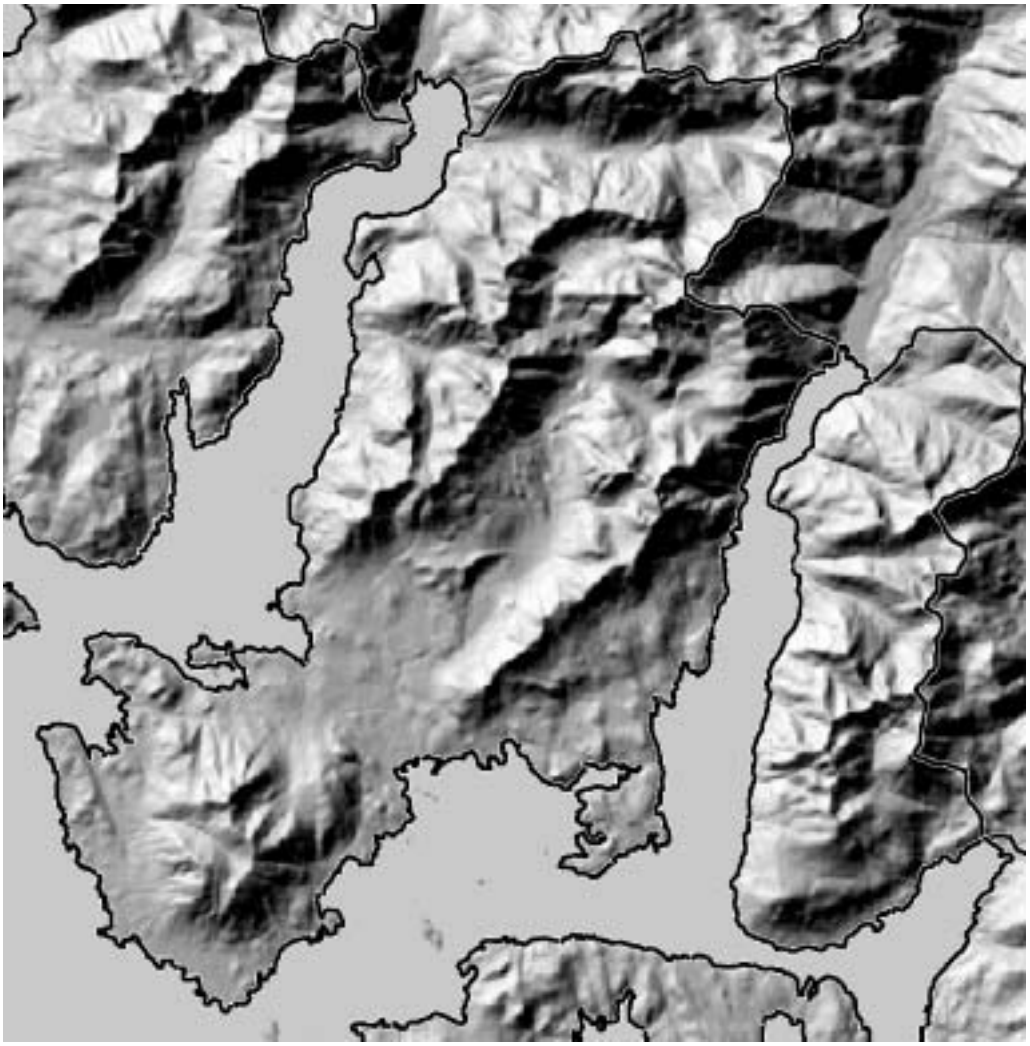
Cypre Watershed Plan



Clayoquot Sound Technical Planning Committee

October, 2003

CYPRE WATERSHED PLAN

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Endorsement Letters

CLAYOQUOT SOUND TECHNICAL PLANNING COMMITTEE
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01 October 2003

File: 17730-60 / CSTPC

Shawn Atleo
Central Region Co-Chair
Nuu-chah-nulth Tribal Council
Post Office Box 1383
5000 Mission Road
Port Alberni, British Columbia
V9Y 7M2

Wally Eamer
Director
Coast Region
Ministry of Sustainable Resource Management
2080 Labieux Road
Nanaimo, British Columbia
V9T 5J8

Dear Shawn Atleo and Wally Eamer:

Re: Official Watershed Plans: Flores Island, Cypre, and Bedingfield Planning Units

Earlier this year, in their letter to the Central Region Board dated May 2, 2003, the Parties endorsed the first three watershed plans subject to the completion of essential modifications or supplements prior to implementation. The Clayoquot Sound Technical Planning Committee has now completed those tasks and either incorporated that information into these plans, or made it available as supporting documentation. The Plans will take effect as 'Official Watershed Plans' on October 15, 2003.

At this time the Planning Committee is finalizing the maps for these first three plans. A limited number of copies of the 'Official Watershed Plans" will be printed and bound and will be made available for distribution by October 15th. Additional copies will be available from the Ministry of Sustainable Resource Management website as well.

Per the direction provided in your May letter, the Planning Committee continues to work on watershed planning for the remaining planning units. We intend to complete the other plans by following a similar format and with similar content as established by the first three plans.

For your information, the Planning Committee recently sought guidance from the Central Region Chiefs with regard to presentation of cultural information in plans where more than one First Nation has identified overlapping culturally-important areas. Where overlap occurs, the Chiefs advised the Planning Committee to show culturally-important areas for both Nations on the plan. This will allow the plan to provide direction regarding consultation, indicating that for areas of overlap it would be necessary to consult with more than one First Nation.

... 2

Thank you for your continuing support to complete watershed-level planning for Clayoquot Sound.

Please contact the undersigned should you wish to discuss further.

Sincerely

Nelson Keitlah
CSTPC Co-chair

Rudi Mayser
CSTPC Co-chair

cc. Anne Atleo and Jim Lornie, Co-Chairs, Central Region Board, Tofino.
Chief and Council, Ahousaht First Nation, Ahousaht.
Cindy Stern, Ministry of Forests, Port Alberni.
Dick Heath, Ministry of Water, Land and Air Protection, Nanaimo.
Don McMillan, International Forest Products Limited, Ucluelet.
Gary Johnsen, Iisaak Forest Resources Limited, Ucluelet.

BRITISH COLUMBIA

Central Region Chiefs Administration
Box 790, Ucluelet, B.C. V0R 3A0

May 2, 2003

Anne Atleo and Jim Lornie, Co-Chairs
Clayoquot Sound Central Region Board
Post Office Box 376
1119 Pacific Rim Highway
Tofino, BC V0R 2Z0

Dear Anne Atleo and Jim Lornie:

Re: Endorsement of Watershed Plans for Flores Island, Cypre, and Bedingfield Planning Units, Clayoquot Sound

On behalf of the Parties to the Clayoquot Sound Interim Measures Extension Agreement (IMEA), and as requested by the Central Region Board (CRB) in its submission to the Parties earlier this year, we are pleased to endorse the first three Clayoquot Sound Watershed Plans covering the Cypre, Bedingfield, and Flores Island Watershed Planning Units. We are also pleased to confirm, within the context of available resources, our continued support for watershed planning in Clayoquot Sound, particularly the timely completion of the remaining watershed plans.

Our general endorsement of these plans as official Clayoquot Sound watershed plans is subject to completion of a number of essential modifications or supplements to the plans, which were identified through the public review process and recommended by the Central Region Board. Among the suggestions and recommendations listed by the CRB, the Parties confirm the following essential tasks to be completed and incorporated in the plans prior to plan implementation:

1. Determination and assignment of rate-of-cut limits to individual watersheds within the planning units in accordance with Science Panel (SP) recommendation 3.1, and as recommended by the CRB (recommendation A.2, part I).
2. Establishment of a clear, yet flexible plan update and amendment process to ensure that the plans stay current and are adapted to reflect significant new knowledge and information as it comes available (SP recommendation 3.19, and CRB recommendation A.10, part I).

3. Guidance, in overview form (e.g. matrix), on conservation of critical wildlife habitat for sensitive species, both at the watershed and site level of planning.
4. Guidance, in overview form, on restoration needs and priorities to recover and rehabilitate areas damaged or degraded by past forestry practices in the Bedingfield and Cypre planning units (CRB letter to the Parties, Dec.18/03, and SP recommendation 3.16).
5. Clarification of how within stand retention, retained as part of variable retention harvesting systems, contributes to the late successional (age classes 8 and 9) retention targets for a watershed planning unit (CRB recommendation A.14, part I).
6. Correction of minor errors, inconsistencies and discrepancies which were uncovered during the course of the public review, and which can be addressed without necessitating major revisions to the reports or the reserve networks.

We have instructed the Clayoquot Sound Technical Planning Committee (TPC) to carry out these tasks and complete the plans by June 15, 2003. The target date for the three plans to take effect as 'Official Watershed Plans' is July 1, 2003.

We would like to acknowledge the considerable effort on part of the CRB in conducting the public review of the draft plans. Furthermore, the CRB's work in organizing and summarizing public comments, and in structuring its recommendations greatly assisted the Parties' own review and evaluation of the plans and the comments received.

We recognize that the public review process and the CRB submission to the Parties identified a large number of suggestions and recommendations relating to the draft watershed plans. However, after careful review of all recommendations, we have concluded that the above-listed modifications are essential prior to implementation of the plans. At the same time, we have asked that the TPC continue to work on addressing the other recommendations provided by the CRB. Our deliberations were guided by the following considerations:

- Many of the public comments suggest that additional or new information should be gathered and incorporated in the plans prior to implementing them. While this may be seen as desirable, it was not judged to be essential at this point prior to implementing the plans. Clayoquot Sound Watershed Plans, once in effect, will be dynamic documents subject to continuous improvements. A plan update and amendment process will be identified and form a part of the plans. New knowledge and improved information will be incorporated through plan updates and amendments.
- Other comments refer to issues and tasks related to plan monitoring and plan implementation. At this time, however, the resources available to the Parties and the TPC will be focused on the expedient finalization of the three plans, as well as preparation of watershed plans for the remainder of the Sound. Once these priority tasks are completed, priorities will be re-evaluated and may shift to tasks associated with plan implementation, including establishment of higher level plan objectives, and plan monitoring.

We would like to thank the CRB, the Central Region First Nations, stakeholders, local governments, interest groups and the public for their contributions to the development of these plans, and for their thoughtful comments.

We are looking forward to a continued close working relationship between the Parties, the Central Region Board, and the Technical Planning Committee. Close cooperation at all levels, and the pooling of resources with all partners who hold a stake in the future and prosperity of Clayoquot Sound, will be instrumental in achieving the goals of sustainable ecosystem management as envisioned by the Scientific Panel.

Sincerely,

Nelson Keitlah
Central Region Co-Chair
Nuu-chah-nulth Tribal Council

Wally Eamer
Director, Coast Region
Ministry of Sustainable Resource Management

Preface

This watershed plan for the Cypre watershed planning unit was prepared by the Clayoquot Sound Technical Planning Committee (TPC). Membership of the TPC consists of representatives from the First Nations of Clayoquot Sound, as well as representatives of the Ministry of Sustainable Resource Management (MSRM) of the province of British Columbia. The TPC is co-chaired by one representative each from First Nations and MSRM (for a complete membership list, please refer to Appendix 2).

In preparing this plan, the TPC followed the pertinent recommendations from the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound for watershed-level planning and identification of reserves. Where the panel's recommendations were lacking in sufficient detail, the TPC sought additional advice from respected experts in their field of expertise.

A draft version of this plan was made available for public review and comment during the summer and fall of 2002. The Clayoquot Sound Central Region Board (CRB) facilitated the public review, collated all comments received, and presented recommendations to the two Parties of the Clayoquot Sound Interim Measures Extension Agreement, i.e. the Nuu-Chah-Nulth Central Region Chiefs and the Province of British Columbia.

In May, 2003, the Parties endorsed the Cypre watershed plan, subject to specific changes that needed to be incorporated to address key public comments, as recommended by the CRB. These changes were made by the TPC and are reflected in this official version of the Cypre watershed plan.

This plan's intent is to guide site-level forest planning and forest harvesting in the Cypre watershed planning unit in accordance with the Science Panel recommendations for sustainable ecosystem management in Clayoquot Sound. The plan is not meant to prejudge the positions that either First Nations or the provincial government may take in treaty negotiations.

The effective date of the plan is October 15, 2003. The plan will be subject to periodic updates and amendments to keep it current and to reflect new information.

Executive Summary

This watershed plan for the Cypre Watershed Planning Unit was developed in accordance with the principles and recommendations set out by the Clayoquot Sound Scientific Panel to guide planning for sustainable ecosystem management in Clayoquot Sound. The Plan encompasses all of the Cypre Watershed Planning Unit, an area approximately 24,500 hectares in size, located to the east of Herbert Inlet, to the south of Strathcona Provincial Park and Ursus Valley, to the north of Calmus Passage, and to the west of the Bulson Creek watershed. It does not apply to provincial parks, Indian Reserves, federal lands, or private land.

The purpose of the Plan is to map and designate the areas set aside as reserves to protect a range of forest values. The Plan also maps and designates the harvestable area – that is, the land that falls outside of reserves and on which sustainable forest harvesting can take place. Within the harvestable area, special management zones are identified which require that certain conditions and limitations be imposed on harvesting and other management activities in order to maintain special and sensitive values, including cultural, scenic, recreation and tourism values.

Development of the Plan

The Scientific Panel identifies three key ecosystem management planning themes: watershed integrity, biological diversity, and human values including First Nations cultural values. The Panel sets out management goals and objectives for each of these three themes. Overall, this framework forms the backdrop to a planning process that includes broad-based regional and sub-regional plans, watershed-level plans, and site-specific plans.

The Scientific Panel identifies watershed-level planning as the cornerstone to the overall ecosystem management planning process. Watershed-level plans give practical meaning to ecosystem management goals and objectives, and also guide the site-level plans that direct forestry activities. Within watershed-level plans, the designation of reserves and special management zones is the key strategy for achieving the ecosystem management objectives articulated by the Scientific Panel. In the harvestable area, the application of the variable retention silviculture system complements ecosystem management at the site level.

This watershed plan for the Cypre Watershed Planning Unit was developed by a Technical Planning Committee (TPC) made up of First Nations representatives and technical staff from the Provincial agencies, led by the Ministry of Sustainable Resource Management. The TPC relied on the report and recommendations of the Scientific Panel as well as expert advice to develop the criteria for establishing reserves and special management zones.

The Cypre Watershed Reserve Network

The Scientific Panel proposed eight different kinds of reserves to protect forest values. Each of these reserve types serves as a strategy to achieve management objectives within one of the key management themes, as described below. Refer to Map 18 for the location of these reserves.

Watershed Integrity

Reserves to protect hydroriparian resources
Approximately 4577 hectares have been designated as hydroriparian reserves for the Cypre Watershed Planning Unit. This represents approximately 18.5 percent of the total land base of the Cypre Watershed Planning Unit.

Reserves to protect sensitive soils and unstable terrain
Unstable terrain reserves (areas of Class V terrain) include approximately 3631 hectares. An additional 1947 hectares of the land base are set aside in sensitive soils reserves. Together, unstable terrain reserves and sensitive soils reserves make up 5578 hectares or 22.5 percent of the total land base of the Cypre Watershed Planning Unit.

Biological Diversity

Reserves to protect red- and blue-listed plant and animal species
Approximately 1907 hectares have been designated as marbled murrelet reserves in the Cypre Watershed Planning Unit. In combination with other reserves and protected areas, approximately 52 percent of all class 1 and 2 marbled murrelet habitat on the Cypre Watershed Planning Unit has been placed in reserves or is located in protected areas. The total amount of protected or reserved class 1 and 2 habitat is about 3913 hectares or 16 percent of the land base of the planning unit.

Approximately 342 hectares or 1.4 percent of the land base of the Cypre Watershed Planning Unit have been designated as reserves for the protection of red- and blue-listed plant communities.

Reserves to protect forest-interior conditions in late successional forest
Currently, approximately 17363 hectares or 77.9 per cent of the forested land base of the Cypre Watershed Planning Unit (22294 hectares) is covered by old growth forests.
The reserve network in the Cypre unit encompasses approximately 8027 hectares of old forest, or 36 percent of the forested land base. Thus, additional old forest (minimum of 891 hectares) will have to be retained within the harvestable areas in order to fully satisfy the Scientific Panel recommendations for old growth retention (i.e. 40 percent of the forested land base).
5175 hectares of the old forest in reserves is in forest-interior condition. This represents 64.5 percent of the old forest in reserves, or 29.8 per cent of the total amount of old forest in the planning unit. The reserve network thus fully meets the old-interior forest recommendations of the Science Panel.

Reserves to represent all ecosystems
In the Cypre planning unit, 15 ecosystem units were found to be underrepresented in the reserve network identified to protect watershed, ecological and human values. A total of 368 hectares of these ecosystem units was added to the reserve network to ensure complete ecosystem representation.

Reserves to ensure linkages among watershed-level planning areas
Once watershed-level plans are completed for a number of adjacent watershed planning units in Clayoquot Sound, opportunities for linkage corridors will be evaluated. Where necessary, reserves that create linkages needed to support biodiversity or recreation objectives will be added to the reserve network.

Human Values

Many of the areas designated to protect culturally significant sites, scenic areas and recreational or tourism values are better characterized as special management zones. Most of these areas are not excluded from harvesting; however, certain conditions and requirements must be met before harvesting may proceed. Only reserve buffers around recreational and tourism features, certain cultural sites and – to the extent they are located within parks or reserves for other values – scenic features are excluded from harvesting.

Reserves to protect cultural values
A total of approximately 7222 hectares or 29.2 percent of the Cypre Watershed Planning Unit has been identified by the Ahousaht First Nations as culturally important areas. Approximately 3119 ha or 44.2 per cent of the culturally significant areas are encompassed within the reserve network. For reasons of confidentiality, the cultural values map included in this report shows only the general locations of the sites of cultural importance.

Reserves to protect scenic and recreation/ tourism values
Reserves have not been established for scenic values, although many areas of high significance for scenic values have been preserved within existing parks and reserves for other values. Scenic values within the harvestable area are maintained through management criteria designed to achieve scenic class objectives and standards.

Approximately 3973 hectares of the Cypre Watershed Planning Unit are assigned to the natural-appearing scenic class objective, 5370 hectares to the minimal alteration, and 5789 hectares to the small-scale alteration class objective. The remaining landscape is not classified because it is largely not visible from communities, recreation sites, and travel corridors. In total, 15132 ha or 61.1 per cent of the planning unit have been assigned scenic class objectives, and 6567 ha or 43.4 per cent of this scenic area is encompassed within parks and reserves.

In addition to the areas that are assigned scenic class objectives and areas within other kinds of reserves, approximately 1623 hectares containing features of high to very high recreation and tourism significance have been reserved, primarily around large lakes. This represents 6.6 percent of the land base of the Cypre Watershed Planning Unit.

Summary

A total of 10715 hectares representing 43.3 percent of the land base of the Cypre Watershed Planning Unit has been reserved.

The Cypre Watershed Planning Unit Harvestable Area

Once all the watershed reserve areas are mapped, the remaining area outside reserves is designated as the harvestable area. Forest harvesting and other resource development such as road-building can take place within the harvestable area as long as this development is consistent with the Scientific Panel recommendations relating to operations, the *Forest Practices Code Act*, and the watershed plan. All forest harvesting activities will take place in accordance with the Variable Retention Silvicultural System which is designed to preserve the characteristics of natural forests.

Within the harvestable area, special management zones have been identified where additional conditions and limitations are imposed on forest harvesting and other operational activities to ensure that the special and sensitive values in these areas - including scenic, recreation, tourism and ecosystem values - are maintained. Map 20 shows the location of the harvestable area, including Special Management Zones, as well as the reserve network.

The harvestable area in Cypre amounts to 13925 ha or 56.2 per cent of the planning unit. Special management zones, including scenic areas, culturally significant areas and recreation/ tourism zones comprise 9679 ha or 69.5 percent of the harvestable area, or 17045 ha and 68.8 per cent of the total land base.

Apart from the conditions and limitations that apply due to special management objectives, forest management in the harvestable areas is also subject to hydrological rate-of-cut limits, in accordance with Scientific Panel recommendation R3.1. The rate-of-cut limits that apply to watersheds on Flores Islands are presented in chapter 4. Map 21 shows the watersheds that are subject to rate-of-cut limits.

Specific harvesting systems will be determined at the site level in accordance with watershed-level objectives. The selection of systems and their application will be consistent with the recommendations set out by the Scientific Panel with respect to harvesting methods and equipment.

Amendments, Implementation and Monitoring

The Plan will be subject to minor updates, as well as major unscheduled and scheduled amendments, as outlined in chapter 5.

Implementation and monitoring of this plan will be the joint responsibility of provincial resource agencies, First Nations, forest tenure holders and partners who share the common goal of sustainable ecosystem management in Clayoquot Sound (see chapter 6).

1.0 Watershed Planning in Clayoquot Sound

1.1 Introduction

Through the late 1980s and early 1990s, Clayoquot Sound was the focus of intense land-use conflicts and resource management debates that drew attention from around the world. In April 1993, the Government of British Columbia announced a land use decision that was intended to resolve this controversy. The decision protected 34 percent of Clayoquot Sound. It also dedicated 45 percent of the area to sustainable resource use, including sustainable forest management, and placed 17 percent under special management. The remainder of the area — including Meares Island, the District of Tofino, and First Nations' reserves — was not part of the decision. See Map 1 for a map of the 1993 Clayoquot Sound Land Use Decision.

Following this land use decision, the Province made a commitment that all forest management activity in Clayoquot Sound would adhere to the strictest standards. As part of this commitment, the government appointed an independent *Scientific Panel for Sustainable Forest Practices in Clayoquot Sound*, which became known simply as the Clayoquot Scientific Panel. The Scientific Panel, which had 19 members including scientists and representatives of the Central Region First Nations, was given a mandate to review the existing forestry standards and to make recommendations for creating sustainable forest practices that would be the best in the world.

The Scientific Panel's report, which contains over 120 recommendations, was published in five volumes in 1995. In the same year the Province adopted all of the Panel's recommendations and assigned a special government team – the Clayoquot Implementation team[1] – to set in motion their implementation.

Sustainable ecosystem management requires not only improved forestry practices, but also long-term planning to protect forest values.

One of the key findings of the Scientific Panel is that sustainable ecosystem management requires not only improved forestry practices on the ground, but also a new approach to planning. This approach establishes an ecosystem-based management framework in which the primary objective is to sustain the productivity and natural diversity of the region. In particular, the Panel advocates the development of long-term watershed-level plans identifying reserves to protect a range of forest values. Many of the Panel's recommendations relate to the scope and content of these watershed plans.

The watershed-level plan is the primary strategy for achieving ecosystem management objectives and goals.

In setting out a new framework for planning, the Scientific Panel first organizes long-term management goals into three broad planning themes: watershed integrity, biological diversity, and human values. For each goal, the Panel goes on to identify a set of management objectives. These objectives include, for example, maintaining soil characteristics, protecting important wildlife habitat, and recognizing First Nations' interests. The establishment of watershed reserves is the Panel's key strategy to accomplish these management objectives. In spatial terms, the watershed-level plan reflects the broader direction that emerges from sub-regional planning, and also provides guidance to more specific site-level plans. In terms of the planning process, the watershed-level plan is a means of securing the forest values at the heart of ecosystem management objectives.

[1] The Clayoquot Implementation Team was made up of three full time members from the Ministry of Forests, one full time member from the Ministry of Environment, Lands and Parks, and one part time member each from the Ministry of Aboriginal Affairs and the Ministry of Small Business, Tourism, and Culture.

This watershed plan designates reserves to protect forest values and identifies where harvesting can take place.

This Watershed Plan for the Cypre watershed planning unit was developed in accordance with the principles and recommendations set out by the Scientific Panel to guide the planning process.[2] The Plan maps and designates the areas that will be set aside as reserves to protect a range of forest values. These reserves are designed to preserve the long-term ecosystem integrity of the Cypre Watershed Planning Unit, to protect First Nations' culturally important areas, and to maintain recreational and scenic values. The Plan also maps and designates the harvestable area – that is, the land that falls outside of reserves and on which sustainable forest harvesting can take place. The Cypre Watershed Plan does not apply to provincial parks, Indian Reserves, federal lands, or private land.

This watershed plan has six parts. Part 1 describes the Clayoquot Sound planning framework and the watershed planning process. Part 2 describes the Flores Island Watershed Planning Unit. Part 3 describes and maps the eight different types of reserves established. Part 4 describes the harvestable areas within the Flores Island Watershed Planning Unit, and the special management considerations that apply to these areas. Part 5 describes how the plan is to be updated and amended. Part 6 explains how the Province and First Nations will implement and monitor the Plan.

1.2 The Planning Framework

1.2.1 Context

As part of its new approach to planning, the Scientific Panel argues that the people most closely affected by resource management decisions should be responsible for making these decisions. In particular, the Panel recommends that the Nuu-chah-nulth First Nations of the region be major participants in planning and decision-making in Clayoquot Sound.

The Province, First Nations, and local organizations and interests collaborated in the development of a planning framework for Clayoquot Sound.

With this in mind, the government's Clayoquot Implementation Team collaborated with the Central Region Board (CRB)[3] to develop a planning framework with input from government officials, First Nations, elected local governments, labour, forest licensees, and environmental groups. After one year of discussions, the Central Region Chiefs and the provincial government ratified the planning framework for Clayoquot Sound in 1997. A copy of the planning framework document is included as Appendix 1. This framework has since evolved as a result of experience gained during the early phases of watershed planning in the Sound.

1.2.2 Participants in the Planning Process

Local people and the provincial government have worked together to develop this watershed plan. Following the ratification of the Clayoquot Sound Planning Framework in 1997, the Province and First Nations established a Clayoquot Sound Planning Committee. This committee was comprised of the twelve-member CRB and one representative each

[2] Sustainable Ecosystem Management in Clayoquot Sound Planning and Practices, Report 5. Clayoquot Sound Scientific Panel: April 1995. Hereafter this document is referenced simply as Report 5.

[3] In 1996, the Nuu-chah-nulth Central Region Chiefs and the provincial government signed the Interim Measures Extension Agreement. The IMEA continued the community-based Clayoquot Sound Central Region Board which was established in March 1994 pursuant to the first Interim Measures Agreement. The CRB is comprised of five members appointed by the Central Region First Nations, and five government-appointed members from local non-aboriginal communities. One of the CRB's responsibilities is to review all land use proposals and to make recommendations to the Province and the Central Region Chiefs on whether to accept, amend or reject these proposals.

from the Ministry of Environment, Lands and Parks; the Ministry of Forests; the Ministry of Small Business, Tourism, and Culture; and the Ministry of Aboriginal Affairs. The mandate of the Planning Committee was to coordinate all planning activities in Clayoquot Sound in accordance with the Scientific Panel recommendations and provincial legislation.

The Planning Committee then identified four priority watersheds – Flores Island, Bedingfield, Tofino/Tranquil and Cypre – and assigned one Watershed Planning Group to lead the development of a plan for each watershed. Each of the Planning Groups was made up of one community representative, one representative of the First Nation whose traditional territory encompassed that watershed, one CRB member, and one provincial official.

This plan was developed by a committee made up of representatives from First Nations and provincial agencies.

The Planning Committee and the Planning Groups met for two years to tackle both sub-regional and watershed level planning tasks in accordance with Scientific Panel recommendations. In 1999, however, in recognition of the need for a more streamlined and cost-effective process, these planning committees were replaced by the Technical Planning Committee (TPC). This committee is made up of First Nations representatives and technical staff from the Provincial agencies responsible for resource management planning,[4] and is focused solely on watershed-level planning.

The plan was subject to public review before it was approved by First Nations and the Province.

The TPC is responsible for preparing all watershed plans in Clayoquot Sound. In keeping with the intent of the Scientific Panel, each plan will be subject to public review before it is approved. The TPC will submit each plan in draft form to the Central Region Board, which in turn will lead a process to solicit public input on the plans. At the end of the public review process, the CRB will forward the draft plans, together with comments and recommendations, to the Central Region Chiefs and the Province for decision.

1.2.3 Planning Levels

The Scientific Panel identifies three levels of planning. The largest planning unit is the sub-regional plan, which establishes broad parameters for large areas consisting of groups of watersheds. The original Clayoquot Sound Planning Committee carried out a number of sub-regional planning tasks, including the identification of 15 watershed planning units and the identification and initiation of essential inventories.

The smallest planning unit is the site-level plan, which sets out prescriptions for one or more discrete units set aside for a specific management activity, such as logging. The development of site-level plans for forest harvesting is the responsibility of forest licensees.

Watershed-level plans are the key long-term planning level.

The critical link between these two planning levels is the watershed-level plan. Watershed-level plans apply to a single watershed or to a group of contiguous watersheds. These plans give meaning to sub-regional plans, and also give direction to site-level plans. The Scientific Panel identified watershed-level plans as the key long-term planning level, noting that "it is within individual watersheds constituting the watershed-level planning unit that the cumulative effects of all land-use activities create stress on ecosystems."[5] Planning efforts to date have therefore been focussed at the watershed level.

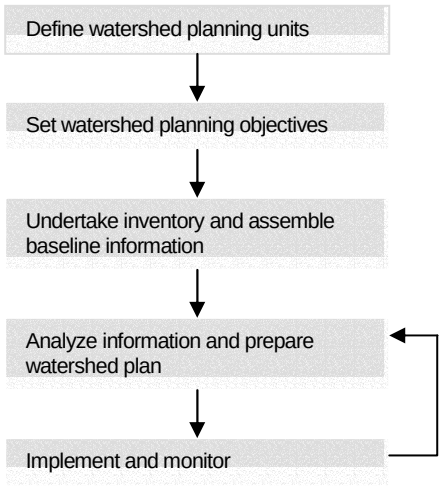
[4] When the Technical Planning Committee was first established the government representatives included staff from the Ministry of Forests and the Ministry of Environment, Lands and Parks. In the spring of 2000 responsibility for resource management planning was transferred to the new Ministry of Sustainable Resource Management. Accordingly, staffs of MSRM now represent the Province on the TPC.

[5] Report 5, p. 166.

1.3 The Watershed Planning Process

The watershed planning process used by the TPC closely mirrors the overall planning process recommended by the Scientific Panel. Figure 1.1 summarizes the watershed planning process. The key steps are described in more detail in the following pages.

Figure 1.1 The Watershed Planning Process[6]



1.3.1 Defining Watershed Planning Units

The watershed-level planning units in Clayoquot Sound were delineated by the Planning Committee. The Committee took into consideration the Scientific Panel's suggestion that watershed-level plans should range in size from 5,000 to 35,000 hectares, and that the appropriate mapping scale for these units is 1:10,000 to 1:20,000. In keeping with the Panel's recommendations, the Committee also adopted physiographic or ecological land units, rather than administrative units, as the basis for planning.

In total, 15 watershed planning units were established by the Planning Committee. Their location is shown on Map 2. This map also shows the location of the Cypre watershed planning unit.

1.3.2 Setting Watershed Planning Objectives

The Scientific Panel sets out a number of watershed planning objectives that apply to all watershed-level plans, including this Cypre watershed plan. According to the Scientific Panel, the overarching objective of watershed planning is "to identify and map reserves and harvestable areas within the watershed planning unit."[7]

The Scientific Panel goes on to list six primary objectives for watershed-level planning:

[6] Adapted from Report 5, p. 157.
[7] Report 5, p. xiv

1 to identify and describe the environmental resources; natural processes; and cultural, scenic and recreational values in the planning unit;

2 to map and designate as "reserves" specific areas within the watershed that:

The watershed-level plan describes the natural and cultural values in the planning unit, establishes reserves to protect forest values, guides resource use within harvestable areas, and sets out a monitoring program.

- contribute significantly to maintaining watershed integrity and habitats of aquatic and terrestrial organisms. These areas include hydroriparian ecosystems; unstable terrain; habitats of threatened, vulnerable, or rare species of plants and animals; and areas of other important forest habitats (e.g., forest-interior habitat and late successional forests) sufficient to ensure continuation of those ecosystems;
- are of special significance for First Nations peoples; and
- have high recreational or scenic significance;

3 to map and designate specific areas (termed "harvestable areas") within the watershed where forest harvesting or other resource uses will not compromise the long-term integrity of the forest ecosystem, its use by First Nations people, or its recreational or high scenic value;

4 to develop, within harvestable areas, management plans that respect the sensitivities of resources to harvesting and other development by:

- checking that rate-of-cut constraints are observed within individual watersheds of the watershed-level planning unit, and determining an appropriate watershed-specific rate for forest harvesting within the harvestable areas;
- projecting an appropriate pattern and distribution of forest roads and cutting units within the harvestable area and other working units, and including, in a general way, proposed retention levels and harvesting methods (details are developed at the site level);
- identifying post-harvesting management and restoration activities;
- developing watershed-level plans for resources other than timber; and
- checking that planning objectives for all resources are being met, and revising plans as necessary

5 to identify species especially sensitive to human disturbance, map their required habitats, and avoid these habitats during construction of roads, trails, and recreation facilities; and

6 to design and implement a monitoring program at the watershed level, and to plan monitoring activities that collect data at the site level.[8]

This watershed plan follows the Panel's recommendations very closely. Its focus is the identification and designation of reserves within the Cypre Watershed Planning Unit. The plan also identifies and designates the harvestable areas in the Cypre watershed, Island, in accordance with objective 3 above.

The watershed plan is not a management plan.

It must be noted, however, that this watershed plan does not represent a management plan as described in objective 4 above. The preparation of management plans setting out anticipated harvest sites and levels is an obligation of the forest companies who hold particular tenures under the ***Forest Act***. Management plans prepared in accordance with

[8] Report 5, p. 167

the requirements of the *Forest Act* and the pertinent license agreements are expected to address the issues identified by the Scientific Panel in objective 4. In addition, the *Forest Practices Code of BC Act, the Forest and Range Practices Act*, and associated regulations require tenure holders to prepare operational plans. These operational plans will also address some of the elements identified in objective 4.

1.3.3 Undertaking Inventories and Assembling Baseline Information

Report 5 of the Scientific Panel identifies information requirements for an ecosystem-based approach to planning in Clayoquot Sound. It also recognizes that adopting this approach may "necessitate the collection of information additional to, or different from, that addressed in the RIC[9] inventory standards or in the Forest Practices Code field guides."[10]

At the time of the Scientific Panel report, many of the existing inventories in Clayoquot Sound were incomplete or out-of-date. In some areas inventory data was lacking altogether. The requirement that planning proceed according to physiographic units (i.e., watershed units) rather than according to the boundaries of forest tenures presented an additional challenge in piecing together existing inventory information, because this information had often been compiled separately for each tenure by various parties, each using different methods of information collection and different standards of information management.

The watershed planning process required that new inventories be developed and that some existing inventories be redesigned.

In 1996 several provincial ministries, in cooperation with International Forest Products and MacMillan Bloedel Ltd, and with input from the CRB and the Central Region First Nations, submitted a multi-year, multi-phase operational inventory proposal to Forest Renewal BC.[11] The proposal encompassed a suite of operational inventories developed with advice from individuals who had been members of the Scientific Panel. Some of the proposed inventories, such as the hydroriparian inventory and the archaeological inventory, were entirely new. In other cases, such as the vegetation inventory and terrain stability mapping, the proposal envisioned updating and redesigning existing inventories in order to tailor them to the task of planning in Clayoquot Sound. Together, these inventories represented the essential baseline information required to undertake watershed planning as outlined in the Scientific Panel report.

FRBC approved the proposal and over the next few years invested over 7 million dollars in the following inventories:

- vegetation resource inventory;
- terrestrial ecosystem inventory;
- wildlife and wildlife habitat mapping;
- recreation inventory;
- fish and fish habitat mapping;
- terrain and terrain stability mapping;
- landslide inventory;
- archaeology inventory;

[9] Resource Inventory Committee, a government committee charged with integrating existing inventories and inventory practices across government agencies.
[10] Report 5, p. 261.
[11] *Operational Inventory and Inventory Framework Projects for Clayoquot Sound*, A proposal to FRBC for Funding, submitted by MOF and MELP in partnership with MSBTC, CRTC, MB, IFP, CRB, and LBMF, January 31, 1996.

- landscape inventory;
- hydroriparian inventory;
- recreation and tourism inventories;
- scenic inventory.

Many of these inventories were typed and/or interpreted using colour aerial photography (September 1996, 1:15,000) and mapped on the Province's existing 1:20,000 terrain resource inventory management map base (TRIM 1983). The photography was flown specifically for this inventory initiative and was used to produce colour orthophoto maps (September 1996). Most of these inventories also have an associated database, and some are accompanied by reports that contain descriptions of the inventory methodology and results as well as conclusions about the findings. Appendix 2 of this document describes in more detail the nature and scope of each inventory.

1.3.4 Analyzing the Information and Preparing the Watershed Plan

Inventory results are used to identify resource conditions and capabilities.

Once inventories have been completed, the results are mapped (where possible) and analyzed to identify sensitive areas and to determine the status and condition of resources, as well as resource sensitivities and capabilities. This analysis uses geographic information system (GIS) technology.

The Scientific Panel sets out recommendations for the management of the various resources within a watershed unit. Once the sensitivity and capability of the resources has been assessed through the GIS analysis, the Panel recommendations relating to these resources are used to guide the designation of *reserve areas*, which are the areas set aside to protect specific resources or values, and *harvestable areas*, which are the areas where forest harvesting can take place.

Establishing reserve areas

Scientific Panel recommendation 7.16 identifies the following eight types of reserves to be established within a watershed planning unit:

- hydroriparian resources;
- sensitive soils and unstable terrain;
- red-and blue-listed species;
- forest-interior conditions in late successional forests;
- cultural values;
- scenic and recreation values;
- representative ecosystems; and
- forest linkages among watershed-level planning areas.[12]

[12] Report 5, p. 169.

Linkages among the different watershed-level planning units will be established in sub-regional plans.

Reserves are first mapped individually and then combined on one map. The reserves required to ensure linkages among watershed level planning units will be identified later at the sub-regional planning level, once watershed plans have been completed for all of Clayoquot Sound.

Identifying the Harvestable Area

Once all the watershed reserve areas are mapped, the remaining area is mapped and designated as the harvestable area.

Once all the watershed reserve areas are mapped, the remaining area outside reserves is mapped and designated as the harvestable area. Forest harvesting and other resource development such as road-building can take place within the harvestable area as long as this development is consistent with the Scientific Panel recommendations relating to operations, relevant forest legislation and the watershed plan. Part 4 of this report provides further information about the harvestable areas in the Cypre Watershed Planning Unit, including the special management considerations specific to the Planning Unit.

1.3.5 Implementing and Monitoring

As noted above, the watershed-level plan is not an operational plan. The watershed-level plan, together with the Scientific Panel recommendations for forest practices and relevant provincial legislation and regulations, will guide the development of operational plans such as forest development/stewardship plans and silviculture prescriptions/ site plans. These plans will be developed and implemented by forest licensees. Part 5 of this report provides more details on the implementation of the Cypre Watershed Plan.

It must be noted that at this point, neither the Scientific Panel recommendations, nor this watershed plan include any legally binding direction or objectives that must be followed in the preparation and implementation of operational plans under the Forest Practices Code or Forest and Range Practices Act and associated regulations. In order to be legally binding, objectives such as the ones presented in this plan will have to be established as 'higher level plan' objectives under the pertinent legislation.

This does not mean, however, that the panel recommendations or objectives in this report are not followed in the implementation of forest practices. Forest licence holders have incorporated the commitment to the Scientific Panel recommendations in their licence documents, and are honouring these voluntary commitments when conducting their management activities within Clayoquot Sound, closely cooperating with the Central Region Board and provincial resource agencies.

The monitoring plan will help the Province and First Nations to evaluate the effectiveness of watershed-level plans.

The Scientific Panel provides comprehensive recommendations for a monitoring program for Clayoquot Sound, including monitoring change over time at the watershed level. Monitoring will help the Province and First Nations to evaluate the effectiveness of watershed plans in securing long-term ecological integrity. Information gathered through monitoring activities will be fed back into the planning process and used to adapt and improve watershed plans and management practices. Part 5 of this report provides more details on the monitoring program.

2.0 The Cypre Watershed Environment

2.1 The Physical Landscape

The Cypre Watershed Planning Unit occupies the area in Clayoquot Sound to the east of Herbert Inlet, to the south of Strathcona Provincial Park and Ursus Valley, to the north of Calmus Passage, and to the west of the Bulson Creek watershed. The Planning Unit is comprised of several individual watersheds including Cotter Creek, Bawden Creek, Peneetle Creek and Cypre River. The Cypre watershed, which drains into Cypress Bay, is the largest in the Planning Unit. The Unit also includes the face drainages on the east side of the Bedwell estuary around to Warn Inlet just west of the mouth of the Buslon River, as well as several small islands including Krann Island, Saranac Island, Rhodes Island, Welcome Island, River Island and Binns Island. The total land area of the Planning Unit is approximately 24,760 ha. Map 2 shows the location of the Cypre Watershed Planning Unit within the Clayoquot Sound Land Use Decision Area.

The climate in the Cypre Watershed Planning Unit – as throughout the west coast of Vancouver Island – is temperate and very wet. Annual precipitation averages approximately 3,000 mm. Mean temperature is 5° C in January and 15° C in July.

The Cypre River and Cotter Creek are the main drainages in the planning unit.

Cypre River, Cotter Creek, and their tributaries are the major drainages within the planning unit. Several smaller steep creeks and gullies drain Herbet Inlet's west facing slope, Bedwell Sound's east and west facing slopes, and the Catface Range.

The most common surficial deposits are till and colluvium. Other surficial geology includes fluvial materials, as well as pockets of glaciofluvial and organic materials.

The topography of the Planning Unit varies from the steep-sided slopes along Bedwell Inlet and the Catface Range to the wide, low-lying floodplain of the Cypre River. Elevation ranges from sea level to 1,500 metres. Some of the highest points within the unit are Mount Abco, Mount Saavedra and Mount Guemes, and the peaks of Mount Cotter and Mount Quimper. Map 3 shows the topographic relief of the planning unit.

2.2 The Ecological Landscape

Most of the Cypre Watershed Planning Unit lies within the Coastal Western Hemlock (CWH) biogeoclimatic zone. The exception is the area above 800 metres, which lies within the Mountain Hemlock (MH) biogeoclimatic zone. The CWH zone is primarily represented by variants CWHvm1 (Submontane Very Wet Hypermaritime) and CWHvm2 (Montane Very Wet Hypermaritime), although the variant CWHvh1 (Southern Very Wet Hypermaritime) is found along the coastline at elevations below 200 m. Ridge tops are characterized by the MH ecosystem type, which here is primarily represented by the variant MHmm1 (Moist Maritime Windward). Small areas of the parkland variant (MHmmp1) occur at elevations above 1200 metres. See Map 4 for details.

Over 100 different ecosystems are represented in the Cypre Watershed Planning Unit.

Three of the most common forested ecosystems in the Planning Unit are Western Hemlock/ Amabilis Fir/ Blueberry (AB), Western Hemlock/ Western Redcedar/ Salal (HS) and Amabilis Fir/ Western Redcedar/ Salmonberry (AS). In all, over 100 different ecosystems are represented within the Cypre Watershed Planning Unit.

Over 90 percent of the Cypre Watershed planning unit is blanketed with forests comprised of western hemlock, amabilis fir, western redcedar, and mountain hemlock of 141 years and older. About one quarter of the forested area has been harvested over the past 40 or more years and this area now supports second growth forests of various ages. Map 5 provides more information on the age distribution of forest stands.

The Cypre River watershed has been extensively disturbed as a result of logging over the past 20 years.

Although only one quarter of the Planning Unit has been harvested, past logging practices have resulted in extensive disturbance to the Cypre River watershed. Approximately 40 percent of the Cypre River watershed has been logged, with most of this activity taking place within the past 20 years. Several FRBC-funded projects have reduced logging-related impacts: through road deactivation and landslide re-vegetation; by employing alternate silvicultural techniques in riparian areas; and, with in-stream fish habitat restoration work. For example, in the last six years, over 50 km of road and several landslides have been rehabilitated in the plan area.

The Cypre Planning Unit contains known habitat for marbled murrelets, a provincially red-listed bird species. Radar inventories were conducted at the mouth of the Cypre River in 1996 and 1997. The maximum number of birds documented at this station was 69, during a dawn survey in 1997. This number was well below the average for the 20 stations monitored in the Sound. Several studies indicate there is a direct correlation between Marbled Murrelet nesting habitat suitability and old growth forests. Also, murrelets entering a watershed at its lowest point tend to remain in that watershed to nest.[13]

Burger's study showed that watersheds with extensive logging of low-elevation forests, such as the Cypre, had fewer murrelets per area, than watersheds with less logging. Although nesting habitat has been reduced, several opportunities remain within this planning unit to provide sufficient nesting areas for maintenance of the present murrelet population. Six Marbled Murrelet nesting reserves have been proposed for the Cypre plan. These reserves are discussed in Section 3.3.1.

Black bears are common in all the Clayoquot Sound planning units. They range from intertidal and estuarine areas at sea level into high-elevation, alpine meadows, utilizing every biogeoclimatic zone, sub-zone and variant in between. Historical bear numbers may have increased in some areas, such as the Cypre planning unit, following forest harvesting - due to the creation of early seral communities which have an abundant supply of fruit-bearing shrubs, grasses and forbs. Throughout this planning unit, there is little moderately-high and high ranking bear habitat during the early spring. By late spring, when most bears have left their dens, the total area ranked as higher value habitat is dramatically increased; and, by summer, a substantial portion of the plan area provides moderately-high, or high value habitat. Conditions continue to improve into the fall. This increasing food supply from forested areas is augmented many times over by the increasing availability of spawning salmonids, thereby allowing bears to readily accumulate fat reserves in preparation for winter denning. Although denning opportunities have been reduced in several areas by earlier logging operations, overall there should be sufficient old growth remaining to provide den sites for the current bear population in this planning unit.

[13] Burger, A. 2002. Radar Inventory and Watershed-level Habitat Associations of Marbled Murrelets In Clayoquot Sound, 1996-1998, in A. Burger and T. Chatwin (2002) Multi-Scale Studies of Populations, Distribution and Habitat Associations of Marbled Murrelets in Clayoquot Sound, British Columbia. BC Ministry of Water, Land and Air Protection, Victoria, B.C.

Black-tailed Deer are found throughout Clayoquot Sound, but are not abundant. Although forest harvesting would have increased spring and summer forage opportunities for deer in the Cypre Planning Unit, it is not known if this led to an increase in numbers. No winter habitat areas are ranked high in this plan area, but large areas offer moderate or moderately-high values, thereby providing sufficient habitat during this critical period.

Most of Clayoquot Sound, including the Cypre plan area, has very infrequent records for Roosevelt Elk. This blue-listed species has been recorded from the Cypre River and Cotter Creek watersheds, which would be expected, as both are adjacent to two planning units with the most frequent records for elk: the Bedwell and Moyeha. Critical, valley-bottom, winter habitat has been lost due to logging; however, extensive areas of moderate, moderately-high and high value habitat remain: more than enough for the present population.

Fish habitat is diverse in the planning unit

Fish habitat in this planning unit is diverse, ranging from high gradient boulder and cobble streams to low gradient gravel-bedded streams. All the larger drainages have been affected by logging and logging-related activity.

Excellent salmonid rearing and over-wintering habitat is provided by the extensive off-channel habitat found throughout the large, low gradient floodplain associated with the lower reaches of the Cypre River and its major tributaries. Although fish habitat in this watershed was degraded by forest harvesting and road construction, the Cypre and several tributaries retain high fisheries values, including long sections of good spawning, rearing and holding habitat. In-stream fish habitat restoration has been ongoing throughout this watershed for six years, culminating in the construction of several off-channel spawning and rearing channels.

Several watersheds rank high for biodiversity values because they support resident fish populations which have been physically isolated, possibly for thousands of years. As a result of this isolation, each separated population can be assumed to be genetically distinct. These include: the upper Cypre River and the mid-section of Cotter Creek, which support Dolly Varden Char; and, Bawden Creek, Peneetle Creek, and an un-named creek, which support resident Cutthroat Trout. Dolly Varden Char and Coastal Cutthroat Trout are both blue-listed species (CDC, 2002).

Another resident species, Rainbow Trout, is found in Cypre River, Bawden Creek, Peneetle Creek, and at least two un-named creeks in this planning unit.

Anadromous species include Chum, Chinook, Coho, Pink and Sockeye Salmon; Steelhead and Cutthroat Trout; and, possibly, Dolly Varden Char (Lewis, 1999). Many small creeks in the plan area provide some spawning and rearing opportunities for anadromous fish in their lowest reaches.

Please refer to Appendix 2 for further information on fish habitat and distribution in the Cypre Planning Unit.

2.3 Human Values

The Cypre Watershed Planning Unit is within the traditional territory of the Ahousaht First Nations. Eight Indian Reserves are located within the planning unit: Quortsowe (I.R. 13)

The Cypre planning unit is part of the traditional territory of the Ahousaht First Nation

is located on the west side of Warn Bay; part of Oinimitis (I.R. 14), on the east side of the Bedwell estuary, is within the unit; Chetarpe (I.R. 17) is located at the entrance of Bedwell Sound to the east; Sutaquis (I.R. 18) is on the southeastern shore of the Catface Range; Wahous (I.R. 19) is located at Cypress Bay and includes the mouth of the Cypre River; Wahous (I.R. 20) is also located at Cypress Bay to the northeast of I.R. 19; Tequa (I.R. 21) is located at Bawden Bay; and Peneetle (I.R. 22) is located at Whitepine Cove, including the mouth of Peneetle Creek. Map 6 shows the locations of the Indian Reserves.

The natural resources of the Cypre unit provide for the traditional economic, cultural and spiritual activities of the Ahousaht people.

Today as in the past, the harvesting of forest and aquatic resources provides for sustenance, ceremonial and societal needs of the Ahousaht, and helps provide an economic base for the community. First Nations' values are discussed more fully in the Panel's Report 3: First Nations' Perspectives Relating to Forest Practices Standards in Clayoquot Sound. In the following passages in Report 5, the Scientific Panel highlights the close connection between Nuu-chah-nulth culture and the natural resources of the region:

> Nuu-Chah-Nulth people view the forest and its resources as gifts of the Creator, to be used with respect and to be maintained by careful stewardship through the legislative power of tribal government found within "hahuulhi." Traditional practices of resource management include harvesting of selected trees and other forest products; highly selective controlled burning to promote production of berries, to provide grazing areas for deer, and to produce firewood; and monitoring and controlled use of all lands and waters and their resources through stewardship of hereditary chiefs.
>
> Within each community, chiefs' territories - rivers and fisheries, hunting and gathering areas, and portions of the ocean - are delimited by boundary markers such as easily recognizable topographic features. While permanent Nuu-Chah-Nulth villages are situated along the coast of Clayoquot Sound, economic and cultural activities (e.g., hunting, fishing, plant gathering, and spiritual practices) occur throughout the region, from the ocean and offshore islands to remote places in the mountains. For example, culturally modified trees, places of spiritual significance (especially caves, streams, pools, waterfalls, and offshore islands) which are often personal to individuals and families, and areas used for traditional activities are scattered widely across the landscape. These places and the area's forests and water resources are essential for Nuu-Chah-Nulth economic, cultural, and spiritual well-being, yet both have been threatened, depleted, or damaged by the activities of non-indigenous peoples.[14]

Several archaeological sites have been recorded within the Cypre planning unit, mainly along the coastline (to date, much of the inland area has not been the subject of archaeological inventories). The majority of these sites are of First Nations origin, including shell middens, fish traps, settlements, canoe runs, historic sites and culturally modified trees. The latter include both aboriginally-logged CMTs, which tend to be clustered near shore where logs could be easily transported and bark-stripped CMTs which are found wherever suitable stands of cedar exist within the Planning Unit. The site of a 1948 Neptune air plane crash has also been designated as a heritage site.

The Planning Unit incorporates a number of important recreational and tourism features. Strathcona Provincial Park, Vancouver Island's largest park, is adjacent to the northern boundary of the Cypre Watershed Planning Unit.[15] The largest undisturbed watershed on Vancouver Island, the Megin watershed, was identified for protection in 1993 as part of the Clayoquot Sound Land Use decision and has been added to Strathcona Park, bringing the total area of the Park to over 250,000 ha. In addition to its excellent camping, hiking,

[14] Report 5, p.38
[15] Strathcona Provincial Park, B.C. Ministry of Environment, Lands and Parks, http://www.env.bc.ca:8000/bcparks/explore/parkpgs/stratrathco.htm

fishing, water activities, cross-country skiing and wildlife viewing opportunities, the Park also supports a number of species of animals including the Vancouver Island Marmot, wolf, and coastal black-tailed deer as well as a varied bird population. Map 6 shows the location of Strathcona Provincial Park in relation to the Cypre Watershed Planning Unit.

The Cypre Watershed Planning Unit contains important marine and land-based recreational and tourism features.

In the early 1990s, completion of the ocean-to-alpine Bedwell Trail by the Friends of Strathcona Park made Strathcona Park accessible by foot from the west coast. The trail begins within the Planning Unit at the mouth of the Bedwell River and follows a public road for six kilometres to the boundary of Strathcona Park where it climbs to several destinations, including the popular Bedwell Lake.

The diverse shoreline of the Unit boasts many features of interest to boaters and recreationists. These include the white sandy beaches, rocky headlands and islets found throughout the coast of the Planning Unit, as well as the tidal flats and pocket beaches at Bawden Bay and the braided estuary of Cypre River. The protected waters of Quait Bay, Bawden Bay, Whitepine Cove and Hecate Bay offer safe anchorage. Rhodes, Saranac, and River Islands also have significant recreation features. Hecate Bay, Calmus passage and the surrounding waters are important areas for viewing marine life, especially grey whales and porpoises. Calmus passage is also an important travel route for recreational boaters and kayakers. The coastline along Whitepine Cove and Bawden point is a very popular sport fishing area.

The inland portion of the Cypre Watershed Planning Unit also has significant recreation features including the highly attractive, broad cirque basin and sub-alpine terrain at the head of the Cypre River which has potential for viewing, nature appreciation, hiking and camping. The lower portion of the Cypre River, with its varied natural features including old growth forests and salmon runs, also has important recreation values. The path of a small stream that drains into Whitepine Cove has been identified as a good site for the development of a nature trail.

Several active informal campsites and points of interest, as well as a handful of private houses and cottages and an air field are found on the shoreline of the Catface Range. Clayoquot Wilderness Resort, a sport-fishing lodge and destination resort, is situated on private land in Quait Bay and offers a range of marine and land-based outdoor activities within the Planning Unit.

Many of the scenic areas of the Cypre Watershed Planning Unit are visible from the waterways and coastal communities of the Sound. These areas include the immediate shoreline, islets and bays, steep landscapes that rise up dramatically from the ocean, and distant mountain peaks. Areas with especially high scenic value include the visible shoreline and unaltered slopes of the Catface range and the steep slopes that flank the head of Bedwell Sound. The landscapes forming the background to Cypress Bay and the slopes above Matlset Narrows, however, have been heavily modified in the past by timber harvesting.

Economic values within the Unit include both forestry and mineral tenures.

A large part of the land area within the Cypre Watershed Planning Unit is within Tree Farm Licence 57, which is held by Iisaak Forest Resources. Iisaak is a joint venture between by the MaMook Development Corporation, which is owned by the Central Region First Nations, and Weyerhaeuser Limited. Much of the remaining area including the eastern slopes of Bedwell Sound, the peninsula and surrounding area of Quait Bay and parts of the Catface Range is within Tree Farm Licence 54 held by International Forest Products Limited. A dry land sort, booming grounds, and a logging camp are located near

Hecate Bay. There are also a barge and dock facilities at Whitepine Cove. Map 6 shows the location of forest tenures.

While the majority of the economic activity in the Planning Unit is forestry-based, the Catface Range also has extremely high mineral potential. A copper deposit known as the Catface is covered by 133 mineral tenures in good standing, most since 1970. A drill-indicated resource of 188 million tonnes of 0.42 per cent copper and 0.0084 per cent molybdenum was estimated for the deposit in 1990.

Between 1960 and 1990, total expenditures on the Catface deposit amounted to nearly $10 million (constant $1990). In 1990, Falconbridge planned to take the claims to mining lease status and undertake a drilling program. Granting of required work permits was delayed by the Clayoquot Land Use dispute and consequently the project was cancelled. Doublestar Resources Ltd. acquired the property in 1999. Refer to chapter 3.5 for information on subsurface resource management legislation and policy in the context of this watershed plan.

3.0 Watershed Reserves in the Cypre Planning Unit

3.1 Introduction

3.1.1 Reserves and Sustainable Ecosystem Management

The key outcome of watershed-level planning is the identification of reserve areas. These are the foundation to the Scientific Panel's framework for sustainable ecosystem management in Clayoquot Sound. Reserves are areas identified to meet objectives at a watershed planning unit level.

The Scientific Panel organized these objectives into three main components or "themes:"

The Scientific Panel identifies three main themes of sustainable ecosystem management: watershed integrity, biological diversity, and human values. The conservation of these themes and their supporting goals is the essence of the watershed plan.

- **watershed integrity**; including
  - water flow, quality and channel stability; and
  - stability and productivity of forest soils;

- **biological diversity**, including
  - viable populations of all indigenous species,
  - late successional forests,
  - representative ecosystems, and
  - linkages amongst watershed-level planning units; and

- **human values**, including
  - First Nations' cultural values,
  - scenic resources, and
  - recreation and tourism values.[16]

The conservation of each of these themes and its supporting goals is essential to achieve sustainable ecosystem management. Each goal can be further broken down into specific conservation objectives that describe in more detail the desired outcomes and end results to be achieved for a given resource or value. The Scientific Panel describes these objectives in its Progress Report 2, as well as in Report 5, particularly in the section on monitoring (Chapter 8 of Report 5).

Together, these themes, goals and objectives define the Scientific Panel's vision. They describe the desired future conditions and outcomes that constitute sustainable ecosystem management in Clayoquot Sound. In turn, the Panel's recommendations represent the strategies that must be undertaken in order to make this vision a reality. The development of watershed-level plans is of central importance in this task.

Figure 3.1 illustrates the panel's conceptual framework for sustainable ecosystem management in Clayoquot Sound. This figure also highlights the role of watershed level reserves within the panel's framework.

[16] Scientific Panel 1994a, and Report 5, p. 151

Figure 3.1 Framework for Implementing Sustainable Ecosystem Management in Clayoquot Sound

THEMES

WATERSHED INTEGRITY	BIOLOGICAL DIVERSITY	HUMAN VALUES

GOALS

Maintain integrity of aquatic ecosystems	**Maintain integrity of forest soils**	**Maintain all naturally-occurring species and genetic variants, such that they are able to persist in the long term, and adapt to their environment within the normal range of variation**	**Maintain cultural values**	**Maintain scenic, recreation and tourism values**

OBJECTIVES

Maintain: - water flow - water quality - channel integrity - natural sedimentation - spawning gravel - large woody debris	Retain soil Maintain erosion within natural limits Maintain soil characteristics	Protect habitats of known importance to species Maintain old growth and forest interior habitats Represent the entire variety of ecosystems within reserves	Recognize First Nation interests and traditional knowledge Engage First Nations in land use planning	Provide a range of experiences and opportunities Integrate use by First Nations and the public

STRATEGIES (watershed–level)

Hydroriparian reserves Rate-of-Cut Limits	Unstable terrain and sensitive soils reserves	Red- and blue-listed species reserves	Interior old growth reserves	Reserves to represent eco-systems	Linkage reserves between water-shed units	Culturally Significant Areas	Scenic class objectives Recreation and tourism reserves

Chapter 3 presents the various reserve types in the context of the framework for sustainable ecosystem management. For each reserve type, the overall theme and goals are identified first, followed by the particular management or conservation objectives. The Scientific Panel's recommendation – the strategy – for designation of the reserve type is presented next. Finally, for each reserve type, the supporting inventory information and the criteria used for mapping and designation are described in detail.

The watershed plan is not an end in itself, but rather a tool to achieve ecosystem management goals.

It is important to note that the watershed plan is not an end in itself. The reserves set out here are tools to help resource managers implement a long-term ecosystem management strategy. Over time, monitoring and evaluation will indicate whether the reserves are indeed contributing to the long-term goals and objectives identified by the Scientific Panel. In some cases it may be necessary to adjust or adapt reserves in order to improve their effectiveness as tools for achieving management goals. Section 6 provides more details about how this watershed plan will be implemented and monitored.

3.1.2 Types of Reserves

As noted above, the Scientific Panel identifies eight kinds of reserves to be established at the watershed level. These reserves follow from the themes and goals identified above:

Watershed Integrity
1 Reserves to protect hydroriparian resources.
2 Reserves to protect sensitive soils and unstable terrain.

Biological Diversity
3 Reserves to protect red- and blue-listed plant and animal species.
4 Reserves to protect forest-interior conditions in late successional forest.
5 Reserves to represent all ecosystems.
6 Reserves to ensure linkages among watershed-level planning areas.

Human Values
7 Reserves to protect cultural values.
8 Reserves to protect scenic and recreation values.

In some cases the Panel provides explicit criteria for the establishment of reserves. In other cases the TPC drew on expert advice.

In some instances, the Panel provides explicit criteria relating to the establishment of reserves. For example, the recommendations dealing with the establishment of hydroriparian reserves (Report 5, Section 7.4) not only set out the specific parts of the system that must be protected, but also specify the reserve widths required. In most instances, however, the Panel does not provide specific criteria. In these cases the planning committees, with advice from technical experts including former Scientific Panel members developed the reserve criteria.

Table 1 provides an overview of the information sources used and criteria applied to identify each reserve type. Appendix 2 describes in more detail the inventories and associated attributes that form the basis for reserve establishment.

Table 3.1: Information Source(s) and Criteria used to Establish Reserves

Reserve Type	Information Source(s)	Reserve Criteria Applied
Hydroriparian	- Hydroriparian Inventory[17]	- Scientific Panel Recommendations relating to Hydroriparian Reserves.[18]
Sensitive Soils and Unstable Terrain	- Terrain and Terrain Stability Mapping[19]Landslide inventory[20]	- 100% protection of Class V Terrain - protection of sensitive soils as listed in section 3.2.2.
Red- and Blue-Listed Species	- Ecosystem Mapping[21] - Conservation Data Center's species list.	- 100% protection of Red-Listed plant communities. - 50% protection of Blue-Listed plant communities.
Forest-Interior Conditions and Late Successional Forests	- Vegetation Resource Inventory	- At least 40% protection of old growth (i.e., age class 8 and 9) of which 20% must be forest-interior conditions.
Representative Ecosystems	- Terrestrial Ecosystem Mapping - Vegetation Resource Inventory[22]	- At least 30% of each site series. - At least 50% of rare site series.[23] - At least 20% of each site series - dominant tree species -group for groupings of 201-400 years and 401 - 600 years larger than 2 hectares in size.
Forest Linkages among watershed planning units	- All inventories	- Logical linkages for wildlife migration, plant and animal connectivity, and recreation and tourism opportunities.
Cultural Values	- Archaeology Inventory[24] - Consultation with First Nations	- 100% protection of archaeology sites. - CMTs and traditional areas are protected as directed by First Nations.
Scenic and Recreational Values	- Scenic Inventory[25] - Recreation and tourism use information[26] - Recreation Inventory, Tourism Inventory & Capability Modelling[27]	- Scenic management classes (i.e., natural-appearing, minimal alterations, small-scale alteration. - Recreation features that have a significance rating of very high and high.

3.2 Reserves to Protect Watershed Integrity

Watershed integrity is one of the three primary themes of sustainable ecosystem management identified by the Scientific Panel. The strategy for achieving this goal involves the designation of reserves to protect the integrity of the hydroriparian system and the integrity of forest soils.

[17] Hydroriparian Inventory, 1:20,000, 1996-1999, Madrone Consultants Ltd.
[18] Report 5, Section 7.4.
[19] Terrain and Terrain Stability Mapping, 1:20,000, 1996-1999, Madrone Consultants Ltd.
[20] Landslide Inventory, 1997, EBA Engineering Consultants Ltd.
[21] Terrestrial Ecosystem Mapping, 1:20,000, 1996-1999, Madrone Consultants Ltd.
[22] Vegetation Resource Inventory 1996-1999, 1:20,000, ARC Alpine Consultants.
[23] Rare site series are described as those present in less than 2 percent of area or 6 or fewer occurrences. Rare site series may or may not include red- and blue-listed plant communities.
[24] Archaeology Inventory, 1;20,000, 1996-1999, Golder Associates Ltd. & Shoreline Archaeological Services.
[25] Scenic Inventory, 1:20,000, various projects, 1993-1999; see Appendix 2.
[26] Various projects relating to recreation and tourism use, 1996-1999; see Appendix 2.
[27] Recreation Inventory, Tourism Inventory and Capability Modelling, 1997-1998, Catherine Berris Associates, Juan de Fuca Environmental Consultants, and Wilcon Wildlife Consulting Ltd.

3.2.1 Hydroriparian Reserves

Hydroriparian zones distribute water through the ecosystem and provide important habitat.

The Scientific Panel recognises the paramount importance of water bodies and their immediate vicinity, describing these zones as the "skeleton and circulation system of the ecological landscape."[28] Hydroriparian ecosystems distribute water through the environment, and also contain the richest and most diverse habitats. These systems are therefore of paramount importance in the protection of watershed integrity.

Hydroriparian Reserves and Sustainable Ecosystem Management

Figure 3.2 shows the role of hydroriparian reserves within the overall framework for sustainable ecosystem management in Clayoquot Sound. The designation of hydroriparian reserves is the panel's key strategy for achieving integrity of aquatic ecosystems.

Figure 3.2 Hydroriparian Reserves and Sustainable Ecosystem Management

THEME

WATERSHED INTEGRITY

GOAL

Maintain integrity of aquatic ecosystems

OBJECTIVES

- Maintain waterflows and critical elements of water quality within the range of natural variability on both seasonal and event bases.
- Maintain the character of the riparian area and the full-length integrity of the stream channel system.
- Minimize deposition of fine sediment and sand in the channel system and - maintain the quantity and quality of spawning gravels.
- Maintain the structural diversity of channels by maintaining the volume, stability, and distribution of large woody debris, and to manage the riparian area to assure a continuing supply of this debris. (Report 5, p. 195)

STRATEGY

Identify reserves that include the drainage system and hydroriparian zone around streams, lakes, wetlands and marine shores to ensure adequate protection for aquatic and riparian ecosystem (Report 5, p. 175).

[28] Report 5, p.32

Criteria and Inventories for Hydroriparian Reserves

Criteria

In recognition of the importance of hydroriparian reserves, the Scientific Panel describes in detail the criteria to be used for their designation.[29] Hydroriparian reserves are designated along the borders of streams, rivers, floodplains, wetlands, lakes and marine shores.

As a general rule, the reserve along a stream or river extends a width of 20 to 50 meters from each side (the exception is ephemeral streams, which carry storm runoff only). This distance is measured in horizontal distance from the highest high water mark (where diverse, mature bank vegetation begins).

In the case of floodplains, the minimum reserve width is 50 metres, while the maximum is the entire contemporary floodplain. [30] Wetland ecosystems are reserved to the edge of the hydroriparian influence.

Lakes have a minimum 30 metre reserve, with an additional 20 metre special management zone where harvesting using retention systems may occur.

Marine shores are similar to lakeshores, but ecological relations between terrestrial and saltwater systems are likely much more complex. Open and protected coasts are treated separately, with low shores adjacent to open waters protected by a 150 metre reserve, while high shores (cliffs, bluffs and steep shores) adjacent to open waters, as well as protected shores receive a 100 metre reserve. Beyond the marine shore classification contained in SP report 5, the Technical Planning Committee recently obtained additional expert advice from Dr. Michael Church regarding the definition of 'open' versus 'protected' waters. Please refer to Appendix II, 'Hydroriparian Inventories', for this additional advice. While this additional advice is not yet reflected in the hydroriparian reserve designations contained in this watershed plan, the TPC will work on revising the marine shore reserves as part of continuous improvement of the watershed plans, and the revised marine shores will be included in a future amended version of this plan. The additional criteria for marine shore classification are presented in Appendix II for use in site level plans. Site level plans will either confirm or revise the marine shore reserves presented in this watershed plan.

Table 3.2 summarizes the hydroriparian classification system and the associated reserve widths.

[29] Report 5 Section 7.4

[30] Contemporary floodplain is defined by the Panel as "valley floor adjacent to stream channel subject to inundation by current hydrological regime." Report 5, p. 274.

Table 3.2 Scientific Panel Recommendations Regarding Hydroriparian Reserves

Streams		Lakes and Wetlands		Marine Shores	
Class	**Width (m)**	**Class**	**Width (m)**	**Class**	**Width (m)**
A1I	Entire Floodplain *	A1i	30 [1]	A1i	150
A1ii	Entire Floodplain *	A1ii	30 [1]	A1ii	150
A1iii	Entire Floodplain *	A1iii	30 [1]	A1iii	150
A2I	50	A1iv	30 [1]	A2i	150
A2ii	50	A2i	30 [1,2]	A2ii	100
A2iii	50	A2ii	30 [1,2]	A2iii	100
B1ai	Entire Floodplain **	A2iii	30 [1,2]	B1i	100
B1aii	Entire Floodplain *	A2iv	30 [1,2]	B1ii	100
B1aiii	Entire Floodplain *	Bi	Hydroriparian Influence [3]	B1iii	100
B1bi	30 ***	Bii	Hydroriparian Influence [3]	B1iv	100
B1bii	50 ***	Biii	Hydroriparian Influence [3]	B2i	100
B1biii	50 ***	Biv	Hydroriparian Influence [3]	B2ii	100
B2ai	50 **	Bv	Hydroriparian Influence [3]	B2iii	100
B2aii	50	Bv1	Hydroriparian Influence[3]	B2iv	100
B2aiii	50			B2v	100
B2bi	30 ***			B2vi	100
B2bii	50 ***				
B2biii	50 ***				
B3ai	20				
B3aii	0 **				
B3b	20 ****				

* Minimum 50m reserve.
** Ephemeral, no general reserve required but may require the evaluation of a professional biologist for any special management prescriptions.
*** Or to the top of slope whichever is greater. An additional 30m “no machinery zone” if the tops of the slope are actively being undercut.
**** If the sides of the slope are stable treat as a B3a.
[1] First 50m or edge of hydroriparian influence is a special management zone. Areas outside of reserve is subject to retention harvesting.
[2] Or to edge of hydroriparian influence whichever is greater.
[3] On sloping edges of wetlands, designate same reserve as for lakes.

Inventories

Cypre River, Cotter Creek, and their tributaries are the major drainages within the planning unit. Several smaller steep creeks and gullies drain Herbert Inlet's west facing slope, Bedwell Sound's east and west facing slopes, and the Catface Range.

The Cypre River runs northeast-southwest through a wide, U-shaped glacial valley. The main stem of the Cypre River is approximately 15 km long. The river varies in width to a maximum of about 100 m at its mouth entering Hecate Bay. Cotter Creek lies within a U-shaped valley that runs east-west. The main stem of Cotter Creek is approximately 6 km long. Over the first two km the valley rises 180 metres above the inlet and then levels out. A small lake intercepts the main stream at this point. Upstream of the lake, alluvial reaches dominate, while non-alluvial reaches dominate the watercourse downstream of the lake.[31]

Table 3.3 identifies the streams inventoried within the Planning Unit by their hydroriparian class.

Table 3.3 Streams inventoried in the Cypre Watershed Planning Unit by Hydroriparian Class

Watershed	Alluvial <8% (A1)	Alluvial >8% (A2)	Non-alluvial <8% (B1)	Non-alluvial 8-20% (B2)	Non-alluvial >20% (B3)
Cypre River	12.9	1.9	14.9	18	52.2
Cotter Creek	5.8	2.9	4.8	14.5	71.9

For a detailed description of the hydroriparian inventory assembled in accordance with the Scientific Panel's classification system, please refer to Appendix 2.

Hydroriparian Reserves in the Cypre Planning Unit

Approximately 18.5 percent of the Cypre planning unit has been designated as hydroriparian reserve.

Approximately 4577 hectares have been designated as hydroriparian reserves for the Cypre watershed. This represents approximately 18.5 percent of the total land base of the Planning Unit. The hydroriparian reserves are shown on Map 7.

3.2.2 Reserves for Sensitive Soils and Unstable Terrain

Only stable terrain and resilient soils will be available for forest harvesting.

To reduce the risk of erosion, the Scientific Panel recommends that "only stable terrain and resilient soils should be available for forest harvesting operations."[32] Watershed plans therefore must include reserves to protect sensitive soils and unstable terrain.

Soil and Terrain Reserves and Sustainable Ecosystem Management

Figure 3.3 locates the role of reserves for sensitive soils and unstable terrain within the overall framework for sustainable ecosystem management in Clayoquot Sound. These reserves are the key strategy for ensuring soil stability, productivity and integrity. In concert with hydroriparian reserves, terrain and soil reserves are the pillars of watershed integrity.

[31] Hydroriparian Inventory Year One Final Report, Clayoquot Sound, March 1998, Madrone Consultants Ltd. For BC Ministry o f Forests. Pg. 26.
[32] Report 5, p.169.

Figure 3.3 Soil/Terrain Reserves and Sustainable Ecosystem Management

THEME

WATERSHED INTEGRITY

GOAL

Maintain integrity of forest soils

OBJECTIVES

- Retain the soil within the ecosystem; that is, manage the land so that modes and rates of erosion are not significantly changed and individual erosion events are within the natural range of variability; (Report 5, p. 193).
- Maintain the physical, chemical (nutritional), and biological characteristics of the soil so that the capability to maintain a wide range of ecosystem states and options for society is not foreclosed or reduced (Report 5, p. 193)

STRATEGIES

- Establish reserves to protect unstable slopes
- Establish reserves to protect sensitive soils (Report 5, p.169)

Criteria and Inventory Results for Unstable Terrain and Sensitive Soils Reserves

Criteria

The single criterion established by the panel for the designation of reserves to protect unstable slopes is that Class V terrain – that is, the terrain most at risk of slides due to forest harvesting – must be reserved.

The TPC relied on the Scientific Panel recommendations and on expert advice in developing criteria for reserves to protect sensitive soils and unstable terrain.

The Scientific Panel does not provide specific criteria for the designation of reserves to protect sensitive soils. The Technical Committee used the Scientific Panel recommendations as a guide, and consulted research specialists in the development of specific criteria. The specialists' report uses terrain mapping and terrestrial ecosystem mapping to identify soil types and ecosystems that require protection at the watershed level. These maps also identify areas of concern, where field assessments will be conducted prior to harvesting in order to determine the extent of slope stability hazards or soil productivity concerns. Part 4 of this document contains more details with respect to the special management considerations relating to sensitive soils (refer to Table 4.2).

Sensitive soils requiring reserves at the watershed level are grouped into six categories: bedrock terrain; shallow organic matter; organic soils; blocky and bouldery colluvial material; active colluvial cones or fans and alluvial fans; and poor growing sites. Another category of sensitive soils identified by the research specialists, i.e. those associated with wetlands is captured in accordance with the hydroriparian classes and inventory (see previous chapter).

Inventory Results

Terrain inventories of the Cypre Watershed Planning Unit divided the unit into two study areas. The Bedwell area is dominated by bedrock, with deep surficial material deposits restricted to the valley bottoms and the wide bedrock benches. Till is a common surficial material and is deposited throughout the area. Colluvial material is also common. Fluvial deposits are found in the valley bottoms, at the mouths of the larger creeks and, occasionally, at the mouths of small creeks. Glaciofluvial, marine, glaciomarine and organic deposits are all found in the area. Common geomorphological processes in this study area include gully erosion, rock fall, debris slumps, rock falls, debris flows and some minor snow avalanches at higher elevations. Gullies are a significant conduit for transporting material down slope. In many places the gully sidewalls are steep (with a slope exceeding 35°) and potentially unstable.[33] In this study area, over half of the terrain is considered to be potentially unstable or unstable and, in turn, close to half of this terrain has a high likelihood of delivering a landslide to a watercourse.[34]

Within the Catface study area, steep rocky slopes with a veneer of colluvium and a mantle of till dominate the northern half. In the southern half, which is not as steep, till is the most common surficial material. Other surficial geology includes fluvial materials, as well as pockets of glaciofluvial and organic materials. There are many gullies showing evidence that rock falls, debris flows and debris slides are common in the area. Avalanches occur within the upper reaches of Cotter Creek and Cypre River. Approximately 12 percent of the Catface study area is unstable as a result of the density of gullies and the steep, dissected slopes.

The southwest- to southeast-facing slopes, which tend to be steeper and are exposed to more storms, are particularly vulnerable to natural slides. Post-logging slides are common on slopes of any aspect throughout this study area.[35] As of September 1996, 194 landslides had been recorded within the Cypre Watershed Planning Unit. Of these, approximately 63 originated within the natural, undisturbed forest and the remainder were initiated either within a cut block or at a road. The recorded natural landslides have an average slide area of 1.6 ha, while the others have an average slide area of 1.1 ha.

Table 3.4 shows the percentage of polygons that fall within potentially unstable categories for both cut blocks and roads within the Bedwell and Catface study areas of the Planning Unit.

[33] Year One Terrain Inventory Clayoquot Sound, August 1997, Madrone Consultants Ltd. for BC Ministry of Forests. Section 1, p. 13.
[34] Madrone Consultants, p. 15.
[35] Madrone Consultants, p. 20.

Table 3.4 Percent Distribution of Potentially Unstable Terrain Classes within the Cypre Watershed Planning Unit

Application	Classification	Percent of Polygons Bedwell Study Area	Percent of Polygons Catface Study Area
Cutblocks	III*c	3%	1%
	IVc	6%	16%
	Vc	0	12%
Roads	IVr	24%	22%
	Vr	15%	33%

For a detailed description of the terrain and associated inventories, please refer to Appendix 3.

Sensitive Soils and Unstable Terrain Reserves for the Cypre Planning Unit

Reserves for unstable terrain and sensitive soils represent about 22.5 percent of the Cypre River Planning Unit.

Unstable terrain reserves (areas of Class V terrain) include approximately 3631 hectares. An additional 1947 hectares of the land base are set aside in sensitive soils reserves. Together, unstable terrain reserves and sensitive soils reserves make up 5578 hectares or 22.5 percent of the total land base of the Planning Unit. The locations of these reserves are shown on Maps 8 and 9.

3.3 Reserves to Protect Biological Diversity

The Scientific Panel defines biological diversity as "the diversity of plants, animals, and other living organisms in all their forms and levels of organization, including genes, species, ecosystems, and the evolutionary and functional processes that link them."[36] This definition includes both the diversity of species and the diversity and function of the ecosystems and habitats that they depend on. The panel acknowledges that "maintenance of biological diversity is inextricably related to the long-term maintenance of healthy, productive ecosystems." [37]The panel recognized this relation in its goals for maintaining biological diversity:

- Maintain all naturally-occurring species and genetic variants, such that they are able to persist in the long term, and adapt to their environment within the normal range of variation.

- Maintain the functional integrity of ecosystems recognizing the connections between terrestrial, freshwater, and marine processes.

The first goal focuses on the individual species and biota, while the second is aimed at ecosystem function and integrity. The achievement of the second goal very much depends upon attaining the objectives for watershed integrity as described in the previous chapter.

[36] Report 5, p.272
[37] Report 5, p.200

By contrast, this chapter focuses on the objectives and strategies outlined by the panel to achieve the first goal of biological diversity, i.e. maintenance of all naturally-occurring species and genetic variants.

The Panel's Report 5 identifies four types of reserves that together form the panel's strategy to protect key elements of biological diversity within or between watershed planning units:

- Reserves to protect red- and blue-listed plant and animal species;
- Reserves to protect forest-interior condition in late successional forest;
- Reserves to represent all ecosystems;
- Reserves to ensure linkages among watershed-level planning areas.

3.3.1 Reserves to Protect Red- and Blue-listed Plant and Animal Species

The protection of rare species is a key strategy for maintaining biological diversity.

A key strategy for maintaining biological diversity is the protection of rare or threatened species. In British Columbia the Ministry of Water, Land and Air Protection (WLAP) and the BC Conservation Data Centre (CDC) rank the relative rarity of plants, animals, and plant communities. The two agencies, however, use different ranking systems. WLAP uses a colour system to designate rarity. "Red-listed" species are the rarest in British Columbia and include endangered or threatened indigenous species or subspecies. The next category of species are those identified as "blue-listed," which means they are vulnerable to human activity or natural events. "Yellow-listed" species are indigenous species and subspecies that are vulnerable during times of seasonal concentration.

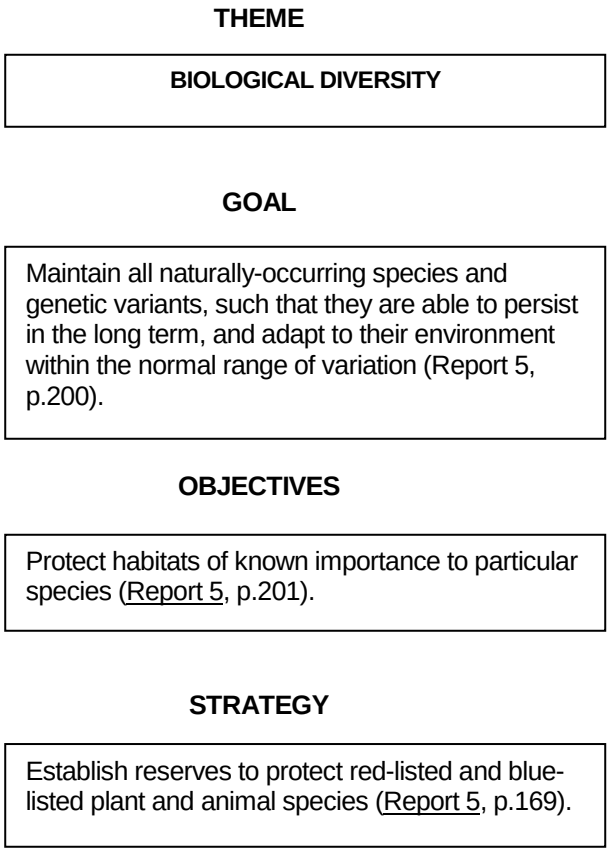
CDC, in contrast, uses a system developed over the past 25 years by the US-based Nature Conservancy. This two-tiered ranking system is used in six Canadian provinces, all U.S. states and a number of Latin American countries. Global rarity – the highest ranking – is designated with a G, while provincial or sub-national rarity is denoted with an S. The latter category includes a number of rankings, including S1 (critically imperilled), S2 (imperilled) and S3 (vulnerable).

Using the WLAP system of designation, the Scientific Panel recommends that reserves be established at the watershed level to protect red-listed and blue-listed plant and animal species. At the same time, the Panel notes that some species will require additional protection measures at the site level, and that planning for species protection may also occur at the sub-regional level.

Red / Blue Reserves and Sustainable Ecosystem Management

Figure 3.4 shows the role of reserves to protect red-and blue-listed plant and animal species within the overall framework for sustainable ecosystem management in Clayoquot Sound.

Figure 3.4 Red / Blue Reserves and Sustainable Ecosystem Management



Criteria and Inventory Results for Reserves to Protect Red- and Blue-listed Plants and Animals

Plant Species

The TPC mapped and reserved entire red-listed plant communities at the watershed level.

Locating and mapping individual red- and blue-listed plants in an area as large as Clayoquot Sound is difficult and expensive. For this reason, the Technical Planning Committee chose instead to identify, map, and reserve entire red-listed and blue-listed plant communities or site series at the watershed level.

The extent to which the plant communities of Clayoquot Sound are rare on a global scale is unclear.

At a provincial level, rare plant communities are tracked by the British Columbia Conservation Data Centre using the CDC ranking system described above. The CDC ranks the relative rarity of plant communities and prepares tracking lists of rare natural plant communities for each forest district. The extent to which the plant communities in Clayoquot Sound are rare on a global scale is unclear because, while individual plant and animal species are tracked globally, plant communities are not. In addition to its provincial rarity rank, the CDC also lists the corresponding WLAP colour code (i.e. red or blue), the site series unit and structural stage for each plant community.

Since site series mapping is available in Clayoquot Sound as a result of terrestrial ecosystem mapping, rare plant communities and site series can be correlated for the purpose of identifying red/ blue reserves. A site series is the sum of all sites within the

watershed that are capable of producing the same mature plant association. The individual sites within a site series have similar conditions including similar elevation, exposure to sun or winds, soil composition and drainage. A particular plant association can be correlated to a site series by comparing it with the vegetation found on that series, and by specifying the structural stage(s) which correspond to the potential climax of the site series. More than one site series may be correlated to any one rare plant association. [38]

Table 3.5 shows the red- and blue-listed plant communities found in Clayoquot Sound, along with their corresponding provincial CDC rarity ranking and their associated ecosystem unit(s) and structural stages. The red- and blue-listed plant communities found in the Cypre planning unit are shown in grey shading.
The table also includes, for information, one yellow-listed mountain hemlock community, which in Clayoquot Sound is not at risk.

[38] Samantha Flynn, Procedures for Creating Rare Ecosystem Reserves in Clayoquot Sound, March 1999.

Table 3.5 Red- and Blue-Listed Plant Communities, Clayoquot Sound (August 2002)

Rare Plant Communities	Rank	Associated ecosystem units in Clayoquot Sound		
		BEC unit	Site Series	
			Number	Symbol
Red-Listed				
Picea sitchensis / Maianthemum dilatatum	*S2*	*CWHvh1*	*08*	*SL*
Picea sitchensis / Rubus spectabilis	*S2*	*CWHvm1*	*09*	*SS*
[Anaphalis margaritacea – Aster foliaceous	S2	MHmm1	00	n/a]
[Carex macrocephala	S1S2	CWHvh1	00	n/a]
[Phlox diffusa - Selaginella wallacei	S2	MHmm1	00	n/a]
[Picea sitchensis / Trisetum canescens	S2	CWHvh1	09	ST]
Blue-Listed				
Abies amabilis - Picea sitchensis / Oplopanax horridus	*S3*	*CWHvm1*	*08*	*AD*
Abies amabilis - Picea sitchensis / Oplopanax horridus	*S3*	*CWHvm2*	*08*	*AD*
Alnus rubra / Maianthemum dilatatum	*S3*	*CWHvh1*	*10*	*AL*
Picea sitchensis / Kindbergia oregana	*S3*	*CWHvh1*	*15*	*SK*
Picea sitchensis / Polystichum munitum	*S3*	*CWHvh1*	*17*	*SW*
Populus balsamifera ssp. Trichocarpa / Cornus stolonifera	*S3*	*CWHvm1*	*10*	*CD*
Thuja plicata – Chamaecyparis nootkaensis / Lysichiton americanum	*S3*	*CWHvm2*	*11*	*RC*
Thuja plicata - Picea sitchensis / Oplopanax horridus	*S3*	*CWHvh1*	*07*	*SD*
Thuja plicata - Picea sitchensis / Polystichum munitum	*S2S3*	*CWHvh1*	*05*	*RF*
Thuja plicata - Tsuga heterophylla / Polystichum munitum	*S3?*	*CWHvm1*	*04*	*RS*
Thuja plicata - Tsuga heterophylla / Polystichum munitum	*S3?*	*CWHvm2*	*04*	*RS*
Thuja plicata / Picea sitchensis - Lysichitum americanum	*S3*	*CWHvh1*	*13*	*RC*
Thuja plicata / Picea sitchensis - Lysichitum americanum	*S3*	*CWHvm1*	*14*	*RC*
Tsuga heterophylla – Picea sitchensis / rhytidiadelphus loreus	*S3*	*CWHvh1*	*04*	*HM*
[Picea sitchensis / Calamagrostis nutkaensis	S3	CWHvh1	16	SR]
[Picea sitchensis / Carex obnupta	S3	CWHvh1	18	SE]
[Picea sitchensis / Malus fusca	S3	CWHvh1	19	00 or 32]
Yellow-Listed				
Tsuga mertensiana – Abies amabilis / Vaccinium alaskaense	*S3S4*	*MHmm1*	*01*	*MB*

Source: BC Conservation Data Centre, August 2002
Note: Communities found in the Cypre Watershed Planning Unit are shown in grey shading.
Notes on ranking system:
S1 = Critically Imperiled in the nation or province because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the province. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).
S2 = Imperiled because of rarity (typically 6-20 extant occurrences or few remaining individuals) or because of some factor(s) making it vulnerable to extirpation or extinction.
S2S3 =Is used to indicate uncertainty about the exact status of a taxon. May fall within S2 or S3 rankings.
S3 = Vulnerable provincial either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction.
S4 = Apparently Secure—Uncommon but not rare, and usually widespread in the nation or province. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.
[ ]: Denotes communities which are not classified as distinct ecosystem units in the TEM data base which supports sub-regional and watershed level planning; these communities may, however, be encountered at the site level of planning.

To establish reserves for red- and blue-listed plant associations, the Technical Planning Committee used an approach similar to that used to establish reserves for representative ecosystems (see Section 3.3.3). The TPC relied on expert advice together with the Scientific Panel recommendations in adopting the following three-step process:

The TPC adopted a three-step process for designating reserves to protect rare site series.

1 Review rarity rankings of each rare site series.

2 Determine gaps in protection for each rare site series.

3 Select rare ecosystem polygons to achieve adequate protection for each rare ecosystem.

The committee also adopted the following criteria to determine the appropriate levels of protection for rare plant associations:

100 percent of all red-listed site series are represented in reserves.

- 100 percent of all red-listed site series should be represented in reserves.
- 50 percent of all blue-listed site series should be represented in reserves.

Additional reserves were added to meet the target of representing 50 percent of all blue-listed site series.

When these criteria were not met within the reserves established for other values, additional reserves were added to the reserve network. All red-listed site series that make up at least 30 percent of a polygon have been reserved. Where existing reserves captured less than 50 percent representation of blue-listed site series, additional locations were added to the reserve network to meet the 50 percent target[39]. The following criteria were used to help the Technical Planning Committee select among candidate areas to be added to the reserve network:

- undisturbed by human activity, when possible;
- age class 8 (141 to 250 years) and 9 (251 years and older);
- relatively large size;
- connectivity to other reserves;
- surrounding other polygons in reserves (to minimize edge effects);
- variety in topographic position; and,
- variety in distribution.

When complex polygons were selected, only the area of the rare ecosystem component was used to calculate the total area of its representation.

Care was taken to ensure that when complex polygons – that is, polygons containing more than one ecosystem component – were selected, only the area of the rare ecosystem component was used in calculating the total area of its representation in reserves.

Individual rare plants will be reserved at the site level when they are discovered.

[39] Where the shortfall was less than 2 hectares, no additional polygons were added at the watershed level. Site-level planning may identify additional locations to be added to the reserve network.

Animal Species

As noted in Section 2.2 of this document, the Cypre Watershed Planning unit contains known habitat for the marbled murrelet, a provincially red-listed species of bird. Murrelet counts recorded at the mouth of the Cypre River are well below average compared to the other radar stations in Clayoquot Sound[40]. The identification of reserves to protect these birds is aided by a habitat suitability model developed in 2001. This model uses the 1:20,000 Vegetation Resource Inventory map to classify the land base into polygons, each of which is assessed for nesting potential based on its vegetation characteristics. The assessment takes into account the following attributes (in descending order of importance):

A number of characteristics contribute to suitable murrelet nesting habitat.

- height of leading or second leading tree species;
- age of the leading or second leading tree species;
- basal area;
- vertical complexity of the forest canopy;
- canopy closure;
- average distance of the polygon from the ocean; and
- average elevation of the polygon.

Based on the above criteria, four classes of potential nesting habitat were identified: important excellent (class 1), important good (class 2), sub-optimal (class 3) and not suitable (class 4). A habitat suitability map was prepared based on these habitat classes, and potential reserves were identified. This map of potential reserves was then examined with reference to a number of additional factors, including the extent of overlap between these reserves and the reserves designated to protect other forest values (soils and terrain, hydroriparian etc), the size of each reserve area (a minimum size of 200 ha is recommended to reduce rates of predation), the availability of nesting platforms, the level of habitat fragmentation, the overall distribution of reserves, the percentage of class 1 habitat included in reserves, and the presence of suitable tree species for murrelet nesting and habitat.[41]

Specific reserves have not been set aside for elk, black bear or black-tailed deer. Suitable habitat for these species is represented in other reserves and protected areas.

Other animal species that are vulnerable or of particular management concern in Clayoquot Sound include Roosevelt elk, a blue-listed species, as well as black bear and black tailed deer. Suitable habitat for these species is represented in other reserves and protected areas within the Cypre planning unit, and therefore specific reserves for these species have not been identified as part of this watershed plan. Please also refer to "*Clayoquot Sound Watershed Level Planning – Wildlife Habitat Overview"* (Clayoquot Sound Technical Planning Committee, August 2003).

[40] See BC Ministry of Water, Land and Air Protection, March 2002, page 46.
[41] See Chatwin, 2002 for further detail on these criteria.

Red- and Blue-listed Plant and Animal Reserves for Cypre Planning Unit

Plant Species

Among the plant communities occurring in the Cypre planning unit, two are red-listed. The common names of these two communities are Sitka spruce/ false lily-of-the-valley Very Wet Hypermaritime 1, and Sitka spruce/ salmonberry Very Wet Maritime. The total area of each community, irrespective of structural stage, in the planning unit is 105.9 and 60.3 hectares, respectively. All of the old and most of the younger seral stage occurrences of these two communities have been protected as part of the reserve network (80.8 and 55.2 ha, respectively).

Table 3.6 includes the blue-listed plant communities found in the Cypre, their total area in the planning unit and the area and percentage in reserves.

Table 3.6 Blue- listed Plant Communities in Reserves

Plant Community	Total Area in Planning Unit (ha)	Area in Reserves (ha)	% Reserved
Blue-Listed			
CWHvh1/RC	5.3	1.8	34.0
CWHvh1/RF	10.3	4.2	41.2
CWHvh1/SD	300.0	148.6	49.5
CWHvh1/SK	47.4	40.7	85.9
CWHvm1/RC	7.2	4.2	58.7
CWHvm1/RS	2.0	.4	22.3
CWHvm2/RC	7.5	6.5	86.9
Total Blue-Listed	***379.7***	***206.4***	***54.4***

All of the red-listed and 54.4 per cent of blue-listed plant communities have been reserved.

In total, 206.4 hectares or 54.4 per cent of the total area covered by blue-listed plant communities is encompassed within parks and reserves.

Taken together, approximately 342 hectares or 1.4 percent of the land base of the Cypre planning unit have been identified as reserves for the protection of red- and blue-listed plant communities. The locations of the red- and blue-listed plant communities within reserves and protected areas are shown on Map 10.

Animal Species

52 percent of all Class 1 and 2 marbled murrelet habitat has been reserved.

In the Cypre planning unit, six marbled murrelet reserves have been identified, totalling 1907 hectares or 7.7 per cent of the planning unit. The location of these reserves is shown on Map 11. These reserves encompass 25 per cent of the important marbled murrelet habitat in the planning unit. Additional important habitat is included in reserves for other purposes and in protected areas. In total, approximately 3916 ha or 52 per cent of all class 1 and 2 marbled murrelet habitat has been protected in marbled murrelet reserves, other reserves and protected areas.

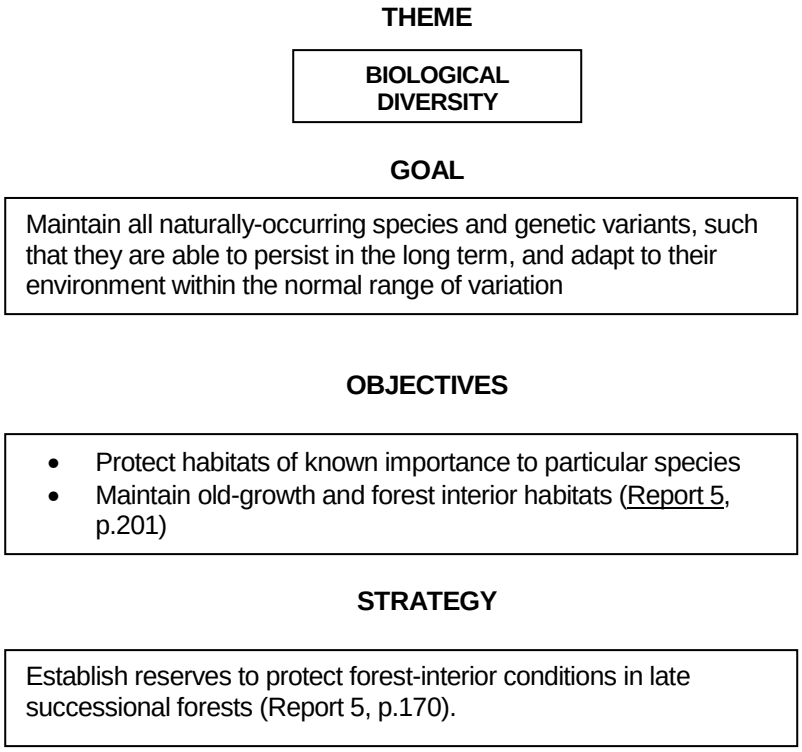
3.3.2 Reserves to Protect Forest-interior Conditions in Late-successional Forests

Late successional forests, or "old growth" forests, have unique characteristics that make them ideally suited to some species of plants and animals. The Scientific Panel recognizes the importance of maintaining some sections of older forests, and of ensuring that these sections of forest are large enough to maintain conditions similar to those in the interior of historic forests. A patch that is too small will suffer "edge effects" from the different habitat conditions (such as changes in humidity, and increased exposure to light or wind) created at or near the boundary between open areas and adjacent forests. Edge effects can also include a higher risk of blow-down as well as increased predation.

Forest-interior Reserves and Sustainable Resource Management

Figure 3.5 shows the role of reserves to protect forest-interior conditions within the overall framework for sustainable ecosystem management in Clayoquot Sound.

Figure 3.5 Forest-Interior Reserves and Sustainable Ecosystem Management



Criteria and Inventories for Reserves to Protect Forest-interior Conditions

The Scientific Panel considers late-successional forests to constitute those in age class 8 (141 to 250 years) and age class 9 (251 years and older). The Panel recommends that at least 40 percent of the forest in a watershed-level planning unit be in age classes 8 and 9.

The Panel further states that this 40% can be comprised of both reserve areas and areas of late successional forest retained in harvestable areas[42].

Apart from this requirement to retain at least 40% of the forest in a watershed-level planning unit in old growth condition, the Panel goes on to recommend that reserves be established to protect forest-interior conditions in late successional forests. The Panel recommends that at least 20 percent of the old forest retained at the planning unit level constitute forest-interior conditions.

The extent of edge effect varies with the nature of the edge.

The Scientific Panel proposed as a guideline that reserves to protect forest-interior conditions be a minimum of 300 meters wide, in order to guard against edge effects. This implies that edge effects extend 150 meters into the forest. Further research, however, indicates that the extent of the edge effect varies with the nature of the edge. That is, an edge between a forest and a clearcut produces different effects from the edge between a forest and a wetland, or forest and a site of selective logging. The Technical Planning Committee therefore used the Panel recommendations along with expert advice to set out the following criteria for the designation of reserves to conserve forest-interior conditions in late successional forest reserves:

- a minimum of 40 percent of the forested area within a watershed planning unit must be reserved and/or retained within harvestable areas in old growth condition (age class 8 and 9) at all times;

- a minimum of 20 percent of the reserved/retained old growth within a watershed unit must be in forest-interior conditions and reserved;

- The minimum depth of edge measurement is calculated in accordance with Table 3.7.

[42] Report 5, p. 171. Consistent with provincial policy on wildlife tree retention and old growth management areas, and pending further expert advice, the TPC will count patches of late successional forest retained within harvestable areas as contributing to the 40% old growth requirement, provided they are greater than two hectares in size.

Table 3.7 Depth of Edge Effect to Determine Interior Forest Conditions in Coastal British Columbia[43]

Type of edge: Forest to ...	Description	Depth of Edge (m)
clearcut	30yrs , South or West Aspect	150
	30yrs , North or East Aspect	100
	30 - 60 yrs, South or West Aspect	100
	30 - 60 yrs, North or East Aspect	75
	60yrs	0
partial harvest	70% retention	0
	30 - 70% retention	linear scale from 150 – 0
	30% retention	150
roads	mainline	100
	non-mainline	50
wetlands	1 - 5ha with high contrast edges (less than 15% crown closure)	75
	1 - 5ha with low contrast edges (more than 15% crown closure)	25
	less than 1ha	0
streams	3m and B3 Creeks	0
	3 - 30m	25
	30m	50

Currently, approximately 17363 hectares or 77.9 per cent of the forested land base (22294 ha) of the Cypre planning unit is covered by old growth forests over 141 years old. 11957 hectares or 68.9 per cent of the old growth forest in Cypre is currently in forest-interior condition. The amount of old growth forest, and the amount of old interior forest are currently well above the minimum amount recommended by the Scientific Panel. Please refer to Map 12 showing the current locations of old growth and interior old growth forests in the Cypre planning unit.

Reserves for Forest-Interior Conditions in Late Successional Forests in the Cypre Planning Unit

Old forest in the reserve network amounts to 36 per cent of the total forested land base.

The Scientific Panel recommends that a minimum of 40 per cent of the forested land base of the watershed planning unit should be maintained in old growth condition (either as part of reserves or retained within the harvestable area) at any given time. The reserve network in the Cypre unit encompasses approximately 8027 hectares of old forest, or 36 percent of the forested land base. Thus, additional old forest (minimum of 891 hectares) will have to be retained within the harvestable areas in order to fully satisfy the Scientific Panel recommendations for old growth retention (i.e. 40 percent of the forested land base).

Recommendation 7.16 of the Scientific Panel Report 5 states that a minimum of 20 per cent of the retained old forest should be reserved in forest-interior condition. 5175

[43] These measurements are drawn from A Review of Edge Effects: Theory, Evidence, and Recommendations for Managers by Laurie Kremsater, March 1997. Stream descriptions have been revised to ensure consistency with the stream widths used in the hydroriparian classification system.

Approximately 64.5 percent of the old forest in reserves is in forest-interior condition.

hectares of the old forest in reserves is in forest-interior condition. This represents 64.5 percent of the old forest in reserves, or 29.8 per cent of the total amount of old forest in the planning unit. The reserve network thus fully meets the old-interior forest recommendations of the Science Panel. Map 13 shows the location of these reserves in the Cypre planning unit.

3.3.3 Reserves to Represent all Ecosystems

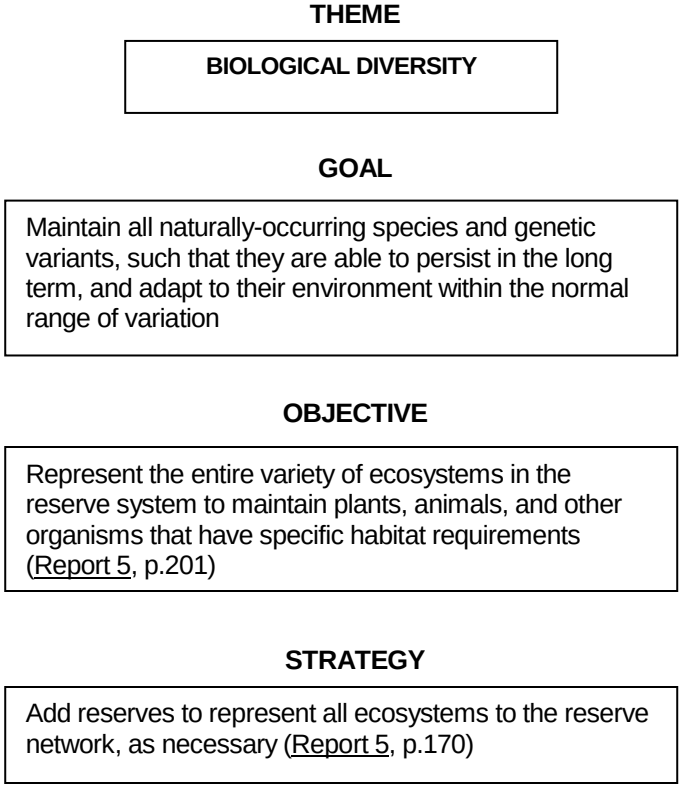
The Panel recommends that reserves to represent all ecosystems be added to the reserve network "as necessary, to ensure that the entire variety of ecosystems is represented in the reserve system to maintain plants, animals, and other organisms that have specific habitat requirements."[44] Representation of all ecosystems is an essential component of biological diversity.

Representative Ecosystem Reserves and Sustainable Ecosystem Management

Figure 3.6 shows the role of reserves to represent all ecosystems within the overall framework for sustainable ecosystem management in Clayoquot Sound.

[44] Report 5, p. 171.

Figure 3.6 Representative Ecosystem Reserves and Sustainable Ecosystem Management



Criteria and Inventories for Representative Ecosystem Reserves

Criteria

The Panel provides some guidance on how to designate reserves to ensure the representation of all ecosystems: it suggests that biogeoclimatic site series be used as a surrogate for ecosystems, and that rare ecosystems be reserved in greater proportion than their representation. However, the Panel does not define the term "rare ecosystem," nor does it indicate the area of each ecosystem that should be set aside to ensure adequate representation. The TPC therefore asked a team of ecosystem specialists to help develop guidelines for establishing ecosystem representation reserves consistent with the Panel's general recommendations. Based on this advice the committee adopted a six-step approach to setting these reserves for ecosystems:

The TPC adopted a six-step process to identify reserves to protect representative ecosystems.

1 Map reserves for all other values.

2 Overlay existing reserved areas on the terrestrial ecosystem mapping and generate a database collating information about the ecosystem unit, site series, total area, proportion of site series in variant, number of occurrences of site series in variant, and total area of the reserve.

3 Produce a GIS map layer of age class and leading species information from the Vegetation Resource Inventory and overlay it onto the terrestrial ecosystem and reserve area overlay created in step 2. Generate a database collating information about the ecosystem unit, leading species, age class, and polygon area.

4 Evaluate summary tables to see if targets for ecosystem representation have been met. The recommended targets are described below.

5 Highlight candidate ecosystem unit polygons outside the other reserve areas that contain a site series, or site series/ dominant tree species/ age class grouping, that is under-represented in the reserve areas.

6 Add new reserves to ensure representation targets are met. New reserves are only added for those site series where the shortfall below the representation target amounts to at least two hectares. Reserve selection will also be guided by watershed-level planning objectives such as providing linkages among watersheds and forest-interior conditions in late successional forests.

The Technical Planning Committee also adopted the following criteria for ecosystem representation:

- At least 30 percent of each site series should be represented in reserves.
- At least 50 percent of rare site series should be represented in reserves. Rare site series are defined as site series that make up less than 2 percent of the area of the watershed, or that appear 6 or fewer times in the watershed inventories. Rare site series may or may not include red-and blue-listed plant communities.
- At least 20 percent of each site series/ dominant tree species/ age class grouping for groupings of 201-400 years and 401 - 600 years should be represented in reserves.

Additional reserves were added to the network to meet ecosystem representation objectives.

These procedures and targets were used to develop the reserves for ecosystem representation. Where representation objectives were not met within reserves established for other values, additional reserves were added to the reserve network. When the Technical Planning Committee encountered a choice about which polygons of a particular site series to add to the reserve network, they based their decision on the priority criteria set out for selecting blue-listed plant associations (see Section 3.3.1 above), community watershed information, and considerations about forest operability.

When complex polygons – that is, polygons with more than one ecosystem component – were selected for inclusion within reserves, only the area of the "underrepresented" ecosystem component was used in calculating the total area set aside in representative ecosystem reserves.

In the case of the Cypre planning unit, terrestrial ecosystem mapping is available for the entire unit, including areas designated as parks and ecological reserves. Thus, the different ecosystems occurring within parks have been included in the process to determine the reserves for ecological representation.

Inventory Results

As shown in table 3.8, most of the Cypre Watershed Planning Unit lies within the Coastal Western Hemlock (CWH) biogeoclimatic zone while the area above 800 metres lies within the Mountain Hemlock (MH) biogeoclimatic zone. CWH is represented by three variants: CWHvh1 (Southern Very Wet Hypermaritime), found below 200 metres along the coastline; CWHvm1 (Submontane Very Wet Hypermaritime), and CWHvm2 (Montane Very Wet Hypermaritime). MH is found along the ridge tops and is primarily represented by the variant MHmm1 (Moist Maritime Windward). There are small areas of the parkland variant (MHmmp1) occurring at elevations above 1200 metres.

Table 3.8: Biogeoclimatic Zones, Subzones and Variants occurring within the Cypre Watershed Planning Unit

Biogeoclimatic Zone	Subzone	Variant	Location	Total Area (hectares)
Coastal Western Hemlock (CWH)	Very Wet Hypermaritime (CWHvh)	Southern (CWHvh1)	Outer Coast up to 200 metres.	7096
	Very Wet Maritime (CWHvm)	Submontane (CWHvm1)	Below 600 metres.	9832
		Montane (CWHvm2)	Between 600 metres & 800 metres.	3959
Mountain Hemlock (MH)	Moist Maritime (MHmm)	Windward (MHmm1)	Above 800 metres near the outer coast	3688
	Moist Maritime Parkland (MHmmp)	Windward (MHmmp1)	Begins at 1200 metres to 1250 metres.	184
Total				24759

102 different ecosystem types (site series) are found in the Cypre unit

There are 102 different ecosystem units occurring within the Cypre Watershed Planning Unit. Three of the most commonly occurring forested ecosystems are: Western Hemlock Amabilis Fir- Blueberry (AB); Western redcedar - Western Hemlock - Salal (HS); and Mountain Hemlock Amabilis Fir - Blueberry (MB). The greatest diversity of site series is found within the CWHvh1 variant (32 different site series), followed by the CWHvm1 (29), vm2 (20), MHmm1 (13) and MHmmp1 (8).

Many of the site series occurring in the Cypre planning unit are rare as defined above, i.e. they cover less than 2 per cent of the planning unit or exhibit less than 6 occurrences. Table 3.9 presents an overview of the occurrence and extent of rare site series within the different variants in the Cypre planning unit.

Table 3.9: Rare Site Series in the Cypre Planning Unit

Variant	Rare Site Series			
	#	ha	% of variant	% of Cypre
CWHvh1	28	1191	17.4	4.8
CWHvm1	24	664	6.8	2.7
CWHvm2	18	984	24.9	4.0
MHmm1	12	1172	31.8	4.8
MHmmp1	8	184	100.0	.8
All	90	4195	n/a	17.1

In total, rare site series cover 4195 ha or just over 17 per cent of the total area of the Cypre planning unit.

Representative Ecosystem Reserves for the Cypre Planning Unit

As discussed above, the technical planning committee, in accordance with expert recommendations strove to achieve the following minimum thresholds of representation in reserves:

- 30 per cent of each site series
- 50 per cent of rare site series, and
- 20 percent of each site series/ dominant tree species/ age class grouping for groupings of 201-400 years and 401 - 600 years.

15 ecosystem units were found to be underrepresented in the reserve network

Once the reserves for all other values were mapped, the committee determined the degree to which the existing reserve network achieved the above representation targets. In the Cypre planning unit, 15 ecosystem units were found to be underrepresented (i.e. two or more hectares below target) in the existing reserve network. Ecosystem polygons in the underrepresented units were added to the reserve network to satisfy all representation requirements. Table 3.10 lists the underrepresented ecosystem units in Cypre planning unit and shows the amount of area added to achieve full representation in each unit.

Table 3.10 Underrepresented Ecosystems in Cypre

Ecosystem Unit	Target	Representation within Existing Reserves		Amount added	Representation in Reserve Network
	%	Hectares	%	Hectares	%
CWHvh1/RS	30	233.4	29.3	16.4	31.4
CWHvm1/AB	30	1485.5	29.9	34.3	30.5
CWHvm1/HS	30	377.5	28.9	18.6	30.3
CWHvh1/LS	50	61.6	31.2	38.9	50.9
CWHvh1/RC	50	26.8	34.6	12.9	49.8
CWHvh1/RF	50	12.1	37.5	7.5	60.5
CWHvh1/YG	50	110.8	27.6	92.9	50.7
CWHvm1/YG	50	19.3	17.8	45.4	59.4
CWHvm2/AF	50	41.4	44.4	6.5	51.3
CWHvm2/HD	50	56.1	28.8	44.4	51.5
CWHvm2/LC	50	7.4	39.2	2.7	53.7
CWHvm2/YG	50	12.6	29.6	6.9	45.9
MHmm1/MO	50	81.7	47.4	4.2	49.8
CWHvm1/AB/ YC/201-400	20	25.6	18.2	5.0	21.7
CWHvm1/YG/ CW/201-400	20	12.5	16.7	31.8	58.9
Total		**2564.3**		**368.4**	

Note: only forested units that were underrepresented by two or more hectares are listed above. When filling representation gaps, representation was achieved for a given ecosystem unit when the final amount of hectares in the reserve network came to, at a minimum, within two hectares of the target amount.

368 hectares of the under-represented ecosystem unit were added to the reserve network

A total of 368 hectares of underrepresented ecosystem units were added to the reserve network to ensure complete ecosystem representation. Map 14 shows the location of the ecosystem units that were added to the reserve network to ensure full ecosystem representation.

3.3.4 Reserves to Ensure Linkages Among Watershed-Level Planning Areas

Reserves to ensure linkages among watersheds will be established once watershed-level plans are completed for adjacent watersheds.

The Scientific Panel recommends that watershed planning areas be linked in order "to allow migrations of animals, to provide connectivity among plant and animal populations, or to accommodate recreational opportunities."[45] While such linkages are primarily an objective of sub-regional plans, the Panel also acknowledges that this objective can be realized only after some watershed-level planning has taken place.

Once watershed-level plans are completed for a number of adjacent watershed planning units in Clayoquot Sound, opportunities for linkage corridors will be evaluated. Where necessary, reserves that create linkages needed to support biodiversity or recreation objectives will be added to the reserve network.

3.4 Reserves to Protect Human Values

The Scientific Panel recognizes that "many aspects of the Clayoquot Sound environment are important to people – both First Nations and others – for cultural, spiritual, and scenic values, and for recreational and tourism use."[46] Accordingly, reserves to protect these values at the watershed planning level form part of the Panel's overall framework for sustainable ecosystem management in Clayoquot Sound.

It must be noted that the Panel's discussion of the values of non-indigenous peoples is largely limited to those values associated with scenery and recreation or tourism. The same limitation applies to this watershed plan, i.e. reverential or spiritual values of the non-indigenous culture have been considered only indirectly by addressing scenic and recreation/tourism values. This limitation is not intended to deny or diminish the existence or importance of these other values.

3.4.1 Culturally Important Areas to protect First Nations' Values

Culturally important areas include sacred sites, historic areas, and areas in current use.

The Scientific Panel stresses the importance of maintaining First Nations' cultural values, dedicating an entire report to an account of First Nations' perspectives and recommendations on how to incorporate these perspectives in planning and management of land, water and resources in Clayoquot Sound. Culturally important areas include sacred sites, historic areas, and areas in current use. The Panel recommends that these areas be identified by the Nuu-chah-nulth First Nations and that they must be protected in ways that are consistent with traditional knowledge.[47]

Culturally Important Areas and Sustainable Ecosystem Management

Figure 3.7 shows the significance of reserves to protect culturally important areas within the Panel's overall framework for sustainable ecosystem management in Clayoquot Sound.

[45] Report 5, p. 171
[46] Report 5, p. 37
[47] Report 5, p. 170

Figure 3.7 Culturally Important Areas and Sustainable Ecosystem Management

THEME

HUMAN VALUES

GOALS

- "To recognize and support the long-standing aspirations and needs of the Nuu-Chah-Nulth people which are based on traditional occupation and use of the land and waters.
- To recognize, support, and incorporate Nuu-Chah-Nulth traditional ecological knowledge and values into land use planning and decision-making.
- To recognize and support the intent of the *Interim Measures Agreement* to engage Nuu-Chah-Nulth participation in Clayoquot Sound land and resource use, including aquatic and marine systems." (Report 3, p.48)

OBJECTIVES

- "To recognize and respect the fundamental spiritual heritage of the Nuu-Chah-Nulth.
- To accommodate First Nations' traditional ownership of land and resources in Clayoquot Sound in land use decision-making and activities.
- To involve the Nuu-Chah-Nulth First Nations in planning and managing resource use activities in Clayoquot Sound.
- To consult and negotiate with Nuu-Chah-Nulth about economic benefits before developing further economic activity in Clayoquot Sound.
- To ensure that forest practices do not negatively impact Nuu-Chah-Nulth foreshore and offshore resource use.
- To ensure that cultural sites defined by the Nuu-Chah-Nulth are inventoried, mapped, effectively protected, and restored where damaged." (Report 3, p. 48).

STRATEGY

To protect culturally important areas of the Nuu-Chah-Nulth Nations in ways consistent with traditional knowledge (Report 5, p.170).

Culturally Significant Areas of Ahousaht – Mapping and Inventory

The Scientific Panel for Sustainable Forest Practices in Clayoquot Sound determined, as of September 30, 1994 that:

"First Nations' perspectives are inconsistently and incompletely addressed in existing forestry documents and standards pertaining to forest management in Clayoquot Sound. New standards and procedures are required to adequately represent First Nations' interests and involve indigenous people in forest management and associated activities within their traditional territories."[48]

New approaches for addressing these two findings were presented in Report 3: First Nations' Perspectives of the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound (the Scientific Panel) and included:

- Recognize more clearly the close interrelationships that exist among the forests, waters, and marine ecosystems in Clayoquot Sound;
- Recognize the importance of Nuu-chah-nulth perspectives and traditional knowledge;
- Include Nuu-chah-nulth people and perspectives in decision-making
- Provide educational opportunities for non-Nuu-chah-nulth forestry workers to learn about and gain an understanding of Nuu-chah-nulth history, traditional knowledge, and perspectives; and
- Provide training and employment opportunities for Nuu-chah-nulth people in forestry activities.

The Scientific Panel's Report 5 (page 166 & 167, 1995b) recommended several watershed-level planning objectives specific to First Nations:

- to identify and describe the environmental resources; natural processes; and cultural, scenic and recreational values in the planning unit;
- to map and designate as "reserves" specific areas within the watershed that: are of special significance for First Nations peoples;
- to map and designate specific areas (termed "harvestable areas") within the watershed where forest harvesting or other resource uses will not compromise the long-term integrity of the forest ecosystem, its use by First Nations people, or its recreational or high scenic value.
- identify reserves and harvestable areas within the watershed. Harvesting is permitted only outside reserve areas which are intended to maintain long-term ecosystem integrity in the watershed, to protect First Nations' cultural important areas, and to protect recreational and scenic values.

The Scientific Panel's Report 5 (page 169) recommendation 7.16, describes how "reserve" status would be applied at the watershed level: map and designate reserves in which no harvesting will occur to protect key hydro riparian ecosystems, unstable slopes and sensitive soils, red-and-blue-listed species, late successional forest with forest-interior conditions, important cultural values, and areas with high value scenic and recreational resources; and integrate reserve establishment with the refinement and detailed mapping of various land-use zones (e.g. Protected Areas). Reserve status would be applied to protect cultural values as described on page 170 of the Scientific Panel's Report 5 (1995b): ….a

[48] Report 3, page 47 First Nations' Perspectives, The Scientific Panel

variety of culturally important areas, including sacred areas, historic areas and current use areas. These areas must be determined by the Nuu-Chah-Nulth Nations and protected in ways consistent with traditional knowledge.

The Ahousaht Culturally Significant Areas Mapping Project is one initiative resulting from the Scientific Panel's (Report 3 and 5) recommendations for new approaches to sustainable forest practices in Clayoquot Sound and the determined work of Ahousaht ***Hawiih*** (Hereditary Chiefs), Elders, leadership, membership, staff and those involved in negotiations related to the Interim Measures Extension Agreement (IMEA). Prior to this mapping project beginning in 1999, a network of reserves that protects a broad range of values, many which protect more than one, was established. This project mapped information on lands not-owned privately by the Ahousaht members. This project included a series of interviews, meetings, workshops and group discussions that produced several outcomes that compliment the existing network of reserves:

- The identification and mapping of areas of significance to Ahousaht in the context of cultural use: sacredness, sensitiveness, historical relevance, for current and/or future use; in three watershed planning units in Clayoquot Sound: Flores Island, Bedingfield and Cypre; all of which lie within the ***Hahuulhi*** (traditional territory) of the Ahousaht ***Hawiih.***

- For watershed planning, a generalized map of areas of cultural significance to Ahousaht, coded one colour.

- A categorization system and consultation process that is framed by ***hishuk ish ts'awalk***, ***Hahuulhi*** and interests in timely decisions for development proposals.

- Further recognition of two important concepts in the history of Ahousaht's resource use in Clayoquot Sound: ***hishuk ish ts'awalk*** and ***Hahuulhi***. ***Hishuk ish ts' awalk*** or "everything is one" , embodies the sacredness and respect for all life forms and their approach to resource stewardship.[49] ***Hahuulhi***, the Nuu-chah-nulth system for hereditary ownership and control of traditional territories, represents a long history of resource use and management in Clayoqout Sound, and provides for a basis for Nuu-chah-nulth participation in co-managing the area and its resources.[50]

The outcomes were achieved by a project team, hired by the Ahousaht Council, that included five community researchers, resource personnel from the Central Region Board and the Ahousaht GIS department, a field supervisor and a project coordinator from the Central Region Chiefs/Ma-Mook Development Corporation. This team developed an interviewing and information management protocol after consultation with Dr. Richard "Umeek" Atleo, a member of the Scientific Panel and a Professor at the Malaspina University College in Nanaimo, BC.

Confidentiality was, and continues to be at the forefront of information gathering and management. All personnel involved in this project have signed letters of confidentiality that were presented to each of the interviewees prior to the commencement of the interview. Interviewees were required to sign an acknowledgement and agreement form so that information may be recorded on acetate(s) and audio tape(s). All information is

[49] Report 3, page vii, First Nations' Perspectives, The Scientific Panel
[50] ibid.

maintained by a secure management protocol and will be protected in ways consistent with traditional knowledge.

A series of maps for Ahousaht use contain detailed, confidential information provided by the interviewees. The map produced for watershed planning locates, in general, the areas of significance to the Ahousaht. The maps are dynamic in nature and the process adaptable to the presentation of new information. The areas may have cultural significance in the context of cultural use: sacredness, sensitiveness, historical relevance, for current and/or future use. The Scientific Panel, page 51 and 52 of Report 3 sets out several recommendations to be considered when establishing the significance of these sites:

> R10 – Before the completion of any ecosystem planning process in Clayoquot Sound, the Nuu-Chah-Nulth of the area (Ahousaht) within the planning is undertaken must be given the opportunity to identify, locate, and evaluate culturally important sites and areas.
>
> R11 – The Heritage Conservation Branch typology (section 4.2.2) for classification of culturally important sites ("traditional use sites") should be used with the categories of "Traditional Land Management Sites" and "Education and Training Sites" to be added to the categories delineated in this typology.
>
> R12 – The determination of culturally important areas will include sites whose significance and existence are communicated by oral traditions as well as those established by physical and written evidence.
>
> R13 – Culturally important areas identified as significant by Nuu-Chah-Nulth must be protected using methods appropriate to the area and to the use. For example, a buffer zone may be used to protect a culturally modified tree.

The Ahousaht, after consultation with Ahousaht ***Hawiih*** (Hereditary Chiefs), Elders, leadership, membership and staff, developed a categorization system and consultation process designed to protect areas of cultural significance to the Ahousaht, located within the Ahousaht ***Hahuulhi*** (traditional territory) that does not designate an area as a "reserve" - the Ahousaht 2001 Annual General Assembly ratified the term: "culturally significant to Ahousaht", to identify areas of cultural significance to the Ahousaht, instead of the government's "reserve" designation. The categorization system and consultation process are framed by the two concepts: ***Hahuulhi*** and ***hishuk ish ts'awalk .***

> ***Hishuk ish ts'awalk*** "everything is one" , embodies the sacredness and respect for all life forms and their approach to resource stewardship.[51]
>
> ***Hahuulhi***, the Nuu-chah-nulth system for hereditary ownership and control of traditional territories, represents a long history of resource use and management in Clayoquot Sound, and provides for a basis for Nuu-chah-nulth participation in co-managing the area and its resources.[52] Prior to the arrival of Europeans in Clayoqout Sound, the Nuu-Chah-Nulth exercised plenary authority over their own territories.

[51] Report 3, page vii, First Nations' Perspectives, The Scientific Panel
[52] ibid.

All the lands, waterways, shorelines, and offshore islands and waters, even relatively remote areas far inland (e.g. The Ursus Valley, Port Alberni Valley, and Gold River area), fell under this system of ownership, control and resource use called Hahuulhi ("private ownership").[53] The boundaries of the various resource use sites owned by individual chiefs were known to all, and were formally recounted and reinforced many times through Nuu-Chah-Nulth oral traditions during feasts and other cultural gatherings.

"Also, we know our boundary lines….These boundary lines we can show on a chart, with the old and the new boundary lines, which can tell you that these boundary lines are very important in the same way that the government is with their boundary lines with the U.S.A. and Canada….All along the Nuu-Chah-Nulth, the whole west of Vancouver Island, had their own territories." [54]

The Ahousaht's 2001 Annual General Assembly determined that designating areas of cultural significance to Ahousaht as "reserves", would not be consistent with traditional knowledge: ***Hahuulhi*** or ***hishuk ish ts'awalk.*** Areas of cultural significance to Ahousaht are to be identified as "culturally significant to Ahousaht". The designation "culturally significant to Ahousaht" would indicate to the Ahousaht, the government and other interested parties that the Ahousaht consultation process must be engaged, in order to initiate any development proposal. A designation of "culturally significant to Ahousaht" identifies the area to be of cultural significance to the Ahousaht in the context of cultural use: sacredness, sensitiveness, historical relevance, for current and/or future use.

The categorization system and consultation process provides for a secure management protocol that protects sensitive details of each area of cultural significance. Detailed Ahousaht maps and associated files include confidential information on: ownership; historical, current and future use; sacredness of an area; and other significant cultural values. Nine categories have been utilized to ensure clarity and certainty of the confidential information chronicled.

The Ahousaht consultation process is consistent with the spirit of the recommendations as set out in the Scientific Panel's Report 3 and 5 - specific to First Nations interests, the recommendations ratified by the Ahousaht 2001 Annual General Assembly, and interests in timely development.

- During sub regional planning, Nuu-Chah-Nulth ***Hahuulhi*** areas should be mapped (by the Nuu-Chah-Nulth) and the role of ***Hahuulhi*** in planning identified. At this planning level, make decisions regarding appropriate levels of protection for culturally important areas that extend across watershed boundaries. Identify such areas and initiate preliminary planning to outline watershed-level management actions to sustain values in these areas. Include participation of Nuu-Chah-Nulth Nations in all planning activities. (Page 165, Scientific Panel's Report 5)

- Harvesting is permitted only outside reserve areas which are intended to maintain long-term ecosystem integrity in the watershed, to protect First Nations' cultural important areas, and to protect recreational and scenic values (page 166, Scientific Panel's Report 5).

[53] Drucker 1951; Ellis and Swan 1981; Haiyupis 1988c, 1992; Bouchard and Kennedy 1990; Sam 1993b
[54] Sam 1993b:6

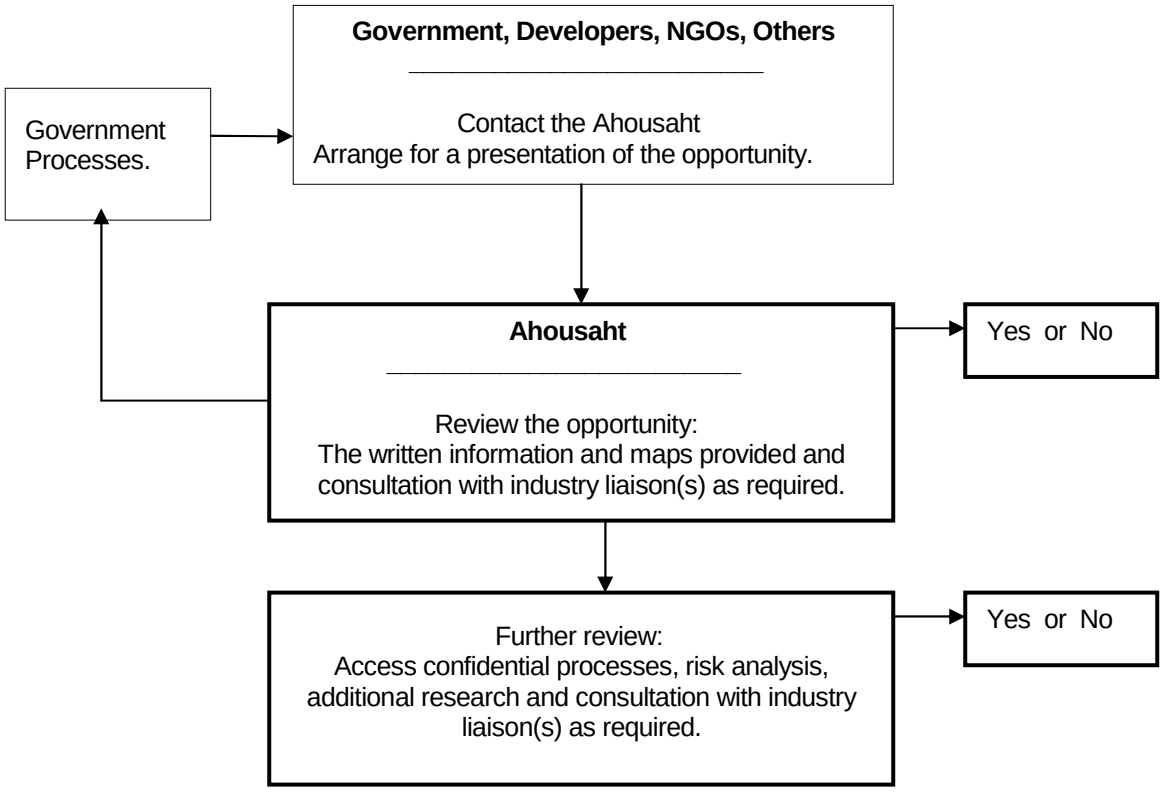
- R7 - In consultation with the co-chairs of the Nuu-Chah-Nulth Tribal Council, ***hahuulhi***, the traditional system for ecosystem management, must be recognized in ecosystem co-management process of Clayoquot Sound. ***Hahuulhi*** will be used in determining ecosystem management within the traditional boundary lines. (page 51, Scientific Panel Report 3, 1995)

The Ahousaht consultation process impacts:

- Areas within the ***Hahuulhi*** of the Ahousaht ***Hawiih*** that have been designated as "culturally significant to Ahousaht" and those that have yet to be identified;

- Territory located outside of the areas designated as "culturally significant to Ahousaht", and within the ***Hahuulhi*** of the Ahousaht ***Hawiih***.

Developers who are interested in accessing, for development purposes, the ***Hahuulhi*** of the Ahousaht ***Hawiih*** would engage the Ahousaht consultation protocol:



Note: The Ahousaht consultation process does not at this time, impact trap lines or lands owned privately by members of the Ahousaht.

The Ahousaht Culturally Significant Areas Mapping Project produced the required outcomes for the three watershed planning units in Clayoquot Sound: Flores Island, Bedingfield and Cypre; all of which lie within the ***Hahuulhi*** (traditional territory) of the Ahousaht ***Hawiih.*** One outcome, that was not required, but is worthy of mention is that the participating youth recognize that traditional knowledge: ***Hahuulhi***, is still very much alive and apart of every day life. It has also been noted that information pertaining to the

significance of an area continues to emerge. Therefore, the consultation, mapping and inventory processes must be flexible, adaptive to change and to new information disclosed over time.

The Ahousaht's 2001 Annual General Assembly ratified a motion to not use the term "reserve" to protect areas of "cultural significance to Ahousaht". The classification, "cultural significance to Ahousaht" is consistent with traditional knowledge and the spirit of the recommendations as set out in the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound, Report 3 and 5.

To realize the full spirit of the recommendations presented in the Scientific Panel's Report 3 and 5, and those provided by ***Hawiih*** (Hereditary Chiefs), Elders, leadership, membership and staff the Ahousaht are proposing that the remaining watershed planning units located within the Ahousaht ***Hahuulhi*** be documented utilizing a similar methodology. Time is of the essence in the completion of this work as many of the Elders who are holders of this significant information may not be able to pass it on as time catches up.

Culturally Significant Areas in the Cypre Planning Unit

29.2 percent of the Cypre unit has been identified as culturally significant areas.

A total of approximately 7222 hectares, or 29.2 percent of the planning unit, has been identified by the Ahousaht First Nation as culturally significant areas. 3119 hectares or 44.2 per cent of these culturally significant areas are located within the reserve network. For reasons of confidentiality, Map 15 only shows the general locations of the areas of cultural importance.

3.4.2 Protection of Scenic Values

Landscape appearance is important both for aesthetic reasons and as an indicator of the health of the forest.

The Scientific Panel acknowledges that "landscape appearance is important to Nuu-Chah-Nulth, other residents, and visitors to Clayoquot Sound, both for aesthetic reasons and as a potential indicator of the health of the forest resource."[55] Accordingly, the Panel identified the protection of scenic values as one component of the ecosystem management theme of maintaining human values.

Scenic Areas and Sustainable Ecosystem Management

Figure 3.8 shows the role of maintaining scenic values within the panel's overall framework for sustainable ecosystem management.

[55] Report 5, p. 40

Figure 3.8 Scenic Values And Sustainable Ecosystem Management.

THEME

HUMAN VALUES

GOALS

- Manage scenic resource to maximize their enjoyment.
- Ensure that residents are satisfied that essential elements of scenery are maintained.
- (Report 5, p. 214)

OBJECTIVES

- Provide for a range of visual landscape experiences, and plan these experiences in relation to existing and potential recreational routes
- Conduct sustainable forest practices and related educational and interpretive programs for the benefit of the public.
- Apply landscape design principles in all areas.
- Maintain examples of different types of landscape in a relatively unaltered state. (Report 5, p. 214)

STRATEGIES

- Maintain scenic values in accordance with the scenic class objectives established for visually sensitive areas.
- Protect areas with especially high scenic values from visible alteration, including unprotected unaltered areas with the highest scenic values, and unaltered scenic areas of high value which are important because of their location. (Report 5, p. 170)

Criteria and Inventories for Maintaining Scenic Values

Scenic values demand special methods of analysis and management.

Scenery is a highly valued resource that demands special methods of analysis, inventory and management. Even before the release of the Scientific Panel's report, government recognized the importance of scenery to the Clayoquot Sound area. In the 1993 land use decision, much of the 21 percent of the land base that was placed under special management was included within designated s*cenic corridors* where protection and

management of scenic landscapes takes priority over other resource activities. Map 1 shows the location of these original scenic corridors.

The classification process includes some areas that lie outside of designated scenic corridors.

The guidelines contained in the land use decision, together with the Scientific Panel's recommendations, have led to tremendous efforts in the development of a new inventory for scenic values and the establishment of a new approach to describing, classifying and maintaining those values. Included in this classification process are areas that are outside of the designated scenic corridors, but that are visible from major waterways, communities and travel corridors. Appendix 2 includes a detailed description of the various inventories and classification efforts that were undertaken.

Following the recommendations of the Panel[56], a new scale to describe scenic objectives in non-technical terms was established. Table 3.11 presents this new description of scenic class objective in Clayoquot Sound. For management standards that apply to each scenic class objective, refer to Table 4.1.

Table 3.11 Description of Scenic Classes

Scenic Class Objectives	***Scenic Class Definition***	***Application***
Unaltered	**No alteration**	**May apply to provincial parks, and areas captured in reserves for other values**
Natural-appearing	**Alteration not discernible to casual observer**	**Visible areas inside and outside scenic corridors where landscape has limited ability to absorb change, is in pristine or retained condition, and has high biophysical rating, viewing condition and viewer ratings**
Minimal alteration	**Alteration may be apparent but not clearly evident**	**Visible areas inside and outside scenic corridors where landscape has moderate ability to absorb change, is in a pristine or retained condition, and has moderate biophysical rating, viewing condition and viewer ratings**
Small-scale alteration	**Alteration must remain subordinate in the landscape**	**Visible areas inside and outside scenic corridors where landscape has a relatively high ability to absorb change, is in a highly to excessively altered condition, and has low biophysical rating, viewing condition and viewer ratings**
Moderate alteration	Alteration dominant	Does not apply to Clayoquot Sound
Highly altered	Alteration out of scale	Does not apply to Clayoquot Sound
Intensively altered	Alteration greatly out of scale	Does not apply to Clayoquot Sound

Scenic class objectives for Clayoquot Sound range from unaltered to small-scale alteration.

Existing visual conditions in Clayoquot Sound include viewscapes that fall into each of the scenic classes, i.e. they range from unaltered to intensively altered settings. By contrast, scenic class *objectives*, while considering current visual conditions, focus on describing the desired *future* condition of a given viewscape with the intent to guide and limit future resource management activities.

In the Cypre planning unit, the scenic class objectives that have been assigned include:

[56] Report 5, p.143

- *small-scale alteration*
- *minimal alteration*
- *natural-appearing*

The above scenic classes have been applied to ensure that areas of especially high scenic value in the Cypre planning unit receive the greatest level of protection. In addition to assigning visually sensitive areas to the above scenic class objectives, many unaltered areas with the highest visual values are located within provincial parks or placed within reserves identified for other resource values, and are thus provided the highest level of protection.

For more information on visual inventories and scenic class objectives, refer to Appendix 2. Section 4.1.1 sets out the management criteria that apply to the different scenic classes.

Scenic Values In Cypre

Scenic values are protected by management standards rather than through reserves.

As noted above, while reserves have not been established specifically for scenic values, scenic values have been preserved within existing parks and reserves for other values. Scenic values that are located within the harvestable areas in the Cypre planning unit are maintained through management criteria designed to achieve scenic class objectives and standards (see section 4.1.1 for these management criteria).

Table 3.12 presents the breakdown of area within each scenic class objective in the visible portion of the planning unit, both within reserves and within the harvestable area.

Table 3.12 Cypre Scenic Class Objectives by Area

Scenic Class	Reserves	Harvestable Area	Total
Natural - Appearing	1832	2140	3973
Minimal Alteration	2260	3109	5370
Small-Scale Alteration	2475	3315	5789
TOTAL	6567	8564	15132

61.1 per cent of the Cypre unit have been assigned scenic class objectives

Approximately 3973 hectares are assigned to the natural-appearing class, 5370 hectares to the minimal alteration class, and 5789 hectares to the small-scale alteration class objective. In total, 15132 ha or 61.1 per cent of the planning unit have been assigned scenic class objectives, and 6567 ha or 43.4 per cent of this scenic area is protected within parks and reserves.

The portion of scenic area in Cypre that is located within the harvestable area will be managed in accordance with the assigned scenic class objective. Timber harvesting and road building operations within these scenic areas will be guided by the management criteria presented in section 4.1.1.

The remaining landscape is not classified because it is largely not visible from communities, recreation sites, and travel corridors. Any future development in these non-visible areas will take place according to Scientific Panel recommendations. In the case of

future timber harvesting, variable retention silvicultural systems will be employed in all areas, visible and non-visible.

Map 16 shows the location of the various scenic class objectives in the Cypre planning unit.

3.4.3 Reserves to Protect Recreation and Tourism Values

Recreation and tourism activities depend on the natural resources of Clayoquot Sound.

The Scientific Panel acknowledges that "there are outstanding opportunities for recreation and tourism in Clayoquot Sound. Natural history excursions along coastlines and to old-growth forests, wildlife tours, air tours, and activities such as kayaking, sailing, and hiking are well established and expanding. These activities depend greatly on the natural resources of Clayoquot Sound, including vegetation, wildlife and scenic resources. They also provide economic opportunities."[57]

Protection of areas with significant recreation and tourism values at the watershed level forms part of the panel's strategy to maintain the human values associated with the Clayoquot Sound ecosystem. Figure 3.9 locates the role of recreation and tourism reserves within the overall framework of sustainable ecosystem management in Clayoquot Sound.

[57] Report 5, p. 42.

Figure 3.9 Recreation/Tourism Reserves and Sustainable Ecosystem Management

THEME

HUMAN VALUES

GOAL

Maintain scenic, recreation and tourism values

OBJECTIVES

- Provide for a range of recreation and tourism opportunities from wilderness-based expeditions to high-end excursions that are sensitive to and based on the area's natural resources.
- Protect valuable resources for recreation and tourism.
- Use procedures for recreation and tourism analysis and planning which are as thorough and objective as possible.
- Integrate into recreation planning the use patterns and needs of tourist and resident groups including First Nations.
- Involve recreation, tourist, resident, and First Nations groups in planning and managing recreation resources. (Report 2, p. 49)

STRATEGY

Identify reserves to conserve areas with especially high recreational and tourism values.

Criteria and Inventories for Recreation and Tourism Reserves

Criteria

Since 1996 a number of projects have sought to identify, describe and quantify recreation and tourism uses – and the features that support these uses – in Clayoquot Sound. A comprehensive recreation and tourism inventory project was also undertaken to refine, integrate and build upon existing tourism and recreation information and inventories. For more information on this project and the other recreation and tourism inventories, refer to Appendix 2.

This recreation and tourism information contributes to watershed planning in a number of ways by

- identifying existing and potential recreation and tourism sites, trails, activities, users and facilities;

- proposing appropriate levels of protection ranging from complete protection in reserves, to maintaining recreation and tourism values through special management conditions; and

- collecting and documenting baseline information relating to recreation and tourism use for future monitoring purposes.

Information from inventories, surveys and the public was used to evaluate recreation features.

The information contained in the various inventories and surveys, as well as input received at public open houses, was used to evaluate individual recreation features to determine the degree of protection required in form of reserves and management zones. Table 3.13 shows the reserves and management zones that were identified to uphold recreation and tourism values.

Table 3.13 Reserves and Management Zones for Recreation and Tourism Features

Type of Feature	Reserve Width	Management Zone Width
Marine shores	100 to 150 meters	150 meters
Large lakes	100 meters	200 meters
Small lakes	30 meters	70 meters
Special features (significant trails, waterfalls etc.)	50 meters	150 meters

Recreation and tourism reserves will be paired with special management zones.

As this table indicates, reserves will be paired with special management zones. This means, for example, that a reserve 100 meters deep will be established around the shoreline of a large lake and around this reserve will be an additional management zone of 200 meters. The purpose of these management zones adjacent to reserves is to maintain the integrity of the reserve zone. Management zones are available for harvesting, and the type, spatial distribution and amount of retained structure will be tailored to the ecological sensitivity of the working unit and the particular values and features in the reserve. For more information on special management zones refer to chapter 4.1.

Inventory Results

The Planning Unit incorporates a number of important recreational and tourism features. Strathcona Provincial Park, Vancouver Island's largest park, is adjacent to the northern boundary of the Cypre Watershed Planning Unit.[58] The largest undisturbed watershed on Vancouver Island, the Megin watershed, was identified for protection in 1993 as part of the Clayoquot Sound Land Use decision and has been added to Strathcona Park, bringing the total area of the Park to over 250,000 ha. In addition to its excellent camping, hiking, fishing, water activities, cross-country skiing and wildlife viewing opportunities, the Park also supports a number of species of animals including the Vancouver Island Marmot, wolf, and coastal black-tailed deer as well as a varied bird population.

Development of the Bedwell Trail by the Friends of Strathcona Park in the early 1990's made Strathcona Park accessible by foot from the west coast. The Bedwell trail, an ocean to alpine trail, begins within the planning unit at the mouth of the Bedwell River and follows a public road for six kilometres to the boundary of Strathcona Park where it climbs to several destinations, including the popular Bedwell Lake.

[58] Strathcona Provincial Park, B.C. Ministry of Environment, Lands and Parks, http://www.env.bc.ca:8000/bcparks/explore/parkpgs/stratrathco.htm

There are also important recreation and tourism features along the diverse shoreline of the planning unit. These features include white sandy beaches, rocky headlands and islets; tidal flats and pocket beaches at Bawden Bay; the braided estuary of Cypre River; and the protected waters of Quait Bay, Bawden Bay, Whitepine Cove and Hectate Bay which offer safe anchorage. Rhodes, Saranac, and River Islands also have important recreation features.

In addition, Hectate Bay, Calmus passage and the surrounding waters are important marine life viewing areas, particularly for the viewing of grey whales and porpoises. Calmus passage is also an important travel route for recreational boaters and kayakers. The coastline along Whitepine Cove and Bawden point is an important sport fishing area.

Several active informal campsites and points of interest, as well as a handful of private houses and cottages, and an air field are found on the shoreline of the Catface Range. The fishing resort, Clayoquot Wilderness Resort, is situated on private land in Quait Bay and offers accommodation, fine dining and fish charters.

Although most of the recreation features and activities occur along the waterways and coastline of the Cypre Unit, there are a few recreation features in-land that have high recreation significance. One of these features is the highly attractive, broad, cirque basin and sub-alpine terrain at the head of the Cypre River which has potential for viewing, nature appreciation, hiking and camping. Another feature is the attractive lower portion of the Cypre River with its varied natural features including old growth forests and salmon runs. In addition, there is potential to develop a nature trail along a small stream which drains into Whitepine Cove.

Recreation and Tourism Reserves in the Cypre Planning Unit

Approximately 1623 hectares containing features of recreation significance have been reserved.

In addition to the areas that fall within the scenic classes and within reserves for other purposes, such as hydroriparian reserves, approximately 1623 hectares containing features of high to very high recreation significance have been reserved, primarily around large lakes. This represents 6.6 % of the total land base of Cypre. Refer to Map 17 for more details.

3.5 Summary: The Cypre Watershed Reserve Network

The watershed reserves identified in the Cypre planning unit are a cornerstone of the Scientific Panel's framework for sustainable ecosystem management. They are designed to maintain watershed integrity, key components of biological diversity, First Nations' cultural values, and scenic and recreational values and opportunities.

Of the nine different reserve types identified, six are reserves in a strict sense; that is, forest harvesting is prohibited under normal circumstances (exceptions to this prohibition are described in Section 4.1). These strict reserves include those established to protect watershed integrity and biological diversity:

- hydroriparian reserves
- reserves for unstable terrain and sensitive soils
- reserves for red and blue-listed species

- reserves to protect forest-interior conditions in late successional forest
- reserves to represent all ecosystems
- reserves to ensure linkages among watershed-level planning areas.

Reserves to protect human values are better characterized as special management zones.

In contrast, reserves to protect human values – culturally important areas, scenic areas and recreational or tourism values – are better characterized as special management zones. Most areas identified to protect these values are not excluded from harvesting; however, certain conditions and requirements must be met before harvesting may proceed. Only reserve buffers around recreational and tourism features, as well as cultural and scenic features of highest significance, are excluded from harvesting.

A total of 43.3 percent of Cypre has been reserved.

Map 18 shows all the reserves in the planning unit. A total of 10715 hectares or 43.3 percent of the island's land base has been reserved. Many of the different reserves overlap and reserve totals and percentages are thus not cumulative. In other words, a given reserve location may be designated for a number of different reasons, and serve a multitude of conservation objectives.

There may be times when forestry activities need to occur in reserves.

In general, harvesting activity is forbidden within watershed reserves. The Scientific Panel recognized, however, that there may be times when forestry activities need to occur even in reserves, primarily for reasons of road access to harvestable areas. The Scientific Panel recommends that the following priorities be respected in resolving conflicts related to road location:

R5.1

Roads will not be built on or near irreplaceable values or highly sensitive features.

- Where irreplaceable values or highly sensitive features are on or near a proposed road location, select another road location or do not build a road. Such features and values including special or rare habitats (including habitats known to be occupied by endangered, rare, and vulnerable species), heritage and cultural features, active floodplain areas and channels, areas mapped as stability class V or Es1, and all but highly localized areas of marginally stable terrain.
- Where damage to watershed integrity and ecosystem function is possible, construct roads only if: no alternative route is available, the road is required to access a substantial harvestable area; and mitigating measures (e.g., special construction, rehabilitation) are biologically and physically feasible. Seek professional advice from appropriate specialists approved by the B.C. Ministry of Forests (e.g., professional agronomists (soil scientists), professional biologists, professional engineers, professional geoscientists) whenever road construction is contemplated in areas including: mapped stability class IV terrain; highly erodible soils; mapped Es2 areas: localized class IV terrain; localized areas of marginally stable terrain; or areas where significant impact on growing sites; riparian zones, or aquatic ecosystems can be anticipated.
- Where significant damage to visual or recreational values is possible, use the proposed location only where mitigating measures are feasible according to appropriate specialists.[59]

The Panel also makes the following specific recommendations relating to road development in hydroriparian reserves:

R7.39 Avoid road construction in hydroriparian reserves. Where no practical alternative is possible, abandoning the development may be advisable. If the development does proceed, engineer and construct the road to minimize disturbance. Require professional engineering supervision at all stages of road construction. The chief

[59] Report 5, pp. 126-127.

circumstances where a road may have to enter a hydroriparian reserve is for direct crossing from one side to another of a stream reserve, or to follow an active floodplain or lakeshore where the higher terrain is not accessible or cannot be safely crossed.

R7.40 In hydroriparian reserves, engineer the road and bridges to ensure that the security of neither the road nor the hydroriparian ecosystem is jeopardized. The road shall not interfere with the circulation of water or with the movement of terrestrial or aquatic animals. In particular, the design must ensure that the roadway does not act as a dam during periods of high flow or storm surge, nor as a source of sediment.

R7.41 Roads constructed near the slope base at the edge of a floodplain or the hydroriparian zone must provide for passage of cross-drainage into the riparian zone. Design traffic and machinery holding places to prevent traffic-associated contaminants from escaping into the hydroriparian zone. Select road surface materials to minimize dust production.[60]

The Panel's terms of reference are clearly focussed on defining sustainable forest practices, and its recommendations regarding reserves apply to forest harvesting. Clearly, from the point of view of forest development, reserves are conceived as no-logging zones, whereas the remainder is referred to as the harvestable area.

The Panel did not make recommendations relating to subsurface resources.

The Panel - within its planning framework for sustainable ecosystem management - does not, however, address or make recommendations regarding exploration and development of subsurface mineral and energy resources within reserves or harvestable areas. Consequently, this watershed plan cannot refer to any Panel recommendations regarding subsurface resource management.

To clarify the approach to subsurface resource management, the Province of British Columbia has recently introduced new legislation that creates a "two zone" approach to subsurface resource management, distinguishing areas where mineral exploration and development will be permitted from those where it will be prohibited.

The Province has recently introduced new legislation to clarify the approach to subsurface management.

Under this legislation, mineral exploration and development is prohibited in areas that are legally designated as 'no-mining' areas, such as parks, protected areas, ecological reserves and other designations. All other areas – including areas identified as reserves and special management zones in this Clayoquot watershed plan – will be considered as "integrated management" areas, where responsible mineral exploration and development is permitted subject to appropriate environmental standards, policies and legislation. Future mineral activities in these latter areas will be integrated to the extent possible with ongoing sustainable resource management processes, through enhanced review and approval processes and consideration of known sensitive values and strategic land use priorities.

Existing policies and legislation require that activities which disturb the surface, including road or trail construction, be designed to minimize potential impacts on known sensitive values. Permits will address site-specific impacts and conditions.

[60] Report 5, pp. 185-186.

4.0 Harvestable Areas in the Cypre Planning Unit

4.1 Criteria for Sustainable Ecosystem Management

In setting out its recommendations for ecosystem management in Clayoquot Sound, the Scientific Panel proposed a fundamental shift in focus from traditional resource management planning:

> In keeping with the goal of sustainable ecosystem management, the Panel recommends a shift in both planning and implementing timber harvesting – from a focus on the trees removed during harvesting to the trees retained. This shift is embodied at the watershed level by delineating reserves to protect ecosystem integrity and forest values, and carried through at the site level by specifying trees to be retained in individual cutting units.[61]

The Scientific Panel proposed a shift in emphasis from the trees to be removed to the trees to be retained.

In this way the Scientific Panel recognizes several levels at which measures are taken to protect forest values: reserves are set aside to protect watershed integrity and biological diversity; special management zones are identified to protect human values; and new forest practices are implemented to ensure that all harvesting activity is undertaken in an ecologically sensitive manner. The following sections describe in more detail the management criteria that apply to special management zones, and all harvestable areas.

4.1.1 Management Criteria for Special Management Zones

Special conditions, considerations and procedures apply in Special Management Zones to ensure that sensitive values are maintained.

As mentioned above, areas in the Cypre Planning Unit that are identified to protect human values are better characterized as special management zones, rather than strict reserves. These areas, which include First Nations' cultural values, as well as scenic, recreational and tourism values are generally accessible for forest harvesting, subject to certain limits and conditions designed to preserve the areas' sensitivities. Only areas of highest significance within these special management zones are excluded from harvesting.

In addition, the Scientific Panel also refers to special management zones in the context of hydroriparian reserves, specifically in R7.30 and 7.31 relating to lakes.

The following paragraphs describe the special conditions, considerations and procedures that apply in each special management zone type.

Culturally Important Areas

As described in section 3.4.1, approximately 29.2 per cent of the area of the Cypre planning unit has been identified by the Ahousaht First Nation as culturally significant areas. Consistent with traditional knowledge, these areas are not designated as "reserves". Rather, the designation "culturally significant to Ahousaht" indicates that the Ahousaht consultation process must be engaged in order to initiate any development proposals (please refer to section 3.4.1). Based on the cultural significance and sensitivity of the area in question, the consultation process will determine the compatibility of the development proposal, and, if applicable, the special conditions, considerations and procedures that need to be met and followed.

[61] Report 5, p. XV

Scenic Areas

As described in Section 3.4.3, over 61.1 per cent of the area of the planning unit has been classed as scenic area, and scenic class objectives range from natural appearing to small-scale alteration. 43.4 per cent of this scenic area is located within parks or reserves for other values, and thus excluded from timber harvesting operations. The balance of the scenic area is located within the harvestable area. While this area is available for timber harvesting, management activities are to be guided by standards and criteria designed to ensure that the applicable scenic class objectives are achieved.

Table 4.1 describes the management standards that apply for each scenic class objective. In accordance with Panel recommendations, the standards are descriptive and qualitative in nature, avoiding quantification of levels of alteration and green-up[62].

Visual landscape design will ensure that scenic class objectives are achieved

To ensure that the applicable scenic class objectives are achieved, visual landscape design principles will be applied in the development of harvesting proposals. In accordance with Scientific Panel recommendation R6.6, visual impact assessments will be conducted prior to commencement of harvesting operations on all of the most important scenic areas (this includes, at a minimum, all areas within the 'natural appearing' scenic class objective).

For a breakdown of scenic class objectives by area in the Cypre unit, please refer to section 3.4.2. Map 19 shows the location of scenic areas in relation to the reserve network and the harvestable area.

[62] Report 5, p.144

Table 4.1 Scenic Class Management Standards – Cypre Planning Unit

	SCENIC CLASS OBJECTIVE		
	NATURAL APPEARING	**MINIMAL ALTERATION**	**SMALL-SCALE ALTERATION**
INTENT	Visual disturbance is not discernible to the casual observer	Visual disturbance may be discernible but not clearly evident in the landscape	Visual disturbance must remain visually subordinate in the landscape
VISUAL LANDSCAPE DESIGN	Ensure alteration is inconspicuous and blends very well with colours and textures in the landscape. Repetition of natural line and form must occur in seen and unseen areas to ensure blending with the landscape. In addition, repetition of colour and texture must occur in seen areas	Ensure alteration blends well with forms, lines, patterns, colours and textures in the landscape such that only minor alteration is seen. Repetition of natural line and form must occur in seen and unseen areas to ensure blending with the landscape.	Ensure alteration does not dominate scene, but blends with forms, lines, patterns, colours and textures in the landscape. Repetition of natural line and form must occur in seen and unseen areas to ensure blending with the landscape.
CUMULATIVE DISTURBANCE IN PERSPECTIVE VIEW	No visible bare ground or tree boles in seen areas.	Cumulative visual disturbance will remain minimal in the landscape unit, based on the landscape's ability to absorb change.	Cumulative visual disturbance will remain subordinate in the landscape unit, based on the landscape's ability to absorb change.
VISUALLY EFFECTIVE GREEN-UP	Disturbed areas must achieve visually effective green-up before additional harvesting is permitted, consistent with scenic class objective and intent for the landscape unit.	Disturbed areas must achieve visually effective green-up before additional harvesting is permitted, consistent with scenic class objective and intent for the landscape unit.	Disturbed areas must achieve visually effective green-up before additional harvesting is permitted, consistent with scenic class objective and intent for the landscape unit.
SILVICULTURAL SYSTEMS	Retention silvicultural systems must be adequate in design, bare-ground visibility, dispersion and degree of retention to remain not apparent in the landscape.	Retention silvicultural systems must be adequate in design, bare-ground visibility, dispersion and degree of retention to remain minor in the landscape.	Retention silvicultural systems must be adequate in design, bare-ground visibility, dispersion and degree of retention to remain subordinate in landscape.
ROADS	Except for shoreline access points, roads must not introduce visible bare ground or visually apparent bare tree boles into the landscape unit.	Except for shoreline access points, roads must not introduce visible bare ground or visually apparent bare tree boles outside harvest blocks and must not introduce visible bare ground inside harvest blocks.	Except for shoreline access points, roads must not introduce visible bare ground outside harvest blocks and must remain visually subordinate inside harvest blocks.
FACILITIES	No new visible facilities are permitted except floats and buoys. Existing facilities will be managed as a legal non-conforming use for the duration of current tenure agreements and will be subject to enhanced standards, or will be relocated to a different scenic zone if feasible.	One visible single facility or one cluster of facilities is permitted in each landscape unit or small bay.	Visible single and clustered facilities are permitted in each landscape unit, consistent with the scenic class objective and intent.

Recreation and Tourism

Section 3.4.3 notes that marine and lake shores, as well as special features such as significant trails and waterfalls, are protected by reserve buffers of varying widths. In addition, management zones have been identified adjacent to these reserves, which serve to maintain the integrity of the buffers. Please refer to Table 3.2 above for reserve and management zone widths.

Forest practices and the application of the retention system in the management zones need to be designed to ensure the integrity of recreation and tourism values encompassed in the reserves. Many, if not most recreation and tourism features, setting and opportunities are valued for the visual enjoyment and experience they provide. For this reason, the visual impact of any forest practices must be managed and should remain minor within recreation and tourism management zones. This may be achieved by following the management standards described in Table 4.1 for the scenic class of 'minimal alteration'. In particular, the retention silvicultural system must be designed in terms of bare ground visibility, as well as amount and dispersion of retention such that the visual impact of harvesting and regeneration remains minor in the management zone. Furthermore, forest practices in the management zone should be designed to reduce the risk of windthrow to the reserve zone.

Map 17 shows their location relative to the reserve network.

Lakes

The panel recommends that a special management zone be designated around all lakes, adjacent to the 30 meter hydroriparian reserve zone. This special management zone is to extend 20 meters beyond the reserve zone, or up to the edge of the hydroriparian influence, whichever is greater.

The panel states that the special management zone around lakes may be subject to retention systems of harvest provided it is outside the hydroriparian (reserve) zone proper.[63] The management zone will function as a buffer to protect the integrity of the reserve zone next to the lakeshore. In particular, forest practices and the application of the retention system in the management zone should be designed to reduce the risk of windthrow to the reserve zone. Furthermore, important wildlife habitat attributes, including wildlife trees, large trees, hiding and resting cover, nesting sites, structural diversity, coarse woody debris and food sources that are characteristic of natural hydroriparian ecosystems should be retained.

4.1.2 Management Criteria for Sensitive Sites

The Panel, as well as experts provided site level planning and management recommendations

At the watershed planning level, resource information that was collected at mapping scales generally ranging from 1:10,000 to 1:20,000 is used and interpreted to specify reserves and harvestable areas. Smaller resource features requiring protection, however, may not be identifiable at this scale. The panel recognized this and provided a number of recommendations that guide site level planning and management activities.

Similarly, experts that were consulted by the technical planning teams over the years to assist with watershed level planning recognized the limitations that are inherent due to the scale and intensity of watershed-level mapping. Accordingly, some provided

[63] Report 5, p. 184

recommendations regarding site-level measures that should be undertaken to ensure that sensitive sites are afforded adequate protection prior to and during operational management activities. Site level recommendations were provided to address a variety of sensitive sites and features, including terrain, soils and wildlife habitat.

The following paragraphs present site-level management criteria for sensitive sites for consideration in operational planning and management activities.

Terrain and Soils

In their report, the team of soils and terrain specialists consulted to provide advice on unstable terrain and sensitive soil reserves[64], describes instances where the terrain or ecosystem mapping process does not result in sufficiently detailed information to determine whether a terrain or sensitive soils reserve is needed, or where specifically the reserve should be. In these instances, they recommend that resource management decisions should be based on follow-up site level assessments. The following table lists the terrain types or features that should be field assessed including any site-level management recommendations referenced in the consultation report.

[64] BC Ministry of Forests, 1998b.

Table 4.2 Site-level Reserves or Limitations for Sensitive Soils or Terrain

Terrain Type or Feature of Concern	Type of Assessment	Management Recommendation
Class IV terrain (moderate landslide hazard)	Terrain Stability Field Assessment (TSFA)	Follow the recommendations from the TSFA
Class I, II or III terrain	n/a	Follow R3.6, i.e. minimum of 15 per cent retention
Complex terrain units that include bedrock (e.g. RH/Mv), or organic soils with poor drainage (e.g. Mv/Ov, with poor drainage)	Site assessment to determine if regeneration is feasible	As a rough guide, the proportional symbols in the terrain label will indicate the percentage of ground that is harvestable and suitable for regeneration (e.g. Rh/Mv – 40% is morainal veneer and could be harvested)
Complex units that include aC or bC terrain	Field assessment to identify areas which should be reserved	Site-level reserves/measures where indicated
Colluvial terrain units with multiple textures and blocks or boulders as dominant texture (e.g. sgbC)	Site assessment of regeneration potential	Site-level reserves/measures where indicated
Fluvial or glaciofluvial sediments which are dominantly bouldery (e.g. gbF)	Site assessment of regeneration potential	Site-level reserves/measures where indicated
Colluvial cones or fans (Cc or Cf), or alluvial fans (Ff)	Site assessment to determine how geomorphically active the fan or cone is, and whether harvesting may occur	Site-level reserves/measures where indicated
High and very high soil erosion hazard areas as indicated on terrain maps	Assess using the methods in the *Hazard Assessment Keys for Evaluation Site Sensitivity to Soil Degrading Processes Guidebook*. The assessment should include whether proposed logging methods will prevent surface erosion.	Site-level reserves/measures where indicated
Areas of known acid rock drainage		Avoid for road building and quarrying
Areas of limestone	Conduct karst field assessment to determine landform type	Site-level reserves if significant active karst development exists

Plants and Wildlife

The panel provides recommendations for the protection of red- and blue-listed plant and animal species through the designation of reserves at the watershed level, and this watershed plans presents the criteria and locations of for these reserves (see section 3.3.1). The panel was mindful, however, that "protection is often better implemented at the site level for widely ranging, rare species".[65] Consequently, the panel recommends that more refined information be collected at the site level about, amongst other things, "endangered, threatened, or vulnerable plant and animal species".[66] When addressing site-level information requirements, the panel describes the biodiversity objective at the site level as confirming the presence or absence of species or habitats that will affect operational management of the site.[67]

In addition to the above panel recommendations pertaining to site-level information and management requirements for red-and blue-listed plant and animal species, further information on watershed level planning and wildlife habitat can be found in "*Clayoquot Sound Watershed Level Planning – Wildlife Habitat Overview*, Clayoquot Sound Technical Planning Committee, August 2003".

4.2 Variable Retention Silvicultural System

Once reserves have been identified in watershed level plans, the remaining area lying outside reserves is the total harvestable area within a given watershed planning unit. This area is available for forest harvesting operations. Within the harvestable area, further retention is prescribed by the application of the *variable retention silviculture system* (VRSS).

The variable retention silvicultural system provides for the permanent retention of forest structures.

This new silvicultural system - first recommended by the Scientific Panel, and now recognized within the Forest Practices Code as the 'retention silvicultural system' – provides for the permanent retention of forest structures from the original stand of trees in order to ensure habitat for various forest biota. Within each proposed cutting unit, planners must first determine the type, number and spatial distribution of the trees to be retained. Once this has been done, the remaining areas are available for logging. In this way, the application of the VRSS within the harvestable area mirrors and complements the designation of reserves at the watershed level.

The variable retention silvicultural system is applied at the site level.

The application of the VRSS influences the designation of reserves and management zones within watershed-level plans; however, the silviculture system itself is applied at the site level. The following discussion in the context of this watershed plan therefore describes the new silvicultural system in conceptual terms only, in order to provide context and guidance for its application.[68]

The intent of the VRSS is to preserve far more of the characteristics of natural forests than are maintained in conventional silvicultural systems. This objective is achieved by retaining structures such as standing dead trees, large living trees, and downed logs within the harvestable area in order to provide for habitat and connectivity. The type, spatial

[65] Report 5, p.169
[66] Report 5, p. 173
[67] Report 5, p. 268
[68] For more details on the VRSS see Report 5 pages 83 to 89.

distribution and number of structures that are retained in a given area are tailored to the site characteristics and to the specific objectives and values associated with the area.

The Panel's direction regarding the amount of structure to be retained in particular sites is found in recommendations 3.6, 3.7 and 3.8. Recommendation 3.6 suggests that the amount of retention be based on the presence of significant non-timber values or sensitive areas: at least 70 percent of the forest should be retained in relatively uniform distribution where those values are present. By contrast, R3.7 recommends that at least 15 percent of the forest is to be retained in areas without such values. These broad guidelines are complemented by R3.8 which recommends that prescriptions for retention should be tailored to the stand and site conditions, and that the appropriate amounts of retention be based on ecological sensitivity and forest values within the working unit.

The Panel emphasises that the variable retention system provides a continuum of options in terms of the type, amount and spatial pattern of the retained material to address site characteristics and management objectives[69]. Just as the designation of reserves in watershed-level planning is based on the physical, ecological and human values found within a given watershed planning unit, the amount and distribution of retention in site-level planning should be based on the particular physical, ecological and human values present in a given working or cutting unit.

The type, distribution and amount of retained structure is tailored to the site characteristics, forest values and management objectives.

The Technical Planning Committee reinforces this principle articulated by the panel, namely that the type, amount and spatial distribution of retained structures be value- and objective-driven, rather than based on rules and prescriptions. The application of this principle will ensure that all forest values – whether deemed significant and sensitive, or not – are addressed by retaining the appropriate amount and distribution of forest structures in each cutting unit. 'Appropriate' is defined as the amount, distribution and type of structure that is found necessary and sufficient to maintain the values and address the sensitivities present at the site.

The panel recommendations addressing the application of the VRSS are understood as site-level, rather than watershed-level recommendations. Consequently, the Technical Planning Committee does not provide watershed-level guidance or direction on what values should be deemed 'significant' or what areas should be classed as 'sensitive' as per R3.6[70]. Apart from the fact that such differentiations would naturally be rather subjective in nature, and thus inevitably be subject to challenge, they seem rather immaterial in light of the Panel's stated principle that amount and type of retention be based on sensitivities and values present at the site.

For instance, in a particular cutting unit it may be necessary to retain 70 per cent of the forest structures evenly distributed throughout the site – as suggested in R3.6 – in order to address scenic values and achieve the stated scenic class objective of the unit. In another cutting unit with different topography and similar scenic values, however, the same scenic class objective might be achieved with 40 per cent retention, aggregated in small patches or strips of retained forest cover. The amount of retention in each case is not indicative of the presence or absence of significant values; rather, in each case the values present have been addressed in accordance with the scenic class objective, i.e. management is objective-driven as opposed to rules-driven.

[69] Report 5, Figure 3.2, p.84
[70] For site-level guidance, refer to chapter 4.1.3.

Similarly, it is easy to conceive other instances (e.g. protection of wildlife attributes, rare plants etc.) where aggregate retention is better suited to address and conserve significant and sensitive values within a cutting unit, rather than relatively uniform distribution as suggested in R3.6.

Except for very small working units, a minimum of 15 percent of any harvest site will be retained.

The distinction between significant and non-significant values as described in R3.6 and 3.7 is thus de-emphasised, and the importance to select from the full continuum of options provided by the variable retention silvicultural system –based on site, values and objectives –is reinforced. The minimum amount of retention, however, will not be less than 15 per cent, regardless of site conditions and resource values. In accordance with the Panel's recommendation 3.9, only very small working units are exempt from the minimum 15 percent retention requirement.

Since the application of the variable retention silviculture system is objective- and value-driven, particular importance must be placed on monitoring its implementation and its effectiveness in achieving the stated objectives and conserving the particular values of a specific site or location. The Scientific Panel emphasizes monitoring to evaluate success in attaining management objectives. See section 5 for more information on monitoring.

In addition to the general guidelines established for the application of the VRSS, the Scientific Panel provides more specific recommendations regarding harvesting, transportation, and rate-of-cut. These recommendations, described below, help to implement the goals and objectives underlying watershed management plans.

4.3 Harvesting Systems

The methods and equipment used in yarding are particularly critical to the variable-retention silviculture system.

The Scientific Panel observes that the selection of appropriate harvesting techniques is a central element of the new silvicultural system. The methods and equipment used in the yarding phase – that is, the way in which logs are moved from where trees are felled to the point at which they are loaded for transport – is particularly critical to the objectives of the variable-retention silvicultural system. While the selection of harvesting systems will be affected by a number of factors including site characteristics, timber characteristics, and regulatory requirements, the VRSS requires yarding methods that

- are efficient and safe;
- can accommodate different levels and distributions of retention;
- are appropriate to steep slopes;
- minimize soil disturbance and damage to retained trees; and
- require low road densities."[71]

Harvest systems are determined at the site level.

Harvesting systems to be used within the harvestable areas of Cypre will be determined at the site level. The selection of systems and their application will be consistent with the recommendations set out by the Scientific Panel with respect to harvesting methods and equipment.

[71] Report 5, p. xvi

4.4 Transportation Systems

Logs and other forest products in Clayoquot Sound are transported by both roads and water. Since roads can have significant impacts on slope hydrology and stability, stream morphology and water quality, the panel includes detailed recommendations and requirements for road location, construction and rehabilitation.

While most of the panel's recommendations regarding roads apply at the local or site level of planning, some must also be considered at the watershed level. In addition to the guidelines identified above for the construction of roads through reserve areas, these recommendations include the following:

R5.3 Require an overall road deactivation plan that addresses and effectively integrates the needs for long-term access for stand tending, protection, and recreation. The plan should reflect the fact that roads are a long-term investment, often needed to facilitate future land management.

No more than five percent of the harvestable area will be converted to permanent access.

R5.7 Determine the percentage of the productive forest land base to be converted to permanent access (roads and landings) on a watershed-specific basis during watershed-level planning. The maximum percentage of the harvestable area designated for permanent access should normally be less than 5%. All other temporary roads and access trails must be rehabilitated to a productive state.[72]

The Scientific Panel also provides more specific direction with respect to road placement and construction within hydroriparian reserves.[73]

4.5 Rate-of-Cut

Rate-of-cut is the term used to designate the rate at which a forest is harvested. More specifically, the Scientific Panel defined it as "the proportion of the watershed area allowed to be cut each year."[74] Rate-of-cut and the volume of timber removed are issues of importance to watershed planning because of the potential impacts of the removal of biomass on the hydrological regime of a watershed and on the associated fish species and other stream organisms. The extraction of timber also has impacts on wildlife habitat and on the prospects for a long-term sustainable timber supply.

Rate-of-cut is distinct from the Allowable Annual Cut.

Rate-of-cut is distinct from the allowable annual cut (AAC). The AAC specifies the amount of timber that may be harvested annually within a management unit such as a tree farm licence or timber supply area. It is expressed in volume of timber (i.e. cubic metres), and is determined every five years by the Chief Forester of British Columbia in accordance with Section 8 of the *Forest Act*.

In contrast, rate-of-cut is the amount of area that is or may be cut within a given watershed. The rate-of-cut is expressed in terms of area (typically in hectares). The Scientific Panel provides detailed recommendations for determining rate-of-cut for individual watersheds within a watershed planning unit. Among these recommendations are the following:

R3.1 Within the watershed planning unit, determine a rate-of cut based on the watershed area. Specifically:

[72] Report 5, p.126 to 128
[73] See Section 3.5.1 and recommendations 7.39 to 7.41
[74] Report 5, p. 285

- Limit the area cut in any watershed larger than 500 ha in total area to no more than 5% of the watershed area within a five-year period.

- In primary watershed of 200-500 ha in total area, limit the area cut to no more than 10% of the watershed area within a 10-year period. (This prescription provides flexibility for harvesting within small watersheds.)

- In any watershed larger than 500 ha in total area, and primary watersheds of 200-500 ha in total area in which harvest has exceeded 20% of the watershed area in the most recent 10 years, allow no further harvest until the watershed conforms with the specified rate-of-cut.

- In any watershed specified in the previous recommendations and in which the recent harvest is greater than 5% in the last five years, but less than 20% in the last 10 years, allow no further cutting until a watershed sensitivity analysis and stream channel audit have been completed. If these assessments indicate significant hydrological disturbance, substantial or chronic increase in sediment yield, or significant deterioration in aquatic habitat, cease harvesting until undesirable conditions are relieved. Otherwise, harvest may continue at a rate which will bring the drainage unit within the recommended rate -of-cut limits within five years.

- In any watershed larger than 500 ha in total area (and primary watersheds of 200 - 500 ha in total area) in which harvest has occurred, require a watershed sensitivity analysis and stream channel audit once every five years. Where such assessments identify hydrological disturbance, substantial increase in sediment yield, or significant deterioration in aquatic habitat, cease harvesting until these conditions are relieved. If such conditions are recognized at any other time, sensitivity analysis and/or stream channel audit shall be undertaken immediately.

- In watersheds where the harvestable area is less than 30% of the total area, allow resource managers to use professional judgement to vary these standards without changing the intent to regulate rate of harvest to minimize hydrological change.

- Periodically review these recommendations and reformulate as the results of monitoring accumulate.

- In watersheds important for their scenic values, complying with the visual landscape management objectives may restrict the rate-of-cut below the limits specified above.[75]

Rate-of-cut limits protect hydrological integrity. The calculation of rate-of-cut will occur at the site level of planning.

For the purposes of this watershed plan for the Cypre planning unit, the Panel's recommendations with respect to rate-of-cut are interpreted as limits imposed on forest development operations in order to protect the hydrological integrity of watersheds. Limits to the rate-of-cut apply to individual watersheds within the watershed planning unit. Table 4.3 identifies the individual watersheds within the Cypre watershed planning unit and includes the rate-of-cut limits assigned in accordance with SP recommendation R3.1. In addition, appendix 4 presents the methodology used in accordance with R3.1 to assign rate-of-cut limits to all watersheds in Clayoquot Sound.

[75] Report 5, p. 81-82.

Table 4.3 Rate-of-Cut Limits for Individual Watersheds in the Cypre Planning Unit

Watershed/ Map Unit	Watershed Type	Area ha	5 yr Cut Limit	10 yr Cut Limit
130	Primary Watershed, >500 ha	652	32.6	-
22	Primary Watershed, >500 ha	872	43.6	-
23	Primary Watershed, <200 ha	142	-	-
24	Primary Watershed, <200 ha	199	-	-
25	Primary Watershed, <200 ha	144	-	-
26	Primary Watershed, <200 ha	135	-	-
27	Primary Watershed, <200 ha	115	-	-
28	Primary Watershed, >500 ha	568	28.4	-
29	Primary Watershed, >=200-500 ha	388	-	38.8
30	Primary Watershed, >=200-500 ha	307	-	30.7
31 Total	**Primary Watershed, >500 ha**	**1,013**	**50.6**	-
31	Primary - residual area	130	-	-
31.1	Secondary Watershed, <=500 ha	368	-	-
31.2	Secondary Watershed, >500 ha	514	25.7	-
33	Primary Watershed, <200 ha	174	-	-
34	Primary Watershed, >=200-500 ha	249	-	24.9
35	Primary Watershed, >=200-500 ha	280	-	28.0
36 Total	**Primary Watershed, >500 ha**	**5,763**	**288.2**	-
36	Primary - residual area	3,002	-	-
36.1	Secondary Watershed, >500 ha	637	31.9	-
36.2	Secondary Watershed, >500 ha	970	48.5	-
36.3	Secondary Watershed, >500 ha	1,154	57.7	-
37	Primary Watershed, <200 ha	167	-	-
38	Primary Watershed, <200 ha	152	-	-
56	Primary Watershed, >500 ha	607	30.4	-
57	Primary Watershed, >=200-500 ha	220	-	22.0
58	Primary Watershed, >500 ha	511	25.5	-
59	Primary Watershed, <200 ha	188	-	-
60	Primary Watershed, >500 ha	784	39.2	-
61	Primary Watershed, >=200-500 ha	208	-	20.8
62	Primary Watershed, >=200-500 ha	253	-	25.3
63	Primary Watershed, <200 ha	193	-	-
64 Total	**Primary Watershed, >500 ha**	**2,381**	**119.0**	-
64	Primary - residual area	2,008	-	-
64.1	Secondary Watershed, <=500 ha	373	-	-

The Ministry of Forests will verify that forest development plans are consistent with rate-of-cut limits.

It is the forest tenure holder's responsibility to ensure that the amount of development proposed within a given watershed is consistent with the rate-of-cut that applies for that particular watershed. The statutory decision-maker (that is, the District Manager in the Ministry of Forests) will verify that forest development plans proposed by licence holders are consistent with applicable rate-of-cut limits.

As described above, rate-of-cut will be used at the site level in accordance with watershed-level objectives. Rate-of-cut will also be used at the management unit level; that is, rate-of-cut limits will be considered along with other factors in the Chief Forester's determination of the AAC for a given tree farm licence or other management unit (or portion thereof) within Clayoquot Sound.

4.6 Restoration

While most Scientific Panel's recommendations are focussed on the implementation of new planning approaches and new forest practices to maintain ecosystem integrity, the panel also recognizes that past practices have led to environmental damage and degradation. Recommendation R3.12 calls for the development of restoration plans where forest values have been degraded[76].

Since adoption of the panel's recommendations in 1994, substantial efforts have been made to restore degraded areas through the funding provided by Forest Renewal BC, and more recently through the Forest Investment Account. First Nations, tenure holders, interest groups and others have cooperated in various ways to repair environmental damage caused by past logging and road building practices in Clayoquot Sound.

Table 4.4 provides an overview over key restoration activities that were carried out in the Cypre planning unit.

[76] Report 5, p. 87

Table 4.4: Completed Restoration Activities (FRBC) in Cypre Planning Unit

Type of Restoration	Description	Area Restored TFL 57	TFL 54
Backlog Silviculture	Alder treatment and brushing selects and promotes the growth of ecologically appropriate conifer species in past harvest areas and helps to restore the original species composition of the climax stand.	265 ha[77]	
Road Deactivation	These are older road networks that were considered to have a significant environmental liability. Road deactivation restores the natural slope contours and re-establishes the natural stream flows.	37.1 km[78]	16.1 km
Watershed Restoration	Side channel construction provides salmonid rearing, spawning and refuge habitat. In-stream work involves re-introducing Large Woody Debris (LWD) into the stream channel. The placement of LWD creates a more diverse stream channel as well as offering cover habitat for both adult and juvenile salmonids.	1935 meters of side channel construction 2115 meter of in-stream restoration	
Hydroriparian Spacing	Hydroriparian spacing is carried out to promote and expedite the restoration of the hydroriparian stand structure and promote an ecologically appropriate species composition within the hydroriparian ecosystem. .	4.6 ha	
Landslide and Gully Rehabilitation	This rehabilitation work reduces the generation and delivery of sediments from hill slopes to stream channels	20.7 ha	21 ha

[77] Includes only those areas that were partnered with Ahousaht First Nation

[78] Includes only deactivation of roads that were not under permit (i.e. not a licensee obligation or liability)

While considerable restoration work was carried out over the past several years, further restoration needs have been identified by the Ahousaht First Nation, as well as licensees and others. Table 4.5 provides an overview

Table 4.5: Identified Restoration Priorities in Cypre Planning Unit

Type of Restoration Activity	Description	Area in need of restoration TFL 57	TFL 54
Backlog Silviculture	Alder treatment and brushing selects and promotes the growth of ecologically appropriate conifer species in past harvest areas and helps to restore the original species composition of the climax stand.	180-250 ha	
Hydroriparian Spacing	Hydroriparian spacing is carried out to promote and expedite the restoration of the hydroriparian stand structure and promote an ecologically appropriate species composition within the hydroriparian ecosystem. .	40-80 ha	
Road Deactivation			High Risk: 4.1 km Med. Risk: 10.7 km Low Risk: 6.3 km

The implementation of the above identified restoration activities will be contingent on the availability of funding from government and non-government sources.

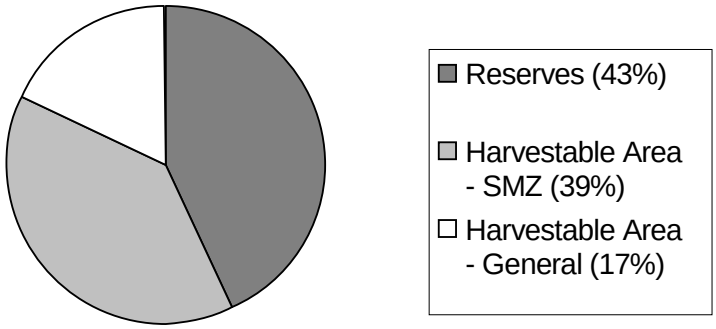
4.7 Harvestable Area in the Cypre Planning Unit

The harvestable area is the area that lies outside designated reserves. Forest harvesting can take place within the harvestable area as long as it is undertaken in a manner consistent with the Scientific Panel recommendations relating to operations,[79] the *Forest Practices Code of British Columbia Act*, and the special management considerations described in Section 3.5.2.

Approximately 56.2 percent of the Cypre planning unit is designated as harvestable area.

Approximately 13925 hectares or 56.2 percent of the land base of the Cypre Watershed Planning Unit has been designated as harvestable area, while the remainder is in reserves. Approximately 9679 hectares or 69.5 per cent of the harvestable area have been designated as special management zones. Map 20 shows the location of the reserves and the harvestable area, including Special Management Zones. Figure 4.1 shows the proportion of designated reserves, harvestable area with SMZ and general harvestable area (i.e. without SMZ designation) in the Cypre planning unit.

Figure 4.1 Reserves and Harvestable Area in the Cypre Planning Unit



[79] Recommendations pertaining to operational planning at the Forest Development Plan level and site-level, including recommendations relating to silvicultural systems: - R3.1 to R3.13, R3.16 to R3.18; recommendations relating to harvesting systems: - R4.1 to R4.3; all recommendations relating to transportation systems: - R5.1 to R5.13; recommendations relating to scenic, recreational, and tourism values and resources: - R6.5 to R6.6; and, recommendations relating to planning for sustainable ecosystem management in Clayoquot Sound: - R7.1 to R7.10, R7.15, R7.17 to R7.41.

5.0 Updates and Amendments

This watershed plan is conceived as a dynamic document

Watershed plans are not conceived as static documents. Rather, it is recognized that each watershed plan will be a dynamic, 'living' document, which will be subject to change and continuous improvement over time as new information comes available and experience is gained through plan implementation and monitoring. The following sections describe the procedures for plan updates and amendments.

5.1 Updates

Plan updates are minor changes, to be approved by the TPC

Plan updates are minor changes to the plan, which are submitted to or initiated by, and approved by the Technical Planning Committee (TPC). After TPC approval, the Central Region Board (CRB), as well as stakeholders, including licensees and interest groups will be notified. Minor changes will be tracked and documented, and planning data bases will be updated where applicable. Updates include:

a. Changes relating to:
   - location of map polygons or linear map features such as reserve or special management zone (SMZ) boundaries and stream locations, or
   - classification of reserve or SMZ polygons or features.

   These changes usually come about as a result of having more accurately ascertained the geographic location of boundaries or the classification of polygons and features through site-level plans and/or assessments.
b. Minor changes or deletions of reserve or special management zone areas or boundaries, which
   - otherwise conform to the CSSP recommendations,
   - do not materially affect the likelihood of achieving the objectives or results specified in the watershed plan, and
   - do not affect more than two hectares of reserve area.

   Where such changes or deletions are requested due to the proposed construction of a road, the TPC will be guided in its review and determination by the pertinent CSSP recommendations, including but not limited to recommendations 5.1 and 7.39.
c. Minor wording revisions and refinements to objectives and strategies suggested by more detailed site-level planning.

Update proposals are received by the TPC, and will be reviewed at the next scheduled TPC meeting. The TPC will accept, modify or reject the update proposal and notify the proponent accordingly. Proponents will usually be notified within 60 days of receipt of the update proposal.

5.2 Unscheduled Amendments

An unscheduled amendment is a major change to the plan that may arise as a result of:

- new information (e.g. inventory, research, resource analysis, monitoring results) which suggests the need for significant revision or refinement of reserve or special management zone boundaries (example: Conservation Data Centre releases new and significantly different lists of red- and blue-listed plant communities);

- new and significantly different interpretations of CSSP recommendations which trigger significant changes in reserve or special management zone criteria;
- significant refinements to reserve or special management zone boundaries as an outcome of site-level planning (e.g. changes affecting more than 2 hectares of reserve or SMZ area);
- significant natural disturbances or environmental change (e.g. blowdown, insect/disease outbreak) affecting large areas under the plan; and
- significant changes required to make the plan conform with new laws, regulations or policies.

Unscheduled amendments are significant changes that may need approval by the CRB or the parties

Proposals for unscheduled amendments are to be submitted to or initiated by the TPC. Proposals for unscheduled amendments need to include clear documentation regarding the nature, location, scope and reasons for the proposed changes. Where applicable, the proposals should include documented expert support. The TPC may invite proponents of amendments to present the proposed changes at the next scheduled TPC meeting.

Depending on the nature and scope of the proposed amendment, the TPC will choose the appropriate course of action, including, but not limited to:

- determine on its own if the amendment should proceed, or be modified or rejected;
- determine on its own to postpone dealing with the amendment until the time of the next scheduled amendment to the plan;
- present the proposed amendment to the CRB and seek the advice from the CRB prior to making a determination;
- forward the proposed amendment including advice received from the CRB, to the Parties with a request for decision.

If the proposed amendment is processed by the TPC on its own, proponents will usually be notified of the TPC determination within 60 days of receipt of the proposal. For amendments processed by the TPC, public review and comment will normally not be required. The TPC will notify the CRB, stakeholders and interest groups, document changes and update planning data bases where applicable.

If the proposed amendment is forwarded to the CRB for advice, and the TPC makes a determination on the amendment in consideration of the CRB's advice, proponents will usually be notified of the TPC determination within 90 days of receipt of the proposal. For amendments processed by the TPC with CRB advice, public review and comment will normally not be required. The TPC will notify the CRB, stakeholders and interest groups, document changes and update planning data bases where applicable.

If the proposed amendment is forwarded to the Parties for decision, the Parties will review the proposal including recommendations by the TPC and/or CRB, and decide on a course of action:

- If the proposed amendment is found to be pressing in nature, the Parties may decide to proceed with implementing the amendment and will give direction to the CRB and TPC accordingly. Once directed by the Parties, the CRB and TPC will make every effort to implement major unscheduled amendments within 120 calendar days. A 60 day public review and comment period will

normally be required for major unscheduled amendments and is included in the 120 day time period.

- If the Parties find that the proposed amendment is not pressing in nature, the amendment will be dealt with at the time of the next scheduled amendment of the plan.

5.3 Scheduled Amendments

Scheduled amendments to the plan occur every five years, if needed

The Clayoquot Sound Scientific Panel recommends that planning be based on a long-term perspective, at least in the order of 100 years when considering large areas, as is the case in watershed planning (R7.7). The panel also recognizes that the innovative practices applied in Clayoquot Sound may have unintended consequences, and that new knowledge and experience gained may give rise to changes in practices and planning (R3.19 and 3.20). For this reason, the panel recommends scheduled revisions to watershed plans every 5 years, or more frequently if required (R7.15).

Thus, if by the 5th year of the plan, a sufficient number of significant amendments have been identified, or new issues have emerged in the plan area that are not adequately addressed in the plan, then the Parties may choose to direct the TPC to redraft the plan.

6.0 Implementation and Monitoring

6.1 Implementation

The Central Region Board coordinated the public review of a draft version of this plan.

This Cypre watershed plan was presented to stakeholders, First Nations and the public for review and comment. The Central Region Board coordinated and facilitated the review process in the summer and fall of 2002, and collated all comments received. The CRB prepared recommendations on how to address the comments and submitted them to the Parties to the Interim Measures Extension Agreement – that is, the Central Region Chiefs and the provincial government – for their consideration and approval. The Parties endorsed the plan and the CRB's key recommendations and the technical planning committee finalised the plan as directed by the Parties.

The Cypre watershed plan took effect on July 1, 2003. Responsibility for the plan's implementation is shared amongst provincial agencies, forest operators, and the joint management structure established by First Nations and the Province:

Responsibility for implementing the plan is shared among provincial agencies, First Nations, and forest companies.

- The provincial government, through its resource agencies, is responsible for ensuring that this plan will be considered in the preparation of operational forestry plans and implementation of forest practices in the Cypre planning unit.
- Licence holders within the Cypre Watershed Planning Unit have made a commitment to carry out forest planning and operations consistent with this Plan.
- In keeping with the terms of the Interim Measures Extension Agreement, the CRB will continue to assess the compliance of forest operations with standards such as those set out by the Scientific Panel and provincial forestry legislation. The CRB will also ensure that the perspectives of First Nations are reflected in forest management activities.

The Parties will consider measures to make its management objectives legally enforceable.

First Nations and the Province will also consider establishing the key objectives for reserves and management zones set out here as "higher level plan objectives" under the pertinent legislation. Establishment of higher level plan objectives will have the effect of making the plan's objectives legally enforceable.

6.2 Monitoring

Since the inception of the Clayoquot Sound Science Panel Recommendations (CSSPR) forestry activities within the Sound have been carried out in accordance with the spirit and intent of the panel recommendations. As empirical knowledge and experience is gained through the practical application of the panel's recommendations, conclusions can be drawn with respect to the effectiveness of particular recommendations and practices in achieving the panel's stated objectives and goals.

Monitoring, research and adaptive management will test the effectiveness of practices in achieving stated objectives

Land managers will determine through monitoring and adaptive management the effectiveness of management decisions being implemented, and provide feedback where adjustments of practices or alternative practices are indicated to better achieve specific objectives. Research programs and active adaptive management methods will be conducted to assess the effectiveness of the panel's recommended standards and practices. This is consistent with panel's own recommendations, specifically:

> R3.19: Implement an adaptive management strategy to incorporate new knowledge and experience. Establish research and monitoring programs to assess effectiveness of these initial recommendations in meeting ecological, cultural, scenic and economic objectives, and to improve recommendations on an ongoing basis.
>
> R7.9: Monitor the effects of plans and check against management objectives to facilitate adjustments to better achieve intended goals; that is, employ adaptive management procedures.
>
> R8.3: Use the findings of this program to modify, as required, management strategies as well as individual plans and practices.

As a result of experience gained in implementation, and feedback obtained through research and monitoring, the planning team may adapt or refine particular management strategies or individual plans and specific practices. Any modification of the stated Scientific Panel recommendations or adaptation of watershed plan strategies and standards, however, will be supported by a clear statement of objectives, explicitly stated methods of analysing and collecting data, and continued monitoring.

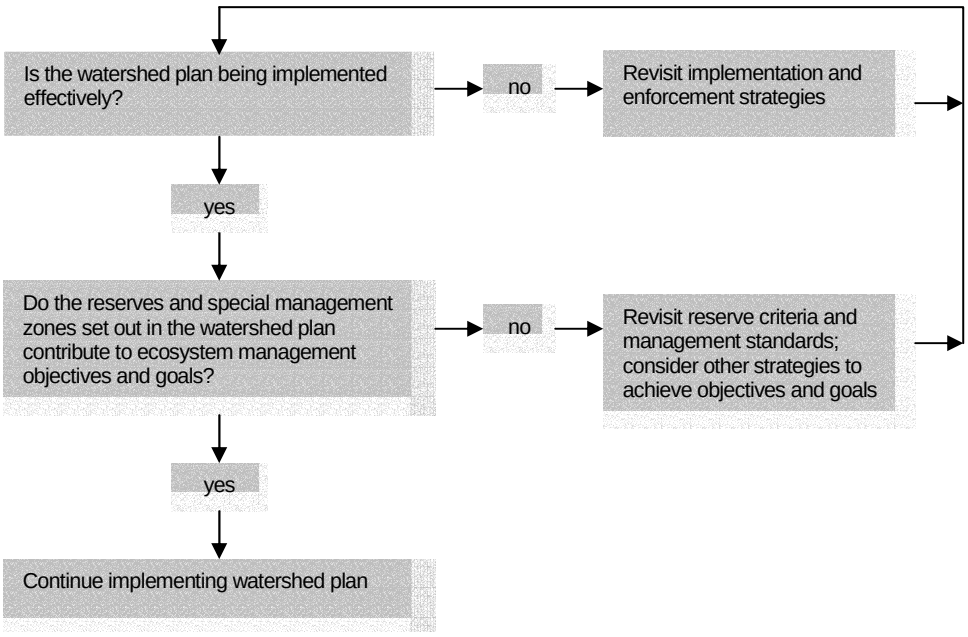
The provincial government, through its resource and planning agencies (including Ministry of Water, Land and Air Protection, Ministry of Forests and Ministry of Sustainable Resource Management), will monitor forest activities within the Flores Watershed Planning Unit to ensure that these activities are carried out in accordance with the Cypre Watershed Plan. Licensees will also incorporate regular operational monitoring into their plans, and carry out monitoring initiatives in partnership with other organizations.[80]

The Parties will continue to evaluate, refine and improve forest planning and practices over time.

The Technical Planning Committee will meet periodically with the Central Region Board to discuss and review monitoring activities. Collectively, the TPC and CRB will advice the Province and Central Region Chiefs whether the objectives of the Cypre Watershed Plan are being achieved and to determine whether the overarching goals of maintaining ecosystem integrity and the cultural integrity of local peoples are being realized at the watershed level. In keeping with the principles of adaptive management, the parties will continue to evaluate, refine and improve forest planning and practices at all levels over time. This ongoing evaluation will involve both monitoring the implementation of the watershed plan itself, and also examining whether the strategies contained in this Plan do

[80] see Long Beach Model Forest Society and Iisaak Forest Resources Ltd., April 2002.

in fact contribute to the achievement of ecosystem management goals and objectives. Figure 5.1 illustrates the basic elements of this evaluation cycle.



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Glossary

Please refer to Scientific Panel Report 5 for a detailed Glossary. The Scientific Panel reports, including the glossary in report 5 can be accessed at the following website:

http://srmwww.gov.bc.ca/rmd/specialprojects/clayquot/archive/reports/Panel.htm

Appendix 1: Planning Framework

Note: *Appendix 1 presents the Planning Framework as originally conceived in 1997 and implemented in the ensuing two years. In 1999, however, this original planning framework and Clayoquot Planning Committee were replaced in favour of a more streamlined and cost-effective process. The Clayoquot Planning Committee was replaced by the Technical Planning Committee, made up of First Nations representatives and staff from provincial resource planning agencies, and watershed-level planning became the primary focus of the Technical Planning Committee.*

Province of British Columbia
Clayoquot Sound Scientific Panel Report Implementation Planning Framework (February 1997)

INTRODUCTION

On July 6, 1995, the provincial government adopted the Clayoquot Scientific Panel report and committed to implementing the more than 120 recommendations of the Scientific Panel. This framework outlines how the panel's recommendations relating to forest planning in Clayoquot Sound will be implemented.

THE SCIENTIFIC PANEL RECOMMENDATIONS RELATING TO FOREST PLANNING

The Scientific Panel recommends a new approach to planning in Clayoquot Sound. An approach where decisions are based on ecosystem management principles and where the people most closely affected by decisions are responsible for making them.

Moreover, the panel recommends that all planning processes for forest and ecosystem use in Clayoquot Sound be undertaken with full consultation and shared-decision making with the Nuu-Chah-Nulth people of Clayoquot Sound.

The panel provides specific recommendations regarding this new planning framework in Chapter 7 of the report. These recommendations touch on such topics as planning principles, participation, planning process, timeframes, levels of planning and information requirements. The panel report does not however provide details on how the new framework should be implemented.

DEVELOPING A NEW PLANNING FRAMEWORK FOR CLAYOQUOT SOUND

During the past several months, the Central Region Board (CRB) and government staff have met with ex-Scientific Panel members to gain a better understanding of the panel report, its intent, and how it should be implemented.

The following framework outlines how this new approach to planning will be implemented. The framework is consistent with the recommendations of the Scientific Panel, while considering the perspectives of the CRB, government, and

the communities of Clayoquot Sound. Furthermore, it recognizes the need for greater community involvement in forest planning.

THE PLANNING FRAMEWORK - AN OVERVIEW

The new planning framework will be community-based. It will incorporate the ecosystem management principles outlined in the panel report by combining traditional ecological knowledge of the Nuu-Chah-Nulth people with scientific knowledge of the Sound.

THE PLANNING AREA

The area covered by the new planning framework will correspond with the April 1993 Clayoquot Sound land-use decision area and land-use designations. It includes the three special management areas, the integrated resource areas, and the established Class A provincial parks. Planning processes developed for Clayoquot Sound under the Scientific Panel processes will incorporate data and inventory from areas within Class A parks, but will not include the development of Master Plans for these parks.

THE PLANNING FRAMEWORK STRUCTURE

The planning framework will include:

- a planning committee; and,
- three watershed planning groups.

The *planning committee* will coordinate forest planning in Clayoquot Sound. The planning committee will be responsible for all matters relating to forest planning. Forest planning will be consistent with the recommendations of the Scientific Panel Report and will be based on sustainable ecosystem management.

Under the guidance of the planning committee, three *watershed planning groups* will prepare watershed-level plans following the recommendations of the Scientific Panel.

The watershed planning groups will be responsible for preparing watershed plans for all watershed planning units in Clayoquot Sound, including the Ursus Creek and Pretty Girl Lake Special Management Areas. Plans will be consistent with the Clayoquot Sound Land Use decision and will consider the work undertaken by the former special management area planning groups. Work completed by previous planning bodies such as the Tofino Creek Integrated Watershed Planning Committee and the Scenic Corridors Advisory Group and Interagency Planning Team will now fall under the mandate of the planning committee and corresponding watershed planning group.

Watershed plans will be developed in full consultation with the planning committee and the local public, including First Nations, licensees, interest groups and others. Once watershed plans are completed, the plans will be directed to the planning committee for approval. Where possible, the planning committee will try to create process efficiencies by dealing with all referral matters at the planning committee level (ie. informal referral process) and thereby eliminating the need for a more lengthy formal referral process. In some cases, the formal process may be defaulted to at the discretion of the CRB and/or provincial government.

Once watershed plans have been approved by the planning committee and have gone through the referral process either informally or formally, the plans will be directed to the provincial government for final approval and designation as "higher level plans" under the *Forest Practices Code Act of British Columbia.*

As required by the *Act*, all subsequent operational plans, such as Forest Development Plans, Silviculture Plans and Logging Plans must be consistent with the higher level watershed plans. In addition, operational plans must be consistent with the Scientific Panel's recommendations relating to site-level planning. Tenure holders will be responsible for developing operational plans. Operational plans will be routed through the formal referral process before being approved by the provincial government.

THE TREATY PROCESS

As it goes about its work, the planning committee must be cognizant of the objectives of the Central Region Board as defined in the Clayoquot Sound Interim Measures Extension Agreement along with the objectives of local governments, individual First Nations, and the province of British Columbia.

The planning framework will be responsive to the ongoing treaty process in Clayoquot Sound. The framework will change subject to agreements reached at the treaty table by the province of British Columbia and the Nuu-Chah-Nulth First Nations regarding the land and natural resources of Clayoquot Sound.

It is also recognized that plans developed under this new framework will be consistent with the land-use decision to the extent that the decision is consistent with the Panel's recommendations and the outcome of treaty negotiations.

REPORTING RELATIONSHIPS

The planning committee will report to the provincial government . The three watershed planning groups will report to the planning committee.

The attached diagram illustrates the reporting and referral structure.

STAFF AND FUNDING

Funding and technical and support staff for the planning framework will reside with the participating government agencies in a partnership arrangement.

THE PLANNING COMMITTEE

As mentioned above in the overview, the planning committee will be responsible for coordinating forest planning in Clayoquot Sound. This section outlines the specific roles and responsibilities of the planning committee, and provides details regarding membership, meetings, and decision making.

ROLES AND RESPONSIBILITIES

Specifically the planning committee will:

- develop a working protocol regarding how the planning committee will operate.
- coordinate planning activities in Clayoquot Sound according to the recommendations of the Scientific Panel Report.

- ensure the local people, including First Nations, license holders, interest groups and others have opportunities to participate in planning.
- assume the responsibilities of subregional planning by building linkages among watershed planning units.
- provide guidance and direction to the three watershed planning groups.
- develop a terms of reference for the watershed planning groups to guide their operation.

- identify and prioritize watersheds for watershed-level planning based on input from government agencies, the forest industry, and public groups.
- coordinate technical and local expertise available for planning.
- coordinate and provide advice on the development of a common, consolidated Master Library of resource inventories and information for all of Clayoquot Sound.
- coordinate and provide advice on baseline monitoring in the sound.
- monitor and coordinate the activities undertaken by the watershed planning groups.
- ensure watershed plans meet the *Forest Practices Code Act of British Columbia* and the Scientific Panel Report recommendations.
- be responsive to the ongoing treaty process.
- review and recommend approval of watershed-level plans.

The committee's immediate priorities are to:

- develop and agree on a working protocol that will guide the planning process.
- develop interim criteria for watershed level plans in previously developed watersheds.
- set criteria for the development of watershed-level plans.
- review and establish criteria for inventory and baseline monitoring programs for each watershed.
- establish three watershed planning groups.

MEMBERSHIP

The planning committee will be community-based. It will be composed of twelve Central Region Board members and three provincial government representatives.

Central Region Board

Central Region Board members will be paid on a per diem rate for their participation in planning committee meetings and will be responsible to their elected councils and communities.

Government Representatives

The provincial government will be represented by BC Environment, BC Tourism and Ministry of Forests.

MEETINGS

The planning committee will meet regularly and will set its own meeting schedule, once established. The committee will develop and agree on a working protocol that will guide the planning process. The protocol will clarify how the group will work together, how disputes will be settled, how decisions will be reached, and how the process (including meeting and work schedules) will proceed.

All meetings will be open to public observation. The public may request time on meeting agendas to make presentations. All papers, reports, and documents will be available for public review.

DECISION MAKING

Decisions of the planning committee will be made according to the working protocol developed by the committee.

In the event that the planning committee cannot reach agreement, a report outlining the issue(s) and option(s) will be provided to the Provincial Government within 10 days of the final date of discussions, for decision.

WATERSHED PLANNING GROUPS

This proposal transfers the responsibility of subregional planning as outlined in the panel report to the planning committee is an effort to reduce costs, increase efficiency and ensure consistency among subregions. A maximum of three watershed planning groups will be formed.

The following section outlines the specific roles and responsibilities of the watershed planning groups and provides details regarding membership, meetings, and decision making.

ROLES AND RESPONSIBILITIES

Specifically, the three watershed planning groups will:

- develop and agree on a working protocol.
- prepare watershed-level plans as outlined in the Scientific Panel Report pages 168 to 171. Watershed plans will define reserve areas and harvestable areas, but will not go so far as to plan management activities within harvestable areas as suggested by the panel on pages 171 and 172.

MEMBERSHIP

The three watershed planning groups will be composed of one community representative, one First Nations representative, one CRB member and one provincial government representative. These representatives may be planning committee members or other representatives. In all cases, group members must be highly motivated and knowledgeable about resources within the subregional planning area.

Watershed planning group members will be appointed by the provincial government and will be paid on a per diem rate for their participation in meetings.

<u>Government Representatives</u>

- A representative from each of the three government agencies - BC Environment, BC Tourism, and Ministry of Forests, will sit on the subregional planning groups.
- Government will provide the watershed planning groups with clerical, administrative, and technical staff.

First Nations Representative
First Nation interests will be represented as determined by the Nuu-Chah-Nulth Central Region Tribes.

Community Representative
Non-aboriginal community interests will be represented as determined by ?????.

CRB Representative
CRB representative will be determined by ????

Other Groups
Experts, stakeholders, and consultants who hold specific expertise or knowledge about the watershed planning area will be invited to participate as required.

MEETINGS
Watershed planning groups will set their own meeting schedule, once established.

All meetings will be open to public observation. The public may request time on meeting agendas to make presentations. All papers, reports, and documents will be available for public review.

DECISION MAKING
Decisions of the watershed planning groups will be made according to their working protocol. In the event that decisions can not be reached, a report outlining the issue(s) and option(s) will be sent to the planning committee within 10 days of the final date of discussions.

INTERIM PLANNING PROCESS
Until the planning committee is fully functioning, operational plans for 1997 logging and 1998 main road construction, including preliminary watershed plans, forest development plans and cutting permits, will be prepared by the forest licensees. These plans and permits will be assessed by government in consideration of the Scientific Panel recommendations and the interim criteria set out in CRB's August 21, 1995, letter as well as any further criteria developed by the CRB or Planning Committee which is agreed to by the provincial government. Preliminary watershed plans will only apply to developed watersheds where forest harvesting has already occurred and the plans will only remain in effect until such time as formal watershed plans as per the panel report are developed by the watershed planning groups.

Any such plan will be referred through the CRB as per the Interim Measures Agreement.

Appendix 2: Clayoquot Sound Technical Planning Committee

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Appendix 3: Inventories and Baseline Information used in Watershed Planning

Over the past years an unprecedented number of scientists, government specialists, technical experts and First Nations people have conducted studies within Clayoquot Sound. This activity can in part be attributed to government's adoption of the Scientific Panel reports in 1995 where specific information requirements for planning were identified. It is also a result of funding made available through the Forest Renewal Program.

The nature of these inventories and studies varies widely, in terms of subject matter, methodologies, and data collection, but they are all aimed at identifying and describing the environment of Clayoquot Sound, its natural processes, and its cultural, scenic and recreational values.

Appendix 2 provides a general description of each FRBC-funded inventory. The inventories described below meet or exceed the Resource Inventory Committee (RIC) standards. Many of them have been customized specifically for Clayoquot Sound, and some are new, never before done anywhere else in the province.

Vegetation Resource Inventory

Description

The Vegetation Resource Inventory (VRI) is a relatively new inventory designed by the Ministry of Forests Inventory Branch to replace the traditional forest cover inventory. It is compiled in two phases - Phase I is photo interpreting and classifying vegetation into polygons of similar attributes, and Phase II is a sample-based adjustment to the attribute values estimated in Phase I. During Phase I all types of vegetation cover, including trees, shrubs, herbs, bryophytes and non-vegetation cover are described. These descriptions are based on the dominant vegetation visible from 1:15,000 aerial photographs, and are field-tested in the air and on the ground.

While the requirements for Phase I were generally established at the time of the Clayoquot Sound VRI, significant development work was still required including standards for map labels. Phase II was still under development. The process of re-inventorying the Sound began in March 1996 when a needs analysis was prepared by Simons Reid Collins. The analysis evaluated the existing forest cover inventories[81] and made recommendations on how to improve them.[82] Simons Reid Collins recommended the Sound be completely re-inventoried according to the Vegetation Resource Inventory standards.[83] In addition, it recommended two enhancements:

(1) undertaking an old growth pilot study to establish a protocol for describing the old growth forests of Clayoquot Sound; and,
(2) increasing the number of forest stands visited in the field (e.g., sampling intensity) both in the air and on the ground to improve the accuracy of photo interpretations.

[81] Forest Cover Inventories existed at the time for TFL 44 (MacMillan Bloedel Ltd.), TFL 54 (International Forest Products Ltd.), and the Arrowsmith TSA. Portions of Strathcona Park, Pacific Rim National Park, and some Indian Reserves have older inventories.
[82] *Needs Analysis, Proposal and Budget for a Phase 1 Vegetation Inventory for Clayoquot Sound*, March 1996, Simons Reid Collins.
[83] *Vegetation Resource Inventory Phase 1 Photo Interpretation Procedures*, May 1996, Province of British Columbia.

The Vegetation Resource Inventory for Clayoquot Sound was conducted over a three year period from 1996 to 1999 by Arc Alpine Consultants. Following the recommendations of Simons Reid Collins, one of the first steps Arc Alpine undertook was the old growth pilot. Arc Alpine gathered a team of people to assist with this, including:

- Dr. Richard Atleo - Coordinator, First Nations Studies, Malaspina University-College and Co-chair of the Scientific Panel for Sustainable Forest Practic es in Clayoquot Sound.
- Frank Scheithauer, RPF - Project Manager, ARC Alpine Resource Consultants Ltd.
- Alex Inselberg - Consulting Forest Ecologist
- Jack Louie, RPF, TFL Inventory Coordinator, Ministry of Forests, Resource Inventory Branch
- Jack Mcellan, RPF, Forest Inventory Photo Interpretation Specialist.

The team visited several old growth stands in the field. Based on the field results, the team recommended changes to the VRI Phase 1 procedures. One of the recommendations related to the descriptor known as vertical complexity. Rather than describing the vertical complexity of the forest canopy in terms of even-aged, uneven-aged and mosaic, the group recommended that vertical complexity classes be described according to canopy uniformity from 1 - Very Uniform Canopy to 5 - Very Non-Uniform Canopy. The provincial VRI standards have now changed to reflect this improved definition.

After the old growth study, Arc Alpine gathered and evaluated all existing vegetation information for the area and compiled and digitized it into one database and map. This information helped determine how many additional data sources (i.e., field samples either by air or ground) were needed for the VRI and where they should be located.

The VRI fieldwork was spread over three years, starting with the Bulson Pilot Project in 1996, and employed several local people. The field work consisted of 250 ground calibration plots, 200 ground observations, and 1200 air calls. Visual products, including stereograms of the ground calibration plots and video footage of air calls were part of the inventory.

Vegetation was classified and mapped at a scale of 1:20,000 and each polygon was described. Vegetation descriptions include: polygon identification, tree data including stand structure, species composition, age, height, basal area, density, and number of snags per hectare, shrub, herb and bryoid data, non-vegetated data, history data and derived data for some polygons including tree site index and average tree volume.

How is Vegetation Resource Inventory Used in Watershed Planning?

The VRI is an important inventory layer. It is used in watershed planning in a variety of ways, including identifying:

- trees in the older age classes 8 and 9; at least 40% of the forest in a watershed planning unit must be in old growth condition, of which 20% must constitute forest-interior conditions;
- critical wildlife habitat, such as marbled murrelet habitat; this information is used to identify reserves for red- and blue-listed animal species; and,
- tree species abundance, distribution, and age class distribution by tree species for each major ecosystem (i.e., site series); this information is used in combination with terrestrial ecosystem mapping to identify reserves for ecosystem representation.

Terrestrial Ecosystem Mapping (TEM)

Description

Terrestrial ecosystem mapping of Clayoquot Sound was conducted by Madrone Consulting Limited from 1996 to 1999. This inventory classified, mapped at a scale of 1:20,000, and described according to Resource Inventory Committee standards the natural ecosystems of the Sound. The reports entitled *Year One Terrestrial Ecosystem Mapping and Wildlife Interpretations for the Clayoquot Sound Area,*[84] *Terrestrial Ecosystem Mapping for the Clayoquot Sound Area Year Two,*[85] and *Terrestrial Ecosystem Mapping for the Clayoquot Sound Area - Year Three*[86] provide more detail on the three year inventory project. Using TEM, Madrone also produced wildlife interpretation reports and maps for black bear, coastal black-tailed deer, Roosevelt elk, bald eagle and marbled murrelet. For more information regarding the wildlife interpretations see *Wildlife and Wildlife Habitat Inventories* below.

Shearwater Mapping Limited also conducted terrestrial ecosystem mapping for Flores Island, Bulson and Ursus Valley between 1994 and 1995. In some cases, Madrone updated Shearwater's work to be consistent with the RIC standards of the day. In other cases, Shearwater updated it themselves.

In addition to Shearwater's mapping, Madrone also collected plot data and maps from earlier work conducted for International Forest Products (by Madrone Consultants Ltd.) and the Ministry of Forests, (Lewis, 1992). Other background information included the Conservation Data Center (CDC) tracking lists for vertebrate wildlife, plants, and ecosystems and relevant reports.

Field work was conducted in 1996, 1997, and 1998, with the assistance of local people. A survey intensity level 4[87] was used meaning 10-25% of the polygons were surveyed. Data collected followed methods outlined in the *Field Manual Describing Ecosystems* (1996). In addition, wildlife habitat assessments were made at the time of the ecosystem field work. Habitat rating forms, coarse woody debris forms, and wildlife tree forms were completed at detailed plots. As well, each plot was searched for evidence of wildlife use, and significant observations between plots were recorded.

Classification and mapping followed the methods outlined in the *Standards for Terrestrial Ecosystem Mapping for British Columbia*, Review Draft (1995), and the *Addenda* (1996) for year 1 mapping and *Standards for Terrestrial Ecosystem Mapping in British Columbia* (1998) for year 2 and year 3 mapping. Ecosystems are classified and mapped according to biogeoclimatic zone, subzone, variant, and site series. Ecosystems are further described in terms of structural stages, general distribution of vegetation, dominant vegetation, associates, and site modifiers. Field work, photo interpretations, and mapping were independently reviewed by a provincial correlator and senior ecosystem specialists from MELP and MOF.

How is Terrestrial Ecosystem Mapping used in Watershed Planning?

TEM is used extensively to develop watershed level plans. Specifically, the inventory is used to identify:

- red- and blue-listed plant communities and to establish reserves to protect them;

[84] Madrone Consultants Ltd., April 1998
[85] Madrone Consultants Ltd., September 1998
[86] Madrone Consultants Ltd., March 1999
[87] *Addenda to Terrestrial Ecosystem Mapping Standards*, May 1, 1996, Pg. 19.

- all ecosystems (site series) found within Clayoquot Sound, calculate their relative abundance and distribution, and to ensure that the entire variety of ecosystems is represented in the reserve system;
- critical wildlife habitat;
- wetland ecosystems reserved as part of the hydroriparian system; and
- sensitive soils.

Wildlife and Wildlife Habitat Inventories

Description

Wildlife inventories were completed for identified species-at-risk and forest-dependent species in accordance with the Clayoquot Sound Scientific Panel recommendations relating to wildlife and input from the Clayoquot Sound Planning process. The objectives of the inventories varied on a species-by-species basis, but overall the inventories were focused on red- and blue-listed species and were conducted to provide information on critical habitats in accordance with the watershed-level information requirements of the Panel. Specifically, inventories were completed on the following species and their habitats within Clayoquot Sound:

- marbled murrelet (red-listed)
- black bear
- Roosevelt elk (blue-listed)
- Bats; one red-listed species (Keens long eared myotis))
- forest birds; one blue-listed species (Huttons vireo)
- owls; one blue-listed species (Northern Pygmy Owl)
- amphibians
- eagles

In addition, Clayoquot Sound was included as part of Vancouver Island wide inventories for water shrew and white tailed ptarmigan, both red-listed species.

In addition to information collected on specific wildlife species, habitat ratings were completed for ecosystem polygons mapped as a part of the terrestrial ecosystem inventory. Habitat interpretations, including species habitat models and planning unit interpretations have been developed for the following species:

- black bear
- marbled murrelet
- black tailed deer
- Roosevelt elk
- bald eagle
- amphibians

Wildlife inventories and habitat interpretations were based on Resource Inventory Committee standards (RIC, 1996).

How is the Wildlife and Wildlife habitat inventory used in Watershed Planning?

Both the wildlife inventories and the habitat ratings were used to determine watershed-level reserve areas based on critical life stages of wildlife species. Watershed level reserves were identified for marbled murrelets based on critical habitat requirements. As was forecast by the Scientific Panel (Report 5 p.169), the results of several species-specific inventories indicate that many species' habitats are best protected at the site level

through the provision of suitable forest structures. Site-level considerations for conservation of critical habitat structures and elements are presented in chapter 4.1.2.

Hydroriparian Inventory

Description

The Scientific Panel emphasizes the important linkages between waterbodies (aquatic) and their adjacent (riparian) land and recommends that these two systems be managed as a single entity termed the "hydroriparian ecosystem."

The hydroriparian inventory is unique to Clayoquot Sound. The objectives of the inventory are to identify, classify and map at 1:20,000 scale all streams, lakes, wetlands and marine shorelines for the purpose of defining hydroriparian reserves for the protection of aquatic and riparian ecosystems. The inventory follows the classification system and recommended reserve widths set out by the Scientific Panel.

Streams are classified according to five basic criteria. They are:

- channel type (alluvial vs non-alluvial),
- stream gradient (<8%, 8 to 20%, and >20%),
- entrenchment (entrenched vs not entrenched),
- stream channel width (<3 m, 3 to 30 m, >30 m), and
- stream flow (ephemeral vs not ephemeral).

Lakes are classified according to the nutrient status of the lake (oligotrophic or nutrient poor versus non-oligotrophic) and according to gradient of the lake shore. Four general classes are used:

- sand or gravel beach,
- low-rocky shore,
- cliffed or bluff shore, and
- wetland shore.

Wetlands are shallower than lakes with a water depth of less than 1 metre. Of the six classifications of wetlands identified by the Scientific Panel, four are found in Clayoquot Sound. Wetlands are classified as marsh, fen, swamp or bog.

Marine shorelines are classified according to exposure to open or protected waters, and according to the physical nature of their coastline. For a complete description of the hydroriparian classification system developed by the Panel refer to CSSP 5, chapter 7.4.

Madrone Consultants Ltd. conducted the hydroriparian inventory from 1996 to 1999, with the assistance of local people and EBA Engineering Consultants Ltd. in 1998. Initial classifications were done using 1:20,000 TRIM maps and 1:15,000 colour aerial photographs. Classifications were verified in the field. In 1996 a total of 110 stream reaches were visited on the ground. At each stream reach, information was collected and recorded on specially designed field data cards. Field verification of lake and marine shores was done by helicopter reconnaissance. In 1997, all field verification was done by air. In 1998, the field work methodology was refined. For more information on the methodology used to conduct this inventory, refer to reports *Hydroriparian Inventory Year One Final Report Clayoquot Sound*[88] and *Hydroriparian Inventory for the Clayoquot Sound Area Year 2.*[89]

[88] Madrone Consultants Ltd., March 1998
[89] Madrone Consultants Ltd., October 1998.

Following the field work, changes to the initial classifications were made and final products were audited by Ministry of Forests personnel. Final inventory products include digital attribute database, 1:20,000 hydroriparian classification map, and 1:20,000 preliminary hydroriparian reserve map.

Most of the wetlands were mapped as part of the terrestrial ecosystem mapping (TEM) inventory and are also shown on the hydroriparian reserve map. For an ecosystem to be classified as a wetland and be designated a reserve, at least 50% of its area must be comprised of one or more of the site series listed in the following two tables.

Table 1: Wetland Ecosystems Reserved

Biogeoclimatic Zone Subzone/Variant	Site Series Number	Site Series Symbol	Site Series Name
CWHvh1	12	LS	PlYc - Sphagnum
	n/a	PS/SM	
CWHvm1	13	LS	Pl - Sphagnum
CWHvm2	10	LS	Pl - Sphagnum
	11	RC	CwSs - Skunk Cabbage
MHmm1	n/a	SC	Sphagnum - Cottongrass

Other non-vegetated and shrub/herb dominated polygons were designated as wetlands as they are either part of the littoral zone or adjacent marine shore and beside some lakes.

Table 2: Non-Vegetated and Shrub/Herb Areas Reserved

Biogeoclimatic Zone Zone Subzone/Variant	Site Series Symbol	Site Series Name
CWHvh1	AL	Dr - Lily-of-the-Valley
	BS	Bulrush - Sitka burnet marsh
	CM	Rocky Mountain cow lily - Marsh cinquefoil marsh
	DS	Dunegrass - Silverweed
	GS	Tufted hairgrass - Silverweed
	SB	Sedge - Buckbean
	SM/	Sweet gale - Sphagnum
	PS	Shore pine - Sedge
CWHvm1	CW	Act - Willow
	DS	Dunegrass - Silverweed
	GS	Tufted hairgrass - Silverweed
	SC	Sphagnum - Cotton-grass
	SG	Sphagnum - Deer cabbage
	SM/	Sweet gale - Sphagnum
	PS	Shore pine - Sedge
	WS	Willow - Salmonberry
CWHvm2	RC	Redcedar - Skunk cabbage
	DS	Dunegrass - Silverweed
	GS	Tufted hairgrass - Silverweed
	SC	Sphagnum - Cotton-grass
	SG	Sphagnum - Deer cabbage
	SM/	Sweet gale - Sphagnum
	PS	Shore pine – Sedge
	WS	Willow - Salmonberry
MHmm1	SC	Sphagnum - Cotton-grass

Floodplains were mapped as part of the terrain and terrain stability mapping and are shown on the hydroriparian reserve map. Terrain polygons with the coding '$F^{a}p$' ('F' - Fluvial, '^{a}' - active process qualifier and 'p' - plain surface expression) have a minimum reserve width of 50 metres to a maximum of the entire contemporary flood plain. For a summary of stream, lake, wetland and marine classifications with their corresponding reserve widths see chapter 3.2.1.

How is Hydroriparian Inventory used in Watershed Planning?

The hydroriparian inventory is used to establish reserves at the watershed level to protect hydroriparian resources. Reserve boundaries will be refined as required when more site-specific information is collected during operational planning.

Additional Expert Advice regarding Open and Protected Marine Shores

Dr. Michael Church, ex-Scientific Panel member, provided additional advice regarding the differentiation of 'open' versus 'protected' shorelines. Dr. Church submitted that "*any shore with a direct view to the open ocean (on any azimuth) should be considered adjacent to open waters. In addition, a precautionary approach would…consider shores in sounds and inlets facing greater than 5 km over water fetch as being adjacent to open waters.*" Dr. Church goes on to caution, however, about using a set distance of 5 km, as wind steering around bays and inlets is all-important and he suggests that the

management regime should be guided by evidence of significant wind damage on the shore in question.

Dr. Church further explains that there may be shorelines in the path of outflow winds, but goes on stating that he is "*inclined not to make special specification for inlets subject outflow winds since such winds blow along the inlet and the forests on the adjacent shore would, I guess, gain little additional protection by additional depth normal to the wind direction. However, certain (island?) shores down the inlet, or at a sharp bend may be directly in the path of outflow winds and should probably be considered to be subject to unusual wind forces.*"

The Technical Planning Committee is aware that the current marine shore classification and assignment of reserves as presented in this watershed plan are not consistently reflective of the above advice. Marine shore reserves will be reviewed and where indicated, revised based on the above advice. Future versions of this watershed plan will incorporate the amended reserves. It is expected, however, that the above advice will be used without delay in site level planning to either confirm or revise the marine shore reserves.

Fish and Fish Habitat Inventory

Description

The Reconnaissance Fish and Fish Habitat Inventory is a sample-based survey covering whole watersheds (i.e., all lakes, stream reaches and connected wetlands within the watershed), as defined from 1:20 000 scale maps and air photos. This inventory is intended to provide information regarding fish species characteristics, distributions and relative abundance, as well as stream reach and lake biophysical data for interpretation of habitat sensitivity and capability for fish production.

The Reconnaissance Fish and Fish Habitat Inventory consists of two components:

1. Fish: This includes identifying and mapping fish-bearing stream reaches and lakes, using both existing and new field information. Field inventory includes:
    - in streams: sampling for species presence and characteristics (e.g., size, age, relative abundance), stratified by channel type, with emphasis on species diversity and the determination of upper distribution limits; and
    - in lakes: sampling for fish presence in all field-sampled lakes, and for species composition and characteristics in primary or main lakes within the watershed.

2. Fish Habitat: This includes identifying and coding all waterbodies (at 1:20 000) and, where necessary, augmenting the mapped stream network:
    - in streams: identifying reaches; characterizing reaches (e.g., confinement, order, pattern, gradient), and recording site characteristics at a sample of reaches stratified by reach type. Field work includes classifying channels (channel assessment procedure [CAP] type), locating and identifying obstructions, describing riparian area properties (e.g., vegetation, presence of fisheries sensitive zones), and mapping critical habitat locations;
    - in lakes: identifying all lakes; determining lake size (i.e., surface area), elevation, and biogeoclimatic zone; characterizing lake riparian area

(e.g., vegetation, land use, access); and assessing fish production potential.

How is the Fish and Fish Habitat Inventory used in Watershed Planning?

This inventory and the associated watershed-based mapping is used to generate interpretative maps that indicate known fish species presence, predicted distribution, as well as important or critical stream reaches for spawning and or rearing. In addition, this inventory is used to identify watershed or fisheries habitat restoration opportunities. The interpretative maps are cross referenced with the final reserve network to ensure that the network protects fisheries habitat values.

Cypre Inventory Results

The following fish species have been identified in the Cypre planning unit:

- Resident Fish: Cutthroat trout, Rainbow trout, Dolly Varden Char, Winter and Summer Steelhead;
- Anadromous Salmon: Chum, Chinook, Coho, Pink, sockeye
- Other species: Sculpins.

Dolly Varden were found in only two of Cypre's watersheds so far. These fish reside in the upper Cypre River and mid-section of Cotter Creek, above the barriers to anadromous salmon. These populations have high biodiversity values since they have been isolated from anadromous forms for thousands of years.

Rainbow trout are found in Cypre River, and the smaller creeks such as Bawden, Peneetle and two other unnamed creeks.

Fish habitat types are widely varied, ranging from high gradient boulder/cobble streams to low gradient gravel-bedded streams.

Table 3 (following page) summarizes information on the physical characteristics and fisheries values of each area in the Cypre Planning Unit.

Table 3: Summary of physical characteristics and fisheries values in the Cypre planning unit (from Lewis, 1999)

Area	Physical Characteristics	Fisheries Values
Cypre River	• Large system with extensive anadromous access • Large low gradient floodplain with extensive off channel habitat • Extensive logging has created many in-channel and upslope problems, especially in tributaries to the mainstem	• excellent coho and cutthroat rearing habitat in lower reaches on the floodplain • potential for large coho populations • system is also stocked by Tofino Salmon Enhancement Society with coho, chinook • high fisheries values • high biodiversity value • Dolly Varden population in headwaters • historically supported native food fishery • good spawning, rearing and adult holding habitat in anadromous reaches • important native food fishery
Bedwell Channel	• small, high gradient systems • headwater slopes susceptible to landslides • east side of channel mostly unlogged, steep terrain • west side of channel logged heavily, upslope instability problems • three drainages contain small lakes with no anadromous access.	• coho observed in one system; possible occurrence in other systems with anadromous access • chum may access the mouths of the numerous steep creeks for spawning areas • potential Dolly Varden habitat in medium size stream near head of Warn Bay (creek farthest east in unit) • cutthroat habitat is extensive
Herbert Inlet East	• medium sized systems have low gradient sections with anadromous access. Tributaries usually disturbed by logging activity • smaller systems have higher gradient and usually disturbed extensivley by logging activity	• excellent coho and cutthroat rearing habitat in lower watershed • good rainbow habitat in higher gradient mid-watershed reaches • resident cutthroat observed upstream of barrier falls • productive system which supports good anadromous and resident populations of fish • high fisheries values
North-East	• small, high gradient systems • generally scoured channels • 0-200 m of anadromous length • Riley Creek has large lake with surface outflow. This results in warmer stream conditions and faster fish growth,	• Medium size systems usually have high biodiversity and fisheries values • Several isolated resident cutthroat populations potentially genetically unique • Potential steelhead populations in third order and higher streams • Dolly Varden population upstream of anadromous barrier in Cotter Creek

Logging has been extensive in the Cypre River and Herbert Inlet East watershed groups, which contain the higher biodiversity values of the planning unit. Bedwell Channel watersheds are logged considerably on the west side slopes and contain mostly intact forests on the east side. Smaller channel sizes and higher gradients in the Bedwell watersheds lead to less variation of fish habitat.

Terrain And Terrain Stability Inventory

Description

Terrain and terrain stability mapping for Clayoquot Sound was conducted by Madrone Consulting Limited and subcontractor EBA Engineering Consultants Limited from 1996 to 1999. The data were collected and presented at a scale of 1:20,000 according to the

Resource Inventory Committee standards[90] (RIC). Terrain stability maps were generated following the standards and procedures outlined in "Mapping Assessing Terrain Stability Guidebook"[91] (FPC). Refinements were made to the five class terrain stability classification system by segregating the terrain stability ratings for clear cuts from those for roads. This change was based on the results of an extensive terrain attribute study carried out on the west coast of Vancouver Island (including Clayoquot Sound) which show that terrain stability along roads and within cutblocks can differ substantially in certain terrain conditions. Rankings of surface erosion potential and landslide induced stream sedimentation potential were also included as part of the terrain stability mapping.

Before going out into the field, interpretations of the 1:15,000 air photos taken in 1996 and delineation of terrain unit polygons were carried out. Field work was conducted in 1996 through to 1998 with the assistance of local people. Field work was aimed at checking the accuracy of photo interpretations and delineations, making necessary revisions, and gathering more information on terrain polygons. A Terrain Survey Intensity Level B was used meaning that at least 50% of pre-typed terrain polygons were field checked. Standard data forms were filled out and observations were recorded including slope processes and evidence of active or historical landsliding. Field work and photo interpretations were independently reviewed by a provincial correlator before 1:20,000 terrain and terrain stability maps were produced.

Terrain Classification Map

The 1:20,000 terrain classification map contains information for each terrain polygon, including:

- surficial material
- soil texture;
- surface expression;
- geomorphic processes;
- soil drainage;
- stratigraphic indicator;
- qualifying material descriptor;
- slope gradient;

Refer to the reports entitled *Year One Terrain Inventory Clayoquot Sound,*[92] *Terrain Inventory for the Clayoquot Sound Area - Year* 2,[93] and *Terrain Inventory for the Clayoquot Sound Area - Year Three,*[94] for more details.

Terrain Stability Map

Each terrain polygon is assigned a terrain stability class. "Terrain stability classes reflect a measure of the probability that a slide will occur. It thus is a measure of the hazard."[95] As mentioned above, the five class system was refined according to the terrain attribute study conducted in 1997 by EBA Engineering Consultants Ltd., and Terry Rollerson, P.Geo., and former Research Manager for the Vancouver Forest Region. Where terrain stability classes for roads and cutblocks differ within a terrain polygon, two classes are noted on the terrain stability map - one for roads (e.g., Vr = V roads) and one for cutblocks (e.g., IIc = II cutblocks). A sixth class has also been added to the system - III* for those polygons that have a higher potential for slope failure than other class III polygons. However, during the planning process, terrain class III* was upgraded to terrain class IV because the management implications, namely the requirement for an on-site assessment by a terrain specialist, are the same. Table 4 below outlines the interpretations for each terrain stability

[90] *Guidelines and Standards for Terrain Mapping in British Columbia,* Resource Inventory Committee, 1996.
[91] BC Ministry of Forests, 1997 and 1999.
[92] Madrone Conultants Ltd., August 1997.
[93] Madrone Consultants Ltd., September 1998.
[94] Madrone Consultants Ltd., March 1999.
[95] *Terrain Inventory for the Clayoquot Sound Area - Year 2*, Madrone Consultants Ltd., September 1998, Pg.23.

class.

Along with the terrain stability class, the 1:20,000 terrain stability map also classifies surface erosion potential for all polygons using a five class ranking ranging from very low potential (VL) to very high potential (VH) and assesses the likelihood of landslide induced sedimentation reaching a stream as low (1), medium (2), or high (3), for those polygons with a terrain stability class of IV or V.

How are Terrain and Terrain Stability Mapping used in Watershed Planning?
Terrain and Terrain Stability Maps are used in a number of ways in watershed planning. Primarily, they help to identify areas where reserves may need to be established, including:

areas with a high likelihood of landslide initiation following harvesting or road building;
areas with a high surface erosion potential and/or high likelihood of landslide induced sedimentation reaching a stream; and,
areas that contain sensitive soil types.

Terrain stability mapping also identifies areas where on-site field inspections are required to be undertaken by geoscientists to confirm the condition of terrain stability prior to any development taking place.

Table 4: Terrain Stability Classes[96]

Terrain Stability Class	Interpretation
I	• No significant stability problems exist.
II	• There is a very low likelihood of landslides occurring following timber harvesting or road construction. • Minor slumping is expected along road cuts, especially for 1-2 years following construction.
III	• Minor stability problems can develop. • Timber harvesting should not significantly reduce terrain stability; there is a low likelihood of landslide initiation following timber harvesting. • Minor slumping is expected along road cuts, especially for 1 or 2 years following construction. There is a low likelihood of landslide initiation following road building. • A field inspection by a terrain specialist is usually not required.
III*	• Using the criteria based on the terrain attribute study the terrain within the polygon is rated as Class III. However, there are one or more terrain characteristics (e.g., soil depth that may increase the hazard). The potential for significant slope failures following logging may be higher than other Class III polygons. • On-site geotechnical evaluation by a qualified terrain stability specialist is required prior to logging.
IV	• Expected to contain areas with a moderate likelihood of landslide initiation following timber harvesting or road construction. Wet season construction will significantly increase the potential for road-related landslides. • A field inspection of these areas is to be made by a qualified terrain specialist prior to any development, to assess the stability of the affected area.
V	• Expected to contain areas with a high likelihood of landslide initiation following timber harvesting or road construction. Wet season construction will significantly increase the potential for road-related landslides. • A field inspection of these areas should be made by a qualified terrain specialist prior to any development, to assess the stability of the affected areas.

Note: Terrain Class III* has been changed to Terrain Class IV.

Terrain stability mapping is also used, along with terrestrial ecosystem mapping to identify sensitive soils as defined in the consultation report prepared by Tom Millard, Paul Courtin and Dennis Collins (BC Ministry of Forests, 1998b). Table 5 below specifies the terrain and ecosystem types that fall within each of the six categories of sensitive soils identified.

[96] *Terrain Stability Map Legend*, Madrone Consultants Ltd.

Table 5: Terrain and ecosystem types associated with sensitive soil categories

Sensitive Soil Categories	Terrain Type	Biogeoclimatic Variant	Ecosystem Types (TEM-primary)
bedrock terrain	pure "R"		
shallow organic matter	pure "Ox"		
organic soils	pure "O"		
blocky and bouldery colluvial material	pure "aC and bC"		
active colluvial cones or fans and alluvial fans	pure "C^ac, C^af , F^af and F^ap"		
poor growing sites (site index < 10)		CWH vh1	BE,CB,LR,LS,PD SM,RO, WP.
		CWH vm1 and vm2	BE,LC,LS,MM, PD,RO,SA,SM, TA.
		MHmm1	MH,MK, MM,PS, RO,SA,TA.
		MHmmp	all
		AT	all
Wetlands			See Table 1

Sources: Terrain Classification System for British Columbia, Version 2, 1997. Madrone, Terrestrial Ecosystem Mapping, 1998/99.

For more information regarding reserves established for unstable terrain and sensitive soils, see chapter 3.2.2.

Landslide Inventory

Description

An inventory of landslides in Clayoquot Sound was conducted by EBA Engineering Consultants Ltd., in 1996 and 1997. In total, 1089 landslides were described and mapped using the 1:15,000 aerial photography (September 1996) and 133 of these were examined in the field. Landslide data cards and landslide rehabilitation data cards were filled out in the field. Detailed information and measurements were recorded including: landslide area, length, slope gradient, slope position, soil type and depth, type of failure, possible triggering factors, plantability and treatment prescriptions.

Among other things, the inventory found that landslide frequency is higher in logged terrain than in the natural forest, although the total area disturbed is greater in the natural forest than in logged areas. In addition, "slope aspect as well as distance to coastline seem to influence the occurrence of landslides. Southeastern slopes close to the coast are particularly susceptible to landsliding."[97]

[97] *Landslide Inventory Clayoquot Sound, Vancouver Island, B.C. - Preliminary Results,* EBA Engineering Consultants Ltd., April 1997, Pg. iii.

The project deliverables includes: 1:20,000 inventory maps showing the landslides of Clayoquot Sound; a detailed database; field cards and photographs of slides visited in the field; and a report of the results entitled *Landslide Inventory Clayoquot Sound Vancouver, B.C. - Preliminary Results.*

How is the Landslide Inventory Used in Watershed Planning?

The landslide inventory is a snap shot in time of the number and extent of landslides (both natural and man-induced) in Clayoquot Sound. This inventory is used in planning in a number of ways, including:

- identifying unstable terrain requiring protection;
- identifying and priorizing landslides that require stabilization and restoration; and,
- establishing baseline information which will be used to monitor changes in landslide activity including the frequency and intensity of landslides over time, as well as gauging the effectiveness of rehabilitation activities.

Archaeological Inventory

Description

The First Nations people of Clayoquot Sound are represented by five Nuu-chah-nulth Central Region First Nations - Ahousaht, Hesquiat, Tla-o-qui-aht, Toquaht, and the Ucluelet. The Toquaht are not situated within the Sound, but are included because of their close cultural ties to the other four Central Region First Nations. "The Nuu-chah-nulth have been part of the landscape of the west coast of Vancouver Island for a least 4,000 years."[98] Physical evidence of their earlier history can be found throughout the Sound. Archaeological sites consist of detectable physical evidence left by past human occupation and/or activity. These sites are important to First Nations people and are protected under the *Heritage Conservation Act*. In Clayoquot Sound, protection is also given to Culturally Modified Trees (CMTs) under Section 27 of the *Clayoquot Sound Interim Measures Extension Agreement.* Under this Agreement CMTs are protected and may only be moved, cut or logged with the consent of the First Nations within whose traditional territory the CMTs are located.

Between 1996 and 1999 an archaeology inventory to revisit known historical (archaeological) sites and to identify and document new sites of Clayoquot Sound was conducted by Golder Associates Limited (GAL) and Shoreline Archaeological Services Inc. (SASI) under the auspices of the Clayoquot Working Group.[99] This archaeological inventory is a large project, the first for BC at this scale and intensity. Most archaeological surveys, including archaeological impact assessments, are done for site specific areas where conflicts have been identified between archaeological resources and proposed development.

The Nuu-chah-nulth Central Region First Nations directly participated in the archaeological inventory and received on-the-job training during the first year of the three year project. In the second and third years, First Nations crew members took on increased responsibilities.

[98] *Archaeological Inventory of Clayoquot Sound, Results of Phase 1,* Golder Associates Ltd., February 1998, Pg. 15.

[99] Clayoquot Working Group is made up of people representing Nuu-chah-nulth Central Region First Nations, MacMillan Bloedel Ltd., International Forest Products Ltd., and the Provincial Government.

The archaeological inventory was aimed at identifying and recording archaeological sites of First Nations' origin as well as other sites. Site information was recorded following *the British Columbia Archaeological Site Recording Guide*. British Columbia site inventory forms were completed for all sites. In addition, Level II CMT recording forms were completed for CMTs. Some of the information collected included:

- site type;
- site dimensions;
- age of site;
- archaeological culture(s) thought to be represented at the site;
- features; and,
- present condition.

The findings of the archaeological inventory are summarized in annual reports. These reports contain sensitive and confidential information and access to them, as well as the 1:20,000 maps showing site locations is restricted.[100]

The first step in the inventory process was to conduct background research of the area. Previous archaeological studies were examined. Traditional ecological knowledge (TEK) was obtained through: (1) ethnographic accounts of the study area; (2) existing traditional land use studies; and (3) consultation with Nuu-chah-nulth individuals familiar with the traditional use of the area. Other relevant information included: topographic maps, forest cover maps, hydrographic charts and aerial photographs.

The inventory methodology employed was two fold. *Shorelines,* including the intertidal zone and the near forest area to a maximum of 300 metres inland, were surveyed separate from inland areas. Shorelines were surveyed on foot as much as possible and where impassable were surveyed by boat, with frequent stops to investigate the forest edge and near shore areas. Areas away from the immediate shoreline were inventoried judgmentally using information obtained from the background research. *Inland areas*, areas more than 300 m above the intertidal zone, were surveyed on foot. "Due to the vast area included in the study, inland sampling focused on drainages and lake shores (with an emphasis on inlets and outlets), and on places where previous archaeological and traditional use studies suggest the majority of archaeological sites would be found. Other specific areas of cultural importance, such as trails or sacred sites, identified through discussions with First Nations or reported in traditional use or overview studies, were also examined, if the original use of the locality was likely to have left archaeological traces."[101]

British Columbia site inventory forms were completed for all newly identified archaeological sites and forms were updated for previously recorded sites where required. All sites were mapped. Level II CMT forms were attached to the site inventory forms where applicable.

Culturally Modified Tree Modelling

In the first year of the inventory two models were developed to predict the locations and densities of culturally modified trees (CMTs) - one for bark-stripped CMTs and the other for logged CMTs. These predictive models were developed based entirely upon variables derived from Terrain Resource Inventory Mapping (TRIM) data. These variables included elevation, slope, aspect, and distance to fresh water and shore.

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[100] *Archaeological Inventory of Clayoquot Sound, Results of Phase I,* Golder Associates Ltd., February 1998, *Archaeological Inventory of Clayoquot Sound Results of Phase II*, Golder Associates Ltd., March 1998. *Archaeological Inventory of Clayoquot Sound Results of Phase III Investigations*, Golder Associates Ltd., March 1999.

[101] *Archaeological Inventory of Clayoquot Sound Results of Phase II*, Golder Associates Ltd., March 1998. Pg. 37.

How are the Archaeological and the CMT Inventories used in Watershed Planning?

The archaeological and CMT inventories identified, described and mapped many new archaeological sites and CMTs in Clayoquot Sound that were otherwise unknown. As part of the watershed planning process, all new and previously recorded archaeological sites, with the exception of CMTs, will be placed in reserves and protected from development. CMTs will be afforded protection as per the *Clayoquot Sound Interim Measures Extension Agreement.*

In addition, the Nuu-chah-nulth Central Region Tribes were given the opportunity to identify, locate and evaluate culturally important sites and areas (e.g., sacred, historic, and current use areas) during the planning process as per recommendation R10 of the Scientific Panel Report # 3 - *First Nations' Perspectives Relating to Forest Practices Standards in Clayoquot Sound.* The locations of these sites and areas are confidential and therefore no maps are included in this report. These sites and areas will be either placed in reserves or assigned special management considerations as per the direction of the Central Region Tribe within whose territory it is located.

Recreation And Tourism Inventories

Description

Since 1996 a number of FRBC-funded projects have been undertaken relating to identifying, describing, quantifying and understanding recreation and tourism uses and the features that support the various uses in Clayoquot Sound. These projects have been managed by MOF and MSBTC and have resulted in the production of the following reports:

- *Developing a Detailed FRBC Recreation and Tourism Inventory Proposal for Clayoquot Sound*, Juan de Fuca Environmental Consultants, April 1996.
- *Measuring Levels of Tourism and Recreation Use in Clayoquot Sound, Literature and Annotated Bibliography*, Axys Environmental Consulting, March 1997.
- *A Recommended Methodology for Measuring Levels of Tourism and Recreation Use in Clayoquot Sound*, Final Report, Axys Environmental Consulting, March 1997.
- *Clayoquot Sound Tourism and Recreation Visitor Survey 1997*, R.B. Rollins and Associates, March 1998.
- *Survey of Recreation and Tourism Use in Clayoquot Sound (1997), Final Report,* Wilcon Wildlife Consulting Ltd. and associate Susan Jones.

In addition to the reports mentioned above, a comprehensive recreation and tourism inventory project was undertaken in 1997 by consultants, Catherine Berris Associates Inc., Juan de Fuca Environmental Consultants, and Wilcon Wildlife Consulting Ltd. The purpose of this project was to refine, integrate and build upon existing tourism and recreation information and inventories. Specifically, the project included:

- updating and expanding the existing Tourism Resource Inventory including mapping and/or documenting the following:

  ⇒ tourism facilities;
  ⇒ tourism features;
  ⇒ use areas;
  ⇒ operator surveys; and,
  ⇒ other information.

- updating the 1:20,000 Forest Recreation Resource Inventory (FRRI) by:

  ⇒ assembling and integrating the existing FRRI and resolving overlaps, splinters and inconsistencies among the existing FRRI data. (Note the original FRRI is a

compilation of existing recreation inventories from various sources (i.e., MOF, MB and IFP);
- ⇒ expanding the inventory to include areas not covered by the existing FRRI data;
- ⇒ producing the new recreation inventory using the latest FRRI standards;[102]
- ⇒ completing a recreation features inventory checklist for each recreation polygon and classifying features according to their significance; and,
- ⇒ producing a separate and updated Recreation Opportunities Spectrum (ROS) inventory.

- producing tourism capability models based on the new combined inventory for the following:

  - ⇒ sea kayaking;
  - ⇒ guided marine tours;
  - ⇒ marine cruising;
  - ⇒ remote lodges;
  - ⇒ saltwater fishing;
  - ⇒ hiking/backpacking;
  - ⇒ mountain biking; and,
  - ⇒ fresh water activities.

- checking the data with tourism operators, recreation users, First Nations, other interested individuals, and field observations to ensure accuracy and completeness;

- contracting all interested agencies, including MSBTC, MOF, CRB, and other Clayoquot Sound local governments or First Nations as required and mailing a brief summary of the study to tourism operators; and,

- providing complete documentation of all information, including digital map and textual files, report, user's manuals and photographs.

Recreation Features and Feature Significance

"Recreation features are biophysical, cultural and historic features which provide an opportunity for outdoor recreation experiences. These features or combinations of features are grouped into polygons based on the dominant features and/or physical boundaries present."[103] The significance of each feature is rated as very high (A), high (B), moderate (C), or low (D). Ratings are based on such factors as feature scarcity/uniqueness, activity attraction capability, and scenic attractiveness.

There are numerous recreation features in Clayoquot Sound including biophysical features such as sand beaches, estuaries, and islets; historic features such as trails or routes, historic general, and use sites; and, cultural features such as structural features, and trails or routes to name a few.

Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (ROS) used by the Ministry of Forests to describe the mixes or combinations of settings and probable recreation opportunities along a spectrum or continuum was first developed by the United States Forest Service. ROS is divided into eight classes according to three basic criteria - remoteness, size, and evidence of humans. These classes are used to indicate the opportunities for users to access and experience recreation values found in the area. Table 6 on the following pages shows the ROS delineation criteria for each class.

[102] *Recreation Features Inventory*, Ministry of Forests, Forest Practices Branch, Recreation Section, June 1996.
[103] *Recreation Features Inventory Checklist Key, Version 2.0*, MOF, Forest Practices Branch, Recreation Section, May 1996, Pg. 5.

Table 6 - Recreation Opportunity Spectrum Delineation Criteria[104]

ROS Class Code	Criteria:					
	Distance	**Size**	**Motorized Use**	**Naturalness**	**Remoteness**	**Social Encounters**
Primitive (P)	8km	5000ha	• Very little or no motorized access or use in the area (may include occasional uses, such as air-accessed recreation).	• Very high degree of naturalness; • Generally no facilities or site modification; • Little on-the-ground evidence of other people.	• Very high opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• Very low interaction with other people; • Very small party sizes expected.
Semi-Primitive Non-Motorized (SPNM)	1km	1000ha	• Generally very low or no motorized access or use (may include occasional uses, such as air-accessed recreation).	• Very high degree of naturalness; • Generally no facilities except where required for safety or sanitation; • Minimal or no site modification; • Little on-the-ground evidence of other people.	• High opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• Low interaction with other people; • Very small party sizes expected.
Semi-Primitive Motorized (SPM)	1km	1000ha	• A low degree of motorized access or use (may include occasional use by, e.g. snowmobiles, ATV"s and jet-boats).	• High degree of naturalness in the surrounding area as viewed from the access route; • Limited facilities; • Minimal site modification; • Some on-the-ground evidence of other people.	• High opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• Low interaction with other people; • Small party sizes expected.
Natural (N)	1km	1000ha	• May have motorized access to but not through the area; • Generally little or no motorized use after access has been established.	• High to moderate degree of naturalness in surrounding area; • Facilities may be present but are few and rustic; • Minimal site modification; • Some on-the-ground evidence of other people.	• Moderate to high opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• Low to moderate interaction with other people; • Small to moderate party sizes expected.
Natural Roaded (NR)	1km	N/A	• Moderate amount of motorized use for both access and recreation.	• Moderate degree of naturalness in surrounding area; • Facilities present and more highly developed; • Moderate site modification; • Some on-the-ground evidence of other people, some on-site controls.	• Moderate to high opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• Moderate interaction with other people; • Small to large party sizes expected.

[104] *Recreation Resource Inventory Standards and Procedures*, BC Ministry of Forests March 31, 1995.

ROS Class	Criteria:					
Code	**Distance**	**Size**	**Motorized Use**	**Naturalness**	**Remoteness**	**Social Encounters**
Modified Roaded (MR)	1km	N/A	• Moderate to high degree of motorized use for both access and recreation.	• Low degree of naturalness; • Moderate number of more highly developed facilities; • Highly modified in areas, genarally dominated by resource extraction activities; • On-the-ground evidence of other people and on-site controls.	• Low to moderate opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• Moderate to high interaction with other people; • Moderate to large party sizes expected.
Rural (R)	1km	N/A	• High degree of motorized use for both access and recreation.	• Very low degree of naturalness; • Complex and numerous facilities, high concentrations of human development and settlements associated with agricultural land; • Obvious on-the-ground evidence of other people and on-site controls.	• Low opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• High interaction with other people; • Large party sizes expected.
Urban (U)	1km	N/A	• Very high degree of motorized use for both access and recreation.	• Very low degree of naturalness; • Highly developed and numerous facilities associated with urban development; • Very high site modification; • Obvious on-the-ground evidence of other people and on-site controls.	• Very low opportunity to experience solitude, closeness to nature; self-reliance and challenge.	• Very high interaction with other people; • Very large party sizes expected.

P	SPNM	SPM	N	NR	MR	R	U

← *the most natural and remote - the least natural and remote* →

For more details on this project, refer to the report *Recreation Inventory User's Manual for Forest Recreation Inventory and Tourism Resource Data Integration, Normalization and Verification for Clayoquot Sound*, March 1998, and the presentation notes prepared for the Planning Committee in March 1998.

How are the Recreation and Tourism Inventories used in Watershed Planning?

The recreation and tourism inventories and information are used in watershed planning in a number of ways including:

- identifying existing and potential recreation and tourism sites, trails, activities, users and facilities;

- establishing appropriate levels of protection ranging from complete protection in reserves, to managing recreation and tourism values through special management conditions; and,
- collecting and documenting baseline information relating to recreation and tourism use for future monitoring purposes.

Scenic Inventory

Description

Recreation and tourism rely strongly on scenery. The Panel recognizes that scenery is a highly valued resource which requires special methods of analysis, inventory and management. Even before the release of the Science Panel's report, government recognized the importance of scenery to the area. In its 1993 land use decision, government placed approximately 21 percent of the land base under special management,[105] the majority of which is designated as *Scenic Corridors* where protection and management of scenic landscapes takes priority over other resource activities. See Clayoquot Sound Land Use Decision Map 2 for the location of the original Scenic Corridors.

Since the decision, more work has been undertaken on inventorying the scenic resources of the area. Below is a description of past processes, recent inventory works, and results relating to scenery.

Scenic Corridors Landscape Management Plan

In accordance with the land use decision, a planning process was initiated in September 1993 to develop a landscape plan for the scenic corridors. The process was guided by two government co-chairs - one from MOF and one from MSBT. It also involved an interagency planning team and an advisory group comprised of users of the corridors whose local knowledge and advice was incorporated during plan development.

As part of the process a detailed 1:20,000 landscape inventory was conducted by Don Benn of Juan de Fuca Environment Consultants in 1993 to provide data on the extent and significance of areas visible from important travel routes, recreation sites and communities. The original boundaries of the Scenic Corridors were adjusted according to the results of this inventory.

A great deal of information was collected, mapped and modeled as part of the planning process including:

- landscape inventory;
- inherent and current scenic quality;
- existing and potential use information for each sector; and,
- dependency of activity and/or sector on scenery.

This information was integrated into a landscape plan. The plan divides the visible areas of the corridors into discrete landscape units.[106] Moreover, the plan zones the corridors

[105] *Clayoquot Sound Land Use Decision - Background Report*, Province of British Columbia, April 1993.

[106] The term 'Landscape Unit' was first coined during the Scenic Corridors planning process. It is closely synonymous with the MOF term 'visual landscape unit'. Both refer to areas visible in the landscape that display similar characteristics in terms of physiography, vegetative cover and view-related factors. It is not to be confused with the strategic plan known as 'landscape units and objectives' under the *Forest Practices Code of British*

(and individual landscape units) according to the degree of acceptable visible disturbance. Refer to Map 20 for revised Scenic Corridors' boundaries and zonation.

For areas in Zone 1, visible disturbance must remain visually subordinate in the landscape. Within Zone 2, visible disturbance may be discernible, but not clearly evident in the landscape and in Zone 3 visible disturbance is not discernible to the casual observer. Zonation standards were established for each of the three zones. These standards addressed such things as: cutblock design; acceptable cumulative disturbance levels; appropriate silvicultural systems, green-up requirements; and road construction measures.

The final landscape management plan[107] was forwarded to Cabinet in the summer of 1995 for decision. This plan was not formally approved by Cabinet. Instead, government endorsed the Clayoquot Sound Scientific Report #5 which was released about the same time the plan was forwarded to Cabinet. The Scientific Panel report includes recommendations regarding scenic values. These recommendations are more or less consistent with the scenic corridors landscape management plan. The Scientific Panel itself acknowledges the similarities of the two reports when it writes - "Many of the suggestions for inventory and analysis of scenic resources have already been implemented in the Clayoquot Sound Scenic Corridors Planning Process. This has occurred partly through informal consultation with members of the Scientific Panel."[108]

Scientific Panel Recommendations Regarding Scenic Values

The Scientific Panel makes a number of recommendations regarding scenic values. Recommendation R6.2 proposes a new inventory system for scenic resources for planning purposes that divides the visible areas of the sound into "visible landscape units based on similarities in landscape characteristics (e.g., physiography and level of alteration), the degree and type of human activity, and viewer-related factors."[109] It also includes a new scale to describe the level of acceptable visible alteration/development for each landscape unit. This inventory system was used in the Scenic Corridors Planning Process and its extension to all visible areas of Clayoquot Sound was recommended by the Panel. The Panel further recommends that reserves to protect especially high scenic values be established at the watershed level (R7.16).

Applying the Scenic Corridors Landscape Inventory System to Visible Areas outside the Corridors

In October 1997, Jeremy Webb of RRL Recreation Resources Ltd. was contracted by the Ministry of Small Business, Tourism and Culture (MSBTC) and Ministry of Forests (MOF) to update and complete the visual landscape inventory for Clayoquot Sound using the new MOF Visual Landscape Inventory standards and procedures.[110] Specific tasks of the inventory project included:

- updating the existing landscape inventories (landscape inventories sources included: Scenic Corridors, MOF, MB and IFP which were merged together in 1997 by MSBTC) and inventorying areas where no previous work exists;
- incorporating the existing 1:20,000 scale inventories for the Bedwell Trail and the Pretty Girl Lakes areas into the updated landscape inventory;
- revising existing visual conditions to reflect recent logging activities; and,

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Columbia Act. There are _____ number of landscape units delineated in Clayoquot Sound; ranging in size from 25 to 1000 hectares.

[107] *Clayoquot Sound Scenic Corridors Landscape Management Plan*, Province of British Columbia, May 1995.

[108] SPanel, Pg. 143.

[109] SPanel, Pg. 143.

[110] *Visual Landscape Inventory Procedures and Standards Manual*, Ministry of Forests, Forest Practices Branch, May 1997.

- adding viewpoints and viewing directions and proving a preliminary ranking of these viewpoints for all areas covered by the inventory.

At the time it was thought that the new standards would result in a landscape visual inventory consistent with the Scenic Corridors results and Scientific Panel recommendations. However, when applied and compared with the Scenic Corridors zonation map, the final visual sensitivity ratings[111] and recommended visual quality objectives[112] were not consistent.

The problem regarding lack of consistency between the zonations and visual sensitivity classes is thought to lie with the way the VSC class is derived rather than with the VLI data itself. Therefore, a new approach using the VLI data and other information was designed by Catherine Berris of Catherine Berris Associates Inc., a former Scientific Panel member and expert on landscape inventory, and Ken Fairhurst, of Resource Design Inc., a registered professional forester specializing in landscape design.

This new approach involved making minor revisions to the original scenic corridors map to show areas visible inside and outside the corridors and updating the zonation standards to scenic class standards. The overall intent of Zones 1, 2, and 3, remain the same, however, some of the standards have now become guidelines to be consistent with the Panel's recommendations. For instance, the Panel states that "the percentage of a landscape unit from which timber is removed depends on how the landscape unit is defined"[113]and warns against using cumulative disturbance as set out in the Scenic Corridors as a hard and fast rule.

Under this new system, zones are now referred to as scenic classes. Specifically, Zone 3 is now *natural-appearing,* Zone 2 *- minimal alteration* and Zone 1 - *small-scale alteration.* This approach also involves classifying those areas that are outside of the Scenic Corridors, but are visible from major waterways, communities and travel corridors, in a manner consistent with the Scenic Corridors process and Scientific Panel recommendations.

Description of New Approach

Using the new approach outlined in the handout materials presented to the Planning Committee entitled: *Clayoquot Sound Scenic Resource Inventory and Scenic Assessment,* VLI data, recreation inventory information, tourism capability mapping, computer modeling, and professional judgment were all used to form scenic classes. Scenic Classes and Scenic Class Objectives are described in chapter 3.4.2.

Those landscape units (LU) that fall within park boundaries and have no previous development may be classified as *unaltered* in future provincial parks master planning processes.

Landscape units are classed as *natural appearing* (equivalent to Zone 3 Scenic Corridor areas) if they meet the following criteria:

[111] Visual Sensitivity Class (VSC) is an overall measure of the sensitivity of the unit to visual alteration and is a function of the last four parametres listed above. There are five classes ranging from VSC1 - very high sensitivity to human-made visual alteration to VSC5 - very low sensitivity.

[112] Recommended Visual Quality Objectives (RVQO) is a specialist' s recommendation to a manager or planning process regarding the level of human-made alteration that would be acceptable on a landscape given VSC, view numbers and expectations, as well as biological, technical and economic factors. RVQOs include: preservation, retention, partial retention, modification and maximum modification.

[113] SPanel, Pg. 141.

- low visual absorption capability (VAC.) (VAC is the landscape's ability to absorb change);
- an existing visual condition of pristine or retention; and,
- high biophysical rating, viewing condition and viewer ratings.

LUs with moderate rankings on average and with a pristine or retention existing visual condition are classified as *minimal alteration* (equivalent to Zone 2 areas). LUs with low rankings across the board and with an existing visual condition of modification, maximum modification and/or excessive modification are classified as *small-scale alteration* (equivalent to Zone 1 areas).

The last three classes - m*oderate alteration*, *highly altered* and *intensively altered* do not apply to Clayoquot Sound, but may be found in other parts of the province and are presented here for information and reference only.

The process of establishing scenic class objectives involves selecting frequented or significant viewpoints and defining a viewscape, or divisible part of the landscape visible from that viewpoint. The existing visual conditions are compared with the desired future conditions and the above criteria are applied to assign the appropriate scenic class objectives.

How is the Scenic Resource Inventory used in Watershed Planning?

The scenic resource inventory identifies, describes and maps landscape units - discrete areas visible from major waterways and/or thorough fares (e.g., oceans, inlets, lakes, rivers and trails) within Clayoquot Sound. The information collected during the inventory has been used to develop scenic classes, an extension of the scenic corridors process, whereby those landscape units with high scenic values in Clayoquot Sound receive the greatest degree of protection. High scenic areas are typically unaltered landscapes with important recreational significance. These areas are commonly visible from a community and/or important recreation site or corridor and are afforded a high level of visual protection as set out in the scenic class standards. Refer to Part III for description of the standards.

Appendix 4: Rate-of-Cut Limits for Clayoquot Sound Watersheds

The following memo from Allan Chapman (P. Geo, principal of Chapman Geoscience) describes the methodology used to assign rate-of-cut limits to watersheds in Clayoquot Sound in accordance with Scientific Panel recommendations. Table 2 attached to the memo presents the rate-of-cut limits for all watersheds in Clayoquot Sound.

"March 31, 2003

Re: Rate-of-Cut Limits for Clayoquot Sound Watersheds

You asked me to provide a summary of the rate-of-cut limits for Clayoquot Sound watersheds, following recommendation R3.1 of the Clayoquot Sound Scientific Panel (*Sustainable Ecosystem Management in Clayoquot Sound: Planning and Practices*, April 1995, page 237). This letter, along with the attached table and map, present the rate-of-cut limits.

I have summarized the rate-of-cut limits based on the 1:20,000 Clayoquot Sound watershed map provided to me by the Ministry of Sustainable Resource Management. This map was produced by the Vancouver Forest Region of the Ministry of Forests in 1996, and is based on TRIM topography and hydrology. On the watershed map, all terrestrial areas are divided into polygons, each of which is identified with a unique identifier. I have classified the polygons as to their type, as follows:

- Primary watersheds, < 200 ha in area;
- Primary watersheds, 200-500 ha in area;
- Primary watersheds, > 500 ha in area;
- Secondary watersheds, ≤ 500 ha in area
- Secondary watersheds, > 500 ha in area;
- Tertiary watersheds, ≤ 500 ha in area;
- Tertiary watersheds, > 500 ha in area;
- Residual areas;
- Non-watershed areas

Note the following:

- Primary watersheds flow directly into the ocean; Secondary watersheds flow into primary watersheds; Tertiary watersheds flow into secondary watersheds, etc.
- Many of the larger primary and secondary watersheds are divided into sub-watersheds. These watersheds generally contain "residual areas". Residual areas do not themselves comprise a watershed, and so the rate-of-cut rules do not apply to the residual polygons separately. Instead, the residual area represents a portion of a watershed, and all or a portion of the rate-of-cut limit appropriate for the total watershed may be applied to the residual portion.
- Many of the polygons depicted on the Ministry of Forests' Clayoquot Sound watershed map are not watersheds. Instead, they are land areas draining directly into ocean. These polygons are sometimes termed "face units". The rate-of-cut rules do not apply to them.

I have applied the recommendation 3.1 of the Clayoquot Sound Scientific panel to calculate the 5-year or 10-year rate of cut. The pertinent part of the recommendation is as follows:

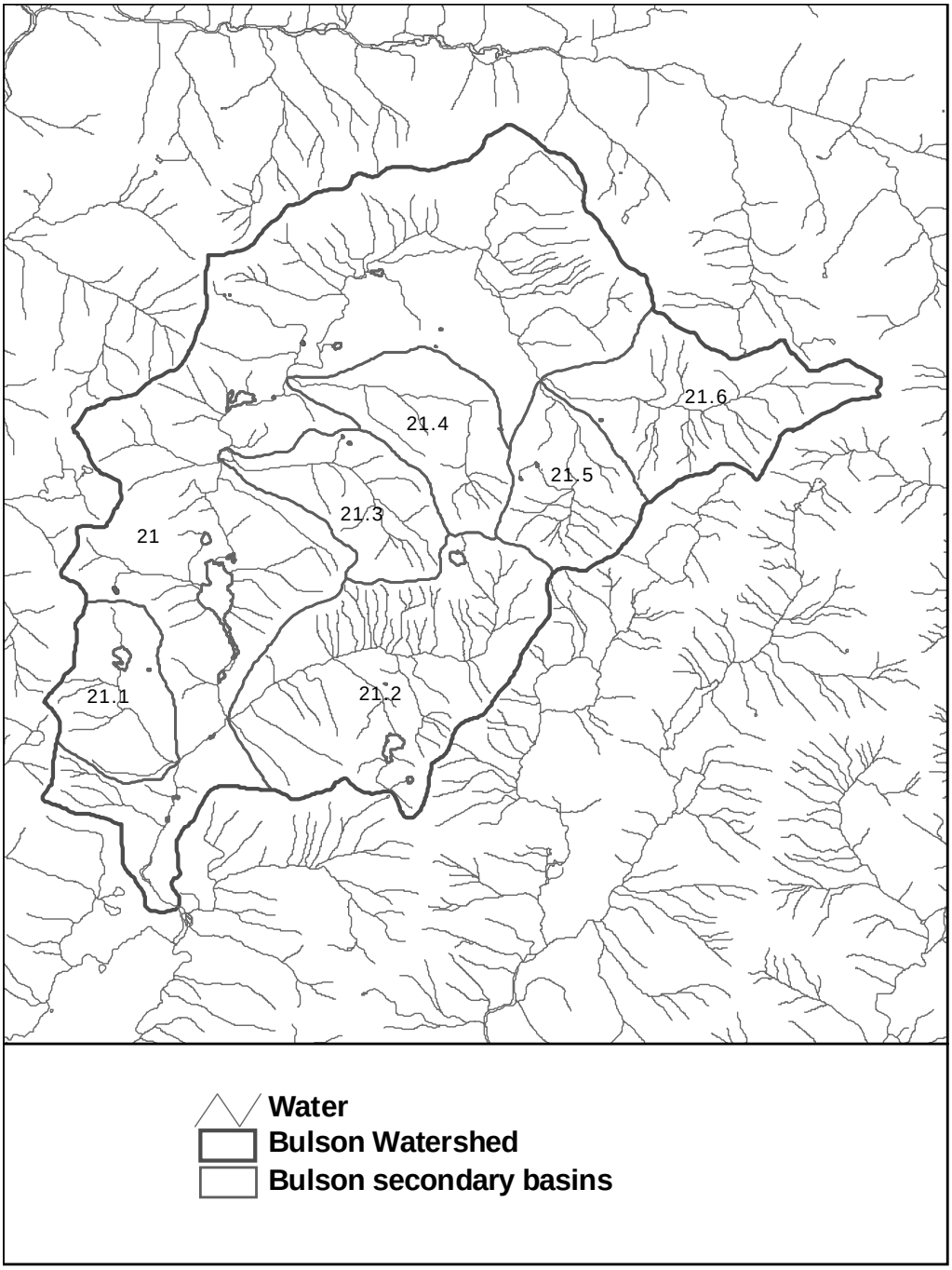
R3.1 Within the watershed planning unit, determine a rate-of-cut based on watershed area. Specifically:

- *Limit the area cut in any watershed larger than 500 ha in total area to no more than 5% of the watershed area within a five-year period.*
- *In primary watersheds of 200-500 ha in total area, limit the area cut to no more than 10% of the watershed area within a 10-year period.*

To illustrate the application of the rate-of-cut rules, please review the following example for the Bulson Creek watershed (Table 1). The Bulson Creek watershed is depicted as watershed "21" on the Clayoquot Sound watershed map, and is divided into seven polygons. Polygon 21 is only the residual portion of the overall watershed, while polygons 21.1 - 21.6 represent six secondary sub-watershed units.

Table 1. Example of the application of the Clayoquot Sound rate-of-cut rules to the Bulson Creek watershed.

Polygon	Area (ha)	Does rate-of-cut rule apply?	Note:	5 Year cut limit (ha)
21	542	no	This unit is not a separate basin, but is the "residual" area of the Bulson watershed	not specified
21.1	384	no	Secondary watershed, <500 ha	not specified
21.2	1,211	yes	Secondary watershed, >500 ha	60.6
21.3	429	no	Secondary watershed, <500 ha	not specified
21.4	480	no	Secondary watershed, <500 ha	not specified
21.5	410	no	Secondary watershed, <500 ha	not specified
21.6	692	yes	Secondary watershed, >500 ha	34.6
Total	**7,148**	**yes**	**This is the entire Bulson watershed, and so the 5% 5-yr r-o-c applies to it**	**357.4**



With this example, the 5-year rate-of-cut limit of 5% of the watershed area applies to the overall Bulson Creek watershed. With a total watershed area of 7,148 ha, a total of 357.4 ha could be logged within the 5-year period. The rate-of-cut rule does not apply separately to the residual area (since it is not a watershed unit by itself). The rate-of-cut rule applies separately to secondary watersheds only if they are >500 ha in area. In the case of Bulson Creek, those are polygons 21.2 and 21.6. They have a 5-year cut limit of

60.6 and 34.6 ha, respectively. Polygons 21.1, 21.3, 21.4 and 21.5 are secondary watersheds <500 ha in area, and rate-of-cut limits are not applied to them directly.

For the Bulson Creek example, a total of 357.4 ha could be logged over a 5-year period, with not more than 60.6 ha cut in polygon 21.2 and not more than 34.6 ha cut in polygon 21.6. There is no limit on how much of polygons 21, 21.1, 21.3, 21.4 and 21.5 can be logged in the 5-year period, except that the total area of logging in the total watershed cannot exceed 357.4 ha.

The accuracy of this analysis is limited to the accuracy of the base map. Because the rate-of-cut calculation is based on a measurement of watershed area, the rate-of-cut limit will change if the watershed area is determined to be different from that depicted on the Ministry of Forests' 1:20,000 Clayoquot Sound watershed map. Most operational forestry planning is done using detailed 1:5,000 topographic maps. It is likely that watershed areas estimated using 1:5,000 maps will change from those estimated from the 1:20,000 map. Rate-of-cut limits will likewise change. It is also conceivable that a change in watershed area above or below the 200 ha and 500 ha threshold points defined by the Scientific Panel will create or negate the requirement for rate-of-cut limits in some watersheds.

The rate-of-cut limits for the Clayoquot Sound watersheds are summarized in Table 2.

Best Regards,

Allan Chapman, P.Geo."

Table 2: Rate-of-Cut Limits for Clayoquot Sound Watersheds

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
1	1452	Primary Watershed, >500 ha	Beach	2,110	Yes	105.5	-
10	1118	Primary Watershed, <200 ha	Tofino/Tranquil	198	No	No limit	No limit
100	212	Primary Watershed, >=200-500 ha	Sydney/Pretty Girl	335	Yes	-	33.5
101	244	Primary Watershed, <200 ha	Sydney/Pretty Girl	100	No	No limit	No limit
102 Total		**Primary Watershed, >500 ha**		**5,591**	**Yes**	**279.5**	-
102	28	Primary - residual area	Sydney/Pretty Girl	1,638	No	-	-
102.1 Total		**Secondary Watershed, >500 ha**		**1,709**	**Yes**	**85.5**	-
102.1.	64	Secondary - residual area	Sydney/Pretty Girl	77	No	-	-
102.1.1	85	Tertiary Watershed, <=500 ha	Sydney/Pretty Girl	460	No	-	-
102.1.2	17	Tertiary Watershed, >500 ha	Sydney/Pretty Girl	1,172	Yes	58.6	-
102.2	21	Secondary Watershed, <=500 ha	Sydney/Pretty Girl	453	No	-	-
102.3	7	Secondary Watershed, >500 ha	Sydney/Pretty Girl	594	Yes	29.7	-
102.4	14	Secondary Watershed, <=500 ha	Sydney/Pretty Girl	417	No	-	-
102.5	2	Secondary Watershed, >500 ha	Sydney/Pretty Girl	780	Yes	39.0	-
103	381	Primary Watershed, >=200-500 ha	Sydney/Pretty Girl	405	Yes	-	40.5
104	510	Primary Watershed, <200 ha	Sydney/Pretty Girl	135	No	No limit	No limit
105	597	Primary Watershed, >=200-500 ha	Sydney/Pretty Girl	343	Yes	-	34.3
106	672	Primary Watershed, >500 ha	Sydney/Pretty Girl	566	Yes	28.3	-
107	731	Primary Watershed, >=200-500 ha	Hesquiat	271	Yes	-	27.1
108	743	Primary Watershed, <200 ha	Hesquiat	103	No	No limit	No limit
109	723	Primary Watershed, <200 ha	Hesquiat	141	No	No limit	No limit
11 Total		**Primary Watershed, >500 ha**		**5,870**	**Yes**	**293.5**	-
11	1090	Primary - residual area	Tofino/Tranquil	2,125	No	-	-
11.1	913	Secondary Watershed, >500 ha	Tofino/Tranquil	1,451	Yes	72.5	-
11.2	911	Secondary Watershed, >500 ha	Tofino/Tranquil	2,295	Yes	114.7	-
110 Total		**Primary Watershed, >500 ha**		**1,062**	**Yes**	**53.1**	-
110	612	Primary - residual area	Hesquiat	893	No	-	-
110.1	599	Secondary Watershed, <=500 ha	Hesquiat	169	No	-	-
111	591	Primary Watershed, <200 ha	Hesquiat	143	No	No limit	No limit
112 Total		**Primary Watershed, >500 ha**		**1,767**	**Yes**	**88.3**	-
112	399	Primary - residual area	Hesquiat	957	No	-	-
112.1	514	Secondary Watershed, <=500 ha	Hesquiat	290	No	-	-
112.2	443	Secondary Watershed, <=500 ha	Hesquiat	192	No	-	-
112.3	367	Secondary Watershed, <=500 ha	Hesquiat	327	No	-	-
113	553	Primary Watershed, <200 ha	Hesquiat	177	No	No limit	No limit
114	503	Primary Watershed, >=200-500 ha	Hesquiat	304	Yes	-	30.4
115	373	Primary Watershed, >500 ha	Hesquiat	565	Yes	28.2	-
116 Total		**Primary Watershed, >500 ha**		**5,672**	**Yes**	**283.6**	-
116	86	Primary - residual area	Hesquiat	1,096	No	-	-
116.1	333	Secondary Watershed, <=500 ha	Hesquiat	235	No	-	-
116.2 Total		**Secondary Watershed, >500 ha**		**2,593**		**129.7**	-

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
116.2	167	Secondary - residual area	Hesquiat	521	No	-	-
116.2.1	97	Tertiary Watershed, >500 ha	Hesquiat	746	Yes	37.3	-
116.2.2	273	Tertiary Watershed, >500 ha	Hesquiat	504	Yes	25.2	-
116.2.3	201	Tertiary Watershed, >500 ha	Hesquiat	823	Yes	41.1	-
116.3	25	Secondary Watershed, >500 ha	Hesquiat	1,499	Yes	74.9	-
116.4	215	Secondary Watershed, <=500 ha	Hesquiat	250	No	-	-
117	216	Primary Watershed, >=200-500 ha	Hesquiat	428	Yes	-	42.8
118	285	Primary Watershed, >=200-500 ha	Hesquiat	251	Yes	-	25.1
119	330	Primary Watershed, >=200-500 ha	Hesquiat	227	Yes	-	22.7
12	1196	Primary Watershed, >=200-500 ha	Fortune Channel	223	Yes	-	22.3
120	250	Primary Watershed, >500 ha	Hesquiat	673	Yes	33.7	-
121	360	Primary Watershed, >=200-500 ha	Hesquiat	295	Yes	-	29.5
121.A	351	Primary Watershed, >500 ha	Hesquiat	685	Yes	34.2	-
122	598	Primary Watershed, >500 ha	Hesquiat	775	Yes	38.8	-
123	642	Primary Watershed, >500 ha	Hesquiat	1,029	Yes	51.5	-
124	556	Primary Watershed, >500 ha	Hesquiat	664	Yes	33.2	-
125	350	Primary Watershed, >500 ha	Hesquiat	829	Yes	41.5	-
126	322	Primary Watershed, >=200-500 ha	Hesquiat	308	Yes	-	30.8
127	306	Primary Watershed, >=200-500 ha	Hesquiat	385	Yes	-	38.5
128	185	Primary Watershed, >500 ha	Hesquiat	1,047	Yes	52.4	-
129	116	Primary Watershed, >500 ha	Hesquiat	675	Yes	33.7	-
13	1225	Primary Watershed, <200 ha	Fortune Channel	196	No	No limit	No limit
130	943	Primary Watershed, >500 ha	Cypre	652	Yes	32.6	-
14	1249	Primary Watershed, <200 ha	Fortune Channel	128	No	No limit	No limit
16	1175	Primary Watershed, >=200-500 ha	Fortune Channel	375	Yes	-	37.5
17	1151	Primary Watershed, >=200-500 ha	Fortune Channel	229	Yes	-	22.9
18	1122	Primary Watershed, >500 ha	Fortune Channel	508	Yes	25.4	-
19	1097	Primary Watershed, <200 ha	Bedwell/Ursus/Bulson	155	No	No limit	No limit
2 Total		**Primary Watershed, >500 ha**		**1,648**	**Yes**	**82.4**	-
2	1442	Primary - residual area	Beach	1,130	No	-	-
2.1	1439	Secondary Watershed, >500 ha	Beach	518	Yes	25.9	-
20	1036	Primary Watershed, >500 ha	Bedwell/Ursus/Bulson	838	Yes	41.9	-
200	1139	Not a watershed - face unit	Tofino/Tranquil	24	No	-	-
200	1144	Not a watershed - face unit	Fortune Channel	1,088	No	-	-
200	1155	Not a watershed - face unit	Fortune Channel	251	No	-	-
200	1468	Not a watershed - face unit	Tofino/Tranquil	130	No	-	-
200	1211	Not a watershed - face unit	Fortune Channel	625	No	-	-
200	1466	Not a watershed - face unit	Fortune Channel	13	No	-	-
200	1231	Not a watershed - face unit	Fortune Channel	91	No	-	-
200	1252	Not a watershed - face unit	Fortune Channel	2,141	No	-	-
200	1266	Not a watershed - face unit	Fortune Channel	109	No	-	-

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
200	1271	Not a watershed - face unit	Fortune Channel	926	No	-	-
200	1369	Not a watershed - face unit	Fortune Channel	138	No	-	-
200	1371	Not a watershed - face unit	Fortune Channel	863	No	-	-
200	1395	Not a watershed - face unit	Fortune Channel	192	No	-	-
201	1142	Not a watershed - face unit	Meares Island	811	No	-	-
201	1215	Not a watershed - face unit	Meares Island	265	No	-	-
201	1261	Not a watershed - face unit	Meares Island	1,122	No	-	-
204	1138	Not a watershed - face unit	Meares Island	2,283	No	-	-
204	1188	Not a watershed - face unit	Meares Island	448	No	-	-
204	1228	Not a watershed - face unit	Meares Island	66	No	-	-
204	1276	Not a watershed - face unit	Meares Island	52	No	-	-
204	1292	Not a watershed - face unit	Meares Island	352	No	-	-
204	1328	Not a watershed - face unit	Beach	58	No	-	-
204	1343	Not a watershed - face unit	Meares Island	182	No	-	-
204	1346	Not a watershed - face unit	Beach	0	No	-	-
204	1356	Not a watershed - face unit	Meares Island	75	No	-	-
205	1083	Not a watershed - face unit	Bedwell/Ursus/Bulson	22	No	-	-
205	1088	Not a watershed - face unit	Cypre	39	No	-	-
205	1096	Not a watershed - face unit	Fortune Channel	295	No	-	-
205	1106	Not a watershed - face unit	Cypre	20	No	-	-
205	1119	Not a watershed - face unit	Cypre	22	No	-	-
205	1134	Not a watershed - face unit	Fortune Channel	140	No	-	-
205	1172	Not a watershed - face unit	Fortune Channel	29	No	-	-
205	1185	Not a watershed - face unit	Fortune Channel	127	No	-	-
205	1209	Not a watershed - face unit	Fortune Channel	94	No	-	-
206	1347	Not a watershed - face unit	Beach	5,495	No	-	-
206	1359	Not a watershed - face unit	Beach	148	No	-	-
206	1448	Not a watershed - face unit	Beach	501	No	-	-
207	810	Not a watershed - face unit	Cypre	29	No	-	-
207	828	Not a watershed - face unit	Cypre	818	No	-	-
207	840	Not a watershed - face unit	Cypre	183	No	-	-
207	871	Not a watershed - face unit	Cypre	303	No	-	-
207	931	Not a watershed - face unit	Cypre	384	No	-	-
207	961	Not a watershed - face unit	Cypre	105	No	-	-
207	1004	Not a watershed - face unit	Cypre	485	No	-	-
207	1012	Not a watershed - face unit	Cypre	126	No	-	-
207	1063	Not a watershed - face unit	Cypre	34	No	-	-
207	1086	Not a watershed - face unit	Cypre	523	No	-	-
208	978	Not a watershed - face unit	Cypre	488	No	-	-
208	1043	Not a watershed - face unit	Cypre	498	No	-	-
208	1115	Not a watershed - face unit	Cypre	348	No	-	-
209	609	Not a watershed - face unit	Moyeha	32	No	-	-
209	623	Not a watershed - face unit	Moyeha	217	No	-	-
209	657	Not a watershed - face unit	Moyeha	94	No	-	-
209	683	Not a watershed - face unit	Bedingfield	1,017	No	-	-

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
209	698	Not a watershed - face unit	Cypre	165	No	-	-
209	726	Not a watershed - face unit	Cypre	107	No	-	-
209	757	Not a watershed - face unit	Cypre	134	No	-	-
209	808	Not a watershed - face unit	Cypre	239	No	-	-
209	825	Not a watershed - face unit	Bedingfield	873	No	-	-
209	850	Not a watershed - face unit	Cypre	833	No	-	-
209	966	Not a watershed - face unit	Cypre	561	No	-	-
209	967	Not a watershed - face unit	Cypre	47	No	-	-
209	971	Not a watershed - face unit	Cypre	378	No	-	-
21 Total		**Primary Watershed, >500 ha**		**7,146**	**Yes**	**357.3**	-
21	799	Primary - residual area	Bedwell/Ursus/Bulson	3,542	No	-	-
21.1	960	Secondary Watershed, <=500 ha	Bedwell/Ursus/Bulson	384	No	-	-
21.2	934	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	1,211	Yes	60.5	-
21.3	897	Secondary Watershed, <=500 ha	Bedwell/Ursus/Bulson	429	No	-	-
21.4	876	Secondary Watershed, <=500 ha	Bedwell/Ursus/Bulson	480	No	-	-
21.5	886	Secondary Watershed, <=500 ha	Bedwell/Ursus/Bulson	410	No	-	-
21.6	858	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	692	Yes	34.6	-
210	439	Not a watershed - face unit	Megin	460	No	-	-
210	469	Not a watershed - face unit	Megin	140	No	-	-
210	539	Not a watershed - face unit	Bedingfield	89	No	-	-
210	568	Not a watershed - face unit	Megin	55	No	-	-
210	574	Not a watershed - face unit	Sydney/Pretty Girl	152	No	-	-
210	608	Not a watershed - face unit	Bedingfield	29	No	-	-
210	628	Not a watershed - face unit	Sydney/Pretty Girl	227	No	-	-
210	634	Not a watershed - face unit	Bedingfield	217	No	-	-
210	667	Not a watershed - face unit	Bedingfield	745	No	-	-
210	692	Not a watershed - face unit	Bedingfield	240	No	-	-
210	752	Not a watershed - face unit	Bedingfield	487	No	-	-
211	716	Not a watershed - face unit	Flores Island	438	No	-	-
211	816	Not a watershed - face unit	Flores Island	891	No	-	-
211	923	Not a watershed - face unit	Bedingfield	220	No	-	-
211	980	Not a watershed - face unit	Flores Island	972	No	-	-
212	722	Not a watershed - face unit	Flores Island	102	No	-	-
212	725	Not a watershed - face unit	Flores Island	306	No	-	-
212	728	Not a watershed - face unit	Flores Island	619	No	-	-
212	753	Not a watershed - face unit	Flores Island	15	No	-	-
212	802	Not a watershed - face unit	Flores Island	17	No	-	-
212	826	Not a watershed - face unit	Flores Island	668	No	-	-
212	969	Not a watershed - face unit	Flores Island	106	No	-	-
212	1031	Not a watershed - face unit	Flores Island	38	No	-	-
212	1038	Not a watershed - face unit	Flores Island	283	No	-	-
214	147	Not a watershed - face unit	Sydney/Pretty Girl	224	No	-	-
214	149	Not a watershed - face unit	Sydney/Pretty Girl	855	No	-	-
214	279	Not a watershed - face unit	Sydney/Pretty Girl	751	No	-	-
214	338	Not a watershed - face unit	Sydney/Pretty Girl	76	No	-	-

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
214	368	Not a watershed - face unit	Sydney/Pretty Girl	25	No	-	-
214	384	Not a watershed - face unit	Sydney/Pretty Girl	478	No	-	-
214	431	Not a watershed - face unit	Sydney/Pretty Girl	8	No	-	-
214	458	Not a watershed - face unit	Sydney/Pretty Girl	19	No	-	-
214	492	Not a watershed - face unit	Sydney/Pretty Girl	79	No	-	-
214	497	Not a watershed - face unit	Sydney/Pretty Girl	21	No	-	-
214	525	Not a watershed - face unit	Sydney/Pretty Girl	1,250	No	-	-
214	620	Not a watershed - face unit	Sydney/Pretty Girl	650	No	-	-
214	691	Not a watershed - face unit	Sydney/Pretty Girl	402	No	-	-
215	321	Not a watershed - face unit	Hesquiat	174	No	-	-
215	369	Not a watershed - face unit	Hesquiat	154	No	-	-
215	387	Not a watershed - face unit	Hesquiat	55	No	-	-
215	391	Not a watershed - face unit	Hesquiat	211	No	-	-
215	435	Not a watershed - face unit	Hesquiat	356	No	-	-
215	446	Not a watershed - face unit	Hesquiat	29	No	-	-
215	521	Not a watershed - face unit	Hesquiat	30	No	-	-
215	550	Not a watershed - face unit	Hesquiat	126	No	-	-
215	552	Not a watershed - face unit	Hesquiat	188	No	-	-
215	626	Not a watershed - face unit	Hesquiat	110	No	-	-
215	659	Not a watershed - face unit	Hesquiat	216	No	-	-
215	671	Not a watershed - face unit	Hesquiat	110	No	-	-
215	709	Not a watershed - face unit	Hesquiat	112	No	-	-
215	712	Not a watershed - face unit	Hesquiat	263	No	-	-
215	746	Not a watershed - face unit	Hesquiat	181	No	-	-
215	759	Not a watershed - face unit	Hesquiat	311	No	-	-
215	797	Not a watershed - face unit	Hesquiat	76	No	-	-
215	838	Not a watershed - face unit	Hesquiat	41	No	-	-
217	475	Not a watershed - face unit	Hesquiat	50	No	-	-
217	1176	Not a watershed - face unit	Beach	66	No	-	-
217	1190	Not a watershed - face unit	Beach	7	No	-	-
217	1195	Not a watershed - face unit	Beach	5	No	-	-
217	1200	Not a watershed - face unit	Beach	518	No	-	-
217	1205	Not a watershed - face unit	Beach	359	No	-	-
217	1259	Not a watershed - face unit	Beach	717	No	-	-
217	1267	Not a watershed - face unit	Beach	89	No	-	-
217	1268	Not a watershed - face unit	Beach	35	No	-	-
217	1305	Not a watershed - face unit	Beach	7	No	-	-
218	161	Not a watershed - face unit	Hesquiat	110	No	-	-
218	222	Not a watershed - face unit	Hesquiat	675	No	-	-
218	403	Not a watershed - face unit	Hesquiat	118	No	-	-
218	520	Not a watershed - face unit	Hesquiat	362	No	-	-
218	676	Not a watershed - face unit	Hesquiat	205	No	-	-
219	1021	Not a watershed - face unit	Cypre	847	No	-	-
22	1006	Primary Watershed, >500 ha	Cypre	872	Yes	43.6	-
23	1089	Primary Watershed, <200 ha	Cypre	142	No	No limit	No limit

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
24	1095	Primary Watershed, <200 ha	Cypre	199	No	No limit	No limit
25	1068	Primary Watershed, <200 ha	Cypre	144	No	No limit	No limit
26	1040	Primary Watershed, <200 ha	Cypre	135	No	No limit	No limit
27	1007	Primary Watershed, <200 ha	Cypre	115	No	No limit	No limit
28	930	Primary Watershed, >500 ha	Cypre	568	Yes	28.4	-
29	895	Primary Watershed, >=200-500 ha	Cypre	388	Yes	-	38.8
3 Total		**Primary Watershed, >500 ha**		**2,920**	**Yes**	**146.0**	-
3	1404	Primary - residual area	Kennedy Lake	1,584	No	-	-
3.1	1431	Secondary Watershed, <=500 ha	Kennedy Lake	493	No	-	-
3.2	1383	Secondary Watershed, >500 ha	Kennedy Lake	844	Yes	42.2	-
30	857	Primary Watershed, >=200-500 ha	Cypre	307	Yes	-	30.7
31 Total		**Primary Watershed, >500 ha**		**1,013**	**Yes**	**50.6**	-
31	832	Primary - residual area	Cypre	130	No	-	-
31.1	807	Secondary Watershed, <=500 ha	Cypre	368	No	-	-
31.2	839	Secondary Watershed, >500 ha	Cypre	514	Yes	25.7	-
32 Total		**Primary Watershed, >500 ha**		**21,570**	**Yes**	**1,078.5**	-
32	436	Primary - residual area	Bedwell/Ursus/Bulson	4,040	No	-	-
32	699	Primary - residual area	Bedwell/Ursus/Bulson	1,060	No	-	-
32.1	734	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	691	Yes	34.5	-
32.1	1186	Primary Watershed, >500 ha	Fortune Channel	624	Yes	31.2	-
32.10	473	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	732	Yes	36.6	-
32.11	340	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	641	Yes	32.0	-
32.12	182	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	2,110	Yes	105.5	-
32.2 Total		**Secondary Watershed, >500 ha**		**7,348**	**Yes**	**367.4**	-
32.2	701	Secondary - residual area	Bedwell/Ursus/Bulson	3,659	No	-	-
32.2.1	750	Tertiary Watershed, <=500 ha	Bedwell/Ursus/Bulson	378	No	-	-
32.2.2	680	Tertiary Watershed, >500 ha	Bedwell/Ursus/Bulson	1,314	Yes	65.7	-
32.2.3	782	Tertiary Watershed, >500 ha	Bedwell/Ursus/Bulson	629	Yes	31.5	-
32.2.4	800	Tertiary Watershed, >500 ha	Bedwell/Ursus/Bulson	812	Yes	40.6	-
32.2.5	760	Tertiary Watershed, >500 ha	Bedwell/Ursus/Bulson	556	Yes	27.8	-
32.3	644	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	502	Yes	25.1	-
32.4	454	Secondary Watershed, <=500 ha	Bedwell/Ursus/Bulson	487	No	-	-
32.5	372	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	632	Yes	31.6	-
32.6	576	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	561	Yes	28.1	-
32.7	584	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	755	Yes	37.7	-
32.8	577	Secondary Watershed, >500 ha	Bedwell/Ursus/Bulson	1,061	Yes	53.0	-
32.9	365	Secondary Watershed, <=500 ha	Bedwell/Ursus/Bulson	326	No	-	-
33	795	Primary Watershed, <200 ha	Cypre	174	No	No limit	No limit
34	920	Primary Watershed, >=200-500 ha	Cypre	249	Yes	-	24.9
35	929	Primary Watershed, >=200-500 ha	Cypre	280	Yes	-	28.0
36 Total		**Primary Watershed, >500 ha**		**5,763**	**Yes**	**288.2**	-
36	824	Primary - residual area	Cypre	3,002	No	-	-
36.1	885	Secondary Watershed, >500 ha	Cypre	637	Yes	31.9	-
36.2	785	Secondary Watershed, >500 ha	Cypre	970	Yes	48.5	-

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
36.3	730	Secondary Watershed, >500 ha	Cypre	1,154	Yes	57.7	-
37	1093	Primary Watershed, <200 ha	Cypre	167	No	No limit	No limit
38	1114	Primary Watershed, <200 ha	Cypre	152	No	No limit	No limit
39	1145	Primary Watershed, <200 ha	Meares Island	112	No	No limit	No limit
4 Total		**Primary Watershed, >500 ha**	**Kennedy River**	**47,540**	**Yes**	**2,377.0**	-
4		Primary - residual area	Kennedy Lake	6,761	No	-	-
4.1	1324	Secondary Watershed, >500 ha	Kennedy Lake	1,276	Yes	63.8	-
4.10	1394	Secondary Watershed, <=500 ha	Kennedy Lake	413	No	-	-
4.11	1309	Secondary Watershed, >500 ha	Kennedy Lake	866	Yes	43.3	-
4.12 Total		**Secondary Watershed, >500 ha**		**20,350**	**Yes**	**1,017.5**	-
4.12	962	Secondary - residual area	Upper Kennedy	8,273	No	-	-
4.12.1	1330	Tertiary Watershed, <=500 ha	Upper Kennedy	468	No	-	-
4.12.10	1041	Tertiary Watershed, <=500 ha	Upper Kennedy	215	No	-	-
4.12.11 Total		**Tertiary Watershed, >500 ha**		**2,445**	**Yes**	**122.3**	-
4.12.11	892	Tertiary - residual area	Upper Kennedy	1,671	No	-	-
4.12.11.1	869	Quaternary Watershed, <=500 ha	Upper Kennedy	373	No	-	-
4.12.11.2	889	Quaternary Watershed, <=500 ha	Upper Kennedy	401	No	-	-
4.12.2	1284	Tertiary Watershed, >500 ha	Upper Kennedy	607	Yes	30.3	-
4.12.3 Total		**Tertiary Watershed, >500 ha**		**889**	**Yes**	**44.4**	-
4.12.3	1270	Tertiary - residual area	Upper Kennedy	2	No	-	-
4.12.3.1	1236	Quaternary Watershed, >500 ha	Upper Kennedy	567	Yes	28.4	-
4.12.3.2	1199	Quaternary Watershed, <=500 ha	Upper Kennedy	320	No	-	-
4.12.4	1238	Tertiary Watershed, >500 ha	Upper Kennedy	1,350	Yes	67.5	-
4.12.5	1182	Tertiary Watershed, <=500 ha	Upper Kennedy	318	No	-	-
4.12.6 Total		**Tertiary Watershed, >500 ha**		**2,611**	**Yes**	**130.5**	-
4.12.6	1140	Tertiary - residual area	Upper Kennedy	1,493	No	-	-
4.12.6.1	1120	Quaternary Watershed, >500 ha	Upper Kennedy	693	Yes	34.7	-
4.12.6.2	1166	Quaternary Watershed, <=500 ha	Upper Kennedy	425	No	-	-
4.12.7 Total		**Tertiary Watershed, >500 ha**		**2,264**	**Yes**	**113.2**	-
4.12.7	1100	Tertiary - residual area	Upper Kennedy	679	No	-	-
4.12.7.1	1085	Quaternary Watershed, >500 ha	Upper Kennedy	1,005	Yes	50.3	-
4.12.7.2	1127	Quaternary Watershed, >500 ha	Upper Kennedy	579	Yes	29.0	-
4.12.8	1067	Tertiary Watershed, <=500 ha	Upper Kennedy	309	No	-	-
4.12.9	946	Tertiary Watershed, >500 ha	Upper Kennedy	600	Yes	30.0	-
4.2 Total		**Secondary Watershed, >500 ha**		**2,073**	**Yes**	**103.7**	-
4.2	1415	Secondary - residual area	Kennedy Lake	661	No	-	-
4.2.1	1433	Tertiary Watershed, >500 ha	Kennedy Lake	736	Yes	36.8	-
4.2.2	1437	Tertiary Watershed, >500 ha	Kennedy Lake	677	Yes	33.8	-
4.3 Total		**Secondary Watershed, >500 ha**		**11,714**	**Yes**	**585.7**	-
4.3		Secondary - residual area	Kennedy Lake	2,478	No	-	-
4.3.1	1386	Tertiary Watershed, <=500 ha	Kennedy Lake	308	No	-	-
4.3.2	1360	Tertiary Watershed, <=500 ha	Kennedy Lake	196	No	-	-
4.3.3	1317	Tertiary Watershed, <=500 ha	Kennedy Lake	358	No	-	-

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
4.3.4	1279	Tertiary Watershed, <=500 ha	Kennedy Lake	165	No	-	-
4.3.5	1280	Tertiary Watershed, >500 ha	Kennedy Lake	571	Yes	28.6	-
4.3.6 Total		**Tertiary Watershed, >500 ha**	Clayoquot River	**7,638**	**Yes**	**381.9**	-
4.3.6	1131	Tertiary - residual area	Clayoquot River	1,866	No	-	-
4.3.6.1	1254	Quaternary Watershed, >500 ha	Clayoquot River	707	Yes	35.4	-
4.3.6.2	1219	Quaternary Watershed, <=500 ha	Clayoquot River	226	No	-	-
4.3.6.3	1198	Quaternary Watershed, <=500 ha	Clayoquot River	345	No	-	-
4.3.6.4	1224	Quaternary Watershed, >500 ha	Clayoquot River	1,003	Yes	50.2	-
4.3.6.5	1143	Quaternary Watershed, >500 ha	Clayoquot River	645	Yes	32.3	-
4.3.6.6	1164	Quaternary Watershed, >500 ha	Clayoquot River	1,085	Yes	54.3	-
4.3.6.7	1117	Quaternary Watershed, <=500 ha	Clayoquot River	354	No	-	-
4.3.6.8	1024	Quaternary Watershed, >500 ha	Clayoquot River	795	Yes	39.8	-
4.3.6.9	1082	Quaternary Watershed, >500 ha	Clayoquot River	610	Yes	30.5	-
4.4	1446	Secondary Watershed, <=500 ha	Kennedy Lake	482	No	-	-
4.5	1447	Secondary Watershed, >500 ha	Kennedy Lake	1,099	Yes	55.0	-
4.6	1444	Secondary Watershed, <=500 ha	Kennedy Lake	249	No	-	-
4.7	1440	Secondary Watershed, <=500 ha	Kennedy Lake	243	No	-	-
4.8	1403	Secondary Watershed, <=500 ha	Kennedy Lake	347	No	-	-
4.9	1316	Secondary Watershed, >500 ha	Kennedy Lake	1,666	Yes	83.3	-
40	1187	Primary Watershed, >=200-500 ha	Meares Island	221	Yes	-	22.1
41	1216	Primary Watershed, >=200-500 ha	Meares Island	447	Yes	-	44.7
42	1258	Primary Watershed, >=200-500 ha	Meares Island	498	Yes	-	49.8
43	1414	Primary Watershed, >=200-500 ha	Beach	286	Yes	-	28.6
44	1339	Primary Watershed, >=200-500 ha	Meares Island	218	Yes	-	21.8
45	1344	Primary Watershed, <200 ha	Meares Island	143	No	No limit	No limit
46	1313	Primary Watershed, <200 ha	Meares Island	167	No	No limit	No limit
47	1288	Primary Watershed, <200 ha	Meares Island	132	No	No limit	No limit
48	1256	Primary Watershed, >=200-500 ha	Meares Island	241	Yes	-	24.1
49	1146	Primary Watershed, <200 ha	Meares Island	154	No	No limit	No limit
5	1272	Primary Watershed, <200 ha	Fortune Channel	92	No	No limit	No limit
50	1157	Primary Watershed, <200 ha	Meares Island	147	No	No limit	No limit
51	1210	Primary Watershed, <200 ha	Meares Island	150	No	No limit	No limit
52	1222	Primary Watershed, <200 ha	Beach	113	No	No limit	No limit
53	1273	Primary Watershed, >=200-500 ha	Beach	490	Yes	-	49.0
54	1226	Primary Watershed, >500 ha	Beach	536	Yes	26.8	-
55	1204	Primary Watershed, >=200-500 ha	Beach	270	Yes	-	27.0
56	1048	Primary Watershed, >500 ha	Cypre	607	Yes	30.4	-
57	1002	Primary Watershed, >=200-500 ha	Cypre	220	Yes	-	22.0
58	986	Primary Watershed, >500 ha	Cypre	511	Yes	25.5	-
59	849	Primary Watershed, <200 ha	Cypre	188	No	No limit	No limit
6	1265	Primary Watershed, <200 ha	Fortune Channel	183	No	No limit	No limit

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
60	787	Primary Watershed, >500 ha	Cypre	784	Yes	39.2	-
61	741	Primary Watershed, >=200-500 ha	Cypre	208	Yes	-	20.8
62	727	Primary Watershed, >=200-500 ha	Cypre	253	Yes	-	25.3
63	694	Primary Watershed, <200 ha	Cypre	193	No	No limit	No limit
64 Total		**Primary Watershed, >500 ha**		**2,381**	**Yes**	**119.0**	-
64	607	Primary - residual area	Cypre	2,008	No	-	-
64.1	695	Secondary Watershed, <=500 ha	Cypre	373	No	-	-
65 Total		**Primary Watershed, >500 ha**		**17,930**	**Yes**	**896.5**	-
65	119	Primary - residual area	Moyeha	8,422	No	-	-
65.1	422	Secondary Watershed, <=500 ha	Moyeha	421	No	-	-
65.2 Total		**Secondary Watershed, >500 ha**		**2,303**	**Yes**	**115.2**	-
65.2	432	Secondary - residual area	Moyeha	259	No	-	-
65.2.1	487	Tertiary Watershed, >500 ha	Moyeha	858	Yes	42.9	-
65.2.2	448	Tertiary Watershed, >500 ha	Moyeha	1,187	Yes	59.4	-
65.3 Total		**Secondary Watershed, >500 ha**		**4,068**	**Yes**	**203.4**	-
65.3	102	Secondary - residual area	Moyeha	1,096	No	-	-
65.3.1	92	Tertiary Watershed, >500 ha	Moyeha	656	Yes	32.8	-
65.3.2	47	Tertiary Watershed, >500 ha	Moyeha	904	Yes	45.2	-
65.3.3	53	Tertiary Watershed, >500 ha	Moyeha	1,412	Yes	70.6	-
65.4	238	Secondary Watershed, >500 ha	Moyeha	632	Yes	31.6	-
65.5	255	Secondary Watershed, >500 ha	Moyeha	963	Yes	48.2	-
65.6	259	Secondary Watershed, >500 ha	Moyeha	602	Yes	30.1	-
65.7	134	Secondary Watershed, >500 ha	Moyeha	519	Yes	26.0	-
66	618	Primary Watershed, >=200-500 ha	Bedingfield	404	Yes	-	40.4
67	779	Primary Watershed, >=200-500 ha	Bedingfield	242	Yes	-	24.2
68	837	Primary Watershed, >=200-500 ha	Bedingfield	323	Yes	-	32.3
69 Total		**Primary Watershed, >500 ha**		**2,732**	**Yes**	**136.6**	-
69	636	Primary - residual area	Bedingfield	2,099	No	-	-
69.1	788	Secondary Watershed, >500 ha	Bedingfield	633	Yes	31.7	-
7	1203	Primary Watershed, >500 ha	Fortune Channel	555	Yes	27.7	-
70	702	Primary Watershed, >500 ha	Bedingfield	791	Yes	39.5	-
71	673	Primary Watershed, >=200-500 ha	Bedingfield	403	Yes	-	40.3
72	635	Primary Watershed, <200 ha	Bedingfield	173	No	No limit	No limit
73 Total		**Primary Watershed, >500 ha**		**1,394**	**Yes**	**69.7**	-
73	592	Primary - residual area	Bedingfield	29	No	-	-
73.1	624	Secondary Watershed, <=500 ha	Bedingfield	388	No	-	-
73.2	527	Secondary Watershed, >500 ha	Bedingfield	977	Yes	48.9	-
74	524	Primary Watershed, <200 ha	Bedingfield	119	No	No limit	No limit
75 Total		**Primary Watershed, >500 ha**		**4,039**	**Yes**	**202.0**	-
75	418	Primary - residual area	Megin	234	No	-	-
75.1	426	Secondary Watershed, >500 ha	Megin	1,928	Yes	96.4	-
75.2	290	Secondary Watershed, >500 ha	Megin	1,877	Yes	93.9	-
76	341	Primary Watershed, >500 ha	Megin	816	Yes	40.8	-

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
77 Total		**Primary Watershed, >500 ha**		**24,047**	**Yes**	**1,202.3**	-
77	184	Primary - residual area	Megin	1,780	No	-	-
77.1	337	Secondary Watershed, >500 ha	Megin	916	Yes	45.8	-
77.2	174	Secondary Watershed, >500 ha	Megin	770	Yes	38.5	-
77.3 Total		**Secondary Watershed, >500 ha**		**7,278**	**Yes**	**363.9**	-
77.3	84	Secondary - residual area	Megin	1,063	No	-	-
77.3.1	74	Tertiary - residual area	Megin	1,055	No	-	-
77.3.1.1	65	Quaternary Watershed, <=500 ha	Megin	374	No	-	-
77.3.2	36	Tertiary - residual area	Megin	1,051	No	-	-
77.3.2.1	27	Quaternary Watershed, >500 ha	Megin	578	Yes	28.9	-
77.3.2.2	42	Quaternary Watershed, >500 ha	Megin	992	Yes	49.6	-
77.3.2.3	16	Quaternary Watershed, >500 ha	Megin	852	Yes	42.6	-
77.3.3	51	Tertiary - residual area	Megin	419	No	-	-
77.3.3.1	40	Quaternary Watershed, >500 ha	Megin	539	Yes	27.0	-
77.3.3.2	37	Quaternary Watershed, <=500 ha	Megin	354	No	-	-
77.4 Total		**Secondary Watershed, >500 ha**		**13,302**	**Yes**	**665.1**	-
77.4	35	Secondary - residual area	Megin	4,080	No	-	-
77.4.1	118	Tertiary - residual area	Megin	1,862	No	-	-
77.4.1.1	106	Quaternary Watershed, <=500 ha	Megin	449	No	-	-
77.4.1.2	294	Quaternary Watershed, >500 ha	Megin	560	Yes	28.0	-
77.4.2	129	Tertiary Watershed, >500 ha	Megin	714	Yes	35.7	-
77.4.3	70	Tertiary Watershed, >500 ha	Megin	582	Yes	29.1	-
77.4.4	56	Tertiary Watershed, >500 ha	Megin	651	Yes	32.5	-
77.4.5	18	Tertiary Watershed, >500 ha	Megin	1,313	Yes	65.6	-
77.4.6	38	Tertiary Watershed, >500 ha	Megin	1,096	Yes	54.8	-
77.4.7	13	Tertiary Watershed, >500 ha	Megin	1,997	Yes	99.8	-
78	501	Primary Watershed, <200 ha	Sydney/Pretty Girl	171	No	No limit	No limit
79	533	Primary Watershed, >=200-500 ha	Sydney/Pretty Girl	274	Yes	-	27.4
8	1188	Primary Watershed, >500 ha	Tofino/Tranquil	729	Yes	36.4	-
80	616	Primary Watershed, >=200-500 ha	Sydney/Pretty Girl	426	Yes	-	42.6
81	739	Primary Watershed, >=200-500 ha	Flores Island	219	Yes	-	21.9
82	733	Primary Watershed, >500 ha	Flores Island	635	Yes	31.8	-
83	806	Primary Watershed, >=200-500 ha	Flores Island	393	Yes	-	39.3
84 Total		**Primary Watershed, >500 ha**		**1,293**	**Yes**	**64.6**	-
84	851	Primary - residual area	Flores Island	406	No	-	-
84.1	842	Secondary Watershed, <=500 ha	Flores Island	386	No	-	-
84.2	883	Secondary Watershed, >500 ha	Flores Island	501	Yes	25.0	-
85	927	Primary Watershed, >=200-500 ha	Flores Island	450	Yes	-	45.0
86	959	Primary Watershed, >=200-500 ha	Flores Island	324	Yes	-	32.4
87	983	Primary Watershed, >500 ha	Flores Island	844	Yes	42.2	-
88	993	Primary Watershed, >=200-500 ha	Flores Island	409	Yes	-	40.9
89	1003	Primary Watershed, >=200-500 ha	Flores Island	203	Yes	-	20.3

Watershed or Map Unit	WS ID	Type	Watershed Group	Area (ha)	Does rate-of-cut Rule Apply?	5 Year Cut (ha)	10 Year Cut (ha)
9 Total		**Primary Watershed, >500 ha**		**4,503**	**Yes**	**225.1**	-
9	991	Primary - residual area	Tofino/Tranquil	2,107	No	-	-
9.1	1011	Secondary Watershed, >500 ha	Tofino/Tranquil	735	Yes	36.7	-
9.2	1101	Secondary Watershed, <=500 ha	Tofino/Tranquil	379	No	-	-
9.3	995	Secondary Watershed, >500 ha	Tofino/Tranquil	683	Yes	34.2	-
9.4	944	Secondary Watershed, >500 ha	Tofino/Tranquil	598	Yes	29.9	-
90 Total		**Primary Watershed, >500 ha**		**1,519**	**Yes**	**75.9**	-
90	1053	Primary - residual area	Flores Island	5	No	-	-
90.1	945	Secondary Watershed, >500 ha	Flores Island	545	Yes	27.3	-
90.2	915	Secondary Watershed, >500 ha	Flores Island	969	Yes	48.4	-
91.A	1009	Primary Watershed, >=200-500 ha	Flores Island	234	Yes	-	23.5
91.B	951	Primary Watershed, >=200-500 ha	Flores Island	414	Yes	-	41.4
92	933	Primary Watershed, >=200-500 ha	Flores Island	215	Yes	-	21.5
93 Total		**Primary Watershed, >500 ha**		**3,033**	**Yes**	**151.6**	-
93		Primary - residual area	Flores Island	276	No	-	-
93.1 Total		**Secondary Watershed, >500 ha**		**1,611**	**Yes**	**80.6**	-
93.1	770	Secondary - residual area	Flores Island	1,208	No	-	-
93.1.1	829	Tertiary Watershed, <=500 ha	Flores Island	403	No	-	-
93.2 Total		**Secondary Watershed, >500 ha**		**798**	**Yes**	**39.9**	-
93.2	868	Secondary - residual area	Flores Island	351	No	-	-
93.2.1	893	Tertiary Watershed, <=500 ha	Flores Island	448	No	-	-
93.3	900	Secondary Watershed, <=500 ha	Flores Island	347	No	-	-
94	742	Primary Watershed, >=200-500 ha	Flores Island	434	Yes	-	43.4
95	632	Primary Watershed, <200 ha	Sydney/Pretty Girl	166	No	No limit	No limit
96	625	Primary Watershed, >=200-500 ha	Sydney/Pretty Girl	238	Yes	-	23.8
97	433	Primary Watershed, >500 ha	Sydney/Pretty Girl	1,515	Yes	75.7	-
98	382	Primary Watershed, >500 ha	Sydney/Pretty Girl	529	Yes	26.5	-
99 Total		**Primary Watershed, >500 ha**		**3,555**	**Yes**	**177.8**	-
99	353	Primary - residual area	Sydney/Pretty Girl	16	No	-	-
99.1 Total		**Secondary Watershed, >500 ha**		**2,409**	**Yes**	**120.5**	-
99.1	143	Secondary - residual area	Sydney/Pretty Girl	618	No	-	-
99.1.1	79	Tertiary - residual area	Sydney/Pretty Girl	1,097	No	-	-
99.1.1.1	76	Quaternary Watershed, >500 ha	Sydney/Pretty Girl	695	Yes	34.8	-
99.2	230	Secondary Watershed, >500 ha	Sydney/Pretty Girl	1,130	Yes	56.5	-

List of Maps