WATERSHED PLANNING IN CLAYOQUOT SOUND

VOLUME 1

PRINCIPLES AND PROCESS

CLAYOQUOT SOUND TECHNICAL PLANNING COMMITTEE

July 2006

BRITISH COLUMBIA

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

July 10, 2006

Guy Louie and Jim Lornie, Co-Chairs
Clayoquot Sound Central Region Board
Post Office Box 790
100 Hittatsoo Road
Ucluelet, BC V0R 3A0

Dear Guy Louie and Jim Lornie:

Re: Watershed Plan Endorsement for the Tofino - Tranquil (Onadsilth - Eekseuklis), Sydney - Pretty Girl, Bedwell - Ursus - Bulson, Hesquiaht, Kennedy Lake, Upper Kennedy River, Clayoquot River, and Fortune Channel planning units.

On behalf of the Parties to the Clayoquot Sound Interim Measures Extension Agreement, and as recommended by the Central Region Board (CRB) in two letters to the Parties during 2005, we are pleased to endorse the watershed plans for the above watershed planning units.

The Board made several significant recommendations in both their letters, including: specific recommendations about individual plans involving technical content; that a summary plan document be completed to provide a regional synopsis of watershed reserves and other Scientific Panel objectives; that a Beach watershed plan be completed and incorporated into the summary document; and, that legal objectives be established under the *Forest and Range Practices Act*.

We understand the Clayoquot Sound Technical Planning Committee (TPC) has undertaken the following initiatives with regard to those recommendations:

- completion of technical changes for individual plans;
- begun work on a regional summary document, including incorporation of Scientific Panel objectives for the Beach planning unit; and,
- initiated inter-agency discussions with regard to setting legal objectives under the *Forest and Range Practices Act*.

We also understand that following the second public review period and during preliminary work on the regional summary document, the Planning Committee found a small number of minor errors and discrepancies in the GIS analyses results. The Committee determined that these, as well as other inconsistencies between watershed plans, could be addressed without making significant revisions to the watershed plans or the reserve networks. Therefore, they

have incorporated the necessary corrections and changes into the final versions of the watershed plans and the regional summary document.

The Parties are pleased to confirm our support for the CRB recommendations and the efforts by the Planning Committee to address them. We have instructed the TPC to ensure all changes and updates are completed, so that individual watershed plans are ready for public distribution by July 31, 2006. At that time, the plans will take effect as 'Official Watershed Plans'.

The Board made one other significant recommendation in its two letters: that the Parties identify the resources to develop and implement a comprehensive monitoring program. Now that the watershed planning process is drawing to a close, the Parties are pleased to announce we have begun discussions regarding the availability of resources that will allow for the evaluation of outstanding priorities, including the details associated with plan implementation and monitoring. The Parties recognize that these priorities are important steps on the road to sustainable ecosystem management, as envisioned by the Scientific Panel, and are crucial components to the practice of adaptive management. We anticipate our discussions will yield direction on these topics to the Board and the Planning Committee in the near future.

We wish to acknowledge the considerable work required of the CRB to conduct two public reviews of the draft watershed plans during 2005. We especially appreciate the Board's efforts to organize and summarize the results from the public processes and its own reviews, then to structure its subsequent recommendations in order to provide assistance to the Parties' review and evaluation of these plans.

Further, we would like to thank the CRB, the Central Region First Nations, various stakeholders and interest groups, local governments, and members of the public for their contributions to the development of these plans - and, for their thoughtful comments during each review process.

We look forward to a continued close working relationship between the Parties, the Central Region Board, and the Technical Planning Committee to achieve the objectives envisioned by the Scientific Panel. Continued close cooperation between all partners will be instrumental in achieving this goal.

Sincerely,

Elmer Frank
Chairman
Central Region Chiefs

Mike Lambert
Associate Deputy Minister
Integrated Land Management Bureau

cc. Nelson Keitlah and Rudi Mayser, Co-chairs, Clayoquot Sound Technical Planning Committee

Preface

This is *Volume 1* in the series *Watershed Planning in Clayoquot Sound.* This document was prepared by representatives of the Nuu-chah-nulth First Nations and provincial government agencies working on the Clayoquot Sound Technical Planning Committee (TPC). The primary responsibility of the TPC is to complete watershed-level planning pursuant to the recommendations of the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound.

Volume 1 describes how the TPC developed watershed planning objectives and strategies in accordance with Scientific Panel recommendations. This volume also sets out the principles, process and criteria that guide the watershed planning process, and therefore provides an important companion piece to individual watershed plans.

Each subsequent volume in the Watershed Planning series comprises a complete watershed plan – which identifies specific reserves, special management zones and harvestable areas for an entire watershed planning unit in Clayoquot Sound. The series is numbered as follows:

Watershed Planning in Clayoquot Sound

Volume 1: Principles and Process
Volume 2: Tofino-Tranquil (Onadsilth-Eekseuklis) Watershed Plan
Volume 3: Sydney - Pretty Girl Watershed Plan
Volume 4: Bedwell - Ursus - Bulson Watershed Plan
Volume 5: Hesquiaht Watershed Plan
Volume 6: Kennedy Lake Watershed Plan
Volume 7: Upper Kennedy River Watershed Plan
Volume 8: Clayoquot River Watershed Plan
Volume 9: Fortune Channel Watershed Plan
Volume 10: Beach Watershed Plan
Flores Island Watershed Plan*
Bedingfield Watershed Plan*
Cypre Watershed Plan*
Megin Watershed Plan[+]
Moyeha Watershed Plan[+]

* These three volumes were completed in 2003 and released in a different format. When updated, they will be incorporated into the Watershed Planning series format.

[+] These two planning areas are located entirely within Provincial Parks; therefore, planning and management are the responsibility of BC Parks.

The Clayoquot Sound Technical Planning Committee made a draft version of *Volume 1* available for public review and comment in January 2005. The Clayoquot Sound Central Region Board (CRB) coordinated the review, collated all comments received, and provided comments and recommendations to the Central Region Chiefs and the Province of British Columbia, both Parties to the Clayoquot Sound Interim Measures Extension Agreement (IMEA), for further direction.

In July 2006, the Parties endorsed this report, as an essential supporting document for official Watershed Plans in the *Watershed Planning in Clayoquot Sound* series.

The intent of this document is to guide site-level forest planning and forestry operations in Clayoquot Sound, in accordance with the Scientific Panel recommendations regarding sustainable ecosystem management. **This document does not represent approved government direction or policy, and does not prejudge the positions that either government or First Nations may take in treaty negotiations**.

The effective date of this report will be July 31, 2006. All reports in the *Watershed Planning in Clayoquot Sound* series are subject to periodic updates and amendments, to keep them current and to incorporate new information.

Table of Contents

Table of Contents (continued)

1.0 The Planning Framework

1.1 Background

Through the 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, First Nations' reserves, Federal Crown land and private land — was not part of the decision. See Map 1 for a map of the 1993 Clayoquot Sound Land Use Decision area.

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 "Scientific Panel." The Scientific Panel had 19 members including scientists and representatives of the Nuu-chah-nulth Central Region First Nations. The Province gave the Scientific Panel 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 reports, which contain over 120 recommendations, were published in 1995. Later the same year, the Province adopted all of the Scientific Panel's recommendations and assigned a special government team – the Clayoquot Implementation Team – 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 was that sustainable ecosystem management required not only improved forestry practices on the ground, but also a new approach to planning. This approach established an ecosystem-based management framework in which the primary objective was to sustain the productivity and natural diversity of the region. In particular, the Scientific Panel proposed the development of long-term watershed plans identifying reserves to protect a range of forest values. Many of the Scientific Panel's recommendations related to the scope and content of these watershed plans.

In setting out a new framework for planning, the Scientific Panel first organized long-term management principles into three broad planning themes: watershed integrity, biological diversity, and human values. Each theme comprised several management goals. For each goal, the Scientific Panel identified a set of management objectives. These objectives included, for example, maintaining soil

characteristics, protecting important wildlife habitat, and recognizing First Nations' interests.

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

The establishment of watershed reserves was the Scientific Panel's key strategy to accomplish these management objectives. In spatial terms, watershed plans reflect the broader direction that emerges from sub-regional planning, and also provide guidance to more specific site-level plans. In the context of the planning process, watershed plans are a means of securing the forest values at the heart of ecosystem management objectives.

Watershed plans designate reserves to protect forest values and identify where harvesting can take place.

Watershed plans have been developed in accordance with the principles and recommendations set out by the Scientific Panel to guide the planning process.[1] These plans map and designate the areas that will be set aside as reserves to protect a range of forest values. Reserves are designed to preserve the long-term ecosystem integrity of each watershed planning unit, to protect First Nations' culturally important areas, and to maintain recreational and scenic values. Individual plans also map and designate harvestable areas – that is, the land that falls outside of reserves and on which sustainable forest harvesting can take place. Watershed plans do not apply to provincial parks, Indian Reserves, federal lands, or private land.

The Watershed Plans for Clayoquot Sound are presented in a series of volumes. Volume 1 describes the principles, process, and criteria that guide the watershed planning process. Each of the remaining volumes sets out a watershed plan for one of the Clayoquot planning units.

1.2 Participants in the Planning Process

The Scientific Panel argues that individuals most closely affected by resource management decisions should be responsible for making those decisions. In particular, the Scientific Panel recommends that the Nuu-chah-nulth First Nations of Clayoquot Sound be major participants in planning and decision-making in the region.

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

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

With this in mind, the Clayoquot Implementation Team collaborated with the Central Region Board (CRB)[2] 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 a 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.

These plans were developed by a committee of representatives from First Nations and provincial agencies.

In 1999, in recognition of the need for a streamlined and cost-effective planning process, the Clayoquot Sound Technical Planning Committee (TPC) was struck by the Parties to the Interim Measures Extension Agreement (IMEA). This committee is made up of First Nations representatives and technical staff from the Provincial agencies responsible for resource management planning,[3] and is focused solely on watershed planning. See Appendix 2 for a list of TPC members.

Each plan is subject to public review before it is 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 is subject to public review before it is approved. The TPC submits each plan in draft form to the Central Region Board, which in turn leads a process to solicit public input on the plans. At the end of the public review process, the CRB forwards the draft plans, together with comments and recommendations, to the Central Region Chiefs and the Province for decision and further guidance.

1.3 Planning Levels

The Scientific Panel identified three levels of planning. The largest planning unit, the sub-regional plan, establishes broad parameters for large areas consisting of groups of watersheds. The original Clayoquot Sound Planning Committee (1997-1999) carried out a number of sub-regional planning tasks, including the identification of watershed planning units and the identification and initiation of essential inventories.

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[2] In March 1994, the Nuu-chah-nulth Central Region Chiefs and the provincial government signed the Interim Measures Agreement which, among other things, established the community-based Clayoquot Sound Central Region Board (CRB). The CRB is comprised of five members appointed by the Central Region First Nations, five government-appointed members from local non-aboriginal communities, and two co-chairs: one appointed by the Chiefs and one by the Province. 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. The IMA was extended in 1996, as an Interim Measures Extension Agreement (IMEA), and has seen subsequent extensions in 2000, 2005 and 2006.

[3] When the TPC was first established, government representatives included staff from the Ministry of Forests, the Ministry of Environment, Lands and Parks and the Ministry of Small Business, Tourism and Culture. In 2001, responsibility for resource management planning was transferred to the new Ministry of Sustainable Resource Management; then in 2005, to the Integrated Land Management Bureau (ILMB), in the Ministry of Agriculture and Lands. Accordingly, ILMB staff now represent the Province on the TPC.

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

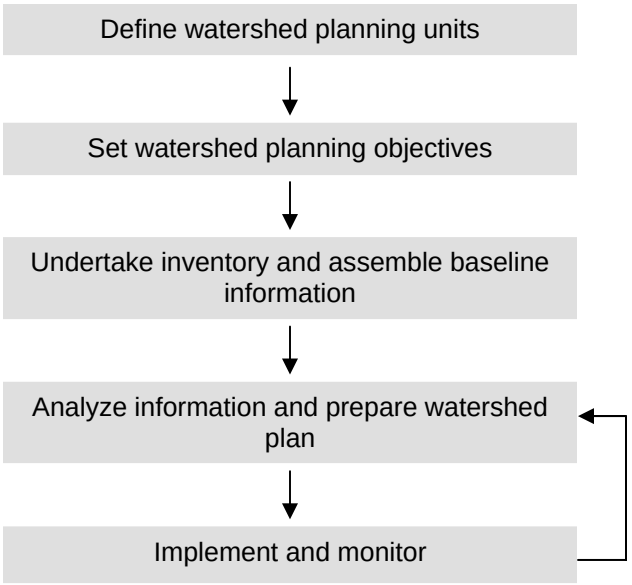
Watershed-level plans are the key long-term planning level.

The critical link between these two planning levels is the watershed plan. Watershed 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 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."[4] Planning efforts to date have therefore been focused at the watershed level.

1.4 The Watershed Planning Process

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

Figure 1.1 The Watershed Planning Process[5]



[4] Report 5, p. 166.
[5] Adapted from Report 5, p. 157.

1.4.1 Defining Watershed Planning Units

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

In total, 14 watershed planning units have been established, exclusive of Meares Island. Their locations are shown on Map 2.

1.4.2 Setting Watershed Planning Objectives

The Scientific Panel set out a number of watershed planning objectives that apply to all watershed plans. 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."[6]

The overarching objective of watershed planning is to identify and map reserves and harvestable areas within the watershed planning unit.

The Scientific Panel listed six primary objectives for watershed planning:

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

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

- contribute significantly to 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 continued ecosystem health,
- 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 and related activities will not compromise the long-term integrity of the forest ecosystem, its use by First Nations people, or its recreational or scenic value;

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

[6] Report 5, p. xiv

- checking that rate-of-cut constraints are observed within individual watersheds of the watershed planning unit, and determining an appropriate watershed-specific rate for forest harvesting within harvestable areas,
- projecting an appropriate pattern and distribution of forest roads and cutting units within the harvestable area and other working units, and proposing general retention levels and harvesting methods (details would be 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 values and 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.[7]

The watershed plans follow the Scientific Panel's recommendations very closely. Their focus is the identification and designation of reserves within each watershed planning unit. The Plans also identify and designate the harvestable areas in each planning unit, in accordance with Objective 3 above.

The watershed plan is not a management plan.

The Watershed Plans do not, however, represent management plans 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 that hold particular tenures under the *Forest Act*. Management plans prepared in accordance with 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.

With regard to objective 6 above, the TPC determined it was more relevant to address the monitoring question at a regional or sub-regional level of planning rather than at the watershed level. Due to limited resources, the TPC decided to focus on the other objectives and the completion of individual watershed plans; then, work on a monitoring strategy upon completion of the watershed plans.

[7] Report 5, p. 167

1.4.3 Undertaking Inventories and Assembling Baseline Information

Report 5 of the Scientific Panel identified information requirements for an ecosystem-based approach to planning in Clayoquot Sound. It also recognized that adopting this approach may "necessitate the collection of information additional to, or different from, that addressed in the RIC[8] inventory standards or in the *Forest Practices Code* field guides."[9]

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

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 (that is, 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.

In 1996, several provincial ministries, in cooperation with International Forest Products Limited and MacMillan Bloedel Limited, and with input from the CRB and the Central Region First Nations, launched a multi-year, multi-phase inventory initiative with funding from Forest Renewal BC (FRBC). The ministries set out a framework for a suite of operational inventories developed with advice from individuals who had been members of the Scientific Panel. Some of these 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 initiative updated and redesigned existing inventories in order to tailor them to the task of planning in Clayoquot Sound. Together, the following inventories provided the essential baseline information to undertake watershed planning as outlined in the Scientific Panel report:

- vegetation resource inventory
- terrestrial ecosystem inventory
- wildlife and wildlife habitat mapping
- recreation inventory
- landscape inventory
- hydroriparian inventory
- fish and fish habitat mapping
- terrain and terrain stability mapping
- landslide inventory
- archaeology inventory
- recreation and tourism inventories
- scenic inventory

Many of these inventories were typed and interpreted using colour aerial photography (September 1996, 1:15,000) and mapped on the Province's existing

[8] The RIC, or Resource Inventory Committee, is a government committee charged with integrating existing inventories and inventory practices across government agencies.
[9] Report 5, p. 261.

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 3 of this document describes in more detail the nature and scope of each inventory.

1.4.4 Analyzing Information and Preparing the Watershed Plan

Inventory results were used to identify resource condition and capabilities.

Once inventories were completed, results were 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. These analyses were facilitated using geographic information system (GIS) software.

The Scientific Panel set out recommendations for the management of the various resources within a watershed unit. Once the sensitivity and capability of individual resources had been assessed through GIS analysis, the Scientific Panel recommendations relating to these resources were used to guide the designation of reserve areas - the areas set aside to protect specific resources or values, and harvestable areas - 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.[10]

Linkages among the different watershed 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 are identified at the subregional planning level.

[10] Report 5, p. 169.

Identifying the Harvestable Area

Once all the watershed reserves 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 related resource development, such as road-building, can take place within the harvestable area as long as such activities are consistent with the Scientific Panel recommendations concerning operations, relevant forest legislation and the watershed plan.

1.4.5 Implementing and Monitoring

As noted above, a watershed plan is not an operational plan. The watershed 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 and stewardship plans and silviculture prescriptions or site-level plans. These plans will be developed and implemented by forest licensees. Chapter 4 of this volume discusses in more detail the implementation of watershed plans.

Neither the Scientific Panel recommendations nor the watershed plans currently include any legally binding direction for the preparation and implementation of operational plans under the *Forest Practices Code* or *Forest and Range Practices Act* and associated regulations. This does not mean, however, that the Scientific 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 in the conduct of their management activities within Clayoquot Sound. This work is carried out in close cooperation with the Central Region Board and provincial resource agencies.

Monitoring will help the Province and First Nations evaluate the effectiveness of watershed 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. Monitoring is discussed in Chapter 5 of this volume.

2.0 Watershed Reserves in Clayoquot Sound

2.1 Reserves and Sustainable Ecosystem Management

The key outcome of watershed 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 set aside in order to meet watershed management objectives.

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

The Scientific Panel organized broad management principles into three main components or "themes," each supported by a series of management goals:

- **watershed integrity**; including the maintenance of
  - water flow, water quality and channel stability, and
  - stability and productivity of forest soils;
- **biological diversity**, including the maintenance of
  - viable populations of all indigenous species,
  - late successional forests,
  - representative ecosystems, and
  - linkages amongst watershed planning units; and
- **human values**, including the maintenance of
  - First Nations' cultural values,
  - scenic resources, and
  - recreation and tourism values. [11]

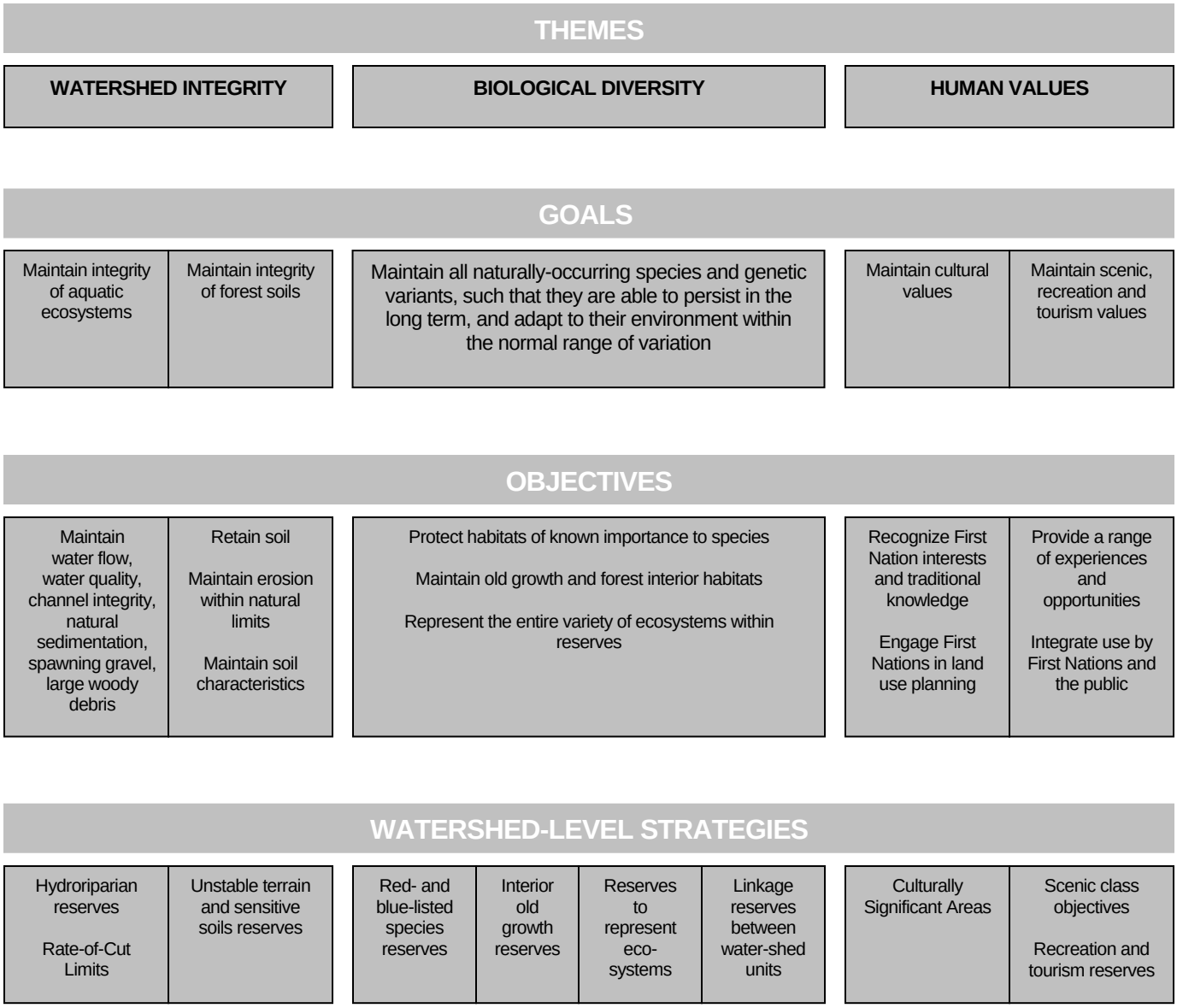
Each of these themes and its supporting goals are essential to sustainable ecosystem management. Each goal can be further broken down into specific conservation objectives that describe in more detail the desired outcomes and end results to be achieved for a given resource or value. The Scientific Panel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

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 Scientific Panel's recommendations represent the strategies that must be undertaken in order to make this vision a reality. The development of watershed plans is of central importance in this task.

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

Figure 2.1 illustrates the Scientific Panel's conceptual framework for sustainable ecosystem management in Clayoquot Sound. This figure also highlights the role of watershed-level reserves within the Scientific Panel's framework.

Figure 2.1 Framework for Implementing Sustainable Ecosystem Management in Clayoquot Sound



The Scientific Panel identified eight kinds of reserves to be established at the watershed level. These reserves follow from the themes and goals identified above, in Figure 2.1:

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 planning areas.

Human Values

7 Reserves to protect cultural values.

8 Reserves to protect scenic and recreation values.

The following sections present 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, ending with the Scientific Panel's recommendation – the strategy – for designation of the reserve type.

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 Scientific 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 Scientific Panel does not provide specific criteria. In those cases, the planning committees, with advice from technical experts - sometimes including former Scientific Panel members, developed the reserve criteria.

Table 2.1 provides an overview of the information sources used and criteria applied to identify each reserve type. Appendix 3 describes in more detail the inventories and associated attributes that form the basis for reserve establishment.

Table 2.1: Information Source(s) and Criteria used to Establish Reserves

Reserve Type	Information Source(s)	Reserve Criteria Applied
Hydroriparian	Hydroriparian Inventory[12]	Scientific Panel Recommendations relating to Hydroriparian Reserves.[13]
Sensitive Soils and Unstable Terrain	Terrain and Terrain Stability Mapping[14] Landslide inventory[15]	100% protection of Class V Terrain Protection of sensitive soils as described in section 2.2.2.
Red- and Blue-Listed Species	Ecosystem Mapping[16] 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[17]	At least 30% of each site series. At least 50% of rare site series.[18] 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[19] 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[20] Recreation and tourism use information[21] Recreation Inventory, Tourism Inventory & Capability Modeling[22]	Scenic management classes (i.e., natural-appearing, minimal alterations, small-scale alteration. Recreation features that have a significance rating of very high and high.

[12] Hydroriparian inventories were conducted by Madrone Consultants Limited between 1996 and 1999. See the Bibliography for references.
[13] Report 5, Section 7.4.
[14] Terrain and terrain stability mapping was undertaken by Madrone Consultants Ltd. between 1996 and 1999. See the Bibliography for detailed references.
[15] Landslide inventory work was conducted by EBA Engineering Consultants Limited in 1997. See the Bibliography for references.
[16] Madrone Consultants Ltd. in 1998f and 1999b.
[17] The vegetation resource inventory was conducted by ARC Alpine Consultants. See the Bibliography for references.
[18] 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.
[19] Archaeology inventory work was conducted by Golder Associates Limited and Shoreline Archaeological Services. See the Bibliography for references.
[20] Various scenic inventory projects were undertaken between 1993 and 1999. See Appendix 3 for details.
[21] Inventory information was drawn from various projects relating to recreation and tourism use. See Appendix 3 for details.
[22] Catherine Berris Associates, Juan de Fuca Environmental Consultants and Wilcon Wildlife Consulting Limited jointly undertook a number of recreation and tourism inventories and capability modelling. See the Bibliography for references.

2.2 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.

2.2.1 Hydroriparian Reserves

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

The Scientific Panel recognizes the paramount importance of water bodies and their immediate vicinity, describing these zones as the "skeleton and circulation system of the ecological landscape."[23] Hydroriparian ecosystems distribute water through the physical environment, and also contain the richest and most diverse habitats. Protection of these systems is therefore crucial to the protection of watershed integrity.

Hydroriparian Reserves and Sustainable Ecosystem Management

Figure 2.2 shows the role of hydroriparian reserves within the overall framework for sustainable ecosystem management in Clayoquot Sound. The designation of hydroriparian reserves is the Scientific Panel's key strategy for achieving integrity of aquatic ecosystems.

[23] Report 5, p.32

Figure 2.2 Hydroriparian Reserves and Sustainable Ecosystem Management

THEME
WATERSHED INTEGRITY
GOALS
Maintain integrity of aquatic ecosystems
OBJECTIVES

Maintain water flows 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 by managing the riparian area to ensure a continuing supply of this debris.

WATERSHED-LEVEL 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 ecosystems (Report 5, p. 175).

Criteria for Hydroriparian Reserves

In recognition of the importance of hydroriparian reserves, the Scientific Panel describes in detail the criteria to be used for their designation.[24] Hydroriparian reserves are designated along the borders of streams, rivers, floodplains, wetlands, lakes and marine shores.

Strategies to protect hydroriparian systems include both reserves and special management zones.

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).

[24] Report 5 Section 7.4

In the case of floodplains, the minimum reserve width is 50 metres, while the maximum is the entire contemporary floodplain.[25] 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.[26]

Marine shores are similar to lakeshores, but ecological relations between terrestrial and saltwater systems tend to be 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. In addition to the marine shore classification provided by the Scientific Panel, the TPC obtained expert advice from Madrone Environmental Consulting Limited regarding the definitions of 'open' and 'protected' waters (see Appendix 3 for details).

Table 2.2 summarizes the hydroriparian classification system and the associated reserve widths.[27]

[25] 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.
[26] Refer to section 3.1.2 for more details regarding management criteria for special management zones.
[27] Please also refer to Report 5, chapter 7.4 and Appendix II.

Table 2.2 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	30	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	Bvi	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 evaluation by 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.
**** Or to the top of slope, whichever is greater. If the sides of the slope are stable treat as a B3a.
[1] A special management zone extending from the reserve an additional 20 m or to the edge of hydroriparian influence, whichever is greater, is subject to retention harvesting.
[2] Reserve is 30 meters or to edge of hydroriparian influence, whichever is greater.
[3] On sloping edges of wetlands, designate same reserve as for lakes.

2.2.2 Reserves for Sensitive Soils and Unstable Terrain

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

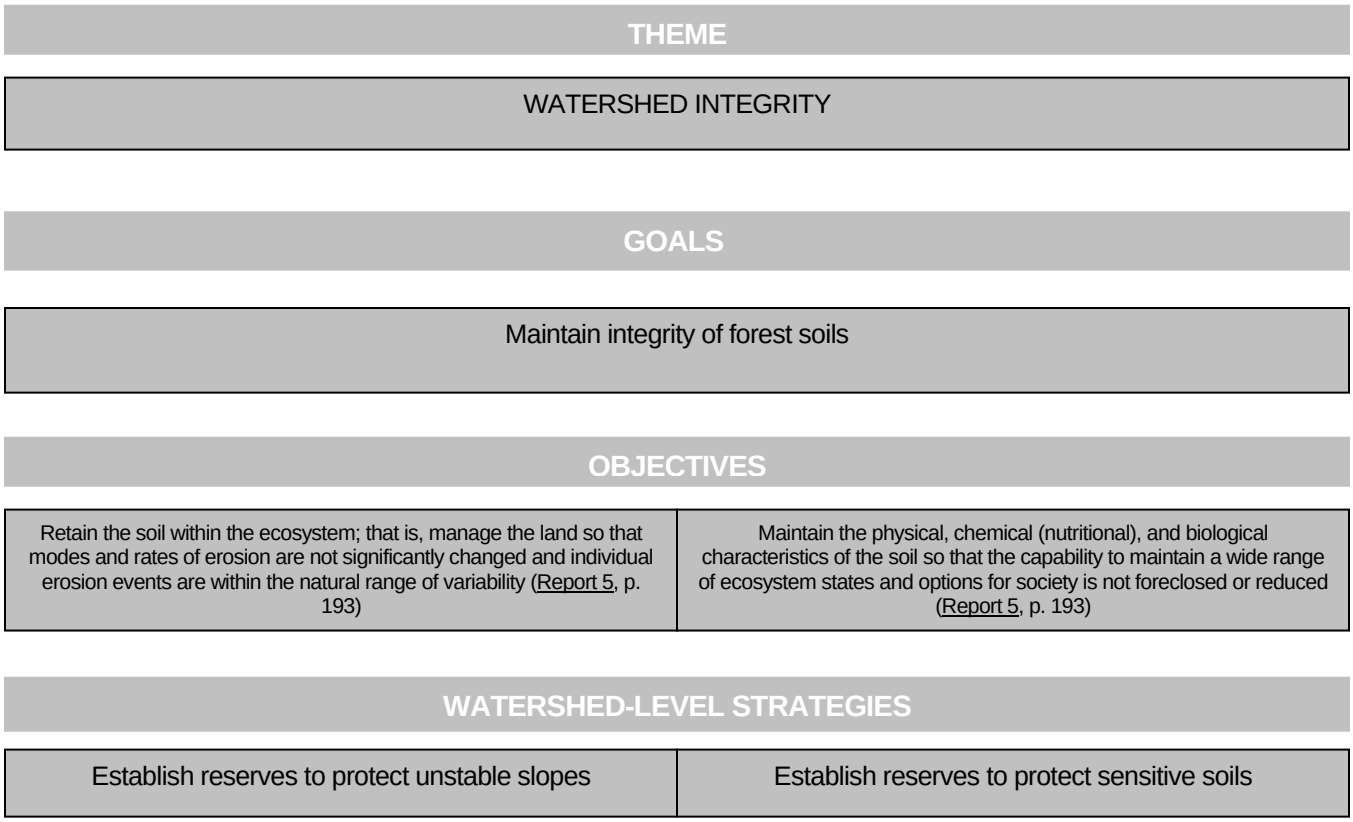
To reduce the risk of erosion, the Scientific Panel recommends that "only stable terrain and resilient soils should be available for forest harvesting operations."[28] Watershed plans therefore must include reserves to protect sensitive soils and unstable terrain.

[28] Report 5, p.169.

Soil and Terrain Reserves and Sustainable Ecosystem Management

Figure 2.3 shows 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.

Figure 2.3 Soil / Terrain Reserves and Sustainable Ecosystem Management



Criteria for Unstable Terrain and Sensitive Soils Reserves

The single criterion established by the Scientific 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 Scientific Panel did not provide specific criteria for the designation of reserves to protect sensitive soils. The TPC used the Scientific Panel recommendations as a guide, and consulted research specialists in the development of specific criteria.[29] The specialists' report used terrain mapping and terrestrial ecosystem mapping to identify soil types and ecosystems that

[29] B.C. Ministry of Forests, 1998.

require protection at the watershed level. These maps 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. For a description of the terrain and associated inventories, refer to Appendix 3.

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 – those associated with wetlands – is captured in accordance with the hydroriparian classes and inventory.

Refer to Section 3.1.2 for further direction with respect to management of sensitive terrain and soils. Appendix 3 provides a more detailed description of inventories associated with terrain stability and sensitive soils.

2.3 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."[30] This definition includes both the diversity of species and the diversity and function of the ecosystems and habitats that they depend on. The Scientific Panel acknowledges that "maintenance of biological diversity is inextricably related to the long-term maintenance of healthy, productive ecosystems."[31] The Scientific Panel recognizes this relationship 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 objectives for watershed integrity described in Section 2.2. This section focuses on the objectives and strategies outlined by the Scientific Panel to maintain all naturally-occurring species and genetic variants.

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

[30] Report 5, p.272
[31] Report 5, p.200

- 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 planning areas.

2.3.1 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 Environment (MoE) 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. MoE 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 generally not at risk but that may be 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). The ranks developed by the CDC provide the basis for the Red and Blue lists used by MoE.

Using the MoE 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 Scientific 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 2.4 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 2.4 Red / Blue Species Reserves and Sustainable Ecosystem Management

THEME

BIOLOGICAL DIVERSITY

GOAL

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 (Report 5, p. 200)

OBJECTIVE

Protect habitats of known importance to particular species (Report 5, p. 201)

WATERSHED-LEVEL STRATEGY

Establish reserves to protect red-listed and blue-listed plant and animal species (Report 5, p. 175).

Criteria 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 extremely expensive. For this reason, the TPC 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 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 MoE colour code, the site series unit and the 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. [32]

Table 2.3 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). The table also includes, for information, three yellow-listed communities, which in Clayoquot Sound are not at risk.

[32] See Ministry of Environment Lands and Parks, 1999i.

Table 2.3 Red- and Blue-Listed Plant Communities in Clayoquot Sound *

Rare Plant Communities	Rank[33]	Associated Ecosystem Units		
		BEC unit	Site Series	
Red-Listed			Number	Symbol
Picea sitchensis / *Maianthemum dilatatum* (Sitka spruce / false lily-of-the valley)	S2	CWHvh1	08	SL
Picea sitchensis / *Rubus spectabilis* (Sitka spruce / salmonberry)	S2	CWHvm1	09	SS
[*Anaphalis margaritacea – Aster foliaceus* (pearly everlasting - leafy aster)]	S2	MHmm1	00	n/a]
[*Carex macrocephala* (large headed sedge) herbaceous community]	S1S2	CWHvh1	00	n/a]
[*Phlox diffusa - Selaginella wallacei* (spreading phlox - Wallace's selaginella club moss)]	S2	MHmm1	00	n/a]
[*Picea sitchensis* / *Trisetum canescens* (Sitka spruce / tall trisetum grass)]	S2	CWHvh1	09	ST]
Blue-Listed				
Alnus rubra / *Maianthemum dilatatum* (red alder / false lily-of-the valley)	S3	CWHvh1	10	AL
Picea sitchensis / *Eurhynchium oreganum (*formerly *Kindbergia oregana)* (Sitka spruce / Oregon beaked-moss)	S3	CWHvh1	15	SK
Picea sitchensis / *Polystichum munitum* (Sitka spruce / sword fern)	S3	CWHvh1	17	SW
Thuja plicata / *Picea sitchensis - Lysichiton americanus* (western redcedar - Sitka spruce / skunk cabbage)	S3	CWHvh1	13	RC
Thuja plicata / *Picea sitchensis - Lysichiton americanus* (western redcedar - Sitka spruce / skunk cabbage)	S3	CWHvm1	14	RC
Thuja plicata - Picea sitchensis / *Polystichum munitum* (western redcedar - Sitka spruce / sword fern)	S2S3	CWHvh1	05	RF
Thuja plicata - Tsuga heterophylla / *Polystichum munitum* (western redcedar - western hemlock / sword fern)	S3?	CWHvm1	04	RS
Thuja plicata - Tsuga heterophylla / *Polystichum munitum* (western redcedar - western hemlock / sword fern)	S3?	CWHvm2	04	RS
[*Abies amabilis - Picea sitchensis* / *Oplopanax horridus* (amabilis (silver) fir - Sitka spruce / devil's club)]	S3	CWHvm1	08	AD]
[*Abies amabilis - Picea sitchensis* / *Oplopanax horridus* (amabilis (silver) fir - Sitka spruce / devil's club)]	S3	CWHvm2	08	AD]
[*Picea sitchensis* / *Calamagrostis nutkaensis* (Sitka spruce / Nootka reedgrass)]	S3	CWHvh1	16	SR]
[*Picea sitchensis* / *Carex obnupta* (Sitka spruce / slough sedge)]	S3	CWHvh1	18	SE]
[*Picea sitchensis* / *Malus fusca* (Sitka spruce / Pacific crab apple)]	S3	CWHvh1	19	SC?]
[*Populus balsamifera* ssp. *trichocarpa* / *Cornus stolonifera* (black cottonwood / red-osier dogwood)]	S3	CWHvm1	10	CD]
[*Tsuga heterophylla – Picea sitchensis* / *Rhytidiadelphus loreus* (western hemlock - Sitka spruce / lanky moss)]	S3	CWHvh1	04	HM]
Yellow-Listed				
Abies amabilis - Thuja plicata / *Tiarella trifoliata* (amabilis (silver) fir - western redcedar / foamflower)	S3S4	CWHvm2	05	AF
Thuja plicata – Chamaecyparis nootkatensis / *Lysichiton americanus* (western redcedar - yellow-cedar / skunk cabbage)	S3S4	CWHvm2	11	RC
Tsuga mertensiana – Abies amabilis / *Vaccinium alaskaense* (mountain hemlock - amabilis (silver) fir / Alaskan blueberry)	S3S4	MHmm1	01	MB

*Source: BC Conservation Data Centre, November 2004.

[33] Notes on ranking system:

S1 - Critically Imperiled because of extreme rarity in the province, or because of some factor(s) making it especially vulnerable to extirpation from the province. Typically, there will be 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 provincially 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 is 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 TPC used an approach similar to that used to establish reserves for representative ecosystems (see Section 2.3.3). 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.

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.[34] The following criteria were used to help the TPC select among candidate areas to be added to the reserve network:

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

- 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.

Animal Species

The watersheds of Clayoquot Sound contain valuable nesting habitat for the Marbled Murrelet, a provincially red-listed bird species. The identification of

[34] 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.

reserves to protect these birds is aided by a habitat suitability model developed by wildlife biologists in 2001.[35] This model uses a 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 the identification of suitable Marbled 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.

Using these criteria, the model identified four classes of potential nesting habitat: important excellent (class 1), important good (class 2), sub-optimal (class 3) and not suitable (class 4). These habitat classes were used to prepare habitat suitability maps. In turn, the maps provided guidance to MoE biologists as they developed murrelet management strategies.[36] Recognizing that additional reserves were needed, biologists used the habitat maps to identify potential reserves. The final reserve areas and boundaries proposed in each watershed plan were developed following an examination of several factors, including:

- the extent of overlap between candidate reserves and existing reserves designated to protect other forest values (e.g. soils and terrain, and hydroriparian values),
- the size of each reserve area,
- the availability of nesting platforms,
- the level of habitat fragmentation,
- the overall distribution of reserves,
- the percentage of high-value habitat included in reserves, and
- the presence of suitable tree species for Murrelet nesting and habitat.[37]

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-Tailed Deer and Black Bear. Most of Clayoquot Sound records very infrequent presence of Roosevelt Elk. Black-Tailed Deer are found throughout Clayoquot Sound, but are not abundant.

Black Bears, in contrast, are common in all the Clayoquot Sound planning units. They range from intertidal and estuarine areas at sea level into high-elevation,

[35] See V. Bahn and D. Newson, 2002.
[36] See Chatwin, T. A., 2002.
[37] For further detail, see the studies described in the March 2002 report by the BC Ministry of Water, Land and Air Protection.

alpine meadows, utilizing every biogeoclimatic zone, sub-zone and variant in between. The needs of these animals vary seasonally; for example, access to spawning salmon is essential to enable the bears to accumulate fat reserves for winter denning. Historical bear numbers may have increased in some areas following forest harvesting, due to the creation of early seral communities which have an abundant supply of fruit-bearing shrubs, grasses and forbs. Bears also rely on old-growth forests for den sites.

Generally, specific reserves are not necessary for Roosevelt Elk, Black Bear or Black-Tailed Deer because critical habitat for these species is often captured in other reserves and protected areas.

Fish habitat in the region is diverse.

Watershed planning must also take into account the need to protect fish habitat, including salmonid rearing and over-wintering habitat. Anadromous species in the region include Chum, Chinook, Coho, Pink and Sockeye Salmon; Steelhead and Cutthroat Trout. Resident fish populations include Rainbow Trout, Cutthroat Trout, Dolly Varden Char and Coastal Cutthroat Trout; the latter two are blue-listed species (CDC 2002).

Several watersheds in Clayoquot Sound rank high for biodiversity values because they support resident fish populations that may have been physically isolated for thousands of years. As a result of this isolation, each separated population is considered genetically distinct.

Appendix 3 provides further information on fish habitat and distribution in Clayoquot Sound. For more information on wildlife habitat requirements, please refer to "Clayoquot Sound Watershed Level Planning – Wildlife Habitat Overview" (Clayoquot Sound Technical Planning Committee, August 2003).

2.3.2 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 preserve conditions similar to those in the interior of historic forests. A patch that is too small will suffer "edge effects" due to the influence of increased exposure to sunlight and wind, along with consequent changes in temperature and humidity 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 Ecosystem Management

Figure 2.5 shows the role of reserves to protect forest-interior conditions within the overall framework for sustainable ecosystem management in Clayoquot Sound.

Figure 2.5 Forest-Interior Reserves and Sustainable Ecosystem Management

THEME
BIOLOGICAL DIVERSITY

GOAL
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 (Report 5, p. 200)

OBJECTIVE	
Protect habitats of known importance to particular species (Report 5, p. 201)	Maintain old-growth and forest interior habitats (Report 5, p. 201)

WATERSHED-LEVEL STRATEGY
Establish reserves to protect forest=interior conditions in late successional forests (Report 5, p. 170).

Criteria for Reserves to Protect Forest-Interior Conditions

The Scientific Panel defines late-successional forests as those in age class 8 (141 to 250 years) and age class 9 (251 years and older). The Scientific Panel recommends that at least 40 percent of these forests be retained in reserves. Also, the Scientific Panel states that this 40 percent can be comprised of both reserve areas and areas of late successional forest retained in harvestable areas[38].

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

The Scientific Panel goes on to recommend that reserves be established to protect forest-interior conditions in late successional forests. The Scientific Panel recommends that at least 20 percent of the old-growth forest retained at the planning unit level constitute forest-interior conditions.

The Scientific Panel proposes as a guideline that reserves to protect forest-interior conditions be a minimum of 300 meters wide, in order to guard against edge

[38] 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.

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 TPC, therefore, used the Scientific 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, 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 or retained old growth within a watershed unit must be in forest-interior conditions;
- the minimum depth of edge measurement is calculated in accordance with Table 2.4.

Table 2.4 Depth of Edge Effect to Determine Interior Forest Conditions in Coastal British Columbia[39]

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

2.3.3 Reserves to Represent all Ecosystems

The Scientific 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."[40] Representation of all ecosystems is an essential component of biological diversity.

[39] These measurements are drawn from A Review of Edge Effects: Theory, Evidence, and Recommendations for Managers by Laurie Kremsater. Stream descriptions have been revised to ensure consistency with the stream widths used in the hydroriparian classification system.
[40] Report 5, p. 171.

Representative Ecosystem Reserves and Sustainable Ecosystem Management

Figure 2.6 shows the role of reserves to represent all ecosystems within the overall framework for sustainable ecosystem management in Clayoquot Sound.

Figure 2.6 Representative Ecosystem Reserves and Sustainable Ecosystem Management

THEME

BIOLOGICAL DIVERSITY

GOAL

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 (Report 5, p. 200)

OBJECTIVE

Represent the entire variety of ecosystems in the reserve system to maintain plants, animals and other organisms that have specific habitat requirements (Report 5, p. 201)

WATERSHED-LEVEL STRATEGY

Establish reserves to protect forest-interior conditions in late successional forests (Report 5, p. 170).

Criteria for Representative Ecosystem Reserves

The Scientific Panel provides some guidance on how to designate reserves to ensure the representation of all ecosystems. Report 5 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 Scientific 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 Scientific Panel's general recommendations.[41] Based on their advice, the TPC adopted a six-step approach to establishing reserves for ecosystem representation:

1 Map reserves for all other values.

[41] See Andy McKinnon, Del Meidinger and Ted Lea, 1998.

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.

The Technical Planning Committee adopted a six-step process to identify reserves to protect representative ecosystems.

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 planning objectives such as ensuring linkages among watersheds and forest-interior conditions in late successional forests.

Based on advice from the team of ecologists, the TPC 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 TPC 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 2.3.1 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. The different ecosystems occurring within parks and ecological reserves within each planning unit were included in the process to determine the reserves for ecological representation.

2.3.4 Reserves to Ensure Linkages among Watershed-Level Planning Areas

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."[42] While such linkages are primarily an objective of sub-regional plans, the Scientific Panel also acknowledges that this objective can only be realized after some watershed-level planning has taken place.

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

Once watershed 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.

2.4 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."[43] Accordingly, reserves to protect these values at the watershed planning level form part of the Scientific Panel's overall framework for sustainable ecosystem management in Clayoquot Sound.

The Scientific Panel's discussion of the values that non-indigenous peoples attach to the land is largely limited to those values associated with scenery and recreation or tourism. The same limitation applies to watershed plans; that is, 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.

[42] Report 5, p. 171
[43] Report 5, p. 37

2.4.1 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 Report 3 to an account of First Nations' perspectives together with recommendations on how to incorporate these perspectives into 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 Scientific Panel recommends that these areas be identified by the Nuu-chah-nulth First Nations and that they be protected in ways that are consistent with traditional knowledge.[44]

Culturally Important Areas and Sustainable Ecosystem Management

Figure 2.7 shows the significance of reserves to protect culturally important areas within the Scientific Panel's overall framework for sustainable ecosystem management in Clayoquot Sound.

[44] Report 5, p. 170

Figure 2.7 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 (Report 3, p. 48)	To recognize, support and incorporation Nuu-chah-nulth traditional ecological knowledge and values into land use planning and decision-making (Report 3, p. 48)	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 (Report 3, p. 48)	To accommodate First Nations' traditional ownership of land and resources in Clayoquot Sound in land use decision-making and activities (Report 3, p. 48)	To involve the Nuu-chah-nulth First Nations in planning and managing resource use activities in Clayoquot Sound (Report 3, p. 48)	To consult and negotiate with Nuu-chah-nulth about economic benefits before developing further economic activity in Clayoquot Sound (Report 3, p. 48)	To ensure that forest practices do not negatively impact Nuu-chah-nulth foreshore and offshore resource use (Report 3, p. 48)	To ensure that cultural sites defined by the Nuu-chah-nulth are inventoried, mapped, effectively protected, and restored where damaged (Report 3, p. 48)

WATERSHED-LEVEL STRATEGY
Protect culturally important areas of the Nuu-chah-nulth Nations in ways consistent with traditional knowledge (Report 5, p. 170)

Each watershed planning unit in Clayoquot Sound encompasses portions of the traditional territory of at least one of four First Nations: the Ahousaht, Hesquiaht, Tla-o-qui-aht and Ucluelet. Each of these First Nations has developed a process for identifying culturally significant sites, along with a consultation process to guide resource developers and decision-makers in their liaison with First Nations leaders. These processes are described in more detail in the individual Watershed Plans to which they apply. Where more than one First Nation identifies sites of

cultural importance in the same area, the consultation process of both First Nations must be engaged. This means that, in areas of overlap, it will be necessary for resource managers to consult with more than one First Nation, using the protocol developed for each.

In all cases, cultural information is shown in the Watershed Plans for consultation purposes only, and is not to be taken as an indication of territorial boundaries.

2.4.2 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."[45] Accordingly, the Scientific Panel identifies the protection of scenic values as one component of the ecosystem management theme of maintaining human values.

Scenic Areas/ Reserves and Sustainable Ecosystem Management

Figure 2.8 shows the role of maintaining scenic values within the Scientific Panel's overall framework for sustainable ecosystem management.

[45] Report 5, p. 40

Figure 2.8 Scenic Values And Sustainable Ecosystem Management.

THEME
HUMAN VALUES

GOALS	
Manage scenic resources to maximize their enjoyment (Report 5, p. 214)	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 recreation routes (Report 5, p. 214)	Conduct sustainable forest practices and related educational and interpretive programs for the benefit of the public (Report 5, p. 214)	Apply landscape design principles in all areas (Report 5, p. 214)	Maintain examples of different types of landscape in a relatively unaltered state (Report 5, p. 214)

WATERSHED-LEVEL STRATEGIES	
Maintain scenic values in accordance with the scenic class objectives established for visually sensitive areas (Report 5, p. 170)	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 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 Clayoquot Sound Land Use Decision, much of the 21 percent of the land base that was placed under special management was included within designated scenic corridors where protection and management of scenic landscapes take priority over other resource activities.

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 located outside of the designated scenic corridors, but visible from major waterways, communities and travel corridors. Appendix 3 includes a detailed description of the various inventories and classification efforts that were undertaken.

Following the recommendations of the Scientific Panel,[46] a new scale to describe scenic objectives in non-technical terms was established. Table 2.5 presents this new description of scenic class objectives in Clayoquot Sound. For management standards that apply to each objective, refer to Table 3.1.

Table 2.5 Description of Scenic Class Objectives

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

Existing visual conditions in Clayoquot Sound include viewscapes that fall into each of the scenic classes. That is, they range from unaltered to intensively altered settings. Scenic class objectives, in contrast – while considering current visual conditions – describe the desired future condition of a given viewscape for the purpose of guiding and limiting future resource management activities.

The scenic class objectives that have been assigned in the Watershed Plans include:

[46] Report 5, p.143

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

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

These scenic class objectives guide or limit resource management activities in areas of especially high scenic value in each planning unit. In addition, 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 3. Section 3.1.1 sets out the management criteria that apply to the different scenic classes.

2.4.3 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."[47]

Protection of areas with significant recreation and tourism values at the watershed level forms part of the Scientific Panel's strategy to maintain the human values associated with the Clayoquot Sound ecosystem. Figure 2.9 locates the role of recreation and tourism reserves within the overall framework of sustainable ecosystem management in Clayoquot Sound.

[47] Report 5, p. 42.

Figure 2.9 Recreation/Tourism Reserves and Sustainable Ecosystem Management

THEME
HUMAN VALUES

GOAL
Maintain scenic, recreational and tourism values

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

WATERSHED-LEVEL STRATEGIES
Identify reserves to conserve areas with especially high recreational and tourism values

Criteria for Recreation and Tourism Reserves

Criteria

Since 1996 a number of projects have sought to identify, describe and quantify recreation and tourism use – and the features that support these – 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 3.

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 the form of reserves and management zones. Table 2.6 shows the reserves and management zones that were identified to uphold recreation and tourism values.

Table 2.6 Reserves and Management Zones for Recreation and Tourism Features

Type of Feature	Reserve Width	Management Zone Width
Marine shores	100 - 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 Section 3.1.

2.5 Resource Management and Development within Watershed Reserves

The watershed reserves 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 for each watershed unit, six are reserves in a strict sense; that is, forest harvesting is prohibited under normal circumstances (exceptions to this prohibition are described below). 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 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.

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

In general, watershed reserves are no-harvest areas. The Scientific Panel recognizes, 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.[48]

The Scientific 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 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.[49]

Subsurface exploration and development

The Scientific Panel's terms of reference clearly focussed on defining sustainable forest practices, and its recommendations regarding reserves apply to forest harvesting. From the point of view of forest development, reserves are intended to be no-logging zones.

Within its planning framework for sustainable ecosystem management, the Scientific Panel does not address or make recommendations regarding exploration and development of subsurface mineral and energy resources within

[48] Report 5, pp. 126-127.
[49] Report 5, pp. 185-186.

The Panel did not make recommendations relating to subsurface resources.

reserves or harvestable areas. The watershed plans therefore cannot refer to any Scientific Panel recommendations regarding subsurface resource management.

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

The Mineral Tenures Act (Section 14 Amendment) sets out a "two zone" approach to guide subsurface resource management in B.C.[50] *The Act* permits mineral exploration and development, subject to the usual laws that regulate mining, throughout the whole of the province (the "mineral zone") except for parks, ecological reserves and lands where mining is prohibited under the *Environment and Land Use Act* (these areas are designated the "protected zone"). All areas within the mineral zone – including areas identified as reserves and special management zones in this Clayoquot watershed plan – are considered "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.

[50] See Ministry of Energy and Mines and Ministry of Sustainable Resource Management, 2003.

3.0 Sustainable Ecosystem Management in Harvestable Areas

3.1 Criteria for Sustainable Ecosystem Management in Harvestable Areas

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 Scientific 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."[51]

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

The Scientific Panel recognized several levels and measures which could protect forest values, including: reserves set aside to protect watershed integrity and biological diversity; special management zones identified to protect human values; and new forest practices 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 to all harvestable areas.

3.1.1 Management Criteria for Special Management Zones

Special conditions, considerations and procedures apply in special management zones to ensure that sensitive values are maintained.

Areas in the watershed planning units 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.

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.

[51] Report 5, p. XV

Culturally Significant Areas

Each watershed planning unit includes areas identified by one or more First Nations as being of cultural importance. The Ahousaht, Hesquiaht and Tla-o-qui-aht First Nations have decided that these areas will not be designated as reserves within watershed plans. Instead, a cultural designation indicates that specific consultation processes must be engaged with individual First Nations as part of the review of any development proposals. 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 will apply to any development. Specific provisions of each First Nation's consultation process are described in the individual watershed plans to which they apply.

Scenic Areas

Some areas identified as scenic areas in each watershed plan are located within parks or reserves for other values, and therefore will be excluded from timber harvesting operations. Other scenic areas are located within the harvestable area. While this area is available for timber harvesting, management activities are guided by standards and criteria designed to ensure that the applicable scenic class objectives are achieved.

Table 3.1 describes the management standards that apply for each scenic class objective. In accordance with Scientific Panel recommendations, the standards are descriptive and qualitative in nature, avoiding quantification of levels of alteration and green-up.[52]

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 description of scenic class objectives, refer to Section 2.4.2.

[52] Report 5, p.144

Table 3.1 Scenic Class Management Standards

	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

Marine and lake shores, as well as special features such as significant trails and waterfalls, are protected by reserve buffers of varying widths. In each watershed plan, management zones have been identified adjacent to these reserves. These management zones serve to maintain the integrity of the buffers. Table 2.2 sets out reserve and management zone widths.

Forest practices in the management zones must be designed to ensure the integrity of recreation and tourism values encompassed in the reserves. Most recreation and tourism features, settings 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 3.1 for the scenic class of 'minimal alteration'. In particular, harvest plans must take into account bare ground visibility, and must also ensure that the amount and dispersion of retention is such that the visual impacts of harvesting and regeneration remain 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.

Lakes

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

The Scientific Panel stated that the special management zone around lakes may be subject to retention systems of harvest provided this harvest takes place outside the hydroriparian reserve zone proper.[53] The management zone functions 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 characteristic of natural hydroriparian ecosystems – including wildlife trees, large trees, hiding and resting cover, nesting sites, structural diversity, coarse woody debris and food sources – should be retained.

3.1.2 Management Criteria for Sensitive Sites

The Panel and other experts provided site level planning and management recommendations.

At the watershed planning level, reserves and harvestable areas are specified using resource information collected at mapping scales generally ranging from 1:10,000 to 1:20,000. Smaller resource features requiring protection, however, are

[53] Report 5, p. 184

not always identifiable at this scale. The Scientific Panel recognizes this and provides a number of recommendations to guide site level planning and management activities.

Experts consulted by the technical planning teams to assist with watershed level planning also recognized the limitations inherent in the scale and intensity of watershed-level mapping. Accordingly, some experts provided 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

The TPC commissioned a report by a team of soils and terrain specialists to provide guidance on unstable terrain and sensitive soil reserves. Their report identified a number of instances where the terrain or ecosystem mapping process would not result in sufficiently detailed information to determine whether a terrain or sensitive soils reserve was needed, or precisely where the reserve should be. In those instances, the report recommended that resource management decisions be based on follow-up site level assessments. [54] Table 3.2 lists the terrain types or features that should be field-assessed, along with site-level management recommendations referenced in the report.

[54] BC Ministry of Forests, 1998b.

Table 3.2 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 Scientific Panel provided recommendations for the protection of red- and blue-listed plant and animal species through the designation of reserves at the watershed level. Each watershed plan includes such reserves. The Scientific Panel was mindful that "protection is often better implemented at the site level for widely ranging, rare species."[55] The Scientific Panel therefore recommended that more refined information be collected at the site level about, among other things, "endangered, threatened, or vulnerable plant and animal species".[56] With respect to site-level information requirements, the Scientific Panel describes the

[55] Report 5, p.169
[56] Report 5, p. 173

biodiversity objective at the site level as one of confirming the presence or absence of species or habitats that will affect operational management of the site.[57]

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

3.2 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 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 plans; however, the silviculture system itself is applied at the site level. The following discussion, in the context of watershed planning, therefore describes VRSS in conceptual terms only in order to provide context and guidance for its application.[58]

The intent of 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 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 Scientific 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

[57] Report 5, p. 268
[58] For more details on the VRSS see Report 5 pages 83 to 89.

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 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 Scientific Panel emphasized that the variable retention system provided a continuum of options in terms of the type, amount and spatial pattern of the retained material to address site characteristics and management objectives.[59] Just as the designation of reserves in watershed 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 are tailored to the characteristics, forest values and management objectives of each site.

The type, amount and spatial distribution of retained structures are therefore value- and objective-driven, rather than based on rules and prescriptions. The application of this principle ensures 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 considered necessary and sufficient to maintain the values and address the sensitivities present at the site.

The Scientific Panel recommendations addressing the application of the VRSS are site-level rather than watershed-level recommendations. The TPC therefore 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[60]. Such differentiations would naturally be subjective in nature, and thus inevitably be subject to challenge; in addition, they are likely immaterial in light of the Scientific Panel's stated principle that the 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

[59] Report 5, Figure 3.2, p.84
[60] For site-level guidance, refer to Section 3.1.3 of this Volume.

addressed in accordance with the scenic class objective. In short, management is objective-driven as opposed to rules-driven.

In a similar way, aggregate retention may be better able than relatively uniformly distributed retention (as recommended by the Scientific Panel) to achieve some management objectives within specific cutting units; such as the protection of wildlife attributes or rare plants.

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

For this reason, the TPC de-emphasized the distinction between significant and non-significant values (as described in R3.6 and 3.7) in favour of the importance of selecting from the full continuum of options provided by the variable retention silvicultural system, based on an analysis of site-specific values and objectives. 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 Scientific 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 emphasized monitoring to evaluate success in attaining management objectives. Chapter 4 provides 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.

3.3 Harvesting Systems

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

The Scientific Panel observed that the selection of appropriate harvesting techniques was 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.[61]

Harvest systems are determined at the site level.

Harvesting systems to be used within the harvestable areas of each planning unit 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.

3.4 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 Scientific Panel made detailed recommendations relating to road location, construction and rehabilitation.

While most of the Scientific 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 in Section 2.5 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.[62]

3.5 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."[63] Rate-of-cut and the volume of timber removed are issues of importance to watershed planning because the removal of biomass can have impacts on the hydrological regime of a watershed, which in turn affects aquatic ecosystems, fish species and other stream-dependent

[61] Report 5, p. xvi
[62] Report 5, p.126 to 128
[63] Report 5, p. 285

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 designates the proportion of the watershed area that can be cut each year. It is distinct from the Allowable Annual Cut.

Rate-of-cut (ROC) is distinct from the allowable annual cut (AAC). Both are restrictions on the forest area that may be harvested in Clayoquot Sound; however, they serve different objectives and are derived using different methods and assumptions. While the rate-of-cut is a key measure to maintain or achieve hydrological integrity of individual watersheds in Clayoquot Sound, the AAC is the total area that may be harvested annually in a given management unit (e.g., TFL 54 or TFL 57). The AAC is a regulatory measure determined every five years by the Chief Forester of British Columbia in accordance with Section 8 of the *Forest Act*, and is based on current forest composition, growth rates, management practices and other factors. Rate-of-cut, in contrast, is the amount of area that is or may be cut within a given watershed. The rate-of-cut is typically expressed in hectares per five- or ten-year period.

The Scientific Panel provided 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:

- 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 judgment 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.[64]

Rate-of-cut limits protect hydrological integrity.

For the purposes of Watershed Plans, the Scientific 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 each planning unit.

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 and Range) will verify that forest development proposed by licence holders is 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.

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

3.6 Restoration

While most of the Scientific Panel's recommendations are focussed on the implementation of new planning approaches and new forest practices to maintain ecosystem integrity, the Scientific Panel also recognized 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[65].

Since the Central Region Chiefs and the Province adopted the Scientific Panel's recommendations in 1995, 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. This work is described in more detail in individual watershed plans.

[65] Report 5, p. 87

4.0 Updates and Amendments

Watershed plans are dynamic documents to be improved over time.

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

4.1 Updates

Plan updates are minor changes. These will be approved by the TPC.

Plan updates are minor changes to the plan. These are submitted to or initiated by the Clayoquot Sound Technical Planning Committee (TPC), and are approved by the planning committee. The TPC will notify the Central Region Board (CRB), as well as stakeholders, including licensees and interest groups of any approved plan updates. Minor changes will be tracked and documented, and planning data bases will be updated where applicable. Updates include:

- Changes relating to
    - location of map polygons or linear map features such as reserve or special management zone boundaries and stream locations; or
    - classification of reserve or special management zone polygons or features.

  These changes usually come about when site-level plans or assessments result in more accurate information about the geographic location of boundaries or the classification of polygons and features.

- 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 Scientific Panel recommendations, including but not limited to recommendations 5.1 and 7.39.
- 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.

4.2 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 (e.g. the release of new and significantly different lists of red- and blue-listed plant communities);
- new and significantly different interpretations of Scientific Panel 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 by First Nations and the Province.

Proposals for unscheduled amendments are 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 a TPC meeting.

Depending on the nature and scope of the proposed amendment, the TPC will choose one of the following courses of action:

- 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, together with advice from the CRB, to First Nations and the Province for their 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.

4.3 Scheduled Amendments

Scheduled amendments to the plan occur every five years, as needed.

The Scientific Panel recommends that planning be based on a long-term perspective. For watershed plans, the planning horizon is recommended to be a minimum of 100 years (R7.7). The Scientific 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 Scientific Panel recommends scheduled revisions to watershed plans every five years, or more frequently if required (R7.15).

This means that 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 Province and First Nations may choose to direct the TPC to redraft the plan.

5.0 Implementation and Monitoring

5.1 Implementation

Once each watershed plan takes effect, responsibility for its implementation is shared by provincial agencies, forest operators, and the joint management structure established by First Nations and the Province:

- The provincial government, through its resource agencies, is responsible for ensuring that this plan is considered in the preparation of operational forestry plans and implementation of forest practices.
- Licence holders operating in each watershed planning unit have made a commitment to carry out forest planning and operations consistent with Watershed Plans.
- 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.

Responsibility for implementing watershed plans is shared by provincial agencies, First Nations, and forest companies.

5.2 Monitoring

From the time that the Central Region Chiefs and the Province accepted the Science Panel's recommendations, forestry activities within Clayoquot Sound have been carried out in accordance with the spirit and intent of those recommendations. As empirical knowledge and experience is gained through the practical application of the Scientific Panel's recommendations, conclusions can be drawn with respect to the effectiveness of particular recommendations and practices in achieving the Scientific Panel's stated objectives and goals.

Through monitoring and adaptive management, resource managers will assess the effectiveness of management decisions being implemented. They will also provide feedback to the Parties where adjustments of practices or alternative practices could better achieve specific objectives. Research programs and active adaptive management methods will be conducted to assess the effectiveness of the Scientific Panel's recommended standards and practices. This is consistent with the Scientific Panel's recommendations, and specifically the following:

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

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, together with feedback obtained through research and monitoring, the TPC 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.

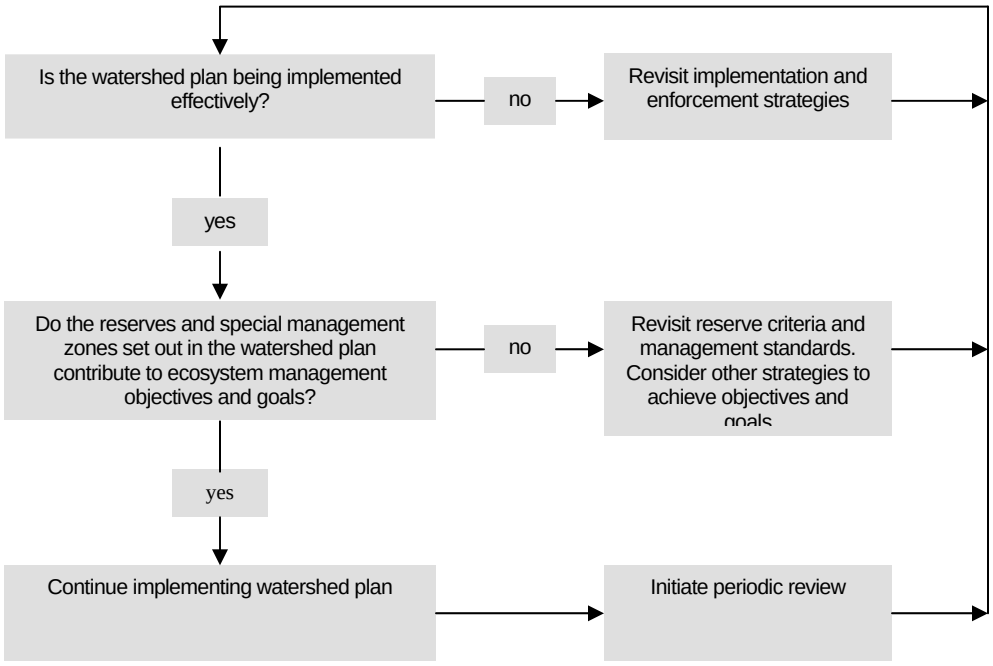
The provincial government, through its resource and planning agencies (including the Ministry of Environment, the Ministry of Forests and Range, and the Ministry of Agriculture and Lands), will monitor forest activities within each watershed planning unit to ensure that these activities are carried out in accordance with the watershed plans. Licensees will also incorporate regular operational monitoring into their plans, and carry out monitoring initiatives in partnership with other organizations.[66]

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

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

[66] See Long Beach Model Forest Society and Iisaak Forest Resources Ltd., April 2002.

Figure 5.1 Watershed Plan Evaluation Cycle



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

It is important to note that a watershed plan is not an end in itself. The reserves set out in the watershed plans 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.

The TPC will meet periodically with the Central Region Board to discuss and review monitoring activities. Together, the TPC and CRB will advise the Province and Central Region Chiefs on whether the objectives of each watershed plan are being achieved, and whether the overarching goals of maintaining ecosystem integrity and the cultural integrity of local peoples are being realized at the watershed level.

Appendix 1: Clayoquot Sound Scientific Panel Report Implementation Planning Framework

(Province of B.C., February 1997)

Note: This document 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.

1.0 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.

1.1 The Scientific Panel Recommendations Relating to Forest Planning

The Scientific Panel recommends a new approach to planning in Clayoquot Sound: 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.

1.2 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.

2.0 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.

2.1 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.

2.2 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 (i.e., informal referral process) and thereby eliminating the need for a lengthier 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.

2.3 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.

2.4 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.

2.5 Staff and Funding

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

3.0 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.

3.1 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.
-

3.2 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.

3.3 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.

3.4 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.

4.0 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.

4.1 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.

4.2 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.

Government Representatives

- 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.

CRB Representative

CRB representative will be determined.

Other Groups

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

4.3 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.

4.4 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.

5.0 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

Membership on the Technical Planning Committee changed during the period it took to complete *Watershed Planning in Clayoquot Sound, Volumes 1 to 9*. The following list includes membership throughout this period:

Nelson Keitlah, First Nations Co-chair, Nuu-Chah-Nulth Tribal Council Central Region Chiefs

Rudi Mayser, Provincial Co-chair, Integrated Land Management Bureau, Ministry of Agriculture and Lands

Jackie Godfrey, First Nations Co-chair Alternate, Central Region Chiefs Executive

Matthew Lucas, former Representative for Hesquiaht First Nation

Guy Louie, Representative for Ahousaht First Nation

Thomas Martin, Representative for Tla-o-qui-aht First Nations

Simon Tom, former Representative for Tla-o-qui-aht First Nations

Brian Retzer, Provincial Co-chair Alternate, ILMB, MAL

Mike Amrhein, former Clayoquot Sound Central Region Board Liaison

Dean Fenn, Ministry of Forests Liaison

Peter Verschoor, former Central Region Chiefs Strategic Planning Forester

Marylin Touchie, Representative for Ucluelet First Nation

Colleen Charleson, Representative for Hesquiaht First Nation

Patricia McKim, Clayoquot Sound Central Region Board Liaison

Associates:

Dan Sirk, Land Information Coordinator, ILMB, MAL

Doug Fetherston, GIS Analyst, ILMB, MAL

Anette Thingsted, Planning Officer, ILMB, MAL

Lindsay Jones, Manager Representative, ILMB, MAL

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 decision in 1995 to adopt the recommendations of the Scientific Panel. These recommendations identified a number of specific information requirements for planning. Many studies were also facilitated by funding made available through Forest Renewal BC.

These inventories and studies vary widely in their subject matter, methodologies, and data collection, but they all share the objective of describing the environment of Clayoquot Sound including its natural processes and its cultural, scenic and recreational values.

This Appendix provides a general description of each FRBC-funded inventory. The inventories described here meet or exceed the Resource Inventory Committee (RIC) standards. Many of these are inventories that have been customized for Clayoquot Sound, and some have never before been undertaken in BC.

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 involves photo interpretation and the classification of 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 necessary, including the designation of standards for map labels. Phase II was still under development. The process of re-inventorying Clayoquot Sound began in March 1996 when Simon Reid Collins prepared a needs analysis. The analysis evaluated

the existing forest cover inventories[67] and made recommendations on how to improve them.[68] Simons Reid Collins recommended the Sound be completely re-inventoried according to the Vegetation Resource Inventory standards.[69] In addition, it recommended two enhancements:

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

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 Practices 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 McClellan, 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 as either even-aged, uneven-aged or 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 since been revised 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

[67] 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.
[68] *Needs Analysis, Proposal and Budget for a Phase 1 Vegetation Inventory for Clayoquot Sound*, March 1996, Simons Reid Collins.
[69] *Vegetation Resource Inventory Phase 1 Photo Interpretation Procedures*, May 1996, Province of British Columbia.

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 the following:

- 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 to identify the following:

- 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,[70] Terrestrial Ecosystem Mapping for the Clayoquot Sound Area Year Two,[71] and Terrestrial Ecosystem Mapping for the Clayoquot Sound Area - Year Three[72] provide more detail on the three year inventory project. Using TEM, Madrone also produced wildlife interpretation reports and maps for Black Bear, Columbian 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 Centre (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[73] was used meaning 10-25% of the polygons were surveyed. Data collection followed methods outlined in a draft version of the Field Manual for Describing Terrestrial Ecosystems (1998). 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 (RIC, 1995) and the Addenda to TEM Standards (BC MoELP, 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:

[70] Madrone Consultants Ltd., April 1998
[71] Madrone Consultants Ltd., September 1998
[72] Madrone Consultants Ltd., March 1999
[73] *Addenda to Terrestrial Ecosystem Mapping Standards*, May 1, 1996, Pg. 19.

- red- and blue-listed plant communities and to establish reserves to protect them;
- all ecosystems (site series) found within Clayoquot Sound. The inventory is also used to 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: Keen's Long-eared Myotis))
- forest birds (Hutton's Vireo was blue-listed in the 1990s)
- owls (two blue-listed species: the Northern Pygmy Owl and the Western Screech Owl)
- amphibians (one blue-listed species: the Red-legged Frog)
- eagles

In addition, Clayoquot Sound was included as part of Vancouver Island wide inventories for the Vancouver Island 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 Wildlife and Wildlife Habitat Inventory Used in Watershed Planning?

Both the wildlife inventories and the habitat ratings were used to assess whether watershed-level reserve areas addressed critical habitat needs for 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 earlier in this volume.

Hydroriparian Inventory

Description

The Scientific Panel emphasizes the important linkages between waterbodies/aquatic habitat and adjacent upland/riparian areas; 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:

- 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 vs. 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 Report 5 Chapter 7.4.

Madrone Consultants Ltd. conducted the hydroriparian inventory from 1996 to 1999, with the assistance of local residents 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[74] and Hydroriparian Inventory for the Clayoquot Sound Area Year 2.[75]

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%

[74] Madrone Consultants Ltd., March 1998
[75] Madrone Consultants Ltd., October 1998.

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 / 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/ PS	Sweet gale - Sphagnum Shore pine - Sedge
CWHvm1	CW	Act - Willow
	DS	Dunegrass - Silverweed
	GS	Tufted hairgrass - Silverweed
	SC	Sphagnum - Cotton-grass
	SG	Sphagnum - Deer cabbage
	SM/ PS	Sweet gale - Sphagnum 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/ PS	Sweet gale - Sphagnum 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 each 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 Section 2.2.1.

In the course of developing the first three watershed plans, the Technical Planning Committee identified inconsistencies between Scientific Panel recommendations, the marine shore classification inventories and the assignment of reserves at the watershed plan level. In early 2004, the TPC coordinated a review to address these problems and amended the reserve network accordingly.[76]

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.

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 has two components:

[76] See Madrone Environmental Services, 2004.

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.

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[77] (RIC). Terrain stability maps were generated following the standards and procedures outlined in "Mapping Assessing Terrain Stability Guidebook"[78] (FPC) Refinements were made to the five class terrain stability classification system by

[77] *Guidelines and Standards for Terrain Mapping in British Columbia,* Resource Inventory Committee, 1996.
[78] BC Ministry of Forests, 1997 and 1999.

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 showed 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 completed. 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 (i.e., 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 landslides. 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 provides the following information for each terrain polygon:

- 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,[79] Terrain Inventory for the Clayoquot Sound Area - Year 2,[80] and Terrain Inventory for the Clayoquot Sound Area - Year Three,[81] 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

[79] Madrone Consultants Ltd., August 1997.
[80] Madrone Consultants Ltd., September 1998.
[81] Madrone Consultants Ltd., March 1999.

the hazard."[82] 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 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 must be undertaken by geoscientists to confirm the condition of terrain stability prior to any development taking place.

[82] *Terrain Inventory for the Clayoquot Sound Area - Year 2*, Madrone Consultants Ltd., September 1998, Pg.23.

Table 3: Terrain Stability Classes[83]

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

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

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.

Table 4: 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,PDSM, 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 Volume 1 Section 2.2.2.

Landslide Inventory

Description

An inventory of landslides in Clayoquot Sound was conducted in 1996 and 1997 by EBA Engineering Consultants Ltd. 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, seems to influence the occurrence of landslides. Southeastern slopes close to the coast are particularly susceptible to landsliding."[84]

The project deliverables included: 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 snapshot 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 prioritizing 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 Ucluelet. The Toquaht are not situated within the Sound, but are included

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

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.[85] 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.[86] This archaeological inventory is large project of a scale and intensity unprecedented in BC. 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 archaeological inventory employed individuals from the Central Region First Nations during this three year project.

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 the following:

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

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

[86] The Clayoquot Working Group consisted of representatives from Nuu-chah-nulth Central Region First Nations, MacMillan Bloedel Ltd., International Forest Products Ltd., and the Provincial Government.

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 to the 1:20,000 maps showing site locations, is restricted.[87]

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

- ethnographic accounts of the study area,
- existing traditional land use studies, and
- 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 was two-fold. Shorelines, including the intertidal zone and the near forest area to a maximum of 300 metres inland, were surveyed separately from inland areas. Shorelines were surveyed on foot as much as possible; where the shoreline was impassable it was 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 – that is, 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."[88]

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.

[87] *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.
[88] *Archaeological Inventory of Clayoquot Sound Results of Phase II*, Golder Associates Ltd., March 1998. Pg. 37.

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 marine shores.

In addition, as part of the watershed planning process, each Nuu-chah-nulth Central Region First Nation developed inventory methodologies and interview protocols to identify and evaluate culturally important sites and areas within its traditional territory (in accordance with recommendation R10 of the Scientific Panel's Report 3). Much of the information collected was determined to be sensitive and therefore has not been included in watershed plans. Each First Nation developed a protocol that will inform the planning process while upholding principles of confidentiality.

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.

The locations and descriptions of sensitive First Nations cultural areas are confidential and this information is therefore not included in the watershed plans. However, the inventories have enabled each First Nation to complete watershed level maps with accompanying consultation protocols. These protocols will guide resource managers considering development activities within First Nations' territories. Consultation protocols specific to each First Nation are described in each watershed plan.

Recreation and Tourism Inventories

Description

Since 1996 a number of FRBC-funded projects were 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 were managed by MOF and MSBTC and resulted in 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;[89]
  - 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.

[89] *Recreation Features Inventory*, Ministry of Forests, Forest Practices Branch, Recreation Section, June 1996.

- 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
    - freshwater 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."[90] 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, as well as historical and cultural features such as buildings and building sites, trails, routes, and resource use sites.

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

[90] *Recreation Features Inventory Checklist Key, Version 2.0*, MOF, Forest Practices Branch, Recreation Section, May 1996, Pg. 5.

indicate the opportunities for users to access and experience recreation values found in the area. Table 6 shows the ROS delineation criteria for each class.

Table 6 - Recreation Opportunity Spectrum Delineation Criteria[91]

ROS Class Code[92]	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.

[91] *Recreation Resource Inventory Standards and Procedures*, BC Ministry of Forests March 31, 1995.
[92] Note that these codes follow a spectrum from P (most natural and remote) to U (least natural and remote).

ROS Class Code[92]	Criteria					
	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, generally 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.

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 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,[93] 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 government 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 modelled 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.

[93] *Clayoquot Sound Land Use Decision - Background Report*, Province of British Columbia, April 1993.

This information was integrated into a landscape plan. The plan divides the visible areas of the corridors into discrete landscape units.[94] Moreover, the plan zones the corridors (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[95] 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."[96]

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."[97] 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).

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[94] 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 Columbia Act.*

[95] *Clayoquot Sound Scenic Corridors Landscape Management Plan*, Province of British Columbia, May 1995.

[96] S. Panel, Pg. 143.

[97] S. Panel, Pg. 143.

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.[98] 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,
- 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[99] and recommended visual quality objectives[100] 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

[98] *Visual Landscape Inventory Procedures and Standards Manual*, Ministry of Forests, Forest Practices Branch, May 1997.
[99] 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 parameters listed above. There are five classes ranging from VSC1 - very high sensitivity to human-made visual alteration to VSC5 - very low sensitivity.
[100] 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.

timber is removed depends on how the landscape unit is defined"[101] 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 modelling, and professional judgment were all used to form scenic classes. Scenic Classes and Scenic Class Objectives are described in Volume 1 Section 2.4.2.

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:

- low visual absorption capability (VAC). The 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 - moderate 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

[101] S. Panel, Pg. 141.

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.

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