

# Implementation Challenges

Ecosystem Based Management on the North

Central Coast of British Columbia

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## ABSTRACT

Ecosystem based management is the holistic management framework being used on a portion of British Columbia's North Central Coast that has come to be known as the Great Bear Rainforest. The Great Bear Rainforest arose from tensions between forest companies extracting timber in the region and environmentalists concerned with conservation as well as land use planning disagreements between the Government of British Columbia and local First Nations. Ecosystem based management seeks to develop timber resources in this coastal temperate rainforest in a sustainable manner by implementing new regulations and increasing protected areas; it further seeks to achieve high levels of human wellbeing for residents of the region. With these new timber development regulations came a host of implementation challenges due to a lack of primary data and clarity. These implementation challenges include the integration and interaction of social, economic and ecological concerns in the region; planning challenges include the integration of multiple scales of planning to meet objectives at varying levels; and mapping challenges include the availability and source of primary mapping data used to create the implementation guidelines in the regulations.

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## KEY WORDS

Sustainable resource development  
Coastal temperate rainforest  
Great Bear Rainforest  
Land use planning  
Protected areas

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## 1.0 INTRODUCTION

The North Central Coast of British Columbia [BC] has for decades been a relatively quiet region with a scattering of small communities and a dependence on resource extraction. The coast hosts a rich wilderness of coastal temperate rainforest with high levels of biodiversity in flora and fauna. In the mid-1990s this region became a hotspot for the environmental movement with a focus on stopping commercial timber harvest operations in an attempt to preserve its old-growth forests. While tensions ran high in the region for more than a decade, a compromise was eventually reached between the multiple stakeholders involved in the conflict. This compromise came in the form of Ecosystem Based Management [EBM].

Ecosystem-based management involves a holistic view of managing the complex systems of our natural world. One significant difference in British Columbia is that the emphasis is on managing people within the ecosystem as opposed to the complexities of the ecosystem itself. With this new form of management came a host of challenges in implementation.

This paper seeks to outline the reasons that this region of BC's coast became such a contentious one as well as the course of events that led to the landuse planning agreement in place now. It will also outline the features of Ecosystem-based Management and how this system fits into pre-existing forest management legislation in BC. The remainder of the paper will focus on the rules and regulations of EBM and how they are being implemented as well as the significant implementation challenges faced by forest licensees on the coast.

## 2.0 BACKGROUND

### 2.1 ECOLOGY OF THE NORTH CENTRAL COAST

The North Central Coast of British Columbia has, in recent years, come to be known widely as the Great Bear Rainforest. It is 6.4 million hectares of coastal temperate rainforest (Price,

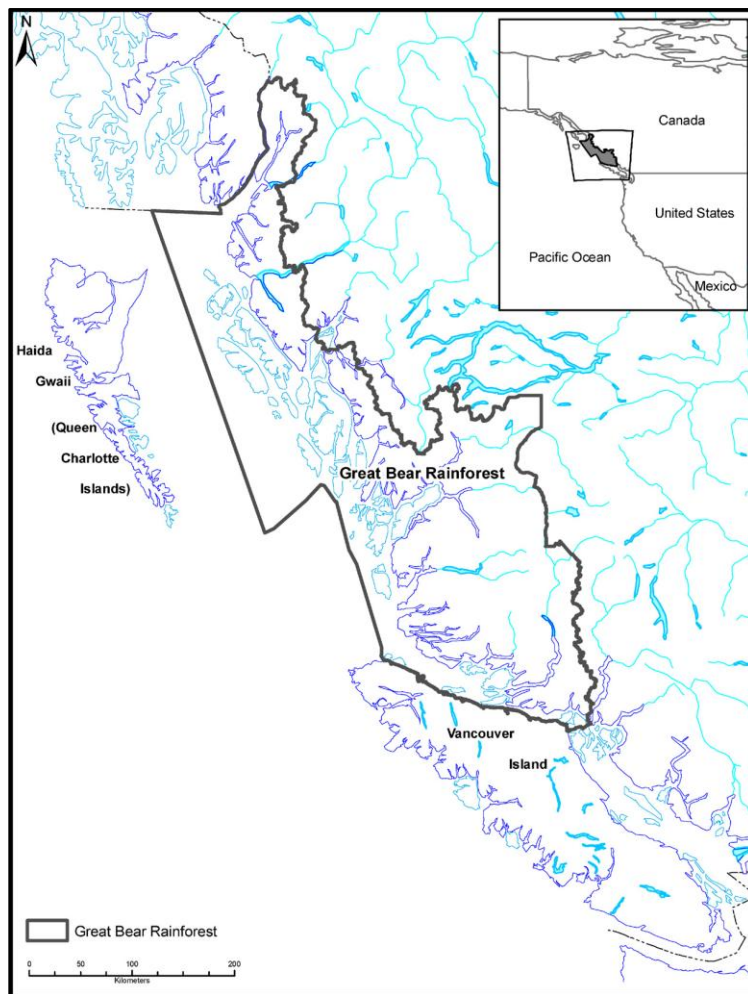


Figure 1: The Great Bear Rainforest (Price, Roburn, & MacKinnon, 2008)

Roburn, & MacKinnon, 2008), characterised by high levels of precipitation, a mild climate, mountainous terrain and coniferous forests [Figure 1]. These forest types experience a low rate of stand-replacing disturbance and are dominated by gap-phase disturbance events. Due to the infrequency of extreme disturbance events, coastal temperate rainforests have a complex structure including trees of various ages and high levels of biodiversity. These forest types cover only 0.1% of the earth's surface and the Great Bear Rainforest contains a quarter of the world's unlogged coastal temperate rainforest (Price, Roburn,

& MacKinnon, 2008).

This region's mild climate is characterised by precipitation between 1.5 and 4 meters annually concentrated more heavily between September and February (Natural Resources Canada,

2009). Temperatures range from lows of -14°C in January and highs of 25°C in July (Natural Resources Canada, 2009). The North Central Coast is also prone to daily fog in August.

The dominant disturbance agent in the coastal temperate rainforest is canopy gap disturbance characterizing the overall structure and dynamics of these coastal forests. While stand-level blowdown, insect and disease outbreaks, and geomorphic disturbances such as slides and avalanches play a role in the coastal disturbance regime, they are not considered dominant as they are generally isolated, stand level events and have little impact at larger scales (Daniels & Gray, 2006). The forests of the North Central Coast are considered to be *old growth* forests, which in British Columbia are defined as having an age of at least 250 (Ministry of Forests and Range, 2010). These forests have passed through many developmental stages and have been subjected to localised disturbance events resulting in canopy gaps which allow understory recruitment and regeneration as well as providing large woody material and diversifying the forest's size distribution and age structure. This explains the fact that 90% of unmanaged forests on BC's coast are classified as old-growth with stand initiating disturbance return intervals exceeding 750-1000 years (Daniels & Gray, 2006).

The Great Bear Rainforest is composed of three main biogeoclimatic ecosystem classification zones: the Coastal Douglas-fir [CDF], Coastal Western Hemlock [CWH] and Mountain Hemlock [MH] zones. These forest types are dominated by western redcedar [*Thuja plicata*], western hemlock [*Tsuga heterophylla*], and amabilis fir [*Abies amabilis*] at lower elevations, with elements of yellow cedar [*Chamaecyparis nootkatensis*] and mountain hemlock [*Tsuga mertensiana*] at higher elevations (Daniels & Gray, 2006) (Forest Service of British Columbia, 2007). The species composition of these forests combined with their diverse structure provide habitat for an abundance of wildlife species. These species include grizzly bear, black bear [and the white variety of the black bear known as the Spirit or Kermode Bear], wolves and cougars, a variety of bird species including eagles, as well as various small mammals, reptiles and amphibians.

The uniqueness and diversity of these old-growth ecosystems within what is now known as the Great Bear Rainforest led to conflict over resource management in the area. Primarily, environmental groups became very concerned with forest harvest practises in the area and started a campaign to improve management practises on the land base.

## 2.2 CREATION OF THE GREAT BEAR RAINFOREST

The North Central Coast of BC became a political point of contention in the mid-1990s when the newly instituted Land and Resource Management Planning [LRMP] process began for the Central Coast region. The LRMP process was meant to be a multi-stakeholder process involving government, forest companies, First Nations and environmentalists. This process was one element of a three-part plan put in place by the New Democratic Party [NDP] to increase protected areas in BC to 12% of the total land base. The other two elements were the Protected Areas Strategy [PAS] and the Commission on Resources and Environment [CORE] (Hoberg, Morishita, & Paulsen, 2004). The Central Coast LRMP proceedings met with resistance from environmental groups who were concerned that some forest companies were continuing their operations throughout the negotiations and planned to develop areas the environmentalists considered especially sensitive. First Nations were also frustrated by the process as they did not agree with being classified as stakeholders (Smith, Sterritt, & Armstrong, 2007).

The environmental groups responded by initiating an international boycott campaign against the forest companies operating on the coast (Smith, Sterritt, & Armstrong, 2007). Their goal was to decrease the profitability of these companies' products and inform consumers about the origin of the products they were purchasing. This campaign included framing the region under a new name: The Great Bear Rainforest. Initially, the industry refused to respond to the environmentalists' claims but by 1999 began to take another approach. Several companies banded together to form the Coast Forest Conservation Initiative [CFCI] and agreed to stop harvesting operations in contested areas providing the environmentalists stopped their market campaign. Talks between the CFCI and several environmental groups began shortly thereafter



and created the Joint Solutions Project, aimed at producing a viable solution to the land use conflict (Smith, Sterritt, & Armstrong, 2007).

Meanwhile, the various First Nations groups on the coast had been working to increase their influence in the land-use planning process. A series of BC court decisions had determined that First Nations groups that could prove use of their traditional territories had rights to these territories and must be included in planning and management activities (Price, Roburn, & MacKinnon, 2008). This led to the creation of what is now known as the government-to-government process, as the Provincial Government and First Nations' governments work together in land-use planning.

These two shifts in power have expanded the actors in land-use planning in British Columbia from primarily government [and forest companies] to include environmental groups and First Nations governing bodies (Price, Roburn, & MacKinnon, 2008). This in turn led to a two-tiered process: first, the forest companies and environmental groups came to an agreement, following this, the Provincial government and First Nations use these land use agreements to help reach a consensus land-use plan. This process led to the April 2001 agreement whereby the Provincial government approved an interim agreement on land-use for the Central Coast and committed to a new framework for reconciling First Nations and crown title and rights issues *and* land-use planning issues (Smith, Sterritt, & Armstrong, 2007) (Price, Roburn, & MacKinnon, 2008). The parties also agreed to move to full implementation of EBM by March 31, 2009 (Smith, Sterritt, & Armstrong, 2007).

### 2.3 ECOSYSTEM BASED MANAGEMENT

A team of independent experts in a variety of fields was assembled to form the Coast Information Team [CIT] following the 2001 agreement. This team was to use the agreed upon definition, principles and goals of ecosystem-based management in their establishment of the framework for the rules and regulations of Ecosystem Based Management (Coast Information Team, 2001). The CIT was led by a management committee and the technical team was made up of nine project teams. These teams consisted of scientists, practitioners, and traditional and local experts from the Provincial Government, First Nations, environmental groups, the forest industry and communities (Coast Information Team, 2004). The members of the CIT started building the guiding principles and rules for ecosystem-based management on the consensus definition from the 2001 Agreement.

The term *ecosystem management* has been widely used in land use planning. On the North Central Coast this term was replaced with *Ecosystem Based Management* [EBM]. This terminology is meant to express the objective of EBM: to manage human activities within an ecosystem as opposed to managing the ecosystem itself (Price, Roburn, & MacKinnon, 2008). The definition of EBM in the context of the Great Bear Rainforest is as follows:

[Ecosystem Based Management is] an adaptive approach to managing human activities that seeks to ensure the coexistence of healthy, fully functioning ecosystems and human communities. The intent is to maintain those spatial and temporal characteristics of ecosystems such that component species and ecological processes can be sustained, and human wellbeing supported and improved (Coast Information Team, 2004).

The CIT came up with seven guiding principles on which to build the rules of EBM. The seven principles are:

- Ecological Integrity Is Maintained,
- Human Wellbeing Is Promoted,
- Cultures, Communities, and Economies Are Sustained within the Context of Healthy Ecosystems,
- Aboriginal Rights and Title Are Recognized and Accommodated,
- The Precautionary Principle Is Applied,
- EBM Is Collaborative, and
- People Have a Fair Share of the Benefits from the Ecosystems in Which They Live (Coast Information Team, 2004).

The CIT also produced a table outlining the goals and objectives of EBM [Appendix 1] as well as several planning documents. These planning documents focus on the science of ecosystem-based management and how to manage the effected forests appropriately. After the CIT had completed its work and made its recommendations to the Provincial Government, the existing South Central Coast Order [July 2007] and Central and North Coast Order [December 2007] were amended to reflect the new land-use objectives and planning requirements (Ministry of Natural Resource Operations, 2009).

In March 2009 the amended South Central Coast [SCC] Order and Central and North Coast [CNC] Order came into effect. Both Ministerial Orders were created through the Ministry of Agriculture and Lands and fell under Section 93.4 of the *Land Act* (Ministry of Natural Resource Operations, 2009). Both Orders have an impact on forestry operations as the objectives they contain “are established as land use objectives for the purposes of the Forest and Range Practices Act...” (Ministry of Natural Resource Operations, 2009) (Ministry of Natural Resource Operations, 2009). The CNC Order is supplemented with Schedules outlining implementation requirements as well as map data files and a list of the legislation the order effects or is

effected by. Similarly, the SCC Order is supplemented with the same types of documents (Ministry of Natural Resource Operations, 2009). Schedule 1 of both Orders is a map of the landscape units covered by the order [Appendix 2].

The primary change in process from forest development planning prior to the inception of EBM is the changes to how Forest Stewardship Plans [FSP] are approached. While the overall process is the same, the finer points of planning are more involved as FSPs must address additional items as outlined in the rules for EBM through the aforementioned Schedules.

## 2.4 FOREST STEWARDSHIP PLANS

With the advent of the Forest and Range Practices Act in January 2004 (Forest Practices Board, 2004) three operational plans were replaced by the Forest Stewardship Plan [FSP] as the primary planning document for major forest licensees (Ministry of Forests, 2002). The new format was anticipated to allow licensees to be more innovative in achieving their management goals through more flexible strategies that could be adapted to specific regional or site requirements or constraints. FSPs must include measureable and enforceable results or strategies and represent a licensees' commitment to fulfill them. Any failure to achieve the results set out in the FSP is considered a contravention of law (Ministry of Forests, 2002).

While there have been concerns that this new form of documenting forest development planning is not stringent enough, licensees are still required to address objectives set for "forest values, such as soils, visual quality, timber, forage, water, fish, wildlife, biodiversity and resource features which include critical wildlife habitats and cultural heritage resources" (Ministry of Forests, 2002). It is the responsibility of resource professionals including Foresters and Biologists to help in the preparation of the FSP as well as ensuring that the results it contains are both measurable and enforceable (Ministry of Forests, 2002).

Forest Stewardship Plans are public documents and are required to be accessible to everyone. Licensees must consult with the public and First Nations regarding the content of the FSP and indicate that they have incorporated any views or opinions expressed in these consultations. FSPs are approved for up to a five year term and must be consistent with approved land use plans (Forest Practices Board, 2004) (Ministry of Forests, 2002).

In the case of the North Central Coast, all Forest Stewardship Plans must be consistent with the rules and guidelines set out for ecosystem-based management. As with any FSP, failure to meet these criteria is considered a contravention of law and licensees will face penalties.

### 3.0 IMPLEMENTING ECOSYSTEM BASED MANAGEMENT

Successful implementation of ecosystem based management requires achieving the two overarching goals outlined in the definition of EBM: “ensure the coexistence of healthy, fully functioning ecosystems *and* human communities” (Coast Information Team, 2004). The remainder of this paper will be confined to a discussion of the first goal and implementation of the rules and regulations set out to achieve it. Specifically the rules and regulations will be outlined and implementation challenges will be discussed.

#### 3.1 EBM RULES & REGULATIONS

The Great Bear Rainforest has been separated into the two large scale areas covered by the North Coast LRMP and the Central Coast LRMP. These areas have been broken into four types of land use zones. The largest portion of both of these large scale areas is classified as “Ecosystem-Based Management [EBM] Sustainable Resource Development”. The next largest portion is classified as “New Protected Areas,” followed by “Existing Parks and Protected Areas” and “Mining/Tourism Areas” (Government of British Columbia, 2011).

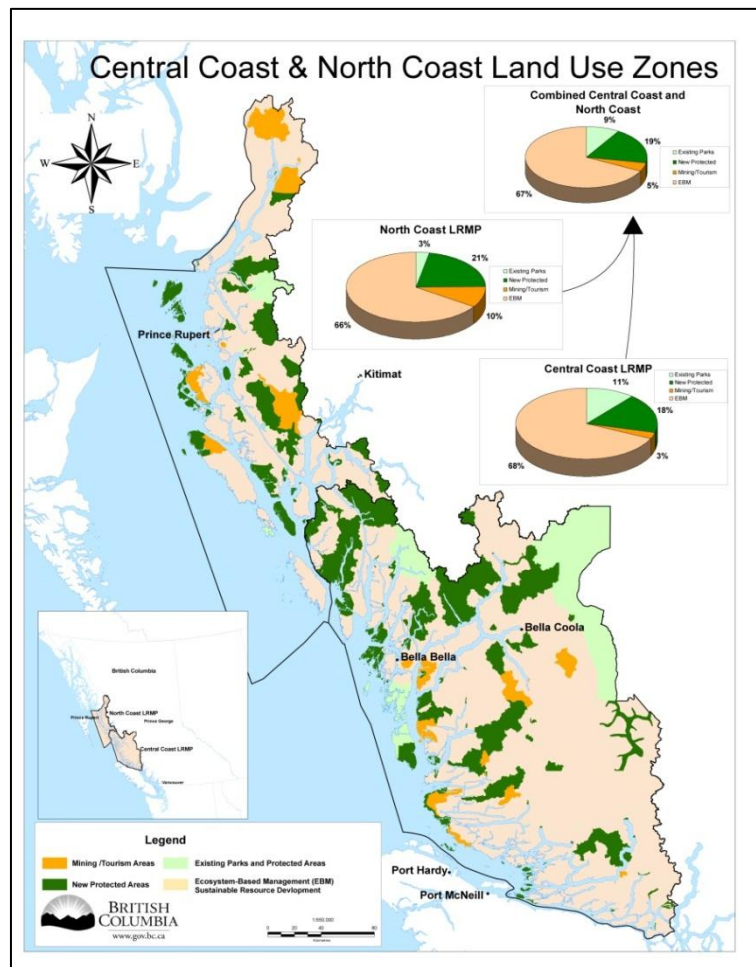


Figure 2: Land Use Zones of the GBR (Government of British Columbia, 2011)

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### 3.1.1 MINING/TOURISM AREAS

Twenty-one separate Mining/Tourism areas make up 5% of the total area of the GBR. These areas were established to maintain biological diversity, preserve and maintain social, ceremonial and cultural uses of First Nations, allow for mineral exploration and mining, allow for tourism and recreation and to allow for power developments (Ministry of Natural Resource Operations, 2009).

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### 3.1.2 EXISTING PARKS

Parks that had been established prior to the 2001 Agreement make up 9% of the total area of the GBR. These areas allow for restricted commercial and industrial activities including businesses such as tourism and hotels, as well as allowing for fishing, hunting and industrial activity such as mining and commercial logging (Government of British Columbia, 1996).

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### 3.1.3 NEW PROTECTED AREAS

New Protected Areas make up 19% of the total area of the GBR. These areas were created primarily through amending the Park Act to exclude commercial and industrial activity under a new designation known as a Conservancy. Conservancies were set aside to protect and maintain biological diversity and natural environments, to preserve and maintain social, ceremonial and cultural uses of First Nations, to protect and maintain recreational values and to ensure that any development of natural resources these areas contain occurs in a sustainable manner (Government of British Columbia, 1996). Park use permits cannot be issued for conservancies for commercial logging, mining, and hydroelectric power generation (Government of British Columbia, 1996).

### 3.1.4 EBM SUSTAINABLE RESOURCE DEVELOPMENT AREAS

EBM Sustainable Resource Development Areas are managed according to the rules and regulations of EBM. One of the key components of EBM is planning. Planning occurs at several levels ranging from course scale [regional] to fine scale [site] and focuses on risk management [Table 1].

**Table 1: Multiple planning scales of EBM (MacKinnon, 2008)**

Scale	Land base [ha]	Example of collaborative effort
<b>Regional</b>	10 million +	Regional agreements and policies
<b>Territory/sub-regional</b>	500 000 – 5 million	Strategic land-use plans
<b>Landscape</b>	30 000 – 100 000	Landscape reserves
<b>Watershed</b>	1000 – 50 000	Resource-use and development plans
<b>Site</b>	<250	Business and project plans

Managing risk is meant to ensure high levels of ecological integrity by keeping ecosystems within [or very close to] their range of natural variability [RONV]. There are three risk classes defined for the GBR ranging from low risk [less than 30% deviation from RONV] to high risk [greater than 70% deviation from RONV]. This range was selected based on evidence suggesting that a greater than 70% deviation from RONV breaks habitat supply thresholds (MacKinnon, 2008). At the course scale [regional level] risk must be managed to a low level while at a finer scale [landscape or watershed] risk levels can vary. Some watersheds can be managed at higher risk levels as long as this is compensated for in other watersheds (MacKinnon, 2008).

There are five overarching components to managing risk and maintaining ecological integrity on the North Central Coast:

- Protect old-growth forests,
- Maintain forest structure at the stand level,
- Protect threatened and endangered species and ecosystems,
- Protect wetlands, and
- Apply adaptive management (MacKinnon, 2008).



Protecting old-growth forests requires that a certain percentage of the naturally-occurring old-growth forests must be maintained at the various planning scales. Stand level structure requirements state a minimum of 15% of each area harvested must be retained as either individual trees or clumps of trees (MacKinnon, 2008). Protecting threatened and endangered species and ecosystems requires that red-listed ecosystems must be retained in full and blue-listed ecosystems retained at no less than 50% (MacKinnon, 2008). Protecting wetlands requires maintaining 90% of riparian forest adjacent to estuaries and greater than 50% of riparian forest adjacent to fens and forested swamps (MacKinnon, 2008). Applying adaptive management requires that managers recognize that many assumptions were used to arrive at the above percentages and that management techniques should be tested and calibrated to local conditions (MacKinnon, 2008).

### 3.2 IMPLEMENTATION THROUGH FOREST STEWARDSHIP PLANS

Forest Stewardship Plans for areas where the rules and regulations of EBM apply must provide *results* and *strategies* for each objective laid out in the relevant Order. International Forest Products' [Interfor] FSP for the North Island – Central Coast Forest District will be examined to illustrate how licensees achieve these objectives. This FSP must follow the South Central Coast Order. The original FSP document was approved on February 14, 2007 and was to be in place for five years. It was revised in December of 2009 and again in February of 2010. The extent of this FSP is illustrated in Figure 3 (International Forest Products Limited, SWC Holdings Limited, A&A Trading Ltd. and Kvamua Enterprises Limited Partnership, 2009).

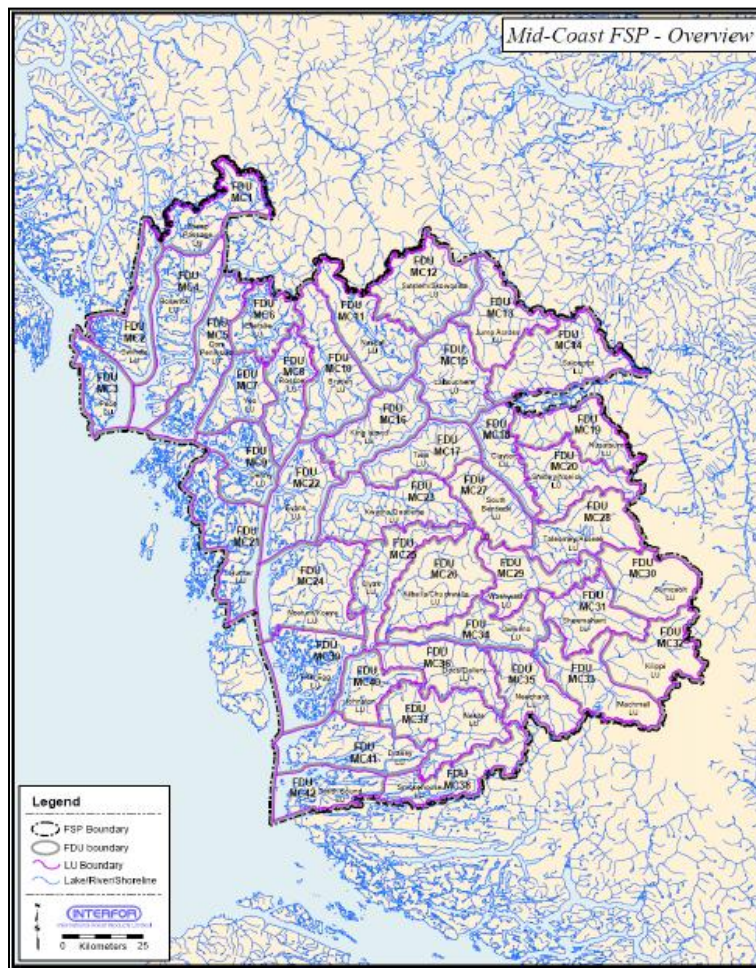


Figure 3: Map of the extent of Interfor's FSP for the North Island - Central Coast Forest District (International Forest Products Limited, SWC Holdings Limited, A&A Trading Ltd. and Kvamua Enterprises Limited Partnership, 2009)

Objective 7 of the South Central Coast Order is: "Objectives for Stand Level Retention of Western Red and Yellow Cedar" (Ministry of Natural Resource Operations, 2009). There are three parts to this objective. For the purpose of this example the first part only will be examined. Portion one of Objective 7 is: "Maintain a sufficient volume and quality of Western red cedar and Yellow cedar to support the applicable First Nation's cultural cedar use of Western red cedar and Yellow cedar, to the extent practicable" (Ministry of Natural Resource Operations, 2009). In Interfor's FSP

this is addressed through *Result or Strategy A*, which states:

1. If the Holder of this FSP constructs a road or harvests a cutblock within the area to which *Ministerial Order South Central Coast*, dated July 27, 2007 and emended March 23, 2009 applies, the Holder of the FSP will do so in a manner consistent with:
  - a) Protecting, to the extent practicable:
    - i) Traditional heritage features; and
    - ii) Historic culturally modified trees; and
  - b) Including a management zone of sufficient size, to the extent practicable for:
    - i) Traditional heritage features; and
    - ii) Historic culturally modified trees; and
  - c) Managing a supply of, to the extent practicable
    - i) Traditional forest resources; and
    - ii) Monumental cedar; and
    - iii) Stand level western red cedar and yellow cedar; and... (International Forest Products Limited, SWC Holdings Limited, A&A Trading Ltd. and Kvamua Enterprises Limited Partnership, 2009).

The objective for EBM is set by the government in the Order and the results or strategies are developed by the licensee in order to achieve the objective. In the example above, Interfor has provided the means by which they intend to “maintain a sufficient volume and quality of Western red cedar and yellow cedar...” (Ministry of Natural Resource Operations, 2009); they will do this by “protecting [...] traditional heritage features; and historic culturally modified trees...” (International Forest Products Limited, SWC Holdings Limited, A&A Trading Ltd. and Kvamua Enterprises Limited Partnership, 2009). The use of the phrase “to the extent practicable” by the licensee is consistent with the phrasing used by the Government of British Columbia in the Order. Implementing the rules and regulations of EBM through FSPs will be examined further in Section 4.2.

#### 4.0 IMPLEMENTATION CHALLENGES

Implementing ecosystem-based management on the North Central Coast of British Columbia presents many challenges to land managers. These implementation challenges are faced primarily during higher level planning activities. The most significant category of challenges, or obstacles, to implementing Ecosystem Based Management takes into account the challenge of integration (Slocombe, 1993). One such integration challenge in EBM is related to society's concept of how ecosystems, societies, and economies are integrated and interact with one another (Slocombe, 1993). Another coarse scale integration challenge concerns the often arbitrary nature by which areas are broken into units and the parameters used to create these units (Slocombe, 1993). One means of overcoming this challenge is by accurately mapping ecosystems on the coast so that the principles of EBM can be effectively applied. The challenge of integration arises primarily from the complexity of integrating "local, regional and national policies, practices, and criteria" (Slocombe, 1993). This concerns the scales at which planning takes place. One of the ways EBM on BC's coast tries to overcome this challenge is through the aforementioned multiple scales of planning.

#### 4.1 INTEGRATION & INTERACTION CHALLENGES

From this point on the focus of this discussion will be the ecological portion of EBM. However, a key component of EBM is the joint goal of "ensur[ing] the coexistence of healthy, fully functioning ecosystems *and human communities*" (Coast Information Team, 2004). An often overlooked challenge to implementing EBM is related to society's concept of how ecosystems, societies, and economies are integrated and interact with one another (Slocombe, 1993).

One significant step toward overcoming this challenge is that EBM on the North Central Coast takes into account human activities within the ecosystems being managed (Price, Roburn, & MacKinnon, 2008). There is however much work to be done if the goal of achieving high levels of human well-being is to be reached [see Appendix 1]. For example, an objective related to this goal is to "create a strong, diverse economy and mix of businesses in communities across the

region” (MacKinnon, 2008). This is a daunting task considering that many communities on the North Central Coast are considered forest dependent. Also, dependency on the forest industry on the North Central Coast is not limited to residents of the coast. A large portion of individuals who work on the coast do not live within the bounds of the GBR (Pierce Lefebvre Consulting, 2006). Over half of coastal forest workers live on Vancouver Island; if the economy of the North Central Coast is to be diversified and strengthened the impacts of such changes will have to be widespread. There has been little work in this area as of yet.

#### 4.2 PLANNING CHALLENGES

The remainder of this discussion will focus on the ecological portion of EBM. EBM on the North Central Coast of BC is characterised by various levels of planning ranging from coarse scale regional plans to fine scale site plans (MacKinnon, 2008). These multiple scales of planning are meant to address the fact that integrating data and requirements from multiple sources of policy and various practices on the land base can pose landuse planning challenges for managers. This planning at multiple scales may in fact add an additional implementation challenge for forest licensees operating on the North Central Coast due to forest tenure regulations.

There are two main types of forest tenure in British Columbia: volume-based tenure and area-based tenure. These two tenure types are differentiated by the duration of the contract between the forest licensee and the Government of British Columbia, the resource rights the contract provides the licensee, when and how much revenue is paid to the Government, and whether harvest is by volume of timber or over a given area (Cortex, 2001).

Area-based tenure includes Timber Licences, Woodlot Licences and Tree Farm Licences. These licences provide the licensee with an exclusive operating area over a longer period of time (Cortex, 2001). This provides certainty and security to the licensee and promotes long-term planning and management activities. Implementing EBM would likely have little impact on

these types of licences as the licensee is the exclusive operator on the land base and can plan accordingly in order to follow the applicable rules and regulations

Volume-based tenure includes Timber Sale Licences and Forest Licences. These licences provide licensees with a given volume of timber to harvest in a given area (Cortex, 2001). Several licensees may have volume-based licences within the same operating area. This can cause friction between licensees as they seek out the most profitable sites from which to harvest their allocated volume. This may also cause difficulty in achieving the coarse scale [regional level] requirements for risk management within EBM. Recall that in the EBM regulations low risk is less than 30% deviation from RENV and high risk is greater than 70% deviation from RENV (MacKinnon, 2008). Each licensee manages their harvest area at the required level of risk for the scale at which they operate, which could vary from low to moderate or high risk at the watershed or site scale. This could potentially create a problem when all activities from the various licensees operating at the sub-regional or regional level are accounted for. If multiple licensees are managing for moderate or high levels of risk at finer scales, this could translate into a greater than 30% deviation from the RENV at coarser scales.

#### 4.3 INFORMATIONAL & MAPPING CHALLENGES

A key component of implementing EBM on the North Central Coast is related to Schedule 4 of both the Central and North Coast Order and the South Central Coast Order. In both Orders Schedule 4 is labeled “Landscape Units and Default/Risk Managed Old Forest Representation Targets” (Ministry of Natural Resource Operations, 2009) (Ministry of Natural Resource Operations, 2009). The tables within Schedule 4 of each Order outline the landscape units covered by the Order and the target percentage of RENV associated with each unit [Appendix 3].

Landscape units are areas of land use planning between 50,000 and 100,000 hectares that arose during the era when forestry in BC was governed by the Forest Practices Code (Integrated Land Management Bureau, 1999). Mapping for old forest representation targets is based on

these landscape units. As stated previously, another coarse scale integration challenge concerns the often arbitrary nature by which areas are broken into units and the parameters used to create these units (Slocombe, 1993). This applies directly to the implementation of EBM as these landscape units were used to determine old forest retention targets as opposed to current and relevant inventory and ecological data. One means of overcoming this challenge is by accurately mapping ecosystems on the coast so that the principles of EBM can be effectively applied.

At this time two subsections of Schedule 4 are missing vital data in both the SCC Order and CNC Order. There is no Terrestrial Ecosystem Mapping [TEM] data for “Section 4[a] – Site Series RONV Requirements for Landscape Unit Targets in Schedule 4,” or “Section 4[d] – Modal, Rare and Very Rare Site Series Surrogate Analysis Unit and Targets” for the CNC Order and “Modal, Rare and Very Rare Site Series Surrogate Analysis Unit Representation Targets” for the SCC Order (Ministry of Natural Resource Operations, 2009). The lack of data for these two subsections poses a significant challenge to full implementation of EBM.

As previously mentioned, FSPs were anticipated to allow licensees to be more innovative in achieving their management goals through more flexible strategies that could be adapted to specific regional or site requirements or constraints. Implementing EBM provides licensees an excellent opportunity to exercise this innovation. Unfortunately the Orders for the North Central Coast of BC have been written in such a way that licensees are inclined to default to pre-set targets as opposed to being creative or innovative; Interfor’s FSP for this area is one example.

Part four of the SCC Order deals with biodiversity and contains Objective 14: “Objectives for landscape level biodiversity” (Ministry of Natural Resource Operations, 2009). This objective addresses the old-growth retention targets for the area in more detail. Both the SCC Order and Interfor’s FSP provide the following:

Objective 14 [1] states:

- a. For the site series surrogate in a landscape unit, retain an amount of old forest equal to or greater than the landscape unit default target listed in Schedule 4, [using site series surrogate targets listed in Schedule 4[b]], except where alteration or harvesting is required for road access, other infrastructure, or to address a safety concern.
- b. For each site series surrogate listed in Schedule 4[c], also maintain an amount of old forest equal to or greater than that specified for each site series surrogate listed in Schedule 4[c] (International Forest Products Limited, SWC Holdings Limited, A&A Trading Ltd. and Kvamua Enterprises Limited Partnership, 2009).

This appears to pose no difficulty as both Schedule 4[b] and 4[c] are provided with the consolidated Order (Ministry of Natural Resource Operations, 2009) (Ministry of Natural Resource Operations, 2009). Reading on to Section 2 of Objective 14 introduces an interesting challenge in both interpreting the Order and implementing EBM.

Objective 14 [2] states:

- a. As an alternative to 14 [1][a], for each site series, or grouping of site series in a landscape unit, retain an amount of old forest equal to or greater than the landscape unit default targets listed in Schedule 4, [using site series or site series grouping targets listed in Schedule 4[a]], except where alteration or harvesting is required for road access, other infrastructure, or to address a safety concern.
- b. As an alternative to 14[1][b], for each site series or site series grouping in Schedule 4[e] also maintain an amount of old forest equal to or greater than that specified for each site series or site series grouping listed in Schedule 4[e] (International Forest Products Limited, SWC Holdings Limited, A&A Trading Ltd. and Kvamua Enterprises Limited Partnership, 2009).



The immediate stumbling block is that neither Schedule 4[a] nor Schedule 4[e] actually exists due to the lack of TEM data. In attempting to refer to these two Schedules it is indicated that the reader should refer to Objective 18[3]. Objective 18[3] of the SCC Order states: “Objective 14[2] takes effect on December 30, 2009” (Ministry of Natural Resource Operations, 2009). This in effect forces licensees to default to sections of the legislation that provide incomplete data based on assumptions. This is especially significant as the data needed for Objective 14[2] to take effect on December 30, 2009 still has not been produced and therefore cannot be implemented.

One of the overarching principles of EBM is the application of adaptive management to manage risk (MacKinnon, 2008). This principle of adaptive management is meant to ameliorate challenges created by the lack of primary data on the North Central Coast as many of the principles of EBM are underlain by assumptions where data is absent. The principle of adaptive management requires active testing and monitoring of management activities on an ongoing basis in order to calibrate management strategies and activities to local conditions (MacKinnon, 2008). Forest licensees conduct ongoing inventories for their current area of responsibility after harvest operations, which would allow them to adapt their management strategies over time; however, this alone will not solve the lack of TEM data associated with Schedule 4 of the SCC and CNC Orders.

## 5.0 CONCLUSION

Ecosystem based management in the Great Bear Rainforest of BC's North Central Coast was founded with the ideal of integrating human activity into the management framework of the coastal temperate rainforest. The current management system was borne out of conflict, which ended in a resolution of collaborative management between previously disparate groups. The agreement increased protected areas in the region through the creation of conservancies and the implementation of new forest management and land use planning rules and regulations.

Implementing the rules and regulations of EBM has brought to light many challenges as forest licensees struggle to meet the demands of this new framework. The legislation is incomplete and relies heavily on assumptions and best guesses (MacKinnon, 2008). The interim agreement was to be in place until 2009 when 'full implementation' would take effect (Smith, Sterritt, & Armstrong, 2007). To this point full implementation has been prevented by a lack of Terrestrial Ecosystem Mapping data.

While there have been implementation challenges from an operation standpoint, the largest obstacle to fully implementing EBM is from a planning perspective. Forest licensees have structured their Forest Stewardship Plans to meet the current and applicable legislative demands. These plans will not, and cannot, change to reflect full implementation of EBM until the legislation is completed and provides all the data necessary to abide by it. While frustration over the delay in reaching full implementation mounts, there is little to be offered in the way of a solution from the licensees' perspective.

There is also the challenge of addressing the goal of achieving high levels of human well-being. One objective related to this goal is to "create a strong, diverse economy and mix of businesses in communities across the region" (MacKinnon, 2008) so as to decrease the region's dependence on the forest industry. A significantly higher portion of implementation efforts have been placed on reaching the ecological goals of EBM to this point.

While there have been serious delays in reaching full implementation of EBM, all parties affirm a strong desire to reach this ultimate goal (Smith, Sterritt, & Armstrong, 2007). A serious commitment from the Government of British Columbia is required to achieve this. The holes in information in Schedule 4 of both the South Central Coast Order and Central and North Coast Order must be filled before full implementation can be achieved. Once the data is collected and these Schedules become available as part of the legislation, licensees will be able to produce Forest Stewardship Plans designed to meet the requirements of full implementation of ecosystem based management.

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## APPENDIX 1: GOALS & OBJECTIVES OF EBM

Table 2: Goals and objectives of EBM (Coast Information Team, 2004)

Goals	Objectives
<b>Maintain the ecological integrity of terrestrial, marine, and freshwater ecosystems.</b>	Represent the biological diversity of the region in a system of protected areas according to the principles of conservation biology.
	Maintain the natural diversity of species, ecosystems, seral stages, and ecosystem functions including biological legacies [e.g., bear dens, wildlife trees, snags, coarse woody debris].
	Restore damaged or degraded ecosystems.
	Ensure that streamflow, channel characteristics, and water quality are within the range of natural variability.
	Protect or restore red- and blue-listed species and their habitats.
	Protect red- and blue-listed and regionally rare ecosystems.
<b>Achieve high levels of human well-being</b>	Maintain viable populations of all native species, including genetic variants, across their range.
	Conserve soil productivity and maintain slope failures within natural rates.
	Achieve the health, wealth, and education status required for a high quality and secure life for both aboriginal and non-aboriginal people.
	Build stable, resilient, well-serviced, and peaceful communities in coastal BC.
	Create a strong and diverse mix of businesses and overall economy within communities and across the region.
	Create a strong and diverse mix of non-profit and voluntary organizations and a vibrant set of traditional, cultural, and non-market activities within communities and across the region.
	Ensure a fair distribution of benefits, costs, and risks across all parts of coastal BC, including aboriginal and non-aboriginal people.

## APPENDIX 2: SCHEDULE 1 CNC & SCC ORDERS

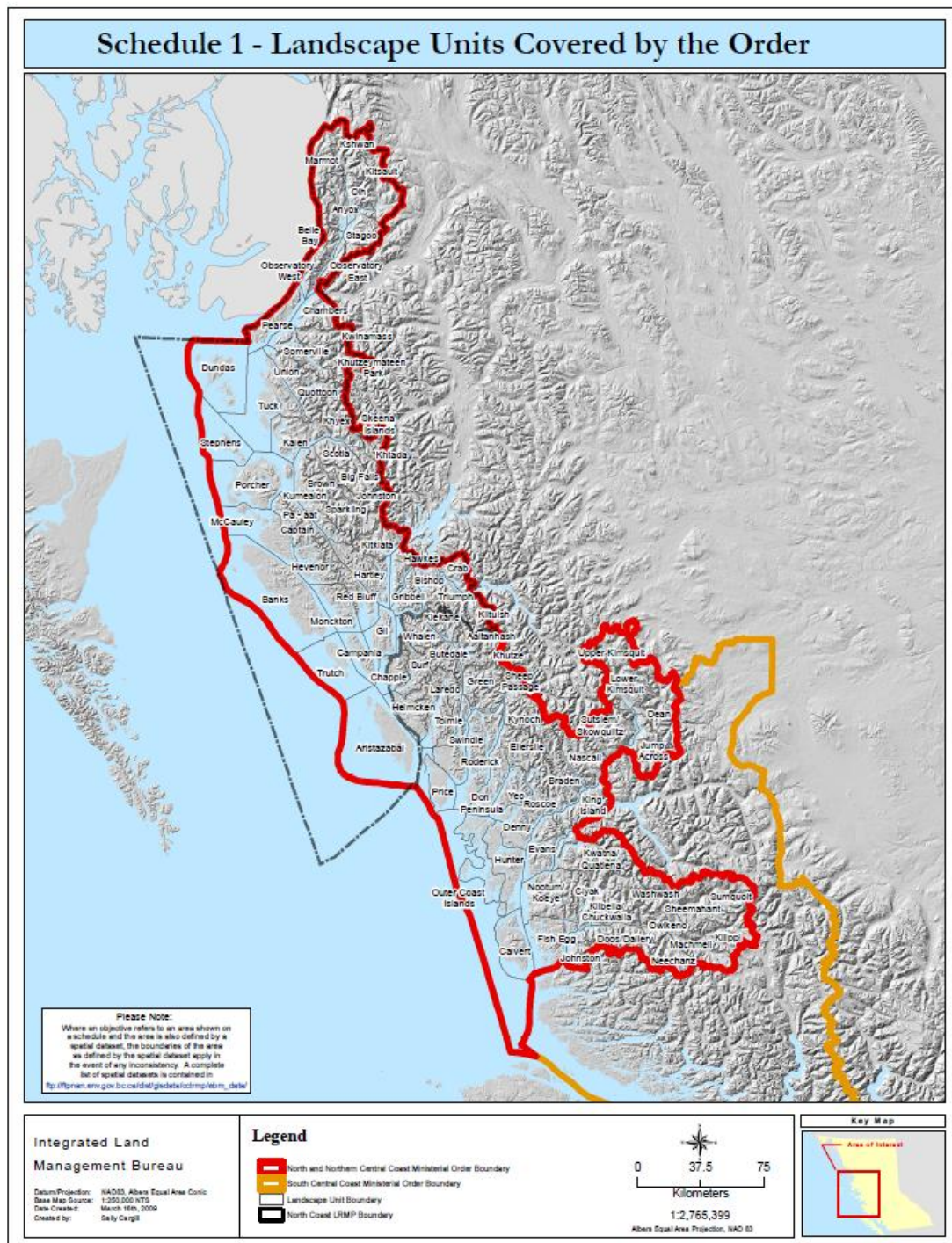


Figure 4: Central and North Coast Order - Landscape Units Covered (Ministry of Natural Resource Operations, 2009)



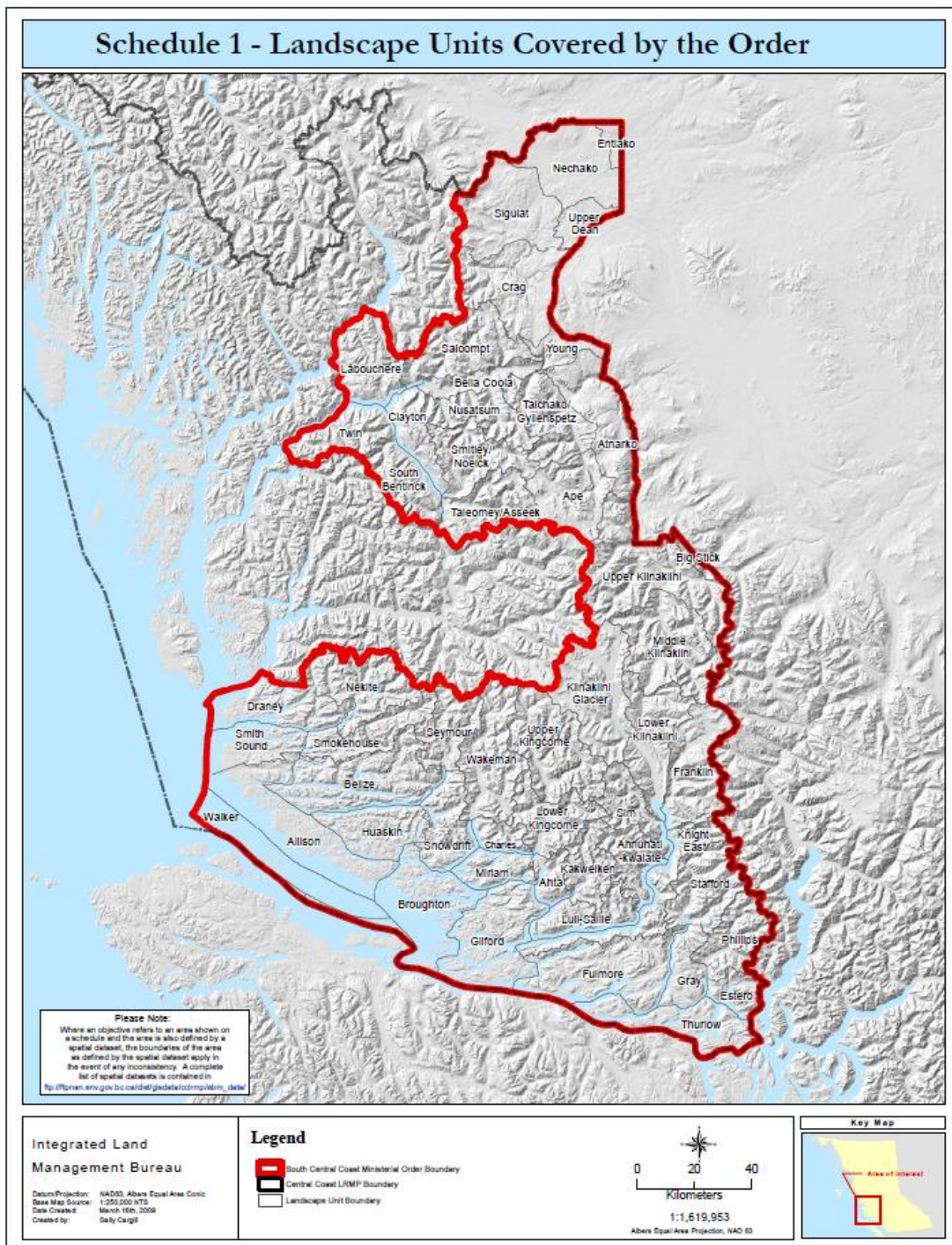


Figure 5: South Central Coast - Landscape Units Covered (Ministry of Natural Resource Operations, 2009)

## APPENDIX 3: SCHEDULE 4 CNC &amp; SCC ORDERS

### Schedule 4 - Landscape Units and Default / Risk Managed Old Forest Representation Targets

Landscape Unit	Default Target (% of RONV)	Risk-Managed Target (% of RONV)	Landscape Unit	Default Target (% of RONV)	Risk-Managed Target (% of RONV)
Aaltanhash	100	N/A	Stagoo	100	N/A
Anyox	70	30	Stephens	70	30
Aristazabal	70	30	Surf	30	30
Banks	30	30	Tolmie	30	30
Belle Bay	70	30	Triumph	30	30
Big Falls	30	30	Trutch	100	N/A
Bishop	50	30	Tuck	30	30
Brown	50	30	Union	50	30
Butedale	30	30	Whalen	30	30
Campania	100	N/A			
Captain	30	30	Braden	30	30
Chambers	30	30	Calvert	100	30
Chapple	70	30	Clyak	30	30
Dundas	70	30	Crab	50	30
Gil	50	30	Dean	50	30
Gribbell	50	30	Denny	30	30
Hartley	50	30	Don Peninsula	30	30
Hawkes South	30	30	Doos Dallery	30	30
Helmcken	50	30	Ellerslie	30	30
Hevenor	30	30	Evans	50	30
Johnston (NC)	100	N/A	FishEgg	70	30
Kalen	30	30	Green	30	30
Khtada	70	30	Hunter	50	30
Khutze	100	N/A	Johnston (MC)	30	30
Khyex	50	30	Jump Across	70	30
Kiltulsh	70	30	Kilbella-Chuckwalla	30	30
Kitkiata	50	30	Kilippi	30	30
Kitsault	70	30			
Klekane	70	30	Kingsland	50	30
Kshwan	70	30	Kwatna Quatlana	30	30
Kumealon	30	30	Kynoch	100	30
Kwinamass	100	N/A	Lower Kimsquit	50	30
Laredo	100	N/A	Machmell	30	30
Marmot	50	30	Nascall	70	30
McCauley	70	30	Neechanz	30	30
Monckton	50	30	NootumKoeeye	30	30
Observatory East	30	30	Outer Coast Islands	100	30
Observatory West	50	30	Owikeno	30	30
Olh	70	30	Price	70	30
Pa_aat	70	30	Roderick	30	30
Pearse	70	30	Roscoe	50	30
Porcher	30	30	Sheemahant	30	30
Quottoon	30	30	Sheep Passage	30	30
Red Bluff	50	30			
Scotia	30	30	Sumquilt	50	30
Skeena Islands	100	30	Sutslem Skowquiltz	50	30
Somerville	30	30	Swindle	70	30
Sparkling	100	N/A			
			Upper Kimsquit	50	30
			Washwash	70	30
			Yeo	30	30

Figure 6: Schedule 4 of the Central and North Coast Order (Ministry of Natural Resource Operations, 2009)

**Schedule 4. – Landscape Units and Default / Risk Managed Old Forest Representation Targets**

Landscape Unit	Default Target (% of RONY)	Risk managed Target (% of RONY)
Draney	30	30
Nekite	70	30
Smokehouse	30	30
Smith Sound	30	30
Allison	30	30
Belize	30	30
Seymour	30	30
Snowdrift	30	30
Broughton	30	30
Gilford	30	30
Lull Sallie	30	30
Ahta	30	30
Kakweiken	30	30
Miriam	30	30
Fulmore	30	30
Gray	30	30
Thurlow	30	30
Estero	30	30
Phillips	70	30
Upper Klinaklini	30	30
Middle Klinaklini	30	30
Klinaklini Glacier	30	30
Lower Klinaklini	30	30
Franklin	30	30
Sim	30	30
Ahnuati	30	30
Knight East	30	30
Stafford	30	30
Huaskin	30	30
Wakeman	50	30
Upper Kingcome	50	30
Lower Kingcome	50	30
Charles	30	30
Talchako Gyllenspetz	30	30
Bella Coola	30	30
Saloompt	30	30
Crag	70	30
Labouchere	50	30
Taleomey Asseek	50	30
Ape	70	30
South Bentinck	50	30
Smitley Neoick	50	30
Twin	50	30
Clayton	30	30
Nusatsun	30	30

Figure 7: Schedule 4 of the South Central Coast Order (Ministry of Natural Resource Operations, 2009)