

Nass South Sustainable Resource Management Plan



June 2012



BRITISH
COLUMBIA

The Best Place on Earth

**Ministry of Forests, Lands and
Natural Resource Operations**



File Number: 17730-02 NASS

June 22, 2012

Dear Reader:

As Minister of Forests, Lands and Natural Resource Operations, I am pleased to confirm approval of the Nass South Sustainable Resource Management Plan and convey it to all participating ministries for implementation.

The Nass South plan contains key management direction for resource development, conservation and protection of natural and heritage resources. It will assist government agencies by providing landscape-level strategic direction for resource management within the plan area.

I recognize and appreciate the dedication and significant efforts of government staff, First Nations and forest licencees in developing this plan. I encourage their continued participation in the plan implementation and monitoring processes.

Yours truly,

Steve Thomson
Minister

cc: Eamon O'Donoghue
Regional Executive Director, Skeena Region

Contact Information:

Province of British Columbia

3726 Alfred Avenue

Bag 5000

Smithers BC V0J 2N0

Ph: (250) 847-7260

<http://www.ilmb.gov.bc.ca/slrp/srmp/south/nass/index.html>

Foreword

The purpose of the Nass South Sustainable Resource Management Plan (SRMP) is to provide long-term sustainability of jobs, communities and natural resources in the southern portion of the Nass Timber Supply Area. In keeping with the *Governance Principles for Sustainable Resource Management*¹, the plan provides the following:

- *Certainty*, by providing clear management direction to resource users;
- *Efficiency*, in the allocation, development and use of natural resources, by clarifying the timing and nature of activities that can occur in the area;
- *Flexibility*, by presenting results-based standards that will allow resource users to innovate and employ their professional skills in developing implementation strategies;
- *Transparency*, by creating the plan in a spirit of openness of information and in consultation with First Nations, stakeholders, the general public, and government agencies; and
- *Accountability*, by setting measurable objectives and indicators that can be tracked over time.

The Nass South SRMP was developed in partnership with the Gitanyow, the Nisga'a Nation as represented by Nisga'a Lisims Government (NLG), key stakeholders and government agencies. It is intended to provide a balance of social, economic and environmental values that meet the interests of all those who have a concern for the area.

Acknowledgements

This plan was completed with the dedicated input from a number of individuals and organizations. We thank everyone who has contributed their time and knowledge to this document, including: the Gitanyow and its representatives; the Nisga'a Nation as represented by Nisga'a Lisims Government (NLG); the previous Ministry of Forests and Range - Kalum Forest District, BC Timber Sales Skeena Business Area; the previous Ministry of Environment - Skeena Region; the previous Integrated Land Management Bureau, the Ministry of Forests, Lands and Natural Resource Operations; West Fraser Mills Ltd. - Skeena Sawmills Division; Timber Baron Contracting Ltd.; the Regional District of Kitimat-Stikine and the District of Stewart.

¹ *Governance Principles for Sustainability – Application Guidelines*. March 2004, Ministry of Sustainable Resource Management.

Table of Contents

Foreword	ii
Acknowledgements	ii
Table of Contents	iii
List of Tables	vi
List of Maps	vi
List of Appendices	vi
List of Acronyms	vii
Glossary	viii
1. Introduction	1
1.1 Plan Overview	1
1.1.1 Plan Goals.....	1
1.1.2 Plan Scope	2
1.1.3 Plan Format.....	2
1.1.4 Process Overview	3
1.1.5 Benefits of the Plan.....	4
1.2 Plan Context	4
1.2.1 Current Policy Framework for SRMPs.....	4
1.2.2 Planning for Adjacent Areas.....	5
1.2.3 Resource Use and Development Activity	6
1.3 Plan Area	7
1.3.1 Ecosystems	7
1.3.2 Communities.....	9
1.3.3 Historical Land and Resource Use.....	10
1.3.4 Current Economic Profile	10
1.4 Gitanyow and Nisga’a Nation	11
1.4.1 Introduction	11
1.4.2 Gitanyow	11
1.4.2.1 History / Political Organization	11
1.4.2.2 Perspectives	12
1.4.2.3 View of the Nass South SRMP.....	13

1.4.3 Nisga'a.....	14
1.4.3.1 Nisga'a Nation.....	14
1.4.3.2 Joint Fisheries Management Committee.....	15
1.4.3.3 Wildlife Committee.....	15
2. Management Direction	15
2.1 Water.....	15
2.1.1 Overview of Water Resources.....	15
2.1.2 Management Direction for Water.....	17
2.2 Biodiversity.....	26
2.2.1 Overview of Ecosystems.....	26
2.2.2 Management Direction for Biodiversity Resources.....	30
2.3 Botanical Forest Products.....	38
2.3.1 Overview of Botanical Forest Product Resources.....	38
2.3.1.1 Pine Mushrooms.....	38
2.3.1.2 Management Direction for Pine Mushrooms.....	39
2.4 Wildlife.....	40
2.4.1 Overview of Wildlife Resources.....	40
2.4.1.1 Moose.....	40
2.4.1.2 Management Direction for Moose.....	41
2.4.2.1 Mountain Goat.....	44
2.4.2.2 Management Direction for Mountain Goat.....	45
2.4.3.1 Grizzly Bear.....	47
2.4.3.2 Management Direction for Grizzly Bear.....	49
2.4.4.1 Fur-bearers.....	52
2.4.4.2 Management Direction for Fur-bearers.....	53
2.4.5.1 Northern Goshawk.....	53
2.4.5.2 Management Direction for Northern Goshawk.....	55
2.4.6.1 General Wildlife.....	56
2.4.6.2 Management Direction for General Wildlife.....	57
2.5 Fisheries.....	57
2.5.1 Overview of Fisheries Resources.....	57
2.5.1.1 Salmon.....	58
2.5.1.2 Bull Trout.....	59
2.5.2 Management Direction for Fisheries.....	59
2.6 Cultural Heritage Resources.....	60
2.6.1 Overview of Cultural Heritage Resources.....	60
2.6.2 Management Direction for Cultural Heritage Resources.....	61
2.7 Timber.....	64
2.7.1 Overview of Timber Resources.....	64
2.7.2 Management Direction for Timber.....	65
2.8 Special Resource Management Zones.....	67
2.8.1 Overview of Special Resource Management Zones.....	67

2.8.1.1 Water Management Units.....	67
2.8.1.2 Management Direction for Water Management Units	68
2.8.1.3 Protected Areas.....	69
2.8.1.4 Management Direction for the Area to be Protected.....	70
3. Plan Implementation, Monitoring and Amendment	73
3.1 Implementation	73
3.2 Monitoring	73
3.3 Plan Amendment	73
References	74

List of Tables

Table 1. Biogeoclimatic Zones and Ecosections in the Nass South SRMP Area	8
Table 2. Equivalent Clearcut Area (ECA) Thresholds for Watersheds	22
Table 3. Retention Targets in Riparian Reserve Zones (RRZ) and Riparian Management Zones (RMZ)	25
Table 4. Recommended Distribution of Patch Sizes (harvest units and leave areas).....	35
Table 5. Wildlife Tree Targets (<i>Forest and Range Practices Act Regulations</i>).....	35
Table 6. Seral Stage Targets	36
Table 7. Rationale for Amending the Ecosystem Network	37
Table 8. Forest Conditions within Ecosystem Network Buffers.....	38
Table 9. High Value Grizzly Bear Habitat in the Nass South SRMP Area	51

List of Maps

Map 1: Nass South SRMP – Plan Area/Base Map	
Map 2: Nass South SRMP – Landscape Units	
Map 3: Nass South SRMP – Ecosections and Biogeoclimatic Zones	
Map 4: Nass South SRMP – Vegetation Cover	
Map 5: Nass South SRMP – Timber Harvesting Land Base	
Map 6: Nass South SRMP – Visual Quality Objectives	
Map 7: Nass South SRMP – Gitanyow Claimed House Territories	
Map 8: Nass South SRMP – Nisga’a Nation Areas of Ownership and Interest	
Map 9: Nass South SRMP – ECA Threshold Watersheds	
Map 10: Nass South SRMP – Old Growth Management Areas	
Map 11: Nass South SRMP – Ecosystem Network	
Map 12: Nass South SRMP – Moose Winter Range	
Map 13: Nass South SRMP – Mountain Goat Winter Range	
Map 14: Nass South SRMP – Grizzly Bear Specified Areas	
Map 15: Nass South SRMP – Special Habitats for General Wildlife	
Map 16: Nass South SRMP – Goshawk Nesting/Post-Fledging Habitat	
Map 17: Nass South SRMP – Gitanyow Treaty Settlement Lands Offer (2002)	
Map 18: Nass South SRMP – Water Management Units	
Map 19: Nass South SRMP – Parks and Protected Areas	
Map 20: Nass South SRMP – Hanna-Tintina Area to be Protected	

List of Appendices

Appendix A: General Wildlife Tree Management Guidelines	
Appendix B: Moose Habitat Attributes for Life Requisites	
Appendix C: Best Management Practices for Moose Winter Range	
Appendix D: Minimizing Human-Bear Conflicts	
Appendix E: Public Review Summary and Response	
Appendix F: Policy Recommendations to Government	
Appendix G: Nass South SRMP Timber Supply Analysis Report and Information Package	

List of Acronyms

AAC	Allowable Annual Cut
AT	Alpine Tundra
BAFA	Boreal Altai Fescue Alpine
BCTS	BC Timber Sales
BEC	Biogeoclimatic Ecosystem Classification
BMPs	Best Management Practices
CDC	Conservation Data Centre
CMA	Coastal Mountain Heather Alpine
CMT	Culturally Modified Tree
CWH	Coastal Western Hemlock
ECA	Equivalent Clearcut Area
EN	Ecosystem Network
ESSF	Engelmann Spruce – Subalpine Fir
FREP	Forest and Range Evaluation Program
FRPA	Forest and Range Practices Act
ICH	Interior Cedar Hemlock
IPP	Independent Power Project
JFMC	Joint Fisheries Management Committee
JRC	Joint Resources Council
LRMP	Land and Resource Management Plan
MH	Mountain Hemlock
MOE	Ministry of Environment
MOFR	Ministry of Forests and Range
NDT	Natural Disturbance Type
NLG	Nisga’a Lisims Government
OGMA	Old Growth Management Area
RMZ	Riparian Management Zone
RRZ	Riparian Reserve Zone
SRMP	Sustainable Resource Management Plan
SRMZ	Special Resource Management Zone
THLB	Timber Harvesting Land Base
TSA	Timber Supply Area
TSR	Timber Supply Review
UWR	Ungulate Winter Range
WRP	Watershed Restoration Plan

Glossary

Adaptive management	The rigorous combination of management, research, and monitoring so that credible information is gained and management activities can be modified by experience. Adaptive management acknowledges institutional barriers to change and designs means to overcome them.
Allowable Annual Cut	The rate of timber harvest permitted each year from a specified area of land, usually expressed as cubic metres of wood per year. The chief forester sets Annual Allowable Cuts (AACs) for timber supply areas and tree farm licences in accordance with Section 7 and/or Section 170 of the <i>Forest Act</i> . The district manager sets AACs for woodlot licences.
Archaeological sites	Locations containing, or with the potential to contain, the physical remains of past human activity. These sites are assessed through archaeological impact assessments.
Biodiversity	The diversity of plants, animals and other living organisms in all their forms and levels of organization, including the diversity of genes, species and ecosystems, as well as the functional processes that link them.
Biogeoclimatic Ecosystem Classification	A system of ecological classification, based primarily on climate, soils, and vegetation, that divides the province into large geographic areas with broadly homogeneous climate and similar dominant tree species. Zones are further broken down into subzones (based on characteristic plant communities occurring on zonal sites) and variants (based on climatic variation within a subzone).
Blue-listed species	List of ecological communities and indigenous species and subspecies of special concern (formerly vulnerable) in British Columbia.
Coarse filter management	An approach to maintaining biodiversity that involves maintaining a diversity of structures within stands and a diversity of ecosystems across the landscape. The intent is to meet most of the habitat requirements of most of the native species.
Critical habitat	Areas considered to be critically important for sustaining a population and where development may cause an unacceptable decline in the population.
Culturally modified tree	A tree which has been intentionally modified by aboriginal peoples as part of their traditional use of forests (Stryd <i>et al.</i> 1998)

Cultural heritage resources	An object, a site or a location of a traditional societal practice that is of historical, cultural or archaeological significance to the province, a community, or an aboriginal people. Cultural heritage resources include archaeological sites, structural features, heritage landscape features, and traditional use sites.
Ecosystem-based Management	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 well-being is supported and improved.
Fine-filter management	An approach to maintaining biodiversity that is directed towards particular habitats or individual species whose habitat requirements are not adequately covered by coarse filter management. These habitats may be critical in some way and the species threatened or endangered.
Forest fragmentation	Occurs when large continuous forest patches are converted into one or more smaller patches surrounded by areas disturbed naturally or by human activities.
Green-up	A cutblock that supports a stand of trees that has attained the green-up height specified in a higher-level plan for the area, or in the absence of a higher-level plan for the area, has attained a height that is 3 m or greater. If under a silvicultural prescription, the cutblock also meets the stocking requirements of that prescription; if not under a silviculture prescription, it meets the stocking specifications for that biogeoclimatic ecosystem classification specified by the regional manager.
Habitat suitability	A habitat interpretation that describes the current potential of a habitat to support a species. Habitat potential is reflected by the present habitat condition or successional stages.
Hydroriparian Zone	Defined as the area that extends to the edge of the influence of water on land, or land on water, as defined by plant communities (including high bench or dry floodplain communities) or landforms, plus one and one-half site specific tree heights horizontal distance. Landforms include: <ul style="list-style-type: none"> • The stream channel, lake or wetland and adjacent riparian ecosystem, where no floodplain exists. • The full width of the floodplain for streams. • Adjacent active fluvial units. • Up to the top of the inner gorge or where slopes become less than 50% for reaches of streams that are gullied, or are in a ravine or canyon. • Immediately adjacent unstable slopes (class IV and V terrain) where it is located such that a surcharge of sediment may be delivered to the stream, lake or wetland.

Landscape connectivity	A qualitative term describing the degree to which late-successional ecosystems are linked to one another to form an interconnected network. The degree of interconnectedness and the characteristics of the linkages vary in natural landscapes based on topography and natural disturbance regime. Breaking of these linkages may result in fragmentation.
Moisture Regime	Describes the relative amount of soil moisture; can be determined from slope position and gradient, soil depth and texture, coarse fragment content, aspect, and sources of seepage. For purposes of terrestrial site description, soil moisture regimes are ranked in the following order from driest to wettest: very xeric (very dry), xeric (dry), subxeric (moderately dry), submesic (slightly dry), mesic (fresh), subhygric (moist), hygric (very moist), subhydric (wet).
Monitoring	Ongoing assessment of how well the goals and objectives of the SRMP are being implemented.
Natural disturbance regime/process	Describes the timing and nature of naturally occurring phenomena, such as fire, windthrow, landslides, and single-tree death that result in changes to ecosystems and landscapes.
Patch Size	In relation to forest harvest, a single cutblock or an aggregation of cutblocks.
Protected Area	A designation for areas of land set aside from resource development activities to protect natural heritage, cultural heritage, or recreational values (includes national park, provincial park, and ecological reserve designations).
Red-listed species	List of ecological communities and indigenous species and subspecies that are extirpated, endangered or threatened in British Columbia. Red listed species and sub-species may be legally designated as, or may be considered candidates for legal designations as Extirpated, Endangered or Threatened under the Wildlife Act (see http://www.env.gov.bc.ca/wld/faq.htm#2). Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.
Regeneration Delay	Defined in the <i>Ministry of Forests and Range Glossary of Forestry Terms in British Columbia March 2008</i> : The period of time between harvesting and the date at which an area is occupied by a specified minimum number of acceptable well-spaced trees.
Riparian area	Areas of land adjacent to wetlands or bodies of water such as swamps, streams, rivers or lakes, including both the area dominated by continuous high moisture content and the adjacent upland vegetation that exerts an influence on it.

Riparian Management Zone	An area described under Division 3 [<i>Riparian areas</i>] of Part 4 [<i>Practice requirements</i>], that: (a) is a portion of the riparian management area, and (b) is established to: (i) conserve the fish, wildlife habitat, biodiversity and the water values of the riparian management zone, and (ii) protect the riparian reserve zone, if any, within the riparian management area (Ministry of Forests and Range: 2004).
Riparian Reserve Zone	An area described under Division 3 [<i>Riparian areas</i>] of Part 4 [<i>Practice requirements</i>], that: (a) is a portion of a riparian management area, and (b) is established to protect fish, wildlife habitat, biodiversity and the water values of the riparian reserve zone (Ministry of Forests and Range: 2004)
Seral (forest or stage)	Sequential stages in the development of plant communities [e.g. from young (or early seral) stage to old stage (or old seral)] that successively occupy a site and replace each other over time.
Structural Stage	The existing dominant stand appearance and structure for an ecosystem unit.
Stand-initiating disturbance	A natural disturbance event, such as wildfire, wind, landslides and avalanches that significantly alter an ecosystem. In most cases, there is considerable mortality of plant species, some degree of site disturbance and the initiation of successional processes that will form a new plant community with a different structure and likely a different composition than its predecessor.
Sustainable	A state or process that can be maintained indefinitely. The principles of sustainability integrate three closely interlinked elements — the environment, the economy and the social system — into a system that can be maintained in a healthy state indefinitely.
Timber Harvesting Land Base	Forested Crown land that is within a Timber Supply Area and currently considered feasible and economical for timber harvesting.
Timber Supply Area	An integrated resource management unit established in accordance with Section 6 of the <i>Forest Act</i> . Timber Supply Areas (TSAs) were originally defined by an established pattern of wood flow from management units to the primary timber-using industries. They are the primary unit for Allowable Annual Cut determinations. A TSA may be subdivided into a number of Timber Supply Blocks.
Two-zone model	Mineral exploration and mining are addressed in SRM Planning through the use of the “two-zone model”. This model ensures that mining applications are considered, subject to all applicable law, anywhere but in parks, ecological reserves, protected heritage property or an area under the <i>Environment and Land Use Act</i> .

Visual Quality Objectives	A resource management objective established by the district manager, or contained in a higher-level plan, that reflects the desired level of visual quality based on the physical characteristics and social concern for the area. Five categories of VQO are commonly used: preservation, retention; partial retention, modification and maximum modification.
Visually Effective Green-up (VEG)	The stage at which regeneration is seen by the public as newly established forest. When VEG is achieved, the forest cover generally blocks views of tree stumps, logging debris and bare ground. Distinctions in height, colour and texture may remain between a cutblock and adjacent forest but the cutblock will no longer be seen as recently cut-over.
Wildlife tree	A tree or group of trees that has been identified, in an operational plan, to provide present or future wildlife habitat. A wildlife tree is a standing live or dead tree with special characteristics that provide valuable habitat for the conservation or enhancement of wildlife. Characteristics include large diameter and height for the site, current use by wildlife, declining or dead condition, value as a species, valuable location and relative scarcity.
Yellow-listed species	List of ecological communities and indigenous species that are not at risk in British Columbia.

1. Introduction

The Nass South Sustainable Resource Management Plan (SRMP) is a landscape level plan developed to address sustainable management of land, water and resources in the southern portion of the Nass Timber Supply Area (TSA) (see **Map 1: Nass South SRMP – Plan Area/Base Map**).

The extensive forests, rivers, lakes and wetlands of the southern portion of the Nass TSA provide habitat to a diverse array of plants, fish and wildlife. The large predator-prey systems inherent to this area, and their component wildlife species, are key values in this plan and in adjacent plans. The Nass South SRMP recognizes the importance of conserving key ecological values as well as providing social and economic stability to the people who live in the area.

A number of reports and supporting documents were used in the development of the Nass South SRMP. To obtain this information, contact:

Province of British Columbia
3726 Alfred Avenue
Bag 5000
Smithers BC V0J 2N0
Ph: (250) 847-7260
<http://www.ilmb.gov.bc.ca/slrp/srmp/south/nass/index.html>

1.1 Plan Overview

There are five primary objectives for the Nass South SRMP:

1. To assist in reaching a broad-based forestry accommodation agreement involving the Province of B.C., the Nisga'a Nation as represented by Nisga'a Lisims Government (NLG) and the Gitanyow, in keeping with the principles of the Province of B.C.'s *New Relationship With First Nations and Aboriginal People*²;
2. To fulfill legal obligations of the Crown related to the transfer of Skeena Cellulose, as described in the Dec. 30, 2004 B.C. Supreme Court judgement known as the Tysoe decision;
3. To promote sustainable forest management in the Nass TSA through a collaborative planning process with the Gitanyow and NLG;
4. To assist in streamlining subsequent consultation processes by collaborating with Gitanyow and NLG on strategic land use planning, and;
5. To increase certainty for long-term access and sustainable development for the Gitanyow, NLG and all resource sectors (e.g. forestry, fisheries, tourism and mining).

1.1.1 Plan Goals

The vision and purpose of the Nass South SRMP is to provide for a wide range of economic opportunities and conserve cultural and environmental resources. Additional goals are:

- to develop general and/or site specific objectives, measures and targets to direct timber harvesting operations, while maintaining the range of cultural, environmental and economic values in the plan area;

² These principles, developed in 2005 through meetings between the Province of B.C. and representatives of First Nations and aboriginal peoples, are described in the New Relationship document available online at http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/407279/new_relationship.pdf

- to provide greater certainty of development potential of the land base, by proactively reducing and/or preventing conflict on the ground; and
- to promote opportunities for sustainable economic development.

This plan was developed with the principle of openness of information. During the preparation and finalization of the plan, the former Integrated Land Management Bureau consulted with NLG, the Gitanyow, stakeholders, other government agencies, and the general public through a public review.

The resulting plan reflects the concerns and/or interests expressed during the consultation and public review phases of this planning process. All information used to develop the plan is available upon request, with the exception of that which is legally recognized as confidential under the *Freedom of Information and Protection of Privacy Act*. Third-party information used during the planning process may only be released with the approval of the respective third party.

1.1.2 Plan Scope

The Nass South SRMP describes resource management objectives for:

- Water quality and hydrology
- Biodiversity, including old-growth and seral stage forests, rare ecosystems, and connectivity (e.g. ecosystem networks, stand structure, wildlife tree retention area composition and size)
- Botanical forest products, such as pine mushrooms
- Wildlife habitat and wildlife, including grizzly bear, moose, mountain goat, fur-bearers and northern goshawk
- Fish habitat and fish, including salmon, steelhead, bull trout, cutthroat trout, rainbow trout, dolly varden, Rocky Mountain whitefish and eulachon
- Cultural heritage and traditional uses, including cedar and culturally modified trees
- Timber
- Special resource management zones

1.1.3 Plan Format

Section two of the Nass South SRMP discusses each resource topic identified above in a separate chapter. All of the resource-focused chapters include the following components:

- **An overview**, which describes the resource value or land use in its local context and outlines area-specific problems, issues or concerns identified during the planning process.
- **Goals**, which broadly describe the desired long-term future condition for the resource or resource use under discussion.
- **Objectives**, which describe the desired future condition for individual aspects of the resource or resource use. Objectives specify outcomes that will achieve identified goals, and are measurable and time-bound.
- **Measures/Indicators**, which set out variables used to track the achievement of an objective.
- **Targets**, which provide objective standards to which resource managers will be accountable.
- **Management Considerations**, which offer greater clarity on the implementation of objectives.

1.1.4 Process Overview

The SRMP process is generally a technical process, not a consensus-based process as has been used to develop Land and Resource Management Plans (LRMPs). The Nass South SRMP is the result of consultation with the Gitanyow, NLG and forest licencees. The process differed slightly from the landscape-level planning process recommended by government planning policies due to the following circumstances:

- An existing LRMP had not been completed for the plan area, consequently social choice decisions had not been made prior to the Nass South SRMP process. Throughout the Nass South SRMP process, it was required that social choice decision making be implemented.
- Due to the absence of an LRMP in place for the Nass South SRMP plan area, no previous strategic direction existed.
- Consistent with direction from the Province, planners identified areas with significant values requiring protection, documented concerns regarding these respective areas and considered them for designation as Protected Areas.

The SRMP process unfolds in seven key phases:

Phase 1: Process Initiation

- Assemble the planning team.
- Develop detailed work plan.

Phase 1 Milestone: Detailed work plan completed.

Phase 2: Information Gathering

- Compile existing inventories.
- Hold a Biodiversity Workshop with table participants.
- Develop a Sharepoint Site as an online repository for background information and research.

Phase 2 Milestone: Relevant information assembled and accessible to table members.

Phase 3: Plan Development

- Draft the chapters for specific resource value implementation, monitoring and reporting methodology.
- Compile draft plan.
- Obtain NLG, Gitanyow and stakeholder agreement on the proposed draft plan.

Phase 3 Milestone: Draft sustainable resource management plan completed.

Phase 4: Government, NLG, Gitanyow and Key Stakeholder Consultation

- Present/provide the draft plan to government agencies, NLG, the Gitanyow and key stakeholders for their input.
- Revise the draft plan as appropriate.
- Obtain NLG, Gitanyow and key stakeholder agreement on proposed revisions.

Phase 4 Milestone: Revised draft sustainable resource management plan completed.

Phase 5: Public Review

- Implement 60-day public review period.
- Revise the draft plan to reflect public review and comment.

- Obtain NLG, Gitanyow and key stakeholder agreement on proposed revisions.

Phase 5 Milestone: Final draft of sustainable resource management plan completed.

Phase 6: Plan Approval

- Submit final plan to the Minister of Agriculture and Lands for review and approval.
- File the Order.

Phase 6 Milestone: Sustainable resource management plan approved and released.

Phase 7: Data Warehousing

- Warehouse data sets used for mapping and analysis during plan development.

Phase 7 Milestone: Data loaded to Land and Resource Data Warehouse.

1.1.5 Benefits of the Plan

The Nass South SRMP promises substantial benefits to the region, in that it will:

a) Address key ecological values

This plan provides objectives to maintain biodiversity values across the land base, as well as habitat features important to key wildlife species. These values include moose, mountain goat, grizzly bear, goshawk, fisher and wolverine.

b) Address key social and cultural values

The Nass South SRMP was finalized with extensive input from local residents, particularly the communities of Gitanyow, the Nisga'a Villages of New Aiyansh, Gitwinksihlkw, Laxgalts'ap and Gingolx, as well as the District of Stewart. An entire chapter has been devoted to cultural heritage resources.

c) Create opportunities for forest development

This plan provides management direction for forestry activities, in consideration of a range of environmental, social and cultural values and in consultation with the Gitanyow, NLG, key stakeholders, government agencies and members of the general public. The completed SRMP provides the Ministry of Forests, Lands and Natural Resource Operations with the information required to approve and/or implement operational plans.

d) Allow additional issues to be addressed as they arise

The Nass South SRMP is a living document, which may be revisited within a transparent, clearly defined process, and expanded as the need arises. This version of the Nass South SRMP focuses on timber development, and offers management direction to balance forest development with environmental, social and cultural values. Additional chapters on resource-based activities, such as mining, oil and gas development and tourism, may be added to the plan at a later date.

1.2 Plan Context

1.2.1 Current Policy Framework for SRMPs

SRMPs address the range of resource values in a region, while considering economic interests and environmental stewardship. They are designed to provide “one-stop shopping” for users of Crown lands and resources. Foresters, tourism operators, land agents and other users of Crown land must look to

SRMPs to know what activities are permitted in specific areas, and how those activities are to be carried out.

This document also recognizes the government-to-government relationships that exist between NLG and the Province of B.C. as well as between the Gitanyow and the Province of B.C. As such, Nass South SRMP development has been guided by the following principles:

- Aboriginal rights and treaty rights will not be unjustifiably infringed upon by resource development activities of the Crown or by licencees;
- The Crown and licencees are legally obligated to consider potential existing aboriginal rights in decision-making processes that could lead to impacts on those rights;
- Consultation with NLG will proceed consistently with the *Nisga'a Final Agreement*; and
- Consultation with the Gitanyow will proceed consistently with provincial government policy³.

1.2.2 Planning for Adjacent Areas

Prior to the Nass South SRMP, no strategic plans were in place to guide resource development in the plan area. However, strategic plans do exist for regions to the east, south and west of the Nass South SRMP.

The Kispiox LRMP is a sub-regional land use plan covering approximately 1.2 million hectares to the east of the Nass South SRMP plan boundary (west central British Columbia). The Kispiox LRMP was completed in 1996, one of the first LRMPs in B.C. It provides management objectives and strategies for biodiversity, water, fisheries, wildlife, timber and numerous other resource values. The plan also designates resource management zones for protection, special resource management and general resource development. It was revised in 2001. In January 2006, the Kispiox LRMP Higher Level Plan Objectives for Biodiversity, Visual Quality and Wildlife was approved. This plan covered most of the area of the Kispiox LRMP, except for the West Babine and Cranberry areas.

The area to the south of the Nass South SRMP is covered by the Kalum Land and Resource Management Plan (LRMP). The Kalum LRMP recommendations were finalized and approved by Cabinet in March of 2001. In May of the following year, the former Ministry of Sustainable Resource Management gave final approval of the Kalum LRMP and conveyed it to all participating ministries for implementation. The Kalum LRMP is not legally binding and remains as government policy. In April 2006, the Kalum SRMP landscape level plan was approved, allowing for the establishment of selected legal objectives and strategies outlined in the LRMP.

The area to the west of the Nass South SRMP is part of the Coast Land Use Decision, which was announced by the Premier on February 7, 2006. The Coast Land Use Decision was the result of government-to-government discussions between the Province and First Nations in the North and Central Coast Plan areas. These discussions were informed by recommendations from both the North and Central Coast LRMPs. Key elements of the Coast Land Use Decision include identification of new protected areas and adoption of ecosystem based management. The area encompassed by the Coast Land Use Decision is approximately 6.4 million hectares and includes roughly 1.8 million hectares of protected areas.

The Nass South SRMP has been developed to be consistent, to the highest extent possible, with resource management direction in these adjacent areas. For further information on these plans, go to: <http://ilmbwww.gov.bc.ca/slrp/lrmp/index.html>

³ As outlined by B.C. Ministry of Aboriginal Relations and Reconciliation in *Provincial Policy for Consultation with First Nations*, October 2002. Accessed June 16, 2008 at http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/407279/new_relationship.pdf

1.2.3 Resource Use and Development Activity

The following is affirmed with respect to resource use and development activity in the Nass South SRMP outside of ‘areas to be protected:’

Mineral resources

- Mineral exploration and development, including road related resource development, is permitted in all zones, subject to standard regulatory approval processes and conditions.
- Existing mineral tenure rights are not diminished by the Nass South SRMP.
- New mineral tenures can be staked and recorded on all mineral lands in accordance with the *Mineral Tenure Act* and Regulations.

Timber harvest

- The Nass South SRMP supports opportunities for timber harvesting for commercial or local use, provided these are consistent with applicable forest legislation, plan objectives and zoning requirements.

Commercial recreation and tourism

- The Nass South SRMP allows development of facilities and infrastructure for commercial recreation and tourism, consistent with applicable tenure and permit requirements. A tourism chapter may be developed at a later time, to provide further direction to commercial recreation, tourism activities and tourism sector development.

Guide-outfitting

- Land management activities will be carried out to sustain existing guide-outfitting opportunities.
- Guide-outfitters will be notified of proposed resource development activities consistent with applicable forest legislation, plan objectives and zoning requirements.
- Industrial proponents and guide-outfitters will be encouraged to work co-operatively to accommodate guide-outfitting values, resource values and resource development operations.

Hunting and fishing

- Hunting and fishing are recognized activities.
- Local / resident hunters and anglers will be notified of proposed resource development activities consistent with applicable forest legislation, plan objectives and zoning requirements.
- NLG will be consulted, in accordance with the *Nisga'a Final Agreement*, on planning and management that potentially affects these activities.
- NLG treaty rights to fish and wildlife as defined in the *Nisga'a Final Agreement* will be protected.

Trapping

- Existing trapping tenures are recognized.
- Trap-line holders will be notified of proposed resource development activities consistent with applicable forest legislation, plan objectives and zoning requirements.

Cultural Heritage Resources

- The Gitanyow have gathered information on archaeological sites, traditional use areas, and trails. This information was used in their contribution to land use decisions in the planning process.
- Cultural heritage information of traditional, social or spiritual importance is protected from disclosure by the *Freedom of Information and Protection of Privacy Act*.
- Cultural heritage resources will be further protected and managed in accordance with applicable legislation, policies, procedures, agreements, and protocols.

1.3 Plan Area

The Nass South SRMP area covers approximately 662,500 hectares within the southern portion of the Nass TSA. It extends northwest from the Nass River - K'alii Aksim Lisims to the Canada/U.S. border, and northeast from Hoan Creek to Mount Bell-Irving (see **Map 1: Nass South SRMP – Plan Area/Base Map**). Much of the SRMP area is within the Nass Wildlife Area and it is wholly within the Nass Area.

Several lakes exist in the plan area. These include Arbor Lake, Brown Bear Lake, Divide Lake, Hughan Lake, Kinskuch Lake - T'aam Ginsgox, Jade Lake, Jigsaw Lake, Knipple Lake, Long Lake, Niska Lakes, Madely Lake, Shishilabet Lakes, Scrub Lake, Summit Lake, Paw Lake and Meziadin Lake - T'aam Mits'iaadin. Meziadin Lake - T'aam Mits'iaadin is the largest lake in the Nass South SRMP area.

Rivers in the plan area include the Bowser, Meziadin, Kinskuch - Ksi Ginsgox, Upper Kwinageese, Kuinatahl, Bear, Tchitin, White and Nass - K'alii Aksim Lisims. The largest of these is the Nass River - K'alii Aksim Lisims, which flows down through the centre of the Nass South SRMP area. The Bell-Irving River forms the plan area's northeast boundary.

Other geographic features that delineate the Nass South SRMP area include Mount Bell-Irving in the plan area's northeast corner, and the Cambia Range which encompasses much of the area's northwest corner.

Topography of the Nass South SRMP area is predominantly valley-bottom in the south and very mountainous in the northwest. The climate is relatively coastal (moist and cold), with greater snow depths compared to areas more inland.

1.3.1 Ecosystems

The Nass South area is divided into three main Ecosections including the Nass Basin, Meziadin Mountains and the Southern Boundary Ranges. Ecosections are units under the ecoregion classification system⁴, and represent areas of minor physiographic and macroclimatic or oceanographic variation. An Ecosection typically encompasses a number of biogeoclimatic zones. Biogeoclimatic zones are classes of ecosystems under the influence of the same regional climate. In sum, these zones can be further stratified into subzones and variants, classifying them into smaller and smaller distinct ecosystem and plant association units. The major difference between the ecoregion classification and the biogeoclimatic ecosystem classification (BEC) is that, in mountainous terrain, ecoregion classification stratifies the landscape into geographical units that circumscribe all elevations, whereas BEC delineates altitudinal belts of ecological zones within geographical units⁵.

⁴ Demarchi, D.A. 1988. Ecoregions of British Columbia. Map at 1:2000000. B.C. Min. Environ., Wildl. Br., Victoria, B.C.

⁵ Pojar, J. and D. Meidinger. 1991. Chapter 2: Concepts. D. Meidinger and J. Pojar, Eds. Research Branch, B.C. Ministry of Forests, Victoria, B.C. pp. 21,29. Available on-line at: <http://www.for.gov.bc.ca/hfd/pubs/Docs/Srs/SRseries.htm>

Within the Nass South SRMP area, the Nass Basin Ecosection includes two Interior Cedar Hemlock (ICH) subzones as well as the Engelmann Spruce-Subalpine Fir (ESSF) zone at higher elevations. West of the Nass Basin, the Meziadin Mountains Ecosection includes the Mountain Hemlock and Coastal Western Hemlock zones in the south as well as the ESSF and Boreal Altai Fescue Alpine (BAFA) zones that run north along the leeward side of the Coast Range to Bowser Lake. The Southern Boundary Ranges Ecosection includes the Coastal Mountain Heather Alpine (CMA) zone over the Cambria Icefield as well as the Coastal Western Hemlock (CWH) and Mountain Hemlock (MH) zones in the Bear River valley. See **Map 3: Nass South SRMP - Ecosections and Biogeoclimatic Zones**, for a graphical representation of these zones.

Table 1. Biogeoclimatic Zones and Ecosections in the Nass South SRMP Area

<i>Ecosystem classification</i>	<i>Zone</i>	<i>Characteristics⁶ (Nass South)</i>
Biogeoclimatic Ecosystem Classification (BEC)	Interior Cedar Hemlock (ICH)	<p><u>ICHmc1</u>: Covers the undulating terrain of the Nass Basin north and east of Cranberry Junction. Elevation range from 100 m along the Nass River - <u>K</u>'alii Aksim Lisims to 950 m. Characterized by western hemlock and subalpine fir forests with moss ground cover. Subalpine fir and Roche spruce dominate on low-lying, wetter sites. Lodgepole pine is the dominant seral species, with trembling aspen and paper birch common, especially on south-facing slopes.</p> <p><u>ICHvc</u>: Extends from the White River north along the Bell-Irving River to Ningunsaw Pass. Elevation range from 240 m at Meziadin Lake - T'aam Mits'iaadin to approximately 900 - 1000 m. Dominated by devil's club ecosystems with subalpine fir and Roche spruce. Drier upland sites dominated by western hemlock and mountain hemlock are less common.</p>
	Coastal Western Hemlock (CWH)	<p><u>CWHwm</u>: Extends from the head of Portland Canal - <u>K</u>'alii <u>Xk</u>'alaan up the Bear River and American Creek to 600 m elevation. Western hemlock and Sitka spruce are the dominant tree species.</p> <p><u>CWHws2</u>: Occurs on mid-mountain slopes and in higher valleys such as the Kwinatahl watershed. Elevation range in the Nass South area from 200 m along Ksi Gwinhat'al to 1000 m. Forests of amabilis fir, western hemlock, mountain hemlock and subalpine fir.</p>
	Engelmann Spruce-Subalpine Fir (ESSF)	<p><u>ESSFwv</u>: Lies above the ICH in the Nass South area from approximately 900 m to 1550 m elevation. Forests dominated by subalpine fir, with lesser components of mountain hemlock, hybrid white spruce and western hemlock.</p>

⁶ <http://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh26.htm>

<i>Ecosystem classification</i>	<i>Zone</i>	<i>Characteristics⁶ (Nass South)</i>
	Mountain Hemlock (MH)	<p><u>MHmm1</u>: The windward variant of the MHmm, found along the western edge of the Coast Mountains. In the Nass South area, only found in the upper Kwinatahl watershed from 800 m to 1200 m elevation. Mountain hemlock, western hemlock, amabilis fir and yellow cedar are the characteristic tree species.</p> <p><u>MHmm2</u>: The leeward variant of the MHmm, found along the central and eastern slopes of the Coast Mountains. In the Nass South area, found above the CWHws2 and east of the MHmm1 between the Tchitin River and Hoan Creek. Mountain hemlock, western hemlock, amabilis fir and subalpine fir are the characteristic tree species.</p> <p><u>MHun</u>: An undifferentiated MH subzone occurring between the CWH and Alpine zone in the Bear Valley area. Elevation range from approximately 400 m to 1600 m.</p>
	Alpine (AT)	Reclassified into the Boreal Altai Fescue Alpine (BAFA) and Coastal Mountain Heather Alpine (CMA) zones ⁷ . CMA occurs on high mountains in the Coast Range above the MH. BAFA occurs on mountain tops in the interior above the ESSF.

1.3.2 Communities

There are only two communities within the plan area: the District of Stewart and Meziadin Junction.

District of Stewart

The District of Stewart is a community of about 500 on B.C.'s north coast, nestled in the glacier-crowned magnificence of the Cambria Icefields and Coast Range mountains. Located at the head of the Portland Canal - K'alii Xk'alaan, Stewart enjoys the distinction of being Canada's most northerly ice-free port. It shares a border with the remote town of Hyder, Alaska, and serves as the base for significant mineral exploration and development in the high-potential mineral area of B.C., known as the Golden Triangle.

Meziadin Junction

Located about 2 km south of the junction of Highways 37 and 37A, Meziadin Junction offers limited services for visitors and local residents. This includes a landfill, highway maintenance operation and a campground on beautiful Meziadin Lake - T'aam Mits'iiadin. According to Canada's most recent census

⁷ The Interior Mountain Alpine (IMA) zone is also a result of the Alpine Tundra reclassification, but this does not occur in the Nass South area.

(2006), the tiny hamlet is home to about 45 people. More than half of registered properties are identified as seasonal/recreational.

1.3.3 Historical Land and Resource Use

Long before the arrival of European settlers, the area around Stewart was used by the Nisga'a people (also known as the Nass people) for hunting in the spring and fall. The present-day site of Stewart was then known by its aboriginal name, Sgamagunt. Sgamagunt refers to the whole Bear valley meaning "the head of" or "the whole flat of the river." That is, the entire valley referred to as the head of Portland Canal - K'alii Xk'alaan.

At the turn of the 19th century, European prospectors made promising discoveries of gold and silver in the region, and a sizable gold rush followed. Two brothers, for whom the town is named, established a townsite in 1905. By 1910, Stewart and the nearby American border-town of Hyder had swelled to almost 10 000 people, boasting hotels, churches, telegraph office, telephone exchange, a large sawmill, electrical plant, regular shipping services and many other modern conveniences of larger southern towns.

In 1918, the discovery of high-grade ore at the Silbak-Premier property led to the development of one of the richest mineral deposits in B.C. From the 1920s until its closure in 1952, the gold mine was North America's largest. Further development followed the construction of Highway 37A in the 1960s, which offered a convenient overland link to inland markets.

At its peak, more than 150 mining properties were being worked in the region, on both sides of the border. Few properties approached the Silbak-Premier success, but mines such as Granduc, Canada Wide, Westmin and Tenejon enjoyed many productive years and collectively established the Stewart area as one of the major gold-silver districts in this part of the continent.

1.3.4 Current Economic Profile

Approximately 550 residents of the plan area are affected by resource use decisions, as are residents in communities outside the plan area, including: Terrace, Kitwanga, New Aiyansh, Gitwinksihlkw, Laxgalts'ap, Gingolx and Dease Lake. Most livelihoods in this region are tied to the resource-extractive industries and to the health of the natural environment.

As changing world markets make ores less economic to produce, the population of Stewart has dwindled – but mineral exploration and development remain as the area's economic mainstay. Mining is also linked to the health of related businesses, such as Stewart Bulk Terminals Ltd.; a ship-loading facility which exports gold and silver ore from Eskay Creek Mine and copper ore from Huckleberry Mine.

In recent decades, logging for export has become a dominant economic activity. Although the forest industry is struggling and most of the region's timber is processed elsewhere, logging is expected to remain important to the region.

Residents increasingly recognize the importance and potential of non-timber resources; botanical forest products such as wild mushrooms, wildlife, fisheries and tourism. An eco and cultural tourism sector has firmly taken root, with visitors drawn by the area's world-renowned glacier and bear viewing opportunities and Stewart's border-town character and unique history.

Settlement around Meziadin is guided by the Meziadin Rural Land Use Bylaw, adopted by the Kitimat-Stikine Regional District in 1993. The bylaw aims to limit widely dispersed commercial and residential development, and instead to encourage it to form around strategic nodes such as Meziadin Junction.

The Regional District of Kitimat-Stikine has expressed its hope that the Nass South SRMP will facilitate, and not curtail, any potential development of a major power transmission line in the area.

1.4 Gitanyow and Nisga'a Nation

1.4.1 Introduction

This section incorporates the independent perspectives and positions of the Gitanyow and NLG on matters relating to the Nass South SRMP. The main purpose of this section is to provide the reader with background on the Gitanyow and Nisga'a, and to afford both groups full elaboration on their viewpoints. This includes contrasting views on the nature of aboriginal rights and title in the plan area.

The position of the Province is that it has Crown title to the land and resources within the Nass South SRMP area, and that it has exercised sovereignty in British Columbia from 1846, subject to the provisions of the *Nisga'a Final Agreement*⁸.

In favour of constructive dialogue about land use and resource management, the issue of aboriginal rights and title as well as jurisdiction over lands and resources is not a subject addressed by the SRMP process or its resultant products. In developing the Nass South SRMP, the Province, NLG and Gitanyow committed to work collaboratively on a Government-to-Government basis in a spirit of mutual recognition, respect and reconciliation to resolve land use and resource management conflicts.

Nothing in this SRMP serves to limit or define any aboriginal rights, aboriginal title, Crown title or treaty rights. The Province has continuing legal obligations to consult and seek workable accommodation with the Gitanyow and NLG, in accordance with any applicable consultation protocol, before approval of specific development proposals that have the potential to impact any aboriginal rights of the Gitanyow or treaty rights of the Nisga'a Nation.

Gitanyow claimed traditional territory covers the majority of the plan area, and as such, the Province has engaged the Gitanyow in meaningful consultations towards the eventual reconciliation of interests. Gitanyow aboriginal rights are recognized and affirmed under Section 35 of the *Constitution Act, 1982*⁹.

NLG, as a Treaty Nation, has a unique role within the SRMP process, and is guided by the specific rights and obligations detailed in the *Nisga'a Final Agreement*. Nisga'a treaty rights are recognized and affirmed under Section 35 of the *Constitution Act, 1982*.

1.4.2 Gitanyow

1.4.2.1 History / Political Organization

The Gitanyow Huwilp comprises eight historic units known as *wilp* (house[s] pl.: *huwilp*), which are the social, political and governing units of the Gitanyow. The Gitanyow are aboriginal peoples as defined in the Canadian constitution and international law, with aboriginal rights and title on their territories recognized and protected under those laws. They are not a band or a "First Nation", which is commonly used as though synonymous with "Indian Band" as defined by the *Indian Act*.

While each Wilp is an independent land-owning unit, the Gitanyow Huwilp work together under the auspices of the Gitanyow Hereditary Chiefs on issues that affect them as a whole. The Gitanyow Wilp *Lax Yip* (territories) collectively forms the Gitanyow Territory. A description of the Gitanyow governing structure can be found in the draft *Gitanyow Ayookwx / Constitution*.

Each Gitanyow Wilp has a long history that is told in their *adawaak*, which describes the ancient migrations of the Wilp, its acquisition and defence of its territories, and major events in the life of the

⁸ *Nisga'a Final Agreement – Initiated August 4, 1998*.

⁹ Section 35 of *Constitution Act, 1982*.

Wilp. These sacred histories are portrayed on Wilp *ayuuks* (crests) and depicted on their regalia and *git'mgan* ("birth" poles, more commonly known as totem poles) that tie them to their lands. These *git'mgan* stand today at the ancient village site in Gitanyow, testimony to the sacred connection between the Wilp, its lands and its ancestors.

Gitanyow history, social organization and territories are well documented, and can be found in a number of publications including *Tribal Boundaries on the Nass Watershed* (Sterritt *et al.* 1998), *Histories, Laws and Territories of the Kitwancool* (Duff 1959) and *Totem Poles of the Gitksan, Upper Skeena River, British Columbia* (Barbeau 1929).

The Gitanyow Huwilp Territories (the Territory) covers the area from Kitwancool Lake, or Gitanyow Lake, in the south, north to the Bell One Bridge on the Bell-Irving River, and from Kitsault Lake in the west to Bonny Lakes in the east, for a total of approximately 6 200 square kilometres. Gitanyow's main village is situated on Highway 37, approximately 20 kilometres north of Kitwanga Junction.

1.4.2.2 Perspectives

The Nass South SRMP planning area covers portions of the territories of six Gitanyow Huwilp (Houses) in the Nass watershed. These are the Lax Yip (House Territories) of Gwass Hlaam, Luux Hon, Gamlaxyeltxw, Malii, Haitsimsxw and Wii'litsxw, which encompass an area of approximately 382 751 hectares or 3 878 square kilometres.¹⁰ (see **Map 7: Nass South SRMP – Gitanyow Claimed House Territories**).

Within the last 10 years, Canadian courts have delivered a number of important decisions related to aboriginal rights and Crown use of aboriginal territories. This evolving body of law provided an impetus on the Provincial Crown to engage aboriginal groups in consultation and where necessary, to accommodate those interests before making decisions which could impact aboriginal rights and title. While Gitanyow welcomed these decisions as a way to end many years of struggle, uncertainty and destruction of their lands, it brought new frustrations as they sought the means to enable government to fulfil their legal obligations.

Forest harvesting development and activities has resulted in huge impacts on Gitanyow territories and resources. As the demand on Gitanyow forest resources has grown, increasing the Gitanyow Hereditary Chiefs' consultation workload, the Gitanyow Hereditary Chiefs became convinced that a territorial land use plan was necessary to sustainably manage resource development, protect Gitanyow interests and values, and address the Huwilp concerns. These interests, values and concerns, some of which were identified in the draft Gitanyow Cranberry-Kispiox Land Use Plan, include:

- A. Our responsibility to uphold the Gitanyow Ayookxw (law) that compels each Wilp Chief to ensure that the lands and resources of the Wilp Lax Yip are managed so as to ensure that they can provide for future generations of the Wilp (houses);
- B. The exercise of our constitutionally recognized aboriginal title rights, which were found by the Supreme Court of Canada in *Haida*¹¹, to have three characteristics:
 - i. The right to exclusive use and occupation;
 - ii. The right to choose how the land is used; and
 - iii. An "inescapable" economic component;

¹⁰ Personal Communication Wil Marsden, Geographic Information Systems Technician, Gitanyow Hereditary Chiefs, Feb 18, 2008.

¹¹ Supreme Court of Canada decision issued Nov. 18, 2004, known as *Haida Nation v. British Columbia (Minister of Forests)*.

- C. The recognition that Gitanyow house members utilize all their land on their territories, including swamps, streams and lakes, to carry out their culture of hunting, fishing, trapping, food and medicinal plant gathering, and spiritual worship, and to uphold their traditional laws. A diversity of ecosystems and forest conditions including streams, swamps, springs, lakes, areas of mature and old forest, areas of young forest and new growth, dense forest and clearings are required to produce the variety of plants, birds, animals, and fish that are harvested and utilized; and
- D. The recognition that Gitanyow values and interests are directly connected to and reliant upon the presence and quality of their ecological resources. Sustaining the land is central to sustaining Gitanyow culture and providing for their economics.

1.4.2.3 View of the Nass South SRMP

- A. The Gitanyow expect the completed SRMP to provide:
 - i. Identification and protection for Gitanyow Huwilp areas of:
 - a) High ecological sensitivity and importance;
 - b) Individual wilp traditional use sites;
 - c) Old-growth values required for some traditional-use activities and exercise of Wilp rights;
 - ii. Identification of Gitanyow Huwilp cultural heritage and economic resources, including:
 - a) Traditional-use sites,
 - b) Traditional uses,
 - c) Resources specific to Gitanyow; and
 - d) Gitanyow interests for current and future use of their territories, to develop and sustain Gitanyow culture, society and economy;
 - iii. Management objectives and strategies to achieve sustainable use of all forest resources on Gitanyow Territories within the Nass TSA;
 - iv. Identification and adequate protection for High value habitat sites (i.e., “critical” grizzly bear habitat) to preserve the ecological integrity of the territories; and
 - v. Identification of the level of harvest that can be sustained during most foreseeable market conditions.
- B. The SRMP represents a preliminary reconciliation of Gitanyow and Crown interests with respect to timber harvesting on Gitanyow Territory in the Nass TSA;
- C. Completion and implementation of the SRMP follows the guidance of the Court as set down in *Haida* and will allow for stability and certainty with respect to the management of Gitanyow territories and resources and industrial forest development on those territories;
- D. The completion of the South Nass SRMP on Gitanyow Huwilp Territories in the Nass TSA as described in the December 2005 Project Charter is an important component of the Land Use Planning committed to by B.C. in the Gitanyow Forestry Agreement;
- E. The next step of that commitment is the identification of a process to merge the two plans to encompass the whole of the Gitanyow Traditional Territory;
- F. Completion of a legally implemented land use plan for the whole of Gitanyow Territory supports the vision of the Gitanyow Huwilp, which includes:

- i. Reconciliation of interests and co-existence with the Crown and third parties;
 - ii. The establishment and implementation of a sustainable land use plan for the whole of the Gitanyow Territory and its resources;
 - iii. Sharing the wealth of the territory; and
 - iv. Shared decision-making on Gitanyow Territories with B.C. through the Gitanyow Joint Resources Council (JRC) which has a mandate to implement, manage and monitor the over-all land use plan;
- G. Such a plan would be consistent with Gitanyow’s “strength of claim” as found by Justice Tysoe in 2002 and confirmed by him in 2004 and in provincial consultation policy related to strength of claim.

1.4.3 Nisga’a

1.4.3.1 Nisga’a Nation

The Nisga’a Nation, Canada and British Columbia entered into the *Nisga’a Final Agreement* on May 11, 2000. The *Nisga’a Final Agreement* is a treaty and land claims agreement within the meaning of sections 25 and 35 of the *Constitution Act, 1982*. Specific rights and obligations of the Nisga’a Nation, British Columbia and Canada are identified within the *Agreement*.

The Nisga’a Nation has certain interests within the Nass Area and Nass Wildlife Area, in which the Nass South SRMP is being proposed, mandated by the *Nisga’a Final Agreement*, including:

- Specific properties owned in fee simple at:
 - Meziadin Lake - T’aam Mits’iaadin, Meziadin Junction, Kinskuch Lake - T’aam Ginsgox, Jade Lake, Grizzly Bear Lake and Sgamagunt
- Commercial recreation tenure area at:
 - Kinskuch - T’aam Ginsgox, Jade and Niska Lakes¹²
- Guide outfitter area
- Specific angling guide license streams at:
 - Nass River - K’alii Aksim Lisims, Kinskuch River - Ksi Ginsgox, Meziadin River, Bowser River, Bell Irving River.

These listed areas of Nisga’a Nation ownership and/or interest are identified on **Map 8: Nass South SRMP - Nisga’a Nation Areas of Ownership and Interest**.

In addition, under the *Nisga’a Final Agreement*, the Nisga’a Nation and Nisga’a citizens have certain rights over the areas being proposed as Nass South SRMP within the Nass Area and Nass Wildlife Area, including:

- Rights to harvest wildlife and migratory birds
- Rights to harvest fish and aquatic plants
- Rights of access

The *Nisga’a Final Agreement* also establishes a number of joint Nisga’a / Provincial / Federal committees to facilitate the planning of certain activities in the areas being proposed as Nass South SRMP within the

¹² Management Plans exist for Commercial Recreation Tenures

Nass Area and Nass Wildlife Area. The two committees relevant to the Nass South SRMP are the Joint Fisheries Management Committee (JFMC) and the Wildlife Committee.

The Nisga'a Nation has concerns about certain First Nations' claims and land use plans, to the extent that they encroach on the Nass Wildlife Area and Nass Area, as defined in the *Nisga'a Final Agreement*.

Nisga'a Lisims Government does not accept that any First Nation other than the Nisga'a Nation has ever had aboriginal title or rights over the Nass Wildlife Area and that part of the Nass Area within the planning area. Nisga'a Lisims Government considers any assertion of such aboriginal title or rights by any other First Nation to be illegitimate, and therefore considers the land use plans of any other First Nations to be illegitimate to the extent that they encroach on the Nass Wildlife Area and that part of the Nass Area within the planning area.

1.4.3.2 Joint Fisheries Management Committee

The JFMC is tasked under the terms of the *Nisga'a Final Agreement* with facilitating co-operative planning and conduct of Nisga'a fisheries and enhancement initiatives in the Nass Area, and making recommendations to NLG and the Minister. The JFMC is a body with representatives from the Nisga'a Nation, Government of Canada and the Government of B.C. that ensures the fisheries provisions of the *Nisga'a Final Agreement* are implemented and adhered to. This includes calculating annual allocations for salmon harvests by the Nisga'a, conducting required stock assessments and developing management strategies, and helping to ensure the preservation, recovery and enhancement (where appropriate) of fish species within the Nass Area. A Joint Technical committee is tasked with supporting the JFMC.

1.4.3.3 Wildlife Committee

The Wildlife Committee is tasked under the terms of the *Nisga'a Final Agreement* with facilitating wildlife management within the Nass Wildlife Area and making recommendations to NLG and the Minister. The Wildlife Committee is a body with representatives from the Nisga'a Nation, Government of Canada and the Government of B.C. that ensures the wildlife provisions of the *Nisga'a Final Agreement* are implemented and adhered to. This includes recommending wildlife harvest levels for designated species, addressing wildlife conservation needs, developing annual management plans, and carrying out other duties to facilitate proper wildlife management within the Nass Wildlife Area.

2. Management Direction

The Nass South SRMP is results-based, in that it focuses on desired future outcomes rather than on the means of achieving those outcomes. The purpose of this approach is to allow people implementing the plan the flexibility to be innovative while using their best professional judgement to achieve desired results. Being results-based, the Nass South SRMP also allows operational planners to adjust their methods as new information becomes available.

The Nass South SRMP has been prepared using the best available information and data, with the understanding that technology and knowledge of ecosystems and resources is constantly being upgraded. Should a particular objective, indicator or target be deemed inappropriate, or a zone be identified as needing adjustment, the plan may be revisited and adjusted at a later date, according to processes outlined in **Section 3: Plan Implementation, Monitoring and Amendment**.

2.1 Water

2.1.1 Overview of Water Resources

The Nass South SRMP encompasses a portion of the Nass River watershed and the Bear River Watershed. The Bear River is a glacial fed stream that drains into the Pacific Ocean at the town of

Stewart. The Nass River watershed is the third largest watershed entirely contained within the province of B.C. and drains an area of approximately 20,500 km². Twenty-six per cent of the watershed lies within the Nass South SRMP area. Draining into the Nass River - K'alii Aksim Lisims is the Meziadin watershed, which encompasses Meziadin Lake - T'aam Mits'iaadin and River, and associated tributaries: Surprise, Hanna and Tintina Creeks. Meziadin Lake - T'aam Mits'iaadin and its tributaries are noted for their contribution to fish spawning and rearing, so water quality of both surface and ground water here is particularly important. The Bell-Irving and associated tributaries, the Bowser and Todd, along with the White, Kinskuch - Ksi Ginsgox, Tchitin and Ksi Gwinhat'al are major rivers that drain into the Nass - K'alii Aksim Lisims within the SRMP area. The plan area contains a number of small lakes and some well known larger lakes such as Meziadin - T'aam Mits'iaadin, Kinskuch - T'aam Ginsgox, Brown Bear, a portion of the Bonney Lake chain, Niska, and high elevation Summit and Long Lakes. Together with the Nass - K'alii Aksim Lisims mainstem, major icefields such as the Stewart-Bowser and Cambria provide the bulk of the water within the plan area. These icefields exert a major hydrological influence in terms of seasonality of peak flows. The tourism value associated with the Bear Glacier of the Cambria Icefield and the Salmon Glacier near Stewart is significant given the road accessibility at certain locations.

Proportionately, the plan area is broken down into the following biogeoclimatic zones: Alpine Tundra (38%), Interior-Cedar-Hemlock (30.5%), Engelmann Spruce Subalpine-Fir (21%), Coastal Western Hemlock (4%) and Mountain Hemlock (6.5%). Annual precipitation levels are very high in these zones and can range from: Alpine Tundra (700-3000 mm – 70-80% snow), Interior-Cedar-Hemlock (500-1200 mm – 25-50% snow), Engelmann Spruce Subalpine-Fir (500-2200 mm – 60% snow), Coastal Western Hemlock (1000-4400 mm – 40-50% snow) and Mountain Hemlock (1700-5000 mm – 20-70% snow).

There are a significant number of water licences within the plan area. Many of these licences have several components, so the actual number of regulated points of diversion is approximately 200. The majority of these licences are on private land. The most common licence category is for domestic use, however the majority of domestic water users in the plan area are unlicensed. The next most common licensed use of water is stock-watering. In terms of settlements, the District of Stewart has a community water system that is sourced from three groundwater wells. The only other settlement in the plan area is the Meziadin Crescent subdivision, which has no community water supply. A number of applications for small independent power projects (IPPs) have also been made within the plan area including along the White River, Kinskuch River - Ksi Ginsgox and Surprise Creek. Two large water reservations were established in the plan area by the Province in favour of the Nisga'a Nation in accordance with the *Nisga'a Final Agreement*. These are the Nisga'a Water Reservation and the Nisga'a Hydro Power Reservation. The Nisga'a Water Reservation is of 300,000 cubic decametres of water per year from the Nass River and other streams wholly or partially within Nisga'a Lands for domestic, industrial and agricultural purposes. The Nisga'a Hydro Power Reservation is of all the unrecorded waters of all streams, other than the Nass River, that are wholly or partially within Nisga'a Lands.

Forestry has been the most important industry in the area for a number of decades, and has had the largest impact on water quality. Impacts are generally caused by road failure, roadside and ditch sediment transfer, soil erosion and mass wasting events, although mass wasting can also occur in areas unaffected by forestry. Aside from the Bell-Irving watershed, which has highly erodible, deep, fine textured soils, most of the mid to high elevation areas contain shallow, coarse textured soils overtop of bedrock. Most of the plan area has relatively stable terrain considering how steep and wet the area is in general. In spite of this, road building and associated harvesting has caused instances of mass wasting, including a large slide behind the Orenda Camp and several areas along the Kotcho Mainline on the Bell-Irving River.

Anecdotal evidence suggests that the majority of stream crossings in the plan area are in good condition with respect to sediment risk, however ongoing stream assessments are required to evaluate and deal with

risk. Road building and timber harvesting on alluvial fans and floodplains are noted high risk activities due to the instability and dynamic nature of these hydrological features. Presently, the biggest risk to water quality in the plan area is from existing roads that are failing and eroding. A large amount of the road network in the plan area falls within what has been perceived as a jurisdictional grey area (nonstatus roads), with maintenance and deactivation now the responsibility of the provincial government. Without proper road maintenance and adequate road deactivation in place, incidences of road fracture and failure are expected to increase.

The Bowser Basin is noted for potential natural gas development which may have major implications on water quality, depending on the nature of extraction and associated infrastructure development. This plan does not directly address energy development, hydro-electric power projects or mine exploration and development, which require focused attention.

Legal requirements for managing water quality and fish habitat already exist in the *Forest and Range Practices Act*, the *Forest Planning and Practices Regulation* and the *Fisheries Act*. This plan only establishes objectives that are not already addressed in other legislation. A key component of management under the *Forest and Range Practices Act* is effectiveness monitoring to determine if forest practices are meeting management objectives. The Forest and Range Evaluation Program (FREP) has developed two protocols related to water:

- Protocol for Evaluating the Potential Impact of Forestry and Range Use on Water Quality (Water Quality Management Routine Effectiveness Evaluation).
- Protocol for Evaluating the Condition of Streams and Riparian Management Areas (Riparian Management Routine Effectiveness Evaluation)

Benthic invertebrate monitoring is another tool for evaluating the health of streams. The planning table regards the FREP Protocols and benthic invertebrate monitoring as valuable strategic tools for evaluating the effectiveness of the practices currently utilized for managing water quality and hydrology, and for developing data that could be used to modify these practices to achieve increased effectiveness of practices to protect riparian resources. The planning table supports the continued application of these tools within the plan area.

2.1.2 Management Direction for Water

Plan Goals for Water Resources

Protect and maintain surface and groundwater to:

- provide a safe and sufficient drinking water supply that supports healthy communities.
- maintain water quality, quantity, peak and low flows within the range of natural variability in rivers, streams, lakes, and wetlands to protect the hydrological integrity of their watersheds (water quality includes temperature, turbidity and chemistry).

Objectives	Measures/Indicators	Targets
1.0 <i>Limit the potential for soil surface erosion</i>	<p>1.1 Number of occurrences of exposed erodible soil¹³ >50 m², caused by industrial activities:</p> <ul style="list-style-type: none"> • that are within the first 10 metres of the riparian area past the edge of the stream, river, lake, or wetland, or, • that are hydrologically connected¹⁴ to a river, stream, lake or wetland, except: <ul style="list-style-type: none"> ▪ active, seasonally or temporarily de-activated haul roads. ▪ Where no practicable alternative exists and timely mitigating measures are implemented to prevent siltation of water bodies. 	0

¹³ An exposed erodible soil is a fine textured soil (fine sand, silt and clay) or erodable mineral deposit that water can readily wash into the adjacent stream.

¹⁴ *Hydrologically connected* means any bare, erodible soil that can reasonably be expected to reach the riparian area if exposed to rainfall or stream flows. This includes:

- bare soil on non-vegetated slopes immediately adjacent to the 10 m riparian zone
- bare soil on vegetated slopes of 10% gradient or steeper that are immediately adjacent to the riparian area, up to the first topographic break.
- bare soil past the topographic break if there is a channel showing a clear connection to the first 10 m of the riparian area
- bare soil on active road surfaces within the 10 m riparian area, including the crossing, if there is evidence that fines eroded off the road surface can reach the stream. This includes the road surface, plus all cut-and-fill slopes associated with the road, within the first 10 m of the riparian area
- bare soil on active road surfaces beyond the first 10 m of the riparian area if there is evidence that fines eroding off these road surfaces will reach the stream. Evidence of hydrologic linkage should be conspicuous, such as ruts or eroding tracks down the road to a spot at the crossing where water spills directly off the edge of the road into the stream or a ditch that is clearly connected to the riparian feature.

(FREP *Protocol for Evaluating the Condition of Streams and Riparian Management Areas*, Version 5.0; March 2009, and, FREP *Field Supplement to Evaluating the Condition of Streams and Riparian Management Areas*, Version 3.0; March 2009).

Objectives	Measures/Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> • The intent of this measure is that there will be no erodible soil exposure. The maximum area is intended to provide flexibility to licensees for occasional small, dispersed incidental occurrences. • The intent is that construction of new roads and future deactivation of existing roads will be completed to a standard, using Best Management Practices that will result in no roads being hydrologically connected to any stream, river, lake, or wetland. • Best Management Practices (BMP) should be established for minimizing soil surface erosion within the plan area. • BMP's should consider road density, road proximity to water courses and number of stream crossings. • Application of best available information to be applied in managing soil surface erosion prior to the development of BMP's. • Hydrologically connected is not intended to be applied to active, seasonally, and temporarily de-activated roads; these roads will be managed by implementation of Best Management Practices and Measure 1.2. • Monitoring should be done over time to determine if the area is a reasonable figure. This figure may be increased or decreased as appropriate. 	
	<p>1.2 Percent of stream crossings on new roads that have appropriate mitigating measures implemented to prevent soil deposition into the stream in accordance with a professionally-conducted risk assessment.</p>	<p>100%</p>
<p><i>2.0 Manage human activities to maintain the hydrologic stability of watersheds</i></p>	<p>2.1 Number of watersheds identified on Map 9: Nass South SRMP – ECA Threshold Watersheds where a hydrologic assessment is completed prior to any harvesting that would cause the thresholds identified in Table 2: Equivalent Clearcut Area (ECA) Thresholds for Watersheds to be exceeded, except for cut blocks that:</p> <ul style="list-style-type: none"> • are approved under section 196(1) of the <i>Forest and Range Practices Act</i>; • are declared areas under section 14(4) of the <i>Forest Planning and Practices Regulation</i>; or • have a cutting permit in place. 	<p>All</p>

Objectives	Measures/Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> • The intent is to permit the harvest of existing blocks, but to require hydrologic assessments prior to any further harvesting that would cause the thresholds to be exceeded. • Hydrologic assessments should be conducted by a qualified professional who will use the assessment to provide guidance for future operations. The assessment does not necessarily have to be a complete Coastal or Interior Watershed Assessment. 	
<p><i>3.0 Maintain ecological functioning of streams, rivers, wetland complexes and lakes, including those that do not support populations of fish.</i></p>	<p>3.1 Number of rivers and streams where industrial activity has caused significant consequences for fish habitat or human water consumption by the following disturbances to channel beds or banks:</p> <ul style="list-style-type: none"> • channel bank erosion; • channel aggradation, degradation or dewatering; or • change in channel morphology. 	<p>0</p>
	<p>3.2 Number of rivers, streams, lakes, and wetlands that maintain riparian reserves and resource management zones around riparian features as outlined in Table 3.</p>	<p>100%</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • “Significant” relates not to the level of disturbance but to the consequence of disturbance. A small disturbance could have a large consequence and a large disturbance could have a small consequence. • Industrial developments include, but are not limited to; timber harvesting, road construction, building of permanent facilities. • Operations should consider larger Riparian Reserve Zones (RRZ) than specified under the <i>Forest and Range Practices Act</i> for retention where possible. • Where economically and operationally feasible, selectively remove only the high value trees within the Riparian Management Zones (RMZ). • Where feasible, concentrate wildlife tree retention areas around riparian ecosystems. • Consider preservation of riparian habitat values, water quality, rare ecosystems and windthrow susceptibility when assessing and designing RMZs. • Consider retention levels of 70% to 100% basal area on all streams of Riparian Class S4. Monitoring of retention levels to consider: <ul style="list-style-type: none"> - Level of retention; - Incidence of windfall; - Changes in stream temperature and turbidity; - Effectiveness of small scale connectivity habitats through cutblocks. • Apply adaptive management principles in management of riparian features. 	

	<ul style="list-style-type: none"> • Establish water monitoring stations on selected water bodies for long term evaluation of water quality and quantity attributes (water quality includes temperature, turbidity and chemistry). • Terrain stability to be considered in relation to its impact on water quality and quantity before logging. Baseline information should be gathered for watershed sub-basins prior to development. Information to consider: <ul style="list-style-type: none"> - Equivalent Clearcut Area. - Road densities in high elevations. - Road densities for the entire sub-basin. 	
	3.3 Number of rivers, streams, lakes and wetlands where blowdown within the RRZ and RMZ is retained as large woody debris.	All
	3.4 Number of rivers and streams in riparian classes S1 to S4 where industrial activity has either: <ul style="list-style-type: none"> • added large woody debris that would not naturally be in the channel; or • removed naturally deposited large woody debris; Except where necessary to satisfy safety considerations.	0
	3.5 Number of new roads and trails that prevent ground water from reaching natural ground water receiving sites.	0
	Management Considerations <ul style="list-style-type: none"> • Natural groundwater drainage patterns can be maintained with adequate cross drains in roads and trails. 	
<i>4.0 Maintain the functional integrity of floodplains and alluvial fans</i>	4.1 Proportion of floodplains and alluvial fans where functional integrity is maintained.	100%
	Management Considerations <ul style="list-style-type: none"> • Timber harvesting is generally not recommended on floodplains and alluvial fans. • Road building on fans and floodplains is risky and requires the advice of a qualified professional. • Access across floodplains and alluvial fans is permitted to access timber beyond these features. 	
<i>5.0 Restore the water quality and hydrologic integrity of damaged watersheds throughout the plan area</i>	5.1 Proportion of watersheds with damaged water quality or hydrological integrity where primary causes of watershed damage have been adequately addressed by: <ul style="list-style-type: none"> • natural processes; or, • operationally and financially feasible activities that do not cause further damage or interfere with natural restoration processes, where funding is available. 	100%

	<p>Management Considerations</p> <ul style="list-style-type: none"> • Intent is to pursue funding to conduct watershed restoration work, but recognize that funding is not guaranteed. • A Watershed Restoration Plan (WRP) should be developed that includes: <ul style="list-style-type: none"> - Identification of damaged or threatened watersheds; - A cost benefit analysis to prioritize watershed restoration opportunities with respect to conserving, restoring and improving fisheries values in the plan area; - Prioritization of WRP projects should be based on vulnerability of fish stocks, social and economic value of fish stocks, level of negative impact, and ecological and economic feasibility; - A risk assessment should be undertaken to prioritize road deactivation work with respect to water quality and fisheries impacts; - Conducting an assessment of the Hanna and Tintina watersheds to determine impacts from encroachment of beavers in relation to past forest development practices, and implementing mitigative measures.
--	--

Table 2. Equivalent Clearcut Area (ECA) Thresholds for Watersheds

Map ID	Base Watershed (WSD) Unit Code and Order	Unit Name	ECA Threshold %
1	KINRWSD000020 - 3	Meziadin River tributary (contains Yaakin Lk)	25
2	KINRWSD000025 - 3	White River tributary 1 (west of Femur Lk)	35
3	KINRWSD000030 - 3	White River tributary 2 (west of Scrub Lk)	35
4	KINRWSD000033 - 3	Niska Creek	25
5	KINRWSD000035 - 4	Kinskuch River	25 (in ICHmc1/in Plan area)
6	KINRWSD000036 - 3	Outlet of Arbor Lake	25
7	KSHRWSD000010 - 3	Bear River tributary (east of Le Sueur Crk)	25 (in CWHwm)
8	KSHRWSD000011 - 3	Le Sueur Creek	25 (in CWHwm)
9	KSHRWSD000012 - 3	grouped(1) Bitter Creek	25 (in CWHwm)
9	KSHRWSD000013 - 4	grouped(1) Bitter Creek	25 (in CWHwm)
9	KSHRWSD000014 - 3	grouped(1) Bitter Creek	25 (in CWHwm)

9	KSHRWSD000015 - 3	grouped(1) Bitter Creek	25 (in CWHwm)
10	KSHRWSD000016 - 3	Glacier Creek	25 (in CWHwm and MHun separately)
11	LBIRWSD000112 - 3	Bell-Irving River tributary 4 (east flank on Mt. Bell-Irving)	30 (in ICH)
12	LBIRWSD000113 - 3	Bell-Irving River tributary 3 (east flank on Mt. Bell-Irving)	30 (in ICH)
13	LBIRWSD000122 - 3	Bell-Irving River tributary 2 (east flank on Mt. Bell-Irving)	30 (in ICH)
14	LBIRWSD000125 - 3	Bell-Irving River tributary 1 (east flank on Mt. Bell-Irving)	30 (in ICH)
15	LNARWSD000008 - 4	Tchitin River	30 (in ICHmc1 and CWHws2 separately/in Plan area)
16	LNARWSD000010 - 8	Nass River tributary 1 (east of Kinskuch confluence)	30 (in ICHmc1/in Plan area)
17	LNARWSD000020 - 3	Kshadin Creek tributary (west of Taylor Lk)	25 (in ICHmc1 and CWHws2 collectively/in Plan area)
18	NASRWSD000040 - 5	Kwinageese River	20 (in Plan area)
19	NASRWSD000049 - 3	Nass River tributary 5 (across river from Meziadin Junction)	30
20	NASRWSD000066 - 4	grouped (2) Bonney Creek (unit also contains Alpha Lk)	25 (in Plan area)
20	NASRWSD000069 - 3	grouped (2) Bonney Creek (unit also contains Alpha Lk)	25 (in Plan area)
21	NASRWSD000072 - 3	Wolverine Creek	30
22	NASRWSD000073 - 4	grouped(3) Axnegrelga Creek (unit also contains Hughan and Jigsaw Lks)	20 (in Plan area)
22	NASRWSD000074 - 3	grouped(3) Axnegrelga Creek (unit also contains Hughan and Jigsaw Lks)	20 (in Plan area)
22	NASRWSD000076 - 4	grouped(3) Axnegrelga Creek (unit also contains Hughan and Jigsaw Lks)	20 (in Plan area)
23	NASRWSD000075 - 3	Kitanweliks Creek	30

24	NASRWSD000077 - 5	Paw Creek	30
25	NASRWSD000078 - 3	Van Dyke Creek	30
26	NASRWSD000079 - 3	Brown Bear Creek	20 (in Plan area)
27	NASRWSD000081 - 4	Little Paw Creek	30
28	NASRWSD000082 - 3	Axnegrelga Creek tributary (west of Brown Bear Lk)	20
29	NASRWSD000083 - 3	Outlet of Noordam Lake	35
30	NASRWSD000084 - 3	Nass River tributary 4 (east of Kinskuch Peak)	35
31	NASRWSD000086 - 4	Nass River tributary 2 (contains Abbi Lk)	35
32	NASRWSD000088 - 3	Nass River tributary 3 (across river from Sideslip Lk)	35

Table 3. Retention Targets in Riparian Reserve Zones (RRZ) and Riparian Management Zones (RMZ)

Riparian Class	Reserve Zone Width Minimum (m)	Retention Minimum (%)	Management Zone Width – Minimum (m)	Retention Minimum (%)
<i>Streams</i>				
S1 (large rivers >= 100m width)	See Biodiversity Objective 7 (Ecosystem Network) and General Wildlife Objectives 1.0 and 3.0 and Water Management Unit Objectives 1.0 and associated Measures, Targets and Management Considerations for large, >= 100m width rivers.			
S1 (specific rivers)	See Biodiversity Objective 7 (Ecosystem Network) and associated Measures, Targets and Management Considerations for specific S1 rivers.			
S1 (except large and specific rivers)	50	100	20	0
S2	30	100	20	0
S3	20	100	20	0
S4	0	n/a	30	0
S5	0	n/a	30	0
S6	0	n/a	20	0
<i>Wetlands</i>				
W1	10	100	40	0
W2	Not applicable: no W2s in the plan area			
W3	0	n/a	30	0
W4	Not applicable: no W4s in the plan area			
W5	10	100	40	0
<i>Lakes</i>				
L1	10	100	20	0
L2	Not applicable: no L2s in the plan area			
L3	n/a	n/a	30	0
L4	Not applicable: no L4s in the plan area			
Note:				
<ol style="list-style-type: none"> 1. Reserve and Management Zone percentage means the percentage of naturally occurring pre-harvest forest basal area and structure of mature and old forest that occupies (or historically occupied) the site. 2. Reserves and Management Zones around all riparian features may be increased in size and % retention to meet management objectives for other resources. 				

2.2 Biodiversity

According to the *Biodiversity Guidebook – Forest Practices Code of British Columbia* (Parminter *et al* 1995), biological diversity (synonymous with “biodiversity”) is “the diversity of plants, animals, and other living organisms in all their forms and levels of organization and includes the diversity of genes, species, ecosystems, and the evolutionary and functional processes that link them.”

This section of the Nass South SRMP has been a focal point of discussion and negotiation, in an effort to craft a balanced approach to maintaining landscape functionality in areas subject to resource extraction and development. Consideration has also been given to the need to maintain biological capital and options, given an uncertain future, in an attempt to address climate change.

2.2.1 Overview of Ecosystems

Biogeoclimatic Zones

Biological diversity within the plan area is governed by time in association with climate, geology, ecology and land use. Within the Nass South SRMP area, five distinct biogeoclimatic zones and associated variants are represented (see **Map 3: Nass South SRMP – Ecosections and Biogeoclimatic Zones**):

- Coastal Western Hemlock, Wet Maritime Subzone (CWHwm)
- Coastal Western Hemlock, Wet Submaritime Subzone, Montane Variant (CWHws2)
- Interior Cedar-Hemlock, Very Wet Cold Subzone (ICHvc)
- Interior Cedar-Hemlock, Moist Cold Subzone, Nass Variant (ICHmc1)
- Mountain Hemlock, Moist Maritime Subzone, Windward Variant (MHmm1)
- Mountain Hemlock, Moist Maritime Subzone, Leeward Variant (MHmm2)
- Mountain Hemlock, Undifferentiated Subzone (MHun)
- Englemann Spruce-Subalpine Fir, Wet Very Cold Subzone (ESSFwv)
- Boreal Altai Fescue Alpine (BAFA)
- Coastal Mountain Heather Alpine (CMA)

The latter two were the result of a reorganization of the Alpine Tundra biogeoclimatic zone classification that took effect in January 2006.

Natural Disturbance Types

Biogeoclimatic subzones within the province are described in terms of five natural disturbance types (NDTs) identified in the *Biodiversity Guidebook*. Each NDT is based upon the historical sizes and frequencies of naturally occurring disturbance events such as fire, insect outbreaks, windthrow and landslides.

With the exception of ICHmc1, all of the forested biogeoclimatic variants within the plan area are considered Natural Disturbance Type 1 (NDT1): ecosystems with rare stand-initiating events.

Historically, NDT1 forest ecosystems were usually uneven-aged or multi-storied even-aged, with regeneration occurring in gaps created by the death of individual trees or small patches of trees. Disturbances caused by wind, fire and landslides were generally small, and resulted in irregular edge configurations and landscape patterns. The mean return interval for these disturbances are typically in the hundreds of years, notably longer in the ESSFwv, MHmm1 and MHmm2 biogeoclimatic zones.

The ICHmc1 is classed as Natural Disturbance Type 2 (NDT2): ecosystems with infrequent stand-initiating events. Historically, NDT2 forest ecosystems were usually even-aged, but extended post-fire

regeneration periods produced stands with uneven-aged characteristics, such as multi-storied forest canopies. The predominant natural-disturbance mechanism was wildfire, generally of moderate size (20 to 1 000 hectares), with occasional very large fires. The landscape was dominated by extensive areas of mature forest surrounding patches of younger forest. For such natural disturbances, the average return interval is about 200 years, resulting in vast areas being in old-growth climax condition of 250 years or more.

The Nass South SRMP presents some of the biodiversity objectives for the plan area by natural disturbance type, to reflect the differences in climate as well as differences in size and scale of the natural disturbance events that created the diversity of forest ecosystems.

Fine and Coarse Filter Approaches

Biodiversity is typically managed from two concurrent perspectives: the fine filter approach and the coarse filter approach.

The **fine filter approach** provides specific direction to specific environmental accounts/species where negative impacts have already been manifested, or where specific management direction is required to maintain ecosystem health and population viability.

The Nass South SRMP offers fine filter direction for the various environmental and species accounts. The preservation and conservation direction for rare ecosystems in this section is considered a fine filter approach to biodiversity.

The **coarse filter approach** attempts to manage for biodiversity in ecosystems with the basic assumption that most species' habitat needs will be met by managing forests to maintain structural features and mimic natural disturbance processes such as fire and wind events, insect and disease attack – thereby maintaining a range of habitats across the landscape.

Coarse filter biodiversity is addressed in part by the Nass South SRMP through management direction on:

- Seral stage distribution
- Patch size distribution
- Landscape connectivity
- Ecosystem networks
- Old-growth management areas
- Tree species diversity
- Stand structure retention and recruitment
- Wildlife tree retention areas

Planning and management for maintenance of biodiversity occurs at various scales, from the stand level to inter-regional levels that consider continental species migration and contingencies for catastrophic stochastic events or adjustments to global climatic shifts.

The first five items in the bulleted list above reflect landscape-level biodiversity provisions; the latter two reflect stand-level biodiversity provisions. Each of these elements is discussed in more detail below. Management direction for aquatic biodiversity has not been covered in this plan.

Seral Stage Distribution

As defined in the *Biodiversity Guidebook*, seral stages are “the stages of ecological succession of a plant community, for example, from the young stage to the old stage; the characteristic sequence of biotic

communities that successively occupy and replace each other, altering in the process some components of the physical environment over time.” A diversity of seral stages creates a diversity of habitat types across the landscape.

Patch Size Distribution

The *Biodiversity Guidebook* defines a patch as “a stand of similar aged forest that differs in age from adjacent patches by more than 20 years. When used in the design of landscape patterns, the term refers to the size of either a natural disturbance [fire, wind, insects] opening that led to even aged forests, or an opening created by [forest harvest] cutblocks.”

Different patch sizes and shapes create a diversity of habitats, thus contributing to the maintenance of biodiversity.

Landscape Connectivity

The *Biodiversity Guidebook* defines connectivity as “a qualitative term that describes the degree to which late successional ecosystems [old forests] are linked to one another to form an interconnected network...” Breaking of these linkages results in forest fragmentation. Fragmentation due to forest harvesting should be viewed and managed to mimic fragmentation resulting from natural disturbance.”

The Nass South SRMP directs the maintenance of forest connectivity, by “managing the matrix” and establishing ecosystem networks.

Ecosystem Networks

“Managing the matrix” implies managing landscape elements (stand-level structural retention¹⁵ and habitat patches) to reduce the effects of habitat loss and forest fragmentation. Ecosystem networks are generally mapped out curvilinear zones within and across landscapes. They capture biodiversity “hotspots”, high habitat values and important wildlife movement corridors, and serve to connect habitats across all elevations. Ecosystem networks also serve to shift the focus of forestry activities, from timber to be removed to timber to be left standing, such that a portion of the landscape has less emphasis on intensive forestry activities that alter natural stand structures, seral and patch size distributions.

Old-growth Management Areas

The *Biodiversity Guidebook* defines old-growth management areas as “areas that contain or are managed to replace specific structural old-growth attributes, and that are mapped out and treated as special management areas”.

Tree Species Diversity

Nass South SRMP area forests feature a wide variety of tree species. Coniferous species include western hemlock, mountain hemlock, subalpine fir, amabilis fir, western red cedar, lodgepole pine and sitka-Engelmann-white spruce hybrids. Deciduous species include white birch, trembling aspen, black cottonwood, and red alder. See **Map 4: Nass South SRMP – Vegetation Cover** for a graphical depiction of the abundance and distribution of forest types in the plan area.

Following natural disturbances, forests regenerate to a variety of species, depending on the sites’ moisture and nutrient regime, elevation, aspect and the nature of the disturbances. Tree species diversity, and genetic diversity within species, both contribute to the resilience of forest ecosystems – their ability to combat, recover from, or adjust to disease, insect infestations, climatic variations and other disturbances.

¹⁵ Natural disturbances rarely kill all the living trees within the patch that the disturbance affects, and rarely remove trees from the site. Residual and downed trees provide habitat that would otherwise be missing while the young forest regenerates, thus providing connectivity between the old and newly regenerating forests.

Additionally, a diversity of species enhances forests' potential to produce a variety of forest habitats and timber products.

Stand Structure Retention and Recruitment

In the *Biodiversity Guidebook*, stand structure refers to the distribution of trees in a stand, which can be described in terms of species, vertical or horizontal patterns of trees, size of trees or tree parts, age, or a combination of these. Stand structure includes living, standing dead and fallen dead trees (“coarse woody debris”). A diversity of stand structure provides a diversity of habitats; large old trees, decadent trees with cavities, snags, and downed trees provide habitats generally not found in young and mature managed forests.

Full-cycle retention trees are live trees deliberately left standing within harvested cutblocks, with the intent that they will never be harvested. Such trees become snags (standing dead trees), fall to the ground and become coarse woody debris, and eventually decay and decompose into soil – thus completing their full cycle.

Full-cycle retention trees may be retained in patches of various sizes in specific locations on a cutblock, as single trees dispersed more or less evenly across a cutblock, or in combinations of patches and single trees. Patch retention appears to be the more suitable system to provide wildlife tree habitat; single tree retention provides a better dispersion of large coarse woody debris across the cutblock for soil and water conservation and nutrient cycling.

Throughout the harvested landscape, full-cycle retention trees provide necessary linkage between the regenerating young forest and the original old forest, and contribute to forest health and sustainability by providing an array of ecological services.

Wildlife Trees and Wildlife Tree Retention Areas

Retained trees are referred to in Forest Stewardship Plans and *Forest and Range Practices Act* regulations as “wildlife trees” and “wildlife tree retention areas” (previously known as “wildlife tree patches”). A wildlife tree retention area (also known as a group reserve) is an area specifically identified for the retention and recruitment of suitable wildlife trees.

2.2.2 Management Direction for Biodiversity Resources

Plan Goals for Biodiversity

- Ensure ecosystem function across the range of ecosystem types, reflective of the historic natural disturbance regime at the landscape and stand level over time.
- Maintain habitat connectivity throughout the landscape.
- Connect old-growth management areas (OGMAs).
- Provide a continuum of relatively undisturbed habitats that possess interior forest conditions for indigenous species that depend on mature and old-growth forests.
- Facilitate movement and dispersal of organisms across the landscape by providing core areas and dispersal corridors that will help a variety of organisms re-colonize their historic range.
- Protect and maintain effectiveness of riparian habitats; all riparian habitats have disproportionately high biodiversity values relative to their proportional occupancy of the landscape.
- Preserve Gitanyow and Nisga'a traditional use sites and maintain opportunities for traditional uses of the land.

Objectives	Measures / Indicators	Targets
1.0 <i>Maintain a landscape pattern of patchiness that, over the long term, reflects the natural disturbance pattern</i>	1.1 Distribution and range of patch sizes by natural disturbance type within the forested area of each landscape unit.	Refer to Table 4. Patch Size Distribution
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Small patch sizes (<40 ha) should include a range of openings, from 0.1 ha to 40 ha. • Large patches should be cut to form the large openings (80 ha to 250 ha). In order to achieve large patches through time, they should also be identified as leave areas, and retained to provide future opportunities for large patches for harvest. • Patch-size analysis will include existing openings greater than 250 ha; no new openings are to exceed 250 ha. • Patch sizes in Table 4 and management considerations should be updated based on best available information (e.g., monitoring data; assessments of the range of historic variability in landscape patterns when these become available). 	
2.0 <i>Maintain or recruit structural</i>	2.1 Percent of representative wildlife tree retention within cutblocks.	Refer to Table 5. Wildlife Tree Targets

Objectives	Measures / Indicators	Targets
<i>attributes of old forests to support stand-level biodiversity</i>	<p>Management Considerations</p> <ul style="list-style-type: none"> Refer to Appendix A: General Wildlife Tree Management Guidelines. Document the contribution of wildlife tree retention in an appropriate record system. Where practicable, promote partial logging in stands conducive to shade tolerant tree species management. 	
<p>3.0 <i>Preserve red-listed (endangered or threatened) plant communities, as classified by the B.C. Conservation Data Centre</i></p>	<p>3.1 Hectares of red-listed plant communities¹⁶ harvested, except:</p> <ul style="list-style-type: none"> where required to access timber that otherwise would be isolated from harvest beyond the core area. where terrain conditions such as slope gradient or terrain stability constrain road locations and dictate that sections of road enter and leave red-listed plant communities to access timber that otherwise would be isolated from harvest. where access is required for mineral development. where no practicable alternative exists. 	0 ha
	<p>Management Considerations</p> <ul style="list-style-type: none"> For the most up-to-date list of rare ecosystems, refer to the Conservation Data Centre list of rare and endangered plant communities, located online at www.env.gov.bc.ca/cdc/index.html Red-listed plant communities encountered during field operations are to be preserved from harvesting. Although red-listed plant communities smaller than the stated minimum size are not required to be preserved, it is desirable to preserve them by including them in wildlife tree retention areas or other forms of stand-level retention. 	
	<p>3.2 Percentage of red-listed plant communities having their ecological integrity maintained, except:</p> <ul style="list-style-type: none"> to access timber that otherwise would be isolated from harvest beyond the core area. where terrain conditions such as slope gradient or terrain stability constrain road locations and dictate that sections of road enter and leave red-listed plant communities to access timber that otherwise would be isolated from harvest. where access is required for mineral development. where no practicable alternative exists. 	100%

¹⁶ The minimum size of red-listed plant community to be preserved is 0.25 ha. Where the red-listed plant community exists as the dominant component of a complex, the minimum size of complex to be preserved is 1 ha.

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> Best efforts are to be made to establish wind firm buffers around red-listed plant communities, to preserve their ecological integrity from industrial development. The intent of the buffer is to maintain conditions of soil chemistry, moisture, light and temperatures that sustain the ecosystem. It is recognized that wind firm buffers are not always practicable. 	
<p>4.0 Conserve blue-listed (at risk) plant communities, as classified by the B.C. Conservation Data Centre</p>	<p>4.1 Proportion of each blue-listed plant community¹⁷ within a cutblock retained, when 100% retention is not practicable.</p>	<p>Minimum of 70% by area or basal area</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> For the most up-to-date list of at-risk ecosystems, refer to the Conservation Data Centre rare and endangered plant communities list online at http://www.env.gov.bc.ca/cdc/index.html Although blue-listed plant communities smaller than the stated minimum size are not required to be preserved, it is desirable to preserve them by including them in wildlife tree retention areas or other forms of stand level retention. 	
<p>5.0 Maintain a diversity of coniferous and deciduous species that represent the natural species composition at the landscape and stand levels</p>	<p>5.1 Proportion of cutblocks, at free-growing stage, with a diversity of species ecologically appropriate to the site.</p>	<p>100%</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> Wherever practicable, site prescriptions should accept and retain, advanced regeneration, poles and saplings, to contribute to the regeneration of the site. Best efforts are to be made, during planting and other post-harvesting operations, to promote western red cedar where ecologically suitable. Incremental silviculture (stand-tending) is to consider maintaining all existing ecologically acceptable (including deciduous) species in the developing stand. On ecologically suitable sites where hemlock, balsam and cedar are not planted, facilitate natural regeneration by maintaining these species as a component of full-cycle retention trees dispersed throughout cutblocks. 	
	<p>5.2 Net loss of area, other than for infrastructure, of areas greater than one contiguous hectare, having more than 50% deciduous trees by basal area.</p>	<p>0 ha</p>

¹⁷ The minimum size of blue-listed plant community to be preserved is 0.25 ha. Where the blue-listed plant community exists as the dominant component of a complex, the minimum size of complex to be preserved is 1 ha.

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> It is recognized that natural loss of deciduous stands occur. Best efforts are to be made to minimize the loss of deciduous stands resulting from primary forest activities. Periodic disturbance (e.g. harvesting and wildfire) is required to perpetuate deciduous dominated stands. Management of deciduous stands will require stocking standards that allow for deciduous species as preferred and acceptable species. 	
<p>6.0 <i>Maintain a range of forest seral stages by BEC variant, within each landscape unit, that reflects the natural disturbance regime</i></p>	<p>6.1 Percentage of early, mature and old seral forest retained in each landscape unit, by BEC variant.</p>	<p>Refer to Table 6. Seral Stage Targets</p>
	<p>6.2 Hectares of forest harvested in OGMA's shown on Map 10: Nass South SRMP – Old Growth Management Areas, without an approved amendment.</p>	<p>0 ha</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> The OGMA amendment process is to follow the current approved policy: Old Growth Management Area Amendment Policy – Skeena Region. Allow natural processes (e.g. fire, insects) to occur within OGMA ecosystems, except where these processes threaten resources outside the OGMA. OGMA's are to provide a percentage of old-growth retention by BEC variant across each landscape unit within the plan area. Primary considerations to determine the location of OGMA's include: <ul style="list-style-type: none"> Old growth forests (greater than 250 years old). Biogeoclimatic Variant and Landscape Unit representation. Areas not contributing to the timber harvesting land base first, followed by constrained areas; strive for overlap with the Ecosystem Network, Grizzly Bear Specified Areas, Moose Winter Range, Mountain Goat Winter Range, Gitanyow Offer Parcels and Cultural Sites, and Visual Quality Objectives (for visuals, see Map 6: Nass South SRMP – Visual Quality Objectives). Avoid proposed cutblocks and proposed roads. Spread timber harvesting land base impact evenly amongst all forest licences. Interior forest conditions within OGMA's (>600 meters length and width). Gitanyow House Territory representation. Follow natural features (streams, ridges, roads, cutblock edges, etc.) and metes and bounds as opposed to forest cover lines. Capture small amounts of non-forest or young forest if completely surrounded by old growth in a larger OGMA. Secondary considerations to determine the location of OGMA's, secondary to the listed primary considerations: <ul style="list-style-type: none"> Connectivity values. Rare or uncommon ecosystems, where known and mapped. Special habitats (e.g. goshawk habitat areas, fur-bearer denning sites). 	

Objectives	Measures / Indicators	Targets
<p>7.0 Maintain structural connectivity in the Ecosystem Network identified on Map 11: Nass South SRMP – Ecosystem Network</p>	<p>7.1 Proportion of the Ecosystem Network hydroriparian zone harvested for reasons other than those listed in Table 7. Rationale for Amending the Ecosystem Network.</p>	<p>0%</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • The hydroriparian zone is a key value of the Ecosystem Network (EN). In general, the EN depicted on Map 11: Nass South SRMP – Ecosystem Network is the best approximation of the hydroriparian zone utilizing aerial photos, mapped topography and digital elevation models. Linework delineating the upper edge of the EN is intended to mirror the edges of the hydroriparian zone. • The EN identified on Map 11: Nass South SRMP – Ecosystem Network for the Kinskuch River – Ksi Ginsgox, Nass River – K’alii Aksim Lisims, Bell-Irving River, White River, Paw Creek, Axnegrelga Creek and Brown Bear Creek accounts for the hydroriparian zone and Gitanyow interests. • The EN identified on Map 11 for the Bear River, American Creek, Bitter Creek and upper Hoan Creek was digitized without the benefit of aerial photos. As such, the hydroriparian zone along these water courses may be considerably larger or smaller than mapped. • The amendment process for the EN will be the same as for spatially identified OGMAs, with the exception of the following circumstance: <ul style="list-style-type: none"> ○ Under item 4 of Table 7, licensees can proceed in the field with minor amendments to the EN, with notification of these amendments to Gitanyow and Nisga’a Lisims Government after the fact, except for the rivers, streams and lakes listed in item 4 which will require a major amendment. • Allow natural processes (e.g. fire, insects) to occur within the EN, except where these processes threaten values or resources adjacent to EN. 	
	<p>7.2 Road length within the EN other than roads constructed:</p> <ul style="list-style-type: none"> • To access timber that otherwise would be isolated from harvest beyond the EN. • Where terrain conditions such as slope, gradient or terrain stability constrain road locations and dictate that sections of road enter and leave the EN to access timber that otherwise would be isolated from harvest. • Where no practicable alternative exists. 	<p>0 km</p>
<p>7.3 Proportion of the 100 metre width Ecosystem Network buffers identified on Map 11 that meet the forest conditions listed in Table 8.</p>	<p>100%</p>	

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> In the Nass South Planning Unit, the 100-metre buffers plus the Ecosystem Network hydroriparian core reserve are intended to achieve, where possible, interior old forest conditions within sections of the EN but not necessarily the full length of the corridor, and to contribute to connectivity and wildlife movement functions, Gitanyow cultural and subsistence use, and representative ecosystem retention. Additional buffer width, where practicable, would further contribute to the effective functions of the ecosystem network. Where the hydroriparian zone (HRZ) reserve and/or the buffers include portions of harvested cutblocks, the interior old forest conditions will be developed over time by re-growth of the harvested forest. 	

Table 4. Recommended Distribution of Patch Sizes (harvest units and leave areas)

(Biodiversity Guidebook 1995)

Natural disturbance type (NDT)	Biogeoclimatic (BEC) zone variant	Percentage of Forest Area within Landscape Unit		
		<i>Small patches</i> (<i><40 ha</i>)	<i>Medium patches</i> (<i>40 to 80 ha</i>)	<i>Large patches</i> (<i>80 to 250 ha</i>)
NDT 1	CWHwm	30 to 40	30 to 40	20 to 40
	ESSFwv	30 to 40	30 to 40	20 to 40
	ICHvc	30 to 40	30 to 40	20 to 40
	MHmm2	30 to 40	30 to 40	20 to 40
	MHun	30 to 40	30 to 40	20 to 40
NDT 2	ICHmc1	30 to 40	30 to 40	20 to 40

Table 5. Wildlife Tree Targets (Forest and Range Practices Act Regulations)

Landscape Unit	Percent area of any individual cutblock to be retained as wildlife trees (not less than)	Percent area of total harvested cutblocks (annual harvest) to be retained as wildlife trees (not less than)
All units	3.5	7

Table 6 lists the Biodiversity Emphasis Options assigned to each Landscape Unit within the Nass South SRMP area. Targets by Biogeoclimatic Ecosystem Classification (BEC) variant are listed in the *Forest Practices Code of British Columbia Biodiversity Guidebook, September 2005*.

Table 6. Seral Stage Targets

Landscape Unit	Biodiversity Emphasis Option
Bear	Intermediate
Bowser	Low
Brown Bear	Low
Cambria Icefield	Low
Kinskuch	Intermediate
Kwinamuck	Low
Madely	Intermediate
Tchitin	High
Tintina	Low
White	Intermediate
Wildfire	Intermediate

Table 7. Rationale for Amending the Ecosystem Network

Acceptable Rationale for Amendment	Major or Minor Amendment	Allowable Amendment
1. Access issues that were overlooked or unknown during the initial Ecosystem Network delineation, where no practicable alternative exists (refer to Biodiversity Measure 7.2).	Minor	<ul style="list-style-type: none"> To establish an appropriate road width through the Ecosystem Network.
2. To account for cut blocks in place prior to the establishment of the Ecosystem Network, including those: <ul style="list-style-type: none"> approved under section 196(1) of the <i>Forest and Range Practices Act</i>; as declared areas under section 14(4) of the <i>Forest Planning and Practices Regulation</i>; or that have a cutting permit in place 	Minor	<ul style="list-style-type: none"> To the edge of the cut block, temporarily, to allow timber harvest. Return to original location following completion of timber harvest and silvicultural responsibilities.
3. To address a compelling forest health issue (e.g. a forest pest or disease is established in the Ecosystem Network and spreads to the point where it threatens adjacent values and resources outside the Ecosystem Network).	Minor	<ul style="list-style-type: none"> To the extent necessary to eliminate the threat to the land and water adjacent to the Ecosystem Network.
4. New data and information such as ground truthing of the hydroriparian zone ¹⁸ , new resource inventories, First Nations cultural sites and updated wildlife mapping. Notwithstanding the exceptions detailed under items 1 to 3 above, in no case will the Ecosystem Network be smaller than the hydroriparian zone.	<p>Major for the following rivers:</p> <ul style="list-style-type: none"> Kinskuch River Nass River Bell-Irving River White River Paw Creek Axnegrelga Creek Brown Bear Creek <p>Minor for all other portions of the EN.</p>	<ul style="list-style-type: none"> To improve the degree to which the Ecosystem Network captures values for First Nations, provides habitat for wildlife, or generally benefits biodiversity. To increase the accuracy of the Ecosystem Network in terms of how it maps the hydroriparian zone.

¹⁸ The hydroriparian zone is defined as the area that extends to the edge of the influence of water on land, or land on water, as defined by plant communities (including high bench or dry floodplain communities) or landforms, plus one and one-half site specific tree heights horizontal distance (Hydroriparian Planning Guide, Coast Information Team, Jan. 30, 2004). Landforms include:

- The stream channel, lake or wetland and adjacent riparian ecosystem, where no floodplain exists.
- The full width of the floodplain for streams
- Adjacent active fluvial units
- Up to the top of the inner gorge or where slopes become less than 50% for reaches of streams that are gullied, or are in a ravine or canyon
- Immediately adjacent unstable slopes (class IV and V terrain) where it is located such that a surcharge of sediment may be delivered to the stream, lake or wetland.

Table 8. Forest Conditions within Ecosystem Network Buffers

<ul style="list-style-type: none">• Continuous forest cover• Small discontinuous canopy gaps• $\geq 70\%$ structure and function¹⁹ retained, including large, old trees, snags, and coarse woody debris• Multi-canopy levels, multi-aged forest• 0% permanent road access, except where, for ecological or economic reasons, no other alternative is possible.
--

2.3 Botanical Forest Products

2.3.1 Overview of Botanical Forest Product Resources

Botanical forest products are non-timber based products gathered from forest and range land. The Ministry of Forests and Range has grouped botanical forest products into the following categories: wild edible mushrooms, floral greenery, medicinal and pharmaceutical products, wild berries and fruits, herbs and vegetable products, landscaping products, craft products, and miscellaneous. The Nass South SRMP addresses pine mushrooms, but recognizes that the collection of medicinal plants is also an important activity, particularly to the Gitanyow and Nisga'a citizens.

2.3.1.1 Pine Mushrooms

The pine mushroom (*Tricholoma magnivelare*) is a commercially important wild mushroom species that grows in coniferous forests throughout British Columbia, Oregon, Washington and northern California. British Columbia's wild mushroom industry was valued in 1999 at about \$25 to \$45 million dollars with an estimated annual harvest of 250 to 400 tonnes. The industry continues to be an important source of employment in many rural communities to this day. For these reasons, some forest managers are seeking ways to accommodate the pine mushroom resource in their forest stewardship plans.

The pine mushroom grows in association with the roots of a number of coniferous tree species, but is only found in certain appropriate forest types across its range. Identifying the extent and specific types of pine mushroom habitat across the forested landscape is an important step in understanding the resource. Sites known to be highly productive pine mushroom habitat were described in northwest British Columbia in 2001. Highly productive sites include areas where soils are well to very rapidly drained and are generally coarse in texture, often with a high coarse fragment content and a thin forest floor. Western hemlock is consistently the dominant tree species, with lodgepole pine also frequently present in the tree layer. Plant communities typically feature sparse herb and shrub layers with a high coverage of mosses. These attributes suggest pine mushrooms consistently occur on low-productivity forests typical of rocky ridges and hill tops, as well as on coarse textured soils near rivers.

Commercial pine mushroom habitat can be reliably identified through soil and vegetation characteristics, and the extent of this habitat can be estimated and mapped for strategic planning. Most mushroom habitat is quite small in extent and dispersed across the landscape. However, a few areas such as the Nass River - K'ali Aksim Lisims are unique because they contain a relatively high concentration of well-defined mushroom habitat within healthy mature forests.

A conflict exists between timber extraction and pine mushroom harvesting because both activities tend to take place in mature stands. After logging or natural disturbances such as forest fire, pine mushrooms

¹⁹ Any harvest unit within the buffer portions of the EN will, within the buffer, retain $\geq 70\%$ of the naturally occurring mature and old forest structure (live trees, range of diameter classes, snags, coarse woody debris, tree species etc.) of the harvest unit measured either as basal area (M^2) or forest area (hectares). No further harvesting may occur within the harvest unit (within the EN buffer area) until such time as the harvested portion has returned to a mature or older condition (ie. ICH 100 years, ESSF 120 years).

will not re-establish for approximately seventy-five years. However, in some landscapes, the submesic²⁰ ecosystems ideal for pine mushroom growth only have marginal economic value for timber because of lower wood volumes and smaller tree size. Partial cutting systems could allow for some timber removal while maintaining mushroom fruiting, and could be appropriate in some stands. Over the long-term, a combination of traditional stand harvest and extended rotation (e.g. 200 years) could be necessary to maintain a productive stock of pine mushrooms in mature forest stands.

There are uncertainties as to how economically valuable the pine mushroom will be in the future. The market for pine mushrooms is entirely in Japan. Many countries, notably China, are now also exporting pine mushrooms to Japan in competition with Canada. In recent years, the prices for pine mushrooms in northwest B.C. have been reduced, down considerably from the lucrative values seen throughout the 1990's. It would seem unlikely that this resource will ever return to premium values again.

As the pine mushroom harvest is currently unregulated, the B.C. government derives little direct value from the harvest through taxes or royalties. The lack of regulation and rights, or tenure, to harvest pine mushrooms makes it difficult to develop and enforce the sector in a sustainable manner. Besides foregoing government revenue, lack of regulation for the harvest also creates problems of potential over-harvesting of the resource and potential infringement of aboriginal rights and traditional use of pine mushrooms.

2.3.1.2 Management Direction for Pine Mushrooms

Plan Goals for Pine Mushroom Resources

- Maintain pine mushroom resources and provide opportunities for a sustainable harvest.

Objectives	Measures / Indicators	Targets
<i>1.0 Maintain productive pine</i>	1.1 Percentage of productive pine mushroom sites ²¹ maintained in an age range from 80 to 200 years. ²²	not less than 50%

²⁰ For a definition of submesic, see “moisture regime” in the Nass South SRMP glossary.

²¹ “Productive pine mushroom” sites means those sites that can best produce pine mushrooms. i.e., sites that currently produce pine mushrooms and those sites undisturbed, previously logged or burned that can produce pine mushrooms. These sites are generally pine or hemlock leading stands below 800 m elevation in the following ecological site series: ICMmc1/01b, ICHmc2/01b, and CWHws2/03. The minimum size of area to be considered is 0.3 ha for homogenous site series and 1 ha for site series complexes.

²² If research shows that silviculture systems (other than clearcut harvesting) can perpetuate pine mushroom production, the areas having these silviculture systems will contribute to meeting the target.

Objectives	Measures / Indicators	Targets
<p><i>mushroom sites across the plan area</i></p>	<p>Management Considerations</p> <ul style="list-style-type: none"> • Pine mushrooms usually grow in forests with an age of 80 to 200 years. The intent is to have at least 50 percent of the productive area in an age range that can grow mushrooms, recognizing that mushrooms may not grow every year in a particular location. The entire age range does not have to be represented to achieve this target. • Best efforts are to be made to map all highly productive pine mushroom sites in the plan area. • Best efforts are to be made to research the effects of various harvesting and silvicultural regimes in the re-colonization and maintenance of productive pine mushroom sites. 	

2.4 Wildlife

2.4.1 Overview of Wildlife Resources

The Nass South SRMP area includes a range of ecosystems that support a wide diversity of wildlife species. Large mammals include grizzly and black bears, wolves, moose, mountain goats, and mule deer. A variety of birds inhabit the area, such as woodpeckers, hawks, owls, eagles, songbirds, grouse, and numerous species of waterfowl on a seasonal basis. Also resident are diverse small mammals, such as marten, vole, shrew, weasel, squirrel, fisher, wolverine and fox, as well as species of bats and amphibians.

The Nisga'a and Gitanyow traditionally utilized a wide range of wildlife for subsistence and cultural purposes, and continue to harvest numerous wildlife species today. The range of wildlife and their associated habitats must be sustained in order for the Gitanyow to continue to exercise their aboriginal rights. Wildlife habitats must also be maintained to help ensure healthy wildlife populations are capable of sustaining a hunter harvest by the Nisga'a, in accordance with the *Nisga'a Final Agreement*.

Hunting and wildlife viewing are also popular activities within the plan area. These activities overlap with the guiding territories of licensed guide outfitters.

With respect to wildlife, the intent of the Nass South SRMP is:

- To maintain natural ecosystems and habitat to sustain viable populations of all indigenous wildlife species within their natural range;
- To sustain or enhance habitats of rare, endangered, threatened, and regionally significant species;
- To maintain habitat to help ensure wildlife populations are capable of sustaining a Nisga'a hunter harvest, in accordance with the *Nisga'a Final Agreement*.
- To provide for Gitanyow continued use of wildlife resources;
- To maintain viable guiding and trapping industries;
- To provide for a sustainable harvest of big game species and furbearers; and
- To provide opportunities for viewing, study, and appreciation of wildlife in their natural habitat.

2.4.1.1 Moose

The Nass South SRMP area provides high value moose habitat, including important calving, rutting and winter habitat. The abundance and quality of winter habitats are key factors that influence over-winter survival of moose. The best habitats provide abundant accessible forage, coniferous canopies that intercept snow and act as thermal and security cover, large trees to help ward off predators, and

opportunities for escape from predators. Winter range habitat is considered critical for moose populations in the plan area.

Moose winter range identified within the plan area consists primarily of low elevation wetland-timber complexes, floodplains of main rivers and large tributary streams adjacent to coniferous stands. Forest harvesting and wildfire have resulted in some interim moose winter range by providing early seral forage in areas where mature/old forest canopy intercepts snowfall and thus reduces snow depths. Although harvested and burned sites can be important to moose in terms of temporary winter habitat, these areas have not been proposed for direct moose winter range management, except where they are embedded in the identified moose winter ranges.

The Gitanyow and Nisga'a depend on moose meat for sustenance and thus place a high value on moose habitat and moose population management.

At the time of plan inception, moose numbers were believed to be well below carrying capacity within a balanced, natural predator-prey system. In 2007, an aerial survey of moose in and near the Nass Wildlife Area found that the moose population was at an unacceptably low level – likely as a result of over-harvesting by humans. New restrictions on moose harvesting, which encompassed hunting within the plan area, were put in place for the 2007 hunting season as a means of helping to restore the population to a higher level. The extent to which the population can be restored will depend largely on effective communications among the Ministry of Environment, NLG, Gitanyow and stakeholders, as well as the extent of compliance with formal harvest allocations.

Road development within moose winter range has contributed to the decline of the moose population because it offers easy access for hunters using vehicles and snow machines. Year round access management will be important in ensuring a sustainable moose population capable of supporting an annual hunter harvest.

The plan area is noted for deep snow conditions, a factor limiting the abundance of moose winter range. Careful planning and assessment within identified moose winter ranges will result in maintenance of winter range.

This plan supports official designation of moose winter range as Ungulate Winter Range under the *Forest and Range Practices Act*. General Wildlife Measures prescribed under the Ungulate Winter Range Order must be consistent with the direction of this plan.

2.4.1.2 Management Direction for Moose

Plan Goals for Moose

- Manage moose winter range to help ensure a healthy moose population.
- Minimize pressure on the moose population from legal and illegal harvest through human access management.

Objective

Measures / Indicators

Targets

Objective	Measures / Indicators	Targets
1.0 <i>Maintain, enhance or restore the moose winter range habitats identified on Map 12: Nass South SRMP – Moose Winter Range</i>	1.1 Number of subhygric to subhydric ²³ sites, large enough to be considered a silvicultural treatable unit ²⁴ , where moose forage production is facilitated post timber harvest.	All
	1.2 Percent of mature forest retained as thermal cover ²⁵ within 100 m of mapped forage areas.	10%
	1.3 Percent of mature + old forest canopy retained for snow interception in each winter range outside of mapped forage areas.	>30%
	1.4 Security cover ²⁶ within or adjacent to cut blocks must be provided.	80% of the security cover shall be separated by no greater than 200 metres.
	1.5 Percent of security cover retained directly adjacent to moderate, high and very high value mapped forage areas.	100%
	1.6 Amount of timber harvesting within moderate, high and very high value mapped forage areas.	None
	1.7 Percentage of the area of any given cutblock that is more than 100 m away from adjacent mature forest cover for snow interception.	<20%

²³ For definitions of “subhygric” and “subhydric”, see “moisture regime” in the glossary.

²⁴ The minimum size for a treatable unit is:

- One hectare for pure subhygric to subhydric sites;
- Two hectares of noncontiguous subhygric to subhydric sites within ecosystem complexes where the individual sites are greater than 0.25 ha and such sites comprise 20% or more of the ecosystem complex area.

²⁵ Thermal Cover is defined as canopy cover that moderates atmospheric temperature – thermoregulation resulting in cooling during the summer and reduction of wind chill in the winter.

²⁶ Security Cover is defined as sufficient vegetation cover and/or terrain features that permit a moose to feel secure, comfortable and not threatened despite adjacent activities or predator movement that would otherwise displace the animal.

Objective	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Within identified moose winter range, harvest using silviculture systems, block configurations, patch sizing and patch distribution that will provide forage, visual screening, thermal and security cover, and snow interception while integrating timber and silvicultural management objectives. • Emphasis for thermal cover, snow interception and security cover management is adjacent to mapped forage areas. A forested buffer of 50 to 100 m wide is recommended, depending on topography. Also recommended that forest types be retained adjacent to moderate, high and very high value mapped forage areas. • Moose forage production can be facilitated post timber harvest by promoting gap openings through reduced stocking standards, cluster planting, spacing and pruning at the silvicultural treatment unit level. • Develop General Wildlife Measures for managing moose winter range through Ungulate Winter Range designation under FRPA. • Moose winter range management plans to be prepared for winter ranges that are subject to forest development, where funding is available. These plans should include a monitoring component to ensure adaptive management can correct any errors, should they be found, in moose winter range placement or the management regime. <p>Refer to Appendix B: Moose Habitat Attributes for Life Requisites and Appendix C: Best Management Practices for Moose Winter Range for supporting information.</p>	
<p>2.0 <i>Through access management, minimize mortality and disturbance to moose within and adjacent to the moose winter ranges identified on Map 12: Nass</i></p>	<p>2.1 Number of roads, excluding mainlines, within 500 m of a moose winter range, where access is controlled following achievement of regeneration delay²⁷ to effectively reduce motorized accessibility to the winter range.</p>	All
	<p>2.2 Number of roads within moose winter range to be deactivated, or have motorized vehicle access restricted following achievement of regeneration delay or within 1 year if roads are inactive.</p>	All

²⁷ For a definition of Regeneration Delay, see Nass South SRMP Glossary.

Objective	Measures / Indicators	Targets
<p><i>South SRMP – Moose Winter Range</i></p>	<p>Management Considerations</p> <ul style="list-style-type: none"> • Access control includes road deactivation, restrictions that attempt to prevent access by 4WD and off-road vehicles, and legislative authorities for vehicle closure. • Within a moose winter range, primary forest activities to focus within a short time frame, followed by a long phase of inactivity to reduce access related impacts to wintering moose. • Moose winter range management plans should address both the risk of disturbance and methods for limiting access to moose winter ranges during their wintering period (November 1 to May 1). • Moose winter range management plans should be prepared by all non-forestry industries that plan developments within the plan area, prior to any development clearing or construction activities, as a condition to receiving a license or permit from the Province of B.C. to proceed with the project. 	

2.4.2.1 Mountain Goat

Approximately 60 to 70 percent of North America’s (global) population of mountain goats are found in B.C. The B.C. population of mountain goats is roughly estimated at 35 000 to 63 000 goats, of which approximately 16 000 to 35 000 reside within the Skeena Region. Although the mountain goat population has not been specifically estimated for the Nass South SRMP area (other than in associated management units), numbers are believed to be relatively high.

In B.C., the mountain goat is yellow-listed, a classification indicating that the species’ welfare is not of immediate conservation concern. However, with a provincial ranking of S4²⁸, populations are considered to be of long-term conservation concern. Mountain goats have low reproductive rates and are vulnerable to hunting mortality which can increase as a result of new access.

Within the SRMP area, most mountain goats utilize old forests on steep south- to west-facing slopes for winter range, generally within a few hundred metres of escape terrain. High- and moderate-value goat winter habitat is present at localized canyon and escarpment sites and throughout the mountains of the plan area. Most goat wintering sites are within areas considered to be inoperable for timber harvesting at this time.

The Nass South SRMP area provides important habitat for mountain goat. The abundance and quality of winter habitats are key factors that influence over-winter survival of goats. The best habitats provide abundant accessible forage, coniferous canopies that intercept snow and act as thermal and security cover, and opportunities for escape or defence against predators. Winter range habitat is considered critical for mountain goat populations in the plan area. Summer habitat for goats mostly consists of alpine ridges and alpine meadows with nearby cliffs that provide escape terrain.

Within the plan area, mountain goats use alpine habitats in summer, and usually winter in subalpine and subalpine parkland areas nearby, primarily on southerly aspects. They can, however, be forced to winter in forested sites right to the valley bottom in coastal areas due to the heavy wet snows that cling to cliffs and bury food supplies. Mountain goats will remain in, or occasionally return to, alpine locations during winter if wind-scouring or minimal snow depth permits foraging in these locations.

²⁸ The S-series ranking is a numeric rank of relative imperilment applied at the provincial scale, based on the conservation status ranking system developed by NatureServe.

The specific diet chosen by goats is dictated by what is available locally. Winter diets in interior areas are predominantly grasses, sedges and subalpine fir. In coastal areas, their diets consist predominantly of woody browse. Arboreal lichens are consumed when available. Summer diets vary, but usually include a mixture of succulent herbs, newly growing grass and sedges, and woody browse.

The use of helicopters in commercial recreation must be carefully regulated and monitored given the disturbance risk to mountain goats. Adherence to the Wildlife Guidelines for Commercial Backcountry Recreation largely addresses concerns associated with mountain goat disturbance in their winter ranges. Heli-logging is addressed within this section of the Nass South SRMP.

This plan does not establish resource management objectives for mountain goat as an Ungulate Winter Range (UWR) Order under the *Forest and Range Practices Act* has already been established http://www.env.gov.bc.ca/wld/documents/uwr/u-6-002_order.pdf. General Wildlife Measures prescribed under the UWR Order must be consistent with the direction of this plan. This plan has addressed the need to increase the disturbance buffer surrounding canyon dwelling mountain goat winter range. A specific resource management objective has been added to increase the buffer width from 500 m to 1000 m for canyon-dwelling mountain goats.

2.4.2.2 Management Direction for Mountain Goat

Plan Goals for Mountain Goat

- Manage mountain goat winter range to help ensure a healthy mountain goat population.
- Avoid disturbance and displacement of mountain goats during vulnerable periods.
- Minimize pressure on the mountain goat population from legal and illegal harvest through human access management.

Objectives	Measures / Indicators	Targets
1.0 <i>Minimize adverse disturbance to goats within mountain goat winter range identified on Map 13: Nass South SRMP – Mountain Goat Winter Range</i>	1.1 Area within mountain goat winter range harvested without approved exemptions.	0 ha
	1.2 Number of industrial activities, within 500 m horizontal distance of a mountain goat winter range, that cause adverse disturbance to mountain goats.	0
	1.3 Percentage of industrial activities, within 500 metres of goat winter range, that have not been exempted, that takes place between November 1 and June 15.	0%
	1.4 Number of industrial activities within 1000 metres of canyon-dwelling goat winter range.	0

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Operators will (as per UWR regulations) refrain from felling trees within mountain goat winter range. • Felling of single trees, such as danger-trees, guy-line anchor, or tail-hold trees, is permitted within a mountain goat winter range when it is required to address worker safety. Trees felled for these purposes will be left on site to provide coarse woody debris for other animals. • Adverse disturbance is to be determined by a qualified professional biologist. • Retention of forest cover is required to deliver habitat attributes critical to the survival of this species. These attributes include patches of mature/old forest, in areas close to escape terrain, which provide winter forage production, snow interception, and thermal/security cover. • Where forests within mountain goat winter range have been disturbed by fire or logging, and where habitat is limited, these areas should be silviculturally treated to accelerate their restoration and rehabilitation, to achieve mature and old forest habitat attributes (snow interception, security and thermal cover, and forage production). Treatments should be based on the recommendations of a qualified professional forester and a qualified professional biologist. 	
<p>2.0 <i>Minimize the number of roads within 500 m of mountain goat winter range and 1000 m of canyon-dwelling goat winter range</i></p>	<p>2.1 Percentage of roads within 500 m of mountain goat winter range and roads within 1000 m of canyon-dwelling mountain goat winter range that have not been exempted, deactivated within one year following the completion of industrial activities.</p>	<p>100%</p>
	<p>2.2 Percentage of existing roads within 500 m of mountain goat winter range and 1000 m of canyon dwelling mountain goat winter range that are deactivated or managed to mitigate adverse disturbance.</p>	<p>100%</p>

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Access roads within 500 m of mountain goat winter range and 1000 m of canyon-dwelling mountain goat winter range are to be constructed in a manner that facilitates effective deactivation. • Where no practicable alternatives to building roads within these buffer areas exist, roads and trails should employ strategies to protect goats and their habitats from disturbance. These strategies may include: <ul style="list-style-type: none"> • placing adequate timber buffers around mountain goat winter ranges; • locating roads and trails no closer to mountain goat winter range than made necessary by operational site constraints; or • other suitable techniques. • When demonstrated by a qualified professional wildlife biologist that there is a low level of risk to goats, exemptions may be considered for: <ul style="list-style-type: none"> • construction of roads or trails in mountain goat winter range where no other access options exist; or • construction of semi-permanent mainline roads within 500 m of mountain goat winter range to access timber beyond a specific mountain goat winter range; and • Existing roads and trails within 500 m of a mountain goat winter range, and within 1 000 m of canyon dwelling/escarpment goat winter range, should be assessed for disturbance risk to mountain goat populations. Mitigation plans should be developed accordingly. • Where road access has a potential impact on identified mountain goats, a risk assessment should be conducted and appropriate measures be taken to help ensure population viability. 	
<p>3.0 <i>Minimize adverse disturbance to mountain goat winter range from helicopter logging activities</i></p>	<p>3.1 Percentage of helicopter logging occurring within 2000 m line of sight of a mountain goat winter range, that have not been exempted, that takes place between November 1 and June 15.</p>	<p>0%</p>

2.4.3.1 Grizzly Bear

The plan area contains high value habitat for grizzly bears. These habitats are generally defined as herb-dominated avalanche tracks, subalpine parkland meadows, herbaceous riparian meadows, wetland complexes, ecosystem networks, rich water-receiving forest sites and skunk cabbage associations.²⁹ Forested buffers surrounding these sites are important habitat components that contribute to thermal and security cover for grizzly bears. Forested buffers also protect high use grizzly trails and bedding sites. In addition, territorial markings and other forms of bear to bear communication commonly occur along high use trails adjacent to foraging areas.

Salmon fishing sites and early seral forests associated with either natural burns or timber harvesting play an important role in grizzly bear food availability. Fish and berries from these sites help build body fat for successful denning. The Hanna and Tintina watersheds are ranked as provincially significant for

²⁹ It is important to note that rich water-receiving forest sites and skunk cabbage associations are not commonly identified through aerial photo interpretation, and may not be captured by the current state of high value grizzly bear habitat mapping.

grizzly bear habitat values, due in large part to the salmon runs here. Extensive patches of huckleberry throughout the plan area are also a key food source for grizzly bears, as are devil's club berries, but to a lesser extent. Moose calves are likely to be important food items as well.

During their planning and operations, forest licencees may discover high value grizzly bear habitats in addition to those currently identified through the Specified Area process (known elsewhere as Wildlife Habitat Area). Rich water-receiving forest sites and skunk cabbage associations, for example, are not commonly identified through aerial photo interpretation and may not be captured in the current mapping. In such cases, forest licencees are encouraged to utilize the services of experienced habitat biologists to determine the value of these additional habitats and develop measures to maintain their quality and effectiveness for grizzly bears.

In forested settings, early seral and old growth stands provide optimal foraging for grizzly bears. Mid-seral forests, especially stands managed for rotational forestry, tend to have minimal forage value. The availability of forage plants in early seral forests can be prolonged in managed stands through the use of wet site patch retention and silvicultural techniques such as cluster planting, variable density stocking, spacing, pruning and thinning. In addition, the designation of OGMA's, ecosystem networks and Protected Areas will contribute to old growth retention across landscapes, and thus the availability of grizzly bear forage.

Besides managing for high value habitats and forage species, resource managers must focus on the threats to grizzlies that arise from road development and the associated increased human access that leads to the erosion of wilderness (bear refuge). This, along with the negative habituation of bears to humans that tends to happen when they are in close association with each other, ultimately results in an increase in bear mortality and displacement. Population extinction and extirpation of grizzly bears is a disturbing trend that continues today throughout North America. Given this, an area like the Nass watershed will become more important to future generations of grizzly bears and humans as one of the last places where both species can continue to co-exist successfully.

This plan supports official designation of Grizzly Bear Specified Areas (SA) under the *Forest and Range Practices Act*. General Wildlife Measures prescribed under the Order must be consistent with the direction of this plan.

2.4.3.2 Management Direction for Grizzly Bear

Plan Goal for Grizzly Bear

- Provide adequate grizzly bear habitat to help ensure a healthy population.

Objectives	Measures / Indicators	Targets
<p>1.0 <i>Preserve the highest value grizzly bear habitat identified on Map 14: Nass South SRMP – Grizzly Bear Specified Areas</i></p>	<p>1.1 Proportion of the forested area of each polygon identified on Map 14: Nass South SRMP – Grizzly Bear Specified Areas retained as functional thermal or security cover in mature and old growth condition, except for the following cases, where the minimum retention of forested area in each polygon is 90%:</p> <ul style="list-style-type: none"> • access; • operational safety considerations; or • to minimize impacts on adjacent environmental values. 	<p>100%</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • The term, “Specified Areas” is replacing the term, “Wildlife Habitat Areas” for the Nass South. The new term is the result of an administrative need only and will provide the same legal authority under <i>FRPA</i> as would Wildlife Habitat Areas. • The high value grizzly bear habitats identified on Map 14: Nass South SRMP – Grizzly Bear Specified Areas, have been established to capture bedding and foraging areas as well as to provide thermal and security cover. • The target is based on the need for operational flexibility where necessary. If harvesting is to occur within SAs, it should be located along the edges of the mapped polygons. • Where practicable, from a harvest block layout and forest operation perspective, major grizzly bear trails leading to or connecting grizzly bear SAs, as noted by bite and marked trees, shall have their integrity maintained in terms of existing natural stand structure. • High use grizzly bear trails should be mapped and managed to maintain their integrity for travel and communication. 	
<p>2.0 <i>Maintain the quality and effectiveness of grizzly bear foraging habitat</i></p>	<p>2.1 Proportion of foraging habitat listed in Table 9: High Value Grizzly Bear Habitat in the Nass South SRMP Area, occupying greater than 1 ha within a cutblock, that maintains herbaceous and woody forage supply for grizzly bears through to stand rotation, as assessed at the achievement of free-growing status for regenerated stands.</p>	<p>100%</p>

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> Vegetation management practices, within high value grizzly bear forage habitat to maximize retention of valuable forage species. Practices may include: <ul style="list-style-type: none"> reduced stocking standards in wetter or richer sites, targeting up to 600 stems/ha at free-to-grow. pruning, spacing or thinning. 	
	<p>2.2 Proportion of non-forested forage areas greater than 2 ha in size, identified in Table 9: High Value Grizzly Bear Habitat in the Nass South SRMP Area, with directly adjacent functional thermal and security cover.</p>	100%
	<p>Management Considerations</p> <ul style="list-style-type: none"> Adjacent areas should be approximately 100 metres in width and fully surround the forage area where possible. Thermal cover includes habitat conditions that afford for a dry place when it is cool and wet, and a cool place when it is hot and dry; these conditions are generally provided in old-growth settings utilizing full canopy mature and veteran trees. Security cover provides visual screening, especially from roads, and exists when vegetation obscures a person’s view of a grizzly bear. High-use grizzly bear trails should be mapped and managed to maintain their integrity for travel and communication. 	
<p>3.0 <i>Minimize human-bear conflicts</i></p>	<p>3.1 Proportion of grizzly bears killed or relocated as a result of human-bear conflicts</p>	Reduction
	<p>Management Considerations</p> <ul style="list-style-type: none"> For expert resources on minimizing bear-human conflict, see Appendix D: Minimizing Human-Bear Conflicts. Until replaced by alternative programs, use BMP’s as described by the provincial Conservation Officer Service and the B.C. Conservation Foundation Bear Aware program: http://bearaware.bc.ca/ Proponents of industrial development should account for impacts to grizzly bear habitat and the potential interactions between humans and grizzly bear. This SRMP supports continuation of the provincial Bear Aware program, or similar efforts to increase public awareness of bear/human interactions and reduce bear mortalities. It is recognized that grizzly bear mortality cannot be eliminated entirely in areas heavily developed for settlement or agriculture, and that grizzly bears attracted by habitat or human-provided food are likely to be killed as a result of conflicts with humans. 	

Objectives	Measures / Indicators	Targets
4.0 <i>Minimize long-term displacement of grizzly bears from industrial access development</i>	4.1 Minimum distance of permanent roads from high value grizzly bear habitat identified on Map 14: Nass South SRMP – Grizzly Bear Specified Areas.	150 m (where practicable)
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Access restrictions could be used to minimize roaded motorized access within selected portions of grizzly bear winter habitat areas for periods of time. This can be achieved through the identification and use of control points, where access restrictions such as bridge removal or gating can be employed. • Industrial development within or adjacent to valuable grizzly bear habitat should be planned for short periods of time, followed by long periods (10 to 25 years) of no development. 	

Table 9. High Value Grizzly Bear Habitat in the Nass South SRMP Area

BEC variant	Site Series #	Site Series Name
CWH ws2	05	HwBa - Queen's cup
CWH ws2	06	BaCw - Devil's club
CWH ws2	07	Ss - Salmonberry
CWH ws2	08	Act - Red-osier dogwood
CWH ws2	09	Act - Willow
CWH ws2	10	Pl - Sphagnum
CWH ws2	11	CwSs - Skunk cabbage
ESSF wv	06	Bl - Devil's club - Lady fern
ESSF wv	07	Bl - Valerian - Sickle moss
ESSF wv	08	Bl - Horsetail - Glow moss
ESSF wv	09	Bl - Lady fern - Horsetail
ICH mc1	04	HwBl - Devil's club
ICH mc1	05	ActSx - Dogwood
ICH mc1	06	Hw- Azalea - skunk cabbage
ICH vc	03	Sx - Devil's club
ICH vc	04	Sx - Devil's club - Dogwood
ICH vc	05	ActSx - Dogwood
ICH vc	06	Sx - Horsetail
MH mm1	02	HmBa - Mountain-heather

MH mm1	05	BaHm - Twistedstalk
MH mm1	08	HmYc - Sphagnum
MH mm1	09	YcHm - Skunk cabbage
MH mm2	05	BaHm - Twistedstalk
MH mm2	08	HmYc - Sphagnum
MH mm2	09	YcHm - Skunk cabbage

Note: CWHws2 04 is excluded from this table. In situations where competing vegetation (silviculturally) that is considered to be grizzly bear forage makes achievement of a target stocking standard difficult, then reduced stocking standards should be acceptable to prevent aggressive control of such competing vegetation. CWHws2 04 is a blue listed ecosystem.

2.4.4.1 Fur-bearers

A number of fur bearers reside within the plan area including marten, fisher, wolverine, ermine (weasel), mink, lynx, fox, coyote, wolf, muskrat and beaver. Historic trapping of these species has been more intense than that of the present day, but many traplines continue to be held in high regard.

Healthy populations of fur bearers are reflective of healthy, functional landscapes. Species such as marten, fisher and wolverine are often referred to as indicator species – if their populations are viable, then generally the ecosystems in which they reside are biologically functional.

Marten are the most abundant of the three indicator fur bearer species with noted population fluxes depending on food supplies. Marten are highly reliant on the presence of coarse woody debris protruding from the snow to permit access to the forest floor in their pursuit of prey. They are also dependent on good forest structure for a variety of life requisites as well as undisturbed meadow complexes in their pursuit of voles. Although marten are generally found in and among forests, they will venture into natural burns provided standing and fallen forest structure remains on site. Clearcutting without consideration of stand structure retention, recruitment or debris pile management effectively eliminates marten habitat suitability well beyond the timelines of rotational forestry. Stand level considerations are essential in maintaining marten habitat within developed landscapes.

Fisher is a relatively rare animal and is a blue-listed (vulnerable) species in British Columbia. It is also listed under B.C.'s *Identified Wildlife Management Strategy Version 2004*³⁰ as a species requiring additional or specific management to sustain viable populations. Within the plan area, its relative rarity is more associated with its natural population distribution than as a result of habitat alteration. However, as landscapes become developed through road development, forest harvesting and other industrial activities, fisher numbers will likely decline. Fishers can be found from valley bottom to near treeline in search of their prey (most notably porcupine), although they generally reside in riparian habitats and dense forests containing decadent trees with cavities. These animals avoid larger openings due to their exposure and vulnerability to predators on these sites. The long-term threat to fisher population sustainability is loss of forested habitat with suitable structure. A secondary threat to fishers is direct mortality associated with their vulnerability to trapping.

Wolverine is a blue-listed (vulnerable) species in British Columbia. Like fisher, the wolverine is listed under the Identified Wildlife Management Strategy. Wolverines are vulnerable to trapping due to their scavenging and predatory nature. The species is also subject to a low reproductive rate and is easily disturbed in late winter when the females are in their dens with their new-born kits. These factors impact

³⁰ Strategy is available online at <http://www.env.gov.bc.ca/wld/frpa/iwms/iwms.html>

the viability of the wolverine population. Much like grizzly bears, wolverines require large areas with limited resource development to sustain viable populations. Areas considered refugia with adequate dispersal and connectivity among landscapes are crucial. In part, the management of grizzly bears will contribute, by default, to the management of wolverines from a landscape perspective.

The focus for fur bearer management within this plan has been on the broader scale known as the coarse filter biodiversity level, whereby managing for biodiversity will contribute to the maintenance of fur bearers. Biodiversity objectives in this plan will augment current management for marten, fisher, wolverine, ermine (weasel), mink, lynx, fox, coyote, wolf, muskrat and beaver. Specific management measures have been developed for vulnerable species, notably fisher and wolverine. To support on-the-ground application of management measures, this plan has recommended habitat suitability and capability mapping for fisher and wolverine.

2.4.4.2 Management Direction for Fur-bearers

Plan Goal for Fur-bearers

- Maintain high value habitat for identified fur-bearer species to help ensure a healthy population of fur-bearers.

Objective	Measures / Indicators	Targets
<p><i>1.0 Minimize impact to known high value fisher and wolverine habitat</i></p>	<p>1.1 Percentage of known fisher and wolverine denning sites impacted by industrial development.</p>	<p>0%</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Habitat capability/suitability mapping should be completed concurrently for fisher and wolverine. • Fisher denning habitats are currently identified as large veteran cottonwood trees which tend to grow on floodplains, but not exclusively. • Develop BMP’s for managing fisher and wolverine habitat. • Achievement of biodiversity objectives listed in the section “Management Direction for Biodiversity”, will contribute to the maintenance of fur-bearer habitat throughout the plan area. • Minimizing the duration of active roads and their conduciveness for human use, in proximity to mountains in the ESSF and MH BGC zones, will reduce risk to wolverine den site disturbance. 	

2.4.5.1 Northern Goshawk

The northern goshawk is a forest raptor that is presently yellow-listed in British Columbia. Yellow-listed species are not considered at risk of extinction, but are noted because they warrant special attention by wildlife and resource managers. The northern goshawk has been placed on this list due to the loss of nesting/post fledging areas and alteration of habitat as a result of clear-cut timber harvesting. As an indicator of forest ecosystem health, goshawk occupancy tends to signal a functional natural landscape.

Goshawks are primarily adapted to forest habitats and typically nest in mature to old growth coniferous stands that are even aged and have a closed canopy with an open understory. Their breeding territory

consists of three components: nest area, post fledging area and foraging area. The nest area usually includes multiple nest sites, plucking perches and roosts and is the center of activity for newly fledged young. Once established, goshawks exhibit a very strong attachment to nest areas, and often use them intermittently for many years. Studies to date suggest that goshawk young stay relatively close to the nest site during their initial post-fledging period. These studies recommend a post-fledging area designation of approximately 24 hectares and note the strong defensive behaviour exhibited by the parents. Nest sites, nest areas and post fledging areas are critical habitat components for the sustainability of goshawks. Protection and maintenance of these areas is a priority for goshawk conservation. As such, OGMA's will be relocated through the OGMA Amendment Process to protect goshawk nest areas and post fledging areas as they are located.

Evidence suggests that goshawks strongly prefer mature forests for foraging habitat. What is unclear is the adaptability of goshawks to habitat alteration in these areas given current forestry operations. Due to uncertainty around the amount and quality of foraging habitat needed to support successful fledging of young goshawks, this plan has not set measures and targets to address the proportion of a foraging area that should be retained in mature to old age classes. Goshawk inventories and research within the plan area are needed to fully understand the life requirements of the species. Priority has been placed on the collection of this information. As knowledge is developed on the subject, it will be important to revisit this section to further define and manage goshawk habitat for the benefit of the species.

Studies have shown that goshawk pairs are relatively evenly distributed within forest dominated landscapes with the distance between territories primarily driven by prey availability. Nests located in the closest and similar TSA, where studies have been conducted - the Kispiox, are on average four to five kilometres apart. Proportionately, prey kills are made more frequently in the largest patches of suitable foraging habitat closest to the nest, with most of the prey brought back to the nest within a two to three kilometre distance. The northern goshawk is a year round resident most years within the Nass TSA. Breeding success is strongly linked to the over winter body condition of the female, who is dependent on the quality of foraging habitat surrounding the nest. To help ensure breeding success, attention must be given to the availability and quality of this habitat. Although the science is not exact, it is desirable to have forty to sixty per cent of the foraging area in mature to old age classes, this prescription not too dissimilar from marten habitat management.

Northern goshawks are noted to prey on squirrels, grouse, thrush sized birds and woodpeckers, among other species. They utilize perch trees from which they launch ambush attacks on prey. They are also noted to hunt prey in second growth forests using the edge of mature to old stands, thus demonstrating some level of adaptability provided there is sufficient mature and old forest to support most of their life requisites.

The goshawk population residing within a few landscape units in the plan area is noted to have been negatively impacted as a result of past timber harvesting. Restoration of these landscape units is described within this section of the plan.

BMPs are to provide direction that allow for restoration of goshawk habitat (e.g. rotation lengths to develop structure, stocking standards and spacing, and future harvesting systems such as intermediate cutting and small patches). Restoration of compromised goshawk habitat, most notably in the landscape units of Brown Bear, Madely, and White, will require identification of location and extent of goshawk habitat that has been negatively impacted by harvesting. Targets are also needed for the conservation of future goshawk habitat.

2.4.5.2 Management Direction for Northern Goshawk

Plan Goals for Northern Goshawk

- Maintain a viable population of northern goshawk within the plan area.

Objective	Measures / Indicators	Targets
1.0 <i>Maintain nesting and post-fledging habitat at known goshawk nest areas, to support continued use and reproduction in those areas</i>	1.1 Number of known goshawk nest and post-fledging areas retained.	All
	1.2 Amount of mechanized activity ³¹ within 500 m of active goshawk nest(s) between February 15 and August 15.	No activity
	1.3 Amount of human activity ³² within 200 m of active goshawk nest(s) between February 15 and August 15.	No activity (unless no practicable alternative exists)
<p>Management Considerations</p> <ul style="list-style-type: none"> • The nest and post-fledging area is approximately 24 ha. This area is generally large enough to include the buffer, the distribution of alternative nests, roosts, plucking perches and juvenile post-fledging area movement. • The shape and boundaries of nest and post-fledging areas should be ecologically based to maximize the value of the area, to maintain nest area occupancy and breeding success. Where multiple nests occur, the nest- and post-fledging area should maximize the amount of high-quality nest-area habitat included within it (e.g. generally Hw leading, age class ≥ 8, canopy closure class ≥ 5, open understory). • A qualified professional should be notified immediately upon discovery of a goshawk or active nest. It will be the responsibility of the qualified professional to determine the size and configuration of the nest- and post-fledging area and adjacent habitat connectivity, in consultation with the respective forest licensee. • If mechanized activity must occur within 500 m of an active goshawk nest between February 15 and August 15, forest licensees are requested to notify the Ministry of Forests, Lands and Natural Resource Operations so that goshawk activity can be monitored. • Habitat capability/suitability mapping should be completed for goshawk, using provincially approved standards. • A concerted effort should be undertaken to identify active nest-post fledging areas to assist in the spatial identification of territories and implementation of plan direction. • See Map 16: Nass South SRMP – Goshawk Nesting/Post Fledging Habitat 		

³¹ Mechanized activity is road construction and timber harvesting/mechanized silviculture activities.

³² Human activity includes log hauling, and those activities not identified as mechanized activity.

Objective	Measures / Indicators	Targets
2.0 <i>Maintain foraging habitat³³ around known goshawk nest and post-fledging areas</i>	2.1 Proportion of perimeter of nest and post-fledging area that is directly connected by mature or old forest to comparable forest in the foraging area.	Minimum of 30%
	Management Considerations <ul style="list-style-type: none"> • Upon locating a goshawk nest-post fledging area, a sensitivity analysis should be conducted of the forage area, as best as it can be defined. The analysis should be in the form of a risk assessment with respect to: <ul style="list-style-type: none"> ○ percentage of mature and old forests; ○ degree of forest fragmentation; and ○ other considerations that may be impacting utilization of available habitat supply. • Where practicable, forest licensees should plan operations to minimize loss of habitat supply within active forage areas, utilizing current science. 	
	2.2 Mature and old forest structure and function retained within determined foraging area around known goshawk nest and post-fledging areas.	$\geq 60\%$

2.4.6.1 General Wildlife

Numerous high value habitats have been identified throughout the plan area for species of management concern. These valuable habitats, although proposed for specific species, also provide significant value for wildlife in general.

Several additional areas of habitat have been identified for general wildlife, centred on wetland and riparian features which are “hot spots” of biodiversity and wildlife activity. Relative to their size, wetland and riparian habitats tend to have a disproportionately higher value for general wildlife than the surrounding forest matrix, and are used by a variety of amphibians, birds and mammals. These areas also serve as biological anchors throughout the landscape.

Management intent is to protect these special wetland and riparian habitats for general wildlife. Protection of these habitats will, in part, also benefit some species of management concern. Additional high value habitats for general wildlife may be identified by forest managers, and it is expected that these will be managed to retain values for general wildlife.

³³ Goshawk forage habitat is defined as the hunting territory typically used by a pair of goshawks.

2.4.6.2 Management Direction for General Wildlife

Plan Goal for General Wildlife

- Protect special habitats for general wildlife

Objectives	Measures/Indicators	Targets
<i>1.0 Maintain effectiveness³⁴ of riparian habitats adjacent to wetlands in polygons identified on Map 15: Nass South SRMP – Special Habitats for General Wildlife</i>	1.1 Proportion of the forested area of the hydroriparian zone ³⁵ retained for each identified feature, except where no practicable alternative exists to: <ul style="list-style-type: none"> • build roads or trails. • access or harvest timber that is outside the hydroriparian zone. • mitigate a safety concern. • negate impacts on adjacent forest values from a compelling forest health issue. 	100%

2.5 Fisheries

2.5.1 Overview of Fisheries Resources

The Nass South SRMP area overlaps the middle portion of the Nass River watershed within the Nass TSA and the Bear River watershed that drains into the Pacific Ocean at Stewart. The Nass River watershed is the third largest watershed entirely contained within the province of B.C., encompassing roughly 20 500 km². It drains the Bowser, White, Kinskuch - Ksi Ginsgox, Tchitin Rivers and Ksi Gwinhat'al, as well as Surprise, Hanna and Tintina Creeks, via Meziadin Lake - T'aam Mits'iaadin.

The plan area has very high fish values, providing habitat for all species of Pacific salmon, steelhead and resident populations of cutthroat trout, rainbow trout, Rocky Mountain whitefish, large-scale sucker, red-sided shiner, peamouth chub, northern pike minnow, Pacific lamprey and eulachon. The region is also inhabited by bull trout and dolly varden, both of which are blue-listed in B.C. or considered threatened in their present range. Very little is known about the range and population densities of bull trout and dolly varden in the Nass, some of which are resident, while others migrate to the ocean.

Management intent is to maintain or increase wild indigenous fish populations, with emphasis on salmon, summer-run steelhead, bull trout and dolly varden; to preserve, maintain and restore fish habitat; to protect sensitive fish populations and habitat; and to provide for sustenance, recreational and commercial use, and tourism opportunities of the fisheries.

Given dwindling salmon stocks to the south, oceanic temperature and nutrient shifts associated with global climatic changes, and various pressures on local salmon contributing to declining stocks, it is imperative that plan area watersheds be managed for effective fisheries stewardship.

³⁴ "Effectiveness" means the continued use of a habitat by the species that historically utilized it.

³⁵ Hydroriparian zone as defined in item 4 of Table 7.

2.5.1.1 Salmon

The abundance and diversity of salmon migration to spawning beds make the Nass watershed provincially, nationally and internationally significant. The Nass River - K'ali Aksim Lisims itself is one of B.C.'s top three salmon-producing rivers. Supporting the third largest run of sockeye salmon in B.C., the Nass - K'ali Aksim Lisims produces twelve distinct stocks and, on average, over 800 000 sockeye per year. The Bear River watershed also supports salmon runs, most notably in the Salmon River flowing near Hyder, Alaska that is sourced by the ice fields associated with the Salmon Glacier in Canada.

Critical habitats for salmon and steelhead can be found within the plan area including the Nass River - K'ali Aksim Lisims mainstem, Bell-Irving River mainstem, Meziadin River, Bowser River, Bear River, Tchitin River, Kwinatahl River - Ksi Gwinhat'al, Kinskuch River - Ksi Ginsgox, Upper Kwinageese River, Brown Bear Creek, Hanna Creek, Tintina Creek and Surprise Creek. Five Conservation Units (CUs) for lake-type sockeye salmon have been designated under the Wild Salmon Policy within the plan area. These are Meziadin River, Upper Kwinageese River, Bowser River, Bear River and Clements Creek, a tributary of the Bear River. A single CU for stream-type sockeye salmon has also been designated within the plan area consisting of two populations: Tchitin River and Brown Bear Creek.

Sixty to eighty percent of all sockeye returning to the Nass River - K'ali Aksim Lisims originate from the Meziadin Lake CU - T'aam Mits'iaadin. Meziadin sockeye spawn along the shorelines of Meziadin Lake - T'aam Mits'iaadin and in Hanna, Tintina and Surprise Creeks. However, the majority of the spawning areas are found in the lower reaches of Hanna and Tintina Creeks. Both Hanna and Tintina Creeks have impassable falls, at approximately 11 and 15 km upstream of Meziadin Lake - T'aam Mits'iaadin, respectively, which limit anadromous spawning to the lower reaches.

After Meziadin Lake CU - T'aam Mits'iaadin, the Bowser River sockeye CU is the next largest producer of sockeye, followed by the Kwinageese River system, although only the Upper Kwinageese River is within the plan area. Brown Bear Creek also hosts a small population of stream-type sockeye and the Bear River sockeye population is relatively modest as well.

Meziadin River, Tchitin River and Kwinatahl River - Ksi Gwinhat'al, provide the most significant tributary habitat for Chinook and Coho salmon and summer-run steelhead within the plan area. The mainstem of the Nass River - K'ali Aksim Lisims and Bell-Irving Rivers also provides quality migration and rearing habitat for all salmon and summer-run steelhead as well as some spawning habitat in presently unknown locations.

As a "keystone" species, salmon bring valuable marine nutrients inland to feed a multitude of flora and fauna throughout the Nass South SRMP watersheds, contributing to rich, diverse and healthy ecosystems. Annual salmon migrations are regarded as one of the important nutrient and life-energy flows that occur within the watersheds. The interconnectedness of salmonids, their habitat, and the surrounding landscape is well established. Salmon help support viable populations of trout and char species, smaller fish and an array of benthic organisms. Abundant salmon in the Hanna and Tintina Rivers also help support a population of grizzly bears.

Sockeye, in addition to the other Pacific salmon and steelhead species in the watershed, are extremely important to the Gitanyow and Nisga'a citizens who fish in the area for food, social and ceremonial purposes. The *Nisga'a Final Agreement* provides for annual allocations of salmon and steelhead to Nisga'a citizens.

Nass River - K'ali Aksim Lisims salmon and steelhead populations are important for commercial and sport fisheries that target these species on an annual basis. The value of the sport and commercial fisheries is a major economic driver in the region. A recent study by IBM Consulting, commissioned by the Northwest

Institute for Bioregional Research, showed that the adjacent Skeena River system contributes \$100,000,000 annually to the economy. No comparative study has been done for the Nass River - K'ali Aksim Lisims, but it is safe to say that it contributes tens of millions of dollars annually to the provincial economy, not including its contribution to the Alaskan economy.

Management for salmon is to be consistent with the intent of the Wild Salmon Policy³⁶. The Wild Salmon Policy is founded on six commitments including: safeguarding the genetic diversity of wild salmon populations; maintaining habitat and ecosystem integrity; managing fisheries for sustainable benefits; making decisions through open and accountable public processes; ensuring accountable management and evaluation of progress; and forging partnerships with First Nations and stakeholders.

2.5.1.2 Bull Trout

Bull trout are resident fish that inhabit plan area watersheds. They are a key predator in the aquatic food chain and a valuable seasonal food fish to the Gitanyow and Nisga'a. Bull trout are also important sport and food fish to local residents.

Bull trout are classified by the Conservation Data Centre of B.C. as a blue-listed (vulnerable) species due to population decline throughout its global range. The decline is attributed primarily to habitat degradation, disruption of migratory patterns and over-fishing.

Careful regulation of fishing, public education of bull trout identification and attention to spawning bed access management are required to conserve bull trout within the plan area.

This plan provides direction for identifying bull trout habitat, which in turn will provide the basis for better stock management.

2.5.2 Management Direction for Fisheries

Plan Goal for Fisheries Resources

- Protect fish populations by preserving, maintaining and restoring fish habitat.

Objectives	Measures/Indicators	Targets
<i>1.0 Maintain habitat for indigenous fish populations</i>	1.1 Number of fish bearing streams, rivers and lakes adversely impacted by industrial development except where permitted under applicable legislation.	Zero

³⁶ For further information on the Wild Salmon Policy, refer to:
http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/wsp/default_e.htm

Objectives	Measures/Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> Maintenance of salmon habitat consistent with the Wild Salmon Policy is a high priority - http://www-comm.pac.dfo-mpo.gc.ca/pages/consultations/wsp/default_e.htm Inventories to be conducted to identify all fish-bearing streams for the entire plan area, with emphasis on salmon, summer-run steelhead, bull trout, dolly varden and eulachon. Areas most likely to be affected by industrial development or potentially having vulnerable fish stocks should receive first funding priority. 	
<p>2.0 Restore habitat for indigenous fish populations</p>	<p>2.1 Percentage of damaged fish-bearing streams, rivers and lakes where pre-damage functionality is restored by operationally and financially feasible activities that do not cause further damage or interfere with natural restoration processes.</p>	<p>100%</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> Intent is to pursue funding to conduct habitat restoration work, but recognize that funding is not guaranteed. See Water Section, Objective 5, Management Considerations, regarding a Watershed Restoration Plan. Restoration of salmon habitat consistent with the Wild Salmon Policy is a high priority. Inventories to be conducted to identify all fish-bearing streams for the entire plan area, with emphasis on salmon, summer-run steelhead, bull trout, dolly varden and eulachon. Areas most likely to be affected by industrial development or potentially having vulnerable fish stocks should receive first funding priority. 	

2.6 Cultural Heritage Resources

2.6.1 Overview of Cultural Heritage Resources

Cultural heritage resources include both intangible and tangible resources.

Intangible resources are those such as oral histories, laws, customs, ceremonies, language, family crests and names, place names, and traditional knowledge. These cultural heritage resources evolved from and were shaped by the surrounding land and the natural resources of the land; they are directly and inextricably connected to and reliant upon the sustained presence and quality of the ecological resources of the land.

Tangible cultural resources include ecological resources: the geographic features, soil, water, fish, wildlife, and plants of the land. Tangible cultural resources also include specific locations on the landscape, termed cultural sites, and broad areas, termed cultural areas, where traditional activities were, and are, pursued.

Examples of cultural sites include, but are not limited to: fishing sites; cabin sites; village sites; medicinal plant sites; spiritual sites; culturally modified trees; grave sites; and cache pit sites. Examples of the broader cultural areas are hunting areas and trapping areas.

Archaeological Sites and Heritage Sites are a subset of cultural sites where archaeological investigations have occurred.

Gitanyow has prepared, completed, and reviewed with the Province of BC and Forest Licensees a cultural heritage policy entitled *The Gitanyow Policy Manual for Management of Cultural Heritage Resources*, September 13, 2009. This is a Gitanyow document that stresses the importance of cultural and natural resources to the Gitanyow culture, and sets forth policies and procedures for identification and management of these resources.

In the past several decades, development activities such as timber harvesting as well as logging road and highway construction have damaged or destroyed many cultural resources of both the Gitanyow and Nisga'a. Development has been initiated with inadequate knowledge of, and concern for, traditional use and cultural resources.

This plan incorporates direction for resource management intended to sustain cultural resources and opportunities for traditional use of the land by current and future generations. This chapter deals primarily with cultural sites; additional chapters focus on management of the natural resources of the land.

2.6.2 Management Direction for Cultural Heritage Resources

Plan Goal for Cultural Heritage Resources

- Recognize and respect Gitanyow and Nisga'a traditional areas, values and activities so that they may exercise their aboriginal rights on the landscape.

Objectives	Measures / Indicators	Targets
<i>1.0 Preserve cultural sites</i>	1.1 Number of pre-1846 cultural sites with their integrity maintained, except where authorized by applicable legislation and consented to by Gitanyow.	All
	1.2 Number of post 1846 cultural sites with their integrity maintained except where consented to by Gitanyow, or consented by NLG if the site is a Nisga'a site.	All

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Preservation refers to mapped and unmapped cultural sites. • Management of cultural sites should be consistent with the <i>Gitanyow Policy Manual for Management of Cultural Heritage Resources, September 13, 2009</i>³⁷. The cultural heritage policy addresses: <ol style="list-style-type: none"> 1) measures for preservation of different groupings of cultural heritage resources, 2) consultation protocols, and 3) procedures designed to develop effective working relationships between Gitanyow and development proponents. • Management of cultural heritage sites is to be consistent with the <i>Nisga'a Final Agreement</i>, as applicable under Chapter 17, paragraphs 37 and 38. • Best efforts should be undertaken by Gitanyow, the Province and forest licensees to locate, with GPS, the remaining sections of the Grease Trail within the plan area. • Gitanyow are to update database of Gitanyow sites annually. • Cultural sites include but are not limited to culturally modified trees (CMTs), trails, cache pits, house pits, grave sites, fishing sites, pictograph sites, smoke houses, cabins, camping sites and archaeological sites. Cultural areas include hunting, fishing and berry-picking areas. 	
<p>2.0 <i>Preserve cultural heritage resources</i></p>	<p>2.1 Percentage of authorizations issued for timber harvesting or road construction where consultation occurs to facilitate continued traditional uses of cultural heritage resources.</p>	<p>100%</p>
	<p>2.2 Percent of identified sites that are reported to Gitanyow, NLG, forest licencees and government for use in a database.</p>	<p>100%</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Continued mapping of cultural heritage resources is required. • Management of cultural heritage resources should be consistent with the <i>Gitanyow Policy Manual for Management of Cultural Heritage Resources, September 13, 2009</i>. The cultural heritage policy addresses: <ol style="list-style-type: none"> 1) measures for preservation of different groupings of cultural heritage resources, 2) consultation protocols, and 3) procedures designed to develop effective working relationships between Gitanyow and development proponents. • Gitanyow are to update the database of Gitanyow cultural heritage 	

³⁷ For a copy of the *Gitanyow Policy Manual for Management of Cultural Heritage Resources, September 13, 2009* contact the Gitanyow Hereditary Chiefs

Objectives	Measures / Indicators	Targets
	<p>resources Management of cultural heritage resources is to be consistent with the <i>Nisga'a Final Agreement</i>, as applicable under Chapter 17, paragraphs 37 and 38.</p> <ul style="list-style-type: none"> Archaeological sites are traditional use sites where archaeological investigation has occurred and where physical evidence of past human activity has been found. Examples include culturally modified trees (CMTs), trails, cache pits, house pits, grave sites, pictograph sites, smoke house, cabins, artifacts and areas traditionally used for camping, hunting, fishing and berry-picking. 	
<p>3.0 Address Gitanyow and Nisga'a interests in access to cultural sites</p>	<p>3.1 Proportion of cultural sites where Gitanyow and Nisga'a access interests are addressed.</p>	<p>100%</p>
	<p>Management Consideration</p> <ul style="list-style-type: none"> Following consultation, interests are addressed regarding access concerns occurring before, during and following industrial development. 	
<p>4.0 Identify and record locations of CMTs; minimize impact to these where appropriate</p>	<p>4.1 Percentage of identified CMTs of any historical date, recorded in a Gitanyow database, or reported to NLG if the CMT is from the Nisga'a.</p>	<p>100%</p>
	<p>Management Consideration</p> <ul style="list-style-type: none"> When collecting CMT related information, best efforts should be made by forest licensees to use the procedures manual, located at: http://www.tca.gov.bc.ca/archaeology/policies/recording_culturally_modified_trees.htm The <i>Gitanyow Cultural Heritage Policy</i> will include the comprehensive CMT Policy and BMP's for CMT Management. 	
<p>5.0. Maintain a sustainable source of cedar for Gitanyow traditional, cultural and subsistence use</p>	<p>5.1 Percentage of polygons identified in <i>Plan for a Long-Term Sustainable Supply of Cedar from Gitanyow Traditional Territory for Gitanyow Cultural and Domestic Purposes, March 12, 2008</i>, that are fully reserved for Gitanyow management and harvest.</p>	<p>100%</p>
	<p>5.2 Percentage of proposed cutblocks having a component of cedar, where consultation with the Gitanyow around the use of cedar occurs.</p>	<p>100%</p>

Objectives	Measures / Indicators	Targets
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Gitanyow are required to identify to licensees their traditional, cultural and subsistence needs. • Identify the amount of available supply of cedar for Gitanyow needs. • Licensees are required to consult with the Gitanyow on proposed or planned cutblocks that have a cedar component. • NLG is to be provided information concerning forest stewardship plans, consistent with the <i>Nisga'a Final Agreement</i>, as applicable under Chapter 5, paragraph 75. 	

2.7 Timber

2.7.1 Overview of Timber Resources

Several biogeoclimatic ecosystems characterize the Nass South SRMP area, due to its proximity to coastal influences along the western boundary and interior influences along the eastern boundary. Within the plan area, both the coastal and interior ecosystems express variances as they transition from south to north, and are impacted by influences from the Coast Mountain Range and the Cambria Icefield.

The majority of the timber-harvesting land base is located along the Highway 37 corridor and east of the Cambria Mountain Range (see **Map 5: Nass South SRMP – Timber Harvesting Land Base**). At lower elevations, these forests are comprised of ecosystems classified as Interior Cedar-Hemlock Moist Cold Subzone/Nass Variant (ICHmc1), southeast of Mt Bell Irving; and Interior Cedar-Hemlock Very Wet Cold Subzone (ICHvc), from the White River watershed to Meziadin Lake - T'aam Mits'iaadin and north along the highway corridor to the northern plan area boundary. Higher-elevation forested ecosystems along the eastern portion of the plan area are predominantly Engelmann Spruce-Subalpine Fir/Wet Very Cold Subzone (ESSFwv).

In the Bear River valley, coastal ecosystems are comprised of Coastal Western Hemlock Wet Maritime Subzone (CWHwm) along the lower elevations, and Mountain Hemlock Undifferentiated Subzone (MHun) at mid-slope and higher elevations. Coastal ecosystems in the southern plan area, primarily in the Kwinatahl and Kshadin watersheds, are Coastal Western Hemlock Wet Sub-maritime Subzone Montane Variant (CWHws2) at lower elevations, with Mountain Hemlock Moist Maritime Windward and Leeward Variants (MHmm1 and MHmm2) at higher elevations.

The leading tree species in the plan area are hemlock (about 70 percent) and fir (about 20 percent), with smaller amounts of pine, spruce, cedar and deciduous tree species (see **Map 4: Nass South SRMP – Vegetation Cover**). Of these stands, approximately 46 percent are older than 250 years; 71 percent are older than 140 years. The timber-harvesting land base is dominated by hemlock-leading stands with low-to medium-productivity site indices of 11 to 15 metres (average height in metres of tallest trees at age of 50 years). Site productivity in second-growth stands is likely higher, because the site index is known to be underestimated in old-growth forests in the Nass TSA.

With the exception of the Bear River watershed, most of the western half of the plan area is covered by mountainous and glaciated terrain which does not contribute to the timber-harvesting land base. Of the forest Crown land base of 289 675 ha, approximately 155 700 ha (or 54 percent) are within the timber-harvesting land base.

Timber-harvesting practices are particularly sensitive to market conditions, for two reasons: there are no primary manufacturing facilities within or immediately adjacent to the Nass South SRMP area, and the area is dominated by old, low-quality stands. Therefore, timber-harvesting within the plan area generally operates at the margins of profitability.

These factors make it difficult for forest licensees to develop and harvest volume from across the complete, operable forest profile, including cable-based harvesting areas. The plan area is dominated by old, low quality, hemlock- leading stands that generally contain a significant pulpwood component. Without a local or sub-regional demand for pulpwood, licensees are limited to those areas where ground-based harvesting can be used.

The Nass South SRMP sets objectives and targets to provide licensees with higher-level direction consistent with the results-based framework of the *Forest and Range Practices Act*. This will provide licensees with the flexibility to develop harvesting plans that can respond to changes in market conditions.

Dothistroma needle blight has impacted a significant portion of young lodgepole pine stands in the ICH biogeoclimatic zone. Management strategies have been implemented, such as limiting the planting of lodgepole pine in the ICH in order to halt the spread of this forest disease. The Ministry of Forests, Lands and Natural Resource Operations continues to monitor existing young lodgepole pine stands for infestation, and is developing management strategies to address areas which are not sufficiently restocked.

The issues described above have important short-term implications for forest management in the plan area. In the short to medium term, the mountain pine beetle epidemic in B.C.'s interior will have provincially significant timber supply impacts. Although the Nass South SRMP area is not significantly affected by the epidemic, it may help address the regional timber supply shortages that are expected to result.

Nass South SRMP requirements will ensure that future forest development is sustainable, and that non-timber values are properly managed.

2.7.2 Management Direction for Timber

Plan Goals for Timber Resources

- Promote full utilization of productive sites while providing stable or increased harvest levels.
- Develop a sustainable and economically viable forest industry that contributes to the local community over the short and long terms, while respecting Gitanyow and Nisga'a interests.

Objectives	Measures / Indicators	Targets
<i>1.0 Dedicate and maintain a productive timber-harvesting land base, that promotes an economically sustainable forest industry</i>	1.1 Net area of timber available for harvest.	Identify and maintain
	Management Consideration <ul style="list-style-type: none"> • Management of the timber harvesting land base is to consider and respect non-timber resources and maintain Wilp sustainability. 	

Objectives	Measures / Indicators	Targets
<p>2.0 <i>Avoid timber harvesting within proposed treaty settlement lands (refer to Map 17: Nass South SRMP - Gitanyow Treaty Settlement Lands Offer (2002))</i></p>	<p>2.1 Amount of timber harvesting occurring within proposed treaty settlement lands.</p>	<p>Zero</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Preservation of proposed treaty settlement lands does not constitute acceptance by Gitanyow of this offer. 	
<p>3.0 <i>Manage the forest harvest to represent the timber quality and terrain profile</i></p>	<p>3.1 Stands harvested with age greater than 250 years.</p>	<p><i>Proportionate to occurrence within Licensee operating area</i></p>
	<p>3.2 Stands harvested on slopes greater than 35%.</p>	<p><i>Proportionate to occurrence within Licensee operating area</i></p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Timber harvest will represent the timber quality and terrain profile of the planning area to the extent possible, as determined by timber type and quality, market prices and operational costs, and remain at the discretion of the licensee. The intent is to harvest the profile, while retaining opportunities for the economic viability of the licensee. • Monitor the terrain and timber profile harvested. Performance in harvesting the profile as averaged over a five- year period should be submitted to the Chief Forester together with a recommendation that the harvesting performance be considered in the AAC determinations. 	
<p>4.0 <i>Maintain the long-term health and site productivity of the timber harvesting land base</i></p>	<p>4.1 Long-run sustained yield.</p>	<p>Maintain or increase</p>
	<p>4.2 Mean annual increment.</p>	<p>Maintain or increase</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Implement silvicultural systems and treatments to realize overall productivity within the timber-harvesting land base. • Consider local forest pests and diseases (e.g. lodgepole pine vulnerability to dothistroma) when restocking sites. • Consider the effects of climate change on forest health. 	
<p>5.0 <i>Limit conversion of the available</i></p>	<p>5.1 Area permanently removed from the productive forest, for purposes other than timber harvesting.</p>	<p>Minimize</p>

Objectives	Measures / Indicators	Targets
<i>productive forest land base for non-timber purposes.</i>	Management Considerations <ul style="list-style-type: none"> It is recognized that some conversion will occur; this will be addressed by the Joint Resources Council on a case-by-case basis. Examples of conversion include, but are not limited to, agriculture and the establishment of utility corridors. Efforts should focus on minimizing duplication of access by other resource sectors (e.g. shared use of logging roads by the mining sector). 	
6.0 <i>Develop long-term plans that recognize and respect Gitanyow and Nisga'a interests in the forest resource.</i>	6.1 Percentage of plans where Gitanyow and NLG interests are incorporated.	100%
	Management Consideration <ul style="list-style-type: none"> NLG is to be provided information concerning forest development plans, consistent with the <i>Nisga'a Final Agreement</i>, as applicable under Chapter 5, paragraph 75. Gitanyow and licensees are to develop a standardized protocol for ensuring Gitanyow interests are recognized (e.g. number of meetings, meeting locations, and items to cover). 	

2.8 Special Resource Management Zones

2.8.1 Overview of Special Resource Management Zones

Special Resource Management Zones (SRMZs) are areas where management direction for some resource values is incremental to general management direction.

The Nass South SRMP identified 2 zones for area-specific management. These are shown in **Map 18: Nass South SRMP – Water Management Units** and **Map 20: Nass South SRMP – Hanna-Tintina Area to be Protected**. Management objectives, developed for each SRMZ, address values that are specific to that area.

2.8.1.1 Water Management Units

Water Management Units with SRMZ status (illustrated on **Map 18: Nass South SRMP – Water Management Units**) encompass the valley walls and headwater bowls of many large rivers and streams of the plan area. The WMUs are located within steep, broken mountainous terrain and have many first and second order streams tributary to the main valley bottom streams. These streams are generally closely spaced, in small to large gullies or canyons, frequently within avalanche tracks, and are susceptible to changes in flow regime and water quality.

Soils within the WMUs are primarily fine textured glacial till deposits of varying depth over sedimentary bedrock. Valley slopes are steep, generally 50% to 70% in gradient, and continuous from valley bottom to ridge top. Throughout the WMUs there is evidence of past and current slope instability. The majority of the area within the WMUs is considered to be within the hydrosiparian zone.

Timber development within the WMUs would result in continuous high steep cut-and-fill road slope vulnerable to erosion, with resultant deposition into down slope streams, and may increase the potential for mass wasting and changes to the natural hydrologic regime

The WMUs are situated primarily within the Englemann Spruce-Subalpine Fir/Mountain Hemlock/Alpine Tundra biogeoclimatic zones, with lesser areas of Coastal Western Hemlock/Interior Cedar-Hemlock biogeoclimatic zones at lower elevations. These areas support high-elevation forests characterized by heavy snow accumulation; harvesting in such areas may result in increased accumulation of snow,

acceleration of snow melt, synchronization of higher- and lower-elevation snow melt, and increased peak flows. The forests are considered unique, with high conservation values for water quality and watershed hydrology.

The water management units are primarily outside of the timber-harvest land base. However, they are not reserved from timber-harvesting or other industrial activities, and may be harvested. The Nass South SRMP determined that the high sensitivity of these headwater wetlands, lakes, and streams demands special management to ensure that industrial operations avoid or minimize impact to water quality and watershed hydrology.

2.8.1.2 Management Direction for Water Management Units

Plan Goal for Water Management Units

- Manage surface water and groundwater to maintain water quality and peak and low flows within the range of natural variability, and protect the hydrologic integrity of the watersheds.

Objective	Measures / Indicators	Targets
<i>1.0 Ensure proper hydrological functioning of streams, lakes and wetlands within water management units identified on Map 18: Nass South SRMP – Water Management Units</i>	1.1 Proportion of wetlands, lakes and streams that have full retention of the forested area of their hydroriparian zone ³⁸ , excluding harvesting for traditional uses, mining, compelling forest health issues, or variances as stated in measure 1.2 below.	100%
	1.2 Variance by which cutblocks overlapping the water management unit boundary may extend into the unit, while maintaining the riparian management practice applicable to the forest land base outside of it.	Up to 50% of the cutblock area, or up to 200 m distance, whichever is less
	Management Considerations	
	<ul style="list-style-type: none"> • Management intent is to provide operational flexibility for cutblock planning, and to account for inaccuracies due to the scale of mapping. 	
	1.3 “Functioning condition” as defined by the <i>Protocol for Evaluating the Condition of Streams and Riparian Management Areas</i> , for each local and downstream stream receiving water from a cutblock within the Water Management Unit.	Properly functioning ³⁹
Management Considerations		

³⁸ Hydroriparian zone as defined in item 4 of Table 7.

³⁹ “Properly Functioning” for a stream, river, wetland or lake and its riparian area means:

- the ability to withstand normal peak flood events without experiencing accelerated soil loss, channel movement or bank movement;
- the ability to filter runoff;
- the ability to store and safely release water;
- ability of riparian habitat to maintain an adequate root network or large woody debris supply;
- ability of riparian habitat to provide shade and reduce bank microclimate change; and,
- fish habitat in streams and riparian areas are fully connected so that fish habitat is not lost or isolated as a result of some management activity.

Objective	Measures / Indicators	Targets
	<ul style="list-style-type: none"> Assessment protocol is available online at: http://www.for.gov.bc.ca/hfp/frep/site_files/indicators/Indicators-Riparian-Protocol-May2007.pdf Monitoring to include streams within cutblocks and streams down slope from cutblocks to which cutblock streams are tributary. The intent is to assess the cumulative hydrological impacts of accelerated snowmelt and groundwater interception as small in-block streams merge down slope from the cutblocks. 	

2.8.1.3 Protected Areas

Protected Areas are managed for their significant natural, recreational and cultural heritage values⁴⁰.

When a new area is set aside for protection, planning and management is undertaken in a co-operative manner, with welcome involvement from NLG, the Gitanyow and any parties with a key interest or stake in the area. While protection excludes extractive activities such as commercial logging, mining, and energy exploration and development, many other existing activities can and do continue inside Protected Areas, subject to each area's specific management plan.

The Nass South SRMP area currently has two Class A (i.e. fully protected) provincial parks within its boundaries:

- Meziadin Lake Provincial Park** (335 hectares): Located near Meziadin Junction on the shores of Meziadin Lake - T'aam Mits'iaadin, this park primarily offers recreational use to the travelling public and provides a boat launch for access to the lake. The provincial campground located within the park is a popular stopover for tourists during summer. Activities include swimming, angling or viewing the salmon enhancement projects at the southern end of Meziadin Lake - T'aam Mits'iaadin, where it flows into Meziadin River. The park serves a secondary conservation role, by protecting part of a salmon-spawning creek and some grizzly bear habitat.
- Bear Glacier Provincial Park** (542 hectares): This park is located 25 kilometres west of Meziadin Junction on Highway 37A towards Stewart. It protects a glacial lake and the lowest portion of the Bear Glacier. A small roadside rest/picnic area offers visitors the only view of a glacier fronting a paved highway in British Columbia. This park was designated and is protected by the *Nisga'a Final Agreement*.

Swan Lake / Kispiox River Provincial Park (62,319 hectares total; 4,400 hectares within SRMP): Only the Brown Bear Lake area of the park falls within the SRMP boundary. Access is via the Brown Bear Forest Service Road, approximately 33 km north of Cranberry Junction on Hwy 37. Characteristic of the park in general, the Brown Bear Lake area features closed-canopy, old growth interior cedar and hemlock forests that provide habitat for populations of grizzly bear and moose. In addition, critical salmon habitat can be found along Brown Bear Creek. The area is virtually undisturbed and is an unmodified natural environment with very few trails.

Collaborative management agreements will be considered between the Gitanyow and the Province of BC as well as NLG and the Province of BC for management of any new parks/conservancies within the Nass

⁴⁰ For further information on Parks within the Nass South SRMP plan area, refer to: <http://www.env.gov.bc.ca/bcparks/>

South SRMP area. The Province will consult with the Gitanyow and NLG with respect to planning and management.

2.8.1.4 Management Direction for the Area to be Protected

The Nass South SRMP will designate a new Protected Area known as the Hanna-Tintina. It is north of Meziadin Junction, and is approximately 24,260 hectares in size, or 3.7% of the Nass South SRMP area. It encompasses Hanna and Tintina Creeks, located in a valley bound by the Hanna Ridge to the west and Mount Bell Irving to the east. It extends south to the confluence of the Meziadin and Nass River - K'alii Aksim Lisims; its northern reach excludes the area around Surveyors Creek but consists of many smaller creeks and wetlands.

With steep timbered hillsides, alpine slopes, riparian and wetland ecosystems, the area's topography and ecology contribute to important grizzly and fish habitats. About 80 per cent of the sockeye salmon in the Nass River - K'alii Aksim Lisims system spawn in Hanna and Tintina Creeks.

The Nass South SRMP recognizes that the Province of B.C. has an interest in potentially establishing a new utility corridor through this area, for the development of a hydroelectric transmission line. This line would provide power to a number of proposed industrial activities in the province's northwest corner.

This plan recommends the establishment of a formal Protected Area under the *Environment and Land Use Act*. If it is determined, through an environmental assessment conducted in accordance with the *Environmental Assessment Act*, all other applicable legislation and regulations, and the *Nisga'a Final Agreement*, that a proposed hydroelectric transmission corridor may be constructed and operated through the Hanna-Tintina Area without significant adverse environmental effects, the construction and operation of such a corridor will be considered to be an acceptable use in the Hanna Tintina Area. The only permitted industrial development within the Protected Area would be the construction and establishment of such a hydroelectric transmission corridor.

NLG, Gitanyow and stakeholders involved in the Nass South SRMP have agreed to move forward with the Hanna-Tintina as an area to be protected. To note: the term "area to be protected" does not imply any specific designation of park, Protected Area or conservancy. BC Parks will determine the most appropriate designation of protection for the Hanna-Tintina area, based on the objectives described by this SRMP.

Prior to legal designation, the Protected Area boundary must be confirmed at an operational scale. This typically results in adjustments to boundaries that were proposed at the strategic scale during the planning process. Such adjustments may be related to terrain or ecological considerations, adjacency concerns or access issues. Ultimately, protected-area boundaries will be established in a manner that does not constrain access to known resources or utility corridors.

The table below contains a set of objectives and implementation direction that applies to the area to be protected as a result of this plan. Overall, this direction is to guide management until such time as a management plan is developed. Any subsequent management plan will be consistent with initial management direction provided by the SRMP.

Plan Goal for the Area to be Protected

- Protect key resource values such as fisheries, wildlife, recreation and cultural heritage resources while allowing for continued traditional use activity and identified economic opportunities to prevail.

Objectives	Measures / Indicators	Targets
<i>1.0 Maintain conservation,</i>	1.1 Completion of a management plan for the area to be protected.	As soon as practicable

Objectives	Measures / Indicators	Targets
<p><i>recreation, and cultural heritage values and features within the area to be protected⁴¹ (identified on Map 20: Nass South SRMP – Hanna-Tintina Area to be Protected)</i></p>	<p>Management Considerations</p> <ul style="list-style-type: none"> • A comprehensive management plan shall define management objectives for the area as well as acceptable uses and levels of use, zoning and other strategies to minimize conflicts and help ensure the integrity of important protected-area values. • Develop management plans collaboratively with input from the public, Gitanyow, NLG and resource agencies. 	
<p>2.0 <i>Recognize the rights and interests of existing eligible tenures within the area to be protected</i></p>	<p>2.1 Percentage of existing tenures retained that are:</p> <ul style="list-style-type: none"> • eligible uses under the <i>Park Act</i>; or • compatible with the new park or Protected Area. 	<p>100%</p>
<p>3.0 <i>Maintain ecosystem representation, abundance and integrity, and protect key resource values and natural features</i></p>	<p>Management Considerations</p> <ul style="list-style-type: none"> • Existing tenures that are eligible to continue under the <i>Park Act</i> will be grandfathered, where consistent with the management direction for each Protected Area. • Trapping, guiding and commercial recreation, including heli-skiing, will be considered acceptable uses. • Tenures are to be eligible for transfer. • Management of the area to be protected should balance the need to maintain or deactivate existing access to manage for other resource values. 	
	<p>3.1 Incidence of human recreation or management practices that impact negatively on the natural resource values of the Protected Area.</p>	<p>Zero</p>
	<p>Management Considerations</p> <ul style="list-style-type: none"> • Management will emphasize maintenance of the ecosystems, resource values and natural features for which the area to be protected was established. • Management interventions will not significantly alter natural ecological, hydrological and geomorphic processes, except expressed management purposes as defined in a protected-area management plan. • Consider forest health issues in the management of ‘areas to be protected.’ • Any new approved facilities will be designed and managed to leave the lightest ecological “footprint” possible. • Manage natural processes / occurrences (e.g. fires, insects, forest disease) within park boundaries relative to their impact, both on the ecosystem values within the boundaries of the Protected Area and on the values of the broader ecosystem of which the Protected Area is a part. 	
	<p>3.2 Number of identified red- and blue-listed plants, animals and communities that are lost or negatively</p>	<p>Zero</p>

⁴¹ Commercial logging, mining and energy exploration and development are not allowed in ‘areas to be protected.’ Many other existing activities can continue, subject to the management plan.

Objectives	Measures / Indicators	Targets
	affected by human disturbance.	
	Management Considerations <ul style="list-style-type: none"> • Maintain functional habitat, cover and site-specific features for fish and wildlife. • Encourage human use patterns that minimize impacts on the environment (e.g. trails, boardwalks, facilities). 	
4.0 <i>Protect cultural heritage values</i>	4.1 Incidence of damage to, or loss of, cultural heritage values.	Zero
	Management Considerations <ul style="list-style-type: none"> • Identify and protect archaeological sites, special sites, traditional use (past and present) and heritage trails (Nisga'a, Gitanyow and pioneer). 	
5.0 <i>Recognize hunting and angling as an acceptable use within Protected Areas</i>	5.1 Percentage of sustainable hunting and angling opportunities maintained	100%
	Management Considerations <ul style="list-style-type: none"> • Continue to provide hunting and angling opportunities for local and resident hunters, anglers, and guide outfitters in the area to be protected; this is subject to hunting and fishing regulations, Gitanyow law, provincial conservation priorities and public safety. 	

3. Plan Implementation, Monitoring and Amendment

Following government approval of the Nass South SRMP, the management objectives and targets will be applied through a dual process of implementation and monitoring. Responsibility for plan implementation and monitoring is shared between government agencies and stakeholders. The Gitanyow and NLG are encouraged to be involved in both the administration side of the implementation and monitoring processes, as well as in operational decision-making.

3.1 Implementation

The Ministry of Forests, Lands and Natural Resource Operations will be establishing the Nass South SRMP plan area as a single landscape boundary; objectives and targets within the plan will be established as landscape-unit objectives.

3.2 Monitoring

The monitoring phase of the plan involves ongoing assessment of how well management objectives of the SRMP are being implemented. Resource values in the plan area are subject to varying degrees of risk from development activities. High-risk resource values will require more regular monitoring than will low-risk resource values. This will be reflected in the SRMP monitoring plan.

3.3 Plan Amendment

A variety of factors will be considered when evaluating the need for plan amendment. The plan may be amended if:

1. The Province, NLG and Gitanyow agree to undertake planning to further integrate Gitanyow and NLG interests into the SRMP. The amendment process would include consultation with the public and stakeholders.
2. Monitoring results show that the SRMP **objectives** are ineffective in achieving the plan goals. The amendment process would include consultation with NLG, Gitanyow, the public and stakeholders.
3. Monitoring results show that the **indicators and targets** are ineffective in achieving plan objectives. If there is minimal social or economic impact, the plan will be amended to incorporate new indicators and targets with a minimum of consultation.
4. Monitoring results show that **indicators and targets** are ineffective in achieving plan objectives. If there is significant social or economic impact, the amendment process would include consultation with the Gitanyow, NLG, the public and stakeholders.
5. If monitoring results show that the **management direction** is ineffective in achieving plan targets and indicators, new management considerations can be developed without amending the plan itself.

The SRMP, and/or legal objectives that have been established to implement the SRMP, should be reviewed at least every 10 years to ensure the plan objectives are still relevant and provide the appropriate balance between social, economic and ecological objectives.

References

- B.C. Ministry of Aboriginal Relations and Reconciliation. 2006. *A New Relationship with First Nations and Aboriginal People*. Accessed June 16, 2008 at http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/407279/new_relationship.pdf B.C. Ministry of Aboriginal Relations and Reconciliation: Victoria, B.C.
- B.C. Ministry of Environment. 2004. *Identified Wildlife Management Strategy*. Accessed June 16, 2008 at <http://www.env.gov.bc.ca/wld/frpa/iwms/iwms.html> B.C. Ministry of Environment: Victoria, B.C.
- B.C. Ministry of Forests and Range. 2004. *Statutes and Regulations – Forest Planning and Practices Regulations Definitions 2004*. Accessed June 16, 2008 at <http://www.for.gov.bc.ca/tasb/legregs/frpa/frparegs/forplanprac/fppr.htm>
- B.C. Ministry of Sustainable Resource Management. 2002. *Provincial Policy for Consultation with First Nations*. Accessed June 16, 2008 at <http://www.llbc.leg.bc.ca/public/PubDocs/bcdocs/357509/ConsultationPolicyFN.pdf> Ministry of Sustainable Resource Management: Victoria, B.C.
- B.C. Ministry of Sustainable Resource Management. 2004. *Governance Principles for Sustainability – Application Guidelines*. Accessed June 16, 2008 at http://srmwww.gov.bc.ca/srm_sp_report_04-05/application_guidelines.pdf
- Banner, A., W. MacKenzie, S. Haeussler, S. Thomson, J. Pojar and R. Trowbridge. 1993. *A Field Guide to Site Identification & Interpretation for the Prince Rupert Forest Region*, in Land Management Handbook No. 26 June 1993. B.C. Ministry of Forests: Victoria.
- Barbeau, Marius. 1929. *Totem Poles of the Gitksan, Upper Skeena River, British Columbia*, National Museum of Canada Bulletin No. 61, Anthropological Series, No. 12, Facsimile Edition 1973, National Museum of Canada: Ottawa.
- Duff, Wilson, ed. 1959 *Histories, Territories and Laws of the Kitwancool in Anthropology in B.C.*, Memoir No. 4. BCPM: Victoria.
- Parminter, J. 1995. *Biodiversity guidebook - Forest Practices Code of British Columbia*. B.C. Ministry of Forests and B.C. Ministry of Environment, Lands & Parks: Victoria, B.C. Accessed June 16, 2008 at <http://www.for.gov.bc.ca/tasb/legregs/fpc/fpcguide/biodiv/biotoc.htm>
- Sterritt, Neil J. Robert Galois, Peter R. Grant, Susan Marsden, and Richard Overstall. 1998. *Tribal Boundaries in the Nass Watershed*. University of British Columbia Press: Vancouver, B.C.
- Stryd, Arnoud H and Vicki Feddema. 1998. *Sacred Cedar – A Report of the Pacific Salmon Forest Project – The Cultural and Archaeological Significance of Culturally Modified Trees* David Suzuki Foundation: www.davidsuzuki.org/files/sacredcedar_sm.pdf

Appendices

Appendix A: General Wildlife Tree Management Guidelines

1. Where practicable, disperse wildlife trees across harvested areas as a combination of patches and individual trees. It is recognized that dispersed retention can work on most ground-based logging systems, but is not operationally always feasible for cable systems.
2. The practicability of retaining wildlife trees, in small patches and through dispersed individual trees, is to be determined on a block-by-block basis.
3. Make best efforts to retain greater than the minimum percentage of within-block wildlife trees.
4. Wildlife tree features:
 - Deciduous and coniferous trees
 - Large, well-branched, wind-firm
 - Decadent, i.e. low commercial value
 - Pine mushroom host trees
 - Trees and snags that show current use by wildlife (e.g. denning or nesting trees, feeding stations)
 - Trees or snags that provide special wildlife values (e.g. large, well-branched trees, large snags, veteran trees)
 - Safe to leave standing (i.e. comply with Workers Compensation Board standards and regulations)
 - Located with more or less even spacing across the harvested area to provide nutrients, and water absorption and release, across the harvested block
5. Wildlife tree retention area features:
 - Mineral licks, wetlands, springs, brush patches, small streams
 - Medicinal plants for Gitanyow and Nisga'a traditional use
 - Pine mushroom habitat
6. Designate and retain wildlife trees within all silvicultural systems, including selection and clearcutting systems.
7. Wildlife trees to be retained at least until other suitable trees can offer equivalent replacement values. This will take at least one rotation (at least 100 years).
8. Retain high densities (30 percent or greater) of wildlife trees:
 - within the large cutblocks (retention densities to increase as size of cutblocks increase),
 - throughout the harvestable portion of ecosystem networks, and
 - throughout all harvested blocks within High value grizzly bear habitat and moose wintering habitat.
9. Wildlife tree retention areas are allowed to be located on the edge of cutblocks. Best efforts are to be made to limit the location of wildlife tree retention areas on edges. It is recognized that even though a wildlife tree retention area is on the edge upon harvesting the cutblock, it will not be on the second or third pass. A wildlife tree retention area is a recognized exclusion from the cutblock and must be maintained.
10. Allow natural processes to occur within retention patches unless infestations, infection or fire threaten resources outside the patch.
11. Where intervention in wildlife tree retention areas is required, best efforts will be made to retain a diversity of structural attributes, or a replacement retention patch will be located.
12. Document the contribution to wildlife tree retention targets in an appropriate information system.

Appendix B: Moose Habitat Attributes for Life Requisites

Compiled by Len Vanderstar, R.P. Bio, R.P.F., Ministry of Environment: Skeena Region, from surveys and published species accounts.

Life Requisite	Habitat Attribute and Description
Forage Habitat	<p>Structural Stage</p> <ul style="list-style-type: none"> • Early seral stages (3 and 4: herb-shrub and pole-sapling) usually provide ideal foraging conditions, supporting abundant deciduous browse year-round within secondary winter range. • Valley bottom fluvial complexes that define primary winter range are noted for providing abundant forage, by virtue of containing many pocketed or larger seasonally wet open areas, regardless of structural stage. • Aquatic habitats provide moose with aquatic forage during spring and summer. Buckbean (<i>Menyanthes trifoliata</i>), pondweed (<i>Potamogeton spp.</i>), and sedges are the predominant aquatic forage species noted in the Nass watershed. <p>Shrub Cover</p> <ul style="list-style-type: none"> • Shrub-dominated habitats that occupy 15 to 30% of a defined area (e.g. moose winter range) generally provide sufficient forage in both growing and winter seasons, provided that height requirements (below) are met. <p>Shrub Height</p> <ul style="list-style-type: none"> • 1 to 5 m for growing season (also assists in providing visual screening); >2.5 m for winter forage. <p>Shrub Species Composition</p> <ul style="list-style-type: none"> • Important woody browse includes willow, red-osier dogwood, high-bush cranberry and young subalpine fir within the Nass South SRMP area; black twinberry, elderberry, mountain ash, aspen and cottonwood are also utilized depending on availability. <p>Aspect</p> <ul style="list-style-type: none"> • Site aspect is generally not important. However, south- and west-facing slopes have reduced snow depths and are first to be snow-free in spring. This provides moose access to shrub cover, early spring herbaceous emergents and green-up forage. <p>Landscape Position</p> <ul style="list-style-type: none"> • Valley bottom floodplains and other fertile drainages/areas have high forage productivity and diversity, particularly for early spring green-up forage.
Thermal Cover	<p>Basal Area</p> <ul style="list-style-type: none"> • 10% measured by pre-harvest mature & old forest cover. <p>Species Composition</p> <ul style="list-style-type: none"> • Thermal cover species should be composed of large canopy, somewhat open grown conifer species, notably very mature and old-growth spruce and subalpine fir.

Life Requisite	Habitat Attribute and Description
Snow Interception	<p>Canopy Cover</p> <ul style="list-style-type: none"> In areas of high snowfall, moose movement is facilitated by forests with crown closure of exceeding 50%. <p>Area Coverage</p> <ul style="list-style-type: none"> No literature is available; however, given snow depths associated with the Nass South SRMP area, the Ministry of Forests, Lands and Natural Resource Operations recommends more than 30% of winter range to have favourable snow interception canopy cover.
Security Cover	<p>Visual Screening</p> <ul style="list-style-type: none"> Stem density that obscures 90% of the moose at 60 m provides optimum visual screening, thus enhancing the animals' sense of security. A diverse understory that obscures a moose at close range also provides effective security cover. Gullied terrain may offer security opportunities, and could be considered good security habitat. <p>Structural Stage</p> <ul style="list-style-type: none"> Suitable security cover could occur in structural stages 3, 4, 5, 6 and 7; however, the best security cover will likely occur in structural stages 3, 4 and 5 (5 being young forests).
Calving	<p>Landscape Position</p> <ul style="list-style-type: none"> Forested patches with good security cover, surrounded by extensive wetland complexes, forested peninsulas (water or wetland), and islands, are primary calving sites. <p>Adjacency</p> <ul style="list-style-type: none"> Isolation or seclusion of calving sites is critical.
Rutting Areas	<p>Landscape Position</p> <ul style="list-style-type: none"> Optimum rutting areas include subalpine meadow complexes, wetland complexes, extensive floodplains, early to mid-seral natural wildfire burned areas, and deciduous stands adjacent to high forage areas. <p>Adjacency</p> <ul style="list-style-type: none"> Isolation or seclusion of rutting areas ensures minimal disturbance to moose activity, and thus more successful mating behaviour.

Appendix C: Best Management Practices for Moose Winter Range

Within moose winter range designated Ungulate Winter Range:

- The forest management focus of the slope adjacent to the floodplain is to provide for security cover.
- Forests within moose winter range will have a forage management emphasis when the site series (subhygric to hydric) that produce deciduous browse species such as willow (*Salix* spp.) dogwood (*Cornus stolonifera*), and cottonwood (*Populus trichocarpa*) become the predominant (more than 50%) site series from a stand-level perspective (e.g. cutblock or overview mapping perspective at 1:20 000 scale). Stand spacing, pruning, reduced conifer-stocking standards and varied conifer spacing will assist in promoting the duration of early seral stage conditions.
- Incorporate moose winter ranges in the design and application of forest connectivity.
- Retain willow and dogwood browse, particularly along island and floodplain channels.
- Retain security and thermal cover in proximity to useable forage areas appropriate to the size of the habitat unit.
- Retain a proportion of mature and old-growth conifer stands with canopy structures which will trap snow and provide bedding sites, particularly adjacent to foraging areas.
- Retain a percentage of large spruce and fir trees within deciduous leading stands, for thermal cover and bedding microsites.
- In regenerating areas and plantations where security and thermal cover are lacking, identify conifer stands or large patches suitable for future cover. Manage these for cover attributes that mimic natural forests in terms of visual screening and large, well-formed branchy veteran trees capable of snow interception and provision for thermoregulation.
- Encourage rotational forest stand development (i.e. harvest at early stand maturity) on sites conducive to both early seral forage and conifer production, while considering visual screening and snow interception.
- Provide adequate security cover within 100 metres line-of-sight in any given direction. Mature and old stands, stand retention or wildlife tree retention areas should be in the range of 200 metres apart, to provide the combination of thermal and security cover.
- Preference will be given to ground-based vegetation management.
- Maintain the natural deciduous/conifer mix of tree species and shrubs as expected for early seral conditions in prime forage potential sites.
- Allow for natural establishment of willows along decommissioned road right-of-ways.
- Limit road development and recreational use within moose winter ranges. Where road avoidance is not practicable, use measures to maintain security, such as maintaining dense coniferous visual screens, deactivating/closing roads before November, building temporary roads and/or rehabilitation road right-of-ways.
- Where practicable, minimize moose disturbance in winter by using measures such as: geographically focusing roads and operations within a given winter range, restricted access and timing of activities.
- Where practicable, retain, enhance or plant visual screens to obscure the winter ranges from high-use transportation corridors.
- Leave a proportion of large old-growth trees for moose predator-response behaviour.

Appendix D: Minimizing Human-Bear Conflicts

The following information has been excerpted with permission from a March 25, 2007 letter from Debbie Wellwood, R.P.Bio., Raven Ecological Services, Smithers, B.C. to Len Vanderstar, R.P. Bio and R.P.F, Ministry of Environment, Skeena Region, Smithers, B.C.

Outline for strategies, targets and measures or indicators for the Nass South SRMP objectives to minimize negative bear-human interactions

General Principles

- Risk of bear-human interactions is influenced by natural features such as habitat suitability, travel concerns (e.g., topographic features or trails that may funnel bears through an area), visibility concerns and other sensory concerns (e.g., loud creeks, winds). Availability of non-natural foods or other attractants will increase this risk. Focus should be on minimizing human activities in higher risk areas when and where possible.
- Human behaviour and types of activity also influence risk of bear-human interactions. Allowing bears to become food-conditioned greatly increases their risk of mortality and risk to the public, most commonly property damage and, rarely, serious human injury or death. Bear-proofing of non-natural foods and other attractants must be a high priority. A common problem is that many people are misinformed or do not understand the motivation, strength and abilities of bears. Frequently, people think they have a solution for storing non-natural foods and other attractants that is bear-proof and it is not. Living with Wildlife Foundation has a bear-resistant product testing program at <http://www.lwwf.org>. Expert input should be solicited where required to prevent bear access to non-natural foods and other attractants.
- Risk of bear mortality associated with bear-human conflicts will be strongly influenced by whether or not the activity is conducted with guns available for use.
- Risk of bear mortality associated with bear-human conflicts will also strongly be influenced by the level of appreciation for bears and knowledge and understanding about bears, including ways to prevent conflicts with bears.
- The level and intensity of bear-human conflicts can be reduced through bear-human conflict management programs where the following components may be applicable to reducing risk associated with a specific land use or activity:
 - Bear-human interactions risk assessment to identify bear-human conflict issues and provide recommendations for prevention of conflicts or risk reduction
 - Bear awareness and safety education program
 - Bear-proof waste and attractant management
 - Green-space management (e.g., in some situations it may be appropriate maintain green spaces to allow bears to move around an area and in others it may be appropriate to remove brush to increase visibility and remove bear foods)
 - Specific rules or regulations to ensure compliance may be required
 - Land use planning to minimize bear-human conflict will be most effective when land use and human activities are considered in the context of land uses and human activities in the surrounding landscape
 - Bear-human conflict management plan
 - Monitoring for bear-human conflict
 - Adaptive management as required

Table D-1: Strategies, targets and measures or indicators to prevent bear mortality resulting from bear-human interactions

Objective	Indicators	Targets	Strategies
<p>1. Minimize negative bear-human interactions (e.g., incidents or conflicts with bears, displacement or mortality of bears).</p>	<p>Number of reports of negative bear-human interactions¹ Indicators may be further defined as follows:</p> <ul style="list-style-type: none"> • Number and severity of bear-human conflicts or incidents • Number of conflicts or incidents where bears access non-natural foods or other attractants • Number and severity of defensive encounters with bears • Number and severity of non-defensive encounters with bears • Number and severity of problem wildlife occurrence reports received by the Conservation Officer Service for bears • Number of reported kills (e.g., COS, Fish and Wildlife) • Number of defence of life or property kills • Number of bears poached • Estimated unreported mortality 	<p>Reduction in number of interactions over time¹ Targets may be further defined as follows:</p> <ul style="list-style-type: none"> • Ideal: No reported or unreported grizzly bear mortality as a result of negative bear-human interactions • Realistically: Low number reported or unreported grizzly bear human-caused mortality for entire SRMP area as a result of bear-human conflicts or incidents (i.e., no mortality associated with most land uses and human use activities) 	<p>Where possible, initiate programs to educate members of the public and visitors re low impact garbage and food handling methods¹</p> <p>Educate public regarding alternatives to shooting to reduce bear-human conflicts e.g., waste management strategies, trail closures etc.¹</p> <p>Strategies may be further defined as</p> <ul style="list-style-type: none"> • Educate people about bear awareness and safety. Include proactive (user group and activity specific) measures that can be taken to minimize negative bear-human interactions². • Implement bear-human conflict prevention programs designed to minimize negative bear-human interactions (e.g., preliminary risk assessment, bear awareness and safety, bear-proof management of non-natural foods and other attractants, best practices or requirements, green space management and planning to prevent bear-human conflicts). If appropriate, develop and deliver program on site, area or activity specific basis. • Conduct regular monitoring of bear-

			<p>human conflict prevention programs to detect successes or failures and revise as required to achieve objective.</p> <ul style="list-style-type: none"> • Enforce non-compliance with rules or regulations to ensure that non-natural foods and attractants are stored or secured using a bear-proof method (e.g., Park Regulation, COS Dangerous Wildlife Protection Order)
--	--	--	---

¹ Taken from North Coast Land and Resource Management Plan (2005).

² Bear-human interactions will be avoided in most management situations to minimize bear-human conflicts. For some specialized management situations, some types of bear-human interactions may be considered appropriate (e.g., bear viewing). Recommend requiring bear-human conflict management plan for management scenarios that allow or promote bear-human interactions.

Table D-2. Strategies or BMPs recommended for consideration for various land uses and types of human activities

Objective	Land Use/Activity	Example Target Groups	Strategies/Best Management Practices
<p>1. Minimize negative bear-human interactions (e.g., incidents or conflicts with bears, displacement of bears, mortality of bears).</p>	Major Travel Routes	<ul style="list-style-type: none"> • Ministry of Transportation and Infrastructure • Highways maintenance contractors 	<ul style="list-style-type: none"> • Install, monitor and maintain bear proof dumpsters • Scheduled garbage pick-up
	Landfill/Dumps	<ul style="list-style-type: none"> • Regional District • Industrial camps • Commercial recreation camps 	<ul style="list-style-type: none"> • Install, monitor and maintain electric fence to exclude bears.
	Industrial Camps – permanent and semi-permanent	<ul style="list-style-type: none"> • Exploration, mining and forestry companies • Government agencies (e.g., FLNRO, MOE, MEM) • Natural resources research and management consultants 	<ul style="list-style-type: none"> • Implement bear-human conflict prevention program such as preliminary risk assessment to avoid higher risk (i.e. selection of low and moderately low risk locations), camp locations, bear awareness and safety program, bear-proof management of non-natural foods and other attractants, best practices or requirements, green space management and planning to prevent bear-human conflicts). Recommend input from expert in bear-human conflict prevention.
	Commercial recreation camps – permanent and semi-permanent	<ul style="list-style-type: none"> • Guide Outfitters • Angling operations • Non-consumptive recreation (e.g., hiking, wildlife viewing etc.) 	<ul style="list-style-type: none"> • Same as per Industrial Camps.
	Industrial – camping, hiking and working in bear country	<ul style="list-style-type: none"> • Exploration, mining and forestry companies • Government agencies (e.g., FLNRO, MOE, MEM) 	<ul style="list-style-type: none"> • Provide bear awareness and safety training to minimize bear-human interactions while working, recreating and camping in bear country. Contractors and personnel should clearly understand how to prevent interactions with bears. • Ensure bears do not have access to

Objective	Land Use/Activity	Example Target Groups	Strategies/Best Management Practices
		<ul style="list-style-type: none"> Natural resources research and management consultants. 	<p>non-natural foods and other attractants.</p>
	<p>Commercial Recreation - camping, hiking and working in bear country</p>	<ul style="list-style-type: none"> Guide Outfitters Angling operations Non-consumptive recreation (e.g., hiking, wildlife viewing etc.) 	<ul style="list-style-type: none"> Same as per Industrial
	<p>Bear Viewing Activities</p>	<ul style="list-style-type: none"> Commercial operations Provincial government (e.g., wildlife viewing promotion etc.) 	<ul style="list-style-type: none"> Conduct a bear-human conflict risk assessment to evaluate appropriateness and feasibility on an operations specific basis and in the context of the surrounding landscape. Evaluate cumulative effects of land use activities (e.g., other bear viewing activities, types of bear viewing activities, hunting and refugia for bears) If the bear viewing operation is considered an appropriate activity, prepare a bear-human conflict risk management plan that identifies bear-human conflict issues and strategies to prevent bear-human conflicts. Note water-based viewing is generally considered to pose lower risk to bears and people. Viewing from non-motorized boats will generally have lower risk of impacts to bears than from motorized boats. DO NOT promote wildlife areas for non-guided bear viewing
	<p>Other commercial or recreational activities</p>	<ul style="list-style-type: none"> Mushroom pickers Various recreation (e.g., hikers, backpackers, horse packing, All Terrain 	<ul style="list-style-type: none"> Promote bear awareness and safety training to minimize bear-human interactions while working, recreating and camping in bear country. Audience should clearly understand how to prevent interactions with bears

Objective	Land Use/Activity	Example Target Groups	Strategies/Best Management Practices
		Vehicle users)	
	Fisheries Operational Activities	<ul style="list-style-type: none"> • Fisheries and Oceans Canada (e.g., fish counting i.e. Meziadin Fishway; spawning facilities) 	<ul style="list-style-type: none"> • Prepare, implement and monitor a facility specific Bear-human Conflict Management Plan. Adaptive management approach required.
	Fish Harvest and Preparation Activities	<ul style="list-style-type: none"> • First Nations (e.g., food fishery, individual sales, commercial fishery) 	<ul style="list-style-type: none"> • Promote bear awareness and safety training to minimize bear-human interactions while harvesting and preparing fish in bear country. Audience should clearly understand how to prevent interactions with bears • For site-specific commercial fish harvest or fish preparation (e.g., smokehouses) operations prepare, implement and monitor a site specific Bear-human Conflict Management Plan. Adaptive management approach required.
	Park Lands (e.g., Provincial Parks)	<ul style="list-style-type: none"> • BC Parks 	<ul style="list-style-type: none"> • Prepare, implement and monitor a Park specific or SRMP area specific Bear-human Conflict Management Plan. Adaptive management approach required.
	Other recreation lands (e.g., recreation sites, trails, recreation reserves) ¹	<ul style="list-style-type: none"> • FLNRO - Recreation Sites and Trails BC 	<ul style="list-style-type: none"> • Prepare, implement and monitor a Recreation Site specific or SRMP area specific Bear-human Conflict Management Plan. Adaptive management approach required. Note: some Recreation Sites will not be suitable for use as a user maintained site based on risks of bear-human interactions.

¹ Sites may be managed in partnership agreements with recreation groups, community organizations, First Nations, private citizens, local governments and forest companies.

Literature Cited

- Alaska Department of Fish and Game and National Parks Service. 2003. Best practices for viewing bears on the west side of Cook Inlet and the Katmai Coast
- B.C. Environment. 1996. Human-bear conflict in British Columbia: draft discussion paper. B.C. Ministry of Environment, Lands and Parks, Victoria, B.C. 70 pp.
- B.C. Environment. 1998. Commercial recreation on Crown Land guidelines for staff and applicants. B.C. Ministry of Environment, Lands, and Parks. 29 pp.
- B.C. Parks. 1998. Bear-human conflict reduction guidelines for river rafting. Grizzly Bear Conservation Strategy. B.C. Ministry of Environment, Lands, and Parks. 15 pp.
- Ciarniello, L. M. 1997. Reducing human-bear conflicts: solutions through better management of non-natural foods. Bear-human conflict committee: British Columbia Ministry of Environment, Lands and Parks.
- Davis, H., D. Wellwood, and L. Ciarniello. 2002. "Bear Smart" community program: background report. B.C. Ministry of Water, Land and Air Protection, Victoria, B.C.
- Harper, W. L., and D. S. Eastman. 2000. Discussion paper: Wildlife and commercial recreation in British Columbia. Assessment of impacts and interim guidelines for mitigation. B.B. Ministry of Environment, Lands and Parks. Victoria, B.C.
- Herrero, S. M. 1985. Revised Edition 2003. Bear attacks - their causes and avoidance. Winchester Press, Piscataway, New Jersey, USA.
- Kellner, M., H. Davis, and D.W. Wellwood. 2001. Annotated Bibliography: Bear viewing literature. B.C. Ministry of Environment, Lands and Parks. Victoria, B.C.
- MacHutchon, A.G. and D.W. Wellwood. 2002. Assessing the risk of bear-human interaction at river campsites. *Ursus* 13:293-298.
- MacHutchon, A.G. and D.W. Wellwood. 2002. Reducing bear-human conflict through river recreation management. *Ursus* 13:357-360.
- Ministry of Water, Land and Air Protection. 2002a. Bear-People Conflict Prevention Plan for Parks and Protected Areas in British Columbia. B.C. Ministry of Water, Lands and Air Protection.
- Ministry of Sustainable Resource Management (MSRM). 2005. North Coast Sustainable Resource Management Plan: Final Recommendations. Ministry of Sustainable Resource Management, Victoria, B.C.
- Ministry of Tourism, Sports and Arts (MOTSA). 2007. Website:
<http://www.tsa.gov.bc.ca/publicrec/categories.htm>. Accessed March 25, 2007.
- Wellwood, D.W. 2001. Hazard assessment of bear-human conflict in Stewart, British Columbia – Phase 1. Ministry of Environment, Lands and Parks, Smithers, B.C.
- Wellwood, D.W., M. Kellner, and H. Davis. 2001. Standards and practices for bear viewing in coastal British Columbia. Review Draft. B.C. Ministry of Environment, Lands and Parks. Victoria, B.C.

Videos

Staying Safe in Bear Country: a behavioral-based approach to reducing risk. 2001. Safety in Bear Country Society. Produced by Wild Eye Productions, Atlin, B.C. in association with AV Action Yukon Ltd.

Working in Bear Country: for industrial managers, supervisors and workers. 2001. Safety in Bear Country Society. Produced by Wild Eye Productions, Atlin, B.C. in association with AV Action Yukon Ltd.

Living in Bear Country. 2005. Safety in Bear Country Society. Produced by Wild Eye Productions, Atlin, B.C. in association with AV Action Yukon Ltd.

DVDs or videos can be purchased from Distribution Access Ltd.

Web Site: www.distributionaccess.com

Email: sales@distributionaccess.com

Phone: 1-888-440-4640

Websites

B.C. Ministry of Forests, Lands and Natural Resource Operations

<http://www.env.gov.bc.ca/wld/bearsmart>

- Bear Smart brochure
- Bear Smart Community Program background report
- Who's who: know your bears brochure
- Safety guide to bears at your home brochure
- Safety guide to bears in the wild brochure
- Don't feed garbage to bears brochure

B.C. Conservation Foundation Bear Aware program - <http://www.bearaware.bc.ca/>

United States Department of Agriculture Forest Service

<http://www.fs.fed.us/r1/wildlife/igbc>

- IGBC bear resistant certification report: includes information on distributors of bear resistant containers for hiking, insulated cooler, grain and food storage containers, panniers, boxes for storage of food in the front country and equipment for hanging food
- Bear safety information
- Pepper spray information

International Association for Bear Research and Management (IBA)

<http://www.bearbiology.com>

- Descriptions of bear species of the world
- URSUS – scientific journal of the IBA
- International Bear News – IBA newsletter

Haul-All

<http://www.haulall.com>

(click on Containers and then click Bear Proof Containers)

Bear resistant garbage and food storage containers

Margo Supplies

<http://www.margosupplies.com>

- bear proof electric fencing materials
- bear deterrents

Living with Wildlife Foundation

http://www.lwwf.org/Living%20with%20Predators_resource_guides.htm

Living with Predators Resource Guides.

Garcia Machine

<http://www.wildernessdining.com/shopbybrand-garciamachine.html>

Bear resistant canister that can be used for backpacking

Appendix E: Public Review Summary and Response

There were no comments received during the public review period.

Appendix F: Policy Recommendations to Government

The following issues have been identified by table members as potential constraints to meeting the table's land use or economic interests. Because it is outside of the official mandate of the Nass South SRMP to make recommendations on these issues, they have been included as policy recommendations separate from the main Nass South SRMP document and any established land use objectives.

<p>Water Resources</p>	<ul style="list-style-type: none"> • It is recommended that the provincial government establish water monitoring stations on selected water bodies for long term evaluation of water quality and quantity attributes. • It is recommended that any water monitoring stations and associated studies be funded, where possible, by the provincial government, forest licencees and Gitanyow.
<p>Botanical Forest Products</p>	<ul style="list-style-type: none"> • It is recommended that the provincial government conduct research necessary to quantify the current economic contribution of the pine mushroom industry towards the Province of BC and towards the economic diversification of rural communities. • It is recommended that the provincial government support and undertake research to develop knowledge about compatible management of timber and pine mushroom resources, and sustainability of pine mushrooms. • It is recommended that the provincial government further explore options for regulating the pine mushroom industry in light of: its importance for income and employment; the need for sustainable management of the resource and; its cultural and economic importance to aboriginal peoples. • It is recommended that the provincial government establish objectives for pine mushroom under the <i>Land Act</i>, through SRMPs, to guide forest planning and practices where pine mushrooms are an important local resource for economic and/or traditional uses.
<p>Marten Habitat Mapping</p>	<ul style="list-style-type: none"> • Marten is often recognized as an indicator species of overall forest health, particularly because these mammals rely on mature and old growth for their life requisites. Managing for a sustainable marten population in the Plan area is seen as one component in maintaining properly functioning ecosystems. For this reason, the Plan recommends that marten habitat suitability and capability mapping be undertaken followed by a risk assessment to guide future work and management direction.

Appendix G: Nass South SRMP Timber Supply Analysis Report and Information Package

**Nass South SRMP
Timber Supply
Analysis Report &
Information Package**

Version 1

May 2008

Completed for:

**Ministry of Agriculture and Lands
Integrated Land Management Bureau
Skeena Region**



Completed by:

Robert J. Schuetz

INDUSTRIAL FORESTRY SERVICE LTD.

1595 Fifth Avenue
Prince George, B.C., V2L 3L9
Phone (250) 564-4115
Fax (250) 563-9679

TABLE OF CONTENTS

	Page
South Nass Timber Supply Analysis Report	1
1. Executive Summary	1
2. Introduction	3
3. Analysis Scenarios	5
3.1. Scenario 1 – Base Case.....	6
3.2. Scenarios 2 to 8	11
3.3. Scenario 9 – The Full Plan.....	12
3.4. Sensitivity of Assumptions related to the Full Plan.....	15
4. Conclusion	16
Nass South SRMP Information Package	18
5. General Description of Inputs and Assumptions for the Timber Supply Analysis	18
6. Analysis Units	21
6.1. Managed Stands.....	24
6.2. Merchantability constraints.....	26
6.3. Transitions and Future Roads.....	26
6.4. Modeling and Harvest Flow Determination.....	26
6.5. Harvest Flow Constraints	27
6.5.1. Visual quality	27
6.5.2. Adjacency.....	29
6.5.3. Landscape Unit, BEO, Biogeoclimatic Zone Productive Forest Areas	29
6.5.4. Grizzly Habitat Areas.....	32
6.5.5. Old Growth Management Areas.....	32
6.5.6. Ecosystem networks	34
6.5.7. Mountain Goat Habitat	34
6.5.8. Moose Winter Range.....	34
6.5.9. Cultural Heritage Sites	36
6.5.10. Pine Mushrooms.....	36
6.6. Non-Recoverable Losses	37

List of Tables

Table 1. Executive Summary of Analysis Results.....	2
Table 2. Modeling Scenarios	5
Table 3. Land Base Classifications.....	7
Table 4. Scenario Results leading to the Full Plan.....	11
Table 5. Sensitivity around the Full Plan	15
Table 6. Inventories used in the Analysis.....	19
Table 7. Analysis Themes.....	20
Table 8 Species / inventory type group assignments.....	21
Table 9. Site Quality Classifications	21
Table 10. Analysis Unit Classifications and Resultant Area	22
Table 11. Unmanaged stand yield tables	23
Table 12. Stands Management Assumptions	24
Table 13. Managed Stand Yield Tables	25
Table 14. Visual Quality Objectives	28
Table 15. Adjacency constraint areas	29
Table 16. Landscape Unit / BEC.....	30
Table 17. Old Biodiversity Seral Constraint Targets.....	30
Table 18. Mature plus Old biodiversity Constraint Targets	32
Table 19. Areas by Grizzly Habitat Quality	32
Table 20. Ecosystem networks.....	34
Table 21. Mountain Goat Winter Range Areas	34
Table 22. Moose Winter Range Areas	35
Table 23. Cultural Heritage Sites.....	36
Table 24. Pine Mushroom Sites.....	37
Table 25. Scenario THLB s and NRLs.....	37

List of Figures

Figure 1. Base Case - Harvest Forecast	8
Figure 2. Base Case - Change in Growing Stock	9
Figure 3. Base Case - Forecast Area Harvested	9
Figure 4. Base Case - Average Stand Age Harvested.....	9
Figure 5. Base Case - Average Stand Volume Harvested	9
Figure 6. Base Case - Age Class Distribution - Date 2008	9
Figure 7. Base Case - Age class Distribution – Forecast for 2058	10
Figure 8. Base Case - Age Class Distribution – Forecast 2108	10
Figure 9. Base Case - Age Class Distribution – Forecast 2208	10
Figure 10. Full Plan - Harvest Flow.....	12
Figure 11. Full Plan - Changes to THLB Growing Stock.....	13
Figure 12. Full Plan - Changes to Area Harvested	13
Figure 13. Full Plan – Changes to Average Stand Age Harvested	13
Figure 14. Full Plan Changes to Average Stand Volume Harvested	13
Figure 15. Full Plan – Age Class Distribution Time 0 years.....	14

Figure 16. Full Plan – Age Class Distribution Time 50 years	14
Figure 17. Full Plan – Age Class Distribution Time 100 years	14
Figure 18. Full Plan – Age Class Distribution Time 200 years	14

List of Maps

Map 1. Location of Nass Timber Supply Area	4
Map 2. Productive Forest and Timber Harvesting Land Base.....	8
Map 3. Visually Sensitive Areas in the Forested land base	28
Map 4. Crown Forest Land Base by Landscape Unit.....	31
Map 5. Crown Forest Land base by BEC	31
Map 6. Old Growth Management Areas	32

South Nass Timber Supply Analysis Report

Executive Summary

A timber supply analysis was completed for the southern portion of the Nass TSA. This was a spatially explicit analysis that builds off many of the management assumptions used in the last Nass TSA timber supply review, and improves on this information through utilization of an updated timber harvesting land base, new visually sensitive areas, ecosystem networks, a buffered road access network, updated wildlife habitat information and several other levels of geographically explicit information. These inventory coverage's were compiled in a geographic information system, intersected and the outputs loaded into a forest estate model. The comprehensive data file was then used to create updated yield tables and forest management constraints and objectives that are current to today's Ministry of Forests and Range forest management initiatives and objectives. The forest estate model was used to derive a sustainable harvest level for the Nass South sustainable Resource Management Plan. Building off a Base Case harvest flow, the impact of proposed management initiatives in support of new or revised resource values was quantified, relative to current and future timber supply harvest levels. Specifically, the impact on the harvest flow as a result of changes in management direction with respect to timber, cultural heritage, water, fisheries, wildlife, biodiversity, pine mushrooms and special management areas were assessed in regard to changes in short and long term timer supply. Table details the results of this assessment.

The "Base Case" scenario identifies the harvest level based upon status quo management assumptions developed during the last timber supply review. The next eight management scenarios measure the incremental change (impact) of alternative management options in a step-wise manner (i.e. Scenario 5 builds on all of the assumptions made in Scenario 4, and then includes a constraint whereby mature and old biodiversity constraints are applied to landscape unit/biogeoclimatic zones). This process culminates in Scenario #9 or what is referred to a the "Full Plan". The Full Plan has an initial harvest level of 447,489 cubic metres per year which is 19.7 percent less than the Base Case scenario.

The remaining six scenarios evaluate the impact of various alternative management philosophies relative to the Full Plan. That is to say they do not build off one another, but are quantified relative to the Full Plan results.

Table 1. Executive Summary of Analysis Results

#	Scenario Description and Step-wise Changes relative to each previous scenario	Short-term harvest level (m ³ /year)	Percent change from Previous Scenario	Long-term harvest level (m ³ /year)	Percent change from Previous Scenario
S1	Base Case	557,392	0.00%	290,224	0.00%
S2	as per S1 but remove Gitanyow treaty settlement lands	547,739	-1.73%	285,200	-1.73%
S3	as per S2 but remove Hanna-Tintina Proposed Protected Area	525,720	-4.02%	273,721	-4.02%
S4	as per S3 but remove OGMA's	503,129	-4.30%	262,040	-4.27%
S5	as per S4 but apply mature + old biodiversity to landscape units	503,129	0.00%	262,040	0.00%
S6	as per S5 but remove EN cores	484,547	-3.69%	252,345	-3.70%
S7	as per S6 but remove grizzly and goat habitat and apply old seral constraints to moose	465,844	-3.86%	242,609	-3.86%
S8	as per S7 but apply selection harvest to EN buffers	449,892	-3.42%	234,132	-3.49%
S9	as per S8 but remove cultural areas (at 400 metre buffer) and restrict harvest in pine mushroom sites – This is the FULL PLAN	447,489	-0.53%	232,871	-0.54%
#	Scenario Description and Changes to the FULL PLAN	Short-term harvest level (m ³ /year)	Percent change from Full Plan	Long-term harvest level (m ³ /year)	Percent change from Base Case
S10	As per FULL PLAN but FN cultural buffers are 100 m instead of 400metres	448,933	0.32%	233,623	0.32%
S11	as per FULL PLAN but clear-cutting with forest cover restrictions allowed in EN buffers	432,099	-3.44%	224,692	-3.51%
S12	as per FULL PLAN but include moderate value grizzly habitat in THLB	456,497	2.01%	237,546	2.01%
S13	As per FULL PLAN but clear-cutting without forest cover restrictions allowed in EN buffers	462,735	3.41%	240,974	3.48%
S14	As per Full plan but clear-cutting without forest cover restrictions allowed in EN cores and EN buffers	478,467	6.92%	249,181	7.00%
S15	As per FULL PLAN but do not apply harvest constraints on moose winter range areas	447,489	0.00%	232,871	0.00%

Acronyms:

S1 = Scenario #1;
 OGMA = old growth management area;
 EN = ecosystem network,
 THLB = timber harvesting land base;
 FN = first nations;
 m³ = cubic metres

Introduction

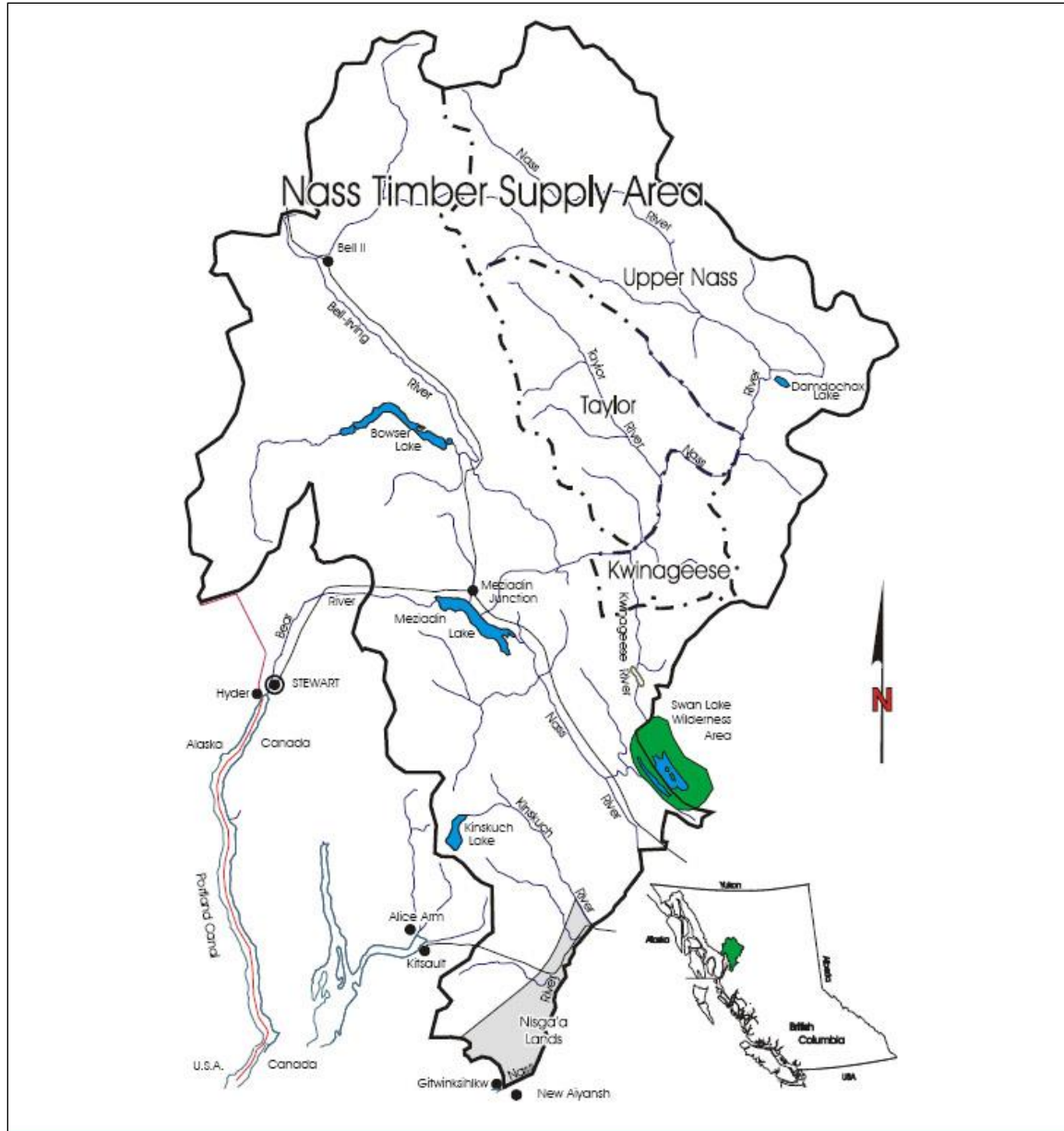
Following is a brief report on the results of a timber supply analysis performed for the southern portion of the Nass Timber Supply Area (TSA). The area is referred to as the Nass South Sustainable Resource Management Plan (SRMP) and, covering the southern half of the Nass TSA, spans an area from Treaty Creek, eastwards towards (not including) Bowser Lake, south of Kwinathl River and west to the District of Stewart. See Map #1.

This analysis was initiated by the former Ministry of Agriculture and Lands Integrated Land Management Bureau (ILMB) for the participants of the Nass South SRMP process. The analysis was completed by Industrial Forestry Service Ltd. (IFS), with assistance from Spatial Mapping Ltd. (both of Prince George, B.C.) The purpose of the analysis is to inform SRMP planning table participants of the level of impact that proposed management objectives pose to timber harvesting levels.

The last timber supply analysis for the Nass TSA was completed in June 2001. In June 2007 the Chief Forester postponed his next allowable annual cut determination to occur no later than July 30, 2012. Many of the inputs and modeling assumptions developed and utilized in the June 2001 Nass TSA timber supply analysis report were utilized for this analysis. The assumptions are documented in Appendix 1 of the Nass Timber Supply Area Analysis Report, June 2001, which is available at <http://www.for.gov.bc.ca/hts/tsa/tsa43/tsr2/analysis.pdf>.

The current analysis makes use of new information wherever it was available. This includes new operability lines, newly defined wildlife habitat areas (or Specified Areas), pine mushroom sites, old growth management areas (OGMAs), culturally sensitive sites with various buffer distances, updated yield tables, and the incorporation of spatially explicit landscape planning.

The latter part of this report describes the Nass South and acts as an information/data package in support of the timber supply analysis. A review of the management assumptions and spatial data base was performed in the town of Smithers with government participation prior to commencement of the analysis.



Map 1. Location of Nass Timber Supply Area

Analysis Scenarios

Appended to this report are details pertaining to analysis assumptions and modeling procedures. The reader may review this section to obtain a better understanding of the operational and management assumptions there were made and which support the results described here.

A substantial number of modeling scenarios were carried out in support of the results described by the following 15 management scenarios. These scenarios were developed by the ILMB, with support from the MOFR and MOE. The scenarios are divided into two parts. The first set begins with the Base Case and makes small incremental changes with the results of each scenario building of a change made in the previous scenario. This step-wise analysis approached culminates in a "Full Plan Scenario" (i.e. Scenario #9) achieved after carrying out 8 progressive management changes from the Base Case Scenario. An additional six management impacts are then assessed based upon small individual changes (as opposed to incremental) to the Full Plan Scenario. Details on management assumptions pertaining to each of the scenarios is provided in the Information Package appended to this report. Table describes each of the scenarios in general terms.

Table 2. Modeling Scenarios

Scenario 1	This Base Case Scenario is the starting point for this analysis. The management and general land base assumptions that were created in support of the MOFR's 2001 timber supply analysis for the entire Nass Timber Supply Areas were used to establish the parameters around the current forest estate model construction.
Scenario 2	Building off of the Base Case scenario, areas identified as the Gitanyow First Nations proposed treaty settlement lands are removed from the timber harvesting land base.
Scenario 3	The amount of area in the timber harvesting land base is further reduced in Scenario S3 through the exclusion of the Hanna-Tintina proposed protected area in the north-eastern portion of the South Nass. Although this area is excluded from harvesting, it continues to provide forest cover in support of biodiversity objectives.
Scenario 4	Building off of S3, areas identified as old growth management areas (OGMAs) are removed from the timber harvesting land base. These areas however remain in the productive forest land base and continue to provide forest cover for biodiversity and wildlife habitat.
Scenario 5	For Scenario 5, the timber harvesting land base established in Scenario 4 was maintained but a forest cover objective was included in the analysis that targeted a specified amount of mature and old forest in each landscape unit / biogeoclimatic zone.
Scenario 6	Scenario 6 builds off of Scenario 5 and removes ecosystem network (EN) cores from the timber harvesting land base.

Scenario 7	Scenario 7 builds off of Scenario 6 but addresses three wildlife habitat issues: (1) Grizzly bear habitat defined as very-high, high and moderate is removed from the THLB; (2) Goat habitat is removed from the THLB; (3) Moose winter range has a mature plus old forest cover constraint applied such that greater than 30 percent of the moose polygon THLB area has to be greater than 111 years, before harvesting could be considered in these areas.
Scenario 8	In Scenario 8, EN buffers that were established around EN cores had restrictions applied such that they were only eligible for selective harvesting (not clear-cut harvesting). The constraints allowed 30 percent of the volume eligible for harvest if the volume was greater than 299 m ³ /ha. These stands then converted their age to a 100 year old equivalent stand and harvest re-entry was restricted for 3 decades.
Scenario 9 "Full Plan"	Scenario 9 builds off of all of the previous scenarios and establishes the "Full Plan". This scenario resulted in the establishment of a 400 metre buffer around cultural heritage sites and the removal of this area from the THLB. In addition, pine mushroom sites were identified and a harvest constraint imposed until 50% of the timber harvesting land base in these areas was between 80 and 200 years of age.
Scenario 10	Scenario 10 builds off of the Full Plan, but the 400 metre buffer distance around cultural heritage sites established in Scenario 9 was reduced to 100 metres.
Scenario 11	Scenario 11 builds off the Full Plan (not Scenario 10) and modifies the assumptions with respect to harvesting in EN buffers. The original selective harvesting assumption was changed to a 1-time clear-cut harvest entry. Constraint on harvest re-entry was restricted until 70 percent of the productive forest land base within each EN buffer area was greater than 160 years of age.
Scenario 12	Scenario 12 builds off the Full Plan, but moderate grizzly bear habitat was re-introduced (included) in the THLB.
Scenario 13	Scenario 13 builds off the Full Plan, but adjusts EN buffer assumptions so that there are no 'special' restrictions on harvesting in these buffers.
Scenario 14	Scenario 14 builds off the Full Plan, but includes both EN buffer and EN core areas in the THLB and does not place any 'special' harvesting restrictions on these areas.
Scenario 15	Scenario 15 builds off the Full Plan, but removes the "special" constraints on moose winter range that were described in Scenario 7.

The results from each of these scenarios will be described in the sub-sections that follow.

Scenario 1 – Base Case

Scenario 1 is the Base Case scenario that builds off of the information and assumptions used by the MOFR in the last timber supply review. Critical to this change however is that this analysis is focused upon the southern portion of the Nass timber supply area (TSA) as opposed to the entire TSA that was

analyzed by the MoFR in 2001. In addition, several other activities took place that changes the overall analysis description and results. Details of these changes are described in the appended information package. Foremost, however is a redetermination of the timber harvesting land base and the productive forest land base in support of this project. A summary of three key area attributes applicable to the Nass South SRMP are provided in Table 1. The timber harvesting land base relative to the productive forest land base is shown in Map 2.

Table 3. Land Base Classifications

Classification	Area (ha)	Forest Volume ('000,000 m3)
Gross Area	662,509	
Productive forest Land base	262,773	81.38
Timber Harvesting Land Base ¹	134,598	40.48

- 1 The timber harvesting land base was derived by the ILMB with assistance from the MOFR. The resultant spatially defined THLB was 136,603 hectares which was then intersected by IFS with existing roads that had been buffered 15 metres. This road area was then removed from both the THLB and the productive forest land base.
- 2 The THLB is overestimated by about 475 hectares as the Little Paw Creek, 'Creek 2' and the steep gullied area between the outlet of Arbor Lake and the Kinskush River were digitized as operable. Within the Nass South THLB this accounts for about a 0.3% decrease in THLB.

The appended Information Package provides considerable information on the distribution of area for other resource concerns within both the timber harvesting land base (THLB) and the productive forest land base (PFLB).

The objective for all of the scenarios tested was to maximize the harvest level subject to meeting other resource management constraints. The Base Case analysis applied only those constraints that were consistent with the MOFRs timber supply review completed in 2001 (TSR2). The harvest level shown in Figure 1 is a result of the management constraints applied to the productive forest land base and that are consistent with TSR2. The harvest level has been adjusted (as have all of the harvest levels in this report) for estimated non-recoverable losses for insects and disease.

The Base Case provides a starting point against which incremental changes to management assumptions can be made, Figures 1 through 9 provide support in respect for the sustainability of the harvest plan.

Map 2. Productive Forest and Timber Harvesting Land Base

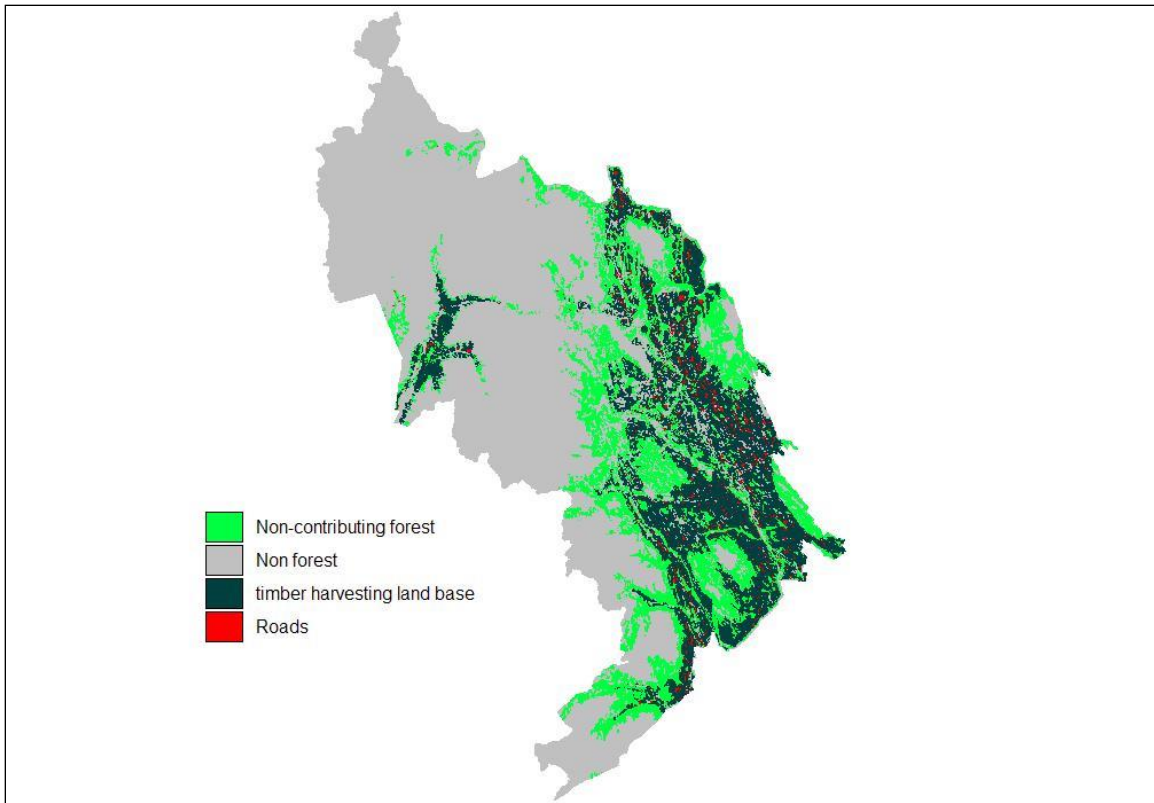


Figure 1. Base Case - Harvest Forecast

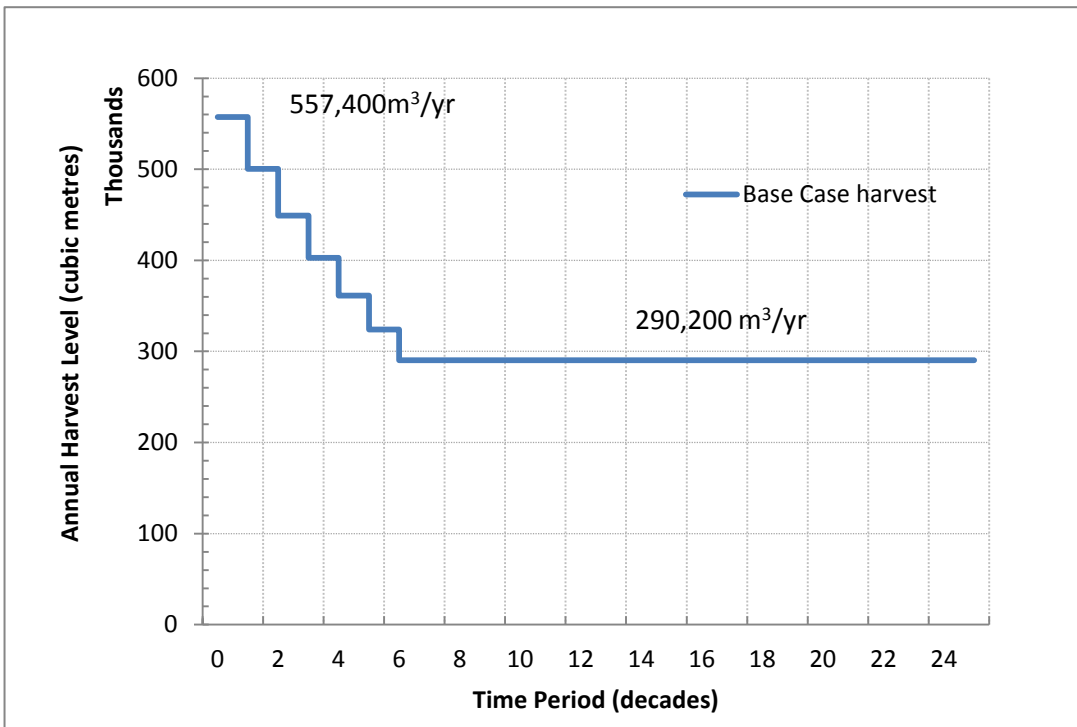


Figure 2. Base Case - Change in Growing Stock

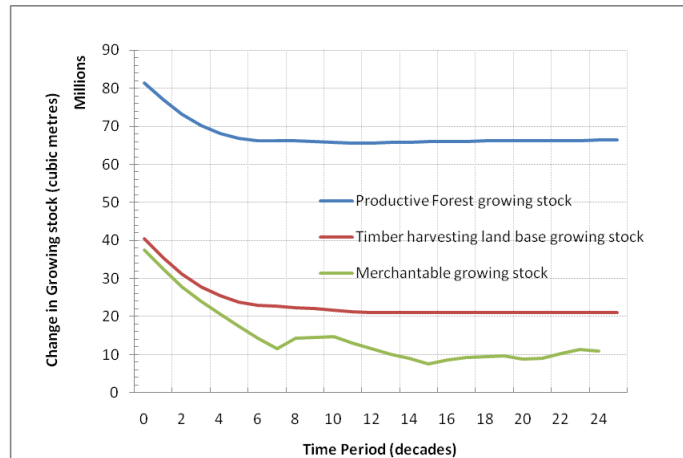


Figure 3. Base Case - Forecast Area Harvested

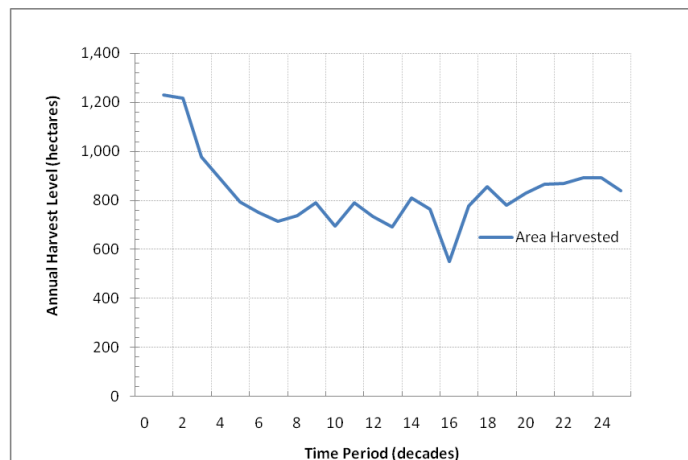


Figure 4. Base Case - Average Stand Age Harvested

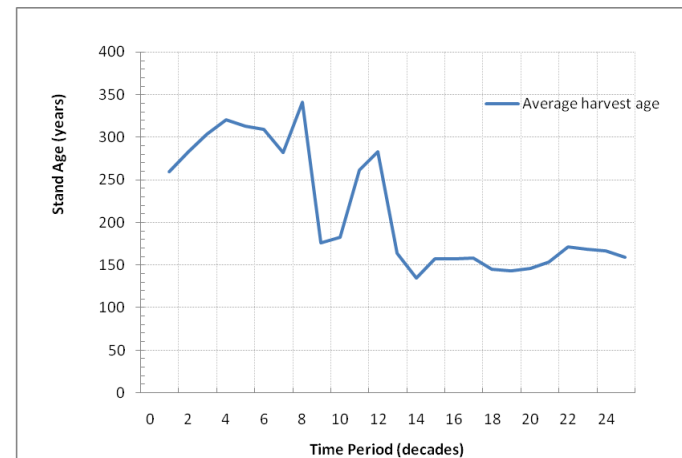


Figure 5. Base Case - Average Stand Volume Harvested

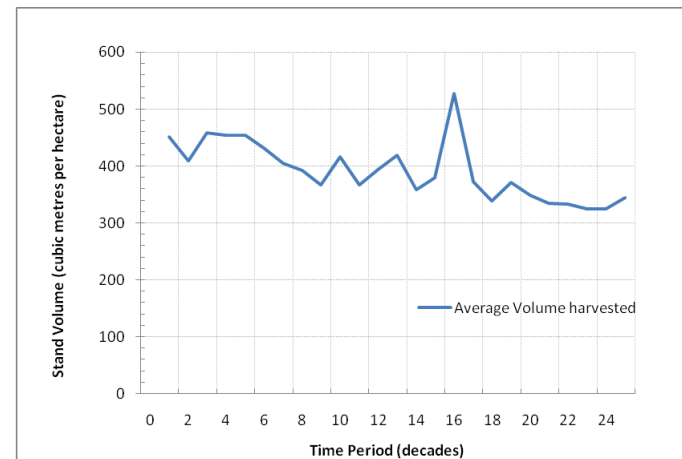


Figure 6. Base Case - Age Class Distribution - Date 2008

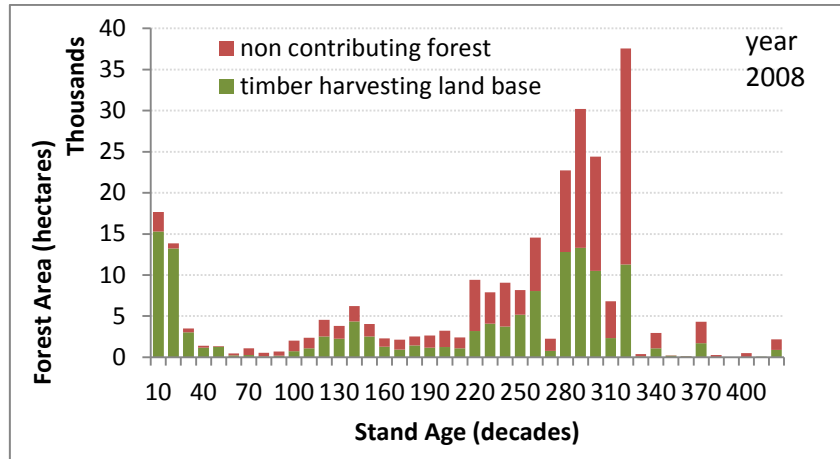


Figure 7. Base Case - Age class Distribution – Forecast for 2058

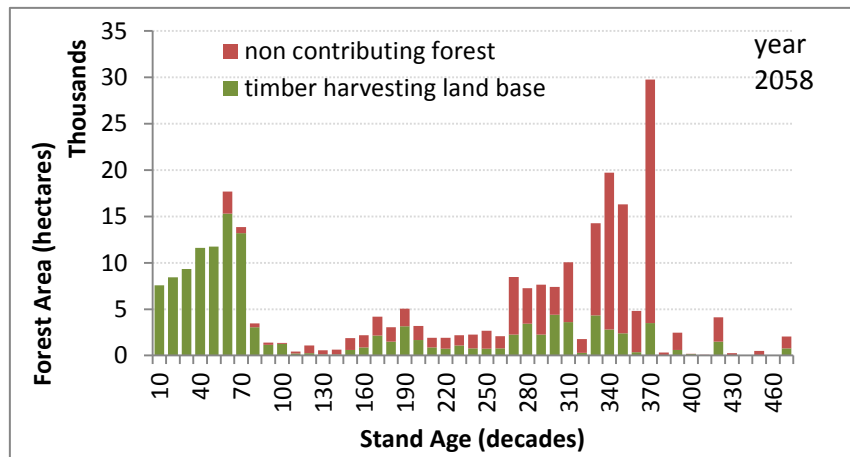


Figure 8. Base Case - Age Class Distribution – Forecast 2108

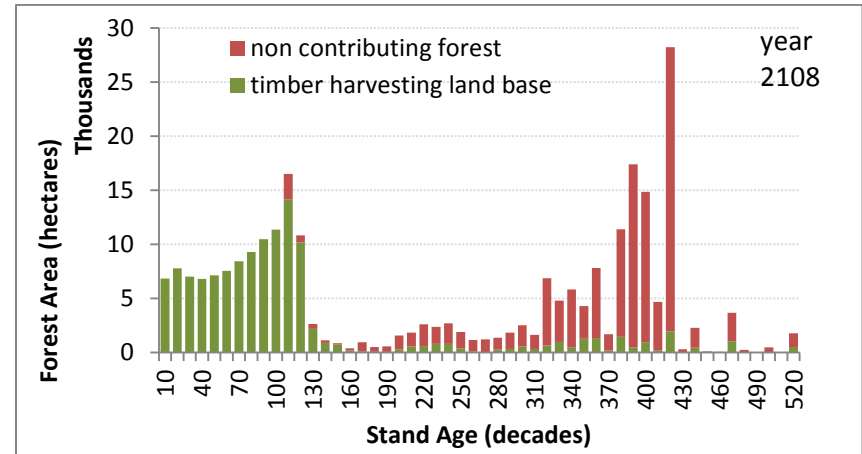
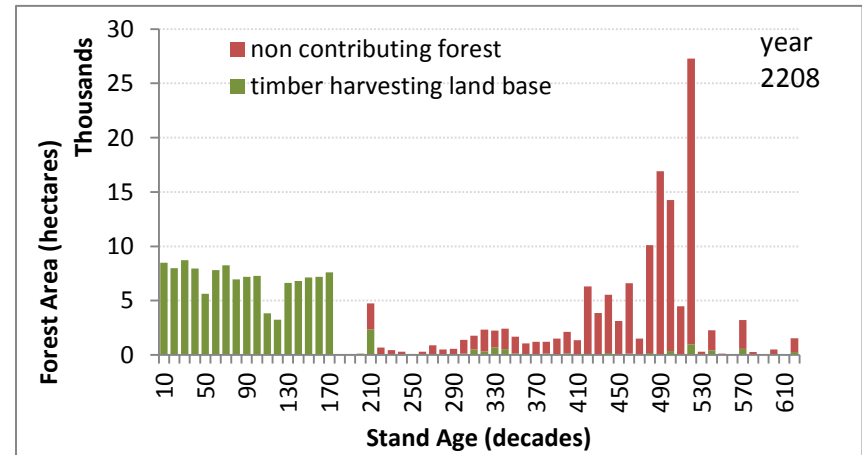


Figure 9. Base Case - Age Class Distribution – Forecast 2208



Scenarios 2 to 8

The analysis of incremental changes to the THLB and/or to management assumptions and constraints was performed through a series of seven scenarios before culminating in what is referred to as the “Full Plan”. Each of these scenarios was described in Section 3.0. The results of these scenarios with respect to change in the timber harvesting land base, the change in the short and long term sustainable timber harvest level and lastly the change in growing stocks is quantified in Table .

Table 4. Scenario Results leading to the Full Plan

Scenario Description		Short term Harvest Level		Long term Harvest		Initial THLB Growing Stock		Initial THLB	
		m ³ /year	% change relative to previous scenario	m ³ /year	% change relative to previous scenario	Cubic metres (000,000)	% change relative to previous scenario	Cubic metres	% change relative to previous scenario
S1	Base Case	557,392		290,224		40.48		134,598	
S2	As per S1 but remove Gitanyow treaty settlement lands	547,739	-1.73%	285,200	-1.73%	39.91	-1.40%	132,146	-1.82%
S3	As per S2 but remove Hanna-Tintina Proposed Protected Area	525,720	-4.02%	273,721	-4.02%	38.85	-4.02%	127,136	-5.54%
S4	As per S3 but remove OGMAs	503,129	-4.30%	262,040	-4.27%	35.73	-11.72%	119,849	-10.96%
S5	As per S4 but apply mature + old biodiversity to landscape units	503,129	0.00%	262,040	0.00%	35.73	-11.72%	119,849	-10.96%
S6	As per S5 but remove EN cores	484,547	-3.69%	252,345	-3.70%	34.50	-14.78%	115,793	-13.97%
S7	As per S6 but remove grizzly and goat habitat and apply old seral constraints to moose	465,844	-3.86%	242,609	-3.86%	32.98	-18.53%	111,234	-17.36%
S8	As per S7 but apply selection harvest to EN buffers	449,892	-3.42%	234,132	-3.49%	32.98	-18.53%	111,234	-17.36%

Scenario 9 – The Full Plan

The cumulative impact of Scenarios 2 to 8 resulted in a timber harvesting land base of 111,234 hectares; equating to a 17.4 percent reduction to the THLB from the Base Case. In Scenario 9, two final changes were made to the forest estate model: (1) cultural heritage sites were identified and a 400-metre buffer was placed around these sites; and (2) areas identified as having the potential to produce pine mushrooms had forest cover constraints placed upon them to ensure that there was an adequate amount of mature and over-mature timber in these areas. The net result was a further decline in the THLB to 110,871 hectares, or 17.6 percent less than the Base Case Scenario.

The resultant harvest levels and the modeling results associated with growing stock, average harvest age, area harvested, volume per hectare harvested are provided in Figure 10 to

Figure 14 with the results from the Base Case shown as a comparative measure. Figure 15 to Figure 18 show changes to the resultant forest age class distribution as a result of this scenario.

Figure 10. Full Plan - Harvest Flow

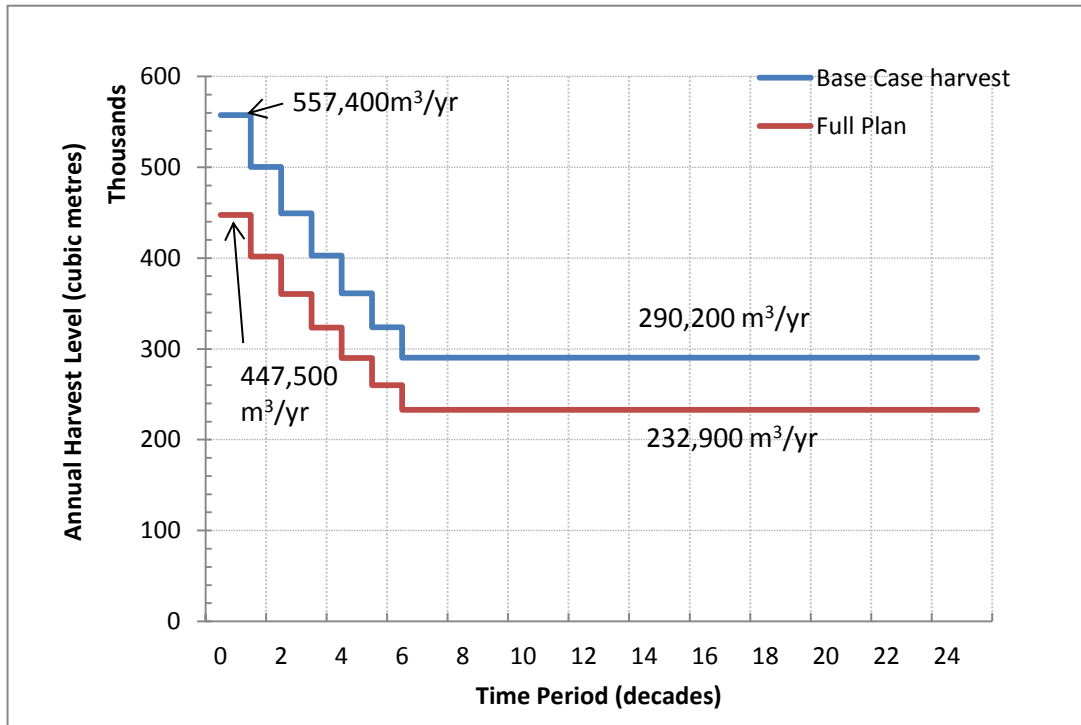


Figure 11. Full Plan - Changes to THLB Growing Stock

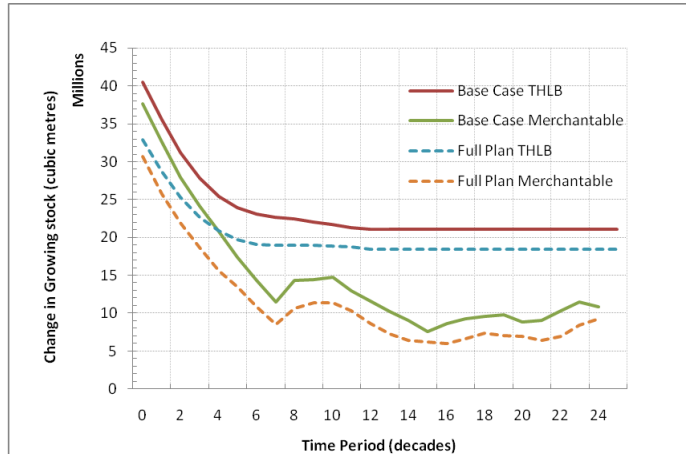


Figure 12. Full Plan - Changes to Area Harvested

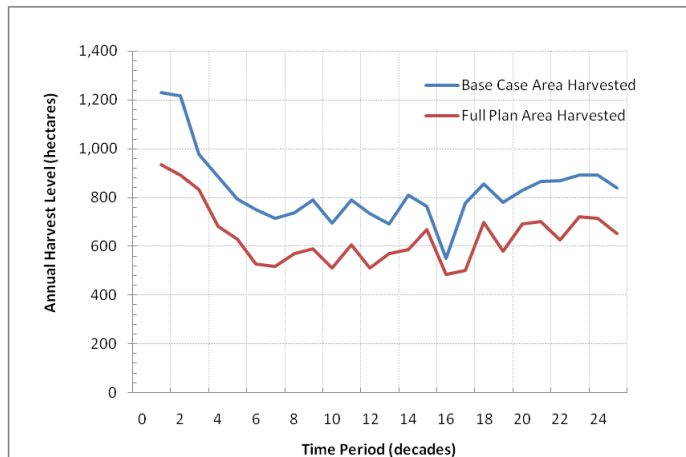


Figure 13. Full Plan – Changes to Average Stand Age Harvested

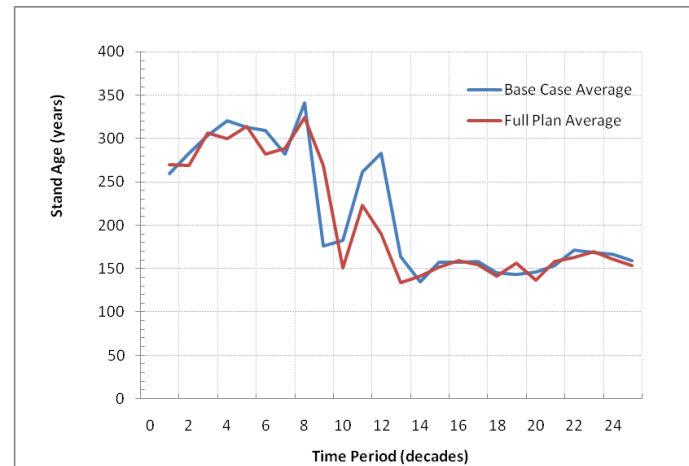


Figure 14. Full Plan Changes to Average Stand Volume Harvested

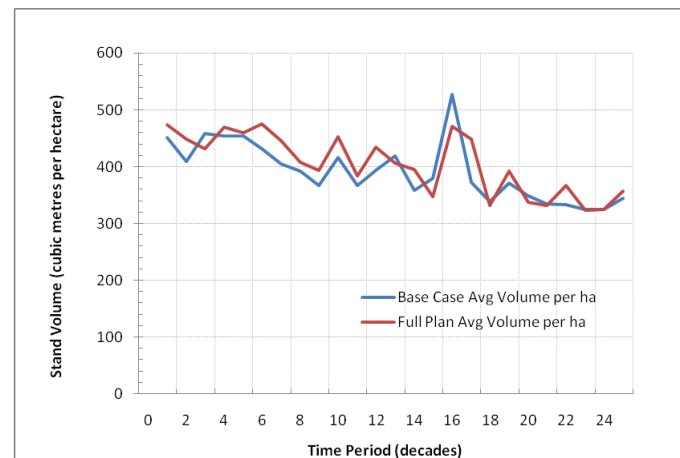


Figure 15. Full Plan – Age Class Distribution Time 0 years

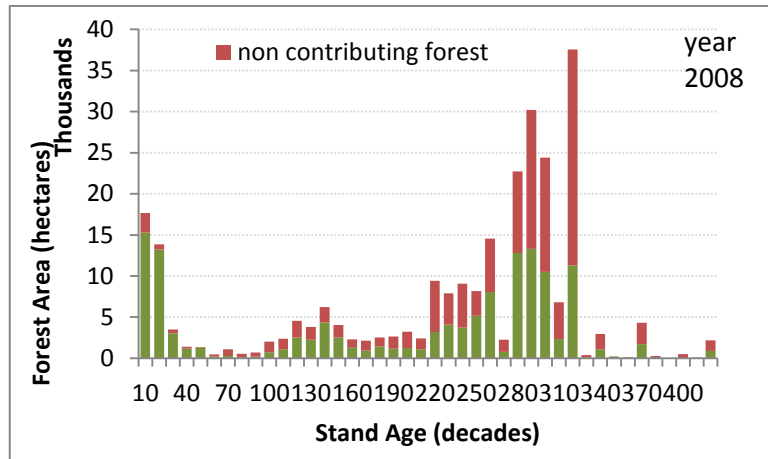


Figure 16. Full Plan – Age Class Distribution Time 50 years

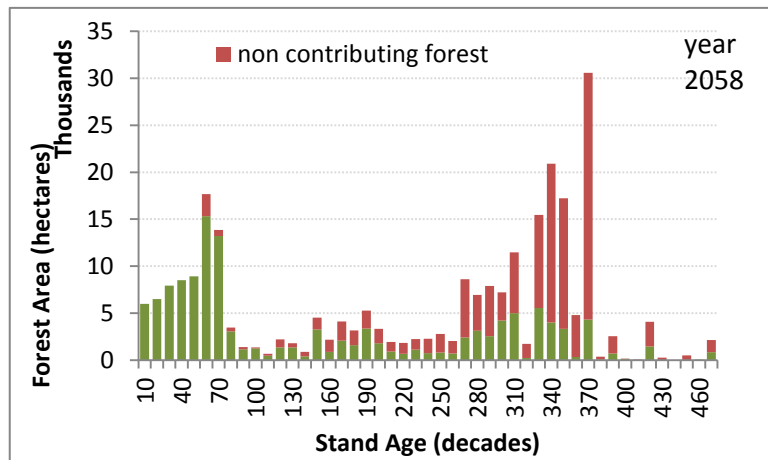


Figure 17. Full Plan – Age Class Distribution Time 100 years

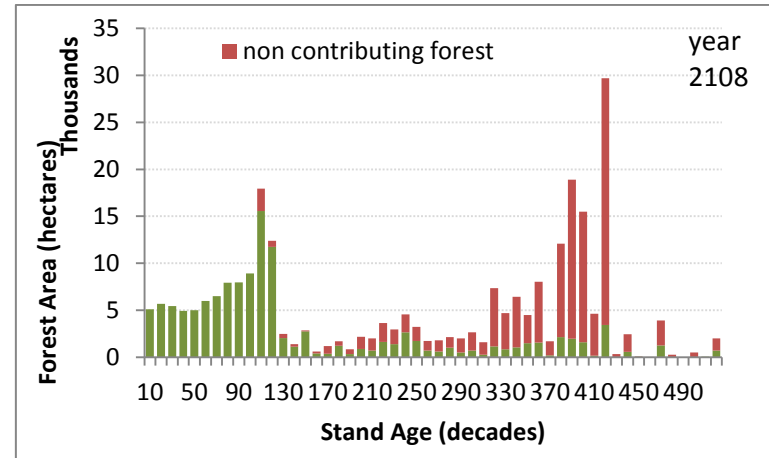
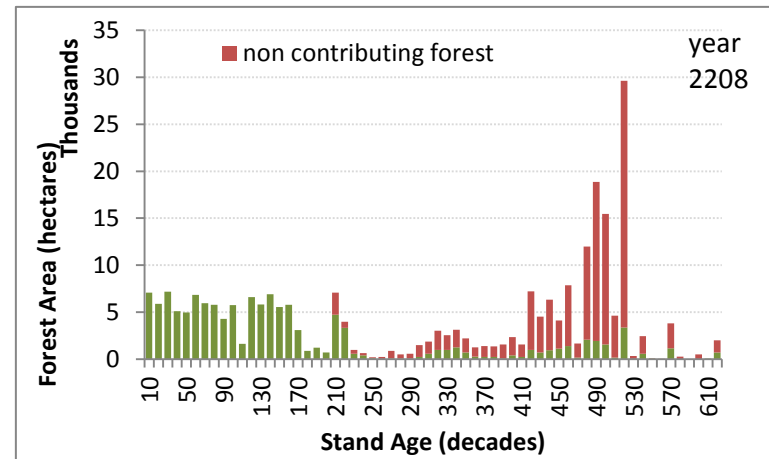


Figure 18. Full Plan – Age Class Distribution Time 200 years



Sensitivity of Assumptions related to the Full Plan

Upon identification of the land base and forest management assumptions pertaining to the Full Plan Scenario, six additional modeling scenarios were derived to quantify the impact of changes to several key management assumptions. Unlike the previous scenarios that built off one another to derive the Full Plan from the Base Case, each of these scenarios were formulated as a single incremental change relative to the Full Plan only. Select results from these scenarios are described in Table .

Table 5. Sensitivity around the Full Plan

Scenario Description		Short term Harvest Level		Long term Harvest Level		Initial THLB Growing Stock		Initial THLB	
		m ³ /year	% change relative to Full Plan	m ³ /year	% change relative to Full Plan	Cubic metres (000,000)	% change relative to Full Plan	Cubic metres	% change relative to Full Plan
S9	Full Plan	447,489		232,871		32.88		110,871	
S10	As per Full Plan but FN cultural buffers are 100 m instead of 400 m	448,933	0.32%	233,623	0.32%	32.97	0.28%	111,211	0.31%
S11	As per Full Plan but clear-cutting with forest cover restrictions allowed in EN buffers.	432,099	-3.44%	224,692	-3.51%	32.88	0.00%	110,871	0.00%
S12	As per FULL Plan but include moderate value grizzly habitat in THLB	456,497	2.01%	237,546	2.01%	33.57	2.11%	113,382	2.26%
S13	As per Full Plan but clear-cutting without forest cover restrictions allowed in EN buffers	462,735	3.41%	240,974	3.48%	32.88	0.00%	110,871	0.00%
S14	As per Full Plan but clear-cutting without forest cover restrictions allowed in EN cores and EN buffers	478,467	6.92%	249,181	7.00%	33.95	3.25%	114,310	3.10%
S15	As per Full Plan but do not apply harvest constraints on moose winter range areas	447,489	0.00%	232,871	0.00%	32.88	0.00%	110,871	0.00%

Conclusion

This analysis identifies both cumulative and incremental changes of various resource management assumptions on short, medium and long term harvest levels for the Nass South SRMP. The results from this analysis were quantified using a spatial analysis of land base changes (via a geographic information system) and linear programming forest estate modeling applications to ensure that the results from one scenario were directly applicable to another, subject only to the changes identified for resource management.

This analysis does not place any greater weight on one scenario being better than another. All are equally valid from a reporting perspective. That more information was provided graphically for the Base Case and the Full Plan is simply a function of brevity. The alternative would have made for a very long report. Tables 2, 3, 4, and 5 provide the critical comparative data.

The information from this analysis is provided as a reference point for discussion that should occur during the decision-making process. It is extremely advantageous that such discussions have this information by which they can quantify the timber impact of alternative resource strategies.

Additional information on the management assumptions and the land base in particular is included in the Information Package following.

Nass South SRMP Information Package

Nass South SRMP Information Package

General Description of Inputs and Assumptions for the Timber Supply Analysis

The following sections describe forest inventory data and forest management assumptions used to construct the harvest forecasts for the Nass South SRMP timber supply analysis. A Base Case forest estate model was developed using the forest management assumptions developed in 2001 for the Nass TSA timber supply analysis. Current forest management has evolved to include updated information and management practices as defined through land-use decisions, forest legislation and forestry practices. Many of these practices and land-use decisions are still evolving. This analysis therefore provides some of the background information required for interest groups to make educated decisions on the impact of specific land-use resolutions on harvest flows.

Uncertainty about some of the inventory and forest management information used in this analysis and its interpretation inevitably exists. This uncertainty is typically dealt with through a prescription of sensitivity analyses around various modeling assumptions. The 'normal' set of sensitivity analyses ('normal' as defined in a MoFR timber supply review) was not completed as part of this analysis. Rather, after a Base Case harvest flow has been identified, the impact of alternative management practices will be evaluated by changing assumptions respecting various management initiatives.

Table lists the spatial inventories used in this analysis. The Integrated Land Management Bureau (ILMB) Land use Planning Section provided these inventories to Industrial Forestry Service Ltd. (IFS) who performed the forest estate analysis.

Table 6. Inventories used in the Analysis

Inventory
Forest Cover (Species, projected age, site index, crown closure, FIZ, PSYU, stocking class, volumes)
Timber Harvesting Land Base inclusion factors
Updated road information – buffered by IFS and then excluded from the THLB
Visual resources
Biogeoclimatic zones
Landscape Units
South Nass Interest Area Location
Pine Mushroom sites
Cultural Heritage sites
Disturbance history
Ecosystem networks – cores and buffers
Goshawk Habitat Area
Mountain Goat Habitat
Hanna Tintina Proposed Protected Area
Grizzly Bear Habitat Ratings
Ungulate Winter Range (moose)
Old Growth Management Areas
Gitanyow treaty settlement lands

The inventory files identified above were loaded into a geographic information system by Spatial Mapping Ltd. of Prince George (a subsidiary of IFS). Using Arc-Info version 9, the various inventory files were intersected to produce one geo-referenced spatial database. To eliminate the numerous polygon slivers resulting from the intersection, all polygons less than 0.001 hectares in size were merged to the largest adjacent polygon.

Forest cover information is current to January 2007 for harvested blocks. A forest cover re-inventory has not been done in the Nass Timber Supply Area for some time, so the base forest cover polygons are considerably out-of-date.

A net-down of the gross land base to a Productive Crown Forest Land Base (PFLB) and then a Timber Harvesting Land Base (THLB) was performed by the Integrated Land Management Branch (ILMB) in cooperation with the Ministry of Forests and Range (MoFR). After receiving these inventories from ILMB, inventories of existing unpaved roads were buffered 15 metres per side and included in the intersected coverage. The areas in these roads were removed from both the PFLB and the THLB.

The methodologies used to create the forest estate model for the Nass South SRMP involved the following process:

- i. The forest and resource inventory information for the interest area was loaded into a geographic information system.
- ii. Inventory files were intersected using Arc-Info to create one geo-referenced shape file for the Nass South SRMP area.
- iii. A ESRI Shape file was created and loaded into Remsoft's Spatial Woodstock program. Modeling themes were created using forest cover and other inventories attributes. The Themes created were:

Table 7. Analysis Themes

Leading species	Old Growth Management Areas
Site quality	Ecosystem networks
Current age class	Grizzly Habitat Rating
THLB inclusion factor	Mountain Goat Habitat
Landscape unit	Moose Habitat
Biogeoclimatic zones	Northern Goshawk nesting sites
Visually sensitive areas	Cultural heritage sites
Pine mushroom sites	Hanna-Tinitina Proposed Protected Area
Forest Management Classification	

- iv. Yield tables were created for the THLB and the non-contributing land base (NCLB) based upon leading species, site quality (e.g. G, M, P, L), age (\pm 140 yrs) and management classification (e.g. managed or unmanaged). Yield Tables were created for unmanaged stands using Batch VDYP v6.6d. Yield Tables for future managed stands were created using Batch TIPSY v4.1.
- v. Forest management objectives, harvest flow constraints and forest cover constraints (e.g. old-growth by LU/BEC, visual quality objectives and greenup/adjacency) were constructed for the Nass South SRMP region based upon the assumptions used in the 2001 MoFR analysis.
- vi. A forest estate model was used to derive a harvest flow using a linear programming optimization model (MOSEK). The harvest flow was generally based upon the 2001 Timber Supply Review harvest flow pattern that modeled a sequential AAC reduction of 10% per decade to the long-term harvest level. The long term harvest level was achieved in decade 7.
- vii. The long-term harvest level was calculated by the inclusion of a growing stock constraint that required that the growing stock for the THLB be

- non-declining after 150 years (15 10-year periods according to the model).
- viii. The results of the Base Case scenario were described in an analysis report with respect to:
 - a. age class distributions at various points in time (0, 50, 100, 200 years)
 - b. average age of stands harvested
 - c. average volume in stands harvested
 - d. changes in total, merchantable and mature merchantable growing stock over time
 - ix. Modeling scenarios were then built for several different management strategies. These Scenarios are described in Table 2. Modeling ScenariosTable of the analysis report.

Analysis Units

Tables 8 and 9 describe the assumptions used to create the analysis unit upon which yield tables were linked. Table describes the THLB and non-contributing forest areas within each analysis unit. Stand age was used in some of the analysis unit designations to separate old and young stands. Stands 140 years or greater were considered "old", stands less than 140 years were "young".

Table 8. Species / inventory type group assignments

Leading Species	Type Group	Leading Species	Type Group
Cedar	1-11	Balsam	18
Hemlock	12	Balsam - hemlock	19
Hemlock – Douglas fir	13, 14	Balsam - spruce	20
Hemlock - Balsam	15	Spruce	21-26
Hemlock - Spruce	16	Pine	27-32
Hemlock - Deciduous	17	Deciduous	33-42

Table 9. Site Quality Classifications

Leading Species	Site quality site index classifications					
	Good	Medium		Poor		Low
	>=	>= and <		>= and <		<
Deciduous	23	16	23	8	16	8
Pine	18	13.5	18	7.5	13.5	7.5

Spruce	24.5	16	24.5	7.5	16	7.5
Balsam	17	13	17	8	13	8
Hemlock	19.5	15	19.5	8	15	8
Cedar	20.5	16	20.5	9	16	9

Table 10. Analysis Unit Classifications and Resultant Area

Analysis Unit	THLB Area (ha)	NCLB Area (ha)	Analysis Unit	THLB Area (ha)	NCLB Area (ha)
Balsam G Old	27	75	Hemlock Balsam M Yng	4,829	141
Balsam G Yng	170	70	Hemlock Balsam P Old	33,911	20,794
Balsam L Old	0	1,188	Hemlock Balsam P Yng	3,095	1,001
Balsam M Old	967	4,953	Hemlock Deciduous G Yng	0	7
Balsam M Yng	532	176	Hemlock Deciduous L Old	0	81
Balsam P Old	478	4,673	Hemlock Deciduous L Yng	0	3
Balsam P Yng	88	37	Hemlock Deciduous M Old	66	11
Balsam Hemlock G Old	26	163	Hemlock Deciduous M Yng	263	39
Balsam Hemlock G Yng	1,134	161	Hemlock Deciduous P Old	296	149
Balsam Hemlock L Old	0	1,300	Hemlock Deciduous P Yng	383	437
Balsam Hemlock L Yng	0	4	Hemlock Douglas Fir G Yng	178	2
Balsam Hemlock M Old	2,183	1,061	Hemlock Douglas Fir L Old	0	62
Balsam Hemlock M Yng	1,626	175	Hemlock Douglas Fir L Yng	0	5
Balsam Hemlock P Old	4,224	6,227	Hemlock Douglas Fir M Old	89	10
Balsam Hemlock P Yng	273	88	Hemlock Douglas Fir M Yng	1,260	24
Balsam Spruce G Old	98	107	Hemlock Douglas Fir P Old	2,650	344
Balsam Spruce G Yng	1,382	148	Hemlock Douglas Fir P Yng	2,969	676
Balsam Spruce L Old	0	17	Hemlock Spruce G Old	1	14
Balsam Spruce M Old	2,123	2,695	Hemlock Spruce G Yng	226	10
Balsam Spruce M Yng	1,125	418	Hemlock Spruce L Old	0	209
Balsam Spruce P Old	987	1,096	Hemlock Spruce L Yng	0	13
Balsam Spruce P Yng	88	65	Hemlock Spruce M Old	150	102
Cedar P	340	11	Hemlock Spruce M Yng	1,038	31
Deciduous G	0	1,818	Hemlock Spruce P Old	2,348	560
Deciduous L	0	29	Hemlock Spruce P Yng	522	108
Deciduous M	0	3,293	Hemlock G Old	126	83
Deciduous P	0	1,219	Hemlock G Yng	446	8
Hemlock Balsam G Old	108	90	Hemlock L Old	0	19,736
Hemlock Balsam G Yng	1,063	10	Hemlock L Yng	0	392
Hemlock Balsam L Old	0	21,566	Hemlock M Old	1,854	477
Hemlock Balsam L Yng	0	221	Hemlock M Yng	1,351	33
Hemlock Balsam M Old	2,843	786	Hemlock P Old	32,171	22,723
NSR all	0	163	Hemlock P Yng	5,364	1,032
Pine G Na	2,684	408	Spruce G Na	64	28
Pine M Na	8,157	2,711	Spruce L Na	0	29
Pine P Na	2,130	578	Spruce M Na	1,431	527
			Spruce P Na	2,652	473

Note: "G" = good site quality, "M" = medium, "P" = Poor, "L" = low

"Old" = stands currently > 140 years of age, "Yng" = stands less than 141 years of age, "NA" = age was not a criteria.

Only the coniferous portion of each stand contributes to the harvest calculation. The deciduous portion of stands were assumed to be left in each cut-block and not harvested. The total merchantable volume (net of decay waste and breakage) for existing unmanaged stands is shown in Table . The percent downward adjustment applied to each yield table for its deciduous portion is included in the right column of this table.

Table 11. Unmanaged stand yield tables

Analysis Unit	Volume per hectare in 10 year increments starting from 5 years of age to 295 years	Decid %
B G old	0 0 0 26 59 95 134 165 193 219 243 265 287 308 329 347 365 382 397 411 425 439 452 464 476 482 482 482 482	9
B G yng	0 0 7 48 92 138 181 218 251 282 310 335 360 385 408 430 450 468 486 503 519 534 549 563 577 584 584 584 585 585	6
B M old	0 0 0 5 33 63 96 124 149 172 194 214 234 253 272 290 307 324 340 355 370 384 397 410 422 428 429 429 430	1
B M yng	0 0 0 19 53 91 129 160 190 217 243 266 289 312 334 354 374 393 411 428 445 461 476 490 503 510 511 511 512 512	0
B P old	0 0 0 0 13 34 58 85 107 127 146 163 180 197 213 228 243 257 271 284 297 310 322 333 345 351 352 352 353 354	1
BH G old	0 0 0 26 75 132 186 231 271 305 335 362 388 414 438 460 481 500 518 535 552 569 584 598 612 619 621 623 625 626	6
BH G yng	0 0 0 23 66 119 170 212 249 281 311 337 362 387 410 432 452 471 489 506 523 538 554 568 581 589 590 592 593 594	3
BH M old	0 0 0 3 22 54 103 141 174 204 230 253 276 299 321 342 361 379 395 410 425 440 454 467 480 488 491 494 496 498	1
BH M yng	0 0 0 3 17 48 97 136 170 199 225 247 268 289 309 327 343 357 370 383 396 408 419 430 441 448 451 453 456 458	2
BH P old	0 0 0 0 6 21 42 84 114 140 163 184 204 225 244 263 280 297 312 327 342 356 369 381 393 401 405 408 411 415	0
BH P yng	0 0 0 0 12 30 58 99 129 155 179 200 221 240 258 276 292 308 323 337 350 362 374 386 397 404 406 409 411 412	10
BS G old	0 0 0 15 46 85 121 151 179 204 226 246 265 282 298 313 327 340 352 364 376 387 398 407 417 421 422 423 424 424	5
BS G yng	0 0 0 12 41 78 113 143 169 191 211 228 244 260 274 286 297 306 315 324 332 339 347 354 360 364 365 365 366 367	33
BS M old	0 0 0 4 22 55 89 117 142 164 185 204 222 240 256 271 286 299 312 324 336 347 358 369 379 385 387 388 390 391	4
BS M yng	0 0 0 7 25 58 91 119 145 170 192 212 231 248 263 277 289 300 311 322 332 342 351 360 369 374 375 376 377 378	8
BS P old	0 0 0 0 6 20 45 72 93 112 130 147 162 178 192 205 218 230 241 252 262 272 282 291 301 306 308 309 311 312	1
BS P yng	0 0 0 0 3 12 33 60 81 100 118 134 150 163 175 186 197 207 216 225 234 242 251 259 266 271 273 275 276 278	3
HB G old	0 0 1 54 152 236 308 369 417 449 473 489 508 532 552 569 582 594 604 613 621 629 635 641 647 651 654 657 660 663	0
HB M old	0 0 0 4 48 122 187 244 291 325 353 373 394 419 441 460 476 491 503 514 526 536 544 551 557 563 566 570 573 576	0
HB M yng	0 0 0 2 22 81 141 192 235 267 293 314 334 356 375 392 406 418 428 438 447 456 464 471 476 480 483 486 488 490	11
HB P old	0 0 0 0 1 7 47 98 143 179 210 235 259 285 308 329 347 363 378 391 404 416 428 439 449 458 465 470 475 479	0
HB P yng	0 0 0 0 1 7 55 106 151 187 218 243 267 292 314 334 351 367 380 392 404 416 427 437 447 455 461 466 470 474	3
HD M old	0 0 0 1 26 81 135 181 219 247 268 285 301 320 336 350 361 370 378 385 393 400 406 412 416 420 423 425 428 430	18
HD M yng	0 0 0 0 11 56 105 148 184 212 234 252 268 286 301 313 322 331 337 344 350 356 362 367 371 375 377 380 383 385	30
HD P old	0 0 0 0 1 13 54 93 128 158 182 202 221 239 254 266 276 285 292 299 306 312 318 324 330 335 338 341 344 347	33
HD P yng	0 0 0 0 1 12 57 99 137 168 195 217 238 258 274 289 302 313 322 331 339 348 356 363 370 376 382 386 390 394	21
HF G yng	0 0 2 45 120 187 244 294 334 365 390 410 431 449 463 473 481 487 491 495 500 504 508 512 515 519 522 524 527 529	10
HF M old	0 0 0 0 25 83 135 181 221 251 276 296 316 335 350 363 374 382 389 394 401 408 414 419 423 427 430 434 437 439	11
HF M yng	0 0 0 4 44 106 159 206 246 278 304 326 347 368 384 398 409 418 424 430 437 444 450 455 460 464 467 470 473 476	5
HF P old	0 0 0 0 1 10 63 109 149 183 211 236 259 284 304 320 334 346 355 364 373 382 390 398 405 412 419 424 428 432	1
HF P yng	0 0 0 0 1 16 67 113 152 185 213 236 259 282 301 317 330 341 350 358 367 375 383 391 398 405 411 416 420 424	7
HS G old	0 0 1 48 137 213 279 334 379 411 436 455 474 496 515 532 546 557 567 576 584 591 597 603 608 612 616 619 622 624	0
HS G yng	0 4 56 195 310 409 495 569 633 688 736 778 817 855 890 921 950 976 1000 1022 1042 1061 1078 1094 1109 1122 1135 1146 1157 1166	0
HS M old	0 0 0 28 116 192 258 315 359 389 411 427 444 465 483 499 512 523 532 540 547 553 559 564 568 572 576 579 581 584	4
HS M yng	0 1 8 56 143 216 278 332 380 421 457 490 519 548 574 598 620 640 658 675 691 706 719 732 744 754 764 774 783 791	6
HS P old	0 0 3 8 20 78 127 169 206 239 268 293 317 340 361 381 399 416 431 445 459 471 482 493 503 513 521 530 537 544	0
HS P yng	0 0 2 6 16 68 114 152 186 215 241 265 286 307 326 343 359 374 388 400 412 423 433 443 452 460 468 475 482 488	7
Hw G old	0 0 0 37 123 197 260 314 355 381 398 410 423 444 461 476 489 499 507 515 521 526 531 535 539 543 545 547 549 551	0
Hw G yng	0 0 1 129 238 331 410 478 535 583 624 658 690 720 748 772 794 813 830 845 858 870 880 889 897 904 910 915 919 922	0
Hw M old	0 0 0 1 66 136 198 251 293 320 341 355 370 391 409 424 438 449 458 466 475 483 489 494 498 502 506 509 511 514	0
Hw M yng	0 0 0 0 37 103 162 215 257 287 310 327 345 367 386 402 416 427 437 445 455 464 472 477 483 487 491 495 499 502	0
Hw P old	0 0 0 0 0 1 42 89 130 163 189 210 230 253 273 290 306 319 331 341 352 362 372 381 390 398 406 413 417 422	0
Hw P yng	0 0 0 0 0 1 27 74 114 147 174 196 217 240 260 278 294 308 320 331 342 353 363 373 382 391 399 406 414 420	0
PI G na	0 0 1 23 74 122 165 205 240 272 301 326 351 371 383 393 399 403 404 406 409 412 416 419 423 426 428 431 433 435	12
PI M na	0 0 0 0 3 9 34 61 85 106 126 144 161 175 187 196 204 210 214 219 223 228 233 237 241 244 247 249 251 253	4
PI P na	0 0 0 0 2 12 45 89 128 162 192 218 242 267 290 310 328 344 358 371 383 395 407 418 428 436 441 446 450 453	0
Sx G na	0 8 52 128 231 312 382 442 494 539 578 611 642 670 695 717 735 753 768 783 797 809 821 832 842 852 862 870 879 887	20
Sx M na	0 0 24 66 141 224 293 353 407 454 496 532 566 597 624 649 671 691 709 726 742 757 771 784 796 808 819 829 839 848	11
Sx P na	0 0 0 0 0 0 2 8 37 65 89 111 131 150 168 184 198 212 224 235 245 255 264 272 279 286 291 295 300 304	0

Managed Stands

Existing managed stands were identified in the Nass South SRMP using a few select forest cover attributes. All sites having a disturbance label of 'L' for logging or an open_ind inventory label of 'Y' were considered managed. However, any of these stands also having a disturbance label of 'B' or 'F' or 'I' were reset to unmanaged. The net result was that 30,351 hectares or 22.5% of the THLB is currently considered managed.

Managed stand yield tables were created for each analysis unit based upon the volume-weighted site index and the existing species distribution. Guidance was also provided through review of the Nass TSR2 Information Package. Table describes the silviculture assumptions used to create managed stand yield tables using Batch TIPSYS version 4.1. Note that the original age classification used in the unmanaged stand classifications were dropped. In addition to the assumptions shown in this table, all stands were assumed to be planted after a 3-year regeneration delay. Utilization was to 17.5 cm plus diameter at breast height. Operational adjustment factors of 15% and 5% were applied as OAF1 and OAF2. The managed stand yield tables created by these management assumptions are shown in Table .

Table 12. Stands Management Assumptions

Species	Site Quality	THLB Area (ha)	Site index	Regenerated Species and Percents								Planting density
				Spp 1	% 1	Spp 2	% 2	Spp 3	% 3	Spp 4	% 4	
B	G	208	18.4	Bl	59	Hw	41					1000
B	M	1,499	14.3	Bl	70	Hw	30					1000
B	P	566	11.8	Bl	100							1000
BH	G	1,236	18.5	Bl	60	Hw	30	Sw	10			1000
BH	M	3,928	14.3	Bl	55	Hw	35	Sw	10			1000
BH	P	4,445	11.5	Bl	50	Hw	40	Sw	10			1000
BS	G	1,503	20.0	Bl	60	Sw	20	Pli	20			1000
BS	M	3,253	14.8	Bl	70	Sw	20	Hw	10			1000
BS	P	1,041	11.8	Bl	55	Sw	45					1000
Cw	P	388	12.0	Hw	50	Bl	50					1100
HB	G	1,244	22.0	Hw	50	Bl	50					1100
HB	M	8,008	16.1	Hw	60	Bl	40					1100
HB	P	36,453	11.7	Hw	60	Bl	40					1100
HD	M	335	16.6	Hw	55	Bl	30	Pli	15			1100
HD	P	656	13.0	Hw	55	Bl	45					1100
HF	G	190	21.0	Hw	55	Pli	25	Bl	20			1100
HF	M	1,420	16.9	Hw	55	Pli	20	Bl	15	Sw	10	1100
HF	P	5,608	12.4	Hw	50	Bl	50					1100
HS	G	234	22.3	Hw	45	Sw	30	Pli	25			1100
HS	M	1,237	18.1	Hw	55	Sw	25	Bl	20			1100
HS	P	2,832	12.7	Hw	60	Sw	30	Pli	10			1100
Hw	G	598	21.5	Hw	80	Bl	20					1100
Hw	M	3,241	17.0	Hw	65	Bl	30	Pli	5			1100
Hw	P	37,056	11.9	Hw	55	Bl	45					1100
Pl	G	2,715	20.0	Pli	60	Bl	15	Hw	15	Sw	10	1200
Pl	M	8,289	15.9	Pli	50	Hw	25	Bl	20	Sw	5	1200
Pl	P	2,203	11.1	Pli	50	Hw	50					1200
Sx	G	62	27.7	Sw	60	Bl	20	Hw	20			1000
Sx	M	1,497	20.5	Sw	65	Bl	15	Pli	10	Hw	10	1000
Sx	P	2,654	13.8	Sw	75	Hw	10	Bl	10	Pli	5	1000
THLB Area		134,598										

Table 13. Managed Stand Yield Tables

Analysis Unit	Volume per hectare in 10 year increments starting from 5 years of age to 295 years
B G	0 0 2 27 89 165 237 305 368 421 464 502 538 569 596 621 641 659 673 684 694 703 712 720 728 734 738 742 746 748
B M	0 0 0 2 17 57 110 161 207 249 291 328 360 387 410 429 446 461 475 488 499 510 520 528 535 541 546 551 556 558
B P	0 0 0 0 1 12 39 78 121 161 194 225 255 286 311 331 349 363 374 384 393 400 406 411 416 420 423 425 427 428
BH G	0 0 2 26 88 165 237 306 368 418 457 492 524 552 576 596 613 627 637 645 652 659 665 671 675 678 680 683 684 684
BH M	0 0 0 2 18 59 112 164 210 254 296 334 367 395 418 439 456 472 488 502 514 526 536 544 551 557 563 569 574 576
BH P	0 0 0 0 2 12 38 74 113 150 183 213 242 270 295 316 335 352 368 382 395 406 416 425 432 440 446 452 457 459
BS G	0 0 8 49 125 204 276 339 386 422 450 473 491 505 515 521 523 523 522 520 518 515 512 510 509 509 509 509 509 509
BS M	0 0 0 2 20 64 121 175 222 269 312 347 376 399 418 435 449 461 472 482 490 497 502 506 509 512 514 516 517 518
BS P	0 0 0 0 1 12 42 83 127 168 204 238 272 304 330 351 369 384 396 407 417 425 432 438 444 448 452 455 457 457
Cw ?	0 0 0 0 3 18 50 90 132 170 203 234 264 293 317 338 358 377 393 408 421 432 442 451 459 467 474 480 486 488
HB G	0 0 15 81 185 285 379 460 527 587 640 684 719 747 771 794 815 835 853 870 881 888 896 902 909 916 922 928 933 936
HB M	0 0 1 9 46 110 175 234 288 341 389 431 467 499 528 556 581 604 625 644 660 676 688 698 708 716 722 728 734 736
HB P	0 0 0 0 3 15 44 82 122 159 192 222 250 277 302 323 343 362 379 395 409 421 432 442 451 459 467 474 480 483
HD M	0 0 1 15 61 127 191 248 301 351 397 436 470 500 529 556 581 603 622 640 655 667 678 688 696 704 710 717 723 726
HD P	0 0 0 1 8 35 80 128 172 211 248 282 314 343 370 394 415 434 450 464 478 490 501 512 522 531 540 548 556 560
HF G	0 0 16 80 176 265 347 423 488 546 601 648 687 720 745 767 789 808 826 844 860 875 886 893 899 905 911 916 921 923
HF M	0 0 2 20 71 140 204 262 317 368 413 452 485 518 549 576 600 621 641 657 671 683 693 703 711 718 724 730 736 738
HF P	0 0 0 1 4 24 62 106 149 188 223 255 287 315 339 362 383 401 418 432 444 455 465 475 483 491 499 506 512 515
HS G	0 1 24 101 204 300 389 465 531 589 638 676 702 724 746 766 785 803 811 811 811 811 811 811 811 811 811 811 811 811 811
HS M	0 0 2 27 90 168 242 311 377 434 482 524 564 600 631 659 682 701 716 730 742 753 764 774 783 791 798 805 811 813
HS P	0 0 0 1 7 32 75 120 162 201 237 271 301 328 353 377 398 418 435 450 464 476 488 498 508 517 525 532 539 542
Hw G	0 0 14 80 184 283 381 472 552 626 696 757 807 848 885 921 954 985 1015 1043 1067 1085 1099 1111 1122 1133 1143 1153 1163 1167
Hw M	0 0 1 17 67 138 206 267 326 382 432 474 512 547 581 612 639 664 686 705 720 734 747 757 767 776 784 792 800 803
Hw P	0 0 0 0 3 18 50 90 131 168 201 232 261 289 314 335 355 374 391 407 420 432 442 451 460 468 475 482 488 491
PI G	0 0 14 69 151 227 291 346 392 429 461 488 511 528 541 551 560 566 569 570 571 572 573 574 575 575 575 575 575
PI M	0 0 1 13 52 108 163 211 253 292 326 355 379 400 418 435 451 465 477 488 497 505 511 516 520 524 528 531 535 536
PI P	0 0 0 0 3 11 33 64 94 123 148 170 191 209 225 240 254 266 278 290 300 310 319 328 336 342 348 354 359 361
Sx G	0 2 59 186 327 443 530 596 635 658 676 683 683 683 683 683 683 683 683 683 683 683 683 683 683 683 683 683 683 683
Sx M	0 0 7 51 134 219 299 369 422 463 498 527 549 563 572 576 579 582 583 584 584 584 584 584 584 584 584 584 584 584
Sx P	0 0 0 1 12 46 98 150 198 243 287 326 357 383 405 423 439 453 466 477 486 494 502 506 507 509 510 511 511 511

Merchantability constraints

Consistent with the 2001 Nass Timber Supply Review, minimum harvest age was dictated by volume per hectare. Existing unmanaged and future managed stands required greater than 300 cubic metres per hectare before they were considered eligible for harvesting.

Transitions and Future Roads

After harvesting, all stands were assumed to convert to a managed state.

Stands that were unmanaged converted to managed stands and 7 percent of the area of the future managed stand was lost to roads.

Existing and future managed stands did not lose additional area to roads.

Modeling and Harvest Flow Determination

The forest estate model developed by Remsoft[®] called Woodstock was used for this analysis. Spatial Woodstock was used to take GIS shape files and create the management themes used for the modeling process. The Woodstock model then builds off of these spatial themes.

All harvest flows were calculated for 25 periods, with each period equating to 10 years (for a total 250-year modeling period).

Harvest flows were determined using a linear program call MOSEK[®]. The linear program objective function was to maximize the harvest level, subject to many land base constraints. As some of these constraints were already broken in period 1, a pure linear program result would make the harvest flow infeasible. To overcome infeasibilities due to area constraints, goal programming was used to allow a harvest level to be calculated while accounting for the fact that some of the constraints were currently not met, (though they may be met in the future as forests continue to age and in so doing eventually achieve age class constraint objectives).

All harvest flows had a similar pattern applied that was consistent with the MoFR's TSR2 results. That is, maximize the harvest such that it can decline a maximum of 10 percent per decade for the first 7 periods, and then convert to an even flow harvest thereafter. All scenarios also had a growing stock constraint imposed that ensured that the timber harvesting land base growing stock was non-declining from period 12 onwards.

Harvest Flow Constraints

The objective of the model was to maximize a harvest flow subject to various land base management constraints. These management constraints included:

1. Visual Quality Objectives
2. Adjacency constraints
3. Biodiversity old seral constraints
4. Biodiversity mature plus old constraints
5. Biodiversity early constraints
6. Moose habitat constraints
7. Ecosystem network constraints
8. Pine mushroom sites

The model also had constraints placed on physical locations within the land base and whether or not these areas contributed to the timber harvesting land base. Such locations included:

1. Old growth management areas,
2. Ecosystem networks (core areas and buffers around the cores),
3. Grizzly habitat areas,
4. Goat habitat,
5. First nations proposed protected area (Hanna-Tintina),
6. First nations cultural areas (Gitanyow),
7. Proposed Gitanyow treaty settlement lands.

Each of these management and land base constraints are described in the sections following.

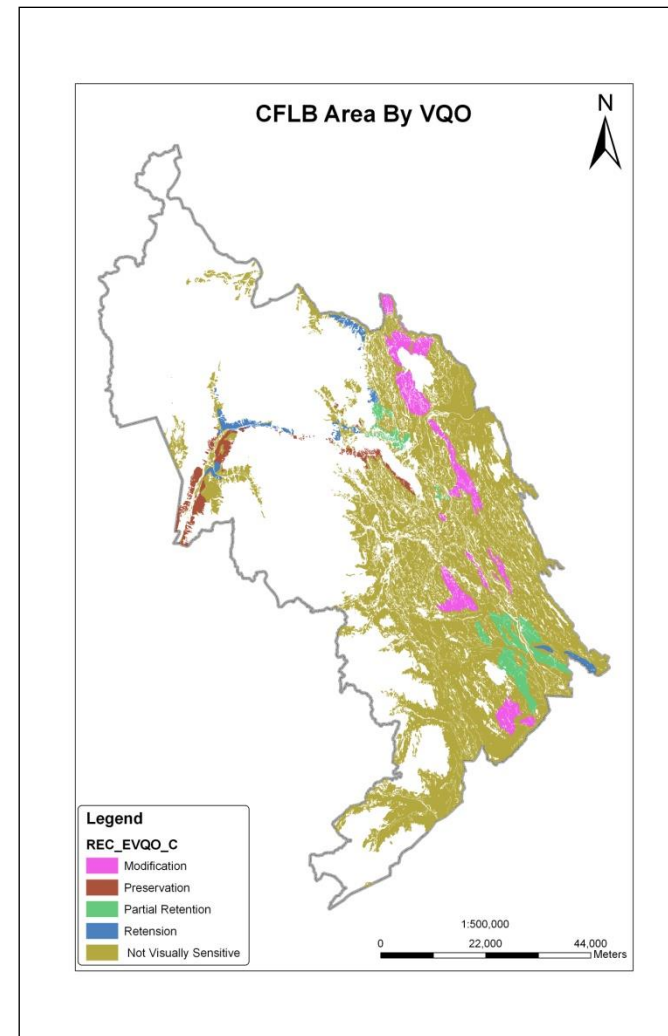
Visual quality

Visual quality objectives (VQO) were applied in all of the scenarios using the most current visually landscape inventory for the Nass TSA. Constraints were applied by landscape unit and VQOs to the areas identified in Table . Modification VQO areas required 25% of the area to be greater than 3 periods (30 years) of age. Partial retention VQOs required 15%, retention VQOs, 5% and Preservation VQOs, 1percent of the productive forest area greater than 30 years. The locations of VQOs are shown in Table 14. Visual Quality Objectives.

Table 14. Visual Quality Objectives

Landscape Unit	Not Visually Sensitive	Visual Quality Objectives / Productive Forest area (ha)				Totals
		Mod	Pres	PR	Retention	
Slivers	35					35
Bear	8,119		4,680		2,245	15,044
Bowser	1,750					1,750
Brown Bear	59,088	6,185		9,528	1,050	75,851
Cambria Icefield	784					784
Kinskuch	27,667	38				27,705
Kwinamuck	12,976					12,976
Madely	37,721	5,524				43,245
Tchitin	14,385					14,385
Tintina	16,665	4,659		1,356	399.2	23,079
White	38,484	139	1,864	887	569	41,943
Wildfire	3,706	1,275			995.1	5,976
Totals	221,379	17,820	6,544	11,771	5,259	262,772

Mod = Modification VQO
 Pres = Preservation VQO
 PR = Partial Retention VQO



Map 3. Visually Sensitive Areas in the Forested land base

Adjacency

Although this analysis utilized a spatially explicit model, cut blocks were not created and scheduled as part of the modeling exercise. To mimic the effect of adjacency on timber availability, the MoFR logic was used whereby a greenup constraint of 33% was applied to the non-visually sensitive portion of the timber harvesting land base in each landscape unit. Table details the areas to which a 2 period (20-year) greenup constraint was applied.

Table 15. Adjacency constraint areas

Landscape Unit	Not Visually Sensitive THLB area (ha)
Bear	4,247
Brown Bear	38,552
Kinskuch	15,104
Kwinamuck	2,561
Madely	21,177
Tchitin	4,977
Tintina	8,200
White	12,494
Wildfire	1,060
Totals	108,373

Landscape Unit, BEO, Biogeoclimatic Zone Productive Forest Areas

Biodiversity constraints were applied by landscape unit, its assigned biodiversity emphasis option (BEO) and biogeoclimatic ecosystem classification (BEC). Productive forest within each landscape unit and BEC are shown in Table . Within each landscape unit BEC area, early seral and old seral constraints were applied according to the MOFR landscape unit planning guidebook. Several scenarios also had mature plus old constraints applied to the areas. The targets applied for old seral constraints are shown in Table . All of these targets were applied using an age classification of 251 years and older. The targets applied to mature and old seral constraints are shown (along with the relevant age target in Table . The location of each landscape unit is shown in Map 4. The locations of Biogeoclimatic Zones are shown in Map 5.

Table 16. Landscape Unit / BEC

Landscape Unit and BEO	Biogeoclimatic Zone / Productive Forest Area (ha)											Total Areas (ha)
	BAF	CMA	CWH wm	CWH ws2	ESSF wv	ICH mc1	ICH vc	MH mm1	MH mm2	MH un	sliver	
Slivers	-	-	0	-	4	25	-	0	2	-	4	35
Bear - I	-	937	7,634	-	145	-	-	-	58	6,269	-	15,043
Bowser - L	2	-	-	-	830	-	918	-	-	-	-	1,750
Brown Bear - L	-	-	-	-	19,479	56,373	-	-	-	-	-	75,852
Cambria Icefield - L	88	36	-	-	608	-	-	-	51	-	-	784
Kinskuch - I	1	-	-	-	9,646	17,826	232	-	-	-	-	27,705
Kwinamuck - L	-	184	-	6,680	-	457	-	2,521	3,134	-	-	12,976
Madely - I	461	-	-	-	12,976	29,420	388	-	-	-	-	43,244
Tchitin - H	-	-	-	3,709	1,721	6,341	-	-	2,614	-	-	14,385
Tintina - L	0	-	-	-	4,159	4,128	14,793	-	-	-	-	23,080
White - I	141	-	-	-	17,649	6,294	17,629	-	230	-	-	41,943
Wildfire - I	1	-	-	-	2,582	-	3,393	-	-	-	-	5,976
Totals	693	1,157	7,634	10,389	69,799	120,864	37,352	2,521	6,090	6,269	4	262,772

BEO, I = intermediate, l = low, H = high

Table 17. Old Biodiversity Seral Constraint Targets

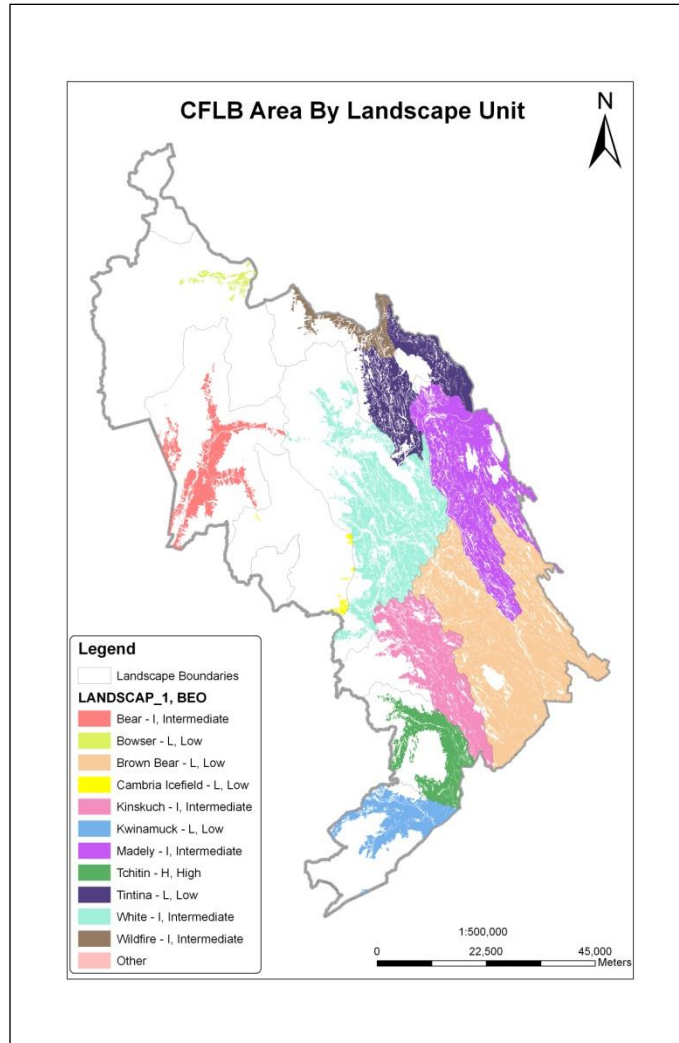
Landscape Unit and BEO	Biogeoclimatic Zone and Seral constraint percent target					
	CMA	CWHws2	ESSFwv	ICHmc1	ICHvc	MHun
Bear - I	28	13	-	-	-	28
Brown Bear - L	-	-	19	9	-	-
Kinskuch - I	-	-	19	9	13	-
Kwinamuck - L	-	9	-	9	-	-
Madely - I	-	-	19	9	13	-
Tchitin - H	-	13	-	13	-	-
Tintina - L	-	-	19	9	13	-
White - I	-	-	19	9	13	-
Wildfire - I	-	-	19	-	13	-

Notes: Low biodiversity constraints were factored in over a 140 year period at a rate of 33% of the target in period 1, 67% of the target in period 8 and 100% of the target in period 15.

All old biodiversity constraints were applied to stands 25 periods of age or older.

Constraints were only applied to landscape unit BEC combinations having THLB area in them. If the LU/BEC had productive forest and no THLB, the constraint would not have an impact on the harvest flow.

Map 4. Crown Forest Land Base by Landscape Unit



Map 5. Crown Forest Land base by BEC

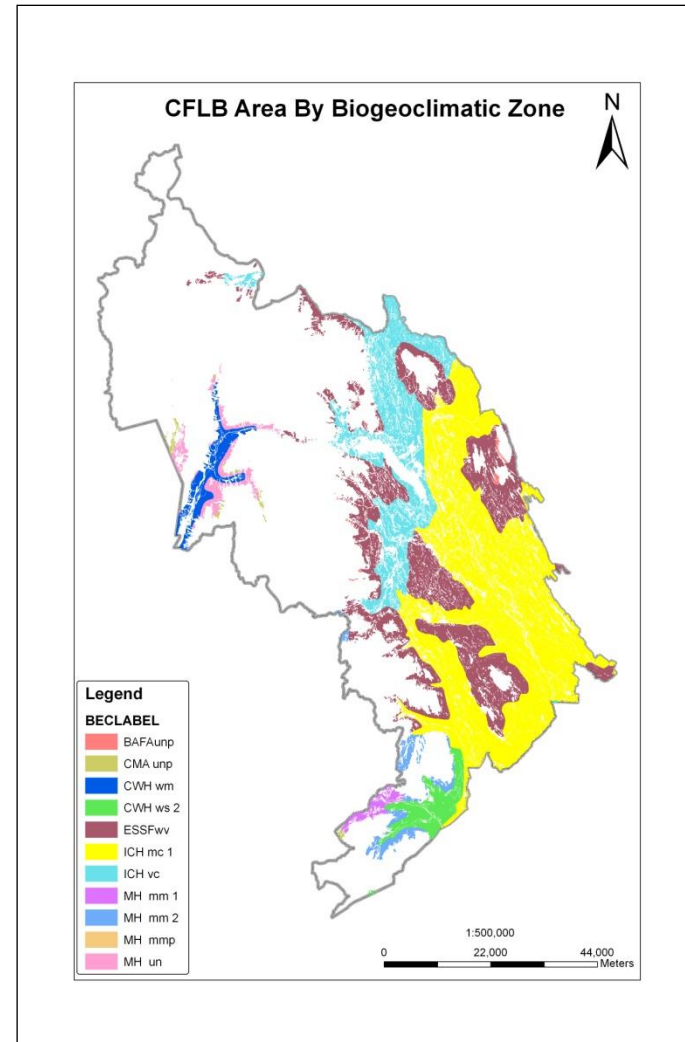


Table 18. Mature plus Old biodiversity Constraint Targets

Landscape Unit and BEO	Biogeoclimatic Zone Seral constraint percent target and age target					
	CMA	CWH ws2	ESSF wv	ICH mc1	ICH vc	MH un
Bear - I	54 / 81	36 / 81	-	-	-	54 / 121
Brown Bear - L	-	-	19 / 121	15 / 101	-	-
Kinskuch - I	-	-	36 / 121	31 / 101	34 / 101	-
Kwinamuck - L	-	17 / 81	-	15 / 101	-	-
Madely - I	-	-	36 / 121	31 / 101	34 / 101	-
Tchitin - H	-	51 / 81	-	46 / 101	-	-
Tintina - L	-	-	36 / 121	15 / 101	17 / 101	-
White - I	-	-	36 / 121	31 / 101	34 / 101	-
Wildfire - I	-	-	36 / 121	-	34 / 101	-

Grizzly Habitat Areas

Grizzly habitat areas were incorporated into the model spatially and used in several scenarios by either including the areas in the timber harvesting land base or excluding them (in whole or part) from harvesting. Habitat areas had classifications of very high, high and medium habitat. Table describes the area in each classification.

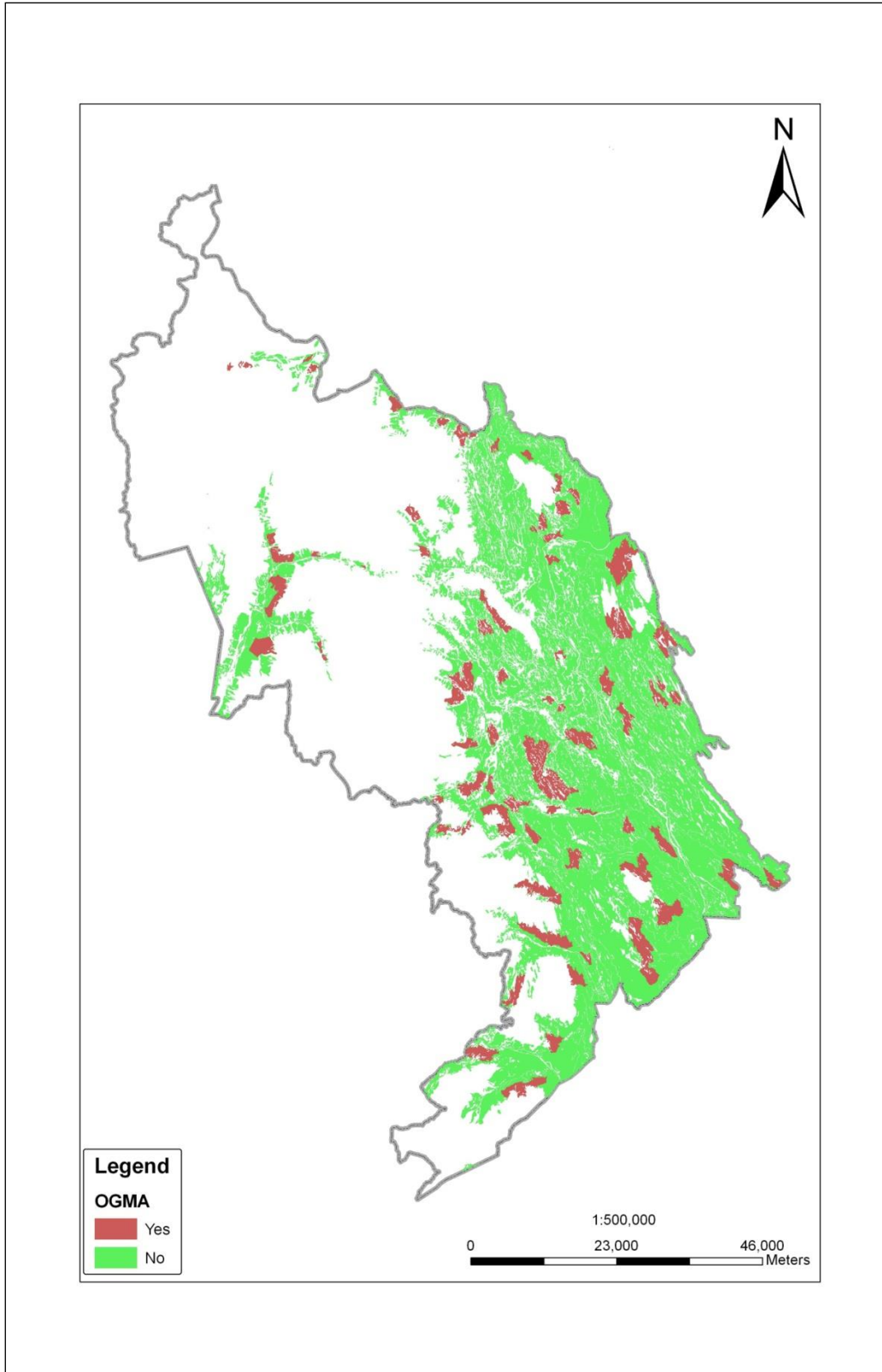
Table 19. Areas by Grizzly Habitat Quality

Habitat Rating	THLB (ha)	Non Contributing Forest (ha)	Total Productive Forest (ha)
Very high	93.5	552.8	646
High	1,357	3,443	4,800
Moderate	2,789	5,921	8,710
Not sensitive	130,359	118,258	248,617
Total	134,599	128,175	262,773

Old Growth Management Areas

Old growth management areas were incorporated spatially into the analysis and excluded from harvesting in all except the first three scenarios. The total forest area in OGMA is 30,524 hectares, of which 7,288 hectares are in the THLB for the first three scenarios analyzed. OGMA are shown in Map 6.

Map 6. Old Growth Management Areas



Ecosystem networks

Ecosystem networks (ENs) were identified spatially in this analysis and several different modeling scenarios were built around them. Table describes the area within ENs. EN cores were removed from the THLB commencing in Scenario 6. In scenario 8, selective harvesting was modeled on the area in EN buffers. Selective harvesting was modeled such that 30 percent of the volume in a buffer area could be removed (i.e. 70% retention), if it was eligible for harvest after consideration for all other constraints (e.g., volume per hectare, biodiversity etc.). After selective harvesting the stand reverted to an age of 100 years and re-entry was restricted for 3 decades. The 100 years was derived through a review of the change in basal area for an average hemlock stand in the Nass with a site index of 13. The basal area at maturity was multiplied by 0.7 to determine the equivalent age of a stand after 30 percent of the basal area was removed. The investigation identified 100 years as an appropriate age equivalent.

Table 20. Ecosystem Networks

Ecosystem Network Classification	THLB (ha)	Non Contributing Forest (ha)	Total Productive Forest (ha)
EN Core Area	4,339	14,266	18,605
EN Buffer	10,816	9,090	19,906
Outside EN	119,444	104,819	224,263
Totals	134,599	128,175	262,774

Mountain Goat Habitat

Mountain goat habitat was identified spatially and removed from the THLB in all except the first 6 scenarios. Table describes the amount of area in mountain goat habitat in the Base Case scenario.

Table 21. Mountain Goat Winter Range Areas

Mountain Goat Habitat	THLB (ha)	Non Contributing Forest (ha)	Total Productive Forest (ha)
High	1,813	5,147	6,960
Non sensitive	132,786	123,027	255,813
Total	134,599	128,174	262,773

Moose Winter Range

Moose winter range polygons were identified spatially in this analysis. They did not receive special management consideration until Scenario 7, whereupon each

polygon was required to have more than 30% of the THLB area greater than 110 years of age. The sensitivity of this constraint is examined in Scenario 15. Table describes the area in Moose winter range habitat polygons.

Table 22. Moose Winter Range Areas

Moose Polygon #	THLB (ha)	Non Contributing Forest (ha)	Total Productive Forest (ha)
3	1,177	684.9	1,862
4	55.5	274.3	329.8
5	15.9	97.1	113
6	116	779.3	895.3
7	0	171.7	171.7
8	997.3	1,773	2,770
9	69.5	47.5	117
10	12.4	14.6	27
11	924.5	164.5	1,089
12	122.2	461.1	583.3
13	805.6	1,015	1,821
14	719.8	847.6	1,567
15	39.9	162.7	202.6
16	674.3	503.2	1,178
17	47.3	140.3	187.6
18	268.1	270.2	538.3
19	255.1	63	318.1
Not sensitive	128,298	120,705	249,003
Totals	134,598	128,175	262,774

Cultural Heritage Sites

Cultural heritage sites are identified several different ways for this analysis.

- 1 The Hanna-Tintina proposed protected area is one large polygon in the NE portion of the SRMP area.
- 2 The Gitanyow First nations have smaller settlement polygons identifying critical areas of concern.
- 3 Cultural heritage sites were identified over much of the SRMP as points or lines. These locations were buffered using the GIS at distances of 50 metres, 100 metres and 400 metres and the impact of removing these buffered areas was examined.

Table 23. Cultural Heritage Sites

Cultural / First Nations Interest Areas	THLB (ha)	Non Contributing Forest (ha)	Total Productive Forest (ha)
Proposed treaty lands	2,452	1,151	3,603
Hanna Tintina	5,010	8,765	13,775
50m buffers	10.7	41.3	52
100m buffers	24.2	40.9	65.1
400m buffers	457.2	590.2	1,047
Not Sensitive	126,644	117,588	244,232
Totals	134,598	128,176	262,774

Note: Buffered areas were concentric rings around various sites. A 400 metre buffer is actually the sum of the distance from the cultural site to the 50 metre ring, plus the distance to the 100 metre ring, plus the distance to the 400 metre ring. Therefore the total THLB impact of the 400m buffer is (10.7+24.2+457.2) 492.1 hectares. Although some buffered areas exist in the Hanna-Tintina and Gitanyow, these areas are not reported above.

Pine Mushrooms

Pine mushroom sites were identified in the South Nass SRMP using a surrogate mapping approach that identified poor site index locations within ICHmc1 and CWHws2 BEC zones. While this approach recognizes that more work needs to be done to spatially identify mushroom sites, the 'potential' impact of harvest restrictions is quantified. Within the potential mushroom sites identified, a harvest constraint was imposed whereby 50 percent of the THLB area had to be between 80-200 years of age.

Table 24. Pine Mushroom Sites

Pine Mushroom Classification	THLB (ha)	Non-Contributing Forest (ha)	Total Productive Forest (ha)
Mushroom	17,286	0	17,286
No mushrooms	117,312	128,176	245,488
Totals	134,598	128,176	262,774

Non-Recoverable Losses

All scenarios had their harvest flow results reduced for non recoverable losses (NRLs) (eg fires, insects and disease). The losses were calculated based upon the change in timber harvesting land base relative to the THLB and NRLs established in TSR2. The timber harvesting land base and volumes lost to non recoverable losses for each scenario is shown in Table .

Table 25. Scenario THLBs and NRLs

Scenario	THLB Area (ha)	Non-Recoverable Losses (m³/year)
TSR2 Base Case	189,175	18,000
S1	134,598	12,807
S2	132,146	12,574
S3	127,136	12,097
S4	119,849	11,404
S5	119,849	11,404
S6	115,793	11,018
S7	111,234	10,584
S8	111,234	10,584
S9	110,871	10,549
S10	111,211	10,582
S11	110,871	10,549
S12	113,382	10,788
S13	110,871	10,549
S14	114,310	10,877
S15	110,871	10,549