



North Coast Land and Resource Management Plan

Map and Inventory Handbook

**Ministry of Sustainable Resource Management
Skeena Region**

January 2002

Acknowledgements

This *Map and Inventory Handbook* was compiled by Denise Stoffels and Hannah Horn for the North Coast Land and Resource Management Plan Government Technical Team. This handbook is based on the Cassiar Iskut-Stikine LRMP Inventory Handbook, written and compiled by Greg Tamblyn of SKR Consultants Ltd. (September 1997).

This handbook would not have been possible without the contributions of many people. This information has been collected and reviewed by government employees from the Ministry of Sustainable Resource Management, the Ministry of Forests, the Ministry of Water, Land and Air Protection, the Ministry of Competition, Science and Enterprise and the Ministry of Energy and Mines, including members of the Government Technical Team.

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List of Acronyms

- ALR Agricultural Land Reserve
- AOA Archaeological Overview Assessment
- BCAL BC Assets and Lands
- BEC Biogeoclimatic ecosystem classification
- BEI (BEU) Broad ecosystem inventory (unit)
- CDC Conservation Data Centre
- CWS Canadian Wildlife Service
- DFO Department of Fisheries and Oceans
- FISS Fish Information Summary System
- FPC Forest Practice Code
- GIS Geographic Information System
- GTT Government Technical Team
- IWMS Identified Wildlife Management Strategy
- LUCO Land Use Coordination Office
- MWLAP Ministry of Water, Land and Air Protection
- MEM Ministry of Energy and Mines

MOF	Ministry of Forests
MCSE	Ministry of Competition, Science and Enterprise
MSRM	Ministry of Sustainable Resource Management
NTS	National Topographic Series
PAS	Protected Areas Strategy
RIC	Resource Inventory Committee
RPAT	Regional Protected Areas Team
SEDS	Salmon Escapement Database System (also called nuSEDS v1.0)
TOS	Tourism Opportunities Study
TRIM	Terrain Resource Information Management
VQO	Visual quality objective

1. Introduction and Background

1.1 Purpose of the *Map and Inventory Handbook*

This *Map and Inventory Handbook* has been developed to provide participants at the North Coast LRMP planning table with a quick and easy reference regarding the types of maps that are available from the LRMP Government Technical Team (GTT), their composition, and any associated information to facilitate their interpretation and use.

Section 2.0 contains descriptions and copies of each of the core maps at a 1:1,000,000 scale so that participants can refer to map information during negotiations. Larger scale maps (1:250,000) will be available at each meeting to allow more detailed assessment of the relative importance of places within the planning area for various resource uses. Overlays will also accompany the 1:250,000 maps to assist participants in identifying overlapping values.

Section 3.0 contains descriptions of other less frequently used reference maps, but does not contain copies of the actual maps.

Appendix 1 describes the set of base inventories that are most commonly used in building maps for resource planning such as TRIM, forest cover inventory, watershed atlas and Fisheries Information System. These base inventories are also described in terms of data coverage, scale, source, age and reliability. The appendix will also cross-reference the types of core and reference maps that are produced using each inventory.

1.2 Overview of Map Information

1.2.1 Map Production

In developing land use recommendations, the planning table will work with a wide variety of maps and information. The Government Technical Team (GTT) has developed a comprehensive package of map and inventory information to assist the planning table with its negotiations.

Key government agencies responsible for land and resource information include:

Ministry of Sustainable Resource Management (land tenures, resource inventory, archaeology, aboriginal land resources) - MSRM

Ministry of Water, Land and Air Protection (fish, wildlife, habitat, parks) - MWLAP

Ministry of Forests (vegetation, range, recreation, visual quality) - MoF

Ministry of Energy and Mines (mineral and energy potential, mineral tenures and activity) - MEM

Ministry of Competition, Science and Enterprise (tourism features and use, archaeology) – MCSE

Ministry of Agriculture and Food (agriculture capability, agriculture land reserve)
MoAF

Land Use Coordination Office (coastal resources, Protected Area Strategy study areas) - LUCO

Canadian Wildlife Service (birds) - CWS

Department of Fisheries and Oceans (fisheries) - DFO

The GTT has attempted to provide the best and most up-to-date information currently available for the planning process and will provide additional information to the table as needed. However, participants should be aware that, as ever, there are limits to the completeness and reliability of information and discussions may have to proceed despite information gaps (see Section 1.3: Dealing with Uncertainty).

1.2.2 Type of Map Information

Maps are an effective way of presenting information for land use discussions, allowing a ready visual interpretation of the spatial location of resource data. Maps for LRMPs are normally produced at a small scale (1:250,000). At a scale of 1:250,000, the area of one square centimetre equals 625 hectares on the ground (or 2.5 km x 2.5 km). The amount of information that can be shown at this scale is limited, but the scale is adequate for identifying regional patterns of land and resource use. It may be useful for participants to keep in mind that, while information may occasionally need to be assessed at a more detailed scale, strategic planning over a large area such as the LRMP requires a relatively small scale of mapping. It would not be possible to cope with the large amount of maps and information at a more detailed or larger scale.

There are two types of maps that have been developed for the LRMP:

- descriptive maps
- interpretive maps

Both types of maps are included in this handbook.

Descriptive Maps

Descriptive maps provide an overview of primary characteristics or features of a resource or activity. The maps are based directly on data from inventories that have been collected using defined methods and standards. In essence, these maps show “what is there” and are value-neutral. Descriptive maps include:

biophysical features such as vegetation, fish streams, bird colonies;

human uses and activities such as roads, cut-blocks, mine sites, or areas of recreation use; and

base map information, including administrative information such as private property, Indian reserves and various tenures as well as primary geographical features such as coastlines, major streams and lakes, and topography.

While descriptive maps are supposed to describe “what is there” there is still a reliability issue. For example, while vegetation maps are described as descriptive maps because they summarize the vegetation that exists on the ground, the maps are based on air photo interpretation at varying scales (usually 1:10,000 to 1:20,000 range). Ground checks are completed on only a percentage of the polygons of the final vegetation map. This means that the reliability of the map depends in part upon the skill of the individuals who are doing the air photo interpretation.

To produce a map that is accurate in all details would require that it have a source scale of 1:1, i.e. in the case of vegetation maps that all information came from ground checks. This is impossible when completing inventories across vast areas such as the planning area.

Interpretive Maps

Interpretive maps involve some kind of assessment of how significant an area’s resource values are. Different types of interpretive maps developed by government ministries include:

- capability maps
- suitability maps
- significance maps
- potential maps

Interpretive maps take various layers of descriptive information and combine them or apply formulae to them in GIS to assess the potential of an area for a particular use e.g., suitability mapping for wildlife habitat. This type of mapping is based on a number of assumptions, which should be clearly stated along with the method of derivation. For example, there are a number of GIS models to identify areas of marbled murrelet habitat and each apply a different set of formulae and data inputs to come up with an answer. Ideally, this type of mapping is followed up with some kind of field verification to test that the assumptions used to develop the map were correct.

Interpretive mapping can be used to derive the following types of resource information:

Physical e.g., soil capability for agriculture, mineral potential;

Biological e.g., wildlife habitat suitability, biogeoclimatic zones/ subzones/ variants; and a fish stream map based on interpretations of stream gradient.

Human activity e.g., tourism capability, recreational opportunity mapping, archaeological potential

1.2.3 Reliability of Map Information

The quality of data that goes into maps may be coarse or detailed, depending on the method of data gathering. The level of detail that goes into gathering the data used in a map will generally affect its reliability. For example, data may be gathered over a small scale¹ such as 1:500,000 with little detail and little or no field verification. Any maps produced from this data will likely have a lower level of reliability than maps prepared using data gathered over a large scale¹, such as 1:10,000 with extensive field sampling.

The age of data also affects its reliability. While some inventories will remain relatively constant over time (e.g., bedrock geology), others will be subject to ongoing change and will therefore become less reliable the older the data. In addition, as techniques and technology improve over time, so will the reliability of the product data.

Of course, more reliable information is always preferable, but is not always essential to a land use planning process. Because the LRMP is discussing issues at the sub-regional scale, it is generally adequate to use a more coarse level of information while providing sufficient flexibility and direction to lower levels of planning to refine management as more detailed information becomes available.

1.2.4 Local Knowledge

Local knowledge can enhance the information base available to the planning table, verifying information provided by government or adding new information. The Government Technical Team acknowledges the knowledge of local residents and resource users and welcomes feedback on map information, including apparent gaps or errors.

1.3 Dealing with Uncertainty

The maps included in this handbook have been prepared using the best information available at the time the LRMP was developed. As always, there will be gaps in the information available. Critical information gaps were identified in the early stages of preparation for the LRMP and the GTT has put together a strategy to address those gaps. At the same time, gathering inventory takes time and money and the LRMP table must move forward.

The challenge for table participants is how to proceed with their negotiations where there are gaps in information or uncertainty about how to adequately address certain issues. There are a few things to keep in mind:

The LRMP is a strategic document, dealing with values over broad areas. Flexibility can and should be built into the LRMP document to allow refinement of management

¹ "Small-scale" imagery covers a large area and generally only shows coarse features (e.g., a 1:1,000,000 scale map). "Large-scale" imagery identifies a smaller area and shows more details about features (e.g., a 1:20,000 scale map)

approaches during more detailed planning (e.g., through landscape unit plans, environmental review processes, and operational planning).

Our information base is continuously being expanded as new inventories are completed and as new technologies become available for gathering and assessing information. In addition, our understanding of effective management of land and resources changes over time.

The LRMP document is not a static document. It may be amended as better information on resources and their use becomes available. Each LRMP is reviewed and updated as a matter of course after ten years and there are provisions in the plan to allow interim amendments, if required.

The North Coast LRMP has been designed to specifically incorporate the principles of adaptive management. This will allow the approaches to the management of land and resources outlined in the LRMP to be tested and improved upon on an ongoing basis as the plan is implemented.

2. Core Maps

The following section contains descriptions and copies of each of the core maps at a 1:1,000,000 scale so that participants can refer to map information during negotiations.

2.1 Base Map

The base map shows the LRMP boundary and basic geographic features. It is the foundation upon which all other LRMP maps are built. The following features are included on the base map:

Water features (lakes, rivers, coastline)

Main and secondary roads

Towns and cities

Rail lines

Transmission lines

The inventories and map products that contribute to the base map are available from Geographic Data BC, Ministry of Water, Land and Air Protection, topographic mapping and baseline thematic mapping.

2.2 Existing Land Use

The existing land use map builds on the base map to show more detailed information on existing land use allocations that will have to be considered when the LRMP is negotiating its recommendations. Most of the existing zoning is not negotiable at the LRMP table. The following are included on the current land status map:

Settlement (private land, Indian reserves)

Protected areas (provincial and national)

Ecological Reserves

Community Watersheds

A protected area is an area of land and/or water where specific development activities, such as logging, mining, and hydroelectric activity, have been excluded. All of the protected areas in the North Coast are provincial, including the Khutzeymateen Grizzly Bear Sanctuary and several marine parks and ecological reserves. In British Columbia, protected areas are currently designated under the *Park Act*, *Protected Areas of British Columbia Act*, or the *Environment and Land Use Act*.

Ecological reserves are areas selected to preserve representative and special natural ecosystems, plant and animal species, features and phenomena. Scientific research and educational purposes are the principal uses of ecological reserves. Ecological reserves contribute to the maintenance of biological diversity and the protection of genetic materials. They are not created for outdoor recreation and should not be confused with parks or other recreational areas

A community watershed is a drainage used to supply drinking water for a waterworks purpose (town or city water supply) or a domestic purpose in which 6 or more water licensees have formed a group and requested community watershed status. The drainage areas are to be not more than 500 km². Community watersheds are classified under the Forest Practices Code.

2.3 Cultural Heritage

2.3.1 First Nations Traditional Territories; Nass Wildlife Management Area

Statements of Intent are prepared by First Nations participating in the Treaty Process and include maps showing the traditional territories of the First Nations. There are three First Nations with a significant portion of their traditional territories in the plan area (Tshimshian, Nisga'a, and Haisla). The Gitanyow and Keiltsuk also have an interest in the LRMP area and have asserted traditional territories within the plan area although their villages are located outside of the LRMP.

The Nisga'a Treaty recognizes Nisga'a ownership of approximately 22,000 km² of traditional lands in the Nass Valley, including current reserve lands, some of which are outside of the Nass valley. The Nisga'a Lands are no longer subject to provincial strategic planning initiatives and have been excluded from the North Coast LRMP area. However, the Nass Wildlife Management Area, established as part of the Treaty, is composed of a much larger land base that includes lands within the LRMP. It is the area where the Nisga'a exercise their treaty right to hunt. Under the terms of the Treaty, the Nisga'a will participate in the conservation and management of the area, providing recommendations on hunting and wildlife management as part of a wildlife committee composed of representatives of the Nisga'a, British Columbia, and Canada.

Type of Map	Descriptive
Source Agencies:	Ministry of Aboriginal Affairs
Source Scale:	Maps prepared by individual First Nations are created at various scales
Source Data:	<ul style="list-style-type: none"> • Traditional territories: based on areas submitted by individual First Nations to the B.C. Treaty Commission indicating an intention to negotiate. • Nass WMA: based on the boundary settled as part of Nisga'a Agreement (Note: Nisga'a Lands are not included in the LRMP area).
Age and Reliability of Data	<ul style="list-style-type: none"> • Boundaries for various traditional territories vary in age. Boundaries were also drawn on maps of various scales and qualities.
Uses in an LRMP	<ul style="list-style-type: none"> • This map provides an indication of the areas of interest of the various First Nations with traditional territories in the plan area.

2.4 Ecological Classification

There are two primary methods of ecological classification used for planning within B.C.: *biogeoclimatic ecosystem classification* (BEC) and *ecoregion classification*. Both classification systems are based primarily on vegetation, climate and landforms. The main difference between the two is that an ecoregion is a distinct geographic area of the province, whereas a given biogeoclimatic zone occurs in areas of similar climate, vegetation, and soils throughout the province, and may be found within several ecoregions.

A third method of ecological classification that is also commonly used is the Broad Ecosystem Inventory. This inventory is used as the base for various interpretive maps such as wildlife suitability and capability maps. More information on the Broad Ecosystem Inventory can be found in Appendix 1.

2.4.1 Biogeoclimatic Ecosystem Classification

The Biogeoclimatic ecosystem classification (BEC) system groups and classifies similar sections of the landscape (ecosystems) based on vegetation, climate, and soils.

There are three main categories within biogeoclimatic ecosystem classification:

- zone:** an area that shares the same dominant climax tree species and regional climate.
- subzone:** an area within a zone that shares climax vegetation cover and sub-regional climate.
- variant:** a further division that delineates areas within subzones that vary slightly by climate (e.g., drier, wetter, warmer, or colder areas).

For example, the CWHvh2 refers to the Central (2) variant of the very wet hypermaritime (vh) subzone of the Coastal Western Hemlock zone.

Type of map	Interpretive
Source Agency:	Ministry of Forests
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • vegetation, soil and climate data • Forest Cover Inventory (See Appendix 1) • satellite imagery and topographic maps, and • a number of scientific references concerning vegetation and ecosystem classification.
Age and Reliability of Data	<ul style="list-style-type: none"> • Provincial BEC mapping (at 1:250,000) is updated annually. The next update will be completed in April 2002. Large-scale BEC mapping (at 1:20,000) will be completed for the Prince Rupert

Forest Region in 2002.

- Though displayed as distinct lines when mapped, the boundaries of ecosystem zones are not precise. There may be wide transitional zones as one ecosystem changes to another type (especially in flatter areas).
- The classification system is technical and rigorous, but the placement of biogeoclimatic unit boundaries relies heavily on experience and professional judgment.
- BEC is a simplification of a complex transitional environment.
- Classification is based on vegetation, climate, soils and topographic information.
- This information is gained from aerial reconnaissance surveys, forest cover maps, air photos, satellite images and ground sampling.
- Classification is confirmed by field sampling in which data on presence and abundance of overstory and understory plant species, soil characteristics (e.g. moisture, nutrient regime and texture) and tree measurements are collected within a plot. These data are extrapolated to areas of similar elevation and climate.
- The degree of ground sampling or field checking varies among zones and areas of the province.
- For more details see: Biogeoclimatic Classification in British Columbia (J. Pojar et al. 1987, Forest Ecology and Management 22:119-154); Ecosystems of British Columbia (Meidenger, D. and J. Pojar, 1991 Ministry of Forests).

Methodology

Uses in the LRMP

- What ecosystems are represented in an area? What does this imply for the type of wildlife use and other ecological values?
- What ecosystems are under-represented in the existing protected area system (locally, regionally, provincially)?
- Which areas should be considered for protection or area-specific management through the LRMP to maintain biodiversity?
- Which landscape units should have high, medium and low biodiversity options?

2.4.2 Ecoregion Classification

Ecoregion classification is a hierarchical system dividing the province into discrete geographical units at five different scales (ecodomains, ecodivisions, ecoprovinces, ecoregions, and ecosections). The classification is based on the interaction of large-scale climatic processes and landforms (e.g. mountain ranges and plateaus). The Ecoregion Classification System includes terrestrial and marine ecosystems.

The two units of concern to the LRMP process are *ecoregions* and *ecosections*. Both classes describe areas of similar climate physiography, oceanography, hydrology, vegetation, and wildlife potential. At the Ecosection level, the coastline separates marine from terrestrial Ecosections.

Ecoregion: an area with major *physiographic* differences and minor *macroclimatic* variation; a ‘big picture’ ecosystem

Ecosection: an area with minor *physiographic* differences and minor *macroclimate* variation.

Type of map	Interpretive
Source Agencies:	Ministry of Water, Land and Air Protection
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • vegetation, soil and climate data, • satellite imagery and topographic maps, and • a number of scientific references concerning vegetation, ecosystems, and biogeoclimatic classification.
Age and Reliability of Data	<ul style="list-style-type: none"> • The Ecoregion Classification System was last updated in March 2000. • Although displayed as lines on a map, the boundaries of ecoregions/ecosections are not precise. There may be wide transitional zones as one ecosystem changes to another type especially in flatter areas). • Ecoregion boundaries do not follow watershed boundaries. • The classification system is designed to be a broad regional level inventory. More detailed information for landscape unit planning or operational planning should use terrain ecosystem mapping or biogeoclimatic ecosystem classification.

Methodology

- Classification is based on major patterns of climate, landforms and geographic information.
- This information is gained from satellite imagery, maps containing physiographic features and to a lesser extent, topographic maps and biogeoclimatic ecosystem classification (BEC) maps.
- Ecoregions were first mapped within BC in 1988. Since then there have been numerous edits, corrections and changes as understanding increased and people have had a chance to use the system.

Uses in an LRMP

- Which ecosections are under-represented in the existing protected area system?
- Which areas should be considered for protection or area-specific management through the LRMP process to maintain biodiversity
- What resource values (e.g., wildlife habitat) exist within the different ecosections?

2.5 Biodiversity and Wildlife

2.5.1 Wildlife Habitat Suitability

The relative importance of various habitats to wildlife populations can be estimated using habitat capability and suitability ratings. Habitat suitability and capability maps are interpretive maps and are usually developed based on Broad Ecosystem Inventory (See Appendix 1 for more information). The unit of classification for the Broad Ecosystem Inventory is the Broad Ecosystem Unit (BEU). The BEU is a permanent area of the landscape that supports a distinct type of dominant vegetation cover or distinct non-vegetation cover (such as lakes or rock outcrops). BEUs are identified by combining biogeoclimatic ecosystem classification with ecoregion classification.

Habitat suitability: ranks the *present* quality of habitat based on existing vegetative cover and landscape pattern

Habitat capability: ranks the quality of *potential* habitat when vegetation is at its optimum seral stage for a particular species.

Habitat suitability maps have been developed for a number of key species in the North Coast LRMP area, including grizzly bear, black bear, mountain goat, moose, black-tailed deer, and marbled murrelet.

a. Habitat Suitability – Grizzly Bear

Type of map	Interpretive
Source Agency:	Ministry of Water, Land and Air Protection
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Broad Ecosystem Inventory
Age and Reliability of Data	<ul style="list-style-type: none"> • BEI updated in 2000 • Methods of assessing grizzly bear habitat based on Broad Ecosystem Inventory are well developed. However, the reliability of data would increase with additional field verification.
Uses in an LRMP	<ul style="list-style-type: none"> • To identify areas of high value habitat for grizzly bear for consideration during zoning for protected areas and area-specific management. • Grizzly bear is a higher-level plan species in the Identified Wildlife Management Strategy (IWMS). An LRMP can provide or make recommendations re management for grizzly habitat over and above the direction in the IWMS.

b. Habitat Effectiveness– Grizzly Bear

Habitat effectiveness rates the value of habitat in consideration of human factors that displace animals. For example, an area may have high habitat suitability but due to pressure from frequent recreational use, or a mainline road, the habitat does not get used to its full potential and therefore has a lower effectiveness rating.

Type of Map	Interpretive
Source Agencies:	Ministry of Water, Land and Air Protection, BC Assets and Lands Corporation, Ministry of Small Business, Tourism and Culture, Ministry of Forests, Department of Fisheries and Oceans
Source Scale:	Various
Source Data:	<ul style="list-style-type: none"> • Grizzly habitat and suitability mapping • Grizzly critical habitat mapping (1:20,000) • 1996 Inventory of Public Use Sites • 2000 North Coast Tourism Opportunity Study • Road inventory • DFO fish escapement data and FISS presence and absence data • Data on number of hunter and angler days
Age and Reliability of Data	<ul style="list-style-type: none"> • Completed in 2001, including updates on roads and areas of human use. • Information on levels of human use is limited by the quality and comprehensiveness of information gathered. LRMP members can provide useful input on levels of human use in the plan area.
Uses in an LRMP	<ul style="list-style-type: none"> • To identify areas of high value habitat for grizzly bear for consideration during zoning for protected areas and area-specific management. • Grizzly bear is a higher-level plan species in the Identified Wildlife Management Strategy (IWMS). A LRMP can provide or make recommendations re: management for grizzly habitat over and above the direction in the IWMS.

c. Habitat Suitability – Mountain Goat Winter Habitat

Summer and winter habitats for goats vary primarily by elevation. Features of winter range include closed canopy mature and old forest with suitable attributes to provide thermal core and forage in winter. Winter habitat is located directly among or in close proximity to escape terrain.

Type of Map	Interpretive
Source Agencies:	Ministry of Water, Land and Air Protection
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Aerial photographs, forest cover inventory, TRIM data, existing reports and local knowledge • Field verification of winter habitat areas using over flights
Age and Reliability of Data	<ul style="list-style-type: none"> • Completed in 2001. Field verification was undertaken to confirm the reliability of interpretive mapping. • Assessment of winter range does not necessarily provide an adequate assessment of overall status of mountain goat populations. A fall population inventory will provide additional data on the population health.
Uses in an LRMP	<ul style="list-style-type: none"> • To allow designation of ungulate winter range under the Forest Practices Code. • To identify areas of high value habitat for mountain goat for consideration during zoning for protected areas and area-specific management.

d. Habitat Suitability – Moose Winter Range

Moose winter range has been subdivided into primary and secondary winter ranges, based primarily on the capability of the landscape to support wintering moose.

Primary winter range is defined as permanent or self-perpetuating forage communities associated with forested stands in wide, low elevation valley floors with extensive low gradient (<40%) slopes, especially those associated with dynamic river floodplains and fens.

Secondary winter range has a similar definition with the exception that it either (a) does not contain self-perpetuating forage communities; or (b) self-perpetuating shrub communities exist but other limitations such as snow depths, poor connectivity, or small habitat areas limit its functionality as winter range. Forest harvesting has the potential to alter the quality of available habitat described in type (b).

Type of Map	Interpretive
Source Agencies:	Ministry of Water, Land and Air Protection
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Aerial photographs, forest cover inventory, TRIM data, existing reports and local knowledge • Field verification of winter habitat areas using overflights
Age and Reliability of Data	<ul style="list-style-type: none"> • Field verification was undertaken to confirm the reliability of interpretive mapping.
Uses in an LRMP	<ul style="list-style-type: none"> • To allow designation of ungulate winter range under the Forest Practices Code. • To identify areas of high value habitat for moose for consideration during zoning for protected areas and area-specific management.

e. Habitat Suitability – Coastal Black-tailed Deer Winter Range

In winter, coastal black-tailed deer are primarily found at lower elevations in mature and old forest with stand attributes to provide winter forage as well as security and thermal cover and interception of snow and rain.

Type of Map Interpretive

Source Agencies: Ministry of Water, Land and Air Protection

Source Scale: 1:250,000

Source Data:

- Broad Ecosystem Inventory, forest cover inventory, TRIM data, aerial photographs
- The deer algorithm is based on variables such as elevation, slope steepness, aspect, stand age, vegetation height, canopy closure, and biogeoclimatic subzone.
- Field verification of winter habitat areas

Age and Reliability of Data

- Completed in 2001.
- Field verification was undertaken to confirm the reliability of interpretive mapping.

Uses in an LRMP

- To allow designation of ungulate winter range under the Forest Practices Code.
- To identify areas of high value habitat for black-tailed deer consideration during zoning for protected areas and area-specific management.

f. Habitat Suitability – Marbled Murrelet

Marbled murrelets nest on mossy platforms or cavities on large branches in tall trees located in mature and old growth forests within 70 km of the ocean. Interpretive mapping identifies forest cover attributes that contribute to high value murrelet habitat.

Type of Map	Interpretive
Source Agencies:	Ministry of Water, Land and Air Protection
Source Scale:	<ul style="list-style-type: none"> • 1:20,000
Source Data:	<ul style="list-style-type: none"> • Map based on algorithms produced by Oikos Ecological Services in 2000. The marbled murrelet algorithm is based on variables such as age class, structural stage, canopy closure, elevation, slope and site series. • Forest Cover Inventory • TRIM
Age and Reliability of Data	<ul style="list-style-type: none"> • Completed in 2001. • Field verification of the algorithm was completed on the Queen Charlotte Islands. Field verifications included: nest platform density transects, forest cover descriptions, full ecosystem plots and critical evaluation of accuracy of Forest Cover labels. • Reliability depends in part on accuracy of Forest Cover Inventory. See Appendix 1 for information about age and reliability of Forest Cover Inventory.
Uses in an LRMP	<ul style="list-style-type: none"> • To identify areas of high value habitat for marbled murrelet for consideration during zoning for protected areas and area-specific management.

2.5.2 Rare Terrestrial Ecosystems

This map of Conservation Data Centre (CDC) threatened (Red-listed) and vulnerable (Blue-listed) ecosystems was developed using a combination of thematic mapping, air photo interpretation, and expert opinion. The map includes: all floodplain sites with Red-listed ecosystems, and proximate Blue-listed floodplain and alluvial/colluvial ecosystems.

Type of Map	Interpretive
Source Agencies:	Ministry of Water, Land and Air Protection, Conservation Data Centre (CDC)
Source Scale:	1:50,000
Source Data:	<ul style="list-style-type: none"> • Broad Ecosystem Inventory (see appendix 1 for more information). • Thematic forest cover mapping (see appendix 1 for more information). • Conservation Data Centre (see appendix 1 for more information). • Bedrock geology at 1:250,000 • Aerial photographs
Age and Reliability of Data	<ul style="list-style-type: none"> • BEI inventory is current to 2000. See Appendix 1 for information about age and reliability of Forest Cover Inventory. • Field verification was carried out in 2002 to confirm the reliability of interpretive mapping.
Uses in an LRMP	<ul style="list-style-type: none"> • Which areas have high concentrations of rare and endangered plant associations that need to be considered during zoning for protected areas and area-specific management?

2.5.3 Anadromous Fish

The information on this map represents recorded salmon distribution from the Fisheries Information Summary System (FISS) database as of September 2001. This information is not necessarily complete, and is subject to frequent updates. Absence of a record for a water body does not imply that there are no salmon present. The data is not intended for display at scales greater than 1:50,000.

a. Salmon

Type of Map	Descriptive
Source Agencies:	Department of Fisheries and Oceans, Ministry of Sustainable Resource Management, BC Fisheries
Source Scale:	Various
Source Data:	<ul style="list-style-type: none"> • Fisheries Information System, FISS (see appendix for more information). • Salmon Escapement Database System, SEDS (see appendix for more information).
Age and Reliability of Data	<ul style="list-style-type: none"> • Current to December 2000. • Data is limited in that not all fish bearing streams are evaluated for presence or size of salmon runs.
Uses in an LRMP	<ul style="list-style-type: none"> • To identify areas of important fish habitat for consideration during zoning for area-specific management or protected areas • For discussion concerning riparian management

b. Steelhead, Cut-throat Trout and Dolly Varden

The information on this map represents recorded salmon distribution from the Fisheries Information Summary System (FISS) database as of September 2001. This information is not necessarily complete, and is subject to frequent updates. Absence of a record for a water body does not imply that there are no steelhead, cut-throat or Dolly Varden present.

Type of Map	Descriptive
Source Agencies:	Ministry of Sustainable Resource Management
Source Scale:	Variable.
Source Data:	<ul style="list-style-type: none"> • FISS (See appendix for more information).
Age and Reliability of Data	<ul style="list-style-type: none"> • Age of data is variable. A compilation of available data was completed for the North Coast in 2001 (summary report in North Coast LRMP library). • Information is limited in that not all fish bearing streams or lakes have been inventoried. Blanks in the data may exist.
Uses in an LRMP	<ul style="list-style-type: none"> • To identify areas of important fish habitat for consideration during zoning for area-specific management or protected areas • For discussion concerning riparian management

2.5.4 Rich Watershed Ecosystems

Ranks watersheds based on marine biomass (returning adult salmon) inputs and diverse anadromous species assemblages. A subset of NC watersheds were selected for biomass richness, and also to capture the variability in species assemblages within a category of top producing systems. Rich and productive rivers and lakes are typically indicators of complex aquatic habitats and/or high biodiversity value.

Type of map	Interpretive
Source Agency:	Ministry of Sustainable Resource Management
Source Scale:	<ul style="list-style-type: none"> • Various (1:1 to 1:250,000)
Presentation Unit	<ul style="list-style-type: none"> • Watershed
Data Sources:	<ul style="list-style-type: none"> • DFO SEDS fish escapement data (1950 – 1996) (See Appendix 1 for more information). • Watershed Atlas (See Appendix 1 for more information).
Age and Reliability of Data	<ul style="list-style-type: none"> • SEDS data is current to 1996. While more data is now available, the incorporation of data for years 1997-1999 into the analysis would be unlikely to change watershed rankings.
Uses in an LRMP	<ul style="list-style-type: none"> • To profile watersheds that are highly productive based on fisheries values.

2.5.5 Protected Areas Strategy

The inventory of protected (and proposed protected) areas indicates areas being studied for protection under the Protected Areas Strategy (PAS) in addition to existing parks and recreation areas. The inventory identifies high-ranking areas of conservation, recreation, and cultural or heritage interest.

Representativeness was evaluated according to:

- viability,
- diversity,
- vulnerability,
- degree of naturalness,
- degree of representativeness,
- opportunity for public use and appreciation, and
- opportunity for scientific research.

Ecosections were prioritized based on current gaps in representation, and extent of existing and anticipated disturbance. High-ranking areas of interest identified as best filling the identified gaps in representation were recommended under the Protected Areas Strategy.

Goal 2 areas:

Special features were identified from inventories of the following kinds of elements and from local knowledge:

- rare elements (i.e. rare species, subspecies, populations and habitats),
- biologically exceptional sites (i.e. important seasonal, migratory, breeding, or feeding habitats),
- physically exceptional sites (i.e. unique landforms, physical or hydrological features),
- paleontological resource (i.e. fossils),
- provincially rare, scarce or unique *recreation features* (i.e. safe anchorages, hot springs),
- areas that meet demand of recreational opportunities (i.e. travel corridor sites), and
- important cultural landscapes, structures, traditional use sites or archaeological sites.

Each special feature was evaluated based on:

- rarity, scarcity and uniqueness (provincial to international),
- viability, diversity, and vulnerability

Type of Map Interpretive

- Source Agencies:** Prince Rupert *Regional Protected Areas Team (RPAT)*, The RPAT is made up of representatives from the Ministry of Forests, Ministry of Water, Land and Air Protection, Ministry of Sustainable Resource Management, Ministry of Energy and Mines and the Ministry of Small Business, Tourism and Culture.
- Source Scale:** 1:50,000
- Source Data:**
- Air photos,
 - public consultation,
 - wildlife habitat maps,
 - existing and proposed protected areas,
 - provincial ecoregion and biogeoclimatic ecosystem classification systems (see section 4 - Ecological Classification),
 - inventories of forest cover, and special natural, cultural heritage, and recreational features.
 - Topographic maps.
- Age and Reliability of Data**
- Inventory was initially completed in 1994. The inventory is current to 2001 and represents Goal 1 and Goal 2 high-ranking areas of interest as of 2001.
 - The data is current and this inventory is based on a rigorous technical analysis, commonly called the gap analysis.
 - The information used to conduct the gap analysis was incomplete as some areas in the region had little or no information on habitat values.
 - Professional judgment played a large role in evaluating the study areas.
 - The data is based on regional and/or provincial priorities and may or may not address local conservation concerns.
- Uses in an LRMP**
- Identifies high-ranking areas of conservation, recreation, and cultural or heritage interest for consideration during negotiation of zoning for protected areas or area-specific management.

2.6 Forestry

Derivative mapping based on forest cover inventory

The forest cover inventory provides the basic inputs to a number of derivative maps used in the LRMP process. The forest cover inventory lists a number of attributes including forest vegetation inventory, value of the land for forestry, and land management and ownership. These attributes can be pulled singly or in combination to provide information on a range of issues. For more information about the Forest Cover Inventory see Appendix 1.

Two key core maps for the planning process are the timber harvesting land base and the height class. In addition, age class distribution, roads and logging history, leading species, and site index have been pulled from the forest cover as reference maps (see Section 3).

2.6.1. Timber Harvesting Land base

This map identifies areas which are included with the timber harvesting landbase. The timber operability map (Section 3.3.1) identifies all locations where harvesting could occur, while the Timber Harvesting Landbase map removes areas that would not be harvested such as riparian reserve zones and sites of low productivity. The netdowns used in the 2001 THLB map are summarized in *Description of Data Inputs and Assumptions for the Timber Supply Analysis (base case), North Coast LRMP, January 2002*.

Type of map	Interpretive
Source Agencies:	Ministry of Forests
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Derivative map based on the Forest Cover Inventory (See appendix for more information about the Forest Cover Inventory). • Revised Operability map (2001).
Age and Reliability of Data	<ul style="list-style-type: none"> • See Appendix 1 for information about age and reliability of Forest Cover Inventory.
Uses in an LRMP	<ul style="list-style-type: none"> • Identification of resource use conflicts • Assessment of the implications of land use decisions on timber harvesting activities

2.6.2 Height Class

One type of information included in the Forest Cover Inventory is the stand height, or height class of forested land base. Height classes are usually based on the height of the dominant trees in the canopy. Height classes are defined as follows:

Class 1	0.1 – 10.4 metres
Class 2	10.5 – 19.4 metres
Class 3	19.5 – 28.4 metres
Class 4	28.5 – 37.4 metres
Class 5	37.5 – 46.4 metres
Class 6	46.5 – 55.4 metres
Class 7	55.5 – 64.4 metres
Class 8	64.5 + metres

Type of map	Descriptive
Source Agencies:	Ministry of Forests
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Derivative map based on the Forest Cover Inventory (See Appendix 1)
Age and Reliability of Data	<ul style="list-style-type: none"> • See Appendix 1 for information about age and reliability of Forest Cover Inventory.
Uses in an LRMP	<ul style="list-style-type: none"> • Identification of distinct forest ecosystems • Assessment of the distribution of forest age and height classes

2.7 Geological Resources

2.7.1 Metallic Mineral Assessment

The province was divided into regions to facilitate the development of mineral potential maps and provide information for priority areas. The major steps involved in the analysis of each region are:

1. Compilation of Geological Maps and Historical Data: 1:250,000 scale geology maps published by the Geological Survey of Canada were the primary source of map data. Historical data came from MINFILE, ARIS and the Mineral Producers database (MINFILE and ARIS are described in section 3.4.4. The Mineral Producers database is a record of production by commodity and year for each producer in the province).
2. Development of Mineral Tracts - Tracts are units in which the geology can be considered to be similar at a scale of 1:250,000. Geologic units within a tract have similar geology, structure and geological history, particularly where these are important to development of mineral deposits. Tract boundaries are geological features such as faults or differences in rock types/stratification.
3. Estimation of Future Deposit Potential - Using historical information (value of past exploration from ARIS; past production; number of mineral occurrences) and tract geology, industry experts estimated the number and type of mineral deposits (i.e. high grade gold veins; low grade copper-gold deposits; massive lead, zinc, silver lenses; etc.) within each tract. Several estimates were made at different probability levels for each deposit type, then all estimates were run through a program (Mark 3 simulator, developed by the U.S. Geological Survey) which simulated projected grades and tonnages of deposit types, to determine the amount of mineral commodity predicted by the estimate.
4. Analysis of Data - The parameters used in analysing each mineral tract were: the value of known resources (i.e. drill indicated reserves) and the expert estimates of number of deposits.
5. Ranking of Mineral Tracts - The predicted amounts of each commodity for all deposit types in a tract are combined, given a dollar value and the tract ranked based on its overall 'value' as compared to other tracts in the region.

Analysis of mineral potential was initially done for metallic minerals (i.e. gold, silver, zinc, molybdenum, etc). A second analysis, using the same mineral tracts, was later done on the industrial mineral potential (i.e. dimension stone, fertilizers, etc.).

Type of Map	Interpretive
Source Agencies:	Ministry of Energy and Mines
Source Scale:	1:250,000

Source Data:

- **Bedrock geology mapping:** completed by the Geological Survey Branch, Ministry of Energy and Mines and Geological Survey of Canada, Cordilleran Section
- **Metallic mineral deposit models:** Open Files 1995-20 and 1996-13, Ministry of Energy and Mines
- **Known Mineral Occurrences:** MINFILE + industry experts
- **Recorded Mineral Activity:** Assessment Reports

Age and Reliability of Data

Mineral Assessment for the province of B.C. was completed in 1998, with the exception of the Queen Charlotte Islands; these were added in 2000.

Though the data is current and the inventory is based on a rigorous technical analysis, it should be used with these qualifiers:

- Mineral potential assessments are extremely time sensitive. New discoveries and new ideas will change the assessments drastically, often within a year. To a lesser extent, a change in economics will also affect these assessments.
- It is an estimation of future mineral potential and must be used for that purpose. Other values must be used to assess current economic potential, such as mineral tenure and current industry activity.
- Large areas of the province are under-explored and in many areas a layer of glacial till obscures the underlying bedrock. Thus some areas have poor quality bedrock geology maps.
- Mineral rankings are restricted to within the province of British Columbia and do not take into account the overall high mineral potential of the province in comparison to the rest of Canada. This problem is further exacerbated by a mandate to declare one third of the province as having low mineral potential.
- Rating of metallic mineral tracts is based on the gross in place value of commodities in each tract and does not take into account any economic factors that would influence development of a mineral deposit. As such there is an overall bias to rank tracts with low grade, high tonnage deposit potential higher than tracts with high grade, low tonnage deposit potential because the contained mineral values are higher in the former, though substantially more difficult and costly to bring into production than the latter.

Uses in an LRMP

- Identifies areas of high metallic mineral value during negotiation of zoning for protected areas or area-specific management.

2.7.2 Industrial Mineral Assessment

The industrial mineral assessment was completed using a procedure similar to the metallic mineral assessment; however, there were two major differences. 1) Far fewer experts were involved in the estimation of future deposit potential for industrial minerals. 2) Some industrial mineral deposit types in British Columbia (i.e. limestone and granitic dimension stone) are so abundant that the potential supply far exceeds the anticipated market demand in the foreseeable future. Therefore, the industrial mineral assessment incorporates an additional step to provide a relative ranking which includes parameters affecting the viability of industrial mineral mining (i.e. transportation infrastructure, markets, unit value of raw materials and distance from market).

The major steps involved in the analysis of each region are:

1. Compilation of Geological Maps and Historical Data: As described in preceding section 2.7.1 - Metallic Mineral Assessment.
2. Development of Mineral Tracts - As described in preceding section 2.7.1 - Metallic Mineral Assessment.
3. Estimation of Future Deposit Potential - Using historical information (value of past exploration from ARIS; past production; number of mineral occurrences) and tract geology, industry experts estimated the number and type of mineral deposits (i.e. gypsum, jade, magnesite, marble, barite, talc, etc.) within each tract. Several estimates were made at different probability levels for each deposit type.
4. Analysis of Data - The parameters used in analysing each mineral tract were: the value of known resources (i.e. drill indicated reserves) and the expert estimates of the number of deposits.
5. Calculation of Relative Deposit Value Score - Ranking scores for different industrial mineral deposit types for each region are established by experts and involve commodity unit-value, size and location of potential market, deposit grade and size, transportation costs, existing infrastructure and extraction costs.
6. Ranking of Mineral Tracts - The estimated future deposits at various confidence levels are multiplied by the relative deposit value scores, which range from 1 to 100, in order to rank the tracts for undiscovered mineral resources. These rankings are then combined with the tract rankings for known but un-mined deposits. These rankings are then combined to establish the rank of all the tracts in the province. It should be noted that none of the tracts have an estimated dollar value for the undiscovered (potential) industrial mineral resources.

Type of Map Interpretive

Source Agencies: Ministry of Energy and Mines

Source Scale: 1:250,000

Source Data: • **Bedrock geology mapping:** completed by the Geological Survey Branch, Ministry of Energy and Mines and Geological Survey of

Canada, Cordilleran Section

- **Industrial mineral deposit models:** Open File 1999-10; in-house models, Ministry of Energy and Mines; article in CIMM Special Volume 50
- **Known Mineral Occurrences:** MINFILE + industry experts
- **Recorded Mineral Activity:** Assessment Reports

Age and Reliability
of Data

Mineral Assessment for the province of B.C. was completed in 1998 (with the exception of the Queen Charlotte Islands; these were added in 2000).

Though the data is current and this inventory is based on a rigorous technical analysis, it should be used with these qualifiers:

- Mineral potential assessments are extremely time sensitive. New discoveries and new ideas will change the assessments drastically, often within a year. To a lesser extent, a change in economics will also affect these assessments.
- It is an estimation of future mineral potential and must be used for that purpose. Other values must be used to assess current economic potential, such as mineral tenure and current industry activity.
- Much of the exploration for industrial minerals has occurred since the 1940s; therefore, there is a much smaller industry database available than for metallic minerals.
- Fewer experts were involved in completing the estimates of industrial mineral potential than were involved in the metallic mineral assessment.
- Large areas of the province are under explored and have poor quality geology maps because a layer of glacial till and/or thick vegetation obscures the underlying bedrock.
- Mineral rankings are restricted to within the province of British Columbia and do not take into account the overall high mineral potential of the province in comparison to the rest of Canada. This problem is further exacerbated by a mandate to declare one third of the province as having low mineral potential.
- Rating of many industrial mineral deposit types, such as magnesite, barite and jade, is based on the gross in place value of the commodities and does not take into account any economic factors that would influence development of a mineral deposit. For other industrial mineral deposit types which are very abundant in British Columbia, such as limestone and granite dimension stone, future deposit potential was only estimated in areas that might reasonably be expected to see development of the resource.

- Uses in an LRMP**
- Identifies areas of high industrial mineral value during negotiation of zoning for protected areas or area-specific management.

2.7.3 Recorded Mineral Activity

The recorded mineral activity map is a compilation of several ministry databases, including MINFILE, ARIS, and mineral tenure data, which illustrate where mineral exploration activity has been recorded. These datasets are underlain by a simplified geology map, which helps to illustrate the relationship of the recorded mineral activity and underlying geology.

The map is not a complete picture of mineral exploration activity, as both the mineral tenure and ARIS datasets are incomplete.

Type of Map Descriptive

Source Agencies: Ministry of Energy and Mines

Ministry of Sustainable Resource Management

Source Scale, Source Data, Age, Reliability and Methodology Please refer to information provided below for each database

Uses in an LRMP

- Provides a snapshot of current mineral activity and areas of known mineralization
- Gives a reasonable indication of areas of previous mineral activity
- Broadly correlates metallic mineral activity with underlying geology

a. Mineral Occurrences (MINFILE)

MINFILE is a relational database containing information on metallic, industrial mineral and coal occurrences within the Province of British Columbia. A mineral occurrence is defined as in-situ bedrock or placer mineralization, on surface, in drill holes, or in underground workings; generally, it does not include float, geochemical or geophysical anomalies. Each record includes extensive detail on location; mineralogy and alteration; geology and host rocks; assay data, reserves and production records plus further references and information on any given occurrence. Included as part of each record is a variable-length text description of the geology and setting of each occurrence. The data is useful for geoscience research, mineral exploration, prospecting, land-use management and a host of related applications requiring data on the Province's mineral resources and production.

Source Scale: 1:50,000

Source Data:

- Geological Survey Branch, Ministry of Energy and Mines
- Mineral occurrences are compiled from geological field surveys, assessment reports, annual reports, government publications, university theses and the Property File (clippings, press releases, prospectuses, articles, etc.).
- A *Coding Manual* defines fields:
<http://www.em.gov.bc.ca/mining/Geolsurv/minfile/manuals/coding/codetoc.htm>
- A 1998 article is available: *A Guide to Locating Mineral-related Information in B.C.*
<http://www.em.gov.bc.ca/mining/Geolsurv/Minfile/products/Guide/guide.htm>

Age and Reliability:

- The inventory was updated in March 2001. Updating of the MINFILE database is ongoing, with the most recent updates available by NTS map sheet on the ministry website: <http://www.em.gov.bc.ca/mining/Geolsurv/minfile/products/prodlist.htm>.
- The **MINFILE** database is a record of known mineral occurrences in BC, compiled from government sources (i.e. geological survey crews, regional geologists and assessment reports). The data is reliable, but incomplete, as it does not include information from private company files.
- Site locations are generally accurate within 500 metres.

Methodology

Mineral occurrences are recorded in the **MINFILE** database and are divided into five categories based on their level of exploration or development work:

1. Showings: Occurrences hosting minor in-situ mineralization and lacking exploration work beyond prospecting.
2. Prospects: Documented occurrences (this may include geochemical and geophysical surveys, trenching and limited drilling) containing mineralization which warrants further exploration.
3. Developed Prospects: Occurrences on which exploration and development have progressed to a stage that allows a reasonable estimate of the amount(s) of one or more of the potentially mineable commodities.
4. Producer: Occurrences from which ore containing one or more commodities is being mined for commercial gain or benefit.
5. Past Producer: Occurrences that are not currently being mined and have recorded production in the past.

Mineral occurrences in the North Coast planning area have been further divided into categories of metallic, industrial or mixed mineral occurrences

b. Recorded Exploration Work (ARIS)

Recorded mineral exploration work is captured in the Assessment Report Index System or **ARIS** database.

Source Scale: 1:250,000

Source Data:

- Geological Survey Branch, Ministry of Energy and Mines

Age and Reliability of Data

- The inventory for the North Coast plan area was updated in March, 2001.

- The **ARIS** database is only a partial record of mineral exploration work in BC. For the following reasons:
 - It is incomplete for work before 1947. Prior to that date there was not a requirement to file reports for assessment.
 - Assessment reports are confidential for one year after filing, as such, the database does not contain reports that were received in 2000, but are still classified as confidential.
 - Significant amounts of current exploration work and expenditures are not submitted as assessment work because the work was conducted on a regional scale and could not be applied to a specific mineral property, **or has not been** filed in order to maintain confidentiality of valuable data.
 - It has been estimated that on a provincial basis, ARIS only captures 40% of all exploration work done. In a study of the Ft. St. James district, ARIS was estimated to capture only 31% of mineral exploration work in the area.

Methodology

- Assessment work is submitted to the government by companies or individuals in order to maintain possession of their mineral tenures. Mineral tenure holders have the option of paying a sum of money (based on a yearly fee and the number of hectares held) or to do an equivalent amount of exploration work on the property and file a detailed technical report of this work with the government. Assessment Reports are a documentation of the type of work done, the results of this work and the amount of money expended on the project. These documents are maintained by the government as paper copies, on microfiche and more recently as digital PDF files. The ARIS database is a brief synopsis of the information submitted in the reports, including the property name, location, operator, type of work and level of expenditure.

c. Current Mineral Tenure and No Staking Reserves

Source Scale: 1:31,680 or 1:20,000

Source Data:

- Mineral Titles Branch, Ministry of Energy and Mines
- Lands and Sub-surface Branch, Ministry of Sustainable Resource Management
- BC Assets and Lands

Age and Reliability of Data

- The inventory was updated in late April, 2001.
- The **mineral tenure** database used for the LRMP contains only tenures which were in good standing as of April 1, 2001. Some recently staked tenures are missing from the map, as they had not yet been digitised from the hard copy maps. Tenures which forfeited prior to February 2001 are not included, regardless of the level of work done on the property. The mineral tenure database is open to frequent and sometimes radical change as tenures forfeit or new tenures are staked.
- **Crown granted mineral claims** are being verified and added to Mineral Titles reference maps. This is an ongoing project and is not yet complete. In the meantime, the lots are shown on maps from the Crown Lands / Surveyor General, but the status of the lot should be confirmed.
- **No Staking Reserves** are in the process of being converted from raster to vector format. This is an ongoing project and is not yet complete.

Methodology

- Within 20 days of being staked by a company or individual, mineral tenures are recorded at any government agent or Mineral Titles office in BC. The tenure locations are recorded on paper copies of 1:20,000 or 1:31,680 digital maps. Copies of these maps are then faxed to Victoria where the new tenures are centrally recorded by the Mineral Titles branch. Until recently, mineral tenure maps were only available in hardcopy. The Mineral Titles branch is in the process of converting to 1: 20,000 TRIM based maps. Previously most maps were scanned from the hardcopy, resulting in distortion between map sheets.

d. Selected Lapsed Mineral Tenures

The Selected Lapsed Mineral Tenure database was developed for the Central Coast and southern half of the North Coast plan areas, to augment the Minfile database. Though the database provides some indication of historical mineral tenure activity, this is but a small portion of the total number of lapsed tenures in the North Coast Region. Rather than detailing historical tenure activity, the primary purpose of the database is to illustrate areas of mineral interest (evidenced by the staking of mineral tenure) that are not documented in Minfile.

Source Data:

- Microfiche of archived mineral tenure maps from 1926 to 1998 for NTS map sheets 103A, H, G, I and J.
- Ministry of Energy and Mines Minfile database.

Age and Reliability of Data

- In the fall of 2000, point locations for selected lapsed tenures within the Central Coast and the southern half of the North Coast plan areas were completed. Site locations are accurate within 1 km.
- In April 2001, the data was clipped to the North Coast plan area. The data was modified from point source to an area in order to reflect the size of the original mineral claim block. The portrayed shape of the tenures does not accurately reflect the original tenure shape since the inventory was developed from point data. The point is now located at the approximate centre of the claim area.

Methodology

- A lapsed tenure database was developed for the North Coastal Region, to identify probable mineral occurrences that had not been captured in the Minfile database. Mineral occurrence descriptions in Minfile are obtained primarily from the Ministry's Annual reports and publications and from private sector (assessment) reports. However, where only physical work (i.e. trenching) is conducted on a mineral tenure, a technical report does not have to be submitted for assessment credit. This assessment credit is recorded as an affidavit and noted on the tenure record, but is not captured by the Minfile database.
- The Ministry's mineral tenure records for the North Coastal Region are reasonably complete from the mid-1920's onward. The location of recorded mineral tenures was cross-referenced with the Minfile database and all tenures that covered mineral occurrences documented in Minfile were discarded. The remaining 303 tenure blocks showed no obvious association with areas of known mineralization. These blocks were plotted as a point, located roughly in the centre of the claim block.

Use in an LRMP

- The data augments the Minfile database, in identifying areas of mineral interest

mineral interest.

- Modification of the data from point source to an area reflecting the size of the original claim block provides a partial record of historical mineral tenure activity.

2.7.4 Construction Aggregate Assessment

Construction aggregate is not defined as a mineral under the mineral tenure act, as such, the Ministry of Energy and Mines does not administer tenure for this resource nor is the resource documented in most ministry databases.

However, the ministry does regulate mining operations at construction aggregate sites and holds an interest in the responsible development of these resources. Utilizing Geological Survey Branch expertise in Quaternary or surficial geology (which encompasses the landforms that may host aggregate resources), reconnaissance level mapping of potential sand and gravel resources was conducted.

Type of Map	Interpretative
Source Agencies:	Ministry of Energy and Mines
Source Scale:	1:100,000
Source Data:	<ul style="list-style-type: none"> • 1:60,000 or 1:70,000 scale air photos covering the plan area. • Ministry of Energy and Mines assessment reports and aggregate pit database. • Ministry of Transportation and Highways reconnaissance mapping, geotechnical reports and water-well drill logs. • Clague, J. J. (1984): Quaternary Geology and Geomorphology, Smithers-Terrace-Prince Rupert Area, British Columbia; Geological Survey of Canada, Memoir 413, 71 pages. • McCuaig, S.J. and Roberts, M.C. (1999): Surficial geology drilling results, Nass Valley, British Columbia; Current Research 1999-A, Geological Survey of Canada, pp. 25-34.
Age and Reliability of Data	<ul style="list-style-type: none"> • Level 4 (reconnaissance) Inventory completed in August of 2001. • The map is a reconnaissance level map, used primarily to target locations for further investigation. The size, quantity and quality of the surficial deposits identified have not been assessed. • No ground truthing of the identified landforms has been conducted.

Methodology

Landforms (polygons) most likely to host accumulations of sand and gravel within the plan area were identified and classified for aggregate potential. This was achieved using a 3 phase process consisting of:

- a) Air photo interpretation of landforms likely to contain significant accumulations of sand and gravel. Polygons identified include, but are not restricted to glaciofluvial, fluvial, colluvial or notable isolated morainal or marine deposits.
- b) Further assessment of the polygons using data from published and unpublished reports prepared by the Ministry of Energy and Mines and the Ministry of Transportation and Highways.
- c) Classification of the polygons as high, moderate or low potential based on the surficial material and landform that each polygon represents.

Uses in an LRMP

- Sand and gravel resources are in extremely short supply within the plan area. Currently these resources are imported from outside of the plan area (i.e. Terrace and Kitimat) or produced locally by crushing bedrock. The mapping provides a baseline for identifying areas potential hosting sand and gravel resources during negotiation of zoning for protected areas or area-specific management.

2.8 Recreation and Tourism

2.8.1 Tourism – Existing Use Sites

An inventory of existing tourism features was completed in 1997 as part of a Forests and Fisheries Tourism Opportunity Study for the North Coast. Tourism Opportunity Studies (TOSs) were part of a province-wide initiative by the former Ministry of Small Business, Tourism and Culture to compile information that can be used by communities and entrepreneurs as a tool for furthering tourism development. One of the products of TOSs is a snapshot of the area’s current tourism industry.

Type of map	Descriptive
Source Agencies:	Former Ministry of Small Business, Tourism, and Culture (MoSBTC), Land Use Unit (Tourism is now part of Ministry of Competition, Science and Enterprise)
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Survey of tourism operators and organizations in the region. • Other provincial ministries.
Age and Reliability of Data	<ul style="list-style-type: none"> • Forests and Fisheries Tourism Opportunity Study, completed in March 2000 and updated in December 2001 to incorporate additional surveys of North Coast tourism operators as well as additional info on tourism uses (e.g., commercial recreation tenures) • Tourism recreation features inventory completed in 1997. The inventory of existing tourism use will become outdated as new tourism businesses open and old ones close. • Data is appropriate at a scale of 1:250,000 but at a more detailed scale may not be spatially accurate. • Tourism operators provided information on areas of use voluntarily – the inventory may not be complete because operators either did not respond to the survey or did not provide complete information in order to safeguard their business interests.
Methodology	<ul style="list-style-type: none"> • Information was collected through surveys of tourism operators and organizations, mapping workshops and industry meetings that were held in a variety of locations.

Uses in an LRMP

- What existing tourism activities occur in the area and where do they occur?
- What are the land use, nature resource and cultural resource requirements for each type of tourism activity?
- How will different land use management scenarios affect the existing tourism industry?

2.8.2 Tourism Potential

The North Coast Tourism Opportunity Study not only identified existing use sites, but also the capability of the resource base to support future tourism use for a wide range of products, including kayaking, marine touring, wildlife viewing, and hut-to-hut hiking.

Type of map	Interpretive
Source Agencies:	Former Ministry of Small Business, Tourism and Culture (now Ministry of Competition, Science and Enterprise)
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Forest and Fisheries Tourism Opportunities Study • Existing government data such as tourism facilities and use areas, biogeoclimatic maps, fish and wildlife mapping and archaeological information Augmented with survey work conducted summer 2001
Age and Reliability of Data	<ul style="list-style-type: none"> • The Tourism Opportunities Study was completed in 2000; and updated in December 2001 to incorporate comprehensive surveys of North Coast tourism operators on potential tourism products. . • A range of ages of data was used in developing the capability maps • Certain assumptions were made in the tourism capability models with respect to which resource attributes are essential to the success of an activity, which modify the quality of the activity and which exclude a particular tourism product or activity.
Uses in an LRMP	<ul style="list-style-type: none"> • Which areas have high potential for different types of tourism opportunities?

2.8.3 Visual Landscape Inventory

The visual landscape inventory identifies visible areas that have known or potential scenic value as seen from selected viewpoints, such as towns, parks, recreation sites and highway and river corridors. This province-wide inventory is designed to provide information on visual quality for planning including strategic planning (e.g. LRMPs) and operational planning (forest development plans).

Type of map	Descriptive
Source Agencies:	Ministry of Forests
Source Scale:	1:250,000 and 1:50,000
Source Data:	<ul style="list-style-type: none"> • Topographic maps • Air photos • Perspective photography • Fieldwork to identify viewpoints and visual landscape attributes • Public consultation
Age and Reliability of Data	<ul style="list-style-type: none"> • Initial inventories conducted from mid-1980's to mid-1990's. • Inventory for majority of planning area updated to 1998 RIC standards in 2000. Observatory Inlet update is tentatively scheduled for summer 2002. Inventory has not been completed for Tuck Inlet, Khtada Lake and Ecstall River Valley. • Inventories do not cover the whole of the land base, instead concentrating in areas perceived to be visually significant. • The visual inventory ratings are not particularly susceptible to ageing given they are based largely on topographic and vegetative factors in combination with social viewing factors. • Although visible landscape units are objectively determined, VQOs are determined subjectively. Accurate classification relies on professional judgment and considerable experience. • Visible landscape units and VQOs are not determined for the entire land base. • It is assumed that maps and other inventories used to produce the visual landscape inventory are accurate.

Methodology

- Visible areas are mapped on topographic maps and distinct visual landscape units are defined.
- Visible landscape units are then rated for their existing visual condition, visual absorption capability and visual sensitivity to forestry activities.
- Based on the preceding visual landscape ratings in combination with biological, economic, technical and social consideration, a visual quality objective (VQO) is recommended for each visual landscape.
- Visual quality objectives are the desired level of visual impact from a viewpoint based on physical characteristics and social concern for an area,
- Define the limits of acceptable visual change when timber is harvested in an area, and
- Are stratified into five separate classes (see below for description of classes).
- The final VQO is established or approved by a strategic planning process (e.g. LRMP) or by the Forest District Manager.
- Procedures for conducting a visual landscape inventory are outlined in the Ministry of Forests Recreation Manual (1991) chapters 6 and 11.
- Techniques of designing timber harvesting and road building to achieve VQOs are documented in the Ministry of Forests Visual Landscape Design Training Manual.

Uses in an LRMP

- Which areas are visually significant areas in the sub-region?
- Which areas should be made known as scenic areas under the Forest Practice Code?
- Where should VQOs be established under the Forest Practice Code?

2.8.4 Marine Recreation Inventory

In Phase 1 of the Small Boat Campsites and Anchorages project, potential marine-access small boat campsites and anchorages were located and inventoried throughout the North Coast Forest District.

The campsites and anchorages shown in this map are suitable for small craft such as kayaks, canoes, small motorboats and rowboats. The inventory excluded anchorages having the following features:

- suitable for large boats;
- very popular; or
- steep-to and do not allow land access.

The rationale for excluding these anchorages is that, although these sites provide valuable shelter, there are usually other options for small boats that are less busy.

Mapped sites will be field-checked in Phase 2 of the project to describe their characteristics and to rank sites according to their potential for recreational use.

Type of map	Descriptive
Source Agencies:	Ministry of Forests
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Publications and local knowledge.
Age and Reliability of Data	<ul style="list-style-type: none"> • Inventory was completed in winter of 2000. • Field verification of inventory will be completed in the spring of 2002.
Uses in an LRMP	<ul style="list-style-type: none"> • Which sites or areas have coastal recreation values such as anchorages and kayaking sites? • Where are areas with potential overlap with other resource uses?

3. Reference Maps

3.1 Cultural Heritage

3.1.1 Archaeological Overview Assessment

Archaeological Overview Assessments estimate the potential for occurrence of cultural heritage resources. This potential is assessed based on known information about archaeological sites combined with geographical information such as topography, distance from waterways, etc. For the most part development of the AOA is a technical exercise with some input from First Nations. It is a living inventory that changes as information becomes available and additional input is provided by First Nations and licensees.

Cultural heritage resources are protected under the *Heritage Conservation Act*. These resources include all pre-1846 features such as archaeological sites and artifacts, culturally modified trees (CMTs), aboriginal rock art, and burial places. The Ministry of Small Business, Tourism and Culture, Archaeology Branch manages archaeological sites and information under the *Heritage Conservation Act*.

Type of map	Interpretive
Source Agencies:	Ministry of Small Business, Tourism, and Culture, Archaeology Branch
Source Scale:	1:50,000
Source Data:	<ul style="list-style-type: none"> • Review of library and archival literature and other data sources. • Consultation with individuals and organizations with knowledge of archaeological resources • Field reconnaissance such as overflights or preliminary surveys of archaeological potential.
Age and Reliability of Data	<ul style="list-style-type: none"> • Some archaeological site records are sketchy, incomplete, or inaccurate.
Uses in an LRMP	<ul style="list-style-type: none"> • Which sites have a high density of archaeological sites that may be considered during zoning for protected areas or area-specific management?

3.2 Biodiversity/Wildlife

3.2.1 Habitat Suitability – Black Bear

Type of map	Interpretive
Source Agencies:	Ministry of Water, Land and Air Protection
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Broad Ecosystem Inventory • Species Models written by professionals that incorporate the species-specific habitat requirements for things such as food, breeding, security and thermal cover.
Age and Reliability of Data	<ul style="list-style-type: none"> • Broad Ecosystem Inventory updated in 2000.
Uses in an LRMP	<ul style="list-style-type: none"> • Where and how are high value wildlife habitats are distributed within the planning area? • Do the distributions of high value wildlife habitats match the distribution of Resource Management Zones and Protected Areas? • Is the population(s) for the wildlife species of concern partially or totally dependent on habitats within the planning area? • Is this wildlife species considered regionally and/or provincially significant?

3.2.2 Marine Sensitive Zones

A Marine Sensitive Area (MSA) is defined as an area containing habitats, biotic communities or species important to the ecological function (or conservation and biodiversity) of the local, regional or global environment (i.e. environmentally significant) that is also vulnerable to human disturbance (From *North Coast Land and Resource Management Plan Framework for Identifying Marine Sensitive Areas*, March 2001, B. Emmett and P. Wainwright).

Type of Map	Interpretive
Source Agencies:	Ministry of Sustainable Resource Development
Source Scale:	<ul style="list-style-type: none"> • 1:250,000
Source Data:	<ul style="list-style-type: none"> • LUCO physical shoreline Classification Database • Gazetted Streams and Flow data if available • Sediment Data source • Watershed Atlas • Rare and Endangered Species mapping • Geothermal mapping
Age and Reliability of Data	<ul style="list-style-type: none"> • To be completed in 2001 • Identification of marine sensitive areas is based on current understanding of ecological processes such as ecosystem function, mechanisms of impacts and recovery from impacts. • The expert knowledge approach to identifying MSAs relies on information (a knowledge base) about the relationship between ecologically significant physical and biotic features and the vulnerability of these features to disturbance. This knowledge base is formed of a series of hypotheses or expert opinion. A set of rules is then developed which implements these hypotheses by stating criteria that can be applied to specific data sets. These rules define the data required to identify MSAs. For more information see: <i>North Coast LRMP Framework for Identifying Marine Sensitive Areas</i>, by Archipelago Marine Research Ltd. And LGL Limited.
Uses in an LRMP	<ul style="list-style-type: none"> • To identify coastal planning units to be addressed through more detailed planning • To identify resource values of concern during negotiations of the marine component of protected areas

3.2.3 Guide Outfitter Territories

This inventory indicates the boundaries and the identification number associated with each guide outfitter territory within the Skeena Region of the Ministry of Water, Land and Air Protection (MWLAP).

Type of map	Descriptive
Source Agencies:	Ministry of Water, Land and Air Protection
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Based on BC Environment map and file archives.
Age and Reliability of Data	<ul style="list-style-type: none"> • Underlying information concerning boundaries is up to date to 1995, and subject to minor change (i.e. amendments) only. • Last major re-organization of guiding boundaries took place in 1976. • Information on harvests is collected annually. • Boundaries as stored on the computer have never been checked for accuracy with the legal documents. • The presentation map is not a legal representation of guide outfitter boundaries.
Methodology	<ul style="list-style-type: none"> • The land base was divided into territories in the early 1970s. • The boundaries of each territory are described on paper (metes and bounds). These descriptions are legal documents. • Boundaries are based on a combination of topographic features (i.e. creeks, rivers, lakes, heights-of-land) and legal bounds (i.e. lot lines, roads); boundaries are not based on wildlife species distributions. • Boundaries of each territory are input into a database run by MWLAP.
Uses in an LRMP	<ul style="list-style-type: none"> • Which areas are active guide outfitting territories, i.e. areas where commercial hunting interests are a consideration?

3.2.4 Trapping Territories

Type of map	Descriptive
Source Agencies:	Ministry of Water, Land and Air Protection
Source Scale:	1:126,720
Source Data:	<ul style="list-style-type: none"> • BC Environment map and file archives.
Age and Reliability of Data	<ul style="list-style-type: none"> • The boundaries were re-digitized in April 1997. • Underlying information concerning boundaries is up to date and subject to minor change (i.e. amendments) only. • Last major re-organization of trapping boundaries took place in 1977. • Basic trapping areas contained within the inventory go back to the 1930s and earlier. • The presentation map is not a legal representation of trapline boundaries.
Methodology	<ul style="list-style-type: none"> • Trap line descriptions were originally recorded on paper from verbal descriptions (metes and bounds). • In the early 1980s the written descriptions were mapped. These maps are the legal documents and act as the inventory. • These legal maps were originally digitized in the 1990s and re-digitized in 1997. • Boundaries are based on a combination of topographic features (i.e. creeks, rivers, lakes Heights-of-land). • Boundaries are not based on aboriginal traditional-use areas or on wildlife species distributions.
Uses in an LRMP	<ul style="list-style-type: none"> • Which areas are of concern re trapping interests?

3.2.5 Sensitive Watersheds

The sensitive watersheds map classifies the plan area into the following categories based on fish habitat values:

Sensitive Watershed Type	Description
A	Watersheds with extensive past forestry development or other forms of human disturbance.
B	Unlogged watershed with sensitive habitat features and/or watersheds with natural terrain stability issues
A/B	Combination of the above two categories. In many cases, the lower watershed has been developed, while the upper watershed is intact, with high terrain stability issues.
B/ND	Limited resource development to date and no further development is proposed by Fisheries & Oceans Canada in order to maintain high fisheries values, and be utilized as reference watersheds.

Type of map	Interpretive
Source Agency:	Fisheries and Oceans Canada
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Forest cover data • Terrain stability mapping • Fisheries and Oceans Patrolmen information • FISS presence and absence data on resident and anadromous fish
Age and Reliability of Data	<ul style="list-style-type: none"> • See Appendix 1 for information about age and reliability of Forest Cover Inventory. • Terrain stability mapping based on Geographic Data BC's Watershed BC North Coast Map Folio, 1999 slopes over 60%.
Uses in an LRMP	<ul style="list-style-type: none"> • What watersheds in the plan area are important for fisheries values? • What watersheds are vulnerable due to historic harvesting levels or methods?

3.2.6 Recreational Fishing Values

This map identifies watersheds that are highly valued for the activity of fishing or other recreational pursuits related to the presence of fish e.g., during eulachon or salmon runs; viewing of wildlife (bears, eagles, seals, whales etc.) drawn to the abundance, or viewing of fish ascending falls. Also included are watersheds for which a history of study exists i.e., index sites for steelhead, or systems which otherwise serve as scientific benchmarks contributing to knowledge needed for management of the fisheries resource.

Type of map	Interpretive
Source Agency:	Ministry of Sustainable Resource Management
Source Scale:	Various (1:1 to 1:50,000)
Presentation Unit	<ul style="list-style-type: none"> • Watershed
Data Sources:	<ul style="list-style-type: none"> • SEDS and FISS data • Salmon and steelhead recreational harvest data • Angling guide management system reports
Age and Reliability of Data	<ul style="list-style-type: none"> • Data current to 2001 • Incorporation of local knowledge could potentially increase the number of high value watersheds
Uses in an LRMP	<ul style="list-style-type: none"> • What watersheds in the plan area are important for recreational fishing or fish-related activities (bear viewing, whale-watching, salmon watching)?

3.2.7 Vulnerable and Unique Freshwater Fish Populations

Watersheds identified as vulnerable or unique are those with systems or fish populations that are thought to be exceptionally vulnerable; fish populations which are at risk of over-exploitation or because they are dependent upon habitats which are considered sensitive to disturbance (karst landscapes, geologies which include marine blue clays, unstable terrain). Also identified are those systems with known unique species assemblages or fish stocks e.g., high value is assigned to systems supporting known summer run steelhead.

There is little available data regarding steelhead, cutthroat, and Dolly Varden for many of the freshwater systems in the North Coast. It is estimated that coastal cutthroat and Dolly Varden are fairly widespread and that while anadromous (sea-run) coastal cutthroat or Dolly Varden systems exist, these are far less common, and potentially quite rare, as are certain types of steelhead (sea-run rainbow trout). It is also expected that some unreported watersheds will support highly diverse fish assemblages (sea-run and/or resident fish)².

Type of map	Interpretive
Source Agency:	Ministry of Sustainable Resource Management
Source Scale:	<ul style="list-style-type: none"> • Various
Presentation Unit	<ul style="list-style-type: none"> • watershed
Data Sources:	<ul style="list-style-type: none"> • SEDS escapement data and FISS data • Stream survey accounts • Local knowledge
Age and Reliability of Data	<ul style="list-style-type: none"> • Data current to 2001 • Insufficient information exists with regards to resident fish, sea-run cutthroat, sea-run Dolly Varden and Steelhead populations. It is likely that additional watersheds would register as “Vulnerable and Unique” if better information was available.
Uses in an LRMP	<ul style="list-style-type: none"> • To profile watersheds in the plan area that are considered vulnerable or unique for the following reasons: <ul style="list-style-type: none"> Known unique species assemblages e.g., summer run steelhead; Known fish populations at risk of over-exploitation; and Fish populations at risk because they are dependent on habitats that are sensitive to disturbance.

² [Noted by Sarma Liepins, Forest Ecosystem Specialist for the North Coast.](#)

3.3 Forestry

3.3.1 Timber Operability

The 2001 operability mapping was completed in the spring of this year. The timber operability inventory is derived from a combination of both physical and economic limits.

Physical Operability Limits

Areas harvested by conventional harvesting systems (road access) are constrained in large part to slope and accessibility to water dumping and log storage facilities

Areas harvested by non-conventional harvesting systems (helicopter logging) are limited in large part to appropriate water drop zones and the distance in which helicopters can physically carry its load.

Economical Operability Limits

All forest cover stands are assessed for volume and average market value conditions collected from the past 9 years. If the operational cost of harvesting the stand exceeds the assessed market value of the stand then it does not meet the economical operability limits.

The 2001 operability mapping for the North Coast LRMP replaces the original 1994 operability mapping for the North Coast TSA. The operability map provides the base for mapping the timber harvesting landbase (THLB).

The updated operability map was created in two stages:

1. The **physical operability limits** were identified by forest license engineers (including Small Business) who operate within the North Coast TSA. Most of the operating limits were compiled from road development plans and a helicopter zoning plans for drainages that have yet to be developed.³ The road development plan includes log dumps, mainlines and log handling/log storage areas. The helicopter zoning plan includes heli-drop zones, flight distance and log handling/log storage areas.
2. Once the limits to physical operating areas had been identified, cutblock configurations from areas harvested over the past 9 years were compiled onto historic forest cover files to extract a timber inventory profile. The timber inventory profile was then separated into six categories that were later used to extrapolate and build future harvest areas. The categories that were harvested under the most market conditions (referred to as “operable”) were modelled first. The categories that were harvested under favourable market conditions and that still made up more than 15% of the timber inventory profile (referred to as “marginally operable”) were modelled last. Once all categories depicting

³ The accuracy with which harvesting methods are identified in the map must be used with caution. Until a careful examination of each drainage has been done to delineate between conventional vs. non-conventional, very little emphasis or reliability should be placed on harvesting method.

future harvest areas had been modelled, they were then extrapolated over the **economic operability limits** to verify or reject economic feasibility. The resulting coverage generated the 2001 operability map.

The categories in the database file are as follows:

a) Previously harvested areas under conventional harvest systems.

- Operable: All tree species $\geq 400\text{m}^3/\text{ha}$. within conventional zoning, on slopes $\leq 60\%$ and height class ≥ 4
- Marginally operable: Combination Western Redcedar stands $\geq 250\text{m}^3/\text{ha}$. within conventional zoning, on slopes $\leq 60\%$ and height class ≥ 3

b) Previously harvested areas under non-conventional harvest systems.

- Operable: All tree species with leading volume $\geq 350\text{m}^3/\text{ha}$. within helicopter zoning, on slopes $> 60\%$ and height class ≥ 4
- Marginally operable: Leading Western Redcedar stands with leading volume $\geq 250\text{m}^3/\text{ha}$ within helicopter zoning, on slopes $> 60\%$ and height class ≥ 3

Type of map	Interpretive
Source Agencies:	Ministry of Forests
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Derivative map based on the Forest Cover Inventory (see appendix for more information).
Age and Reliability of Data	<ul style="list-style-type: none"> • The 2001 economic timber operability mapping replaces 1994 operability mapping (see above description). • See Appendix 1 for information about age and reliability of Forest Cover Inventory. • A timbersheds project, to be completed in 2002, will assess the economic feasibility of applying alternative management regimes (such as partial retention) to the operable land base.
Uses in an LRMP	<ul style="list-style-type: none"> • What is the known and potential operable land base, based on operating costs, terrain and market conditions? • Is there potential for applying alternative management regimes? What are these alternatives?

3.3.2 Age Class Distribution

This derivative map shows the age class of the forest across the landscape. Age class categories are defined as follows:

Class 1	1 – 20 years
Class 2	21 – 40 years
Class 3	41 – 60 years
Class 4	61 – 80 years
Class 5	81 – 100 years
Class 6	101 – 120 years
Class 7	121 – 140 years
Class 8	141 – 250 years
Class 9	251 + years

Type of map	Descriptive
Source Agencies:	Ministry of Forests
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Derivative map based on the Forest Cover Inventory (see appendix for more information).
Age and Reliability of Data	<ul style="list-style-type: none"> • See Appendix 1 for information about age and reliability of Forest Cover Inventory. • Age class data will be updated with use of the SELES landscape model in 2001 to combine age class with forest structure.
Uses in an LRMP	<ul style="list-style-type: none"> • What is the age class distribution within the forested landscape? • What should the biodiversity emphasis options be for the landscape units?

3.3.3 Species Identification

This map is often referred to as a Leading Species map, however the Species Identification map displays information on sub-canopy and undergrowth tree species as well as dominant tree species.

Type of map	Descriptive
Source Agencies:	Ministry of Forests
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Derivative map based on the Forest Cover Inventory (See appendix for more information about the Forest Cover Inventory).
Age and Reliability of Data	<ul style="list-style-type: none"> • See Appendix 1 for information about age and reliability of Forest Cover Inventory.
Uses in an LRMP	<ul style="list-style-type: none"> • What are the different ecosystem types based on the complexity of species in the stands? Is particularly useful in combination with other maps e.g., forest age class and height class.

3.3.4 Site Index

The Site Index describes the capability of the land for growing timber. The index is used to calculate how much timber the land will produce. A model is used to estimate the height of the trees when the main species is at age 50 years. For example a site index of 29 would mean that the trees would be 20 metres tall at the age of 50.

Type of map	Interpretive
Source Agencies:	Ministry of Forests
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Derivative map based on the Forest Cover Inventory (See appendix for more information about the Forest Cover Inventory).
Age and Reliability of Data	<ul style="list-style-type: none"> • See Appendix 1 for information about age and reliability of Forest Cover Inventory.
Uses in an LRMP	<ul style="list-style-type: none"> • Which areas have productive timber regeneration and growth? • Which areas are important sites of productivity for wildlife?

3.3.5 Licensee Operating Areas

Type of map	Descriptive
Source Agencies:	Ministry of Forests
Source Scale:	<ul style="list-style-type: none">• 1:20,000
Source Data:	<ul style="list-style-type: none">• Defines the operating areas negotiated between the Ministry of Forests and forest licensees
Age and Reliability of Data	<ul style="list-style-type: none">• Operating areas were updated in 2001 following the announcement of the 2000 Allowable Annual Cut
Uses in an LRMP	<ul style="list-style-type: none">• What are the specific areas of interest of each of the forest licensees?

3.3.6 Landscape Units

Landscape units are planning areas established under the Forest Practices Code for the purposes of applying biodiversity objectives. Landscape unit boundaries were identified based on the following criteria:

- distinct heights of land, the primary biophysical consideration;
- amalgamation of smaller watersheds or sub-drainage units into larger units where there is no functional distinction between sub-drainages;
- major rivers and lakes;
- significant coastal water barriers such as channels, inlets and sounds;
- groups of islands that are similar ecologically; and
- modifying boundaries for the functionally distinct Skeena Islands North Coast and Nass North Coast units.

Type of map	Descriptive
Source Agencies:	Ministry of Forests and Ministry of Water, Land and Air Protection
Source Scale:	1:20,000
Source Data:	<ul style="list-style-type: none"> • Existing information regarding ecological values. • Forest Cover mapping. • Watershed Atlas • Biogeoclimatic zone mapping. • Wildlife inventories.
Age and Reliability of Data	<ul style="list-style-type: none"> • Draft landscape unit maps were completed as part of the landscape unit planning process in 1999. • See Appendix 1 for information about age and reliability of Forest Cover Inventory. • The scale at which this inventory was completed is appropriate for the purposes of LRMP, but are too general to be used at an operational scale.
Methodology	<ul style="list-style-type: none"> • Experts identify boundaries based on the source data and professional judgment.
Uses in an LRMP	<ul style="list-style-type: none"> • Which areas have similar ecological values? • Which areas are important for biodiversity? • What biodiversity values exist in each landscape unit?

3.3.7 Existing and Approved Roads/Logging History

Type of map	Descriptive
Source Agencies:	Ministry of Forests, Licensees
Source Scale:	<ul style="list-style-type: none">• 1:20,000
Source Data:	<ul style="list-style-type: none">• Forest Development Plans• Derivative map based on the Forest Cover Inventory (See appendix for more information about the Forest Cover Inventory).
Age and Reliability of Data	<ul style="list-style-type: none">• Based on 2000 approved forest development plans.• See Appendix 1 for information about age and reliability of Forest Cover Inventory.
Uses in an LRMP	<ul style="list-style-type: none">• Used in grizzly effectiveness mapping• Which areas have existing and short term future development activity?

3.3.8 Terrain Stability

Terrain stability mapping, is a method to delineate stable potentially unstable and unstable areas within a particular landscape. Detailed terrain stability maps use a five class rating system with Class I indicates land with no apparent slope instability to Class IV indicates unstable terrain with active and recurrent landslides. (Note: Maps only indicate hazard--- risk associated with a potential landslide is not mapped. This is another level of interpretation.) Terrain stability maps do not exist for the entire LRMP area. Maps are completed for most operational areas on a need basis as presently required under the FPC. Quality of existing maps varies widely depending on mapping standard at the time a map was completed and by the experience of the mapper. Maps completed pre-1995 are generally not available in a digital format.

Type of map	Interpretive
Source:	Ministry of Forests, licensees
Source Scale:	1:15,000 1,20,000
Source Data:	<ul style="list-style-type: none"> • Aerial photographs • TRIM maps • Terrain map (terrain classification system for B.C 1997)
Age and Reliability of Data	<ul style="list-style-type: none"> • Map reliability is variable. Maps produced since 1999 are prepared at present RIC standards. • Classification is based on landscape/terrain features that do not change. Classification is not a landslide inventory. • Guidelines for the five class hazard rating system are defined, however, professional judgment and experience is involved.
Methodology	<ul style="list-style-type: none"> • Maps are based on aerial photo interpretation, professional judgment and field checking of selected areas (typically 20 to 25% for detailed terrain stability maps prepared at 1:20,000). • The BC Terrain Classification System 1997. • For more information the Forest Practices Code Guidebook "Mapping and Assessing Terrain Stability: (1999).
Uses in an LRMP	<ul style="list-style-type: none"> • Identify parts of the landscape that are unstable or potentially unstable. • Identify areas of landslide/erosion hazard that may carry risks to other forest resource values from different harvesting practices..

A new tool for creating slope stability hazard maps is SINMAP (A stability index approach to terrain stability hazard mapping). SINMAP implements computations and mapping of slope stability index based upon geographic information, primarily digital elevation data.

Calibration is undertaken using a landslide inventory for the area and existing terrain stability mapping. This modelling approach is in the testing stages within the North Coast LRMP and SINMAP products may become available for consideration by the LRMP table.

3.4 Geological Resources

3.4.1 Bedrock Geology

Type of Map	Descriptive and Interpretive
Source Agencies:	Ministry of Energy and Mines
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Geological Survey Branch, B.C. Ministry of Energy and Mines • Geological Survey of Canada, Cordilleran Section
Age and Reliability of Data	<ul style="list-style-type: none"> • Minor upgrades were made to the maps in the Spring of 2001, to reflect information collected by fieldwork conducted in the summer of 2000.
Uses in an LRMP	<ul style="list-style-type: none"> • The bedrock geology map is the base from which mineral tract boundaries are determined. The bedrock geology can assist the table in refining areas of high mineral interest that are identified in the industrial and metallic mineral assessments. • Bedrock geology has a strong influence on surface landforms and there are indications that it may also have a strong influence on forest productivity (and other vegetative growth) in the North Coast plan area. Areas of calcareous rock, important both from a forest productivity and timber harvesting perspective, can be identified from the map. The Karst potential map is based on information from bedrock geology mapping.

3.4.2 Limestone Geology / Karst Potential

Type of Map	Interpretive
Source Agencies:	Ministry of Forests
Source Scale:	<ul style="list-style-type: none"> • 1:250,000
Source Data:	<ul style="list-style-type: none"> • bedrock geology and surficial geology maps • topographic information • air photos • terrain stability mapping • karst inventory maps and reports, cave maps and related information, forest cover maps, forest development plans; • other records on any unique karst-related biota or habitat.
Age and Reliability of Data	<ul style="list-style-type: none"> • Reconnaissance level karst inventory was completed for the province in 1999. • Mapping conforms to RIC standards. • Reconnaissance level inventory has severe limitations and should be used with care. The criteria used can be unreliable in areas not field checked for karst and karst can occur outside of identified polygons.
Methodology	<ul style="list-style-type: none"> • Two criteria were used to evaluate karst potential within a particular polygon. • Criterion #1: The likelihood of karst forming or soluble bedrock (e.g., limestone, dolomite or gypsum) occurring within a unit (or map polygon), was evaluated by estimating the proportion of soluble bedrock and rating it as one of three categories-Primary (P) >50%, Secondary (S) 20-49% or Tertiary (T) 5-19%. • Criterion #2, the intensity of karst development in a particular type of soluble bedrock, was determined for each map polygon using four principal attributes that are important controlling factors for karst development-chemical purity, bedrock lithology, topographic position and unit thickness/continuity. Data for each of these attributes were obtained, categorized and placed into a numerical algorithm, which weighted the attributes from the most important (chemical purity) to the least important (unit thickness/continuity). Numerical values from the algorithm were then qualitatively ranked as high (H), moderate (M) or low (L) for their intensity of karst development.

Uses in an LRMP

- Karst limestone areas contain a number of resource values – they are important ecologically, are high in timber value, and are also high in recreational values.
- Identify where more detailed level inventory needs to be completed.

3.4.3 Energy Potential

a. Oil and Gas (Hydrocarbon) Potential

This inventory evaluates potential oil and gas terrestrial reserves only. The map does not address potential off shore reserves.

Type of Map Interpretive

Source Agencies: Ministry of Energy and Mines

Source Scale: 1:1,000,000

Source Data:

- Geological Survey of Canada’s Institute of Sedimentary and Petroleum Geology studies both published and unpublished.

Age and Reliability of Data

- Oil and Gas Potential mapping, completed September 1994.

Methodology

- All areas of sedimentary bedrock, or ‘sedimentary basins’ are identified, and then divided into tracts that are ranked on relative resource potential.
- **Oil and Gas (Hydrocarbon)** resource assessments are computer - generated by a statistical program known as PETRIMES, developed by the Geological Survey of Canada. These assessments can be applied to mature, immature and conceptual hydrocarbon plays. A play is defined as a family or group of hydrocarbon pools or prospects with similar histories of hydrocarbon generation and migration, as well as similar trapping mechanisms and reservoir configurations. A mature play has sufficient discoveries and pool definitions for analysis by the “discovery process model”, while an immature play has too few discoveries to allow analysis by this method. A conceptual play has no defined pools, just prospects.
- Speculative plays were also defined in the assessment. These plays are ones where little or no pertinent petroleum geological information is available. In addition it was deemed that sufficient negative conditions are present that significant accumulations of hydrocarbons are not likely to occur. These speculative plays were not statistically analyzed, but were included as a part of the map for the sake of completeness.
- The inventory information is a generalized view of resource potential distribution.
- These resource assessments are based on expert geologic evaluations.

Uses in an LRMP

- Identify areas of terrestrial oil and gas potential for the planning area.

b. Geothermal Potential

This inventory illustrates point locations for known geothermal resources and polygons of geothermal potential.

Type of Map Descriptive and interpretive

Source Agencies: Ministry of Energy and Mines

Source Scale: 1:1,000,000

Source Data:

- Geothermal potential mapping prepared by Fairbank Engineering based on data from the Geological Survey of Canada and the B.C. Ministry of Energy, Mines and Petroleum Resources.

Age and Reliability of Data

- Inventory compiled in 1991.

Uses in an LRMP

- Identify expected geothermal potential for the planning area and whether or not this potential is significant in land use planning.
- Identify where geothermal exploration and development activity may have occurred and where future explorations might be initiated.

3.5 Recreation

3.5.1 Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (ROS) is part of the Forest Recreation Resources inventory. All forest and range land is divided into one of the following seven ROS classes, indicating an area’s remoteness and natural integrity:

- primitive,
- semi-primitive non-motorized,
- semi-primitive motorized,
- natural roaded,
- modified roaded
- rural
- urban.

Criteria for defining each class are described in the Recreation Manual (Ministry of Forests 1991). The criteria defining ‘motorized’ access have been modified for many roaded areas in the North Coast are only accessible from tide water. These areas are classed as non-motorized in spite of the existing road infrastructure.

Type of Map	Interpretive
Source Agencies:	Ministry of Forests
Source Scale:	1:50,000
Source Data:	<ul style="list-style-type: none"> • User groups, industry and the general public • Government Agencies • Forest cover, topographic and BEC maps. • Environmentally sensitive area maps. • Canada and BC land inventories. • Land capability and landform classification maps.
Age and Reliability of Data	<ul style="list-style-type: none"> • A revised recreation opportunity spectrum was created for the North Coast in 2001. • The determination of the ROS class is somewhat subjective despite well-defined criteria.

Methodology

- Using air photo interpretation, with some ground verification, the land base is classified based on the recreational experience it is capable of providing in a given setting. Classes are based on remoteness or distance from roads, evidence of human use and size of area and naturalness. Public consultation, professional judgment and considerable experience are required to determine classes.
- A revised ROS classification has been developed in recognition that most roads in the North Coast are accessed from tidewater and, so, will not have the same impact on remote recreational experience as roads that are connected to a land-based road network
- For more information see: Ministry of Forests. 1991. Recreation Manual, chapter 6. Victoria, BC.

Uses in an LRMP

- Identifies lands that offer remote backcountry experiences.
- Identifies lands that are more accessible for motorized recreation.
- Can be used to determine how different land use management scenarios affect the range of recreation opportunities in the region.

3.5.2 Human Use Areas

Type of Map	Descriptive
Source Agencies:	Ministry of Competition, Science and Enterprise Ministry of Forests Ministry of Water, Land and Air Protection BC Lands and Assets Corporation
Source Scale:	Various – 1:20,000 – 1:250,000
Source Data:	<ul style="list-style-type: none"> • Literature Review • Public Knowledge • Tourism Opportunities Study • Public Use Sites • UREPs (Land reserves for the Use and Recreational Enjoyment of the Public) • Protected Areas Strategy
Age and Reliability of Data	<ul style="list-style-type: none"> • Age of data varies. Tourism Opportunities Study was completed in 2000. Protected Areas Strategy was completed in 1996. • Data varies in reliability. Data that are documented in two or more sources are likely to have greater reliability than areas that are documented in only one or two sources.
Uses in an LRMP	<ul style="list-style-type: none"> • Assist in development of the grizzly bear effectiveness map. • Identify areas of important recreational significance. • Identify areas of concentrated human activities.

3.5.3 Commercial Recreation Tenures (Existing and Proposed)

Type of map	Descriptive
Source Agencies:	BC Assets and Lands
Source Scale:	Various, usually 1:50,000
Source Data:	<ul style="list-style-type: none"> • Applications from commercial recreation operators. • Boundaries usually are hand drawn on 1:50,000 NTS maps.
Age and Reliability of Data	<ul style="list-style-type: none"> • Age varies depending on when application was submitted. • Reliability varies depending on accuracy of application boundary.
Uses in an LRMP	<ul style="list-style-type: none"> • Identifies lands in which existing and potential commercial recreation activities occur.

Appendix 1: BASE INVENTORIES

The information for many of the maps described in Sections 2 and 3 are collected by different inventories. These often complex inventories contain information on many basic attributes that can be used to describe the land base and its associated resources. For example the Forest Cover Inventory describes various attributes of the forested landscape, such as tree species composition, age of the forest, logging history and many more. The inventories used are:

- Watershed Atlas
- Fisheries Information Summary System
- Salmon Escapement Database System
- Forest Cover Inventory
- Broad Ecosystem Inventory
- Rare and Endangered Species
- Topographic Maps

The following section describes each of these inventories in greater detail.

a. Watershed Atlas

Description of inventory	Watershed boundaries and coastlines River, stream, lake and wetland locations
Source Agency:	Ministry of Sustainable Resource Management, Inventory and Data Systems Section, Fisheries Branch.
Source Scale:	1:50,000
Source Data:	<ul style="list-style-type: none"> • 1:50,000 NTS map series of aquatic features.
Age and Reliability of Data	<ul style="list-style-type: none"> • Age varies depending on date of each NTS map sheet. • Designed to be used at a scale of 1:50,000 but can be used to display data at a scale of 1:250,000. • Watershed boundaries were drawn by hand. • Ephemeral streams were not differentiated from “all-season” streams. • Certain groups of NTS map sheets have a higher density of streams than neighbouring sheets. This inconsistency affects the ordering of streams and may have a secondary impact on some fish habitat decisions that are made based upon the order of a stream. • It is assumed that the locations of streams as shown on the NTS maps are correct.
Methodology	<ul style="list-style-type: none"> • All features scanned from original mylars and from hand drawn watershed boundaries. • Files were then modified to fit GIS format. • For more information see also: An introduction to the British Columbia Watershed Atlas. Prepared for the Fisheries Branch, MWLAP by Spatial Vision Consulting Ltd. 1996.).
Uses in the LRMP	<ul style="list-style-type: none"> • Where are the watershed divides located? • What are the main river and stream systems in the LRMP area? • What are the main lakes and how many lakes are found within an LRMP?
Associated Maps	<ul style="list-style-type: none"> • Marine Sensitive Zones • Rich Watershed Ecosystems • Maps which use information from FISS or SEDs which describe data based on Watershed Atlas descriptions.

b. Fisheries Information summary System

Description of inventory	A summary of existing fish and fish habitat information for lakes and streams, including known distribution by species, obstructions, flow, escapements, life history timing, enhancement and management activities and objectives
Source Agency:	Ministry of Sustainable Resource Management, Fisheries Branch, Inventory of Data Systems Section
Source Scale:	1:50,000
Source Data:	<ul style="list-style-type: none"> • Federal and provincial government files and databases. • Knowledgeable government fisheries staff. • Consultant and government reports and surveys. • Organizations known to have information on the fishery resource • General public.
Age and Reliability of Data	<ul style="list-style-type: none"> • Data collected since the 1920s. • Data entered into database between 1992 – 1996. • Designed to be used at a scale of 1:50,000 but can be used to display data at a scale of 1:250,000 which is reasonable for the purposed of strategic planning. • The information contained in FISS is collected from fisheries filed studies, anecdotal information from non-fish experts is also included in some circumstances and is noted in the database. • All fish distribution information has supporting reference in the FISS database. • Not all streams and rivers have been checked for fish within the LRMP area. • In some areas bull trout (blue-listed) may have been mis-identified as Dolly Varden. • Assumptions: Waterways are mapped correctly on 1:50,000 NTS maps; all information collected to date is contained in FISS; all reports used to compile FISS are accurate; watershed codes are correct.

Methodology

- Information from the above sources was initially entered into the Stream Inventory Summary System (SISS) – the precursor to FISS. SISS was primarily concerned with salmon.
- Additional fish information (on all species) was collected from the sources mentioned above (Source Data) and placed onto 1:50,000 maps and onto data compilation forms.
- Data from the forms was entered into a database.

Uses in the LRMP

- What is the known distribution of fish species?
- Are there rare or endangered fish species known to be present in lakes/streams in the LRMP area?
- Are there any exceptionally valuable or sensitive fish resources known to exist in the area?
- Which streams may be suitable for habitat enchantment or restoration work?
- What streams are important for other wildlife e.g., grizzly bears?

Associated Maps

- Anadromous Fish
- Sensitive Watersheds
- Recreational Fishing Values
- Vulnerable and Unique Freshwater Fish Populations

c. North Coast Salmon Escapement Database System

Description of inventory	A summary of salmon escapement data by species.
Source Agency:	Department of Fisheries and Oceans, North Coast Salmon Stock Assessment Unit.
Source Scale:	<ul style="list-style-type: none"> • 1:20,000
Source Data:	<ul style="list-style-type: none"> • North Coast Salmon Stock Assessment Files: Annual Report of Salmon Streams and Spawning Populations (BC16 Reports). This data is available on the North Coast Fisheries and Oceans Canada Intranet public drive.
Age and Reliability of Data	<ul style="list-style-type: none"> • Data encompasses the years 1950 to 2000. 2001 data will be available by March 1, 2001. A review of the dataset comparing information with data recorded in original BC16 reports has been carried out to enhance reliability of information. While more data is now available, the incorporation of data for years 1997-2000 into the analysis would be unlikely to change watershed rankings. • Not all streams in the plan area are inventoried.
Methodology	<ul style="list-style-type: none"> • Adult salmon escapement information may be obtained by a variety of methodologies. These include visual inspections from stream walks or overflights, fence/weir counts, mark-recapture estimates, swimmer counts or estimates from dead pitch. • Final estimates may result from actual counts with no expansions, expansions using area-under-the-curve methodology or documented or undocumented expansions of actual counts.
Uses in the LRMP	<ul style="list-style-type: none"> • What is the known distribution of salmon species? • Are there any exceptionally valuable or sensitive salmon resources known to exist in the area? • Which streams may be suitable for habitat enhancement or restoration work? • What streams are important for other wildlife e.g., grizzly bears?
Associated Maps	<ul style="list-style-type: none"> • Anadromous Fish • Rich Watershed Ecosystems • Recreational Fishing Values • Vulnerable and Unique Freshwater Fish Populations

d. Forest Cover Inventory

The forest cover inventory provides descriptions of forested and non-forested land. For forested land, the inventory includes information on tree species, age, height, crown closure, site index. In areas with disturbance such as logging, fire, insects or disease information on site rehabilitation and planting activities. The inventory also identifies non-productive forest landbase.

The forest cover inventory is designed to provide estimates of timber volume for forestry planning on a timber supply area basis. The forest inventory is not designed for estimates of volume on a cut-block by cut-block basis.

Description of inventory	<p>Forest vegetation (forest vs. non-forest, stand age, stand height, leading species, crown closure, etc)</p> <p>Value of land for forestry (timber volume, mean annual increment, site index, etc)</p> <p>Land management and ownership (land tenure, administrative boundaries, reserves, etc)</p>
Source Agency:	Ministry of Forests
Source Scale:	1:20,000 with some 1:1 ground checks
Source Data:	<ul style="list-style-type: none"> • Aerial photography (1:15,000), interpretative cartography, field checks and sampling. • Forest cover type lines from interpretive aerial photography was then digitized into 1:20,000 source scale maps (BCGS).
Age and Reliability of Data	<ul style="list-style-type: none"> • The last re-inventory in the LRMP area was completed in 1995. This inventory was based on 1:15,000 black and white air photos from 1992 and 1994 (area north of Nass). Periodically, certain map sheets are updated to reflect logging/silvicultural activity. Currently this information is updated to 1999. • In terms of air photo interpretation methodology, the inventory is comprehensive, well documented and rigorous. • The data was developed at a 1:20,000 scale – a detailed planning scale that is reasonable for the needs of the LRMP table because the data can be reliably aggregated up to the strategic planning level. • Inventory attributes do vary with time due to both natural and silvicultural developments.

- An audit was conducted on the old inventory that suggested that the inventory volume may be overestimated. The same audit was compiled over the new inventory which is being used for the LRMP and those audit results suggest that the new inventory falls within the acceptable limits allowed within the provincial inventory standards.

Methodology

- The forest cover inventory is based upon a combination of aerial survey and statistical projections.
- Through air photo interpretation (at a scale of 1:15,000) the land based is divided into similar forest units, based on textural and tonal differences (which translate to information concerning species, age, height, site conditions and crown closure).
- The units are drawn onto the air photos, sampled using air and ground-truthing and labelled. Linework and data are then stored in digital format.

Uses in the LRMP

- What is the species, age, size and volume of timber in an area?
- Which lands are most productive, both for timber production and ecologically – now and in the future?
- What is the history of forest use (e.g., harvesting) and change (e.g., due to natural disturbance) in an area?
- What is the age class distribution/ height class distribution of the forest?

Associated Maps

- Biogeoclimatic Ecosystem Classification
- Habitat Suitability – Mountain Goat Winter habitat
- Habitat Suitability – Moose Winter Range
- Habitat Suitability – Coastal Black-tailed Deer Winter Range
- Habitat Suitability – Marbled Murrelet
- Protected Areas Strategy
- Timber Harvesting Land base
- Height Class
- Rare Terrestrial Ecosystems
- Sensitive Watersheds
- Timber Operability
- Age Class Distribution
- Leading Species
- Site Index
- Landscape Units
- Existing and Approved Roads/Logging History
- Recreation Opportunity Spectrum

e. Broad Ecosystem Inventory

British Columbia's unique ecological diversity means habitats can vary dramatically over short distance, usually through interrelationships of topography, soil and climate. The hierarchy used for Broad Ecosystem Inventory (BEI) biophysical classification and mapping includes ecoregions (see Section 2.4.2), biogeoclimatic units (see Section 2.4.1, BEC) and ecosystem units. Ecosystem units are based on the integration of vegetation, terrain, topography and soil characteristics.

A Broad Ecosystem Unit (BEU) is a permanent area of the landscape that supports a distinct kind of dominant vegetative cover or a distinct non-vegetative cover. A BEU is defined as including potential vegetation and any associated seral stages and are amalgamation of site series. BEUs are meant to be mapped at small scales (1:250,000) for use in sub-regional land use planning.

Description of inventory	Habitat units based on biogeoclimatic and ecoregion mapping, forest cover, terrain, soil mapping, ecosystem mapping where available (terrain ecosystem mapping or predictive ecosystem mapping)
Source Agency:	Ministry of Water, Land and Air Protection
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Ecoregion Classification • Biogeoclimatic Ecosystem Classification • Satellite photos (sometimes air photos)
Age and Reliability of Data	<ul style="list-style-type: none"> • BEI was completed for the LRMP area in 2000 • Although displayed as distinct lines when mapped, the boundaries of ecosystem zones are not precise. There may be wide transitional zones as one ecosystem changes to another type (especially in flatter areas). • The placement of unit boundaries relies heavily on experience and professional judgment. • BEI is a simplification of a complex transitional environment.
Methodology	<ul style="list-style-type: none"> • An ecosystem mapping specialist, usually a vegetation ecologist, maps the basic physical and biological elements that form broad ecosystem units. Major subdivisions such as slope and aspect changes are delineated. Satellite photos are used to delineate the broad ecosystem units, and in some cases air photos are used to supplement information that may not be provided by satellite imagery.

- Uses in the LRMP**
- Development of habitat capability and suitability maps
 - Locating ecosystems of special management concern
- Associated Maps**
- Habitat suitability and capability maps
 - Rare Terrestrial Ecosystems

f. CDC - Rare and endangered species

The Conservation Data Centre provides up-to-date tracking lists of rare and endangered species in the Province. The CDC maintains a “red list” of indigenous species considered to be extirpated, endangered or threatened in BC⁴ and a “blue list” of indigenous species considered to be vulnerable in BC⁵. These lists include plant species, plant communities, vertebrates birds, mammals, amphibians, reptiles and freshwater fish) and invertebrates (insects, shellfish). The CDC also maintains a “yellow list” of species that are not at risk in BC, but that are regionally important species whose habitat requirements are not met by other provisions of the Forest Practices Code or that are vulnerable during times of seasonal concentration (e.g., breeding colonies).

Description of inventory	Tracking lists of rare vertebrate and invertebrate animals, vascular plants and natural plant communities.
Source Agency:	Ministry of Water, Land and Air Protection, Conservation Data Centre
Source Scale:	Various
Source Data:	<ul style="list-style-type: none"> • The CDC uses filed studies, reports from scientists and naturalists, published and unpublished reports and museum collections to compile lists. Information is updated as research brings new information forward. CDC scientists also do field work to update lists
Age and Reliability of Data	<ul style="list-style-type: none"> • 1991 – present (is an ongoing process to update data). • CDC records are not complete and habitat classes are not necessarily recorded.
Uses in the LRMP	<ul style="list-style-type: none"> • What red- and blue-listed species are known to occur in the planning area? • What listed species are known to exist in each biogeoclimatic subzone variant? • How are red- and blue-listed species and ecosystems distributed within the plan area? • Are these listed species considered regionally, provincially or internationally significant? • Do existing and proposed protected areas adequately protect rare and endangered plant and animal communities?

⁴ Extirpated taxa no longer exist in the wild in British Columbia, but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed.

⁵ Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not extirpated, endangered or threatened.

- Associated Maps**
- Protected Areas Strategy
 - Rare Terrestrial Ecosystems

g. Topographic Maps

i. National Topographic System

Description of Inventory	Elevational information (as contour lines), names of places and features, and planimetric information such as roads, buildings, streams, lakes and wetlands.
Source Agency:	Ministry of Water, Land and Air Protection, Geographic Data BC
Source Scale:	1:250,000
Source Data:	<ul style="list-style-type: none"> • Digital maps created from federal National Topographic Series maps.
Age and Reliability of Data	<ul style="list-style-type: none"> • Inventory completed in 1994. • The information displayed on these maps is only as recent as the Federal NTS maps (which could be 10 to 15 years old).
Methodology	<ul style="list-style-type: none"> • The conversion of the Federal NTS maps to digital format was completed according to “British Columbia Specifications and Guidelines for Geomatics: Content Series Volume 2; Digital Baseline Mapping at 1:250,000.
Uses in the LRMP	<ul style="list-style-type: none"> • Identifies where towns, cities and major water bodies are located in the plan area. • Shows the topography (shape of the land) within the plan area. • Shows where it is steep or flat relative to various land use activities (e.g. operable forest). • Shows how much land versus marine and fresh water is within the plan area.
Associated Maps	<ul style="list-style-type: none"> • Base Map • Current Land Status map

ii. **Terrain Resource Information Management (TRIM)**

Description of Inventory

TRIM contains five types of information:

Digital Elevation Model- a series of mass points and breaklines defining the earth's surface.

Raw Contours at a 20 metre interval (derived from the DEM file).

Non-positional - control points, bridge deck and tower heights, etc.

Planimetric - all man-made features such as roads, buildings, fences, etc., as well as natural features such as streams, lakes, swamps, etc.

Toponymy - official place names, such as *Prince George*, *Capilano River*, etc

Source Agency:

Ministry of Water, Land and Air Protection, Geographic Data BC

Source Scale:

1:20,000

Source Data:

- Digital planimetric data compiled directly by stereo compilation

Age and

Reliability of Data

- Dec 17, 1996
- The map compilation photography is as much as 15 years out of date in some areas. TRIM II program underway to update areas.

Methodology

- The conversion of photographs to TRIM planimetric data was completed according to specifications in "TRIM 1:20,000 Specifications (Volume 3, January 1992)"

Uses in the LRMP

- Identifies where towns, cities and major water bodies are located in the plan area.
- Shows the topography (shape of the land) within the plan area.
- Shows where it is steep or flat relative to various land use activities (e.g. operable forest).
- Shows how much land versus marine and fresh water is within the plan area.

Associated Maps

N/a