NANCY GREENE HIGHLAND FOREST

MANAGEMENT PLAN

Arrow Forest District

July 15, 1997

Executive Summary

The Nancy Greene Highland Forest (NGHF) is the name chosen by the planning committee for the former Nancy Greene Recreation Area. This latter name was given to the area north of Red Mountain ski hill in honour of the achievements of Nancy Greene during the 1968 Olympics and World Cup skiing. This management plan is a result of government direction through the Kootenay-Boundary Land-Use Plan (KBLUP) which sought to ensure that local concerns would be considered prior to the transfer of the NGHF back to Provincial Forest.

The NGHF area is a mixture of rugged forests and bare rocky terrain dominated by Old Glory Mountain, Mount Plewman and Mount Kirkup. Total area of the unit is 4,795 hectares with about 1,000 hectares classified as operable forest. It is most well known for providing winter and summer recreational opportunities to the region as well as water, timber and mineral resources to the local economy.

The NGHF Planning Committee met from May to December 1996 and discussed the main features and values important to society and the regional ecosystems. Some of the highlights are as follows:

Watersheds

There are five community watersheds that account for 20% of the NGHF gross area and 71% (734 hectares) of the net harvestable land base. The Forest Practices Code Community Watershed guidelines impose significant land management obligations on forest licensees and mining operations. Additionally, there are domestic watersheds that must be considered as well.

Visual Landscape

Most of the eastern portion of the NGHF is classified as Partial Retention (PR) Visual Quality Objective since it is readily visible from Highway 3B and Trail. Again, most of the net forested land base is located within this zone. The primary objective in managing the viewscape is to retain a high standard of visual landscape design while considering other resources.

Biodiversity

There are no known regionally significant wildlife or biotic features in the NGHF. However, biological diversity will still be considered during resource development planning. Forest managers in British Columbia are considering how harvesting fits into the disturbance patterns that have occurred naturally through the millennia. If these processes are mimicked then there is a good chance of avoiding serious impacts on most species of plant and animal life.

The NGHF is centered in the hub of three landscape units. At a future date these units will be the focus of another planning process to establish a plan for biodiversity through time.

Recreation

The NGHF is a very popular location for winter and summer recreationalists. The terrain of most of the area is suited for non-motorized travel on foot, skis or horseback. The logged area adjacent to the highway is classified as roaded resource area but most of the trails have overgrown. Any resource development within the NGHF will have to consider the importance of this area to residents throughout the region.

Timber & Silviculture

The NGHF forest contributes to the Allowable Annual Cut within the Arrow Timber Supply Area (TSA). On average, the landbase should contribute about 1800 - 2300 m^3 of the 619 000 m^3 harvested in the TSA annually. Due to the concerns for community watersheds, visuals and recreation this harvesting will be undertaken with considerable planning and care. It is anticipated that silvicultural systems will include group selection or small clearcuts due to the challenges of reforesting areas at this elevation and aspect. Glading to provide more ski-able terrain shall be considered.

Mining

There are no significant indications of mining potential in the NGHF. The KBLUP does consider the area available for mineral development.

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Accronyms

CORE	Commission on Resources and the Environment
KBLUP	Kootenay-Boundary Land-Use Plan
LUP	Landscape Unit Planning
TSA	Timber Supply Area - Administered by a District Office of MOF
MOF	Ministry of Forests (British Columbia Forest Service)
Forestry	- Office of the MOF/BCFS - silviculture - the science of forestry
NGHF	Nancy Greene Highland Forest
NGHFPC	Nancy Greene Highland Forest Planning Committee
TSL	Timber Sale License (Small Business Forest Enterprise Program)

1. INTRODUCTION

The Nancy Greene Highland Forest (NGHF) is the name chosen by the planning committee for the former Nancy Greene Recreation Area. This latter name was given to the area north of Red Mountain ski hill in honour of the achievements of Nancy Greene during the 1968 Olympics and World Cup skiing. (See HISTORY OF THE AREA, page 29 for more information.)

The area is a mixture of rugged forests and bare rocky alpine terrain dominated by Old Glory Mountain, Mount Plewman and Mount Kirkup. It is well known for providing winter and summer recreational opportunities to the regional population as well as water, timber and mineral resources for the local economy.

The NGHF falls within an integrated resource management zone within the Kootenay-Boundary Land-Use Plan (KBLUP). This means that no one resource use of the zone will dominate activities within this zone. All the resources, such as watersheds, recreation, forestry and mining should be kept in balance to avoid comprising another resource.

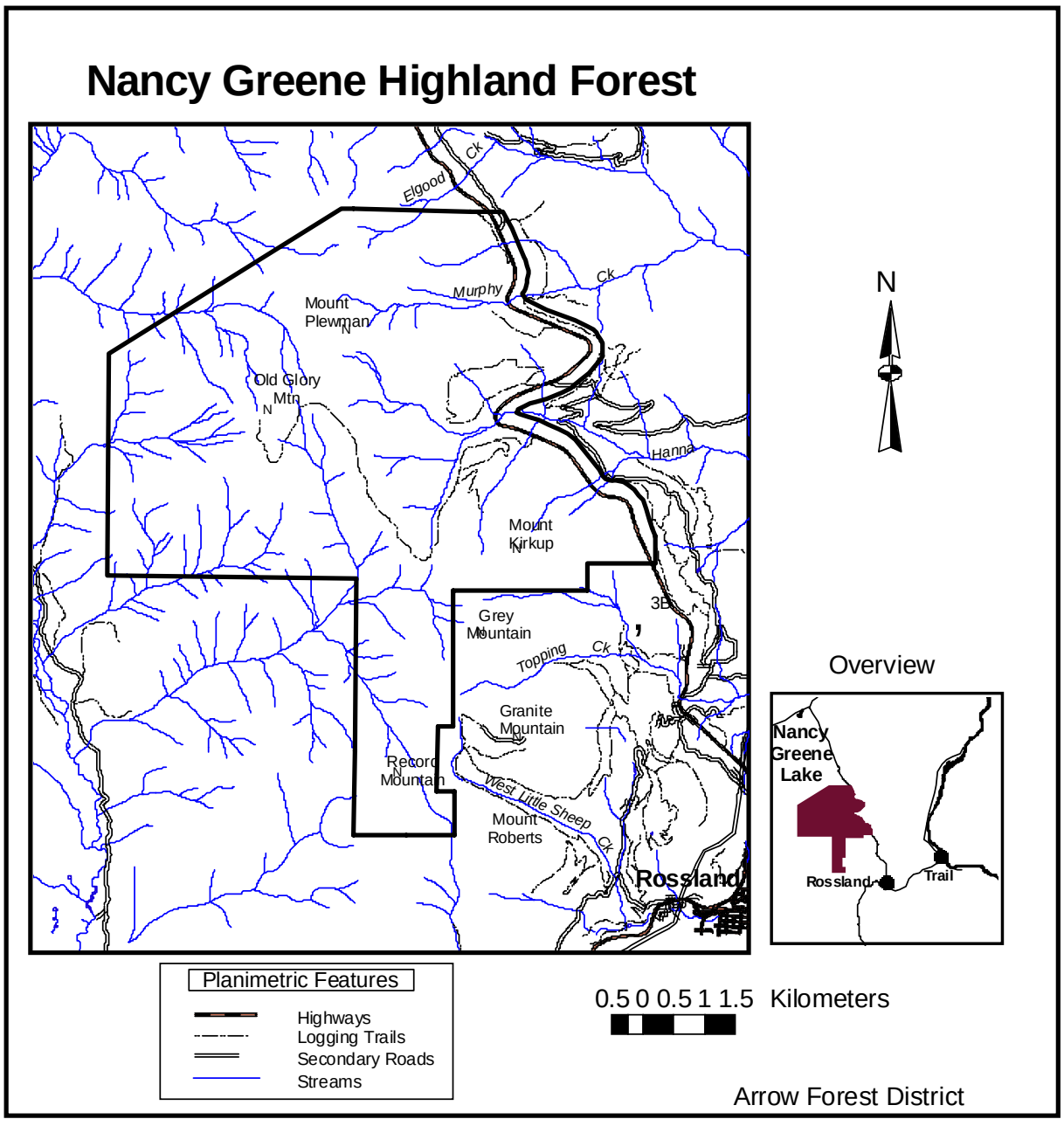
This plan contains information on key resource inventories, management objectives and strategies. Also included are the NGHF Planning Committee Terms of Reference which identify the methods of operation for the committee and the spokespeople who represent the diverse interests in the area.

This plan is not the final word on management in the NGFH but is the identification of key issues that concern local residents and resource managers. The plan will be utilized by subsequent operational planning processes as a guide to development. Table 1 provides an overview of the planning processes currently required in resource management in B.C. The last five years have seen dramatic changes in resource management and it can be expected to continue to evolve.

The shaded rows indicate planning levels that must conform to the NGHF plan and preceding levels.

Table 1 Planning Overview (1997)

Plan Product	Planning Management Level	Duration
Forest Practices Code (Act, Regulations)	Provincial	N/A
Kootenay-Boundary Land-Use Plan	Regional to Sub Regional	N/A
Timber Supply Review	Sub Regional (Timber Supply Area)	5 years
Landscape Unit Plan	Sub District I	N/A
Local Resource Unit Management Plan **(Nancy Greene Highland Forest Plan)**	Sub District II	N/A
Forest Development Plan	Licensee	5 years
Silviculture Prescription	Cutting / Road Permit	Green Up
Logging Plan	Block	



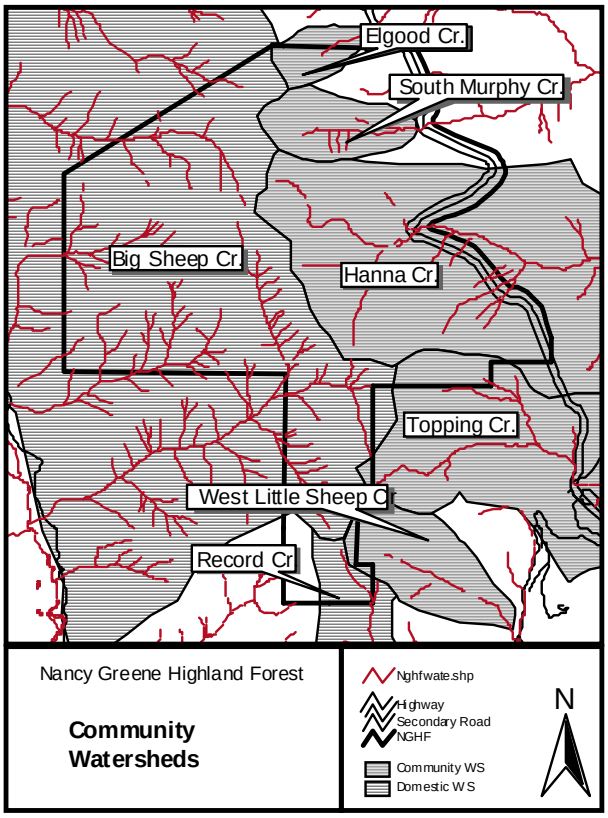
Map 1 Nancy Greene Highland Forest

2. WATER RESOURCES

The headwaters of a number of locally important stream channels originate within the NGHF. The management plan strives to ensure resource use and development activities do not pose an unacceptable risk to water quality, quantity and timing of flows at the point of intake. The Forest Practices Code will be interpreted as a minimum benchmark from which the planning committee will review development proposals. The objectives of the management plan will also be achieved by conducting watershed assessments to better understand the extent of water-related problems that exist in consumptive watersheds. The results of the assessments will also be used to indicate the potential impacts of forest development on the water resources and suggest restoration opportunities.

2.1 Inventory

Murphy, Hanna, Topping, West Little Sheep and Record creeks are the main watercourses that drain the east and south slopes of the Nancy Greene Highland Forest (NGHF). Lamb, Esling and the other tributaries of Big Sheep Creek drain the north and west sides (Map 2). Lakes and wetlands are scarce and small in the planning area.



Map 2 Community Watersheds

There are five Community Watersheds as defined by the Forest Practices Code within the NGHF area. They are: Elgood Creek, South Murphy Creek, Hanna Creek, Topping Creek, and West Little Sheep Creek. Table 2 shows the area and net productive forest of the community watersheds within the NGHF. These five sources supply domestic water for the City of Rossland, Rivervale Improvement District, and Cominco Ltd. The community water intake on South Murphy Creek is the only water intake located within the planning area. It is licensed for storage (non-power) in addition to waterworks purposes.

Activities within the NGHF area have the potential to affect a number of water users outside the planning area (Map 2). 17 licensed water intakes collectively hold 27 water licenses downstream from NGHF. Of the 27 licenses, 9 are allocated for waterworks; 6 domestic; 5 irrigation; 2 processing; 3 storage; 1 enterprise and 1 watering. It should be noted that the community water intakes on Hanna and Elgood creeks are located immediately east of the planning area boundary below Highway 3B.

Table 2 Community Watersheds within NGHF

Watershed	Area of Community Watershed (CW) within NGHF (ha)	% CW area within NGHF	Net Productive Forest for NGHF (ha)	% Net Productive Forest within CW for NGHF
Elgood	92.4	57.7	24.5	26.5
Hanna	1372.9	40.9	600.0	43.7
S. Murphy	308.6	100.0	99.4	32.2
Topping	120.8	16.3	10.1	8.4
W. Little Sheep	27.2	6.8	0.0	0.0

2.2 Water Quality

The Ministry of Health samples for microbiological contamination (total and fecal coliform) at a frequency of once a week from the tap at the Uplander Hotel in the City of Rossland (pers. convers. Shelly Stetsko, Environmental Health Officer). Bacteriological sampling of raw water from individual community water intakes is not collected. A full chemical analysis is conducted approximately once every year or two at the community water intake; the last analysis was conducted in February 1996. Information on chemical analysis of raw water is available back to 1985 for Topping, Murphy, Hanna, and West Little Sheep creeks.

In 1991, the Ministry of Health placed a “Boil Water Advisory” on the water supplies of the cities of Rossland and Trail due to several reported cases of Giardiasis. As a result, the City of Rossland conducted approximately one year of water sampling, measurement, and analysis on their water supply. The results were presented in the *Rossland Water Supply Master Plan* developed by Urban Systems Ltd. (1993).

The summary of the test results is indicative of good quality mountain stream water. Virtually all the physical and chemical parameters of the water are within the *Canadian Maximum Acceptable Concentration (CMAC)* guidelines for drinking water with the exception of low alkalinity, hardness, and dissolved solids. The report concluded that the main water quality concern over the long term was bacteriological and organic as opposed to chemical due to the occasional presence of Giardia Lamblia cysts, Cryptosporidium oocysts, and fecal coliform.

Topping and Hanna Creeks were noted as being the most susceptible to surface water contamination. Topping Creek has several residential developments with minimal control over sewage disposal in addition to commercial recreation development located within the watershed. Beaver populations in Hanna Creek have also been noted as an increased risk to water quality due to fecal coliform contamination.

Activities such as logging, mining exploration, highway construction, ski resort development, transmission line construction, use of ATVs, etc result in an expanded road network, increased opportunities for soil erosion, and potentially increased coliform counts.

2.3 Water Quantity

In general, runoff from streams in the NGHF results from spring snowmelt, and is concentrated in the months of May and June. Summer rains, thaws, or rainfall in the early winter, can occasionally result in high flows but such events are normally much lower in discharge than the spring runoff peak. Minimum flows normally occur in this area in the months of September to November.

A potential flooding hazard has been identified on the lower reaches of Murphy and Hanna creeks (*Floodplain Mapping*, MOE, Sept. 1995). Over the years, complaints have been reported to the Ministry of Environment regarding flooding hazard/erosion on the alluvial fan of these two systems (See Complaints pp.37).

2.4 Forest Practices Code Act References

A Community Watershed is defined in Bill 18-1995 Forest Practices Code of B.C. Amendment Act (June 1995) which amends Section 41(8) of Bill 40.

The intent of the community watershed designation under the Code is to capture watersheds which serve as important water supplies for legally organized user groups such as municipalities, regional district areas, improvement districts, utilities and water users' communities. The user groups utilize larger water systems which service many properties. Under the Code, additional regulations and guidelines have been established for designated community watersheds which recognize water quality, quantity, and timing of flow as the principal values within these areas.

2.5 Domestic Watershed Guidelines

Under the KBLUP, a forest management strategy has been implemented for domestic watersheds. The *Domestic Watershed Guidelines (DWG)* will be applied to all licensed consumptive watersheds not designated as community watersheds under the Code. Domestic watersheds will be classified into one of three categories based on size (Class 1,2, or 3). Big Sheep and Record creeks are domestic water supplies within the NGHF which would be managed under the *DWG*.

The *Domestic Watershed Guidelines* define a level of management for forest activities which lies between standard *Forest Practices Code* and management in community watersheds. It does this by providing:

- A classification and mapping system for domestic watersheds;
- A basic assessment of hazard related to forestry activities;
- A set of recommended forest practices;
- A strengthened opportunity for public input to the forest development plan;
- A contingency plan in case of damage to water supply.

2.6 Objectives of Water Resource Management

- To treat water as the highest priority resource in designated community watersheds within the NGHF planning area.
- To ensure that resource use and development will not pose an unacceptable risk to water quality, quantity and timing of flows for domestic consumption in the NGHFP area in the short or long term.
- To apply the *Community Watershed Guidebook* where appropriate in community watersheds within the NGHF.
- To apply the *Interior Watershed Assessment Procedure* to community watersheds and ensure recommendations from the assessment are reflected in future forest development plans.
- To apply the *Domestic Watershed Guidelines* to domestic sources within the NGHF.

2.7 Strategies for Water Resource Management

Community Watershed Guidelines

The spirit and intent of the Community Watershed guidelines will be followed in the designated community watershed portions of the planning area (South Murphy, Elgood, Hanna, Topping, and West Little Sheep). This means that the Community Watershed Guidelines will be used as a reference when evaluating development proposals.

Interior Watershed Assessment Procedures

The Interior Watershed Assessment Procedure (IWAP) is a tool to help forest managers understand the type and extent of current water-related problems that exist in a watershed and to recognize the possible hydrologic implications of proposed forestry-related development in that watershed.

The assessment of hydrological impacts focuses on:

- The potential for changes to peak flows;
- The potential for landslides;
- The potential for accelerated surface erosion; and
- The anticipated changes to the channel riparian buffer.
- The IWAP has three levels of analysis:

Level 1 is a reconnaissance level analysis intended as a coarse filter to identify watersheds that may have impacts from the cumulative effects of past forest practices.

Level 2 is an overview stream channel assessment performed by someone with basic experience in hydrology and/or geomorphology.

Level 3 is a very detailed analysis performed by a watershed specialist qualified in BC, involving mostly fieldwork. The work is guided by the results of the Level 1 and Level 2 analyses.

A Level 1 IWAP was conducted for each of the community watersheds within NGHF in March 1996.

The following recommendations are based on the results of the assessment:

- Field verification of all office derived hazard indices should be undertaken before the results are used for operational purposes
- If the field verifications confirm the results of the office assessment, the following recommendations should be considered:
  - No further analysis is required in the Hanna creek watershed
  - Due to hazard indices $\geq$0.5 existing in the Elgood, South Murphy, Topping and West Little Sheep creek watersheds a Level Two analysis (Channel Assessment Procedure) should be conducted in these watersheds to determine the actual hazard ratings.

Forest Development Plans in the Community Watershed areas should reflect recommendations from the IWAP roundtable. Prior to an overview field assessment, however, the map-based exercise should be revisited to ensure the most up-to-date information reflecting both present and proposed activities has been used to generate the hazard indices.

Recreation Sites

Recognizing that increased human activity in these watersheds will increase the risk of waterborne disease, toilets will be installed and maintained by the Forest Service at recreation sites agreed to by the planning committee. All activities will be focused onto areas away from riparian areas of streams whenever possible.

Water Licensing

The principles of "Integrated Resource Management" recognize licensed water users as stakeholders As such, they (or their spokesperson) will be encouraged to participate in the operational planning of any activities within their watershed.

Water licensees will be given 2 weeks notice prior to any proposed in-stream work in order that measures can be taken to protect intakes. These areas will be identified during review of development proposals.

Industrial Activities

Stream riparian classification and management strategies will be addressed at the Silviculture Prescription (SP) level.

Streams within a community watershed or those which are fish bearing will receive the greatest protection.

A reserve zone must be established upslope of both domestic and community water intakes. The size of the reserve must adequately protect the integrity of the water quality at the intake. A minimum reserve zone of 50 m will be established upslope of domestic intakes and 100 m upslope of community intakes.

Springs, seeps and intermittent streams should be marked during spring runoff where development has been proposed.

Terrain stability and surface erosion assessments will be conducted as required by the Forest Practices Code (FPC). Constraints on forest-related activities may be applied to those areas with potentially-unstable or unstable terrain or where there is high or very high surface erosion potential and risk of delivery to a stream channel.

All proposals to apply fertilizers in the NGHF area will be referred to the planning committee for comment. Pesticides will not be used in the NGHF planning area.

Portable toilets may be required for industrial activities under the direction of the planning committee.

Contingency Planning in the Case of Forestry-Related Damage to the Water Supply

The development of a contingency plan will be the responsibility of the forest licensee in conjunction with water licensees and government agencies.

If development results in detrimental impacts to the water resource, the goal will be to identify and correct the problem as soon as possible, and to revise activities to prevent similar problems in the future.

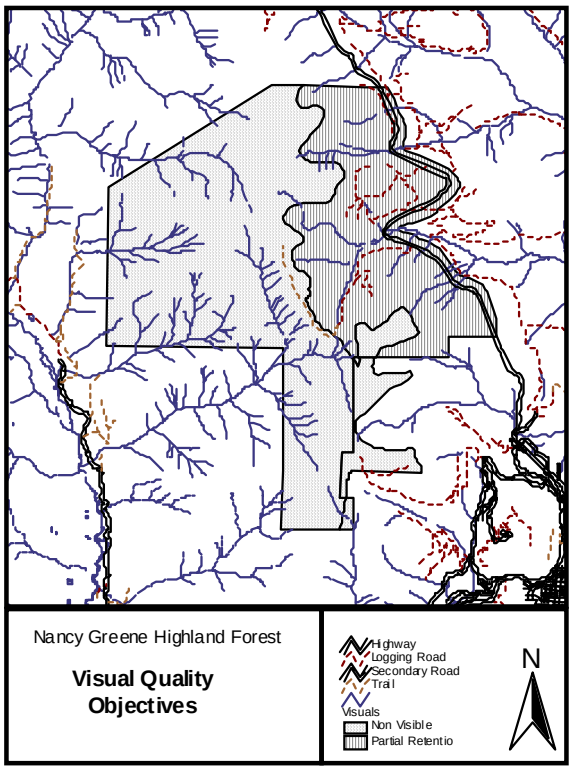
Water licensees will have protection under the Community Watershed Contingency Plan (CWG) or Domestic Water Contingency Plan (*KBLUP*) should water problems occur. Contact persons and responsibilities will be confirmed to allow rapid response and communication in the event that water supplies are impacted.

3. VISUAL LANDSCAPE

Since the NGHF surrounds Old Glory Mountain, which is one of the highest peaks in the area, resource development must give careful consideration to the management of the viewscape. Design of harvesting units should avoid generating geometric patterns based solely on operational criteria. In essence, the nature and shape of the landform will guide the design of the harvest units while giving consideration to other resource values in the area.

It has been widely observed that the eye tends to be drawn down ridges and convex landforms and up hollows, valleys and concave landforms. Any line superimposed on a landform with shape or position conflicting with the natural landform, may have a visually disruptive effect. Irregular shaped harvesting units should interlock with other parts of the forest and not stand out or lack visual unity.

Therefore harvesting units should be designed to follow the patterns defined by a landform's topography while giving consideration to other resource values and operational constraints. This will lead to a number of units that interlock with existing shapes due to their varied edges. The continuity of interlocking patterns in the landscape will help to control and absorb changes within a landscape.



Map 3 Visuals

3.1 Forest Practices Code References

- Applicable regulations and references are:
- FPC Act, Section 17(2)(a)(iii)
- Operational Planning Regulation
- The FPC provides for the establishment of Scenic Areas by the District Manager to ensure the full consideration of visual resources in any development proposals.
- A Visual Impact Assessment (VIA) must be completed and submitted as part of Forest Development Plan when operations are proposed in a scenic area with Visual Quality Objectives.
- Visual Landscape Design Manual, MOF 1994.

3.2 Visual Landscape Resource Inventory

The NGHF, located north-west of Rossland, as viewed from Highway 3B is a highly visible area and visual quality is considered a very high resource value to the residents and tourists in the Rossland-Trail area.

Much of the open nature of the ridges and alpine basins are largely attributable to fires. Previously harvested areas (openings) are evident in the eastern section adjacent to Highway 3B.

The area viewed from Highway 3B has been inventoried as having a high-visual sensitivity with a recommended visual quality objective of partial retention.

Primary viewpoints used to assess harvest proposals have been defined.

They are Highway 3B and City of Trail, Waneta Plaza.

3.3 Objectives of Visual Landscape Resource Management

Scenic areas will be identified in the KBLUP for consideration by the District Manager.

Visual Quality Objectives (VQO) are resource management objectives, established by the District Manager within scenic areas. Until such time that VQO's are established for the Arrow District, the area viewed from the Highway 3B corridor will be managed with a Partial Retention VQO.

The primary objective is to retain a high standard of visual landscape design while managing for other resources.

Enhanced block design will incorporate Landscape Character Analysis as a guiding principle for harvesting of timber. Block design would have to utilize *Visual Force Analysis* (see Visual Landscape Design Manual) and fit the landform.

3.4 Strategies for Visual Landscape Resource Management

Design

Any further harvesting of timber in the visual corridor will require appropriate design of harvesting units to reflect the quality of shape found in the landscape. Alterations should be subordinate to the character of the landscape. Repetition of line, form and texture is important to ensure blending with dominant elements.

Varying silvicultural systems will be used in order to create a diverse visual landscape that will suite the topography and character of the area.

The shape of harvesting units must incorporate visual landscape design procedures and reflect the quality of natural shapes found in the landscape. Units should therefore be irregular in shape and interlock with the existing forest.

Some existing harvested units may be rehabilitated to fit the land forms and reduce visual impacts.

Harvesting activities should be designed so that visual impacts will be absorbed over a period of time with adequate spatial distribution.

Where natural openings exist, they will guide the size and shape of visible portions of clearcuts.

Consideration should be given to views from hiking trails when designing harvesting units.

Harvesting

The Forest Development Plan will allow for public comment prior to harvesting.

Visual Impact Assessments (VIA) will be required for all proposed harvest units visible from Highway 3B.

Cable logging skid routes should be oriented away from populated centers or other important viewpoints within the parameters of the cable operation on site.

Landings and skid trails should be minimized in visually sensitive areas.

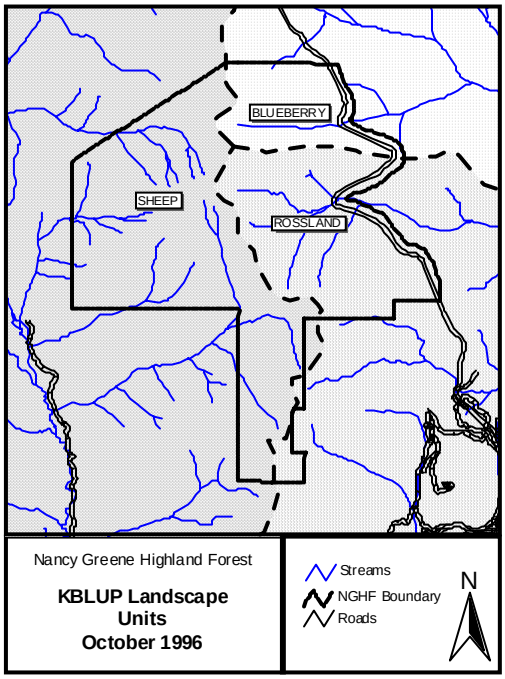
Build all roads with as narrow a right-of-way width as possible within operational constraints.

Grass seed all landings, spur roads and trails within 50 meters on either side of main roads. All road right-of-ways will be seeded within 1 growing season of construction.

4. BIODIVERSITY

Biodiversity is defined by the FPC Biodiversity Guidebook as :

> *"The diversity of plants, animals, and other living organisms in all their forms and levels of organisation, and includes the diversity of genes, species, and ecosystems, as well as the evolutionary and functional processes that link them."*



Map 4 Landscape Units

The biological diversity in a forest landscape results from a variety of naturally-occurring disturbance types, ranging in scale from the death of a single tree, to massive wildfires covering thousands of hectares. Forest management can enhance biodiversity by incorporating a degree of disorder and "wildness" into managed forests at both the landscape and stand level.

The 4795 ha. of the Nancy Greene Highland Forest (NGHF) occupies the centre and highest point (Old Glory, 1917 m.) of the Rossland Range of the southern Monashee Mountains, the area bounded by Big Sheep Creek to the west, the Columbia River to the east, the confluence of the two rivers at Northport to the south, and the Lower Arrow Lake on the north.

As Map 4 illustrates, the NGHF falls within three Landscape Units. These units are significant because the next layer of resource planning that comes after regional/sub regional planning (KBLUP) is landscape unit planning (LUP). The main focus of the landscape unit planning exercise is to apply biodiversity and other objectives in a spatial context over time, to determine, for example, where and how old growth values will be enhanced along with other resource values such as watersheds and visuals. The purpose is to co-ordinate non-timber and timber resources in such a way that each is maximized.

The KBLUP has also assigned one of three levels of biodiversity: Low - Intermediate - High. The biodiversity emphasis rating relates to the degree of seral stage forest to be maintained within the units. (See Map 5 and Table 3) The western portion of the NGHF within the ESSF of Big Sheep drainage will be managed in accordance with an Intermediate biodiversity emphasis. All the remaining area of the NGHF has been assigned a Low biodiversity emphasis.

All Silvicultural Prescriptions and Stand Management Prescriptions must include a strategy to maintain or enhance biodiversity at the stand level, regardless of the designated biodiversity emphasis.

4.1 Inventory

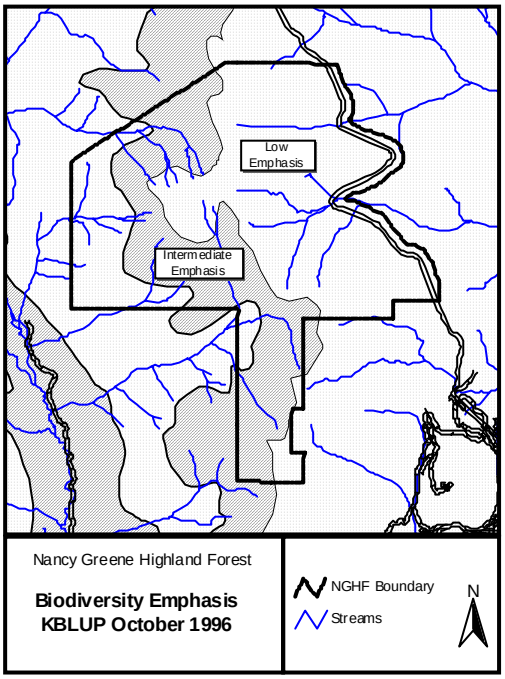
Fisheries

There are no fish-bearing streams within the plan area. There are populations of rainbow trout inhabiting the lower reaches of tributaries to the Columbia (Murphy Creek) that originate within the NGHF. The culvert under the highway at Murphy Creek acts as a barrier to fish passage due to an 18" drop. BC Hydro confirmed this after they carried out fishery inventories in 1995 constructing weirs adjacent to Highway 3B.

The CORE fisheries map also shows Class 1 streams in the Sheep and Little Sheep rivers.

Wide ranging Carnivores

There is a low-density transient population of cougar, grizzly bear, coyote, bobcat, wolverine and possibly wolf in the NGFH. Black bear are present year-round in the NGHF.



Map 5 Biodiversity Emphasis

Ungulates

The NGHF is summer and fall habitat for white-tailed and mule deer, elk and occasionally moose. A herd of mule deer are permanently located near Esling Creek on the west side of Record Ridge. A herd of mountain goats is also believed to summer on the west slopes of Old Glory. *(Nancy Greene Recreation Area Master Plan, 1986).*

Small Fur Bearers

Fur-bearing mammals residing in the NGHF include pine marten, fox, lynx, ground squirrels, marmots, raccoons, pikas, rabbits and hares. A colony of marmots is reported on the upper ridge near Old Glory.

Wildcrafting

Commercial use of botanical products originating within the NGHF is limited to cone collection for nursery seedlings and small-scale gathering of edible mushrooms and huckleberries *(Vaccinium membranaceum).*

4.2 Objectives for Biodiversity

The management of biological diversity in all its forms is one of the important objectives of resource management in the NGHF. Objectives and strategies have to be identified at the landscape and stand levels.

4.2.1 Landscape and BEC Subzone Level

The NGHF consists of mid to high elevation forest types including the ICHmw2 (Interior Cedar-Hemlock), ESSFwc4 (Engelmann Spruce-Subalpine Fir) and AT (Alpine Tundra) biogeoclimatic subzones (BEC subzones).

The Forest Practices Code Biodiversity Guidebook classifies the BEC subzones into five Natural Disturbance Types (NDT). The underlying principle is that

> *"The more managed forests resemble the forests that were established from natural disturbances, the greater the probability that all native species and ecological processes will be maintained."*

The guidebook classifies the ICH and ESSF subzones as NDT 2 (Ecosystems with Infrequent Stand-Initiating Events , 250 years.) while the AT (Alpine Tundra and Subalpine Parkland) subzone is NDT 5.

Only about 20 % of the NGHF is considered operable timber, and this area lies within the ICH and ESSF zones (NDT2). Management for biodiversity within the NGHF will conform to higher level plans resulting from the landscape planning process for the Blueberry, Sheep and Rossland landscape units.

Table 3 Seral Requirements by Landscape Unit & BEC Subzone

Landscape Unit NDT 2	Biogeoclimatic Subzone	Biodiversity Emphasis	Mature & Old Requirement*	Old Requirement
Sheep	ESSF	Intermediate	28 %	9 %
Blueberry & Rossland	ICHmw2	Low	15 %	9 %
"	ESSF	Low	15 %	9 %

* These requirements by Landscape Unit are guidelines only.

The biodiversity guidebook recommends the above percentages of mature and old forest be maintained within the landscape unit and BEC subzones.

The KBLUP has determined that old growth seral requirements in LU's with a low biodiversity emphasis do not have to be met immediately. According to the guidelines it can be met in up to three rotations (200 to 350 years). Due to past fire history and harvesting most of the old growth has been removed and existing percentages of old growth to total forest are low. The old growth will be recruited from the immature and mature forest through time

The Alpine Tundra portion of the NGHF is classified as NDT 5. As this zone is beyond the range of operable timber, it generally will not be subject to alteration by harvesting. The AT zone within the NGHF is slowly recovering from turn-of-the-century wildfires, and wildfires should be suppressed to avoid delaying the recovery process.

4.2.2 Species and Stand Level

The Biodiversity Guidebook also prescribes within block wildlife tree patches (*BGB Table 20 A & B*). These patches provide refuges and cover for plants and animals. The percentage of forest to be left in and around a cutblock depends on how much of the landscape unit has been and could be harvested. The greater the impact of harvesting within the landscape unit the higher the percentage of wildlife tree retention. The targets for the Blueberry, Sheep & Rossland LU's is 3% - 10% depending on the BEC subzone.

Although the Community Watershed Guidelines will provide protection to fisheries located outside the NGHF it is still worth mentioning the need to protect this resource.

Management should seek to maintain present populations of ungulates and wide ranging carnivores. Goats, deer, moose, elk, bears, cougars, coyotes, and other large nomadic mammals are able to utilize managed forests, particularly those bordering unmanaged subalpine areas as in the NGHF.

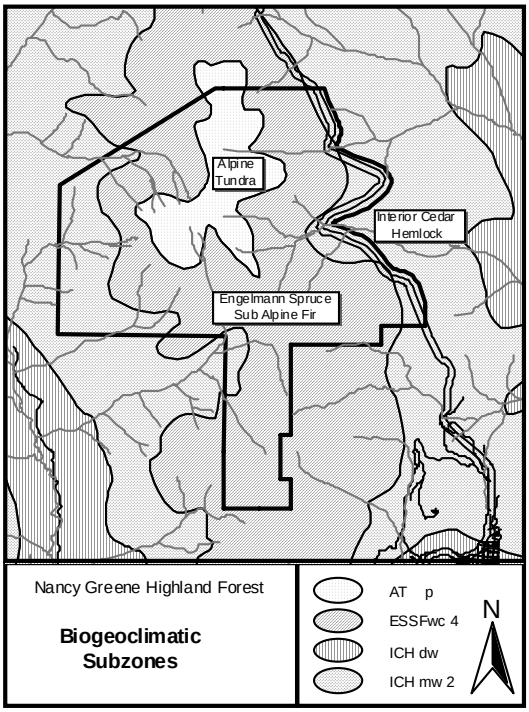
4.3 Strategies for Biodiversity

4.3.1 Landscape Level

The FPC Biodiversity Guidebook recommends "where natural landscapes have been administratively divided, management agencies and licensees should develop a biodiversity plan together." The NGHF is in such a position since it straddles the height-of-land between the Big Sheep Creek watershed, most of which is administered by the MOF under the Small Business Forest Enterprise Program; and several tributaries within the Columbia River watershed, which are within the Forest License held by Atco Lumber Co.

The MOF will coordinate landscape planning with other tenure-holders in each Landscape Unit. This will involve rationalizing the attributes of biodiversity at the Landscape Unit level, such as: seral stage distribution; temporal and spatial distribution of the cut and leave areas; old seral stage retention and representativeness; landscape connectivity; species composition and stand structure

The Alpine zone contains what is locally known as the “Silver Forest”, a stand of remnant snags which is considered to be an important element of biodiversity in this area. The snags are home to cavity-nesting birds and is important to the regeneration process, therefore, damaging or removing these snags for firewood should not be permitted in the NGHF.



Map 6 BEC Subzones

The land use objectives for this area do not preclude cattle grazing in the NGHF but grazing would seriously conflict with recreational and watershed uses in the NGHF, and should not be permitted.

Forest management plans should follow the recommendations in the Biodiversity Guidebook for seral stage distribution, within block wildlife tree retention and patch size.

4.3.2 Species/Stand Level Strategies

Stand-level biodiversity is most effectively maintained through the accommodation of biodiversity attributes during the development of Silviculture Prescriptions. All SP’s and Stand Management Prescriptions must include a strategy to maintain or enhance biodiversity at the stand level.

Fisheries

Measures designed to protect community water sources will also protect downstream fish habitat. Riparian Management Zones and limitations on the amount of non-greened up forest (equivalent clearcut area) are intended to ensure stream channel integrity and minimize sedimentation. However, water diversion from these creeks for community use has the potential to itself endanger fish populations lower down if adequate streamflows are not maintained. BC Environment biologists will review applications for water diversion prior to granting permits.

Wide Ranging Carnivores

Logging slash can create habitat for small mammals which in turn provide food for carnivores, including raptors such as hawks and great horned owls, which inhabit the NGHF.

Note that even if sufficient habitat features are maintained across the landscape, the greatest impact on these animals is human presence which, in the NGHF, is most commonly due to recreational use.

Ungulates

Mountain goats are sensitive to human presence but are not usually affected by logging as they tend to inhabit more rugged, rocky areas of inoperable forest, such as the west slopes of Old Glory. The western half of the NGHF should remain unroaded to discourage motorized recreation and minimize disturbance to resident mountain goats.

Small Fur Bearers

Provision of habitat for naturally fluctuating populations of small mammals will primarily be acheived through landscape level biodiversity management. Stand level management will be based on site specific assessments and include the use of wildlife tree patches, snag retention and creation of brush piles where appropriate.

Wildcrafting

Normal forest management practices are likely sufficient to maintain existing and potential wildcrafting opportunities.

5. RECREATION

The nature and quality of recreation attractions in the Nancy Greene Highland Forest have more of a regional than provincial importance. Most visitors currently come from the regional population base of the West Kootenays. The area offers opportunities for ski touring, hiking, snowshoeing, hunting, horseback riding, ridge walking, viewing, photography, snowboarding, birdwatching and berry picking.

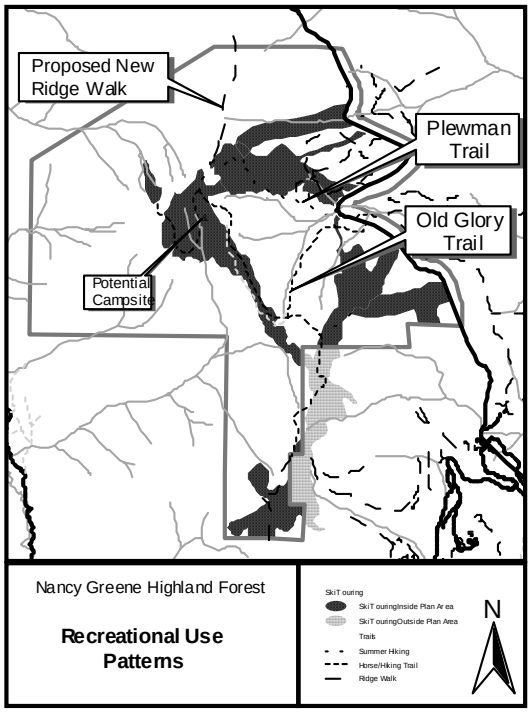
Due to steep and rugged terrain, much of the area is not suitable for motorised activities. The existing recreational use of the area may be considered to be incompatible with motorised activities except for the established road systems north of Hanna Creek. It is expected that these recreational trends will follow much the same pattern into the future. (See Map 7 Recreational Use Patterns).

Skiing and hiking commercial back-country opportunities exist in the area but to this point no operations have been undertaken.

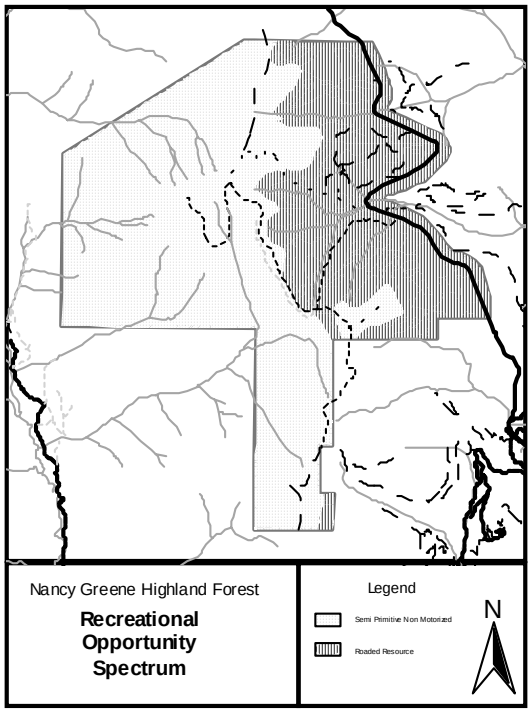
5.1 Forest Practices Code References

- Recreation values management
- Trail and Recreation Facility
- Wilderness and Backcountry Management (Draft)
- Cave Management (Draft)

5.2 Inventory of Recreation Resource



Map 7 Recreational Use Patterns



Map 8 Recreational Opportunity Spectrum

The present recreation inventory classifies the western portion of the Nancy Greene Highland Forest as semi-primitive, non-motorised and the eastern portion as roaded resource land (see Map 8).

Within the semi-primitive, non-motorised area, a natural appearing environment is present with some evidence of people, non-motorised access with travel routes such as trails or cross-country routes.

Signing, as well as facilities for sanitary and safety needs, may be present, but minimal site modification would be expected. The opportunity exists to experience a reasonable degree of isolation from the sites and sounds of motorised activity in a natural appearing setting.

The roaded resource lands environment may be substantially modified as there may be a presence of motorised vehicles, as well, there are roads previously used for timber extraction.

Recreation Project number 16660-20/2434 is presently assigned to the existing trail network from Highway 3B to Old Glory Mountain.

Presently, there are no commercial recreation permits within the NGHF although Red Mountain Resorts Ltd. operates just south of the NGHF. There is some potential for commercial recreation expansion into the NGHF in the future, particularly in the Hanna Creek area.

5.3 Objectives of Recreation Resource Management

- To manage and maintain the integrity of the recreation features and facilities.
- To maintain a visual landscape, recreation features and activities inventory.
- To ensure compatibility of recreational activities and provide a range of recreation opportunities.
- To maintain the character of the Semi Primitive Non Motorised area and to provide opportunities for dispersed non motorised recreation.

5.4 Strategies for Recreation Resource Management

Proposals to allocate crown land for commercial backcountry purposes will be referred to affected government agencies and resource interest groups. Proposals will be evaluated with consideration being given to a full range of issues, concerns and public processes.

- Map notate Ministry of Forests recreation sites and trails in order to facilitate the management of the recreation resource and facilitate public recreation.
- Assess demand for and potential location for a recreation site in the vicinity of Old Glory Mountain.
- Manage the existing trail network for non-motorized recreational activities through access management planning. Consultation with a wide range of user groups will be imperative throughout this process.
- Schedule harvesting outside of peak recreational use times.
- Consider glade skiing opportunities when designing cutblocks.
- Place trail signage at trail head, trail junctions and locations where protection of natural biodiversity or silviculture investments are a priority.
- Assess demand for vehicle parking adjacent to highway 3B.
- Produce a hiking trail map

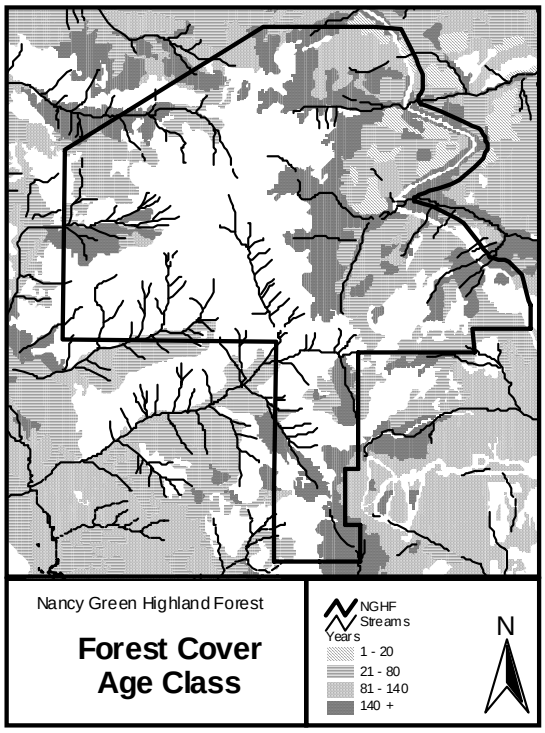
Lessen impacts on hiking trails during harvesting. Actions may include one or more of the following :

- Maintain a 30m wide machine free buffer each side of the trail tread.
- Harvest only one side of the trail during 1st pass harvesting.
- Partial cut 30m wide each side of the trail tread.
- Directional fall trees away from the trail.
- Yard away from the trail.
- Remove all slash and debris from the trail right-of-way.
- Re-establish trail tread where damaged.
- Provide trail signage at the cut block boundary.
- Ensure all landings are set back a minimum of 100m from the trail tread.
- Construct roads at right angles to the trail tread where they cross.
- Re-establish the trail tread on road cut and fill slopes after road construction.
- Re-establish trail tread on a new location if displaced by roads.

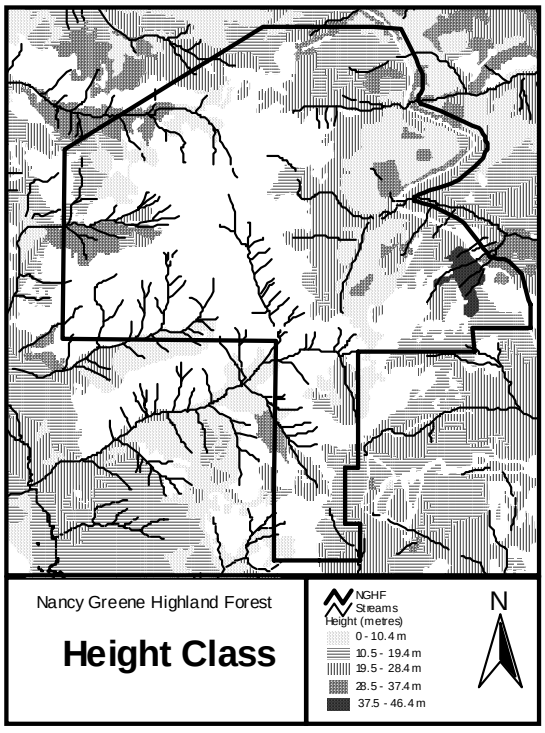
6. TIMBER & SILVICULTURE

The NGHF will contribute to the Annual Allowable Cut of Arrow Timber Supply Area. The AAC for the TSA is set by the Chief Forester based on social objectives determined by the provincial government, public input and a variety of technical and socio-economic studies. Ultimately though, the rate and method of harvest will reflect the regional land use plans, the Forest Practices Code and the many resource objectives recorded throughout the district.

Harvesting within the provincial forest is licensed and monitored by the MoF through a number of different tenures including Woodlot License, Timber Sale License under the SBFEP, Forest License, or Tree Farm Licenses. The form of tenure to be applied in the NGHF will be decided by the Arrow Forest District Manager considering input from the public and advice from within the provincial government.



Map 9 FC Age Class



Map 10 FC Height Class

Regardless of the form of tenure or the licensee, the location and details of each harvest unit must be recorded on a Forest Development Plan as governed by the FPC Act (Sec. 18) and the Operational Planning Regulation (Part 3). Forest Development Plans are usually prepared annually and cover 5 years of proposed harvesting activities. These are available for public review prior to approval. The NGHF planning committee would be given the opportunity to comment on the treatment units and consider recommendations to prevent or mitigate problems.

In the case of a Forest Licensee managed area, the planners with the licensee identify candidate stands and options to access them. Depending on the location and the sensitivity of resources being managed in the area, a number of studies may be undertaken such as terrain hazard assessment, archaeological impact assessments and so on. A Silviculture Prescription (SP) is prepared by the planners to account for local site conditions and landscape unit objectives. The purpose of the SP is to clearly specify the location of the cutblock, when it will be harvested, and what harvest system will be used. One of the more important purposes of the SP is to state what measures will be required to successfully re-establish another crop of trees. (See *Silviculture Systems* for more information.)

The SP is reviewed by technicians and foresters in the district office to determine whether all legal and forest management objectives have been met before it is approved.

6.1 Inventory of the Timber Resource

Table 4 NGHF Provincial Forest Areas

Land Type	Area (ha)	Percent
Non-Forest	2477	52 %
Inoperable Forest	394	8 %
Environmentally Sensitive Areas, etc.	965	20 %
Net Operable, Productive Forest	959	20 %
Provincial Forest	4 795	100 %

Of the 4795 ha. in the NGHF only about half is forest with the rest being rock and other non-productive forest types. The bulk of the forested area is concentrated in the north-east section of the NGHF. Due to steep slopes, uneconomic and environmentally sensitive areas a mere 20% or 1000 ha. can be considered operable, productive forest land.

Table 5 Volume by Species and Merchantability

SPECIES	**Net Mature (m3)**	**Gross All Ages (m3)**	**Minimum Harvesting Age** (approx.)	**Minimum Harvesting Age** (approx.)
			Good Site	Medium/Poor
Balsam	35 760	159 446	100	140
Spruce	22 455	69 476	100	140
Cedar	19 045	22 989	90	130
Hemlock	11 904	15 513	90	130
White Pine	2 476	4 656	70	90
Douglas Fir	792	11 471	80	120
Larch	584	22 812	80	120
Aspen	3	1 119	N/A	N/A
Lodgepole Pine	0	25 638	70	90
Birch	0	141	N/A	N/A
Total	93 019	333 261		

The tree species in the NGHF are predominately sub alpine fir, Engelmann Spruce, western red cedar and western hemlock. Smaller amounts of white pine, lodgepole pine, Douglas fir, western larch, aspen and birch are interspersed within these stands.

The distribution of age classes by area, in the NGHF, is relatively well balanced with peaks in the young, mature and old ages. The original forest was probably left undisturbed for 200 - 300 hundred years.

At the turn of the century resource exploration and development resulted in fires and logging which accounts for the peak in the mature ages. A number of areas were logged or burned between 1938 and 1988. Up to about the late 1970's blocks were left for natural regeneration with more recent ones being spot or broadcast burned followed by planting. Due to colder soil and air temperatures, growth of the regenerated forest is slower at higher elevations.

Table 6 NGHF Age Class Distribution (Entire Forest).

Age Class	Age Years	Net Area (ha)	Net Area (%)	Gross Area (ha)
	Non-forest & Age 0	0	0	2,452
1	1- 20	72	8%	72
2	21-40	270	28%	438
3	41-60	50	5%	157
4	61-80	163	17%	627
5	81-100	101	11%	138
6	101-120	19	2%	25
7	121-140	50	5%	116
8	140-250	231	25%	767
9	251+	3	0	3
	Sub Total	**959**	**100%**	**2 343**
	Total	**959**		**4 795**

A few blocks were manually brushed in 1994 by girdling non crop trees. A number of silvicultural surveys have been done on the area even though it was outside the Provincial Forest at the time. More survey work will be done to assess the stocking of these openings to determine what work will be required to meet legislated requirements.

Table 7 Area by Site

Site Class	Net Area (hectares)	Net Mean Annual Increment (m3/year)	Gross Area (ha)	Gross Mean Annual Increment (m3/year)	Average Net MAI (m3/ha/yr)
Good	273	814	381	1 080	2.98
Medium	525	1 131	1 118	2 375	2.15
Poor	156	289	626	872	1.85
Low	0	0	279	107	
not determ.	4	0	0		
Total	**958**	**2 234**	**2 404**	**4 434**	

Table 8 Volume by Species and Age

SPECIES	**Net Mature (m3)**	**Gross All Ages (m3)**	**Minimum Harvesting Age** (approx.)	**Minimum Harvesting Age** (approx.)
			Good Site	Medium/Poor
Balsam	35 760	159 446	100	140
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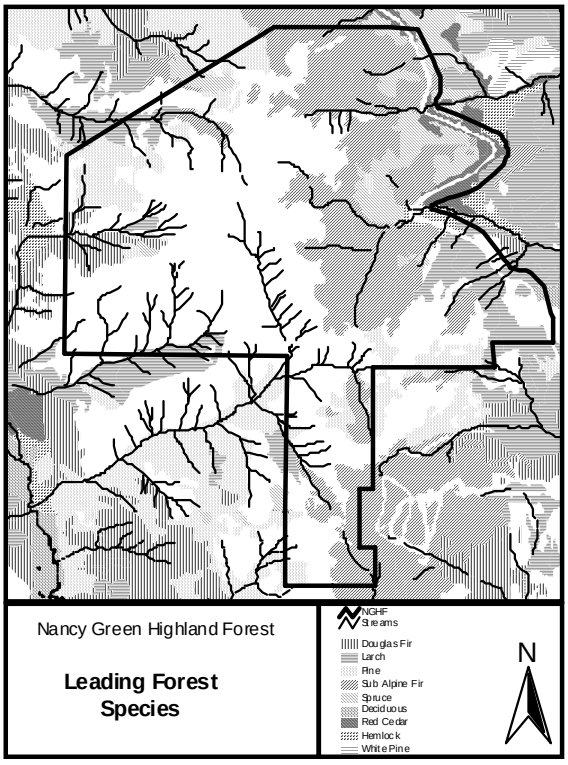
Total	93 019	333 261		



Map 11 FC Leading Species

6.2 Silviculture Systems

A silviculture system is a planned program of silvicultural treatments throughout the life of a stand, to achieve stand structural objectives based on the resource management goals for the area. A silviculture system includes harvesting, regeneration and stand tending phases. It covers all activities for the entire length of a rotation or cutting cycle.

The silviculture systems employed on this operating area will be even-aged systems to match the natural disturbance pattern of the area. Even-aged silviculture systems include the general categories of clearcut, patch cut, seed tree, and some shelterwood silviculture systems. Selection harvesting will not be considered unless the associated regeneration and brush management issues can be resolved.

The recreation emphasis of the operating area will require predominantly patch cutting systems due to the visual constraints. Shelterwood systems will be used in all areas when necessary to address forest health concerns. Mountain Pine Beetle infestations may be controlled with a shelterwood or patch cut system when it is not desirable to harvest the other species on site at the same time.

6.2.1 Stand Structure Goals

The operating area will be managed for even aged stands of mixed coniferous species to produce sawlogs. A minor component of deciduous species will be acceptable for biodiversity and forest health. The minimum harvest ages in Table 8 can be considered to be the rotation ages for these stands. These ages are district averages and are not hard and fast rules.

6.2.2 Opening size

A clustered harvest pattern, using small to large aggregated harvest units, most closely simulates the natural pattern of fires and large unburned areas. It also results in less fragmentation of the landscape. Retention of patches of forest or single trees within aggregated harvest units simulates the island remnants left within burned areas. These remnants are vital to maintain biological diversity, especially when large cuts are used. This will result in greater structural diversity in order for stands to resemble natural forest.

A harvest strategy such as this provides numerous ecological benefits. Concentrating harvest activity in one area allows other large areas of older forest to be left intact and unfragmented for extended periods.

Table 9 Harvest Unit Size and Distribution BGB

Patch Size	% Forested area within landscape unit
<40 ha	30 - 40
40 - 80 ha	30 - 40
80 - 250	20 - 40

As well, the combination of seral stage distribution on harvest unit size recommendations are designed to ensure that some large, unfragmented mature forests are always present on the landscape. Harvest units and the remaining mature forest stands within the operable forest should be distributed in the landscape unit as noted above.

These percentages are applied at the landscape unit level. In the case of the NGHF, the emphasis on water flow and visuals will require a higher percentage of smaller blocks within the NGHF portions of the landscape units.

6.2.3 Regeneration

Preferred species are ecologically suited to the site. Management activities are primarily aimed at establishing these species. The characteristics of these species are consistent with the desired timber and non-timber objectives for the site. Only preferred species will be planted. Acceptable species are ecologically suited to the site, but management activities are not aimed at establishing them. The reasons for including a species in this category may be a higher than acceptable site limitation, such as a pest risk, or a lower productivity than preferred species. Special restrictions or limitations will often apply to these species. For example deciduous stocking will be limited to two hundred stems per hectare within this operating area.

Preferred and acceptable species may be selected from the primary, secondary, or tertiary categories listed in the Tree Species Selection and Free Growing Stocking Standards Guidelines for the Nelson Forest Region.

Before any harvesting is undertaken the licensee must complete a Silviculture Prescription (SP). The SP is a legal document which contains all the information related to the harvesting and regeneration of a block. It clearly specifies the methods and target conditions that must be met by the licensee before the licensee can be cleared of obligations once the block has been successfully regenerated in ten or fifteen years.

6.2.4 Brushing

The potential for brush competition to reduce the growth rate of the regenerated stand will be assessed and anticipated treatments prescribed in each silviculture prescription. Table 10 shows the common vegetation complexes that can be expected after harvesting. Brushing treatments will be done before the regeneration becomes suppressed and will be continued as required until the stand is free growing.

Table 10 Expected Brush

Subzone	Site Series	Vegetation Potential	Common Complexes
ICH mw2	02	low	dry shrub
ICH mw2	03	medium	dry shrub, fireweed
ICH mw2	04	low	fireweed, mixed shrub
ICH mw2	01,05,07	medium	fireweed, mixed shrub, seed banking species will be prolific after fire
ICH mw2	06, 08	high	mixed shrub, fern
ICH mw2	09	medium	sedges
ESSF wc1	02, 03	low	ericaceous shrub, fireweed
ESSF wc1	01, 04, 05	medium	ericaceous shrub, fireweed

(Newton, & Comeau, 1990)

6.2.5 Stand Tending

Stand tending assessments will be conducted on every stand when the free growing survey is done. Stands that are selected for treatment will have a Stand Management Prescription prepared that describes actions to be carried out to:

- Ensure that stand management activities are planned and implemented to maintain or enhance the inherent productivity of the site.
- Ensure that treatments identify and accommodate the resource objectives of this plan.

It is expected that all good and medium sites in the ICH mw2 will be evaluated for juvenile spacing.

6.2.6 Free Growing

A regenerated stand will be declared free growing when a survey shows that at least the minimum number of healthy, undamaged, well spaced preferred and acceptable trees are present that meet the minimum age and size standard relative to competing vegetation. If the density of the stand exceed 5000 stems per hectare the stand will be spaced down to the regeneration target number before declaring the stand free growing.

6.2.7 Commercial Thinning

Commercial thinning opportunity will be considered in all prescriptions for second growth stands that are on good sites with less than thirty percent slope. The prescription will ensure that the target stand structure is appropriate for commercial thinning.

6.3 Objectives of Timber Resource Management

- To maintain the forest stands in the NGHF in a condition that will continue to provide the integrated functions as follows: hydrological values, visual quality, recreational, biodiversity, timber supply, wildlife habitat and social values.
- To maintain the NGHF as a source of wood products to achieve the varied goals of the Arrow Forest District.
- To maintain obligations by the Arrow Forest District to plan and coordinate all forest management and development activities.

6.4 Timber Resource Management Strategies

General

- Maintain the independence of the MOF to operate within procedures, administration, and personnel that are established both at the provincial level and at the Arrow Forest District.
- Strive to maintain the following schedule for a Forest or Timber Sale License as it progresses through the Forest Development Plan. Nb. Fiber flow issues may preempt this schedule. Timber in imminent danger of destruction or damage (pests etc. can be harvested in as little as 5 days. The licensee must advertise the proposed harvesting for a sixty day period in the provincial gazette and the local paper).
    - Year 5 --- Show on plan
      Year 4 --- Review by the NGHF Planning Committee.
      Year 3 --- Layout of harvest unit and road.
      Year 2 --- Build road
      Year 1 --- Approve and sign Cutting permit or award TSL
- Hold an annual meeting on or about November of each year with the licensee in attendance. The meeting agenda is to exchange ideas toward producing the development plan the following year.
- Clearcut and seed tree prescriptions cannot exceed 40 ha. in size (this includes any non-greened up area adjacent to the block). This size can be increased if the blocks incorporate characteristics of natural disturbances and serve an objective in meeting biodiversity requirements. Characteristics that must be incorporated are irregular edges, and green tree retention or forested patches, and may include wildlife trees and coarse woody debris.
- Harvest patterns and cutblock design will reflect a balance of biological, social, and economic objectives.
- All appropriate guidelines in FPC Regulations and guidebooks will be adhered to.

Reforestation

- The Silviculture Prescription will outline species preference for management in addition to documenting the free growing stocking standards.
- The Silviculture Prescription will outline expected regeneration delays. In general, the objective will be to restock planted sites immediately after harvest.
- As per legislative requirements, harvested sites must be reforested to the "free growing" stage.
- Utilized mixed-species planting where practical.
- Decisions regarding reforestation by natural or planting methods will favour planting if there is any doubt as to excessive regeneration delay by natural methods.

7. MINING

Minerals are a hidden resource that provide considerable benefit to the economy with relatively low environmental consequence. The total area in BC disturbed through mining is one tenth of one percent (0.1 %). At the same time a good mine will generate as much income on per hectare basis as 75,000 years of forest management. Some of the past mining activity has affected the landscape negatively due to incomplete reclamation of old spoil piles, slag heaps or improper road construction. Current mining laws ensure that these practices are not repeated.

7.1 Objectives

The Kootenay-Boundary Land-Use Plan (KBLUP) states that for the Rossland -Trail area :

> *"Opportunities for minerals resource tenure acquisition, exploration and potential development are available throughout the unit, excepting those areas reserved from activity through no staking reserves or conditional reserves."*

It goes on to say that

> *"(The KBLUP should) promote the awareness among resource managers and users and the public respecting the acceptability of minerals exploration, development and mining throughout the unit... ensuring that sensitive values are respected."*

There are no caveats against mining in the NGHF in the KBLUP so it can be assumed that energy and mineral activities could proceed if there were any discoveries.

7.2 Inventory

There is little indication of mineralization in the NGHF, consequently mining activity is unlikely. Nevertheless the old saying *'The best place to find a mine is close to an existing one'* gives room for optimism in some people's minds.

The geology in the Rossland area represents an interface between two contrasting bedrock types: one a very hard batholithic salt & pepper granite (Nelson or *Coryell Batholith*) and the other, a softer rapidly cooled volcanic rock. (Rossland Volcanics or *Marron Formation*). The significant showings at the Leroy mine in Rossland are an example of the potential of interface areas like this to provide rich seams of ore. There were some expectations that the mineralization would extend further north into the NGHF but no one has been able to find anything yet.

The National Mineral Inventory from the federal Geological Survey Branch shows three sites located in the NGHF with the following minerals reported.

Mineral	Comments
Tungsten	China is producing a lot of tungsten which has lowered the price to the point of making all but the richest deposits uneconomical.
Molybendite	Similar to tungsten requiring an exceptional find.
Wollastonite	A calcium silicate rock used in place of limestone and silica in the reduction or smelting of ore. Demand for this kind of material is dropping because of new technology using bacterial and/or electrical reduction methods. A new demand for Wollastonite is in fine paper production to give paper a smooth finish.
Uranium	A big showing or uranium anomaly was discovered on Record Ridge near the Constantine cabin during a ground based geophysical survey, but this is outside the NGHF.
Scheelite	

Prospecting

Generally prospectors are freelance operators who undertake the exploration for minerals. They use a variety of techniques including hand digging or trenching; geomagnetic surveys, sound wave attenuation surveys and geochemical analysis of soil or water samples. Prospecting follows logging into newly opened areas to take advantage of side cuts on roads and landings. Exploration in early days was done with trenching, short shafts and addits (horizontal shafts). Once a likely showing is discovered, the prospector will sell the claim to mining companies. Mining companies will carry out drilling or construction of mine shafts to prove out interesting showings.

A Notice of Work must be submitted by prospectors and mining companies to Ministry of Employment and Investment, Mines Division who in turn will refer it to the resource agencies if warranted. (MOF, MOE, Lands & Parks). The Notice will detail development plans for the project which varies from collecting small bags of soil to road construction and digging of drilling rig sump pits. The operations on the bigger projects are usually inspected by resource agency staff during all phases of the project, particularly if it takes place in community or domestic watersheds.

Mine Development

Mine development must follow all the applicable regulations and guidelines in the Forest Practices Code. The most relevant guidelines pertain to community watersheds, soil conservation and roads.

There isn't much likelihood of an open pit mine or milling facility being developed in the NGHF. Consequently, the chances of mining impacting water supplies in the NGHF are low. Also, the non-porous nature of the batholithic bedrock implies that the disruption of sub-surface drainage isn't likely either. Past experience has shown that the leaching of toxic minerals from mines and waste piles into ground water systems in the area hasn't been a problem. Samples taken from water accumulated in the Leroy workings above Rossland since the time of abandonment in the early part of the century revealed that the water stays as pure as water samples taken from Trail's water supply. In other words there is very little contamination of the ground water from the local rock types.

8. FOREST HEALTH

The Nancy Greene Highland Forest is characterised by the chronic pest problems associated with aging natural stands where fire has been excluded. Increasing levels of root disease, bark beetle, dwarf mistletoe and white pine blister rust are evident. There are generally two main categories of damaging agents which have significant potential in causing serious damage on the forest resources: bark beetles and root diseases. The following is a review of the known current pest problems (most of these pests are very dynamic and there status may change annually):

8.1 INVENTORY

8.1.1 Bark Beetles:

- Mountain Pine Beetle, *Dendroctonus ponderosae*:
- Balsam Bark Beetle, *Dryocoetes confusus*:
- Red Turpentine Beetle, *Dendroctonus valens*:
- Spruce Bark Beetle, *Dendroctonus rufipennis*: NB. Not very much at the present time but was a problem in the past (Neptune Creek)
- Ips Species - associated with Blackstain Root Disease. (secondary insect)

8.1.2 Root Diseases:

- ***Armillaria ostoyae*:** Stands which are under this stress appear to have allowed successful attacks of mountain pine beetle and Douglas fir bark beetle.
- ***Inonotus tomentosus***: This root disease is occurring in higher elevation spruce-fir stands in the ESSF biogeoclimatic zone.
- ***Rhizina undulata*:** Occurs in recently burned blocks
- ***Leptographium wageneri*** - Black Stain root disease. - very prevalent in certain Pine stands causing substantial mortality. Can be controlled through conventional harvesting practices since it is an obligate parasite.

8.1.3 Others:

- Spruce (White Pine) weevil, *Pissodes strobi:* Causing deformed (multiple leaders) in spruce regeneration (natural and planted).
- White Pine Blister Rust, *Cronartium ribicola*: Infections by this introduced disease continue to intensify annually.
- Larch dwarf mistletoe, *Arceuthobium laricis*: Infections by this parasitic plant are common throughout the host range. This disease causes vigour, growth and quality loss and sometimes tree mortality. Can also infect lodgepole pine.
- Needle Diseases: Fungal infection and foliage discoloration of western larch by needle blight, *Hypodermella laricis*, and lodgepole pine by needle cast, *Lophodermella concolor*.
- Blowdown: Blowdown originates from a heavy snow fall combined with high wind events on a 2 to 5 year frequency period. Blowdown has the potential to worsen any bark beetle problems.

8.2 Forest Health Management Objectives and Strategies

- Reduce damage and losses attributed to forest health agents to levels that are economically and socially acceptable.
- Ensure that damaging agents do not impede silviculture obligations or investments.
- Prevent the build-up of forest health agents before they cause unacceptable levels of losses or damage.

Arrow Forest District Forest Health officer in conjunction with the NGHF and forest licensee will manage forest health issues in conjunction with the identified resources in the plan, the requirements of the Forest Act and the Forest Practices Code.

9. TERRAIN, LANDFORMS, SOIL & ROADS

9.1 FPC References

- FPC Act (The Forest Practices Code of British Columbia Act)
- Operational Planning Regulations
- Timber Harvesting Practices Regulation
- Silviculture Practices Regulation
- Forest Road Regulation
- Forest Road Use Regulation

9.2 Inventory

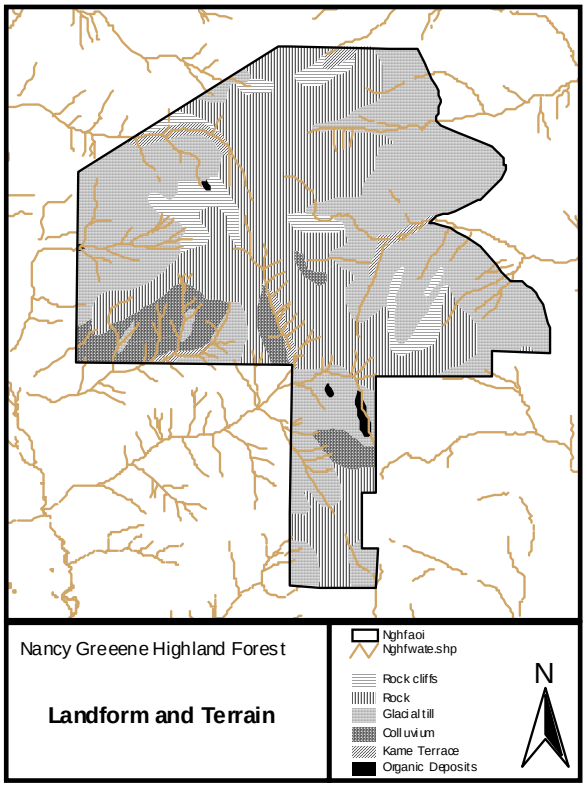
Interpretative Landform Terrain Map

Upper most elevations of the Nancy Greene Highland Forest area are characterized by sparsely vegetated, moderately to gently sloping bedrock ridges. North and east facing slopes of the ridges are typically defined by steep bedrock cliffs which have thick blankets of colluvium (talus) deposited at their bases.

Till, deposited beneath glacial ice during the last glaciation (approx. 10,000 y.b.p.) covers the bedrock as thin veneers (<1m) and, in places, thick (1m+) blankets at the mid and lower elevations of the map area.

Deposits of ice contact glaciofluvial kame are found in a number of the valley bottoms in the northern portion of the map area. These deposits are comprised primarily of locally stratified to unsorted and unconsolidated sands, gravels and cobbles.

Sub-alpine bogs formed through the accumulation of organic material occur at three locations in the map area. These bogs typically occupy depression formed beneath cirque glaciers after the ice melted.



Map 12 Landform & Terrain

Terrain Stability

In general areas underlain by till should be considered sensitive to forest development when slope gradients exceed 50% or when the slopes are gullied.

Slopes underlain by gullied till are common on the east-facing hillsides above Highway 3B.

Kame terrace deposits, regardless of the gradient of the slope should be considered sensitive due to their unconsolidated nature. One area of bedrock instability was noted immediately north of the ski lift on Granite Mountain - this is outside of the NGHF area.

A number of snow avalanche tracks occur in the map area. These should be considered for their potential impacts on forest development.

9.3 Objectives

- To identify management strategies to preserve the landform characteristics

throughout the NGHF area.

- To reduce the overall area of required roads in NGHF through Total Chance Planning, deactivation planning, and minimizing road widths wherever possible.
- To develop silviculture prescriptions that outline the methods used to maintain long-term forest soil productivity and to keep the amount of site disturbance to a minimum level.
- To minimize the impact of roads on water quality through careful monitoring both during and after construction, and good road maintenance.
- To minimize environmental impact and loss of productive sites due to roads.

9.4 Management Strategies

General

- Where, because of adverse field conditions (such as high rainfall or excessively wet soils), forest practices are causing, or may imminently cause, soil or other environmental damage, those forest practices must stop and appropriate temporary measures must be taken. Forest practices may resume only when the conditions that are causing or could cause the damage are no longer present.
- Areas identified as having unstable soils will receive special consideration. i.e. Clear cutting and road building may be restricted. Alternate silvicultural systems may be required on sensitive soils.
- The Soil Conservation Guidebook will be adhered to. The Site Preparation Guidebook, Harvesting Strategies Guidebook, and the Field Guide Insert "Guidelines for Site Preparation Strategies for Minimizing Site Disturbance" will be used as minimum benchmarks in limiting soil degradation. Any site with a Very High sensitivity rating will be referred to the Forest Service Regional Pedologist, as per Regional guidelines.
- All Silviculture Prescriptions will include assessment of soil sensitivity.
- A terrain field assessment will be carried out for planned road locations and permits where the detailed mapping indicates a terrain stability rating of H or VH (Class 1V or V).
- Diversion of natural drainage channels, perennial or intermittent, must be avoided.
- Soil disturbance rehabilitation measures will be identified in Silviculture Prescriptions and will be taken where necessary.

Skid Roads and Trails

- All excavated trails (cut to a depth of >.73m into mineral soil, and >1.5m in width) must be constructed with an excavator in a manner to facilitate retrieval. All excavated trails must be fully rehabilitated in accordance with the "Soil Conservation Guidelines for Timber Harvesting-Interior B. C." (1993) including installation of sub-surface waterbars as required.
- Skidding patterns in draws may be perpendicular to the draw thus minimizing the side cut. Water barring of all skid trails and grass seeding of any disturbed area will be required.
- Random skidding shall be avoided unless optimal soil conditions and structure exist. Non-random skid roads or trails shall be prelocated prior to harvest. This is of particular importance for silvicultural systems requiring multiple entries into the stand.

Landings

- Landings will be seeded with a suitable grass and legume mix within one season.
- Landings will be pre-located, preferably on stable, low productivity sites.
- Landings will be kept as small as operationally feasible. Maximum areas for landings are specified in the Soil Conservation Guidebook.
- For small cutblocks (less than or equal to 4 ha.), landings will be located strategically, so that they can be used for future adjacent blocks.
- On sensitive sites, skidding will occur on dry or frozen ground, or suitable snow pack. alternately, low-impact yarding systems such as low ground-pressure skidders or cable systems will be used.
- Road-side decking will be encouraged where cable systems are used, to reduce the area in landings.

Slash Disposal and Site Preparation

- An assessment of sensitivity to site preparation must be completed for any area for which prescribed site preparation is recommended.
- Light burning will be considered as an alternative to mechanical site preparation.
- Burning will be avoided for areas with thin organic layers over shallow or coarse soils.
- Machine travel will be minimized by piling only concentrations of slash.

10. SPIRITUAL VALUES

Spiritual values are those values that cannot be physically measured. It is recognised that many people find spiritual value in areas such as the NGHF. This includes a range of values from profound religious experience to a feeling of contentment or well being. While the experience will vary greatly from person to person and from time to time it is most often associated with appreciation of natural beauty, realisation of the interconnectiveness of ecosystems, and with a sense of solitude.

Spiritual values cannot be managed for directly because of their intangible nature. This plan will ensure that biodiversity is maintained and that visual quality is managed so that there are a complete range of settings present to ensure the physical environment is available to allow the spiritual experience to occur.

11. HISTORY OF THE AREA

Amongst other tribal groups the Colville Indians from Washington State made regular trips into the upper slopes of the Nancy Greene Recreation Area to pick huckleberries. Local place names, Squaw Basin, Indian Flats and Papoose Basin - reflect the aboriginal use. There is no known archaeological evidence of Indian habitation or use of the NGHF but various sites have been found at the confluence of the Columbia River and creeks flowing from the NGHF. The KBLUP has identified land claims from the Shuswap and Okanagan First Nations

Significant deposits of workable ore were found in the late 1800's along the south slopes of Red Mountain. This led to major industrial developments at Rossland through to the 1930's. During its years of operation from 1891 to 1928, the Rossland Gold mine produced over six million tons of gold-copper ore. There were also other smaller mines intermittently worked through the early 1900's.

The Forest Service Lookout on Old Glory Mountain, the remains of the meteorological station, related stables and ridge cabin, a plane crash site and the Old Glory trail are other remnants of the area's history which have local significance and interest.

Much of the landscape within the NGHF has been affected or altered by man. The open nature of the ridges and alpine basins is largely attributable to fires. Old mining works are visible throughout much of the southern section while logging that started in the late 1930's in Hanna and Murphy Creeks is still readily visible. Highway 3B was constructed in 1965.

When introduced into the Park Act in the late 1960's, "recreation area" designation was intended to provide for integrated resource management with a priority for recreational values, as distinct from Class 'A' park designation which provides for full protection of all resources. Consistent with these definitions, Nancy Greene Recreation Area was established in 1969 to secure the land base for the local community ski hill and to manage the traditional resource uses - forestry , mineral and watershed - in a manner that would emphasize summer and winter recreational opportunities in adjacent areas.

Until 1988, Nancy Greene Recreation Area was managed by BC Parks to permit the continuation of community water supplies, small-scale mineral exploration and even limited timber harvesting. A policy change in 1988 closed recreation areas to timber harvesting. In 1992, the boundary on Nancy Greene Recreation Area was redefined to exclude large blocks of private land and to place the expanding ski resort solely under the jurisdiction of BC Lands. The size of the recreation area went from approximately 7870 hectares to 4795 hectares.

During the CORE land use planning process for the West Kootenay-Boundary, the public negotiating table was specifically asked to confirm whether the four existing recreation areas in the West Kootenay, including Nancy Greene, should be established as fully protected. Although the table did not record a consensus on the question of Nancy Greene Recreation Area, the focus of the table was heavily toward other protected area candidates in the general area. Consequently, CORE's published October 1994 report recommended that Nancy Greene Recreation Area be included in an integrated management zone. Although the table did not record a consensus on the question of Nancy Greene Recreation Area, most input favored Special status. However, in subsequent government negotiations (which did not involve any representation from Rossland), the government determined that the area would be classified as Integrated. This was indicated in CORE's published October 1994 West Kootenay Boundary Land Use Plan (which inaccurately identified the reclassified area as "East of Nancy Greene Recreation Area".)

The recommendation was therefore confirmed in the government's March 13, 1995 announcement of its decision.

12. APPENDICES

12.1 Terms of Reference for the NGHF Planning Committee

12.1.1 Purpose

The purpose of the Nancy Greene Highland Forest Planning Committee (NGHFPC) is to develop an integrated resource use management plan for the plan area consistent with the Kootenay Boundary Land Use Plan (KBLUP) and the Forest Practices Code (FPC). Notwithstanding the legal requirements, the Nancy Greene Highland Forest is important for the protection of water quality, quantity and timing of flow and the protection and enhancement of recreation, wildlife, timber, mining and other resource values.

12.1.2 Objectives

- To ensure that resource use and development will not pose an unacceptable risk to water supplies in the short or long term.
- To recommend specific resource management objectives for the plan area ensuring compatibility with other resource objectives.
- To review and comment on proposed development and operations plans. (i.e. forest licensee Forest Development Plans, Commercial Recreation proposals, mining exploration and development Notices of Work)
- To consider the views of all resource users and concerned agencies during all Committee deliberations and during the implementation of approved resource activities.
- To keep all concerned parties informed in a timely manner.
- To encourage improvement in the standards of resource use and activities occurring in the Nancy Greene Highland Forest Planning Area

12.1.3 Planning Area

The planning area encompasses that part of the former Nancy Greene Recreation Area as it existed in 1995. (Area : 4 795 ha.)

12.1.4 Representation

The Nancy Greene Highland Forest Planning Committee may consist of representatives from government agencies and resource users having responsibilities for or interests in resource management on public lands within the plan area.

Nancy Greene Highland Forest Planning Committee Representation (Jan. 1997)

Agency / Group	Designate	Alternate
City of Rossland	Dave Butler Box 1203, Rossland, B.C. V0G 1Y0 Vce.:362-3385, Fax: 362-5451	Vince Profili
Environmental Groups	Jerome Cranston Box 694, Rossland, B.C. V0G 1Y0 Vce.: 362-7351, Fax 362-5120	Hanne Heintz 362-7767
Mining	Mike Pistak Box 1305, Rossland, B.C. V0G 1Y0 362-5436	
Trappers	Alan Martin Box 1317, Rossland, B.C. V0G 1Y0 362-5941	
Recreation Groups	Derek Choukalos Box 1143,Rossland, B.C. V0G 1Y0 362-5546 ue017@ciao.trail.bc.ca	
Commercial Recreation	Terry Miller Box 670, Rossland, B.C. V0G 1Y0 362-7384 (H) 362-9656 tmiller@awinc.com	
Rossland Chamber of Commerce	Rosa Jordan Box 1143, Rossland, B.C. V0G 1Y0 362-5546 ue017@ciao.trail.bc.ca	
Forest Service	Peter Lewis Arrow Forest District 845 Columbia Avenue Castlegar, B.C. V1N 1H3 Vce. 365-8641, Fax: 365-8568 pjlewis@mfor01.for.gov.bc.ca	Dave Fitchett Arrow Forest District 845 Columbia Avenue Castlegar, B.C. V1N 1H3 Vce. 365-8600, Fax: 365-8568 dfitchet@mfor01.for.gov.bc.ca
Ministry of Environment	Jo Anne Nassey Water Resource Specialist MOELP 845 Columbia Avenue Castlegar, B.C. V1N 1H3 Vce. 365-8600, Fax: 365-8568 jnassey@mfor01.for.gov.bc.ca	Norbert Kondla Forest Ecosystem Specialist MOELP 845 Columbia Avenue Castlegar, B.C. V1N 1H3 Vce. 365-8600, Fax: 365-8568 rkondla@env.gov.bc.ca

12.1.5 Committee Operations

Function

In accordance with these Terms of Reference, members of the Nancy Greene Highland Forest Planning Committee shall:

- describe the concerns and interests of their agency/group and ensure that they are considered during preparation of the management plan and other committee deliberations;
- review all resource proposals and make recommendations to the appropriate agencies regarding these proposals, data needs or operating standards;
- identify resource management issues and consider solutions and/or remedial measures to mitigate these problems and to make recommendations to the appropriate agencies ;
- conduct field reviews and evaluate activities prior to and as they proceed; and
- keep their respective group members or agencies informed of planning and operational activities.
- Resource management decisions must be consistent with existing legislation, regulations and higher level plans.

Procedure

- The Chairman shall be a member of the Nancy Greene Highland Forest Planning Committee and shall be elected annually by the Nancy Greene Highland Forest Planning Committee members.
- The Chairman and the District Manager Arrow Forest District, or his designate, shall serve in close liaison.
- The Chairman will be responsible to organize and co-ordinate all news releases, press coverage or organization of any public relations function associated with the operations of the Committee as approved by the Committee members.
- Minutes and agenda shall normally be forwarded seven (7) days prior to the next scheduled meeting.
- The Nancy Greene Highland Forest Planning Committee shall strive for agreement or consensus on all decisions.
- On motions put to a vote only designate members, or in their absence the agency/group alternate, of the Nancy Greene Highland Forest Planning Committee may vote. A quorum shall be present and a simple majority shall be sufficient to decide a vote.
- Participation in the discussions during meeting proceedings shall be restricted to Nancy Greene Highland Forest Planning Committee members and invited guests. Parties wishing to make a presentation to the Technical Committee must make arrangements through the Chairman.
- Meetings shall be held at mutually agreed to intervals consistent with the stated purpose of the Nancy Greene Highland Forest Planning Committee.
- The Arrow Forest District shall provide, without cost, logistic support including meeting rooms, information material and maps as reasonably requested.
- Members of the Nancy Greene Highland Forest Planning Committee recognize that decisions on the management and allocation of Crown land resources are made by the appropriate legislated authority. Resource management decisions and the reasons for the decisions shall be communicated to the Nancy Greene Highland Forest Planning Committee in writing and, where possible, within seven (7) days of the decision.

12.1.6 Organisations to Contact

Kootenay Mountaineering Club

West Kootenay Naturalists

Trail Wildlife Association

12.2 Miscellaneous References

Ministry of Forests Act
Forest Act
Environment Management Act
Water Act
Land Act
Ministry of Forests Policy for Community Watershed Planning (Policy Manual Volume III; Chapter: Planning and Inventory (P&I): Section 010)
Health Act and Regulations
Canadian Drinking Water Standards (current edition)
Forest Practices Code Act
Kootenay Boundary Land Use Plan
Other Acts, Regulations and documents as they may apply

(List as of January 7, 1997. Available on request from MOF or from MOF World Wide Web site : http://mofwww.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/guidetoc.htm)

12.2.1 Organization of the Guidebooks

(Note: **bold** titles are most relevant to NGHF management.)

Plans and prescriptions

- **Higher Level Plans - Policy and Procedures**
- **Access Management Plans**
- **Five-Year Silviculture Plans**
- **Forest Development Plans**
- **Logging Plans**
- Public Consultation
- Range Management
- Sheep Management Guidelines
- **Stand Management Prescriptions**
- **Silviculture Prescriptions**

Procedural guidebooks for conducting required assessments

- **Channel Assessment Procedures**
- **Fish Stream Identification**
- **Forest Health Surveys**
- **Gully Assessment Procedure**
- **Hazard Assessment Keys for Evaluating Site Sensitivity to Soil Degrading Processes**
- **Interior Watershed Assessment Procedures**
- Mapping and Assessing Terrain Stability
- Regional Lake Classification and Lakeshore Management
- SnowAvalanche Guidebook
- **Visual Impact Assessment**

Survey methodologies procedures

- Silviculture Information Reporting
- Silviculture Surveys
- Soil Conservation Surveys

Biodiversity and aquatic resources management

- **Biodiversity**
- **Community Watersheds**
- Green-up
- Managing Identified Wildlife
- Riparian Management Area
- **Soil Conservation**
- **Soil Rehabilitation**

Recreation and scenic values management

- **Backcountry Recreation Management**
- Cave Management
- **Trail and Recreation Facility**
- **Visual Landscape Management**
- **Visual Impact Assessments Guidebook**

Engineering practices

- Design and Construction of Fish Stream Crossings
- Forest Road Engineering
- **Road Density Guidebook**

Timber Harvesting practices

- Boundary Marking

Silvicultural practices

- **Commercial Thinning**
- **Establishment to Free Growing Nelson Forest Region**
- Forest Fertilization
- Pruning
- Seed and Vegetative Material
- **Silvicultural Systems**
- Site Preparation
- Spacing
- Vegetation Management

Forest protection and use of prescribed fire

- Fire Management

Forest Health

- Bark Beetle Management
- Defoliator Management
- Dwarf Mistletoe Management
- Management of Terminal Weevils in BC
- **Pests of Young Stands**
- Pine Stem Rust Management
- Root Disease Management
- Tree Wounding and Decay Management Glossary

12.2.2 Glossary

KBLUP

- Kootenay Boundary Land Use Plan. The Commission on Resources and the Environment (CORE) & KBLUP Implementation Strategy

Consensus
- general agreement arrived at by a majority of the Committee designates or alternates.

Integrated Resource Use
- the deliberate and careful planning of the integration of various resource uses.

Quorum
- more than half of the agency/groups must have a designate or alternate in attendance.

Unacceptable Risk
- as defined by consensus of the Nancy Greene Highland Forest Planning Committee.

12.3 Kootenay-Boundary Land-Use Plan References

Land & Resource Management Direction within Lower Columbia, Kootenay, Pend d'Oreille and Salmo Rivers (Polygon A- I01)

Objective	Strategy
Commercial Tourism 1. Maintain and enhance opportunities for resorts and commercial backcountry recreation.	1.1 Provide Crown land, as necessary, for expansion of ski areas and resorts at Red Mountain and Salmo. These actions will be subject to consideration of conservation values, municipal and regional planning, and the provincial land use charter and goals.
Recreation 1. Maintain a range of recreation opportunities from semi-primitive non-motorised to roaded resource land.	1.1 Ministry of Forests to work with the community of Rossland to develop an integrated resource management plan for the former Nancy Greene Recreation area.
Fisheries 1. Maintain wild fish stocks and habitat for Rainbow and Eastern Brook trout	1.1 In establishing priorities for watershed assessments, consideration should be given to Murphy; Little Sheep, Beaver Creeks, Pend d'Oreille and Salmo River systems.

12.4 Water Resources References

12.4.1 Reports

- Elgood Creek, South Murphy Creek, Hanna Creek, Topping Creek, west Little Sheep Creek, Results of the Interior Watershed Assessment Procedure, Dobson Engineering Ltd. (1996)
- Floodplain Hazard Mapping, Ministry of Environment, Water Management (1995)
- Keeenleyside-Murphy-Selkirk 230kV Transmission Project Environmental Impact Assessment Studies, Tera Environmental Consult. Ltd. (1983)
- Murphy Creek Culvert Obstruction, MOE (1988)
  A preliminary engineering survey and site investigation was carried out on the culvert crossing Highway 3A to propose a solution to the obstruction to rainbow trout attempting to swim upstream to spawn. 1:100 year peak flow for Murphy Creek was calculated to be 15.65 m3/s average daily flow and 25.83 m3/s instantaneous flow.
- Red Mountain Official Settlement Plan,
  Kerr Wood Leidal Assoc. Ltd. (1983)
- Rossland Water Supply Master Plan, Urban Systems Ltd. (1993)
  Represents the results of a study of the City of Rossland's water quality and develops options for treatment and long-term supply and storage schemes.

12.4.2 Complaints

Hanna Creek

- Flash-flood erodes stream channel and threatens house below Highway 22 (08/14/80) File #: 55.5028029.
- Flood threat due to beaver dams in headwaters of northern tributary (04/26/89) File #: 55.5028040.
- In-fill side channel of Hanna creek (02/08/94) File #: 55.502805.
- Logging slash debris in creek causes siltation of south fork of Hanna Creek (06/16/71) File #: 55.5028013.

Topping Creek

- Erosion of stream channel (11/03/88) File # 55.5028038.
- Improper containment of waste and unauthorised culvert installation above community water intake (04/03/84) File # 55.5028034.

12.4.3 Water Quality/Quantity Sampling

Snow course information

Murphy Creek: 1987

Nancy Greene Recreational Area: 1987-present 30 sites: 10 forested; 10 regeneration; 10 clearcut

Ministry of Health records of chemical analysis of raw water from Topping, Murphy, Hanna, West Little Sheep creeks from 1985 to present.

12.4.4 Riparian Areas

Riparian areas are areas along the shores of lakes and wetlands or along the banks of streams. The objective of the riparian management zone is to protect the integrity of the reserve zone where one is required, and to maintain important wildlife values where no reserve zone is required.

Harvesting in watersheds is mentioned frequently in the Act and Regulations pertaining particularly to riparian management, soil conservation, and forest road engineering.

12.5 Silviculture History

Table x Silviculture Information - Treatment History

Opening	Rsp	Gross Area	Disturb Date	Disturb Type	ATU Id	Base	Act Tech	Act Meth	ATU Comp Date	Act Trtmt Amt	Act Stems	BEC Zone	BEC Sub	BEC Var	BEC Site Series
82F01100 4	F	21.0	38.06.01	B	W0	SU	RG	PLOT	73.01.01	21.0	0	ESSF	wc	1	
82F01100 4	F	21.0	38.06.01	B	W1	SU	FG	PLOT	87.07.01	21.0	0	ESSF	wc	1	
82F01100 11	F	34.0	69.06.01	L	W1	SU	FG	PLOT	87.08.01	34.0	0	ICH	mw	2	01
82F01100 11	F	34.0	69.06.01	L	W2	SU	FG	PLOT	91.10.01	34.0	0	ICH	mw	2	01
82F01100 11	F	34.0	69.06.01	L	X0	SP	BU	SPOT	70.01.01	34.0	0	ICH	mw	2	01
82F01100 11	F	34.0	69.06.01	L	W0	SU	RG	PLOT	73.01.01	34.0	0	ICH	mw	2	01
82F01100 11	F	34.0	69.06.01	L	W3	SU	BR	PLOT	93.08.26	34.0	0	ICH	mw	2	01
82F01100 12	F	26.0	78.06.01	L	DY1	SU	FH	PLOT	94.06.16	26.0	0	ICH	mw	2	
82F01100 12	F	26.0	78.06.01	L	DY	SU	JS	PLOT	94.06.16	26.0	0	ICH	mw	2	
82F01100 12	F	26.0	78.06.01	L	W1	SU	FG	PLOT	90.10.01	24.0	0	ICH	mw	2	
82F01100 12	F	26.0	78.06.01	L	W0	SU	RG	PLOT	78.01.01	25.0	0	ICH	mw	2	
82F01100 13	F	22.0	66.06.01	L	X0	SP	BU	SPOT	70.01.01	10.0	0	ESSF	wc	1	01
82F01100 13	F	22.0	66.06.01	L	W0	SU	RG	PLOT	73.01.01	22.0	0	ESSF	wc	1	01
82F01100 13	F	22.0	66.06.01	L	W1	SU	FG	PLOT	87.08.01	22.0	0	ESSF	wc	1	01
82F01100 13	F	22.0	66.06.01	L	W2	SU	FG	PLOT	93.06.01	22.0	0	ESSF	wc	1	01
82F01100 14	F	20.0	67.06.01	L	W1	SU	FG	PLOT	87.08.01	20.0	0	ESSF	wc	1	01
82F01100 14	F	20.0	67.06.01	L	W0	SU	RG	PLOT	73.01.01	20.0	0	ESSF	wc	1	01
82F01100 14	F	20.0	67.06.01	L	X0	SP	BU	BROAD	69.01.01	20.0	0	ESSF	wc	1	01
82F01100 14	F	20.0	67.06.01	L	W2	SU	FG	PLOT	91.10.01	20.0	0	ESSF	wc	1	01
82F01100 15	F	102.0	65.06.01	L	W1	SU	SU	PLOT	73.01.01	26.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W0	SU	RG	PLOT	78.01.01	16.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W2	SU	PL	PLOT	68.01.01	26.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W3	SU	PL	PLOT	71.01.01	23.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W4	SU	SU	PLOT	73.01.01	20.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W8	SU	RE	WALK	91.08.01	102.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W7	SU	RG	PLOT	84.06.01	102.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W9	SU	FG	PLOT	93.06.01	102.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	WA	SU	JS	PLOT	93.06.01	15.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	W5	SU	PL	PLOT	72.01.01	20.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	Y1	PL	PL	CTAIN	71.01.01	23.0	38000	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	B1	BR	MA	MANGI	94.01.07	20.8	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	X0	SP	BU	BROAD	66.01.01	41.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	Y0	PL	PL	CTAIN	68.01.01	26.0	12000	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	X2	SP	BU	BROAD	68.01.01	28.0	0	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	Y2	PL	PL	CTAIN	72.01.01	20.0	33000	ICH	mw	2	
82F01100 15	F	102.0	65.06.01	L	X1	SP	BU	SPOT	67.01.01	7.0	0	ICH	mw	2	

82F01100 15	F	102.0	65.06.01	L	W6	SU	FG	PLOT	87.08.01	102.0	0	ICH	mw	2	