REVELSTOKE COMMUNITY FOREST CORPORATION

TFL 56
MANAGEMENT PLAN #3

12 February 2001

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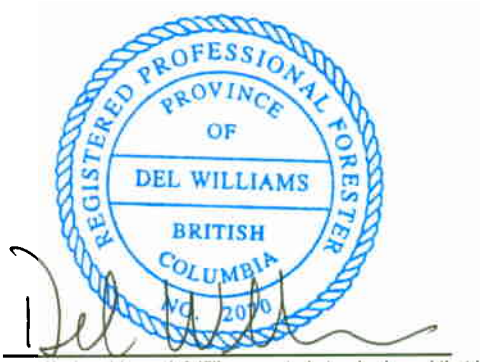
Prepared by:



I certify that this work fulfills accepted standards and that I did personally supervise the work

February 20, 2001

Del Williams, R.P.F.
Operations Forester
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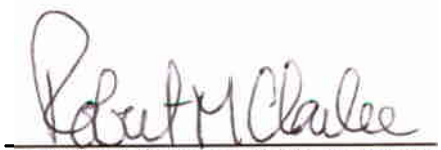

I certify that this Management Plan is approved on behalf of Revelstoke Community Forest Corporation.

February 20, 2001

Bob Clarke, R.P.F.
General Manager
Revelstoke Community Forest
Corporation

Acknowledgements

Management Plan #3 has been prepared by Del Williams R.P.F. and the staff of Revelstoke Community Forest Corporation with the help of Derek Millsop of *Azimuth Forestry and Mapping Solutions* (landscape unit planning, inventory update, mapping, and other items), Cameron Brown R.P.F. of *Silvatech Consulting* (timber supply analysis), and Mike Rooney of *New Woods Forest Consulting* (silviculture portions).

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1.0 Introduction

1.1 Purpose

The purpose of Management Plan #3 (MP #3) is to identify and propose for approval by the Chief Forester, the management objectives and strategies for achieving those objectives, for the timber and non-timber resources within the Tree Farm Licence. The MP is a strategic five-year plan. Operations conducted under the Tree Farm Licence must be consistent with the objectives and strategies stated in the plan.

1.2 Location and Description of the TFL

Situated 40 kilometers north of Revelstoke, TFL 56 covers an area of 119,748 hectares. It is bounded on the west by the Lake Revelstoke reservoir, on the east by the height-of-land of the Selkirk Mountains, on the north by the Goldstream River and on the south by the Downie-Carnes height-of-land.

The land is extremely rugged and dominated by two roughly east-west valleys – those of Downie Creek and Goldstream River – and one north-south valley, that of the Columbia River (Lake Revelstoke Reservoir). Elevation ranges from 573 metres at reservoir level to 3050 meters at Carnes Peak.

The forested land base is a relatively small proportion of total area and the timber harvesting land base is even a smaller proportion still. Most harvesting is confined to valley sidewalls and valley bottoms. The remaining "high country" is too rugged or does not support marketable timber.

The ruggedness has minimized human use, hence there are no settlements, little private land, and until recently little recreation use. One highway (Hwy 23N) traverses the TFL. Traffic is light and dominated by logging and other industrial traffic.

Wildlife use the TFL area extensively. Grizzly bears, black bears, moose, deer, and caribou are common. Caribou have become a management issue because they have been extirpated over much of their former range.

1.3 History

From 1955 to 1992, the licence area was part of a much larger Tree Farm Licence (TFL 23). In 1992, the southern portion of TFL 23 (south of Revelstoke) was sold to Pope and Talbot Ltd. while the northern portion (including what are now TFL's 55 and 56) was retained by Westar Timber. In late 1992, Westar Timber negotiated a sale of the northern portion of the TFL to Evan's Forest Products Ltd. Due in large part to concerns identified by citizens of Revelstoke, the sale was disallowed and a revised deal negotiated. This revised deal -- reached in early 1993 -- saw the northern portion of what was once TFL 23 split into TFL's 55 and 56. TFL 55 was sold to Evans Forest Products and TFL 56 to the City of Revelstoke.

The first Management Plan that TFL 56 operated under was Management and Working Plan #7 for TFL 23. This was followed until MP #2 was approved in 1996. Management Plan #2 was the first MP devised solely for TFL 56 and is due to expire in May 2001.

Additional historic information is available in Appendix 7.

1.4 Licence Holder and Administration

The Revelstoke Community Forest Corporation (RCFC) was formed in April 1993 to manage and operate Tree Farm License (TFL) 56 that was purchased from Westar Timber Ltd. The corporation is wholly owned by the RCFC Holding Company Ltd., which in turn is wholly owned by the City of Revelstoke. Three local industry partners helped finance the original purchase.

The city holds 100% of the shares in the Holding Company while the industry partners' purchased timber removal rights to a portion of the license's Allowable Annual Cut (AAC). The City's sawlog allocation (50% of the AAC) is sold through a log sort yard on a competitive bid basis. The industry partners' sawlog volumes are provided at cost (averaged annually) with species and grades representative of the profile harvested. Pulpwood is sold under separate contract with the proceeds being factored back into the cost of logs.

Previously, the corporation was wholly owned by the City of Revelstoke. In January 2000, corporate restructuring took place – the RCFC Holding Company was placed in complete ownership of the corporation. This was done for various reasons and with the advise of our lawyers and accountants.

RCFC Holding Company Ltd. and RCFC are governed by seven member Boards of Directors composed of the Mayor, two City Councilors, the City Administrator and three appointees from the community. A staff of five employees manages the day-to-day business. The industry partners have input through a management advisory committee. All forest management, construction, logging and silviculture activities are contracted out. The goal is to maximize local employment and economic benefit in the community. The Corporation is funded through the proceeds of log sales. A condition of the TFL agreement with the government is that 50% of the AAC from the license must be sold on a competitive basis to the highest bidder. During the community referendum, which was held to ratify purchasing the TFL, a commitment was made that tax payers would not be called upon to fund the venture. During the first seven years of operation, the company has been profitable and met the expectations of the majority of citizens.

TFL 56 lies within the Columbia Forest District. The Ministry of Forests District Office is in Revelstoke.

The AAC for TFL 56 as specified in MP #2 is 100,000 m^3 annually, of which 11,480 m^3 is apportioned to the Ministry of Forests' Small Business Forest Enterprise Program (SBFEP).

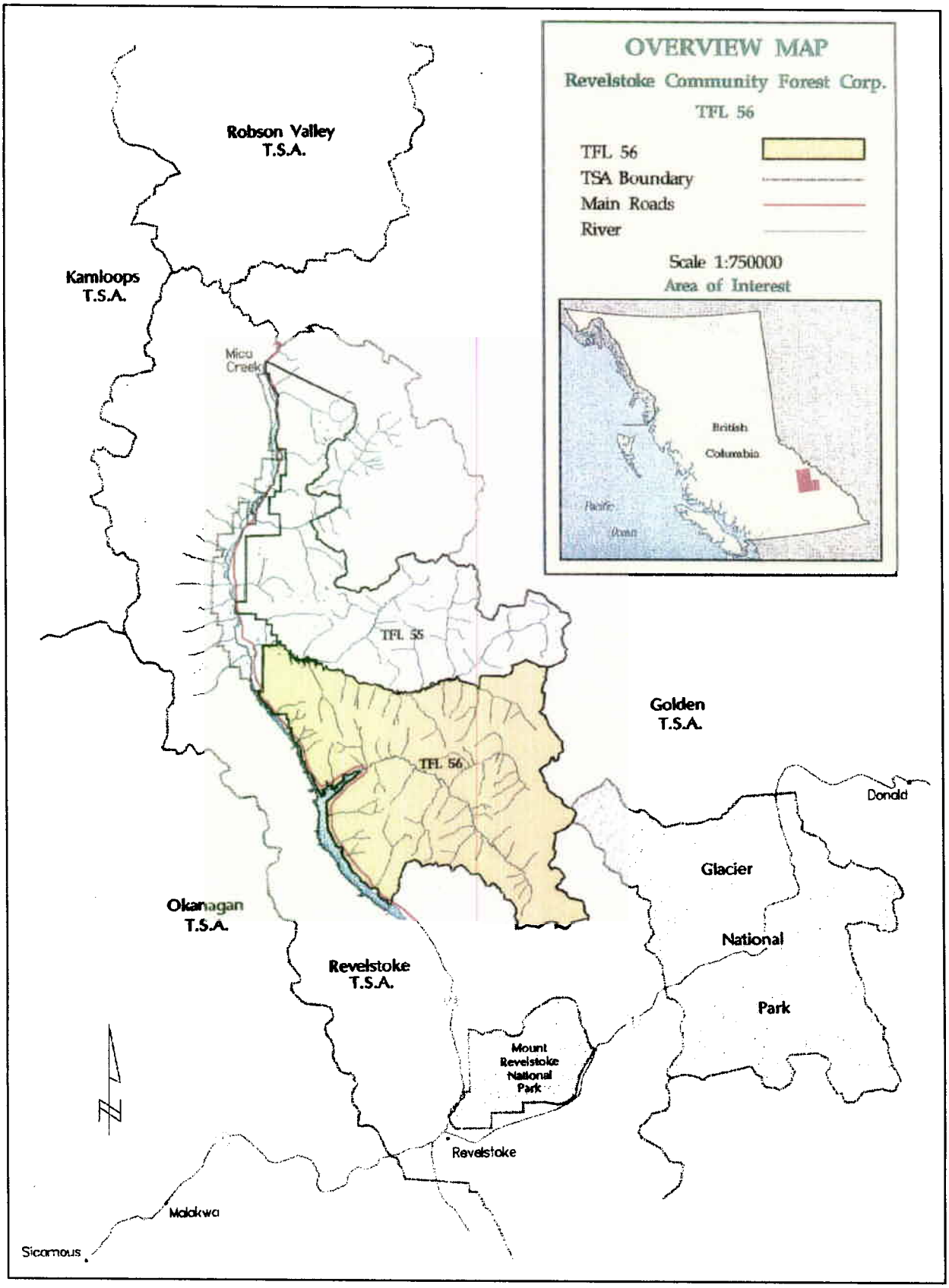


Figure 1. Location Map for TFL 56.

Figure 2. The Community of Revelstoke

1.5 Resource Issues

At the beginning of the Management Plan #3 process, a large number of issues that RCFC faced were presented. These issues are detailed in the SMOOP (Appendix III). Through the Management Plan process, many of these items have been dealt with and are no longer issues, some are still issues, and other items have become issues. The list below includes the later two categories.

Pulp Log markets: Markets and prices for pulp logs continue to be problematic. RCFC's timber supply has a high proportion of pulp logs – typically 35% to 40% of the volume harvested annually.

Revelstoke Minister's Advisory Committee: The Revelstoke Minister's Advisory Committee spent several years formulating a land use plan for the Revelstoke area, including TFL 56. The report is entitled *Revelstoke and Area Land Use Planning Final Recommendations* dated October 1999. This plan is locally known as the "MAC Plan" and that name will be used throughout this Management Plan document. Implementation of the MAC plan is still somewhat uncertain. The MAC Plan is still not officially approved but it has been adhered to over the last two Forest Development Plan periods. This Management Plan will adhere to the principles of the MAC plan. In the accompanying Timber Supply Analysis Report, the MAC plan assumptions are used in the base case, a sensitivity analysis is used to examine the effect of using landscape level biodiversity goals rather than the MAC strategy.

Kootenay-Boundary Land Use Plan: The MAC plan has been used in the formulation of this report rather than the Kootenay-Boundary Land Use Plan (KBLUP). A sensitivity

analysis is presented in the *Timber Supply Analysis Report* to show the expected changes in the timber supply if KBLUP were implemented instead of the MAC plan.

Caribou Habitat Management: Mountain caribou (Figure 3) utilize a large proportion of the TFL area. The issue has revolved around harvesting and caribou habitat interactions. The MAC planning process devoted a great deal of time and energy to formulate caribou guidelines. These guidelines are followed in the Timber Supply Analysis and have a significant impact on timber supply in TFL 56. The recommended allowable annual cut has these impacts incorporated.

Figure 3. Mountain Caribou.

Harvesting Costs: Harvesting costs have increased dramatically in the last decade. There are many reasons for this including: stumpage increases, costs associated with Forest Practices Code implementation, and harvesting in higher cost locations. In the case of TFL 56, the most significant reason either is the fact that the lower-cost operating areas are already harvested or forest cover constraints prevent harvesting at present.

Species Profile: The forest cover on TFL 56 is dominated by older forests with a high proportion of low value timber. The current volume on the operable forest by leading species is hemlock 34%, cedar 34%, spruce 25%, subalpine fir 4%, and Douglas-fir 3%. RCFC must harvest this profile and remain profitable.

Small Business Forest Enterprise Program (SBFEP): The SBFEP has a right to harvest timber at a non-declining rate of 11,480m^3 per year without consideration of the annual allowable cut (AAC) for the TFL. This presently comprises 11.8% of the AAC. As the AAC for the TFL declines to the long-term harvest level of 74,100m^3/yr, the SBFEP proportion will rise to 16.0%. RCFC will have to pay all of the fixed costs of managing the TFL on a much smaller AAC that is further aggravated by the non-declining SBFEP apportionment.

Another issue related to the SBFEP program is the accounting process for determining volume harvested. The present SBFEP practice within TFL 56 is to use cruise volumes for cut control. In other words, if a sale is cruised at 10,000m^3 and 13,000m^3 of logs are

scaled, and an additional 1,000m^3 of waste is assessed, the SBFEP program only considers the 10,000m^3 cruised for cut control purposes rather than the 14,000 m^3 actually cut. This procedure is not at all like the procedure that RCFC must use for RCFC's harvesting on TFL 56. Volumes for cut control purposes are scaled volumes plus waste volumes.

Wood Quality for the Future: Currently, RCFC is harvesting older forests. The trees in these forests, although often partially decayed, have a higher proportion of wood that is fine-grained and clear than do second-growth forests. At issue is the quantity of harvestable high-quality wood in the future for the many end-products produced from TFL 56 forests.

These issues will be addressed in the text of this plan.

2.0 Resource Inventories

2.1 General

The Forest Act states "inventory of the forest, recreation and cultural heritage resources of the tree farm licence area" is the responsibility of the TFL holder. These inventories must provide sufficient information to adequately:

(a) Establish and carry out higher level plans,
(b) Prepare and carry out operational plans,
(c) Manage and conserve the forest, recreation and cultural heritage resources of the tree farm licence area, and
(d) Assess the impact that managing the resources referred to in paragraph c would have on the timber supply for the tree farm licence area.

RCFC has carried out or maintained existing inventories of timber, recreation, and cultural resources. RCFC also required other information to adequately manage the TFL area -- a number of other activities that may be loosely defined as "inventories" have been completed. The following table lists all the inventories that have been completed, date completed, approval status, standards used, and other information. Where further explanation is warranted, the following sections of MP #3 will provide it.

Table 1. Forest Resource Inventories.

Inventory	Date completed	Approval	Standard or Intensity	Comments
Aerial Photo-graphy	July 1998. We anticipate redoing this in 2003	Approval not required	1:50,000 scale, B&W.	1:50,000 aerial photography was completed on TFL 56. This photography was digitally ortho-rectified to create 1:20,000 mapsheets. Essentially these are maps that look like photos and are invaluable planning and inventory tools. They exist digitally as a "layer" in RCFC's digital base map and physically as mapsheets in our map cabinet.
Large Scale Contour Mapping	1997	Approval not required	1:5,000 scale, 5-metre contour interval.	Mapping at a 1:5,000 scale and at a 5 metre contour interval has been completed for timbered portions of the TFL.
Total Chance Inventory	November 1996	Approval not required	Completed using above-mentioned orthophotos and 5-metre contour mapping with field checks.	Total chance harvest planning has been carried out in the entire TFL. This essentially provides an inventory of all timber that is currently deemed "practical" to harvest and suggests methods for access and harvest.
Forest Cover	July 1999	Update approved in late 1999	Completed to Ministry of Forests standards.	▪ A major update using the above-mentioned orthophotos was completed. Spatial positions of all existing roads and cut blocks were checked and corrected if necessary using these orthophotos. ▪ RCFC used this updated inventory information – further updated with GPS data for harvesting completed since July 1998 – for the timber supply analysis. Ministry of Forests Resources Inventory Branch has a digital copy of the approved updated inventory.
Terrain Stability	April 1997	Approval not required.	Completed to Ministry of Forests standards.	Terrain stability (TSIL D) mapping was completed for the entire TFL.
Recreation	New inventory completed Oct. 2000	Submitted Oct. 2000.	Completed to Ministry of Forests standards.	This has now been updated and digitized to current ministry standards.
Caribou habitat	February 1996	Approval not required.	Completed by professional biologist to accepted standards.	Caribou Habitat Suitability mapping has been completed for key areas of the TFL
Stream and Wetlands	February 1998	Approved February 1998 by Columbia Forest District.	Completed to Ministry of Forests standards.	Stream and wetland classification has been done for the entire TFL. The information used is field-based for most streams in the Downie Valley and Front Face areas of the TFL. Limited field data was available for the Goldstream area. However, fieldwork is being completed in 1999 for the Goldstream watershed.
Avalanche Likelihood	September 1998	Approval not required.	Completed by avalanche professionals	Avalanches have become an issue as harvesting progresses on steeper slopes, higher elevations, and further back in narrow valleys. This mapping has been completed for the entire TFL and provides avalanche hazard by polygon.
Cultural Heritage Resources	Ongoing	Individual inventories approved as completed.	Completed by professional archaeologists to accepted standards.	Cultural heritage inventories will be completed on a site-specific basis when specific concerns are brought forward or if any signs of cultural heritage resources are noted during the other on-site assessments that take place. RCFC has to-date completed three archaeological impact assessments where concerns were noted during the Forest Development Plan process. No archaeological sites were discovered.

2.2 Timber

2.2.1 Forest Cover

Management Plan #2 was approved subject to a requirement to complete a "comprehensive inventory specific to the TFL landbase for use in preparation of MP No. 3." This was not completed for a number of reasons including the completion of a favourable audit of our inventory, and our wish to be a part of the VRI inventory of the Revelstoke area (that has been delayed several times). RCFC requested that we not be required to complete a comprehensive inventory. The Chief Forester, in a letter dated February 21, 2000, agreed.

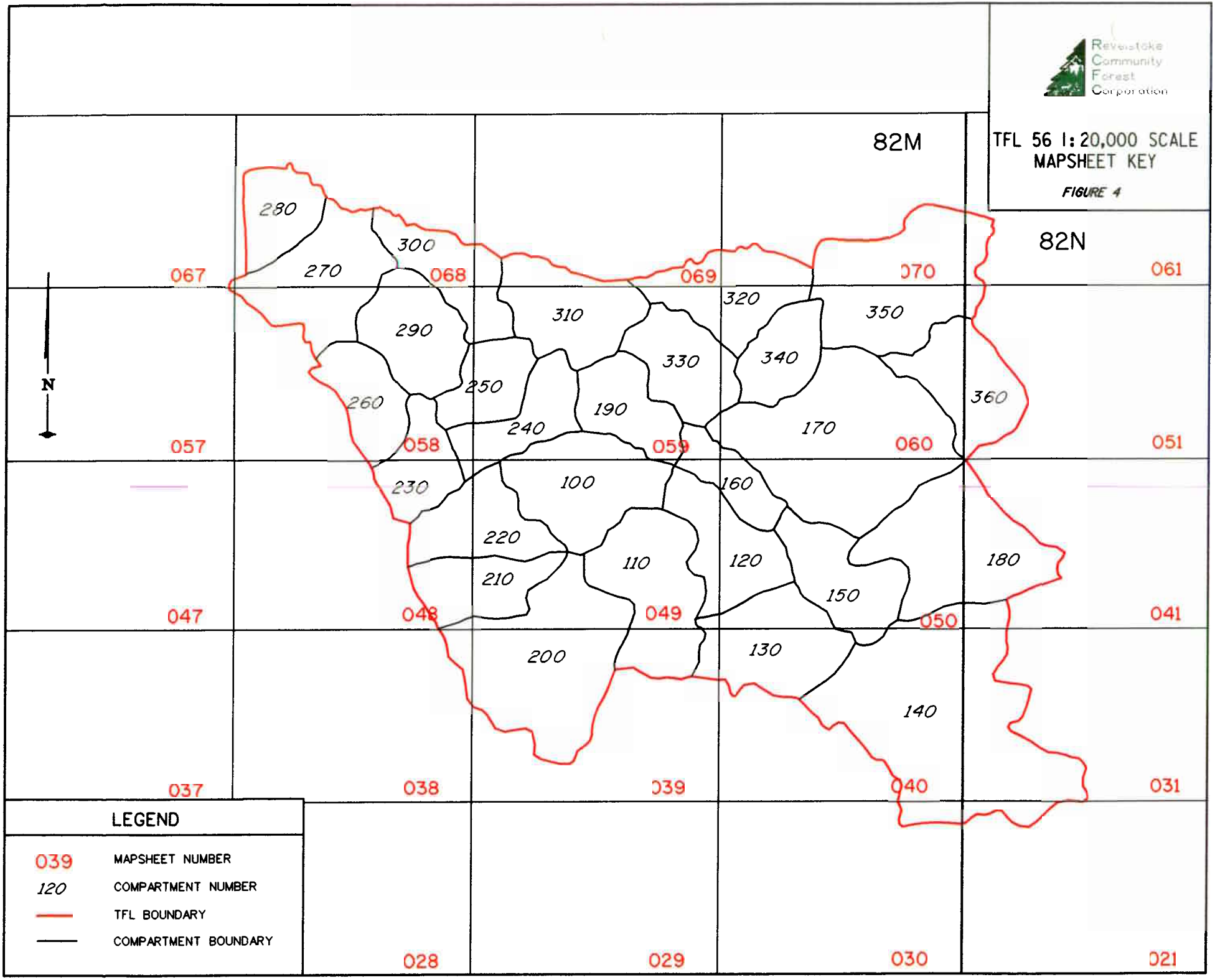
Although the Chief Forester waived the requirement to complete a "comprehensive inventory", he did require RCFC to complete a "thorough assessment of the forest cover inventory in conjunction with regional and provincial inventory staff". The assessment is to evaluate the existing inventory against current inventory standards. The MP document is to commit RCFC to an action plan to prioritize and resolve any outstanding concerns and must form part of the MP commitments to be met over the term of MP #3.

The action plan is, during the MP #3 period, to:

- Complete a new forest inventory to Ministry of Forests "VRI" standards or
- Resolve all significant concerns with the present inventory in the following manner:
  - Complete a thorough assessment of the forest cover inventory in conjunction with regional and provincial inventory staff. This assessment will evaluate the existing inventory against present inventory standards.
  - Where significant shortcomings exist, prioritize them, and resolve in a manner considered satisfactory to regional and provincial inventory staff.

It should be noted that a Ministry of Forests audit team assessed the present inventory. The Inventory Branch audit report stated "audit results for the mature component of the inventory for TFL 56 suggest that inventory is statistically acceptable". However, the audit did suggest that further review of the site index assignment on the immature component was necessary and that the non-forest classification did not meet present provincial standards due mainly to broad delineation of alpine areas.

Figure 4 illustrates our inventory base maps.


Revelstoke Community Forest Corporation
TFL 56 1:20,000 SCALE MAPSHEET KEY
FIGURE 4
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82N
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057
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051
047
048
049
050
041
037
038
039
040
031
028
029
030
021
LEGEND
039 MAPSHEET NUMBER
120 COMPARTMENT NUMBER
TFL BOUNDARY
COMPARTMENT BOUNDARY

2.2.2 Operable Cut Line

An operable cut line (OCL) that estimates the limits of productive forest suitable for harvest was first established in 1974. Areas that were not considered harvestable by existing logging methods or that were considered inaccessible were discounted from the timber harvesting landbase. A revision to the OCL line was completed in 1991. This OCL line discounted pulpwood stands as inoperable. In 1994, the OCL was revisited and revised to include many pulpwood stands previously discounted. The 1994 line was the basis for MP #2. In 1999, the OCL line was again determined. This 1999 line encompasses more low quality timber and extends into areas that were previously considered inoperable. It is based upon RCFC's harvesting history during the MP #2 period.

Three reports thoroughly cover this subject. They are:

1. *R.C.F.C. Operability Line Rationale*,
2. *Aerial Harvesting in TFL 56 – Past Present and Future*, and
3. *RCFC TFL 56 Current Harvest Practices: A Review of Management Plan #2 Harvest Requirements and the 1999 Operability Line*.

These reports are included in the Timber Supply Information Package.

Figure 6 shows the extant of our operable cut line on a small-scale map. During the term of MP #3, RCFC will monitor the accuracy of the 1999 OCL and revise it if necessary for MP #4.

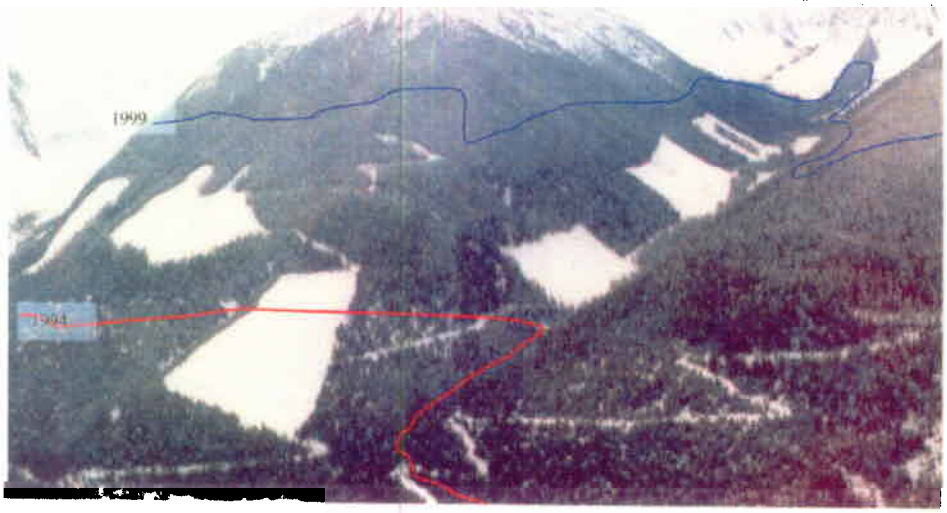
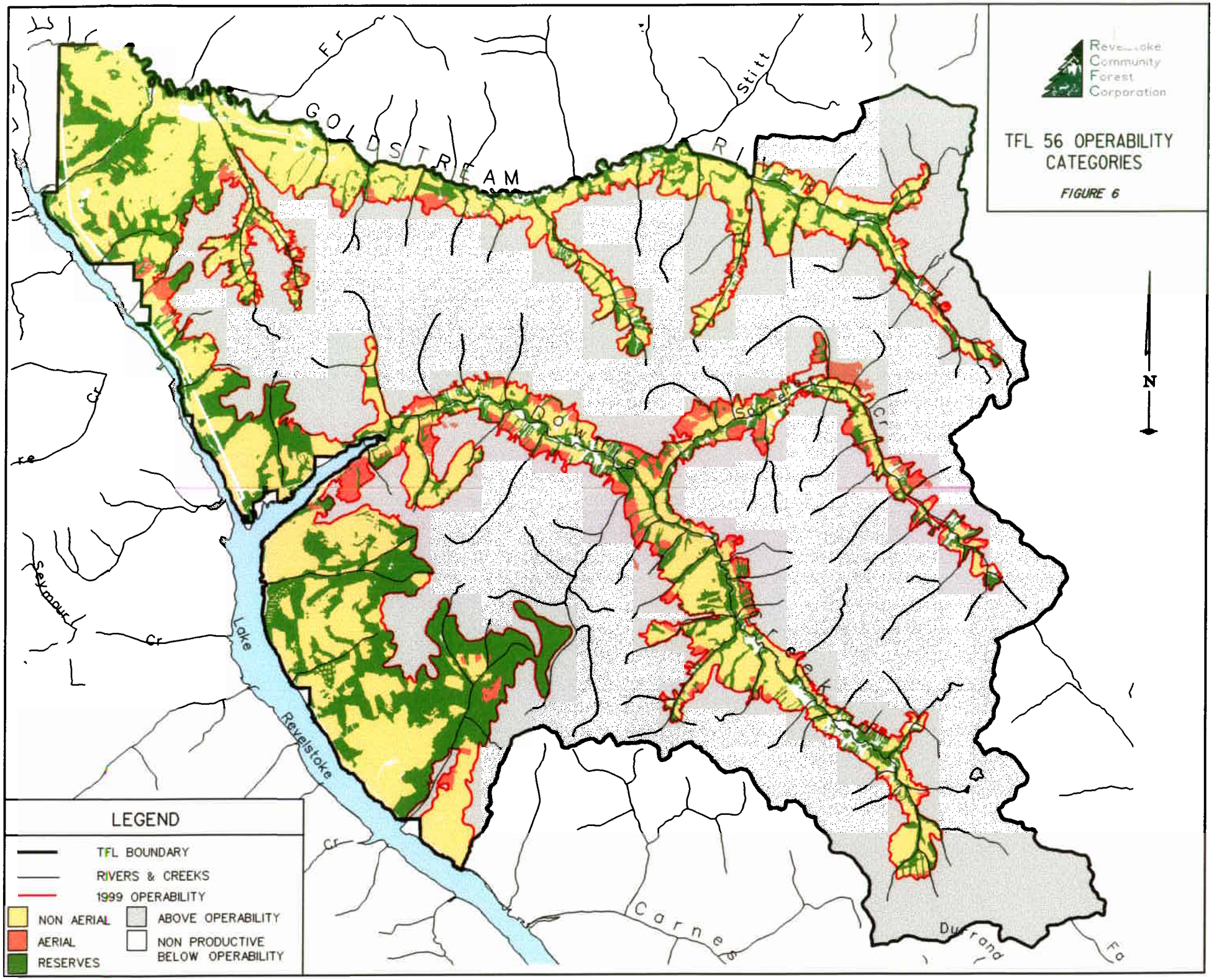


Figure 5. 1994 and 1999 Operable Cut Lines at Pass Creek


Revelstoke Community Forest Corporation
TFL 56 OPERABILITY CATEGORIES
FIGURE 6
N
GOLDSTREAM
Stitt
Lake
Revelstoke
Seymour
Carnes
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
1999 OPERABILITY
NON AERIAL
AERIAL
RESERVES
ABOVE OPERABILITY
NON PRODUCTIVE
BELOW OPERABILITY

2.2.3 Total Chance Inventory

The Total Chance Harvesting Plan (TCHP) was completed by Grant Sime R.P.F. of Silvatech Forestry Consultants using a Wilde stereo-plotter with 1994, 1:15,000 aerial photography, and 1: 5,000 five-meter interval contour mapping as a base map. The plan looked at all harvesting opportunities on the forested land base without regard to the 1994 operability line. This work was fine-tuned with 1994 forest cover mapping, "Level D" terrain hazard mapping, ESA mapping, Avalanche Hazard mapping, Slope Thematic mapping and field knowledge and experience. The new operability line was plotted on the 1:20,000 scale forest cover base maps and checked against 1:20,000 digital orthophotos which were produced in 1998 using new 1:50,000 aerial photography.

In the TCHP, road systems for the entire TFL were projected based on existing roads and Ministry of Forest's engineering guidelines for grade control on new roads. Blocks were designed for a combination of ground skidding (slopes less than 30%) and cable yarding (30% to 80% slopes). Yarding distances on cable blocks were limited to 200 meters downhill and 300 meters uphill utilizing medium-sized (e.g. Madill 071) mobile yarders. Areas containing merchantable timber which were not suitable for road construction and conventional skidding or yarding were designated for helicopter logging. Generally, these areas were only considered if they were within 1500 meters of a suitable landing site with road access. Longline or skyline systems may be used instead of helicopters where deflection is suitable, but specific sites must be identified through detailed ground assessment and they were not distinguished in the TCHP. Block sizes were kept to maximum of 40 hectares although most are less than 15 hectares in size. A clearcutting system was anticipated in block design but many blocks are suited to small group selection where other values dictate a less intrusive harvesting system.

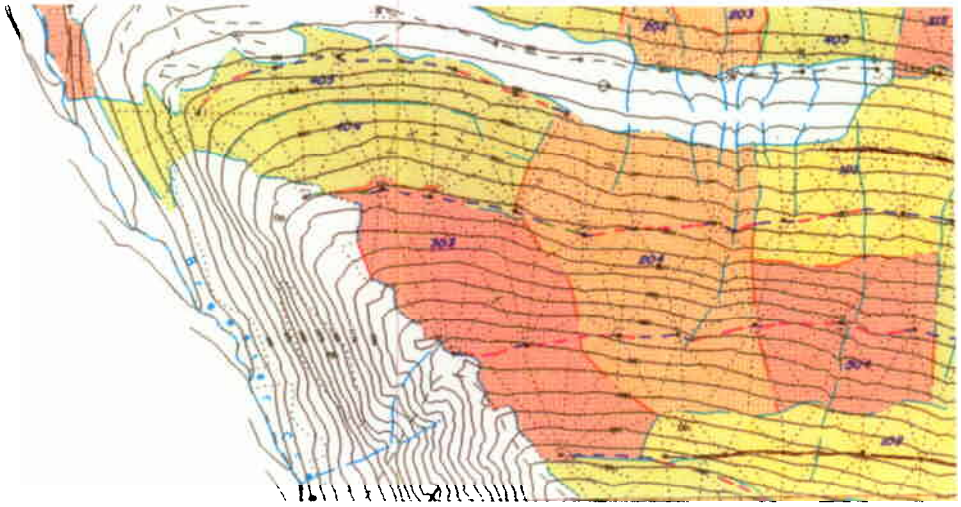


Figure 7. Excerpt From Total Chance Harvest Plan.

2.2.4 Operational Inventory

An operational level inventory of the timber resource (timber cruising) will be completed as part of every cutting permit application. Timber cruising is done in compliance with the applicable Ministry of Forests guidelines.

2.2.5 Growth & Yield

RCFC does not have its own growth and yield program, but does cooperate with the Ministry of Forests on the provincial program.

RCFC has begun a program of collecting site index information at the time of Free Growing assessments. The *growth intercept* method is used and the relevant forest inventory electronic files are updated with the new information. The *Timber Supply Information Package* has a listing of all such updates completed to date. It is of interest to note that of 934 hectares that have had the original site indices updated, the average site index has increased from 16.0 to 22.9 metres (at breast height age 50), a 36% increase. Details are shown in Appendix 1 of the *Timber Supply Information Package*. The information package is included in Appendix 2 of this Management Plan.

2.3 Terrain Stability

Terrain stability mapping to a "level D" standard was completed in April 1997 and has been an important part of forestry planning since completion. A report entitled *TFL 56, Revelstoke Forest District, TSIL D Reconnaissance Landscape Hazards* and a series of 1:20,000 map sheets were produced.

RCFC uses this information in forest level planning. When operational plans are prepared, further geotechnical investigations are completed under the following circumstances:

- TSIL "D" mapping indicates unstable or potentially unstable terrain, or
- Slopes are greater than 60%, or
- Fieldwork reveals signs of instability.

2.4 Recreation

2.4.1 Recreation Features Inventory and Recreation Opportunities Spectrum

Both recreation features inventory (RFI) and recreation Opportunity spectrum (ROS) classification were recently completed on TFL 56.

The RFI provides information about recreation features to land use planners and resource managers to assist them in making decisions on appropriate land uses, resource development objectives and management prescriptions. The inventory

may be used as input to higher level plans, provincial initiatives, or operational plans.

Figure 8. Hiking in the Keystone Area.

The ROS classification system is largely a function of an area's distance from a road. TFL 56 lies in very mountainous terrain with a series of valleys through it. Since these valleys are mostly roaded and the valleys are not far apart, the vast majority of the landscape falls within the Semi-Primitive Non-Motorized ROS class (areas more than 1 km but less then 8 km from a road). Most of the remainder (small areas adjacent to and <1 km from roads) falls within the Roaded Modified (RM) class. There are no Primitive or Roaded Natural areas, and one small area of Semi-Primitive Motorized (SPM). Table 2 indicates the area and proportion of each ROS class.

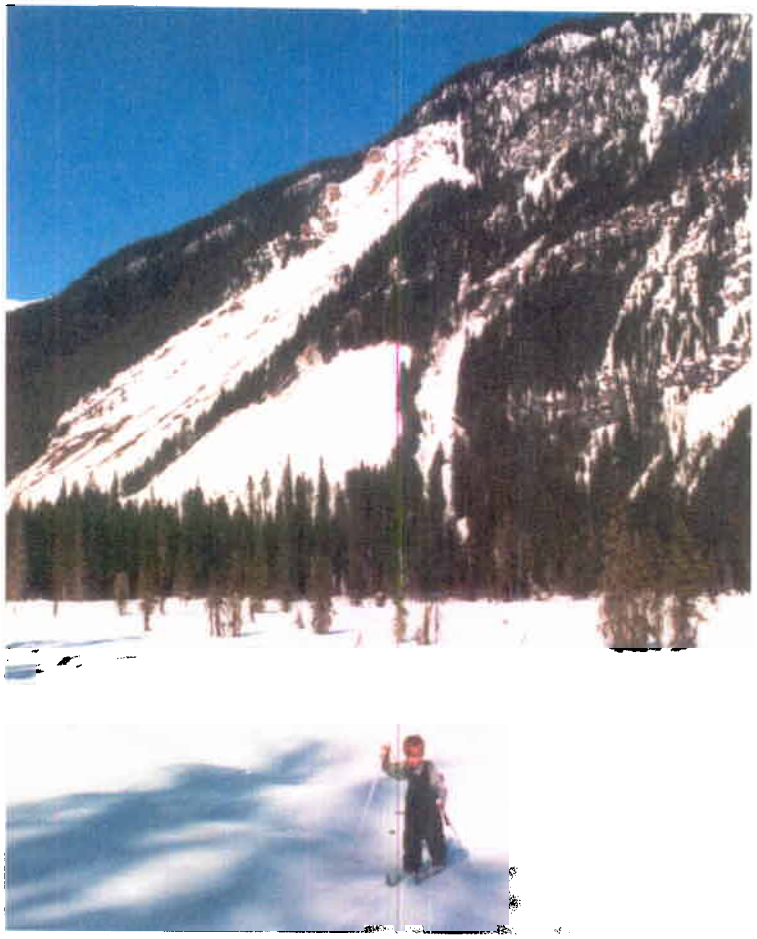


Figure 9. Cross-Country Skiing in the Upper Downie Valley.

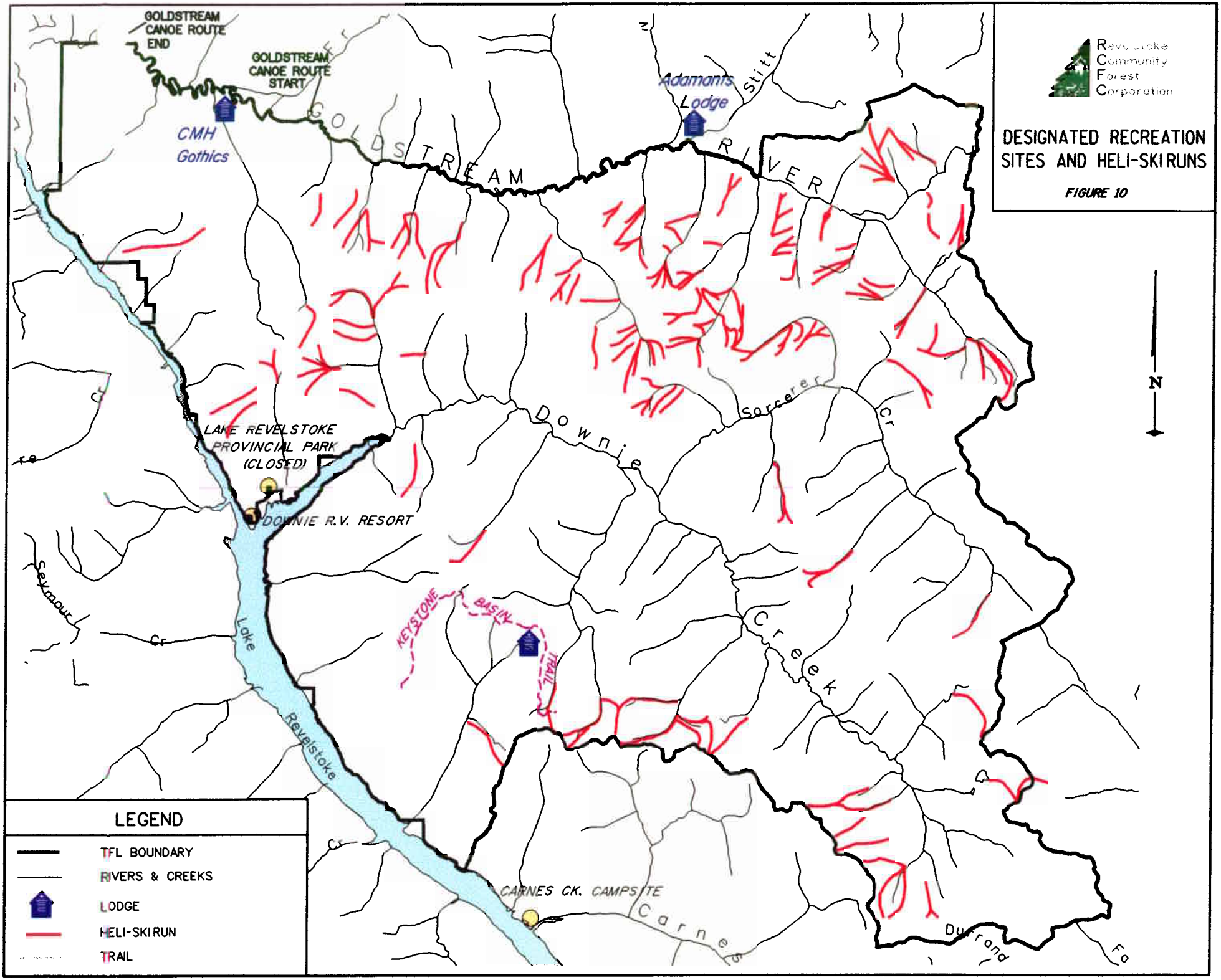

GOLDSTREAM CANOE ROUTE END
GOLDSTREAM CANOE ROUTE START
CMH Gothics
Adamants Lodge
GOLDSTREAM RIVER
Stitt
Downie
Sorcerer Cr
LAKE REVELSTOKE PROVINCIAL PARK (CLOSED)
DOWNIE R.V. RESORT
Seymour Cr
Lake Revelstoke
KEYSTONE BASIN TRAIL
Creek
CARNES CK. CAMPSITE
Carnes
Durand
Revelstoke Community Forest Corporation
DESIGNATED RECREATION SITES AND HELI-SKI RUNS
FIGURE 10
N
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
LODGE
HELI-SKI RUN
TRAIL

Table 2. ROS Classes in TFL 56.

ROS Classification	Area (ha)	Proportion of TFL
Primitive (P)		
Semi Primitive Non-Motorized (SPNM)	77,948	65%
Semi-primitive Motorized (SPM)	807	1%
Roaded Natural (RN)		
Roaded Modified (RM)	41,038	34%
Rural (R)		
Urban (U)		
Total	119793	100%

2.4.2 Visual Landscape Inventory

A visual landscape inventory has not been required in TFL 56 because the area has not been designated as a scenic area. However, RCFC does recognize the importance of the visual resource and the visual sensitivity of steep mountainsides in the Columbia Mountains.

RCFC will undertake visual landscape planning in specific localities identified in the forest development plan process or operational level plans.

Figure 11. Digital Modelling of a Proposed Harvest Plan.
The lodge in the foreground is the CMH Adamants Lodge; the view is of the proposed Cutting Permit 320 development.

2.5 Wildlife and Fish

2.5.1 Stream and Wetland Classification

The streams, wetlands, and lakes of TFL 56 support resident fish species including rainbow trout, bull trout, kokanee, mountain whitefish, and others. Recreational fishers heavily use Lake Revelstoke, a hydroelectric reservoir along the western TFL boundary. The two major streams in the TFL, Downie Creek and Goldstream River, are fished less but still support populations of game fish and other species. Many tributaries of these streams, and other feeder streams of Lake Revelstoke, support fish populations.

Stream and wetland classification has been completed for the entire TFL. Intensive on-site sampling of the Downie, and to a lesser extent the Goldstream watersheds, has taken place. However, all streams and wetlands have not been visited due to inaccessibility or minor nature of the features. These have been classified from maps or aerial photos.

Field classification of these streams will be gradually completed as RCFC does forestry fieldwork adjacent to map-classified streams and wetlands.

Further information is available in the report entitled *Stream, Wetland and Lake Classification Data for Tree Farm Licence #56* dated February 6, 1998.

Figure 12. Mature Forest Retention Area in Downie Valley.

2.5.2 Wildlife

While many species of wildlife exist in TFL 56, few have been inventoried. Caribou have been extensively studied, radio-collared, and counted. As well, RCFC has completed habitat suitability mapping on portions of the TFL to aid in forest planning. Research, funded by RCFC's Forest Renewal BC budget, is taking place on bats (northern long-eared myotis).

A list of red and blue listed species that occur in the Revelstoke area is included in Appendix 3.

Hunting occurs throughout TFL 56 for a variety of species (black bear, grizzly bear, deer, cougar, mountain goat) and is governed by BC hunting regulations.

2.6 Avalanche

RCFC operates in some of the most avalanche prone forestland in the world. The first step in managing forestland to reduce the potential of destructive avalanches is to identify where the hazards are. RCFC commissioned an inventory of avalanche likelihood to aid in both forest level and stand level planning. Further field assessments are carried out on higher risk areas as indicated in the following table.

Table 3. Avalanche Risk Assessments.

Cut Block Characteristics	Type of Assessment	Qualifications of Assessor
"Negligible", "low" or "moderate" risk on Likelihood Map	No further assessment unless prescribing forester feels that one is necessary	Canadian Avalanche Association level 2 certified individual for difficult situations, otherwise R.P.F. with at least two years of experience in the Columbia Mountains
"High" or "very high" on Likelihood Map	On-site assessment at time of SP fieldwork	

Figure 13. Avalanche in the Downie Valley.

2.7 Archaeological

First nations groups did not use the TFL area heavily. The river served as a transportation corridor and was likely the most heavily used area near or within the TFL. The flooding of the Revelstoke Dam pondage obliterated any archaeological sites that may have existed near the river. There are no known archaeological sites associated with First Nations elsewhere in the TFL area.

Also of historical concern are the activities of early settlers and miners. A placer mine operated in the Goldstream Valley near the confluence of French Creek and Goldstream River during and after the gold rush of the 1860's. Associated workings exist on McCullock Creek and it is likely that early miners sampled other areas nearby. This activity took place in the 1860's. These sites are just north of TFL 56 on neighbouring TFL 55. No known archaeological sites associated with early miner or settler activity occur in TFL 56.

Archaeological overview assessments have not been carried out in the TFL area. In lieu of these, sites most likely to have been used historically are identified at the Forest Development Plan stage in cooperation with First Nations groups. Qualified archaeologists then carry out archaeological impact assessments. To date, RCFC has carried out three of these in the TFL – no archaeological evidence has been unearthed.

RCFC will continue to cooperate with first nations and other groups in identifying potential archaeological sites and carrying out archaeological impact assessments.

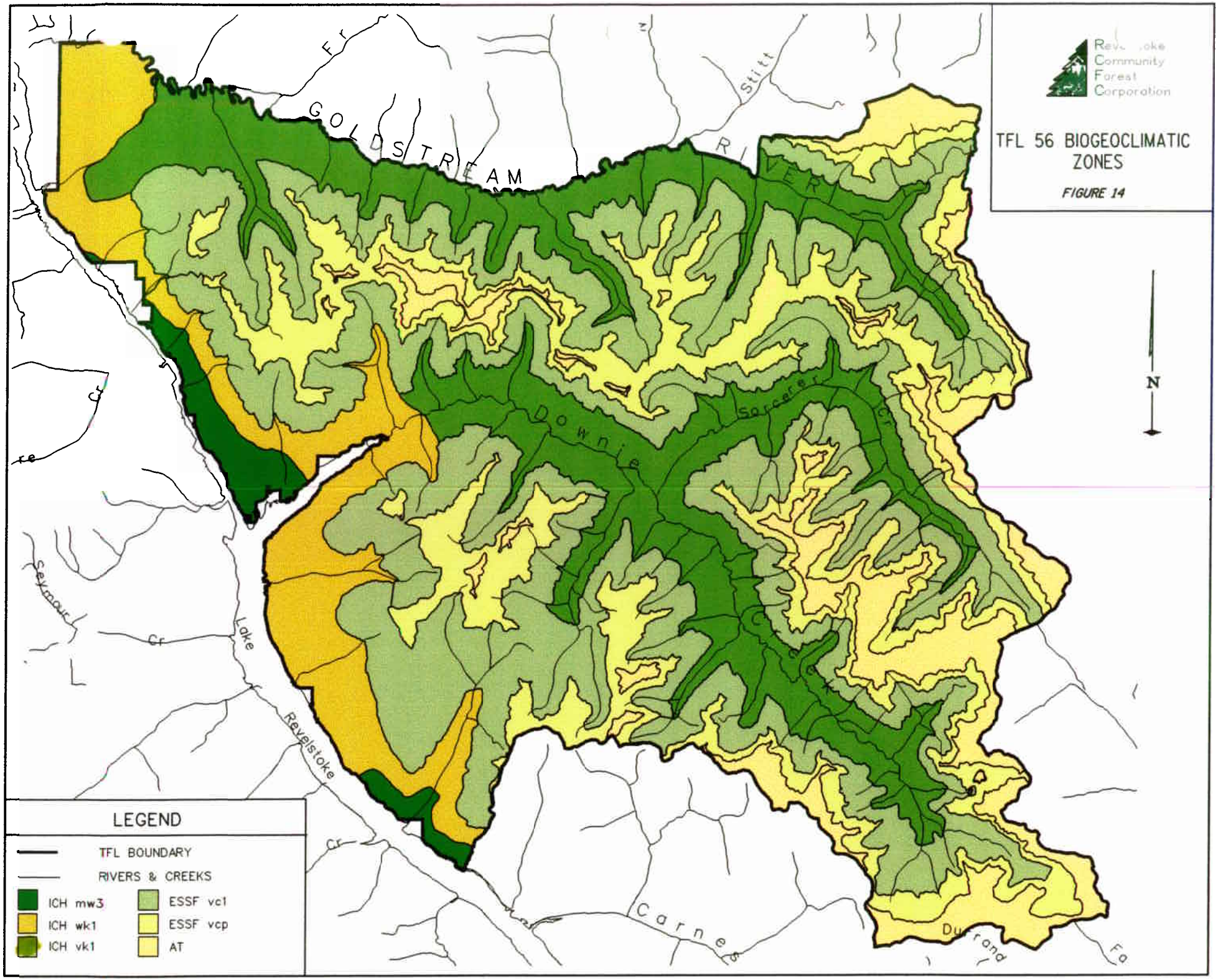
2.8 Biogeoclimatic Ecosystem Classification

The biogeoclimatic subzones and variants that occur in TFL 56 are listed in Table 4 and illustrated in Figure 14. For the most part, TFL 56 is in the wetter portion of the interior wet belt – this is reflected in the biogeoclimatic subzones that occur. Complete descriptions of these subzones can be found in A *Field Guide for Site Identification and Interpretation in Nelson Forest Region*.

Table 4. Biogeoclimatic Subzone and Variant Occurrence.

Climatic Region	Biogeoclimatic Subzone and Variant	Description	Proportion of entire TFL	Proportion of operable landbase in TFL
Moist	ICHmw3	Thompson Moist Warm Interior Cedar - Hemlock Variant	2%	5%
Wet	ICHwk1	Wells Gray Wet Cool Interior Cedar-Hemlock Variant	11%	27%
	ICHvk1	Mica Very Wet Cool Interior Cedar-Hemlock Variant	22%	39%
	ESSFvc	Very Wet Cold Englemann Spruce Subalpine - Fir Variant	38%	29%
	ESSFvcp	Very Wet Cold Parkland Englemann Spruce Subalpine - Fir Variant	18%	0%
	AT	Alpine Tundra	9%	0%

RCFC has used the most current Ministry of Forests line work to delineate the occurrences of these subzones and variants. In the Goldstream Valley, silviculture prescription fieldwork was used to refine the boundary between the ESSFvc and the ICH subzones,


Revelstoke Community Forest Corporation
TFL 56 BIOGEOCLIMATIC ZONES
FIGURE 14
N
GOLDSTREAM
R I V E R
Downie
Sorcerer Cr
Seymour Cr
Lake
Revelstoke
Carnes
Durand
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
ICH mw3
ICH wk1
ICH vk1
ESSF vc1
ESSF vcp
AT

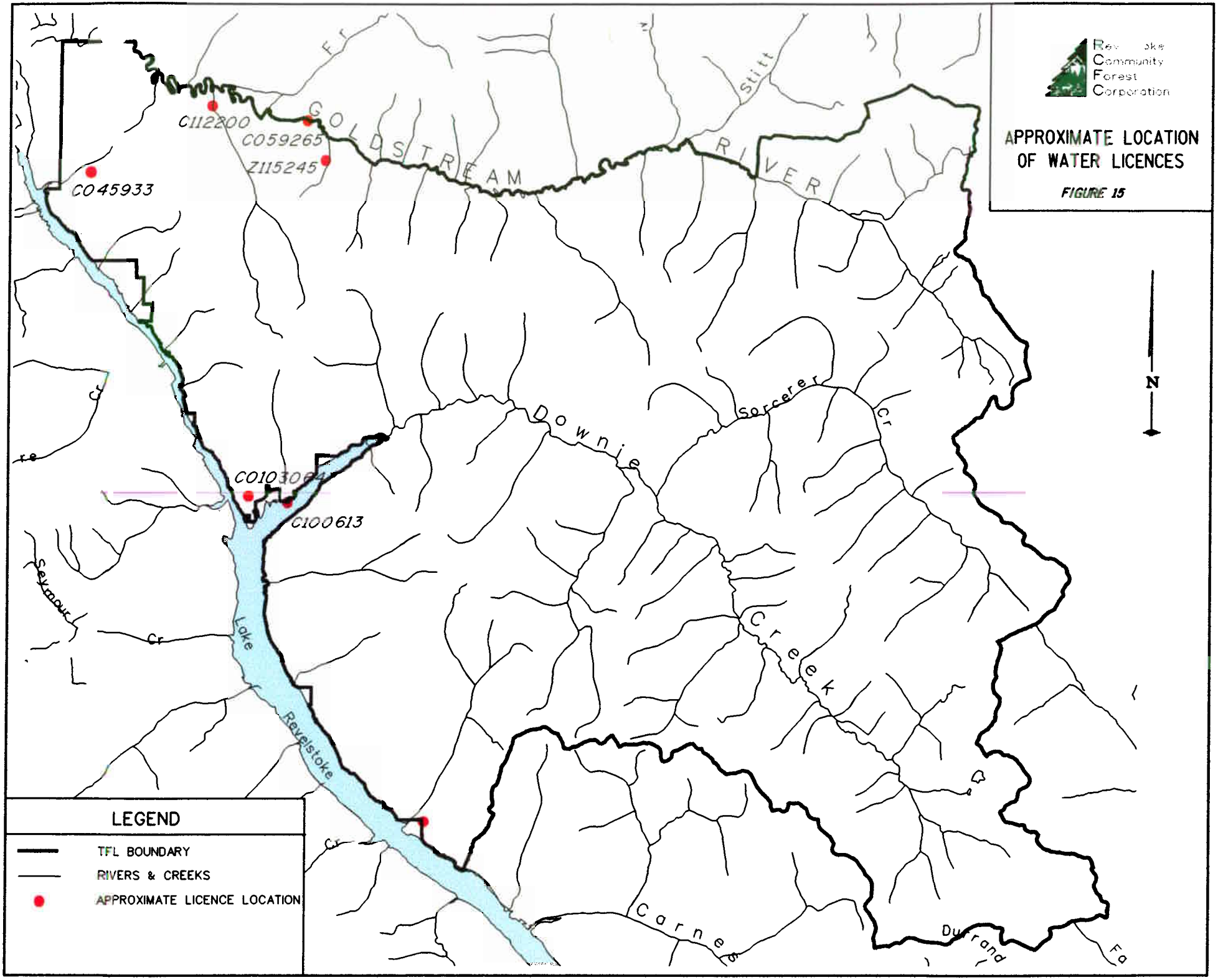
2.9 Watersheds

There are several domestic and commercial water use licences on TFL 56, but there are no community watersheds. Licenced water users are listed in Table 5 and approximate locations are shown in Figure 15.

Table 5. Water Licences on TFL 56 (current to November 2, 2000).

Licence No.	Stream Name	Purpose	Map-sheet	Comments
C065949	Clydesdale Creek (DL3414)	Domestic and Irrigation	82M039	Water supply for district lot 3414 near Mars Creek
C100613	Lake Revelstoke	Enterprise and Watering	82M048	For Lake Revelstoke Provincial Park at Downie Reach
C103064	Roylance Creek	Waterworks	82M048	Water supply for Downie resort
C045933	Old Goldstream Creek	Enterprise	82M068	Water supply for highways camp
C045933	Angelico Creek	Enterprise	82M068	Water supply for highways camp
C059265	Goldstream River	Enterprise, Mining, and Processing Ore	82M068	Water supply for Goldstream mine at 13 km on the Goldstream FSR
C112200	Brewster Creek	Enterprise	82M068	Water supply for Canadian Mountain Holidays Gothics Lodge
Z115245	Hopwood Creek	Work Camp, Mining, and Processing Ore	82M068	New application for Goldstream mine

RCFC will continue to review annually changes to the existence of licenced water users on or adjacent to the Tree Farm Licence area.


Revelstoke Community Forest Corporation
APPROXIMATE LOCATION OF WATER LICENCES
FIGURE 15
C112200
C059265
Z115245
C045933
C100613
GOLDSTREAM RIVER
Downie Creek
Sorcerer Cr
Lake Revelstoke
Seymour Cr
Carnes Cr
Durrand
N
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
APPROXIMATE LICENCE LOCATION

2.10 Mining

Mining has been occurring on what is now TFL 56 since the mid 1800's. Trails into the Keystone were developed to "rawhide" ore from hard rock mines out to the river for transportation to smelters. Placer mining was occurring in the Goldstream area. Until recently, the Bethlehem mine in the Goldstream valley has been active. However, there are no active mines at present in the TFL 56 area.

There are many valid mineral claims that do generate significant exploration expenditures annually.

Figure 16. Mining Operations in The Goldstream Valley.

3.0 Management Objectives

Revelstoke Community Forest Corporation first outlined management objectives for Management Plan #3 in the "SMOOP" document in October 1999. No public or government agency comment was received specifically addressing the management objectives. RCFC has modified some of these somewhat while still being consistent with the SMOOP document.

3.1 Management and Utilization of the Timber Resource

Objectives for the management and utilization of the forest resource are:

- Manage the licence area according to environmentally sound integrated resource use principles and land-use plans within the context of government regulations and guidelines.
- Harvest the various forest types in proportion to their relative abundance within the operable land base. This is sometimes referred to as "harvesting the profile"
- Use forest management and harvest planning strategies that will sustain the long term productivity of the working forest while minimizing impact on non-timber resources including fish, wildlife, recreation, biological diversity, wilderness and water.
- Use harvest methods that best suit the on-site conditions and that allow access to all areas of the timber harvesting landbase.
- Maximize conifer timber utilization.
- Explore utilization of the deciduous timber resource.
- Manage the forest in a manner that will produce a continuous flow of logs of suitable quality and quantity while maintaining other resource management goals.
- Recommend an annual allowable cut (AAC) which reflects the timber producing capacity of the landbase, the needs of non-timber resource users, and the social and economic values related to TFL 56.
- Cooperate with the District Manager in the sale of Small Business Forest Enterprise Program (SBFEP) timber licences within the TFL, explore the possibility of defining a fixed area for the SBFEP to permanently operate in, and encourage the use of the same standards for calculation of harvest volumes (see section 1.6, Resource Issues).

3.2 Protection and Conservation of Non Timber Values

Objectives for protection and conservation of non-timber volumes are:

- Continue to use visual landscape planning principles and design in harvest planning and to coordinate visual landscape planning with other non-timber resource users.
- Minimize the effect of forestry activities on water quality, quantity, and flow timing.
- Continue to provide opportunities for public recreational use at the current level and to explore opportunities for increase and enhancement in the future.
- Protect cultural heritage resources.
- Provide a diversity of habitat capable of supporting viable populations of native fish and wildlife species.

3.3 Integration of Harvesting with Non-Timber Uses

Objectives for integrating harvesting with non-timber uses are:

- Consider the needs of other licenced users during planning and operations within TFL 56. At present, these users include guide outfitters, helicopter ski and hiking operators, miners, and water users.
- Foster a cooperative relationship with first nations groups having an interest in the TFL area.

3.4 Forest Health and Forest Protection

Objectives for maintenance and protection of the forest resources are:

- Maintain a forest health program that will promote healthy conditions within the forest
- Minimize losses caused by forest fires, insects, diseases, and other damaging agents.

3.5 Silviculture

Silvicultural objectives include:

- Maintain a basic silviculture program that complies with the Forest Practices Code of B.C. Act and ensures prompt and appropriate restocking of productive forestland.
- Undertake selected treatments on free-growing stands that result in increased forest growth, reduced losses to pests and diseases, and improved timber quality in the future.

- Complete a silviculture strategy during the MP #3 period. This strategy will set goals for future timber quality, and suggest treatments to achieve the goals. Timber quality is a concept that is dependant on the end-product desired. For example, spruce used for sound boards must be clear, fine grained and even in texture; yet spruce for timber frame construction may be considered high quality if it is large diameter, tight knotted, and free of decay. It is important then that the strategy must look at projected end-product use of our growing forests.

3.6 Roads

Objectives relating to forest access structures are:

- Design, construct, and maintain roads in accordance with all applicable Ministry of Forests requirements.
- Respond promptly to road-induced erosion hazards in order to minimize environmental damage.
- Deactivate roads in accordance with all applicable Ministry of Forests requirements.

3.7 Other

Other objectives include:

- Provide open and accessible information to the public concerning the management of TFL 56.
- Provide local opportunities by hiring local consultants and contractors when available.

4.0 Planning

4.1 General

Forest planning on TFL 56 follows this general pattern:

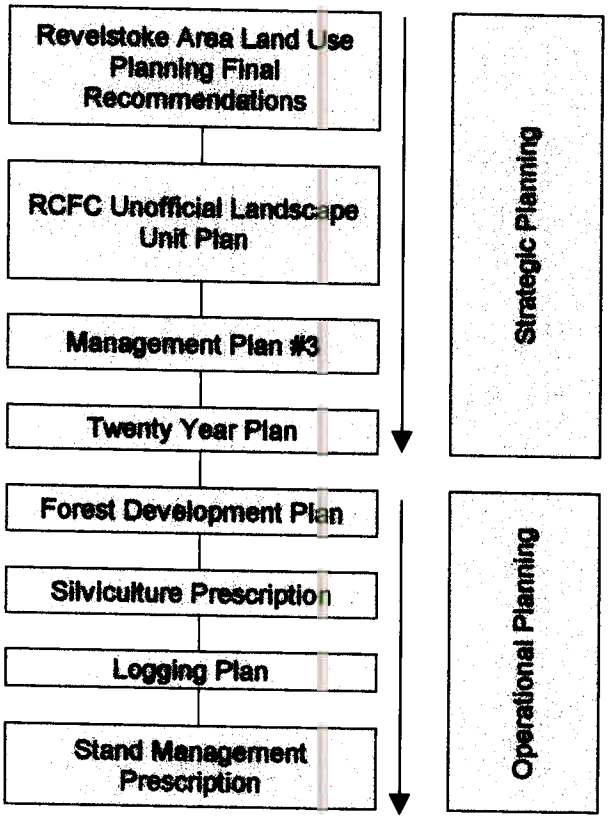


Figure 17. Planning Schematic.

TFL 56 occupies a very challenging landscape. Extreme topography, productive forestland (often occupied by low value forests), recreationally valuable landscapes, and valuable habitat combined with a historic harvest pattern that is at odds with present-day management ideals together create considerable planning challenges. In this environment, RCFC must profitably harvest and reforest its lands while ensuring that future opportunities will not be compromised, and other resources are adequately managed.

In order to profitably harvest both now and in the future without compromising other forest values, careful planning must take place. The basis of any sound planning process is good information. RCFC has collected or recently improved the following information:

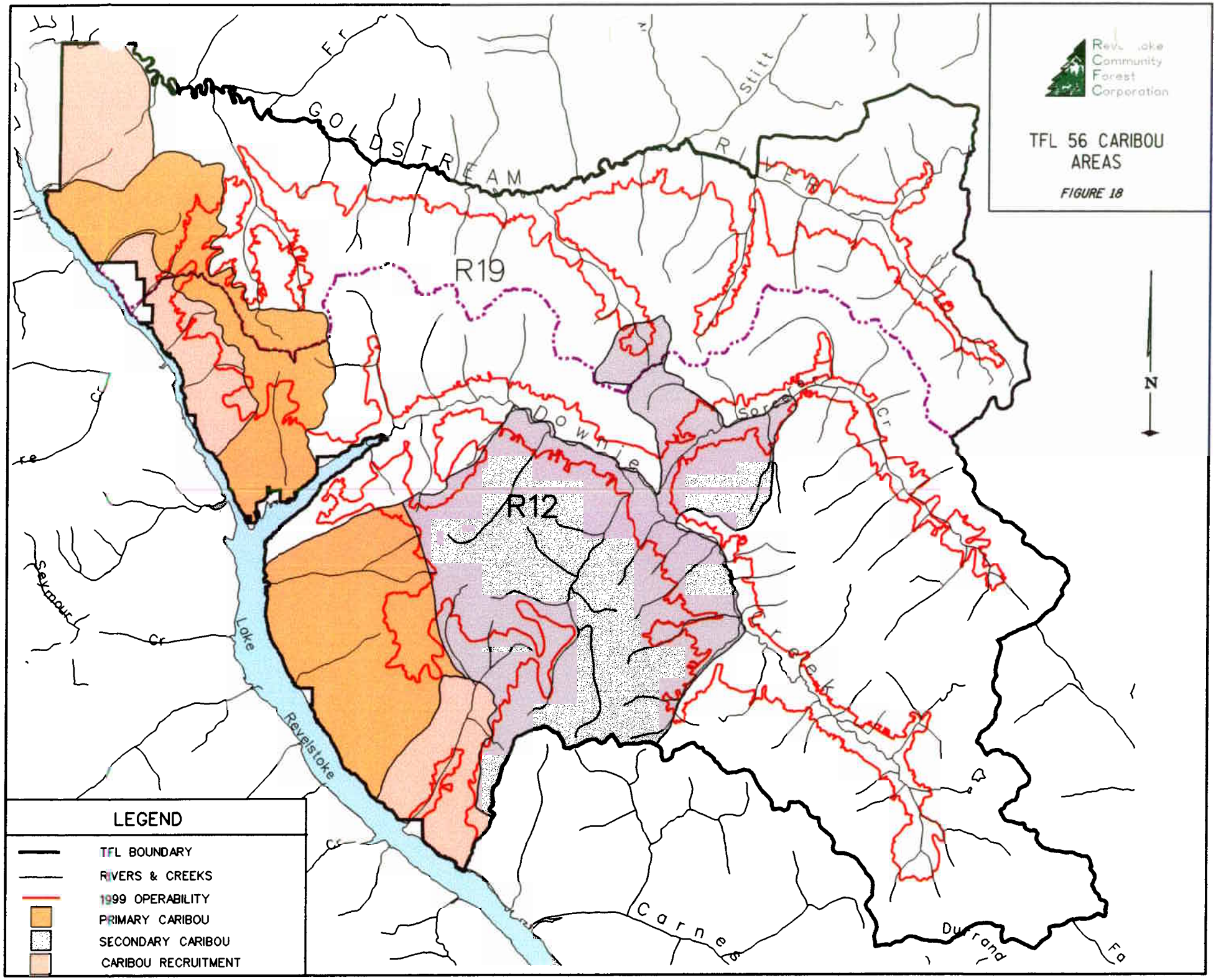
1. Aerial photography
2. Digital orthophotos
3. 1:5,000 5-metre contour interval mapping
4. Total chance harvest plans
5. Operability mapping
6. Forest cover mapping
7. Avalanche likelihood mapping
8. Caribou habitat mapping
9. Recreational features inventory
10. Recreation opportunity spectrum classification
11. Terrain stability mapping
12. Stream, lake, and wetland classification and inventory

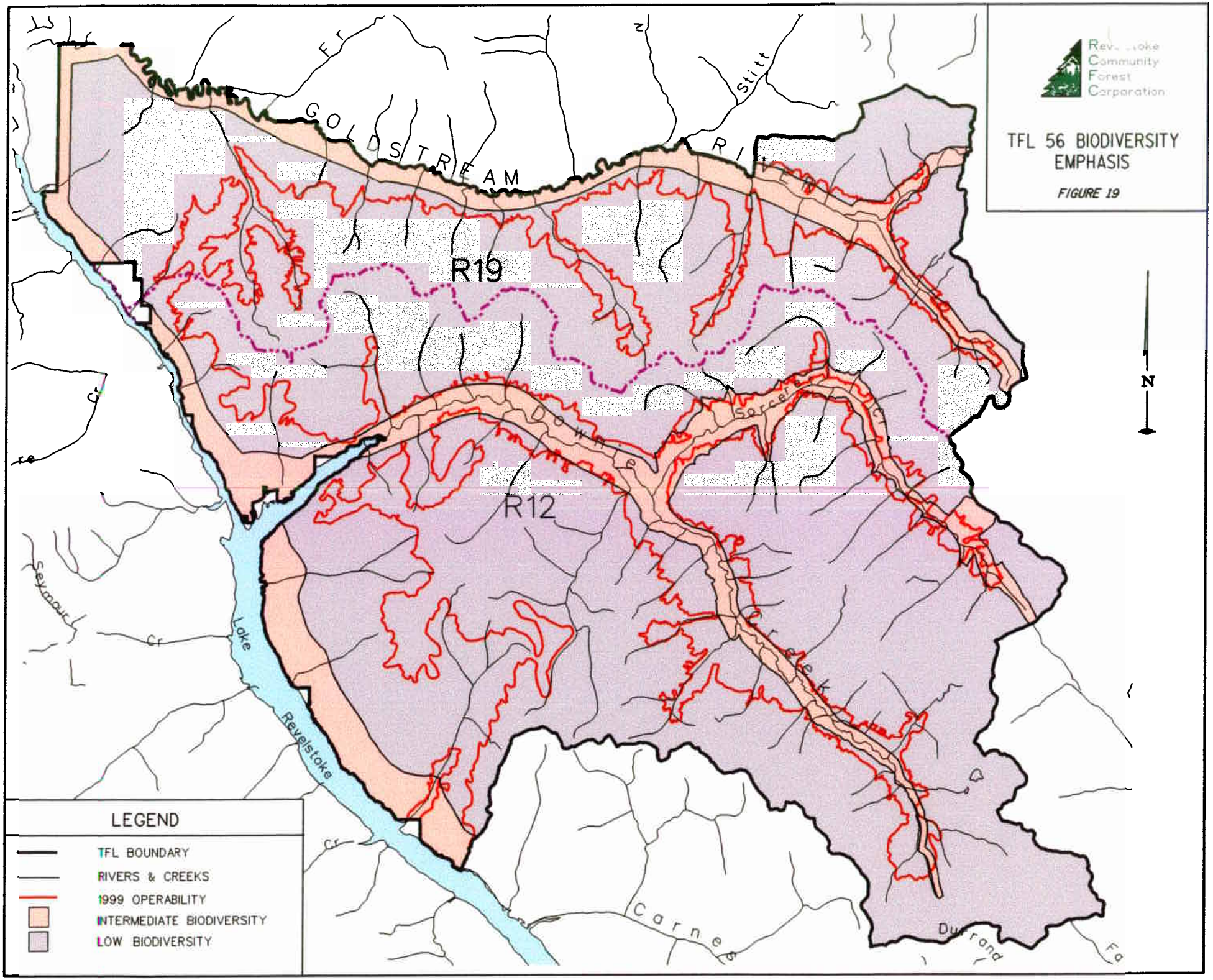
The information collected is of limited utility unless it is in a form that is convenient to use. To this end, RCFC has developed, through local consultant Azimuth Forestry and Mapping Solutions, a digital map database with layers that include:

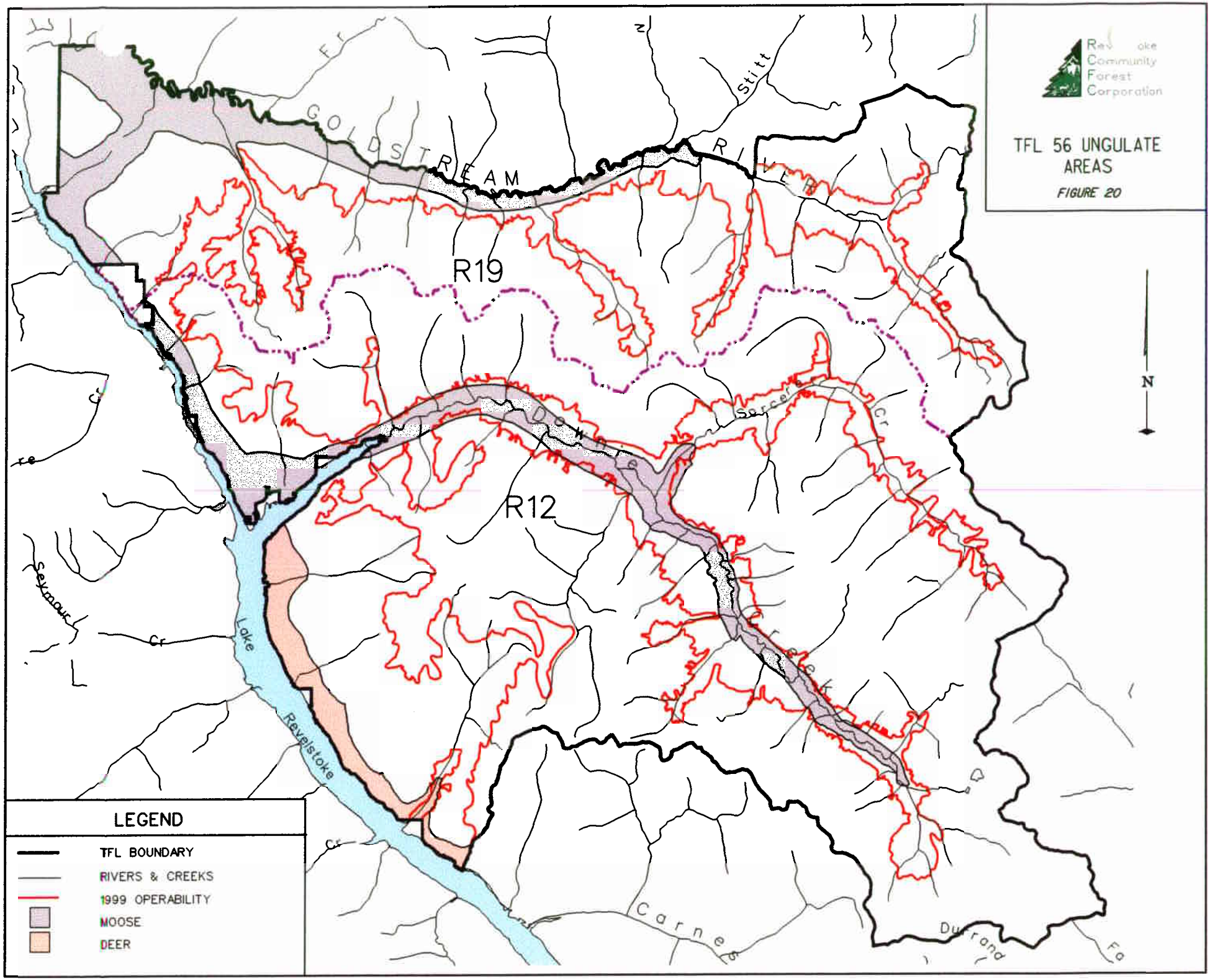
1. TRIM map data
2. Forest cover data
3. Biogeoclimatic zone line work
4. 5-metre contour interval mapping
5. Digital orthophotos
6. Operability mapping
7. Total chance harvest plans
8. Recreation inventories
9. MAC final land use recommendations

With this information in the RCFC database, intensive planning is both possible and effective. RCFC began an intensive planning project in 1998. The initial objective was to delineate a truly operable landbase while setting aside areas to meet forest cover objectives required for biodiversity, caribou, ungulate winter range, and other resources.

To complete this project, RCFC split the landbase into discrete management units. These were determined by first separating the TFL into the Landscape Units (R12 and R19) specified in the MAC plan. Then biogeoclimatic subzones and variants were overlaid (ICHvk1, ICHwk1, ICHmw3, and ESSFvc). Biodiversity zones (low and intermediate emphasis), caribou management zones (primary, secondary and recruitment), and ungulate winter range zones (deer and moose) were added. This split the TFL into nearly 40 discrete zones with unique forest cover constraints. RCFC used this information to create the RCFC landscape unit plan. This plan, entitled *Revelstoke Community Forest Corporation 1999 Caribou, Biodiversity, and Ungulate Analysis* describes the forest cover requirements in each management zone, describes the present state of forest cover, and sets reserves to best meet the forest cover requirements. It is not an "official" landscape unit plan (LUP) as described in the Ministry of Forest's *Landscape Unit Planning Guide* but does meet most of the objectives for an official LUP and can be easily adapted to meet other objectives.


Revelstoke Community Forest Corporation
TFL 56 CARIBOU AREAS
FIGURE 18
GOLDSTREAM
Stitt
RIVER
R19
R12
Downie
Seymour
Cr
Lake
Revelstoke
Carnes
Durand
N
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
1999 OPERABILITY
PRIMARY CARIBOU
SECONDARY CARIBOU
CARIBOU RECRUITMENT


Rev. Loke Community Forest Corporation
TFL 56 BIODIVERSITY EMPHASIS
FIGURE 19
GOLDSTREAM
R19
R12
Downie
Sorcerer Cr
Seymour Cr
Loke
Revelstoke
Carnes
Durrond
N
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
1999 OPERABILITY
INTERMEDIATE BIODIVERSITY
LOW BIODIVERSITY


Revelstoke Community Forest Corporation
TFL 56 UNGULATE AREAS
FIGURE 20
GOLDSTREAM
R19
R12
Downie
Seymour
Lake
Revelstoke
Carnes
Durrand
N
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
1999 OPERABILITY
MOOSE
DEER

4.2 Strategic Plans

4.2.1 Kootenay-Boundary Land Use Plan

The Commission on Resources and Environment (CORE) was created in 1992 to address land use planning issues throughout the province. The Revelstoke area, including TFL 56, was included in the Kootenay-Boundary Land use Planning (KBLUP) CORE process.

In 1994, CORE issued the West Kootenay Report. This report, which included Revelstoke, predicted a large decrease in timber supply due to its recommended management practices. The residents of the Revelstoke area were understandably concerned with this result and felt that local experience and expertise could be used to develop a plan that better addressed the values identified. The residents requested the opportunity to develop their own recommendations and the government agreed to consider this.

A community committee was appointed to develop an alternative approach. The committee, known as the Minister's Advisory Committee (MAC), became involved in the land use planning process. The main task was "to begin to implement the West Kootenay Land Use Plan for Revelstoke and Area by developing strategies which address the values identified"[1].

Meanwhile work on the KBLUP continued. The provincial government in July 1997 approved the KBLUP Implementation Strategy. The MAC recommendations will be considered a subset of the KBLUP. RCFC's TFL 56 is entirely within the area that the MAC recommendations cover.

4.2.2 Revelstoke and Area Land Use Planning Final Recommendations

The *Revelstoke and Area Land Use Planning Final Recommendations* were released in October 1999. Although not given final approval yet by the government, RCFC has abided by all the guidelines and used them to determine the "base case" timber supply forecast in the *Timber Supply Analysis Report.* The MAC draft recommendations have been "recommended" practice on the last two Forest Development Plans.

Excerpts of the Minister's Advisory Committee *Revelstoke and Area Land Use Planning Final Recommendations* report (MAC report) that are pertinent to RCFC's landbase are available in Appendix 3.

[1] Revelstoke and Area Land Use Planning Recommendations, October 1999

4.2.3 RCFC Landscape Unit Plan

The RCFC landscape unit plan entitled *Revelstoke Community Forest Corporation 1999 Caribou, Biodiversity, and Ungulate Analysis* was formulated in 1999 using the following procedure:

1. Information was gathered as discussed above.
2. The current forest conditions for each management zone were determined by GIS analysis.
3. Using the Total Chance Harvest Plan (TCHP), individual harvest units were used as building blocks to build *mature forest retention areas* (MFRA's). The MFRA's were used to meet mature and old forest cover requirements.
4. A GIS analysis was then used to see if forest cover requirements were met. If not, then the MFRA's were modified or recruitment areas added if there was not sufficient area in the appropriate age classes. This was an iterative process.
5. When the process was complete for the entire TFL a meeting was held with local Ministry of Forests staff and the Forest Ecosystem Specialist from the Ministry of Environment Lands and Parks. The purpose of the meeting was to review the plan with government staff in order to obtain approval in principle.
6. Some modifications were made as a result of the meeting and a subsequent Forest Service review of the plan.

The end result is a report and digital map that:

1. Quantifies current forest conditions for each management zone.
2. Maps mature forest retention areas designed to meet forest cover goals.
3. Quantifies the "reserved" area and compares it to the forest cover requirements.

The report is contained in Appendix 5 of the *Timber Supply Information Package.* The results will be used in creating forest development and other plans.

The results were used in the Timber Supply Analysis. During the analysis additional net downs (for slope stability, riparian areas, wildlife tree patches, low productivity) supplemented the MFRA's. These supplementary areas serve to increase the amount of mature and old timber available for caribou, biodiversity, or ungulate purposes and in most cases eliminate deficits in the management zones' mature and old timber accounts. Where there was still a deficit, the timber supply analysis model applied constraints to ensure that mature and old targets were met as soon as possible.

4.2.4 Timber Supply Analysis

The timber supply analysis is used to provide a basis for the Annual Allowable Cut (AAC) proposed in Management Plan #3, to provide a projection of expected timber supply over the next two centuries, and to provide an approximation of selected forest conditions over time. The full report, entitled *Timber Supply Analysis Report, Tree Farm Licence 56, Management Plan #3*, is in Appendix 4.

RCFC chose to use *Forest Planning Studio* (FPS-ATLAS) to provide timber supply forecasts. It is a spatially explicit, forest-level simulation model that was developed by Dr. John Nelson at the University of British Columbia. In brief, this model is designed to schedule harvests according to a range of spatial and temporal objectives (i.e. harvest flows, opening size, riparian buffers, seral stage objectives and patch size distributions). Silviculture system, rotation age, and growth and yield curves can be assigned to each polygon. Polygons are grouped to form analysis areas called cliques that have constraints applied – the model will not "harvest" the polygon if constraints for that clique are violated. Overlapping constraints – a common feature in TFL 56 – are handled by having polygons in more than one clique.

The output of this model includes harvest forecasts – as do non-spatial models – but also includes maps showing where the model "thinks" it is harvesting in any selected time period. These maps have proven to be an effective tool for assessing forest cover changes over time.

The analysis had the following objectives:

1. To maintain the current AAC as long as possible
2. To limit declines to no more than 10% per decade.
3. To not allow harvest levels to drop more than 15% below Long-term Harvest Level (LTHL).
4. To achieve a LTHL that reflects the productive capacity of the landbase and the current level of forest management.

The analysis was completed on a net landbase described in Table 6 and depicted on the net-down map in the information package. The gross area of TFL 56 is 119,747.6 hectares, but with the series of net-downs, the long term THLB is 20,513.1 hectares.

Table 6. Land Base Net-down Summary.

	Area (ha)[2]			Coniferous (m^3) [3]
	Operable 99	Inoperable	TFL 56	TFL 56
TOTAL	42778.7	76968.9	119747.6	16,616,361
Non Productive/ Non Forest	4472.2	55307.0	59779.2	0
Non Classified Roads	957.8		957.8	141,487
Productive Forest	37348.7	21661.9	59010.6	16,474,874
Less				
Inoperable		21661.9	21661.9	5,526,325
Keystone LRUP Reserve	1745.1		1745.1	443,078
Unstable Terrain	1979.2		1979.2	777,280
Low Sites	298.7		298.7	62,325
Problem Forest Types	247.6		247.6	44,271
Deciduous Forest Types	837.0		837.0	0
Riparian Reserves	1049.8		1049.8	373,887
Long-term Low Stocking	223.1		223.1	
Wildlife Tree Patches	266.0		266.0	79,800
Timber Harvesting Land Base	30702.2	0.0	30702.2	9,167,908
Less Long-term Removals				
Future Roads	963.0		963.0	305,790
Retention Areas	9226.3		9226.3	3,440,892
Long-term THLB	20513.1	0.0	20513.1	5,421,256

The base case was modeled as follows:

- The Timber Harvesting Landbase as defined in Table 6 was used.
- The Mature Forest Retention Areas (MFRA's) identified in the *Revelstoke Community Forest Corporation 1999 Caribou, Biodiversity, and Ungulate Analysis* (RCFC LU Plan) were used in place of modeled constraints except in the case of Downie Valley deer winter range and Goldstream Valley moose winter range. In these two cases, minor variations from the required forest cover constraints were present in the RCFC LU Plan. As can be seen in Table 6, 9,226.3 hectares are reserved from harvest to meet forest cover constraints (due to caribou, ungulate winter range, and biodiversity forest cover constraints)
- An initial harvest level of 100,000 m^3/yr (current AAC) was used.

[2] The areas presented above do not include any overlap between classifications. Deductions were made in the order presented above such that overlapping classifications are removed by the net-down occurring first on the list.

[3] Volumes are coniferous net volumes based on minimum 17.5 cm dbh utilization standard.

- Other assumptions are outlined in the Timber Supply Analysis document in Appendix 4.

Because most timber harvesting constraints have been dealt with through the MFRA system, the model harvests timber on the remaining landbase with few forest cover constraints. Wildlife tree patches (WTP's), patch size goals, ungulate winter range, and group selection harvest systems are the only management issues left to determine where and how harvesting occurs in the working portion of the THLB, and their effects are relatively minor.

The base case harvest projection in Figure 21 shows that the current AAC (100,000 m3/yr) can be maintained for twenty years before dropping to a long-term harvest level (LTHL) of 74,100 m3/yr.

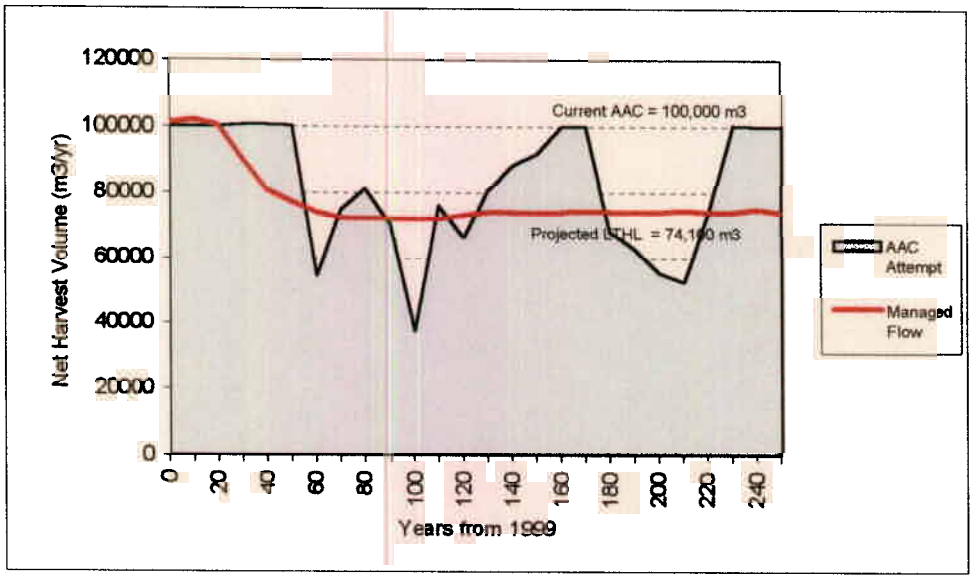


Figure 21. Base Case Harvest Forecast for TFL 56.

Figure 21 also shows a harvest projection that attempts to harvest the AAC for the entire planning horizon. This indicates that the current AAC could be harvested for 50 years before falling sharply in the sixth decade followed by several other significant troughs. The *managed flow* line smoothes the erratic *AAC attempt* by conserving harvestable timber in the "peaks" with which to "infill" the troughs.

As part of the base case analysis, several non-timber values were analyzed. Caribou seral goals, ungulate seral goals, and biodiversity seral and patch size goals were analyzed and these are discussed further in Section 5.

Sensitivity analyses were conducted around several issues:

1. Alternate harvest profiles.
2. THLB biological potential.
3. Old growth site indices.
4. Minimum harvest ages.
5. Natural stand volumes.
6. Managed stand volumes.
7. Landscape level biodiversity.
8. Aerial hemlock harvest.
9. Old seral stages.
10. Mature seral stages
11. Harvest priorities.
12. Seral goals met as quickly as possible in "Recruitment Caribou" zone.
13. Seral goals met entirely using constraints rather than reserves.

In the **alternate harvesting profile** sensitivity analysis, several scenarios were examined including:

1. Maximum start – Start harvesting at the maximum cut level without compromising LTHL.
2. One drop – Continue harvesting at the current AAC as long as possible, then drop to LTHL.
3. Drop immediately to LTHL

All of these scenarios resulted in LTHL's very similar to that of the base case (within 2%).

To assist in putting the base case harvest scenario in perspective, a **biological potential harvest scenario** was also completed. This scenario is not a possible option for the management of TFL 56 because it does not address any of the non-timber values on the land base – but it does provide an upper bound on potential timber production.

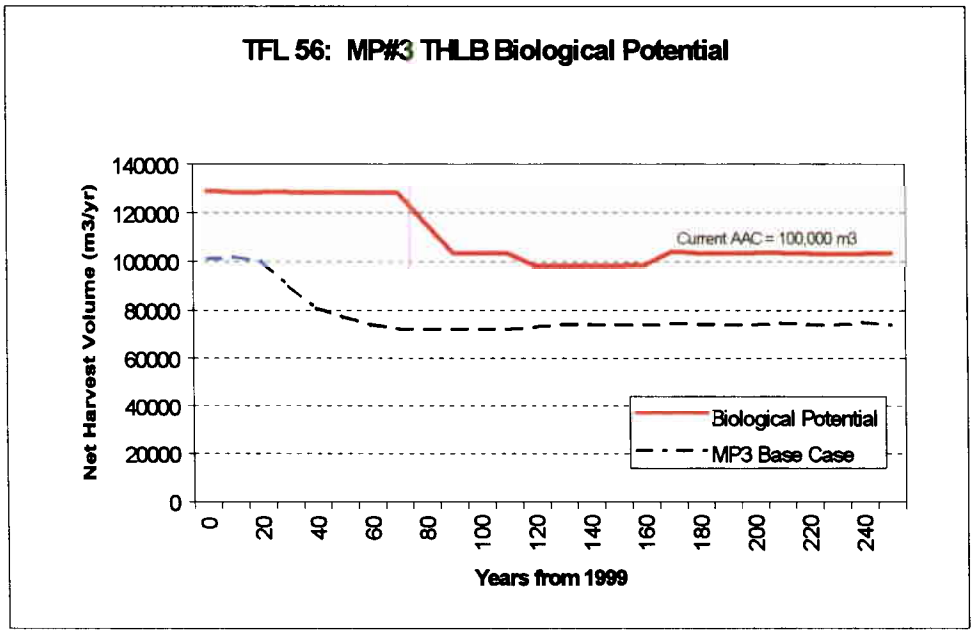


Figure 22. Biological Potential for the THLB.

In the **old growth site indices sensitivity analysis**, the effect of changing site indices on old growth stands to reflect the OGSI studies was examined. In this case, LTHL increases 18% to 85,100m^3/yr. If one also changes minimum harvest ages to reflect the new data, LTHL is slightly higher than the 85,100m^3/yr quoted earlier, and is achieved several decades earlier. The effects are illustrated in Figure 23.

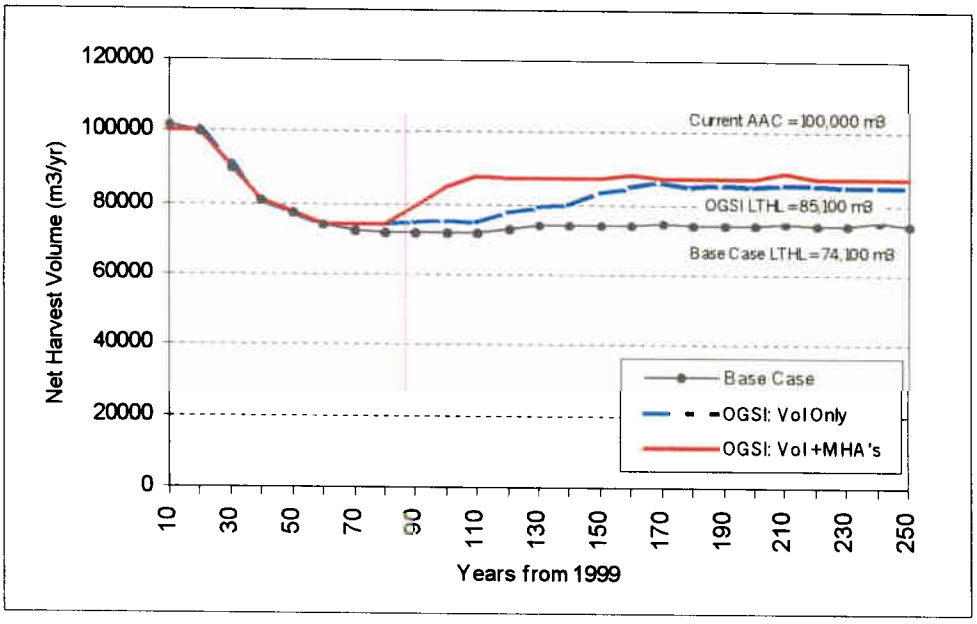


Figure 23. Harvest Projections Using OGSI Adjustments.

Minimum harvest ages were adjusted up and down by 10%. There was very little change in the LTHL's in either case. However, adding 10 years to the minimum harvest ages reduced the time that the existing harvest levels can be maintained. Reducing minimum harvest ages by 10 years increased the time that existing harvest ages can be maintained without significantly effecting later harvest levels.

Natural stand volumes are subject to uncertainties relating to forest inventory data and the statistical process by which the equations for the growth and yield model are derived. Although no issues related to existing volumes were identified in the recent inventory audit for TFL 56, standard sensitivity analyses were completed to address the possibility of volume estimates being off by 10%.

When volumes for existing stands were decreased by 10%, the two decades of current AAC shown by the base case were no longer available. The initial harvest level dropped to 89,900 m^3/yr and then transitioned to the LTHL of 74,100 m^3/yr. This result occurs because the existing old stands now provide less volume and must be harvested at a slower rate in order to mete out the available volume until significant areas of regenerated stands come on line in decade six.

Uncertainty around **managed stand yields** exist for the same reasons listed for natural stand yields (inventory data and G&Y model equations). The limited amount of experience with regenerated managed stands in the Revelstoke area results in additional uncertainty when predicting future harvest volumes. Sensitivity analyses were completed to address the possibility of volume estimates being off by 10%.

When managed stand volumes were decreased by 10%, the mid and long-term harvest levels were decreased to 67,600 m^3/yr (9% drop in LTHL). This occurred

because the regenerated stands that came available through time provided less volume. The short-term harvest level did not change, as it is entirely made up of existing natural stands.

When managed stand volumes were increased by 10%, the mid term harvest levels increased by 3% to 74,500 m^3/yr and long-term harvest levels increased by 10% to 82,500 m^3/yr. This occurred because the regenerated stands that came available through time provided more volume. The short-term harvest level did not change, as it is entirely made up of existing natural stands.

The modeling of **landscape level biodiversity** requirements was completed to view the results of the provincial rules being applied rather than the MAC plan. A weighted average of all three emphasis options (45% low, 45% inter, 10% high) for each BEC zone in each draft landscape unit was completed. This method of modeling biodiversity requirements is significantly different from the MAC strategy used in the base case. This sensitivity analysis illustrates the change in harvest flow associated with using the provincial biodiversity modeling strategy. Differences between the two modeling strategies are quite significant – implementation of provincial biodiversity would result in an increase in the LTHL of approximately 11%.

RCFC's Total Chance Harvesting Plan that was used as a basis for setting up the spatial analysis has a significant proportion of stands proposed for aerial harvest. Approximately 656 hectares of these are old (>140 years) hemlock stands. A sensitivity analysis was completed around the issue of excluding the **aerial hemlock stands**. Short-term harvest levels are approximately 5% less than in the base case, with long-term harvest levels slightly lower at 72,200 m^3/yr. This result occurs because there is less old forest to mete out until regenerated stands come on line in the sixth decade and the smaller net land base provides less volume in the long-term.

Sensitivity around the **old seral stages** may be an issue. More specifically, would a lower age definition for "old" affect the timber supply analysis. The accuracy of the inventory data for the age of older stands is somewhat suspect. All stands over 215 years are presently identified as either 225 or 325 years old – a somewhat improbable scenario. In addition, the map sheets covering the Goldstream LU do not identify any stands over 225 years old. This is not consistent with age data collected during silviculture prescription fieldwork. The accuracy of older stands is potentially an issue because the large area of 225 year old stands does not currently meet the definition of *old seral* within natural disturbance type1 (NDT1).

No specific computer runs were made to look into the sensitivity of old seral stages because in the base case, old seral goals were not constraining in any zone -- RCFC's retention areas (MFRA's) included enough of the oldest stands available to ensure that the old seral goals were met as soon as possible. In almost all cases, there was a large surplus of old stands because stands reserved for mature seral goals also met the old condition. Thus, lowering the definition of old to 225 years would only change the time when the old seral goal is officially met -- it would not alter the base case timber supply projection.

Sensitivity around **mature seral stages** was also a possible concern. Again, no specific runs were necessary for similar reasons as stated above for "old seral" requirements". A reserve strategy will be the most efficient way of meeting the constraint and will have a set impact on the land base (i.e. 150 ha out of production). This area loss will result in a consistent long-term impact on timber supply regardless of the mature seral age.

It should be noted that although the age that a stand is considered "old" or "mature" will not affect the amount of MFRA set aside, it could effect the placement of MFRA's because they are built around existing stands that meet the current definition of old or mature. A better overall MFRA network may be possible using flexible definitions for these two terms.

Changes to **harvest priorities** had almost no effect on timber supply. When runs were completed without the oldest first priority, several harvest profiles showed a small dip (4%) in decade eleven and twelve. Changes to the priority zoning showed no change in timber supply but did result in different landscape patterns over time – although the patch size distributions still appeared to have a high percentage of smaller openings.

Forest cover requirements were addressed in the base case primarily through the application of RCFC's landscape level MFRA strategy. The MFRA's ensure that the seral goals for each of the management zones are met over time. In several zones, stands too young to currently meet the seral goals were included as MFRA's in order to address long-term connectivity and to give future replacement options. Because of this, **seral goals were not met as soon as possible** in two ungulate zones and three recruitment caribou zones. In the base case analysis, the ungulate zones had constraints applied to ensure that the seral goals continued to be met or were met as soon as possible. The recruitment caribou zones in the base case used RCFC's MFRA's and had violations occur.

This sensitivity analysis looks at the impacts of using constraints to enforce strict adherence to the seral goals in recruitment caribou zones. The results show a slightly weaker harvest projection. The current AAC can only be maintained for one decade before it drops to slightly lower mid-term levels than the base case. Long-term harvest levels are not affected.

As has been mentioned previously, RCFC set up a system of MFRA's to ensure forest cover constraints were met. These MFRA's were set in places where they would be functional for their intended purposes (i.e. ungulate winter range, caribou habitat, biological diversity), link together in a logical fashion, and if possible, where impact on timber values would be minimized. A sensitivity analysis was designed to allow the computer to meet **seral goals entirely using constraints rather than reserves**. The initial harvest level could be maintained for an extra decade and then drop to a long-term harvest level of 89,100 m3/yr.

Conclusions derived from these sensitivity analyses are:

- RCFC's MFRA strategy places more area into retention than when the model is allowed to choose locations.
- RCFC's MRFA strategy can likely be refined to include less area but the practical location of reserves to accommodate operational realities while considering other resource values will generally result in a bigger impact on timber supply than simply modeling percentages.
- The base case harvest projection (RCFC's MFRA's) should be considered a worst-case harvest projection for the impacts of seral goals.

4.2.5 20-Year Plan

A 20-year plan is a traditional part of the Management Plan process. One purpose of this plan is to provide spatial verification that the proposed AAC is feasible given all of the guidelines, constraints, and rules that apply to the landbase. With the use of a spatial model such as FPS-Atlas, the 20-year plan is merely a subset of the output that is available. The entire planning horizon can be viewed spatially with its associated timber and non-timber outputs. The 20-year plan presented in the *Timber Supply Analysis Report* is simply a summary of the first 20 years of model results. The assumptions and data used in the 20-year plan are therefore the same as those documented for the base case. Harvest forecasts and non-timber outputs (seral stages, patch size, etc) associated with the 20-year plan are also consistent with the base case and can be found in Section 6.4 of the *Timber Supply Analysis Report* (Appendix 4).

4.2.6 Local Resource Use Plans

Local Resource Use Plans (LRUP's) may be required when critical resource issues or demands in a particular area cannot be resolved by the usual planning process. A LRUP is a resource management plan with detailed prescriptions for a specific area. A formal committee prepares it with representatives from government, the public, and the affected Licensee. Specific terms of reference are drawn up to ensure that a LRUP achieves a consensus from all parties involved.

If a contentious resource issue concerning an area on TFL 56 arises that requires a high degree of public input, RCFC is prepared to initiate and participate in a LRUP process.

At present, one LRUP is in effect on TFL 56. This plan, completed in 1993, covers the Keystone Standard Basin. Activities in this area will be incompliance with the plan.

4.3 Operational Plans

The requirements for operational planning are detailed in the *Operational Planning Regulation* of the *Forest Practices Code of B.C. Act.* Further direction is provided in the Guidebooks and in direction from the Ministry of Forests. The following table outlines the current operational level plans.

Table 7 Operational Level Plans.

Type	Purpose	Renewal
Forest Development Plan (FDP)	Indicates proposed harvesting and road building for a five-year period	Biannually or annually as required by District Manager
Silviculture Prescription (SP)	Prescribes the silviculture system, harvesting method and reforestation standards for the proposed harvesting area.	Created and amended as needed
Logging Plan	Provide site-specific instructions for logging crews. These are no longer required by regulation, but are continued as a RCFC initiative.	Created and amended as needed.
Stand Management Prescription	Prescribes the silvicultural treatments to be carried out on a free growing stands.	Created and amended as needed.

4.3.1 Forest Development Plans

RCFC is obligated as a condition of the Tree Farm Licence Agreement and Operational *Planning Regulations* to prepare a Forest Development Plan (FDP). Implementation of strategies outlined in the Management Plan and other strategic plans are linked through preparation of the Forest Development Plan.

A Forest Development Plan will be updated annually or biannually as required in accordance with direction from the Columbia Forest District. The plan will outline the proposed harvesting pattern for a five-year period. It will include information on harvesting method, silviculture system, road development, harvest volumes, and other details.

The Mature Forest Retention Area network will be shown on the 1:20,000 FDP maps. New blocks will not be proposed within the MFRA's unless suitable substitute MFRA areas are designated. The need for Ministry of Forests-generated timber availability numbers will be eliminated because the Caribou, Biodiversity, and Ungulate Analysis will supersede these numbers.

The Forest Development Plan will be referred as a draft to the Ministry of Forests and the Ministry of Environment Lands and Parks. It will also be advertised and made available to the public prior to approval by the Ministry of Forests. The public review period will include an "open house". All comments, issues, and concerns received by RCFC will be considered in the preparation of the final plan.

4.3.2 Silviculture Prescriptions

Silviculture Prescriptions (SP's) are prepared for all proposed cutblocks and submitted to the District Manager for approval prior to harvesting. Silviculture Prescriptions include a large amount of information including:

- Tenure information,
- Area details,
- Objectives,
- Ecological information,
- Management objectives,
- Conservation of soil and site productivity
- Silvicultural system,
- Anticipated silviculture prescription, and
- Silviculture stocking standards.

RCFC will strive to maintain the equivalent of two years' volume in approved SP's. These can then be used as components of cutting permits (Section 4.3.5).

4.3.3 Logging Plans

Logging Plans (LP's) are no longer required on area covered by SP's approved after June 15, 1998. However, RCFC will continue to prepare LP's to ensure that harvesting personnel are cognizant of all the pertinent details for each cutblock.

4.3.4 Stand Management Prescriptions

Stand Management Prescriptions (SMP's) are meant to provide information on, and a proposed prescription for, free growing stands where enhanced stand management activities are proposed. Such activities include spacing, pruning, fertilization, and other treatments. They also describe the treatments proposed, ecological site information, post-treatment stocking standards, and non-timber resource values.

SMP's must be approved by the Ministry of Forests. All actions proposed in an SMP will be consistent with the objectives outlined in the Management Plan.

4.3.5 Other Operational Plans

Other plans, prescriptions, and permits that might be considered "operational plans" include road permits, cutting permits, deactivation prescriptions, fire pre-organizational plans, and special use permits. These are described below.

Road permits are granted by the Ministry of Forests and are required prior to road construction on the Tree Farm Licence area. They must be consistent with the current Forest Development Plan.

Cutting permits are also granted by the Ministry of Forests. They provide the authority to harvest timber and must be consistent with approved FDP's and SP's. RCFC will submit a sufficient quantity of cutting permits to ensure an adequate log supply without unnecessary slow-downs in harvesting. Currently, RCFC has a *Fibre Flow Memorandum of Understanding* with the Ministry of Forests district office that specifies a desired level of approved cutting permits ($100,000m^3$). RCFC will strive to continue maintenance of approximately one year of approved cutting permits.

Deactivation Prescriptions for roads will be prepared for all planned deactivation at levels of semi-permanent or permanent. These prescriptions outline in detail the type of work required at each section of road.

Special Use Permits are required for certain uses not covered in the licence document. Examples include work camps, borrow pits, and radio repeater sites. These are updated as required.

5.0 Timber Resource Management

5.1 Allowable Annual Cut

The approved timber supply analysis (Appendix 4) presents the results of the base case and several sensitivity analyses. The analyses are briefly discussed in Section 4.2.4 of this report and fully described in the *Timber Supply Analysis Report, Tree Farm Licence 56, Management Plan #3*.

Some of the key conditions that the base case is predicated upon are:

- Use of the MAC final land use recommendations
- Use of a series of Mature Forest Retention Areas designed to meet the forest conditions set out in the MAC recommendations
- A long term harvesting landbase of 20,513.1 hectares
- An initial harvest level of 100,000 m^3 per year.

The sensitivity analyses tend to support the base case. Very brief summaries of the sensitivity analyses are:

- Using different harvest profiles reveals no trends to base a lower initial AAC on nor is the LTHL significantly affected.
- Using OGSI adjustments does not affect initial AAC and provides increased LTHL's.
- Reducing minimum harvest ages does not significantly change the LTHL, but does affect the short-term harvest levels. However, minimum harvest ages used in the base case do not appear to be unrealistic.
- Reducing natural stand volumes does not affect the LTHL, but does affect short-term harvest levels. Again, the natural stand volumes do not appear to be unrealistic.
- Reducing managed stand volumes does not affect short-term harvest levels but will change LTHL's.
- Changing from MAC biodiversity seral goals to provincial biodiversity targets (10-45-45) actually increases the LTHL and increases the time that current AAC can be supported.
- Removing aerial hemlock cutblocks reduces LTHL slightly and reduces the time that the current AAC can be maintained
- Changing the definition of mature and old seral stages does not affect the short term or long term harvest levels.
- Meeting seral goals for "recruitment caribou" zones as soon as possible caused a reduction in the length of time that the current AAC can be maintained but no affect on long term harvest levels.
- Meeting seral goals using modelled constraints instead of MFRA's led to a large increase in long-term harvest levels and an increase in the time that the current AAC can be maintained.

The analysis indicates that based upon current inventory, growth and yield projections, and management practices, timber harvesting can be maintained at the current level for two decades before changing to long term harvest levels. The sensitivity analyses show that only an overestimation of existing natural volumes would result in an immediate reduction of the AAC. All other sensitivity analyses show at least 10 years at the current AAC.

Based upon this, **RCFC recommends an annual allowable cut of 100,000m^3 per year** for the period of Management Plan #3. During the Management Plan #3 period, RCFC will explore the possibility of optimizing the reserve strategy and applying OGSI – this would result in seeing the current harvest level maintained for at least 30 years with a long term harvest level of at least 90,000 m^3 annually.

Table 8 Proposed AAC.

	2001	2002	2003	2004	2005	2006
Total TFL AAC	100,000	100,000	100,000	100,000	100,000	100,000
SBFEP	11,480	11,480	11,480	11,480	11,480	11,480
Total Licensee AAC	88,520	88,520	88,520	88,520	88,520	88,520

RCFC has a small quantity of Schedule "A" land within the TFL. This land's tenure is in the form of five timber licences (TO617, TO648, TO662, TO658, TO646) with 754 gross hectares, and 370 hectares of land in the long term THLB. The AAC prorate would be:

Net operable landbase (ha):		
Schedule A	370.1	1.8%
Schedule B	20,143.1	98.2%
Total	20513.1	100%

Because the area of schedule "A: land is so small, the actual annual harvest off of the land will vary considerably from year to year. In the long term it will average 1800 m^3 per year.

A comparison of the MP #2 AAC and that proposed for MP#3 is shown in the following table. The AAC's are identical except that RCFC is not proposing a partitioned cut.

Table 9 AAC in MP#2 and MP#3.

	Management Plan #2 Approved AAC (m^3/yr)	Management Plan #3 Proposed AAC (m^3/yr)
SBFEP portion	11,480	11,480
Partition	10,000	0
Total AAC	100,000	100,000

The partition has been eliminated in this Management Plan because of RCFC's performance in during the MP #2 period. During MP #2, RCFC consistently overachieved on its commitments to harvest in the partitioned cut. RCFC considers the entire landbase, with all its requisite harvesting and silvicultural practices; to be within the realm of RCFC's demonstrated performance.

5.2 Harvesting

5.2.1 Harvesting Priorities and Guidelines

Harvesting taking place on TFL 56 will be in accordance with the approved Management Plan, Forest Development Plan and the following documents:

- *Forest Practices Code Act* and other relevant legislation and regulations.
- Forest Practices Code guidebooks.
- *The Revelstoke and Area Land Use Planning Ministers' Advisory Committee Final Recommendations* (Appendix 3).
- Columbia Forest District's forest development plan supplement.

RCFC also uses information on other resource values that may not yet be in the above documents. For example, knowledge on caribou management is improving – RCFC will vary or improve its harvesting guidelines based on any such information that comes available.

Priorities for harvesting are set by first using the parameters set down in the above documents. Then, RCFC uses current market conditions to prioritize harvesting. For example, if spruce log prices are high, RCFC will shift harvesting to stands with a high component of spruce. With RCFC's forest inventory being rather high in low quality hemlock stands, RCFC is always ready to shift harvesting priorities to these types of stands when any improvements to hemlock pulp markets occur. As well, when markets are generally high, RCFC shifts to higher cost or lower value stands to "save" the more profitable stands for more difficult market conditions.

5.2.2 Harvesting Systems

Prior to 1994, RCFC's landbase was harvested primarily by **ground-skid** methods. This method was suitable to the gently sloped portions of the TFL.

Figure 24. Ground-Skid Harvesting.

The steep slopes were a problem, and it was apparent to RCFC when they purchased the TFL that use of suitable harvesting systems would be the key to effective utilization of the TFL 56 forested landbase. Soon after the purchase in 1993, RCFC shifted primarily to **cable harvest** systems. However, even cable did not allow full utilization of the landbase. In Management Plan #2, RCFC stated, "In the future, RCFC foresees the need to introduce other alternative logging systems. These may include multi-span skylines, helicopters and long-line yarding systems." Further, RCFC committed to "incorporate all or some of these alternative logging systems during the period of Management Plan #2"

Figure 25. Cable Harvesting.
Schiller Logging's 90-foot Madill spar in the upper Downie Valley

RCFC first tried **helicopter harvesting** in 1995. RCFC proceeded with several blocks in an isolated area in Downie Valley and found that it was viable on TFL 56. Since then, RCFC has increased the proportion of lower quality timber in helicopter harvest areas and has used helicopters every year. In 1994, helicopter harvesting comprised close to 0% of the area harvested (some helicopter cedar salvage took place). By 1998 helicopter harvesting comprised 11% of the area harvested annually. Helicopter harvesting is now a current practice" on TFL 56.

Figure 26. Helicopter Harvesting.
CP 172 block 4 in the Sorcerer Valley.

RCFC started **longline harvesting** in 1997 with a single block harvested by a local contractor, Murray Saunders, who had developed a skyline machine. The block was completed successfully at a lower cost than if the block had been logged by helicopter. Mr Saunders is now (November 2000) completing his second block on TFL 56. Meanwhile, RCFC staff investigated Wyssen skyline systems – one of our contractors bought a **Wyssen system** and as of November 2000, has completed his third block on TFL 56 with the system. The two skyline systems available now give us a theoretical capacity in excess of 20,000 m^3 annually. It is considerably less expensive to harvest with a longline or skyline system than a helicopter system.

Figure 27. Skyline Harvesting.
To the left is CP 172 block 1 in the Sorcerer Valley harvested in late 2000 with a Wyssen skyline owned by Encampment Creek Logging of Revelstoke. On the right is an intermediate support and jack for the same Wyssen system employed at Devil's Garden.

RCFC continues to investigate other systems for use on TFL 56. Some that warrant mention here are:

- Use of **long distance forwarding** with other harvest systems – This is to reduce road costs in cases where the costs would exceed the value of the wood accessed by the road. A forwarder would use a narrower and steeper road thereby lessoning the amount of road and the unit cost of the road.

- Summer **ground skid harvesting using low ground pressure equipment** – This would be to reduce snow-ploughing costs in high elevation areas. RCFC has shied away from summer ground skidding mainly because few areas were found suitable in recent years and if found suitable, there was a local prejudice against such systems because of poor practices in past decades. New operating areas, such as cutting permit 222, are presently being harvested using this method.

- **Hybrid systems** – This includes combination helicopter/cable or helicopter/ground skid. Such hybrid systems allow the creative use of leave trees or larger reserves where required for such reasons as avalanche amelioration or slope instability retention areas. The recently harvested cutting permit 121 block 3 employs a hybrid heli/cable system.

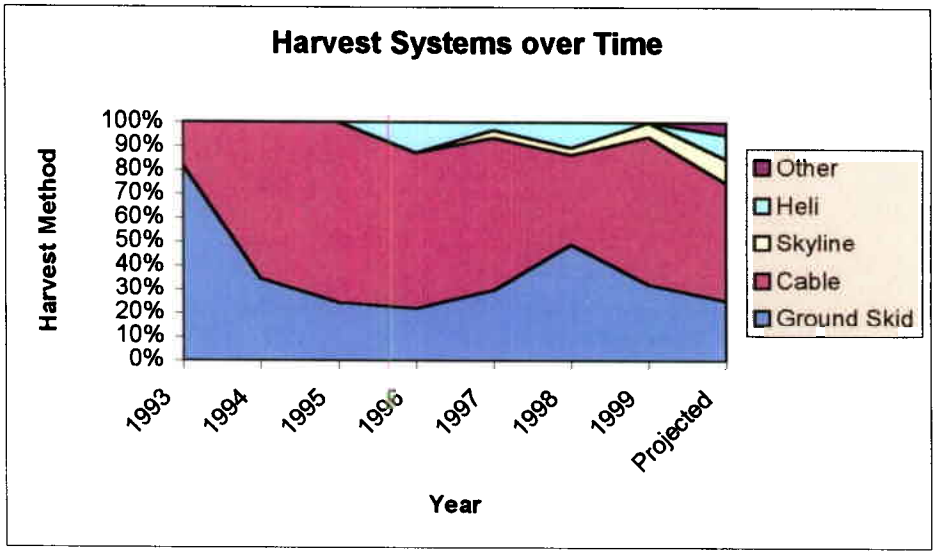


Figure 28. Harvest Systems In Use In TFL 56.

In the chart above, the trends described in the above paragraphs are apparent. In 1993, over 80% of the harvest was derived from ground skidding. Ground skidding resurgence in 1997 and 1998 reflected special winter ground skidding in group-selection silvicultural system areas. In the longer term, ground skidding is expected to comprise 25%. Cable systems were rapidly deployed in 1994 to cope with the steep slopes in the TFL and have become the most common system. In the longer term, use is expected to be about 50%. Helicopter systems were initially tried in 1995 and continue to be used at an average rate of about 9%. Average use is expected to increase to 10%. The first skyline area was logged in 1997 – use of skyline and longline systems is projected to increase in the future (to about 10%) now that RCFC has two machines available.

In the MP #3 period, RCFC expects that the projection indicated on the above chart will be reasonable. "Other" systems, as described in the paragraphs above, will begin to be used – likely at a rate of about 5%.

5.2.3 Silvicultural Systems

Although even-aged systems such as clearcutting have been used extensively and continue to play a leading role in RCFC's plans, the use of alternate systems has been increasing. This trend is illustrated in Figure 29. In Table 10, the use is portrayed in more detail.

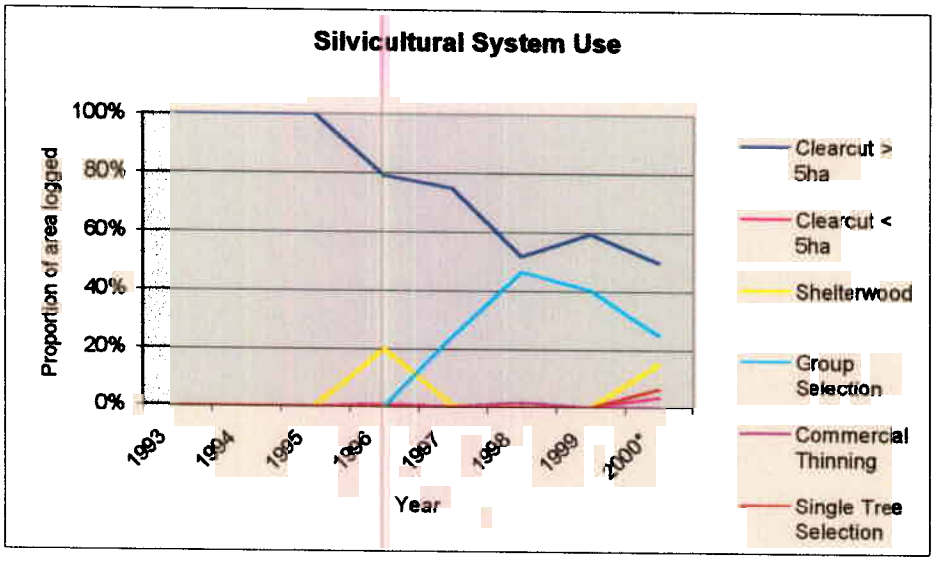


Figure 29. Silviculture Systems In Use In TFL 56[4]

Clearcutting will continue to be the most commonly used silviculture system on TFL 56. It is used where visual or biological reasons to use alternate systems do not exist. The variant, **clearcutting *with reserves***, is often used. The reserves are most often groups of trees rather than single trees and are left to provide wildlife habitat or old tree "legacies" in the regenerated stand. Another variation of clearcutting is the use of very small openings. RCFC has harvested several blocks under 5 hectares in size and finds that this is an effective way to harvest small "helicopter" patches without significantly affecting visual quality. Approximately 60% of the area harvested in TFL 56 in recent years has been harvested with the clearcut silviculture system or a variant of the clearcut system. We expect this trend to continue.

Group selection has been used extensively in the TFL in recent years. This system has been used to promote wildlife habitat, reduce visual impacts, improve reforestation success and will be used in the future for these reasons as well as to reduce the chance of destructive avalanche damage in avalanche-prone areas. There have been two variations used – in the ICH biogeoclimatic zone, the system has been designed with a three-pass pattern of groups. These groups are up to 1 hectare in size. In the ESSF biogeoclimatic zone, the three-pass pattern is also used, but the groups are less than 0.5 hectares.

[4] The proportion of silviculture system use in 2000 is an estimate.

Figure 30. Group Selection Silviculture System in the Keystone Area.

RCFC has been experimenting with **single tree selection** silviculture systems. As of November 2000, one cutblock has been harvested (CP 222 block 1), another is in progress (CP 201 block 1), and a cutting permit is being prepared for another (CP 274 block 3). Single tree selection is seen as a viable system on high elevation ESSF blocks where forest regeneration, or caribou management are concerns. In low elevation ICH areas, it is seen as a system that is compatible with ungulate winter range requirements. RCFC will continue to apply this system where appropriate.

Figure 31. Single Tree Selection Silviculture System Near Cap Creek.

The **shelterwood** system has been used, or is planned for use, in TFL 56 in areas of wildlife management, visual management, or avalanche concern. Of particular interest is the planned use of this system near the Canadian Mountain Holidays Adamants lodge for visual management reasons.

Figure 32. Shelterwood Silviculture System.
This block, CP 150 block 6, was harvested in this manner to remove spruce bark beetle infected trees while maintaining valley bottom ungulate habitat.

Although **commercial thinning** is not a silvicultural system, it is often discussed in the context of alternate silviculture systems. RCFC has commercially thinned one small stand and is currently exploring the possibility of further use of commercial thinning. It is seen as a tool to extract volume from an area while improving the future stand and still providing ungulate winter range or other biological values.

Figure 33. Commercial Thinning.
This 70 year-old 3-hectare site was thinned to focus growth on fewer stems. It is scheduled for harvest in 2030.

Table 10 Silviculture Systems in use in TFL 56.

Silviculture System	Hectares Harvested							
	1993	1994	1995	1996	1997	1998	1999	2000[5]
Clearcut > 5ha	262	184	115	270	195	96	106	100
Clearcut < 5ha				3				7
Shelterwood				68	2			30
Group Selection					63	86	72	50
Commercial Thinning						3		
Single Tree Selection								13
Total	262	184	115	341	260	185	178	200

RCFC will continue to utilize a variety of silviculture systems during the Management Plan #3 period. Systems will be chosen site specifically with regeneration, wildlife habitat, visual quality, and other objectives in mind.

5.2.4 Utilization Standards

RCFC will use the Ministry of Forests interior minimum utilization standards (Table 11). Variation from these standards may be required occasionally and will be stated in the cutting permit application.

[5] The amount of harvesting in 2000 is estimated.

Table 11 Utilization Standards.

Species	Utilization			
	Minimum dbh (cm)	Maximum stump height (cm)	Minimum top dib (cm)	Firmwood standard (%)
Western red cedar >140 years	17.5	30	15	50%
Lodgepole pine	12.5	30	10	50%
Other coniferous species and cedar ≤ 140 years	17.5	30	10	50%
Deciduous species	Currently not utilized			

Utilization of deciduous species will remain optional for the term of Management Plan #3. RCFC has been operating primarily in older stands with low or non-existent deciduous component. During the term of MP #3, RCFC expects to operate in some stands with a higher component of deciduous trees. When deciduous volume is available, RCFC will experiment with sales of deciduous volumes. Based on success of these sales, RCFC will consider committing to utilization of some, or all, deciduous species during the term of MP #4.

5.3 Forest Road Systems

The objective of the forest roads on TFL 56 is simply to provide safe, efficient, and environmentally appropriate transportation corridors from the forest stands to the public highway. The terrain that the roads pass through is quite difficult and requires careful road design, engineering, and construction.

5.3.1 Road System Planning and Development

The road system has been developed progressively over the past 40 years. Initially, the system was designed for off-highway hauling to the Columbia River where the logs were dumped. By the mid 1970's, as a result the Revelstoke Dam, log transport was converted to highway hauling using the rebuilt Big Bend Highway (Highway 23).

The road system is now designed to transport logs to the market via Highway 23 to Revelstoke and then beyond if necessary. Pulpwood is sent either to Cache Creek or south to Shelter Bay log dump for delivery to Castlegar. Sawlogs may end up at any of the three local mills or at RCFC's log yard for sale on the open market. The distances provided in Table 12 illustrate some typical distances and cycle times. The present road system is shown in Figure 34.

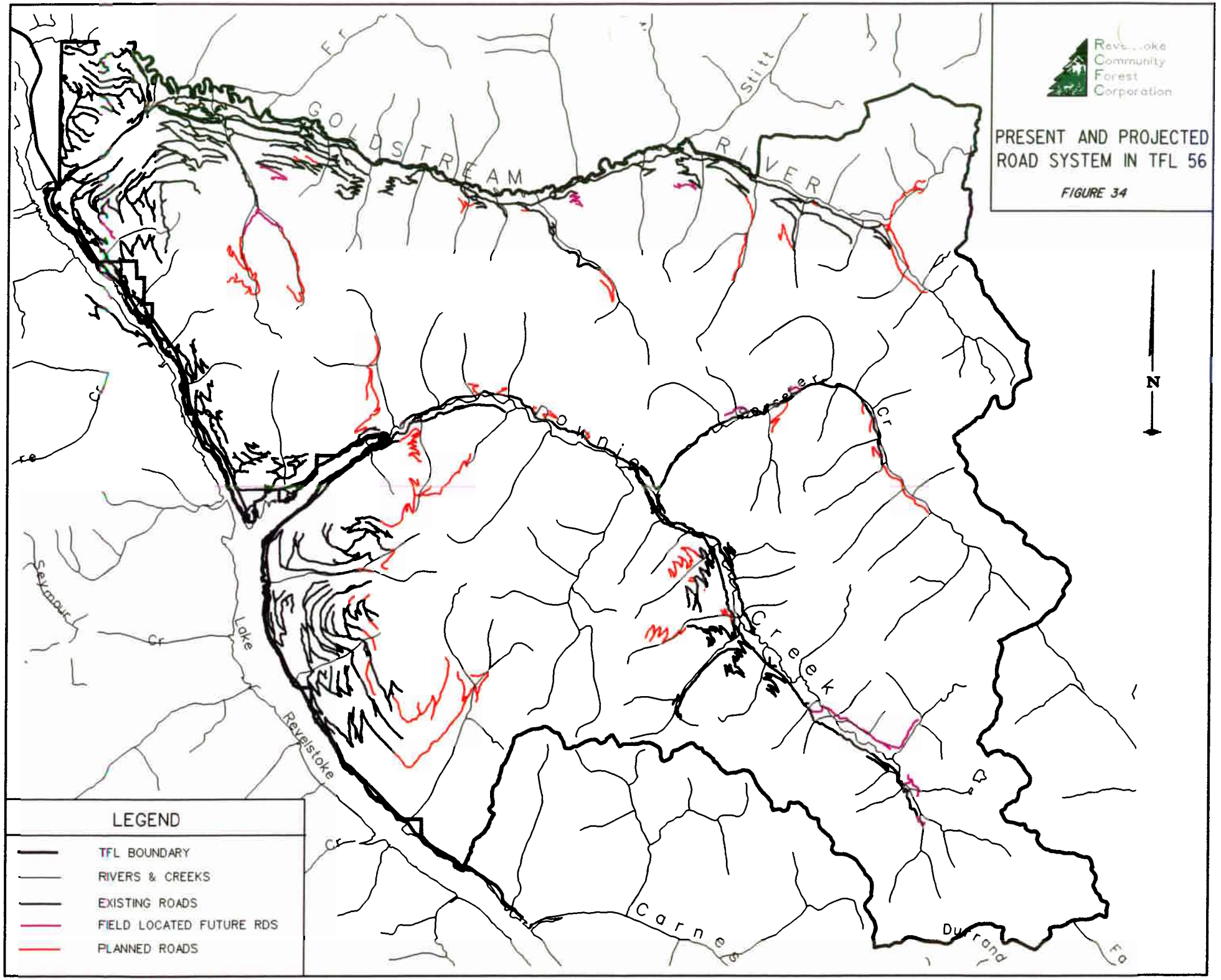

Revelstoke Community Forest Corporation
PRESENT AND PROJECTED ROAD SYSTEM IN TFL 56
FIGURE 34
N
GOLDSTREAM
RIVER
Downie
Creek
Cr
Lake
Revelstoke
Carnes
Durand
Seymour
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
EXISTING ROADS
FIELD LOCATED FUTURE RDS
PLANNED ROADS

Table 12 Typical Log Hauls to Revelstoke Mills.

Location	Distance (km)	Cycle Time (hrs)
12 km on Key Road	75	3.9
30 km on Downie Road plus 8 km on spur road	107	6.0
30 km on Goldstream Road plus 8 km on spur road	134	6.2

Main road access will be maintained in the Goldstream and Downie Valleys during the plan period. New roads will be extended into East Brewster and West Brewster Creek. The road in Sorcerer Creek will be extended to the end of the valley, as will be the Tumbledown Creek road.

Other major road headings include an extension of Key Road into the higher elevation areas in Compartment 100 south of Downie Creek and a road into the upper Mars Creek valley.

In addition to these major developments, there will be many smaller road systems and spurs built during the plan period. All access structures will be built to the regulatory requirements in force at the time.

Grass seeding is carried out on new roads within the first growing season following construction to minimize erosion. Figure 35 shows a road under construction using the end-haul technique.

Figure 35. End-Haul Construction at Brewster Valley

5.3.2 Maintenance

Maintaining the road system is expensive but necessary to permit safe operation of logging trucks, to provide safe access to the public, and to prevent environmental damage. This is achieved by completing these activities:

- Grading road surfaces,
- Clearing ditches,
- Cleaning culverts to ensure adequate water flow,
- Inspecting and maintaining bridges and major culverts,
- Removing slide and slough material,
- Stabilizing road banks,
- Brushing roadsides to maintain adequate visibility,
- Falling dangerous snags adjacent to roads,
- Spot gravelling, and
- Sign maintenance.

Regular inspections are completed on roads and the maintenance levels are somewhat dependant on use. For example roadside brushing will be completed quite frequently on the main roads but infrequently on lesser-used spurs. Inspections are completed on roads at least annually in the spring as the snow is melting to ensure drainage structures are working properly.

5.3.3 Deactivation

Deactivation plans are completed annually or biannually as part of the Forest Development Plan. These are reviewed with Ministry of Forests and Ministry of Environment, Lands, and Parks staff.

RCFC will continue to complete temporary, semi permanent, and permanent deactivation as needed (Table 13). This work is completed at RCFC's expense on road permit roads and is subject to FRBC funding on older non-status roads.

Table 13 Deactivation Definitions and Uses.

Deactivation Type	Usage
Temporary	For roads whose regular maintenance is to be suspended for up to three years. The measures primarily include water management techniques (cross ditches and waterbars) in areas of sensitive and steep terrain or heavy rainfall. Field inspection of road drainage structures should be conducted after major storms, during spring break-up, and prior to fall rains.
Semi-permanent	For snow roads; roads located in particularly isolated areas or areas where there is a potential for landslides and regular maintenance is to be suspended for up to three years; and roads in areas where harvesting is to be suspended until the next rotation of harvesting. Field inspections should be carried out, particularly after major storm events, or after heavy usage by vehicles, to assess the adequacy of the deactivation works or repair any problem areas.
Permanent	For roads to be closed permanently.

5.3.4 Access Management

Access management refers simply to actions taken to "manage" access to areas. This usually means limiting access – typically for wildlife management reasons.

Use of forest roads in TFL 56 is still largely industrial in nature – logging contractors, silviculture workers, and forestry people. However, mining, commercial recreation, and private recreational access is increasing.

With timber development comes increased road access. The increased traffic can lead to disturbance and additional hunting pressure on wildlife. Actions to reduce wildlife disturbance and hunting pressure can include avoidance of road construction, road deactivation, or administrative road closures. All of these methods are used in TFL 56.

The Downie Valley has an administrative road closure imposed on it. Hunting from motorized vehicles is prohibited. Hunters must walk, ride horses, or ride bicycles in. This has reduced the impact of the road on wildlife. However, there is still the disturbance issue. RCFC has avoided extending the road along the south side of Downie Creek between 8 km and 15 km in order to prevent wildlife disturbance. RCFC has longline and helicopter logged in this vicinity to avoid roading.

Roads along the north side of Downie Creek between 26 and 31 km have also been avoided. In this case, helicopter harvesting and a temporary bridge installation were used to preclude permanent vehicle access.

RCFC will continue to work with Ministry of Environment staff to identify areas of access concern and create site-specific solutions.

5.4 Silviculture

The purpose of the silviculture program is to promptly regenerate forest sites with crops that will produce the desired products within the desired time frames. Silviculture activities will be carried out to ensure that all harvested areas, and productive areas denuded by wildfire or pests, are reforested with acceptable coniferous and hardwood species. Regenerated stands will be tended to maintain growth rates and improve timber quality.

During the period of the last Management Plan, the reforestation of all economically treatable backlog NSR areas (areas harvested pre October 1987) was completed, and all recently logged areas were promptly reforested.

The goals of the silviculture program are to:

- Regenerate all logged areas within a maximum of three years of logging being completed (the average time is expected to be less than two years);
- Conduct an aggressive brush control program to maximize stand vigour and health;
- Comply with the Silviculture Practices Regulation in satisfying free-growing stocking standards;
- Use regeneration techniques that will increase productivity. ;

- Establish regeneration with mixtures of two or more species ecologically suited to the growing site;
- Comply with the Forest Practices Code and the guidelines included in the code.
- Establish silvicultural trials where knowledge of an activity or treatment is inadequate. (RCFC currently has active trials on the following subjects: brush blankets, tree supports, seedling fertilization, mounding, etc.)

5.4.1 Basic Silviculture

Basic silviculture will be performed on all areas harvested after October 1, 1987 in compliance with the *Silviculture Practices Regulation* (BC Reg. 108/98). The reforestation costs of this program will be paid for by RCFC. Basic silviculture treatments will also be performed on areas harvested prior to October 1, 1987 but the Ministry of Forests or Forest Renewal B.C will pay the costs.

The projected basic silviculture activity goals for the period (2000-2004) are given in Table 14. These programs goals are updated annually. The revised projection will be submitted to the Ministry of Forests as part of the 5-Year Development Plan update. Ministry of Forests funding responsibility is essentially completed, except for brushing and surveys.

The achievements of the basic silviculture program will be outlined each year in the TFL annual report. On completion of silviculture activities RCFC will submit reports to the Ministry of Forests' *Major Licence Silviculture Information System* (MLSIS).

Components of the basic silviculture program are discussed below.

Table 14 Basic Silviculture Program Goals.

	2000			2001			2002			2003			2004		
	Ministry of Forests	RCFC	Total	Ministry of Forests	RCFC	Total	Ministry of Forests	RCFC	Total	Ministry of Forests	RCFC	Total	Ministry of Forests	RCFC	Total
SP		350	350		350	350		350	350		350	350		350	350
Surveys:															
Regen [4]	300	575	875	200	600	800	5	600	605	5	600	605		600	600
Stocking/Survival [5]	50	550	600	35	550	585	5	550	555	5	550	555		550	550
Free Growing	1600	110	1710	1500	150	1650	1200	200	1400	900	250	1150	600	300	900
Site Preparation: [1]															
Burning					20	20		20	20		20	20		20	20
Chemical	5	9	14												
Mechanical		5	5		15	15		15	15		15	15		15	15
Planting		185	185	5	315	320		190	190		300	300		300	300
Cone Collection (hl) [2]															
Brushing [3]	90	500	590	95	500	595	40	500	540	5	500	505		500	500

1 Includes site rehabilitation

2 Depends on cone crop year

3 Includes conifer release

4 PA3YR, and PA5YR

5 PA6MO, and PA2YR

Silviculture Prescriptions. Silviculture Prescriptions (SP's) will be prepared for all cutblocks prior to harvesting and submitted to the Ministry of Forests for approval. SP objectives are to be consistent with the management objectives in this plan. Silviculture planning will be completed for all areas in accordance with the Silviculture Practices Regulation. Each SP will describe the silviculture system to be used, harvesting method, reforestation treatment and stocking standards, and measures to accommodate non-timber resource values. The Ministry of Forests' *Interior Seed Transfer Guidelines*, which provide rules for the elevational and longitudinal transfer of seedlots, will be followed.

Stocking standards used will follow Ministry of Forests *Establishment to free Growing Guidebook, Nelson Forest Region*, May 2000. At a cutblock specific level, variances to these guidelines may be proposed for preferred and acceptable species choice and stocking standards. Ecological characteristics, forest health considerations, alternative species management regimes, biodiversity or other concerns may provide sufficient reason to vary stocking standards.

When variances to the standards are proposed in a SP, the reasons and rationale will be provided to the Ministry of Forests.

Biogeoclimatic subzones or variants in TFL 56 to which these standards apply are:

- ESSFvc
- ICHwk1
- ICHvk1
- ICHmw3

Conifer Stand Establishment. Stand establishment strategies will focus on prompt reforestation after harvesting. On areas where significant brush competition is expected, planting will occur within one to two years following harvesting. On areas that have a lower potential for brush competition planting will occur within two to three years after harvesting. All areas will be planted at prescribed target levels.

Supplementary natural regeneration fill-in will be recognized providing it conforms to the SP. Planted species choice will be made to ensure mixtures of species are established both by planting and through the recruitment of natural regeneration. These mixtures of species will comply with the stocking standards specified in the current *Establishment to Free Growing Guidebook – Nelson Forest Region.*

Once an area is sufficiently restocked, plantation health and growth will be monitored through silviculture surveys until a free growing stand is achieved. Stand tending treatments will be prescribed during this period to maintain the vigour, growth, and health of the regeneration. Where necessary, fill planting will be done to meet stocking standards.

Mixed Wood Stand Establishment. Hardwood species grow well in the interior cedar/hemlock subzones on a wide range of site series that occur on the TFL. Hardwoods contribute significantly to nutrient cycling due to deciduous growth habit, rapid litter decomposition, and high foliar nutrient concentrations.

There was no provision for hardwood management in Management Plan #2, so past efforts to include a small proportion of hardwoods in silviculture prescriptions met with administrative problems. RCFC staff had planned to devise a hardwood management strategy in MP #3, but recent changes to the methods to assess free growing acceptability outlined in the *Establishment To Free Growing Guidebook - Nelson Forest Region – 2000* have increased the quantity of hardwood trees that can be in a conifer stand, and still have the stand considered free growing. This somewhat negated the need to have deciduous trees accepted in the stocking standards. RCFC will continue to explore marketing opportunities for deciduous species during the MP #3 period.

Hardwoods are considered tolerant or immune to many root diseases and could therefore reduce the impact of those root diseases on regenerated stands.

Site Preparation. Site preparation will be carried out to create plantable spots, facilitate planting (break up slash accumulations, set back competing vegetation, improve soil growing conditions), or to reduce fire hazard. This may be accomplished by treatments such as spot burning, broadcast burning, mechanical site preparation (excavator piling or mounding primarily), or chemical treatments.

Usually the burning of debris piles at landings and along roadsides is all that is required to prepare for planting. As a general practice, there has been a reduction in the use of burning on the TFL area for the following reasons:

- Risk of escape into standing timber.
- Social unacceptability.
- Increasing need to retain clumps of trees within cutblock boundaries.
- Limited weather related windows.

Reforestation. Target stocking levels will generally be achieved through planting. Natural regeneration will add (10-20%) to species composition and assist in addressing biodiversity issues. A mixture of ecologically suitable conifer species will be planted dependent on subzones and site series.

The objective will be to plant a mixture of two or more species on all sites. RCFC will continue to plant and monitor the performance of rust resistant white pine. Only twenty percent, or less, white pine will be planted on any one cutblock during this trial period. RCFC will plant minor amounts of western larch, lodgepole pine, and mountain hemlock on some ecologically suitable sites.

The approximate distribution of species to be planted is:

- 40% Western Red Cedar
- 35% Engelmann Spruce
- 10% Douglas-fir
- 8% White Pine (rust resistant)
- 7% Western Larch, Lodgepole Pine, Balsam, Western and Mountain Hemlock.

Western red cedar will be favoured where ecologically suited to the site. The long-term prospects for the marketing of western red cedar continue to be very promising as few areas in the world grow it. Various species of pine and spruce are widely cultivated commercially throughout the world. Even western North America's own Douglas-fir has is grown on most continents now. Western red cedar is rarely grown elsewhere and commands very high prices on the open log market.

On sites susceptible to root disease, more tolerant species such as cedar, white pine, lodgepole pine, and western larch will be planted to lower the risk of infection and mortality from root rot. These stands will be managed to include hardwoods as a component (less than 20% of crop trees) of the free growing stand. Mixed-wood prescriptions that utilize combinations of root disease tolerant conifers and hardwoods (birch, aspen, and cottonwood) are an ecologically sound method of managing root disease.

Once a cutblock has met regeneration delay the subsequent establishment and growth of the regenerated stand will be monitored over a two to fifteen year period by silviculture surveys until a free growing status has been achieved.

During the review of the draft version of Management Plan #3, question was raised about the validity of the species proportions listed above. Specifically, the Ministry of Forests noted that historically, planting was dominated by spruce with less than 20% cedar. The amount of cedar was low in the early years of the MP #2 period. In the latter half of the MP #2 period, RCFC made a decision to increase the proportion of cedar planted. Because of the inherent delays in making prescriptions and ordering seedlings, these changes are being felt only recently. A survey of recent (1999 and 2000) Silviculture Prescriptions indicates that the proportions of species prescribed for planting are Cw 36%, Sx 32%, and others 32%. The species proportions represented in sowing requests will "catch up" as the SP's are implemented.

Seed Supply. RCFC will continue to maintain a sufficient seed inventory to supply the projected seedling requirements for a ten-year period. The following Table 15 illustrates that this objective has been met for most species. This will provide adequate seed to cover fluctuations in cone crops. Seed year periodicity varies from two to eight years depending on the species.

The seed inventory as at September 2000 is summarized in Table 15.

Table 15 Tree Seed Inventory (September 2000)

Species	Potential Seedlings	Years of Supply
Bl	62,000	3.5
Cw	1,745,900	10 +
Fdi	1,094,600	10 +
Hw	335,200	10 +
Lw	68,900	10
Pli	78,900	10
Pw	125,100	4.5
Sx	7,278,300	10 +

This inventory will be maintained by RCFC through cone collections or seed purchases. Cone collections will be made within the seed zone by elevation band. Cone crops will be monitored annually for size and seed viability prior to any collection being made. Cones will be collected from the best phenotypes within a stand. Collections will be made in accordance with the *Tree Cone, Seed, and Vegetative Material Regulation* (BC Reg. 164/95).

The Ministry of Forests has established seed orchards to produce genetically improved seed (Known as "A" seed). RCFC will purchase all the available "A" seed that is appropriate for planting on the TFL area. The proportion that has been used in the recent past is indicated in the table below.

Table 16 Use of Class "A" Genetically Improved Seed.

Year	Spruce from Class "A"	Total Spruce Planted	% Class "A" Spruce of total Spruce	Total Trees Planted or Sown	% Class "A" Spruce of Total
2000	54,555	104,856	**52.0%**	239,418	**22.8%**
2001	109,100	164,200	**66.4%**	374,000	**29.2%**
2002	61,400	131,300	**46.8%**	257,700	**23.8%**
TOTAL	225,055	400,356	**56.2%**	871,118	**25.8%**

Seedlings. Coniferous seedlings are grown under contract by private nurseries. Styro-block container grown seedlings are used. Generally the preferred stock types are PSB415 and PSB412; PSB410 are used on cold or shallow soils.

Silviculture Surveys. Silviculture surveys will be done at various stages of the stand establishment phase. This may take up to fifteen (twenty at high elevations) years after harvesting. The results of these surveys are used to assess the status and stocking of regeneration as well as progress towards completing basic silviculture obligations. The surveys are also used to plan any additional silviculture treatments to ensure that basic silviculture is achieved.

The status and survey results are entered into the silviculture record management system (PhoenixPro). Two key progress points will be reported to the Ministry of Forests (MLSIS):

1. Attainment of regeneration delay, and
2. Achievement of free growing.

The types of silviculture surveys are:

- Plantability Survey

These surveys will be carried out on cutblocks within six months after harvesting. The results are used to assess the need for site preparation and to confirm or modify the planting prescription (Normally at one plot per 1-2 hectares).

- Regeneration/Survival Survey

An initial survey is done at the time of planting, including natural regeneration, to assess regeneration delay (Normally at one plot per 1-2 hectares.).

Walk-thru surveys are carried out on all plantations after one and two growing seasons. The results are used to assess the survival and condition of the planted seedlings and to determine if re-planting or brushing treatment is necessary. (Normally only six plots per cutblock.)

After the third and fifth growing seasons stocking surveys are carried out to assess regeneration performance and to prescribe any follow-up silviculture treatments or any enhanced silviculture opportunities. (Normally at one plot per 1-2 hectares.)

- Brushing Survey

Brushing surveys are not normally required as information on brush conditions is collected in conjunction with other surveys. However, any block that has been prescribed for brushing or anticipated to need brushing will be assessed in the spring, prior to brushing, to confirm the need for treatment. This is normally an informal visual confirmation.

- Free Growing Survey

This is the final survey used to assess the free-growing status of a cutblock. The dates for the earliest and latest possible free-growing survey are given in each SP. For TFL 56 this is usually between 10 and 15 years after harvesting. If free-growing standards have been met, the basic silviculture obligations have been completed. If not, further silviculture treatments may be prescribed. The results of free-growing surveys will be reported to the Ministry of Forests within six months of completion. A summary of free-growing status will be included in the TFL annual report.

- Pre-Stand Tending Survey

If a free-growing, or other, survey indicates an opportunity for any enhanced silviculture treatment(s) a pre-stand tending / forest health survey will be carried out to collect the information required to prepare a Stand Management Prescription (SMP). The SMP will define the objectives of the required treatment.

Brushing. The purpose of brushing treatment is to control, temporarily, the growth of woody or herbaceous vegetation that is competing with the preferred crop trees. During the period of stand establishment, brushing treatments will be justified to ensure adequate survival and growth. The strategy for brush control will emphasize early identification of possible competition and timely application of treatment. This starts with identification of potential brush competition in the SP.

In order to reduce the potential need for brushing, other practices that may be employed are:

- Identification and monitoring of potential brush problem sites;
- Immediate site preparation and planting;
- Planting of large, sturdy seedlings; and

- Experimentation with vegetation management techniques and timing.

All cutblocks potentially requiring brushing treatment will be assessed several times during the first three growing seasons after stand establishment. When a survey or other assessment determines that a cutblock requires brushing, enough data is collected to enable the prescribing of preferred and alternative brushing treatments.

Brushing treatments near riparian areas will require careful consideration. On these sites the regrowth of hardwoods and woody brush species after harvesting can be considered as part of the natural vegetative diversity that occurs during the revegetation phase. The vegetation complexes also serve as preferred habitat and browse for wildlife, particularly bears, moose and birds, and provide shade for fish streams.

Brushing treatments commonly used include:

- Manual cutting with hand tools.
- Mechanical: motor-manual cutting (e.g., brush saws).
- Aerial and ground foliar, or individual stem application of herbicides.

RCFC's preference is to use manual or mechanical treatments before selecting a herbicide treatment. Community values require minimum usage of chemical applications. RCFC accepts these values and will endeavour to undertake reforestation activities in such a manner that chemical usage is minimized. However, the company recognizes that the judicious use of herbicides has a role in vegetation management and sometimes is the most appropriate treatment option.

5.4.2 Enhanced Silviculture

Enhanced silviculture refers to stand treatments that maintain or increase future stand value by increasing the volume to be harvested and/or the quality of wood to be harvested beyond that achieved through basic silviculture. Potential treatments include juvenile spacing, pruning, and fertilization. These are optional treatments and are not required by the *Silviculture Practices Regulation* (Except for post April 1, 1994 regenerated stands with more than 10,000 stems per hectare at free growing, for which juvenile spacing is considered a basic silviculture activity).

During the term of Management Plan #3, RCFC will complete a strategic silviculture plan. The plan will include:

- Definitions of wood quality for various species.
- Wood quality objectives related to possible end-products.
- Possible treatments to achieve the wood quality objectives.

Potential treatments are listed below.

Juvenile Spacing. Juvenile spacing may be prescribed for young, excessively stocked stands to select crop trees for release, optimize preferred species composition, meet specific product quality objectives, and provide future opportunities for commercial thinning. Stands will be assessed for juvenile spacing once they have reached sufficient age and height. Selection will be based on forest health considerations, site productivity, and density.

Stand Management Prescriptions are prepared for the selected stands. They include the proposed juvenile spacing, as well as associated, or separate, pruning and / or fertilization treatments. They also accommodate wildlife habitat and biodiversity objectives, and ensure that activities within riparian management areas are prescribed in accordance with the *Operational Planning Regulation*. (BC Reg. 107/98)

Pruning. Pruning for value is carried out to increase the amount of high quality, clear logs recovered when harvested. Pathological pruning of white pine (to control blister rust infection) may be done along with value pruning.

Fertilization. To date there has been no fertilization of any second growth stands on TFL 56. Fertilization treatments may be prescribed to increase growth rates and produce merchantable-sized stands sooner. Where FRBC funding permits, operational fertilization may be schedule in conjunction with other enhanced silviculture treatments or as a separate treatment.

Additional opportunities for enhanced silviculture may arise because of funding from Forest Renewal BC. RCFC will explore all possibilities related to enhanced silviculture that can obtain financial support from FRBC.

White Pine Management. Western white pine (*Pinus monticola*) is a high-value commercial conifer species. Its silvical characteristics, high growth rates and potential for desirable products make it an attractive regeneration species. White pine is susceptible to white pine blister rust (*Cronartium ribicola*) infection and this may limit its potential to reach merchantable size. RCFC's goal is to increase the amount of white pine regenerated and managed on the TFL. Ministry of Forests and Forestry Canada are engaged in a white pine tree improvement program that involves the breeding and testing of superior rust-resistant white pine.

RCFC intends to prepare a white pine management strategy. Initially, this involves reviewing the status of white pine management in the province and identification of short and long-term options. RCFC has purchased rust resistant white pine seed from *The Inland Empire Tree Improvement Cooperative* (IETIC) since 1995 and has been planting seedlings grown from this seed on a trial basis.

5.5 Forest Health

A variety of insects and diseases occur naturally in the forests of TFL 56 (Table 17). The incidence and level of endemic activity is often higher in old growth stands. Periodic outbreaks have been a concern but have not yet resulted in major volume losses. For example, spruce bark beetle (*Dendroctonus rufipennis*) attack of mature spruce stands has been problematic. Hemlock looper (*Lambidina fiscellaria lugrobosa*) periodically

reaches epidemic levels in the area. The last epidemic was in the 1991 to 1994 period. It may reoccur during the period of this Management Plan. Root disease, in particular *Armillaria ostoyae* , is widespread throughout the district and is having an influence on operational practices.

Table 17 Common Pests and Diseases of TFL 56

Type	Pest	Susceptible tree species
	Insects	
Bark beetles	Spruce bark beetle (*Dendroctonus rufipennis*)	Sx
	Douglas-fir beetle (*Dendroctonus pseudotsugae*)	Fd
	Western balsam bark beetle (*Dryocoetus confusus*)	Bl
Tissue feeders	Spruce terminal weevil (*Pissodes strobi*)	Sx
Defoliators	Forest tent caterpillar (*Malaosoma disatria*)	At Act
	Hemlock sawfly (*Neodiprion tsugae*)	Hw
	Western blackheaded budworm (*Acleris gloverana*)	Hw,Fd,Bl,Sx
	Spruce budworm (*Choristoneura biennis*)	Sx
	Western hemlock looper (*Lambdina fiscellaria lugubrosa*)	Hw,Cw,Fd
	Black army cutworm (*Actibea fenica*)	Seedlings
	Diseases	
Root diseases	Laminated root rot (*Phellinus weirii*)	Fd,Cw,Hw
	Armillaria root disease (*Armillaria ostoyae*)	Conifers
	Black stain root disease (*Leptographium wageneri*)	Fd,Pl
	Rhizina root disease (*Rhizina undulata*)	Seedlings
Stem rusts	White pine blister rust (*Cronartium ribicola*)	Pw
Others	Pine needlecast (*Lophodermella concolor*)	Pl

In the regenerated forest, there has been no noticeable increase in pest or disease activity with the exception of "voles". In 1999, voles damaged several plantations. The damage varied, but two plantations were rendered "not satisfactorily restocked" (NSR). Vole activity subsided somewhat in 2000. White pine blister rust (*Cronartium ribicola*) continues to infect western white pine regeneration and is the most notable pathogen. Black army cutworm (*Actibea fenica*) has caused periodic mortality in new plantations. Spruce terminal weevil (*Pissodes strobi*) is a potential problem in spruce plantations.

To ensure that forest disease activity is detected early in any potential cycle, the following measures are taken.

- Conduct an annual flight over the TFL to assess windthrow and pest conditions.
- Cooperate with government pest specialists to ensure pooling of knowledge and exchange of data.
- Closely monitor areas of known disease problems. Use the results to prepare action plans and treatments.
- Conduct surveys of infected areas to monitor pest activity, prepare control plans, or to prepare silviculture

prescriptions. More intensive ground surveys will be conducted to evaluate levels of known diseases such as *Armillaria ostoyae* and spruce bark beetle.

It is not possible, nor is it desirable, to eradicate pests from the forest. The strategy will be to attempt to maintain pests at endemic levels by preventing the conditions that favour build-up and spread. Measures to prevent epidemic conditions, or control epidemics if they occur will include:

- Prompt harvesting of windthrow.
- Salvage harvesting of bark beetle or other heavily damaged stands.
- Use of pheromone attractants
- Reforestation with mixed species
- Stump removal in root rot areas.
- Spacing and density control in managed stands.
- In the case of white pine blister rust, resistant tree seed will be used in reforestation efforts, and pruning will be completed on selected juvenile stands.

RCFC will continue to monitor development of new control techniques and utilize them if appropriate. Any control techniques will be conducted in accordance with a plan prepared by RCFC. Ministry of Environment Lands and Parks personnel will be provided an opportunity to review the plan when significant impacts to other resources are possible.

5.5.1 Non Recoverable Losses

The damage caused by fire, insects, disease, and other agents combine to cause a loss in harvestable volume. Losses of individual trees, or small groups of trees, are accounted for in the growth estimates used in the timber supply analysis (Appendix 4).

Larger groups of trees or catastrophic losses must be estimated. As well, portions of these losses can be salvaged and are therefore not "non recoverable". It is only the portion that cannot be salvaged that need be estimated. Based upon a comprehensive review, the losses were estimated at 955m^3 per year. Further details are outlined in Appendix 2.

5.6 Fire Protection

RCFC will continue necessary operations to protect the licence area from fire damage. The goal is to minimize damage from fire in the forested landbase and to maximize the timber salvage from fire damaged stands. Historically, the licence area has experienced a relatively low frequency of wildfires. Most fires that have occurred have resulted from

lightning strikes. The fire prevention program consists of fire prevention, detection, and control.

Fire suppression and prevention measures will be done in accordance with the *Forest Fire Prevention Regulation* (BC Reg 169/95). A high standard of fire fighting organization will be maintained during the fire season.

5.6.1 Prevention

Fire protection awareness and preparedness will be reflected in all forest activities carried out during the fire season.

5.6.2 Fire Pre-Organizational Plan

An updated fire organizational plan will be submitted to the District Manager by April 1 each year. The plan will outline steps the company will take in the event of a fire. The plan content is specified in the *Forest Fire Prevention and Suppression Regulation.*

5.6.3 Fire Detection

The goal is to detect all wildfires as soon as possible, and control wildfires by 10:00 am of the day following detection.

During fire season, several functions are carried out to enable early detection and control of fires. Fire weather stations operated by the Ministry of Forests are used to calculate fire weather indices. When the fire danger rating reaches high, regular contact is kept with the Ministry of Forests fire officer. The Ministry of Forests will conduct aerial patrols after lightning events or when the fire danger rises to extreme. Forest closure and access restrictions may be applied.

6.0 Non-Timber Resource Management

6.1 Range

There is no range use in or near TFL 56. We do not anticipate any range use during the Management Plan #3 period.

6.2 Recreation

Many outdoor recreational activities are carried out on TFL 56. The types of activities are related to the scenic mountains, glaciers, rivers, and lakes within or adjacent to the TFL. The scenery is outstanding and is attracting more recreationists every year.

The increase likely has several factors including:

- Increasing pressure on the adjacent national parks;
- Additional road access within the TFL;
- Few restrictions on backcountry use when compared to neighbouring national parks;
- Improvement of some facilities (Keystone cabin and road, Goldstream canoe route); and
- Huge increases in snowmobile tourists in the Revelstoke area.

RCFC recently updated the Recreation Opportunities Spectrum and Recreation Features Inventory components of the recreation inventory. As well, a Recreation Use Inventory was recently completed for the Revelstoke portion of the Columbia Forest District. These inventories, along with our knowledge of the TFL landbase, allow us to see where the features are and where recreational use is taking place.

Current commercial operations in the TFL are listed in Table 18. Non-commercial recreational activities are listed in Table 19.

Table 18 Commercial Recreation Activities on TFL 56.

Company	Activities
Canadian Mountain Holidays	CMH conducts helicopter skiing and helicopter-access hiking and climbing from two lodges in the Goldstream Valley (Gothics and Adamants Lodges).
Selkirk Tangiers Heli Skiing	Selkirk Tangiers conducts helicopter skiing in the southern portion of TFL 56. Clients stay at the firm's lodge in Revelstoke.
Monashee Outfitters	This firm conducts guided hunting and fishing in the Goldstream Valley.
Selkirk Big game Outfitters	This firm conducts guided hunting and nature viewing in the Downie Valley and Keystone area.
Downie RV Resort	Provides accommodation and has provided some guided snowmobiling.

Figure 36. Helicopter Skiing.
CMH Gothics' Columbia face ski run descends through several plantations. This is CP 726-300.

Table 19 Non-Commercial Recreation Activities on TFL 56.

Activity	Location and Comments
Fishing	Most fishing takes place on Lake Revelstoke. The rivers, streams, and small lakes are fished very lightly.
Hunting	Big game hunting (deer, moose, grizzly bear, black bear, and cougar) takes place. A small amount of grouse and migratory bird hunting also takes place.
Hiking	Hiking opportunities are limited by a lack of developed trails and routes. The Keystone-Standard basin trail is the most travelled hiking route in the TFL and is becoming well known.
Mountaineering	Mountaineering use is light although many impressive peaks lie within TFL 56.
Canoeing and Kayaking	The Ministry of Forests maintains a canoe launch and take-out on a segment of the Goldstream River. There is also unorganized use of other sections of the Goldstream River and Downie Creek.
Wildlife Viewing	The riparian habitat and avalanche tracks in the Downie, Goldstream, and Sorcerer valleys afford excellent big game viewing opportunities.
Sightseeing	Views are excellent from the logging roads and highway 23. Sightseeing use is still quite light.
Mountain Biking	Mountain biking is quite popular on the Keystone Standard Basin trail although overall use is quite low. Mountain biking elsewhere in the TFL is extremely light.
Snowmobiling	Snowmobiling has increased dramatically over the last decade. The Keystone Standard Basin area is very heavily used in the spring. Caribou basin, at the head of Brewster Creek, is also becoming popular. Interactions with caribou are a concern in both these areas.
Backcountry Skiing	Excellent backcountry ski opportunities exist although use is still light.

Table 20 Forest Service Recreation Sites Within or Near TFL 56.

Site	Site Objectives	Activity and Comments
Keystone Standard Basin trail and cabin	**TRAIL**: The objectives are to manage the Keystone Standard Basin Trail for a semi-primitive non-motorized recreation experience. The trail will be maintained and the sub alpine/alpine flora and fauna will be protected. Opportunities for hiking, viewing, mountain biking, and horseback riding will be provided. Very rough road access to the trailhead will be maintained for four wheel drive vehicles June to October. The objectives are to manage the Standard Cabin recreation site for a semi-primitive non-motorized recreation experience from June 15 to October 15 of each year, and a semi-primitive motorized recreation experience from October 16 to June 14 of each year. **CABIN: The Standard Cabin will be maintained and opportunities will be available for overnight use associated with back country hiking and skiing. Access to the site is via trail in the snow free months, which will be maintained by the Ministry of Forests.** **BASIN: The objectives are to manage the Keystone Standard Basin recreation site for a semi-primitive non-motorized recreation experience from June 15 to October 15 of each year, and a semi-primitive motorized recreation experience from October 16 to June 14 of each year. The** sub alpine/alpine flora and fauna will be protected. Opportunities will be available for viewing, hiking, ski touring and camping. Access to the site is via Ministry of Forests trail.	The trail provides easy access to an extensive alpine and parkland area. A cabin at 11 1/4 km provides accommodation.
Goldstream River Canoe Route	The objectives are to manage the Goldstream Canoe recreation site for a natural roaded recreation experience. The riparian areas of the Goldstream River along the canoe route corridor will be retained. Opportunities for viewing and non-motorized water craft will be available. Rough road access to the site will be maintained for two wheel drive vehicles from May to October.	A put-in and take-out site is provided for this canoe trip. The section of river is quite gentle and suitable for intermediate canoeists. It is about 15 river kilometres long.
Carnes Creek Campsite		This drive-in campsite is on Lake Revelstoke just South of TFL 56. It provides unserviced campsites and a boat launch

Figure 37. Keystone Cabin.
RCFC has participated in repairs and maintenance on this backcountry cabin.

Table 21 Commercial or Provincial Parks or Campgrounds Within or Near TFL 56.

Site	Activity and Comments
Downie RV Resort	This commercial enterprise provides tenting and RV sites as well as long term RV sites. Snowmobile tourism is also based here.
Martha Creek Provincial Park	This campsite is open in the summer and provides lake-based recreation opportunities.
Lake Revelstoke Provincial Park	This campsite was closed several years ago, but could open in the future if demand increases.

To manage the recreational resources on or adjacent to TFL 56, RCFC will continue to:

- Maintain access to important recreational areas and trail heads.
- Work with the Ministry of Forest to maintain or enhance existing recreation sites and trails, and to identify and manage potential recreation sites and trails.
- Work with commercial recreation firms to maintain commercial recreation opportunities.

6.3 Visual

The TFL area is extremely scenic with high mountains, glaciers, waterfalls, forested slopes, and other elements combining to provide superlative landscapes (Figure 38). Much of the harvestable timber lies on slopes that are visible from valley bottom logging roads or Highway 23 and therefore harvesting can easily impact the scenic quality.

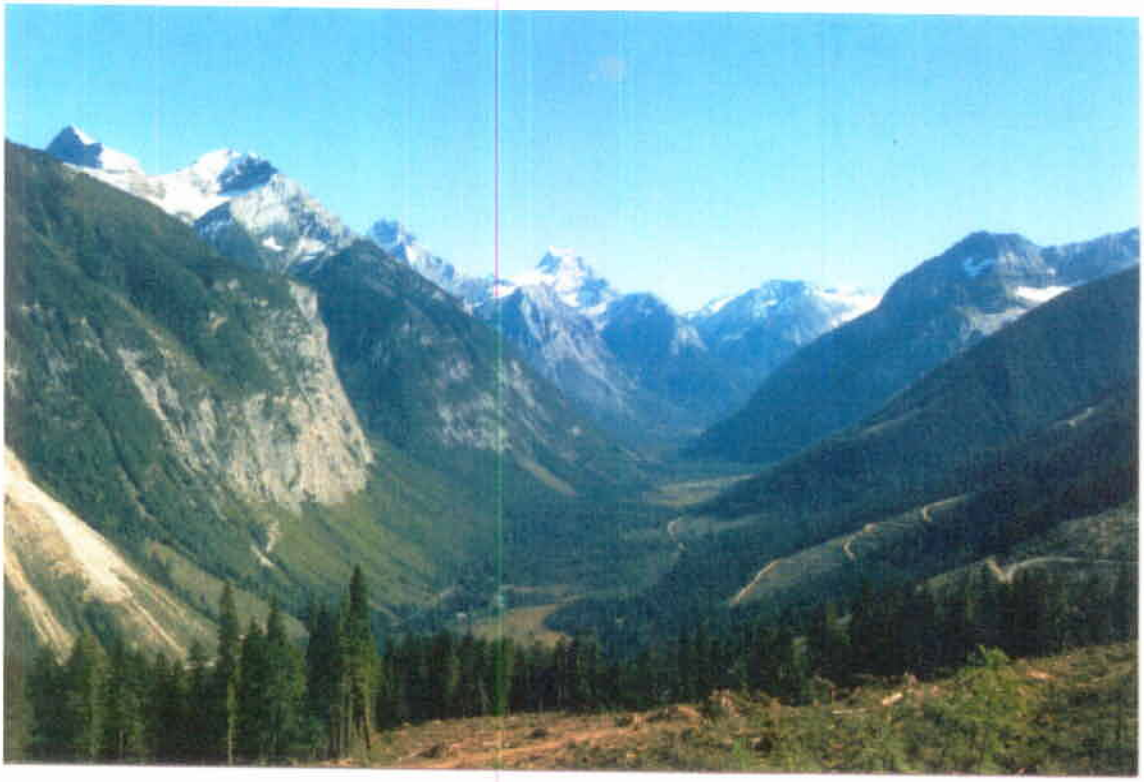


Figure 38. Typical Scene in TFL 56.

Although the TFL is very scenic, no areas have been designated as "known scenic areas" under the Forest Practices Code. As well, the MAC Plan does not recommend that any TFL 56 areas be designated as "known scenic areas". Visual Quality Objectives have not been set for the TFL area except in Zone C of the *Keystone Standard Basin Local Resource Use Plan* where Partial Retention is specified.

However, The MAC Plan does specify some backcountry visual design guidelines and RCFC will adhere to these. As well, RCFC will continue to engineer new harvesting areas with basic visual principles in mind. These principles involve shape and configuration of cutblocks but not the overall percentage of viewscapes that may be modified.

The various plan guidelines that apply to TFL 56 are shown in Table 22.

Table 22 Visual Management Guidelines from Applicable Plans.

Plan	Guideline
MAC Plan	**Feature:** Campsites, cabins, historic sites **Definition**: Forest Service campsites, named historic sites **Design Intent:** Resource exploration and development should minimize potential impacts to the immediate surroundings of the site. **Visual Design:** Any logging within 200m of the site should be designed such that modification may be discernibly but not clearly evident from the site.
	Feature: Lodges, Commercial cabins, Camps **Definition**: Permanent or semi-permanent camps or structures associated with commercial tourism tenures, without highway access. **Design Intent:** Resource exploration and development should minimize potential impacts to the immediate surroundings of the site. **Visual Design:** Any logging within 200m of the site should be designed such that modification may be discernibly but not clearly evident from the site. Statements of concern and interest are to identify areas requiring particular design consideration.
	Feature: Tenured or Licensed use areas **Definition**: Areas tenured for commercial recreation under the Lands Act **Design Intent:** Resource exploration and development activities will be evident in tenured use area. Where possible, this activity should be designed to compliment or minimize conflict with commercial recreation activity. **Visual Design:** Resource exploration and development in tenured use areas should show evidence of good visual design. Statements of interest and concern are to identify areas requiring particular design consideration.
	Feature: Backcountry lakes **Definition**: Lakes, 2 ha or larger, with no road or highway access within 500m. **Design Intent:** Backcountry lakes should be managed to maintain an unroaded condition (ROS Semi-Primitive Non Motorized) **Visual Design:** Any logging within 200m of the lake should be designed such that modification may be discernibly but not clearly evident from the lake.
Keystone Standard Basin Local Resource Use Plan	Zone C of the local resource use plan area encompasses the mid Mars Creek valley (upper boundary follows ESSF/ICH transition) and is subject to partial retention Visual Quality Objective.
Lake Revelstoke Reservoir Integrated Recreation Plan	This excerpt from the Lake Revelstoke Plan applies to TFL 56 lands: "Forest landscape management practices, in accordance with the Forest Practices Code, will be applied to ensure that harvesting methods used are sensitive to visual resource values while meeting the requirements of other resource values."

In addition to the guidelines stated in Table 22 above, RCFC will use visual management techniques in designing harvesting plans in areas within the Adamants lodge and Gothics lodge viewscapes

6.4 Aquatic Resources

Aquatic resources include fisheries and other resources associated with the lakes, streams, and wetlands of TFL 56. TFL 56 is bordered by the Lake Revelstoke reservoir, includes two major stream valleys, many smaller streams and several small alpine lakes. RCFC has completed overview stream and wetland classification of the entire TFL (1:20,000 maps) and has also completed field-based surveys of most of the streams within the TFL area. The following documents contain the information:

1. *Stage One Stream Inventory Report for Revelstoke Community Forest Corporation T.F.L. #56* by Bruce Runciman, Silvatech Consulting Limited, not dated.

2. *Locational Point Data and Stream Summary Forms for Tree Farm Licence #56,* by Bruce Runciman, Silvatech Consulting Limited, February 1996.
3. *Overview Fish Habitat Assessment Procedure and Fisheries Survey for the Downie Watershed and Keystone Face*, by Bruce Runciman, Silvatech Consulting Limited, July 1997.
4. *Goldstream River Watershed Restoration Program Overview Assessments,* by Bruce Runciman, Silvatech Consulting Limited, March 31, 2000.

These reports are supplemented by biologists' reports on individual streams when necessitated by nearby forestry activities. Fisheries are not the only values associated with riparian areas. For example, wetlands provide important habitat for some species of big game (i.e. moose) and many species of birds, small mammals, reptiles, and insects. The streams and wetlands all flow into Lake Revelstoke, and eventually through the turbines of the Revelstoke Dam.

RCFC has the following objectives relating to streams, lakes, and wetlands:

- Maintain and protect the productive capacity of fish habitat,
- Maintain streamside vegetation and the integrity of stream channels,
- Prevent unnatural stream bank erosion, sedimentation, and introduction of woody debris,
- Maintain the integrity of wetlands.

The objectives will be achieved by completing necessary riparian assessments and adhering to Forest Practices Code legislation and regulations. During planning and fieldwork on areas where watercourses exist, the following procedures are followed:

1. The correct classification for each stream, lake, or wetland will be determined (i.e. S1 to S6, L1 to L5, and W1 to W5).
2. Harvesting will be designed to protect the riparian reserve and management area.
3. Operating "windows" for in-stream work (i.e. for bridges and culverts) will be determined in consultation with Ministry of Environment, Lands, and Parks staff.
4. Debris deposited in streams as a result of harvesting operations will be removed following harvesting.

RCFC will determine correct classification of each stream, lake, or wetland by using the current Forest Practices Code Guidebook or any local area agreements in place with Ministry of Environment Lands and Parks.

6.5 Wildlife and Biological Diversity

The TFL 56 area is rich in both the presence of individual wildlife species and in biological diversity. These resources are important to licenced users such as trappers and guide-outfitters as well as the general public who might enjoy viewing or simply knowing that these resources are present.

To protect these resources, RCFC has completed a major forest-level project where networks of mature forest retention areas (MFRA's) were delineated. The MFRA's are designed to provide mature forest linkages and ensure that applicable forest cover requirements are met. This project is described in Section 4.2.3 and in the report entitled *Revelstoke Community Forest Corporation 1999 Caribou, Biodiversity, and Ungulate Analysis* that is appended to the Timber Supply information Package (Appendix 2).

The forest cover requirements for caribou, biodiversity, and ungulate winter range are all modelled over time under the assumptions of the base case scenario in the timber supply analysis. The requirements are met in almost all cases (using the MFRA's), and when not met immediately, the oldest forests that logically fit into the MFRA 's are reserved from harvest and the requirements are met in a few decades. Charts indicating the supply of forest cover over time are displayed in the Timber Supply Analysis Report, figures 13 to 25 (Appendix 4).

During the Management Plan #3 period, RCFC will refine the RCFC landscape unit planning and MFRA's system further as new information comes available on mature forest retention requirements and landscape unit planning. As well, an Old Growth Management Area (OGMA) strategy will be formulated.

As well as retention of mature forest, the patch size distribution, maintenance of wildlife trees, and access management are important factors in wildlife and biodiversity management.

RCFC will strive to achieve the patch size targets specified in the *Biodiversity Guidebook* although these may not be possible to achieve throughout RCFC's landscape. The patch size targets for natural disturbance type 1 (NDT 1)[6] are as indicated in the following table.

Table 23 Recommended Distribution of Patch Sizes (Harvest Units and Leave Areas)

Patch Size	Size Range (ha)	NDT 1 % Of Young Seral Area	NDT 3 (with Douglas-fir) % Of Young Seral Area
Small	(0-40 ha)	30-40% of area <20 yrs	20-30% of area <20 yrs
Medium	(40-80 ha)	30-40% of area <20 yrs	25-40% of area <20 yrs
Large	(80-250 ha)	20-40% of area <20 yrs	30-50% of area <20 yrs

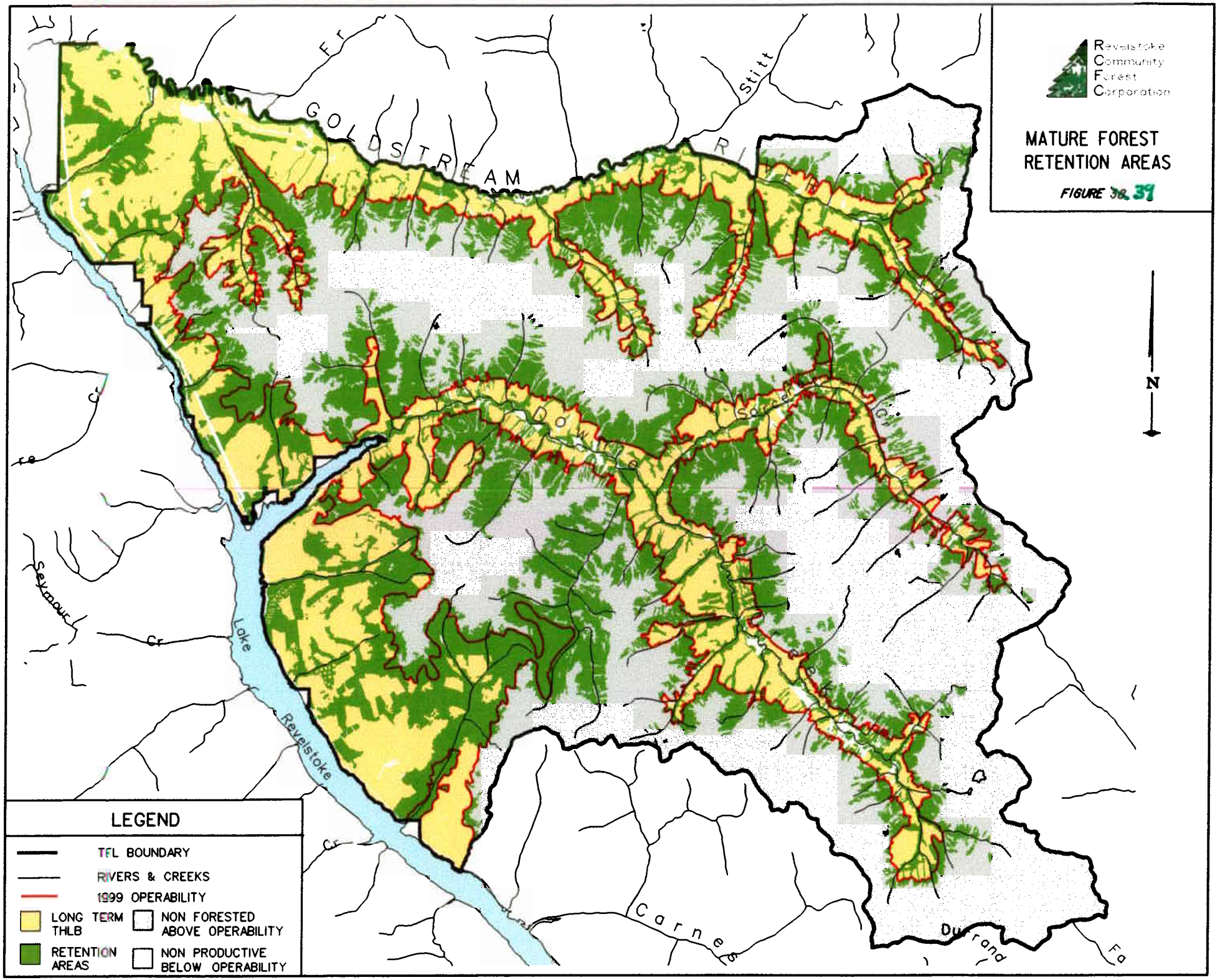
The patch size targets for larger patches are difficult to meet on RCFC's landscape for two main reasons. First, the forest is naturally fragmented by avalanche paths, gullies, and other terrain features. Second, the forested portions of the valleys are narrow meaning that small terrain features easily fragment the potentially larger patches. Third, the early harvesting was done in small patches, and the pattern is difficult to change now without transgressing other rules such as mature forest cover requirements. Although there are difficulties, RCFC will strive to meet the patch size targets where possible to do so. As well, RCFC will work with Ministry of Forests and Ministry of Environment, Lands and Parks to ascertain reasonable patch size targets for the TFL's conditions.

[6] NDT 1 ecosystems are those with rare stand-initiating events. Historically, these forest ecosystems were usually uneven-aged or multi-storied even-aged, with regeneration occurring in gaps created by the death of individual trees or small patches of trees. When disturbances such as wind, fire, and landslides occurred, they were generally small and resulted in irregular edge configurations and landscape patterns.

NDT 3 ecosystems are those with frequent stand-initiating events. Historically, these forest ecosystems experienced frequent wildfires that ranged in size from small spot fires to conflagrations covering tens of thousands of hectares.

Maintenance of wildlife trees will be accomplished in two ways. Where the proposed harvesting is near an MFRA, the wildlife tree requirements will be met within the MFRA's. When harvesting is proposed further than 500 metres from MFRA's, wildlife tree patches will be placed within the cutblock. These wildlife tree patches will be designed to maximize effectiveness for wildlife while being practical from a harvesting perspective.

RCFC recognizes that access management can be a very important tool in maintenance of wildlife populations. Access management is discussed in section 5.3.4.


Revelstoke Community Forest Corporation
MATURE FOREST RETENTION AREAS
FIGURE 38, 39
N
GOLDSTREAM
Stitt
Seymour
Lake
Revelstoke
Carnes
Durand
LEGEND
TFL BOUNDARY
RIVERS & CREEKS
1999 OPERABILITY
LONG TERM THLB
NON FORESTED ABOVE OPERABILITY
RETENTION AREAS
NON PRODUCTIVE BELOW OPERABILITY

7.0 Consultation With the Public and Other Resource Users

The public have a special stake in TFL 56 and the Revelstoke Community Forest Corporation. RCFC was born out of a desire by the people of Revelstoke to have more influence in forest management decisions in the Revelstoke area.

RCFC has continued to provide consultation opportunities to the public as part of the regular processes of running the TFL. These include:

- An annual public meeting;
- An annual report sent to each household in Revelstoke:
- Frequent advertisements in the local newspaper advising the public of operations and achievements; and
- An "open door" policy for public consultation.

As well, RCFC has provided the required public consultation opportunities for the Forest Development Plan process as well as this Management Plan process

7.1 Non-Timber Tenure Holders

In TFL 56, non-timber tenure holders include guide-outfitters, trappers, commercial recreation operators, and water users.

RCFC's goal is to continue meaningful consultation with these tenure holders. This will usually be accomplished by providing opportunities at the time of formulation of the Forest Development Plan. Non-timber tenure holders are normally not contacted directly regarding planned operations, but do have input at the FDP stage. They are expected to respond to public notices and contact RCFC if they believe that the proposed operations will affect their interests.

In addition to the above, RCFC will also provide additional consultation in the following circumstances:

- For proposed SP's in the CMH Adamants Lodge viewscape (foreground and middle ground), RCFC will consult with CMH on visual designs.
- For timing of springtime harvesting in the Downie watershed, RCFC will consult with the guide-outfitter to not unduly affect his springtime operations.
- For other situations brought up by other licenced non-timber tenure holders.

7.2 First Nations

RCFC must consult with first nations people who may wish to carry out traditional activities with the licence area. Although the present and historic use of the TFL 56 area by first nations people is very low, RCFC does consult with first nations groups as follows:

- Letters inviting nearby first nations groups to view and comment on FDP's
- FDP meetings with first nations groups who have requested a meeting (currently, only the Ktunaxa Kinbasket Tribal Council).
- Referral of all Archaeological Impact Assessments to the Ktunaxa Kinbasket Tribal Council

The Ministry of Forests maintains a list of first nations groups who must be sent referral letters for each Forest Development plan. The current list is provided in Appendix 5.

7.3 Public Review Strategy

A review strategy for this Management Plan (MP #3) was completed and approved in early 1999 (Appendix 6). This review strategy provided an approximate schedule and methodology for the review during several points of progress on this Management Plan preparation. Main points included opportunities to review or comment on were:

1. Implementation of MP #2 (December 1998)
2. Statement of Management Objectives and Operating Principles (August 1999).
3. Draft Management Plan #3 (November 2000)

A review strategy will also be required for the preparation of Management Plan #4 that is scheduled to take effect in 2005. An updated version of the current review strategy will be used

8.0 Impact Summary of MP Implementation

The impact of implementation of this management plan will be relatively light. While many new constraints have arisen since preparation of the last Management Plan, these have been countered by RCFC initiatives to add area to the harvestable landbase. Impacts are placed in four categories below; annual cut levels, operating costs, employment, as well as biodiversity and habitat.

Annual Cut Levels. RCFC has added area to the harvestable landbase by proving operability in areas previously considered inoperable. This has been part of a conscious decision to harvest in areas previously considered to be inoperable by:

1. Using aerial and skyline systems,
2. Building road into more difficult areas, and
3. Harvesting lower value timber.

The landbase during Management Plan #2 was 20,936 hectares. The operable landbase was increased to 30,702 hectares after net downs when the operability line was reassessed in 1999.[7]

RCFC can do this only by carefully balancing expenses with expected revenues. As markets change, RCFC shifts the harvest plans accordingly. If markets are high for RCFC's products, then RCFC harvests in more expensive operating areas. Conversely, if log markets are poor, RCFC withdraws to lower cost areas. This strategy allows the company to develop high cost or low revenue areas that previously would have been shunned.

The additional constraints have been managed by building the Mature Forest Retention Areas (MFRA's) to account for the required amounts of mature forest for habitat or biodiversity. The 30,702-hectare operable landbase has 9,226.3 hectares of MFRA's. This, along with a deduction for future roads, brings the long term Timber Harvesting Land Base to 20,513 hectares – a figure that is very close to the MP #2 land base.

Operating Costs. Although the AAC impact is small, the impact on operating costs is significant. It simply costs more to operate in the expanded landbase using aerial, skyline or other techniques. RCFC has proven that it is possible to operate under these conditions, however net income to RCFC and stumpage revenues to the Crown from TFL 56 will be lower.

Employment. Employment levels in TFL 56 are dependent on annual cut levels and methods of harvest. RCFC has shifted from primarily ground skidding to a combination of cable, ground skidding, aerial, and skyline. While aerial harvest provides relatively little employment, skyline and cable provide increased employment. Overall, the shift to the expanded landbase will likely increase employment over that experienced in the early MP #2 period.

Biodiversity and Habitat. Caribou, ungulate, and general biodiversity requirements have been, as described elsewhere in this plan, been met by a spatially explicit planning process utilizing a system of MFRA's. If anything, the impact of this plan is to provide wildlife managers with increase assurance that the biological needs are met.

[7] This is documented in the Appendix 2 of the *Timber Supply Information Package* that is contained in Appendix 2 of this report.

9.0 Employment and Economic Opportunities

RCFC, as the holder of a TFL with an AAC of 100,000 m^3 per year, can have a significant impact on employment and economic opportunities in the vicinity of TFL 56. RCFC employs a small planning and administrative staff, and contracts out services including engineering, layout, road building, timber harvesting, and sort yard operation.

Figure 40. RCFC Log Yard.

However, RCFC's tenure is somewhat unique among the array of Tree Farm Licences in B.C. in that RCFC does not own, and is precluded from owning, a timber processing facility. Therefore any employment and economic opportunities must be provided in forestry phases that are not associated with timber processing. The exceptions to this are the timber processing opportunities that arise from having timber readily available through RCFC's sort yard as well as the volume of timber provided to existing processing facilities

RCFC does operate a log yard where logs are scaled, sorted, and sold for a variety of uses. As well, 50% of RCFC's sawlogs are automatically sold to RCFC's industry partners who do have mills in Revelstoke and must use their entire apportionment from RCFC in those mills or trade for and equivalent volume.

RCFC employs directly only five full-time persons. However many more people are employed directly on a contract basis and indirectly through economic spin-offs. The table below summarizes direct employment activities.

Table 24 Direct Employment In TFL 56.

	Cruising and Engineering	Road Building	Logging	Silviculture	Log yard	Administration
RCFC Staff	0	0	0	0	0	5
Contract Employees	Up to 10	Up to 16	Up to 30	Up to 30	2	0

Many secondary jobs are created as a result of RCFC activities and are not included on the above table. These include jobs created as a result of raw logs made available for processing. The following table provides an estimate of the processing jobs created by RCFC saw logs and pulp logs.

Table 25 Secondary Employment In TFL 56.

	Volume per year[8] (m^3)	Person-years per cubic metre [9]	Total person-years employment
Solid wood processing	57538 (65%)	0.5	29
Pulp	30982 (35%)	0.3	9
Total	88520		38

RCFC was created to address the concern of logs (and jobs) leaving town. One of the objectives in creating RCFC was to provide opportunities for local businesses to create local employment. There are no specific objectives regarding first nations employment because there are no first nations communities near TFL 56 or Revelstoke.

RCFC creates opportunities for local employment by:

- Providing a supply of logs through the local log yard that people can purchase.
- Providing sawlogs (50% of RCFC's sawlogs) to the industry partners to process locally.
- Procuring goods and services locally providing they are available and priced reasonably as well as providing opportunities for local businesses when the goods or services are not available. RCFC spent $5.8 million locally in 1999-2000 fiscal year.

While RCFC has a distinct focus on local community benefits, it does not prohibit or restrict logs from leaving the community other than those required by the TFL agreement to be processed locally. Businesses from outside the community have equal access to logs sold at our sort yard.

RCFC will continue to:

- Look for opportunities to develop local uses for low-grade pulp logs
- Provide saw logs, 50% to the industry partners, and 50% sold through our local log yard, to a full spectrum of buyers. Local buyers have a distinct advantage in that they do not have pay for transportation out of town.
- RCFC will continue to sort and sell logs based upon feedback from customers and potential customers – this ensures that our sorts are relevant to our customers and opportunities are present to develop local businesses.
- RCFC will also continue favouring local sources of goods and services.
- When local sources of goods and services are not available, RCFC will continue working with local businesses to develop the required expertise and competitive structure to provide these goods and services to RCFC and others in the community.

[8] Does not include SBFEP portion of cut (11,480m3/year)

[9] Source: Revelstoke and Area Land Use Planning Draft Recommendations, Multiple Account Analysis (prepared for the MAC committee and dated August 1997)

10.0 Comparison of Current and Proposed MP

A comparison of major factors and inputs used in MP #2 and MP #3 are described below.

Timber Supply Modeling: For MP #3, a modern spatial analysis model was used. For MP #2, a non-spatial model was used. The primary difference in results between the two models relates to output. With the spatial model, maps indicated where the model "thinks" harvesting is taking place can be generated for any future time. As well, spatial reserves were built into the model. The model results can be checked by reviewing the mapped output, an option that is unavailable with non-spatial modeling. Further comparisons are shown in the table below.

Resource Inventories: For MP #3, RCFC used an updated version of the forest cover inventory used in the preparation of MP #2. RCFC completed new recreation inventories for MP #3. As well, new aerial photography, orthophoto mapping, 5-metre contour mapping, total chance planning, terrain stability mapping, stream & wetland classification, and avalanche likelihood mapping were completed for use in preparation of MP #3. These resources were not available for MP #2 preparation – a vast improvement in information has been made in recent years by RCFC.

Management Objectives: There have been no significant changes to the management objectives although the planning and management themselves have changed to better meet the stated objectives.

Planning: RCFC has made vast changes in planning during the MP #2 period. The entire landbase has been the subject of "total chance" planning. All forestland deemed operable has been reviewed for harvest potential and "blocked" as a potential harvest unit. There also may be additional opportunities in forestland deemed inoperable as harvesting methods change or timber values increase. Mature forest retention areas – forest ecosystem network-like structures – have been laid out throughout the landscape. This level of planning was made possible by the acquisition of the resource inventory products noted above.

Timber Resource Management: RCFC has introduced skyline and aerial harvesting to the TFL during the MP #2 plan period. As well, group selection, single tree selection, and commercial thinning have been introduced. These methods and systems have not been used in significant amounts in the past and reflect a genuine change in timber resource management.

Non-Timber Resource Management: The biggest difference in non-timber resource management has to do with the adoption of the MAC plan and RCFC's use of MFRA's to meet the objectives for forest retention as stated in the MAC plan.

Table 26 Comparison of Timber Supply Modeling In the Current and Proposed MP.

MP#2	MP#3 Base Case
TIMSIM model used (non spatial)	FPS-Atlas model used (spatially explicit)
Keystone wilderness area not removed.	Keystone wilderness area removed.
Forested operable area = 26,326 ha Long-term THLB = 24,747 ha	Forested operable area = 37,348 ha THLB = 30,702 ha THLB less reserves = 20,513 ha
Net-downs were non-spatial and no net-downs for riparian areas or WTP's were used.	Net-downs applied spatially to the land base. Net-downs for riparian areas and WTP's were implemented.
Caribou rules applied (10%> 140yrs)	Revelstoke MAC guidelines for ungulate, caribou and biodiversity modeled using RCFC's mature forest retention areas.
3m green-up / adjacency modeled (non spatially).	Patch size management used in place of green-up/adjacency.
Only clearcut systems modeled.	Clearcut and group select modeled.
Unsalvaged Losses = 3480 ha/yr	Unsalvaged Losses = 995 ha/yr

11.0 Annual Report

RCFC will continue to produce the *Annual Report for T.F.L. No. 56.* RCFC has produced this document annually since purchasing the TFL in 1993. It contains information on volume production, stand treatments, reforestation, stand tending, forest development and forest protection.

This document has proven valuable in tracking forest management. As new information needs occur, new statistics can be gathered and published in this document. During the MP #3 review process, Columbia Forest District staff requested that performance in aerial harvesting of hemlock stands as well as problem forest types be recorded. RCFC will derive statistics for these items and publish them in forthcoming annual reports.

The *Annual Report for T.F.L. No. 56* is distributed internally within RCFC as well as to the Ministry of Forests Columbia Forest District office and Nelson Forest Region office.

List of Appendices