MANAGEMENT PLAN 6
1999 - 2004

KITIMAT TREE FARM LICENCE 41

West Fraser Mills Ltd

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PREAMBLE

This management plan was prepared over the past 12 months by Skeena Sawmills Division, with principal assistance from Sterling Wood Group Inc., forestry consultants. Individuals who made a significant contribution in completing this plan include D.C. Keating, RPF, S.S.N. Jay, RPF and S.J. Macpherson, RPF, S.M. Smith, PhD, RPF and J.D. Layden, RPF.

Many other organizations assisted in providing data and information. Forest Mensuration Services Inc. completed the new timber inventory and Doug Levears Consulting prepared the recreation analysis report. Fish escapement data was provided by Eric Grundman, DFO, Nanaimo, while John Thornton, MELP Wildlife Branch supplied statistics for the wild animal harvest database. Louise Shaw, curator of the Kitimat Centennial Museum provided historical information on mineral exploration. The assistance from these and many other individuals is acknowledged.

Professional Forester Certification

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

D. Keating

D.C. Keating, RPF

Licensee Submission

Submitted on Sept. 20/99 on behalf of West Fraser Mills Ltd.

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Woodlands Manager
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DISTRIBUTION

Management Plan 6 has been distributed as follows:

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West Fraser Mills - Quesnel

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1.0 INTRODUCTION

The Kitimat Tree Farm Licence #41 is located 100 km inland from Prince Rupert, south of Terrace in the Kitimat Valley and along the main valleys tributary to the Douglas Channel and the Gardner Canal. It encompasses the Municipality of Kitimat and the townsite of Kemano (see key map).

TFL 41 was established in December 1966 when the licence was awarded to Eurocan Pulp and Paper Co. Ltd. West Fraser Mills Ltd. became the licence holder in 1993. The tree farm licence agreement was replaced by the Minister of Forests on March 1, 1995 and was renewed for a new 25 year term, expiring in 2022.

Management Plan 6 (MP 6) is the sixth management plan completed for TFL 41. The term of the plan is five years, from December 1999 to December 2004 or as otherwise approved by the chief forester. Submission of MP 6 to the provincial chief forester fulfils a condition of the licence agreement. In preparing MP 6, West Fraser has completed key components in the planning process that required approval from the Ministry of Forests (MoF):

- Preparation of a review strategy for public consultation.
- Submission of a statement of management objectives, options and procedures.
- Completion of an information package for the timber supply analysis and a timber supply analysis report.
- Preparation of a 20 year strategic development plan.

The content of MP 6 covers all the requirements of clause 2.25 of the tree farm licence agreement. It is organized into the following sections:

Section 1 - Introduction

Provides background description about TFL 41, the licensee (West Fraser Mills Ltd.) and summarizes the salient management commitments.

Section 2 - Management Goals

Outlines the management objectives and the resource issues affecting TFL 41.

Section 3 - Resource Inventories

Summarizes the current status of the timber and non-timber resource inventories and outlines ongoing plans for updating.

Section 4 - Integrated Resource Planning

Sets out strategic and operational planning that is on-going or to be undertaken.

Section 5 - Timber Resource Management

Outlines the goals and strategies for managing the timber resource, including the allowable annual cut, harvesting, access management, reforestation, forest health and fire protection.

Section 6 - Non-timber Resource Management

Details the goals and strategies for managing watersheds, recreation, visual quality, biodiversity, fish and wildlife habitat and cultural resources.

Section 7 - Public Consultation

Reports on the input received from the public during preparation of MP 6.

Section 8 - Employment and Economic Opportunities

Outlines the employment levels and job opportunities generated from operating the TFL.

Section 9 - Special Projects

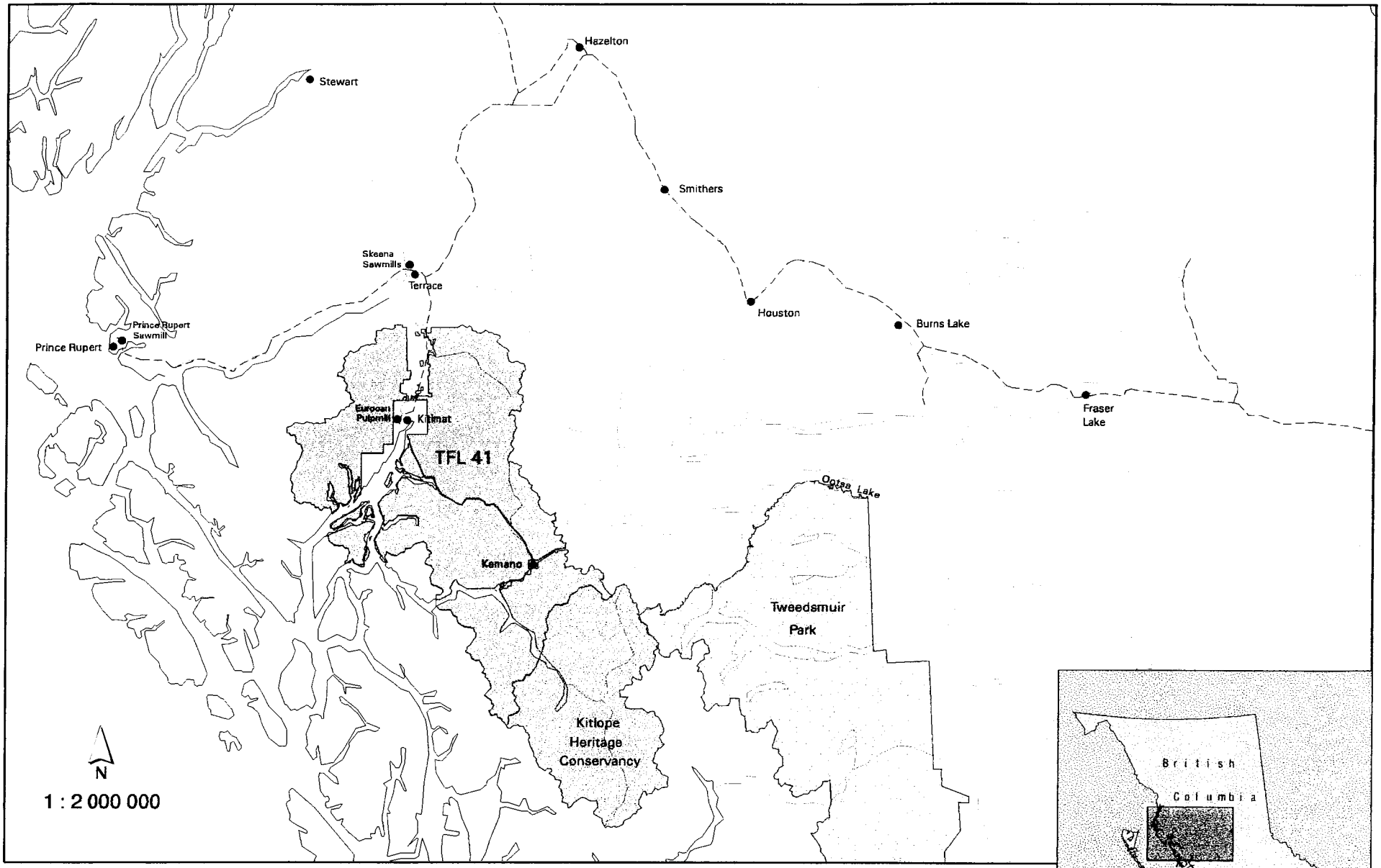
Ongoing projects and new initiatives planned over the next five years are listed.

Section 10 - Monitoring

Makes provision for implementation, revisions and an annual report.

Appendices

Provides the supporting statistics and technical reports completed to prepare the plan.



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West Fraser Mills Ltd

TFL 41 - Key Map
Figure 1

1.1 PURPOSE

The purpose of this management plan is to set out the objectives, goals and resource management strategies for the planning period, 1999-2004. It builds upon the strategies pursued in previous management plans. Integrated resource management by its very nature is a dynamic process and West Fraser has used adaptive management to refine and improve on the strategies described in each successive plan.

West Fraser is legally bound to comply with the *Forest Act* and the *Forest Practices Code Act of British Columbia* (Code) in managing the tree farm licence. The *Forest Act*, the Code and all relevant legislation is therefore implicit in the strategies and practices described in MP 6. Other legislation such as the *Fisheries Act* and the *Water Act* must be complied with when conducting operations that could impact other resources.

1.2 DESCRIPTION

TFL 41 is situated in northwestern British Columbia, approximately 100 km inland from Prince Rupert, in the lee side of the Coast Mountains and includes a significant portion of the Kitimat Ranges. The gross area is approximately 703,745 hectares. It includes a northern onshore portion from the head of Douglas Channel to the Onion Lake divide. It encompasses the upper headwaters and major tributaries of the Kitimat Valley. This portion is accessible by road from Terrace and Kitimat. The southern offshore portion includes watersheds along the Douglas Channel, immediately south of Kitimat and the Gardner Canal inland to Kemano and terminates on the boundary of the Kitlope Heritage Conservancy Area. Notable tributaries to Douglas Channel include Gilttoyees Inlet, Foch Lagoon, the Dala and Kildala River valleys, and the Kemano valley. (refer to figure 1)

The topography is steep and mountainous with narrow valleys and characteristic round topped ridges due to heavy glacial action. Although the majority of the area is extensively forested, the economically merchantable forest is largely confined to the valley floors and mid-slopes. The timber stands are predominantly old growth mixtures of western hemlock, amabilis fir and western red cedar. Small bands of mixed Sitka spruce and cottonwood stands occur along alluvial valley bottom lands but do not dominate. Amabilis fir becomes the dominant species on the mid-to-upper slopes. Mountain hemlock is found at higher elevations, while yellow cedar and shore pine occurs on sites along the Douglas Channel. TFL 41 also has the most northerly stands of coastal Douglas-fir. These are found on drier aspects along the Gardner Canal and the lower end of the Kemano Valley.

The forest structure has largely developed without the influence of wildfires, which are infrequent and many stands are 200 years old or more. As a consequence, timber quality is variable and tends to have a high pulplog content and a higher proportion of lower quality sawlogs than younger hemlock/balsam stands.

The local climate is influenced strongly by the coastal weather patterns, but due to the proximity inland from the outer coast, it also displays some characteristics of an interior climate. Summers tend to be short, followed by heavy storms and rainfall in the autumn. Winters are characterized by heavy wet snowfall, although the ground rarely freezes for prolonged periods. The Municipality of Kitimat records a mean annual temperature of 8.2° C, 143 cm total annual rainfall, (158 days) and 361 cm of snowfall (42 days).

The forests support populations of black bear, grizzly bear, mountain goat and black-tailed deer, furbearers and various songbirds, raptors and sea birds. All species of salmon, steelhead trout and fresh water trout are found in the rivers and streams. Marine mammals, such as seals and others utilize the shoreline and river estuaries.

Biogeoclimatic Classification

TFL 41 is covered by three main biogeoclimatic zones: alpine tundra (AT), mountain hemlock (MH), and coastal western hemlock (CWH). Forestry activities are concentrated in the CWH, which comprises 39% of the gross area while the subalpine forests of the MH zone accounts for 40% of the gross area. (Figure 2)

Table 1: Biogeoclimatic Subzone Distribution

	Zone/Subzone	Area (ha)	(%)
AT	Alpine Tundra	149,848	21%
MHmm	Mountain Hemlock - Moist Maritime (forested)	274,042	39%
MHwh	Mountain Hemlock - Wet Hypermaritime (forested)	4,200	1%
CWHvh	Coastal Western Hemlock - Very Wet Hypermaritime	21,353	3%
CWHvm	Coastal Western Hemlock - Very Wet Maritime	166,081	24%
CWHws	Coastal Western Hemlock - Wet Submaritime	87,319	12%
ESSFmk	Englemann Spruce Subalpine Fir - Moist cool	901	0%
	Total	**703,745**	**100%**

The natural forest management system and sustainable forest management strategies adopted for TFL 41 at both landscape and operational levels are driven by the ecological characteristics of these subzones. These attributes provide a technical basis in the preparation of landscape level plans, biodiversity conservation strategies, harvesting and reforestation plans.

The following brief description of the biogeoclimatic zones is from Land Management Handbook 26.

AT Alpine Tundra Zone

High elevation mountain and ridge tops. The severe climate is cold, windy and snowy. Mainly treeless, with dwarf shrubs, alpine grasses and herb meadows, mosses and lichens. Stunted mountain hemlock, yellow cedar and subalpine fir occur at lower alpine elevations.

MH Mountain Hemlock Zone

High elevation subalpine zone. Characterized by short cool summers, rainy autumns, and long, cool, wet winters with heavy snow cover. Often enveloped in low-lying clouds, providing additional moisture. Mountain hemlock and amabilis fir are the dominant tree species, with western hemlock. Deciduous trees are absent. Lower elevations of the MH are continuously forested, while upper parkland elevations have clumps of trees interspersed with subalpine heather, meadows and wetlands. There is low species diversity in the shrub and lesser vegetation layers. Soils are acidic, highly leached, predominantly podzols and folisols with Mor humus forms.

CWHvh Coastal Western Hemlock Very Wet Hypermaritime Subzone.

An outer coastal subzone never found more than 25 km from salt water. Terrain is subdued and rocky. The climate is extremely wet throughout the year. The vegetation is a mosaic of poor forests and bog. The major tree species are western red cedar, western hemlock, yellow cedar, shore pine, Sitka spruce and red alder.

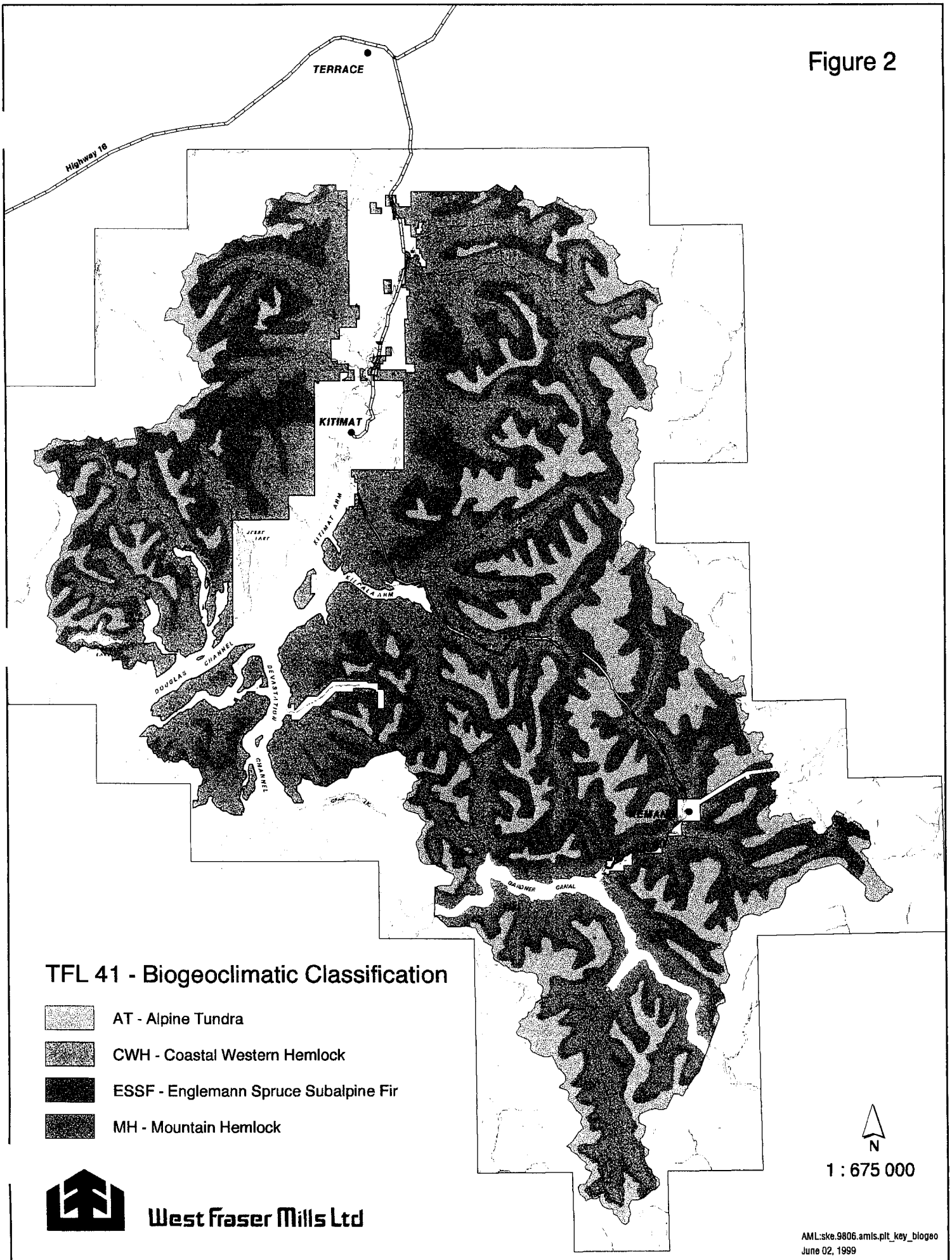
CWHvm Coastal Western Hemlock Very Wet Maritime Subzone

This subzone has a wet humid mild maritime climate with relatively little snow and a long growing season. It borders on the MH zone. The subzone supports large trees; western hemlock, amabilis fir, Sitka spruce dominate, with a diversity of other plant species. The Gardner Canal phase around Kemano has Douglas-fir present on xeric and subxeric sites. Soils are well-developed podzols and folisols with thick humus layers, being Humimors and Hemihumimors.

CWHws Coastal Western Hemlock Wet Submaritime Subzone

This is an inland subzone with a climate that is coastal - transitional. It is described as submaritime as it has drier, colder winters, hotter summers and more frequent forest fires than a true maritime climate. Supports forests of western hemlock, amabilis fir, Sitka and hybrid spruce. Western red cedar and red alder are a minor component. More interior species; lodgepole pine, birch, and trembling aspen occur as seral species, while maritime plants such as yellow cedar, shore pine, western yew, salal, deer fern are very rare. Soils are podzols and folisols with compacted humus layers, Humimors or Hemihumimors.

Figure 2



TFL 41 - Biogeoclimatic Classification

- AT - Alpine Tundra
- CWH - Coastal Western Hemlock
- ESSF - Englemann Spruce Subalpine Fir
- MH - Mountain Hemlock

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1.3 HISTORY

TFL 41 was granted to Eurocan Pulp and Paper Co. Ltd. in December, 1966 in order to provide a secure timber supply for the unbleached kraft pulp and paper mill which the company was building at Kitimat. Since that time there have been changes in the ownership of Eurocan and the name of the licence holder.

Originally Eurocan was a joint-venture company between two major Finnish forest companies, Enso Gutzeit Oy and UPM Kymmene Group. In 1981, West Fraser Mills Ltd. acquired a major share in Eurocan by purchasing UPM Kymmene's holdings. West Fraser subsequently purchased Enso Gutzeit's shares and in 1993 the name of the licensee was changed from Eurocan to West Fraser Mills Ltd.

The original area of TFL 41 was 1,019,740 hectares. It excluded fee simple land owned by Aluminum Company of Canada Ltd. (Alcan) at Kemano and their powerline transmission corridor from Kemano to the aluminum smelter at Kitimat as well as Indian Reserves. Two major area revisions recently have reduced the gross area to approximately 70% of the original. These revisions were:

- Removal of the Kitlope drainage in 1996 to create the Kitlope Heritage Conservancy area. (321,120 hectares)
- Removal of Lots 305 and 306 for transfer to the Haisla Band Kitamaat Indian Reserve in 1997. (139.5 hectares)
- Addition of expired timber licence, TO 991, in the Kitimat valley as Schedule A land (906.4 hectares) and Schedule B (176.5 hectares) land.

See Appendix I.2 for a listing of the TFL 41 amendments since inception.

Prior to creation of the TFL some logging had taken place south of Kitimat along the shoreline of Douglas Channel and the inlets. Initial logging began on TFL 41 in 1970 and the first plantations were established in 1973. A further account of the history of operations on TFL 41 is in Appendix I.3

1.3.1 Accomplishments during MP 5

Considerable progress was made between 1994-98 in the implementation of MP 5. Significant achievements include the following:

Strategic Planning

- Participation in the Kalum Land & Resource Management Plan meetings. (in progress)
- Completion of a 20-year strategic development plan. (1996)
- Removal of the Kitlope watershed (321,120 ha), without compensation, to establish the Kitlope Heritage Conservancy Area.
- Exchange of Lots 305 and 306 to add to the Kitamaat Indian Reserve at Minette Bay for timber licence area in the east side of the lower Kitimat Valley.

Resource Inventories

- New timber inventory completed in 1998 in digital format to MoF specifications.
- All new and updated resource inventory data available was translated and entered into a digital, accessible GIS platform.
- Classification and mapping the productive forest into operability classes was completed.
- An Archaeological Overview and Traditional Use Study was completed in co-operation with the Haisla Nation and the MoF.
- A new recreation and landscape features inventory was completed as well as a recreation analysis, that guides recreation strategy (1998).
- Terrain stability hazard mapping (TSIL C) completed for all current development areas.
- Stream inventory and classification completed for all the major watersheds on the TFL included in the five year development plan.

Operations

- Development continued offshore in the Dala/Kildala, and commenced in the Pike/Sleeman, Kemano, Hawkesbury (SBFEP) drainages.
- Complied with onshore/offshore AAC partition of 45/55 %.
- Helicopter logging that was successfully introduced in 1990 continued in 1994 and beyond.
- A program to deactivate roads commenced in 1994. The road system in the inactive Wedeene watershed was deactivated, under an access management plan.
- No significant wildfires occurred and no insect outbreaks occurred.
- Forest health situation remained stable.

- Achieved a high level of compliance with the Code as evidenced by a compliance audit completed by the Forest Practices Board in 1998.
- Salvage logging of windthrow caused by major storms in the Upper Kitimat Valley in 1997 was completed.
- Logged 1,838,760 m^3 from 3,214 hectares, between 1994-1998. This represents 97.2% of the AAC for the cut control period.

Silviculture

- Reforestation has kept in balance with the area harvested.
- Planted 3.515 million seedlings: Hw 39%, Cw 13%, Ba 36%, Ss 9% on 3,708 hectares. The balance was regenerated naturally (1590 hectares).
- Free growing surveys of 2,381 hectares began in 1988 of regeneration established under the *Silviculture Regulation.*
- Reforested almost all backlog NSR areas.
- Juvenile spacing of 1,813 hectares.
- Regenerated stands are healthy and thriving, exhibiting productivity (site indices) higher than previously assigned. No major regeneration issues were encountered.

Recreation

- Upgraded and maintained the Mt. Elizabeth and Robinson Ridge trails.
- Facilities improvements completed at four campsites: Enso Park, Hirsch Creek, Chist Creek and Kitimat River.
- Placed mooring buoys at Eagle Bay and Kitsaway anchorages.

1.4 LICENCE HOLDER

West Fraser Timber Co. Ltd. began operations in 1955 in British Columbia and in Alberta in 1989. West Fraser Mills Ltd. (West Fraser) is the wholly-owned principal operating subsidiary. The company has become a major integrated forest products company in Canada producing dimension lumber and speciality wood products: medium density fibreboard, pulp, linerboard, kraft paper and newsprint. Most of the forest products manufactured by West Fraser are sold world-wide as commodities. The company through its subsidiaries, Revelstoke Home Centres Ltd. and Revy Home Centres Inc., owns and operates a chain of retail home improvement stores in Western Canada and Ontario. West Fraser holds Crown timber tenures in British Columbia and Alberta and has forest products divisions in both provinces. West Fraser's share of the current annual capacities of its wholly-owned and joint venture manufacturing facilities is approximately 1600 MMfbm of lumber, 210 MMsf of MDF, 450,000 tonnes of linerboard and kraft paper, 325,000 tonnes of BCTMP (bleached chemi-thermomechanical pulp) and 125,000 tonnes of newsprint.

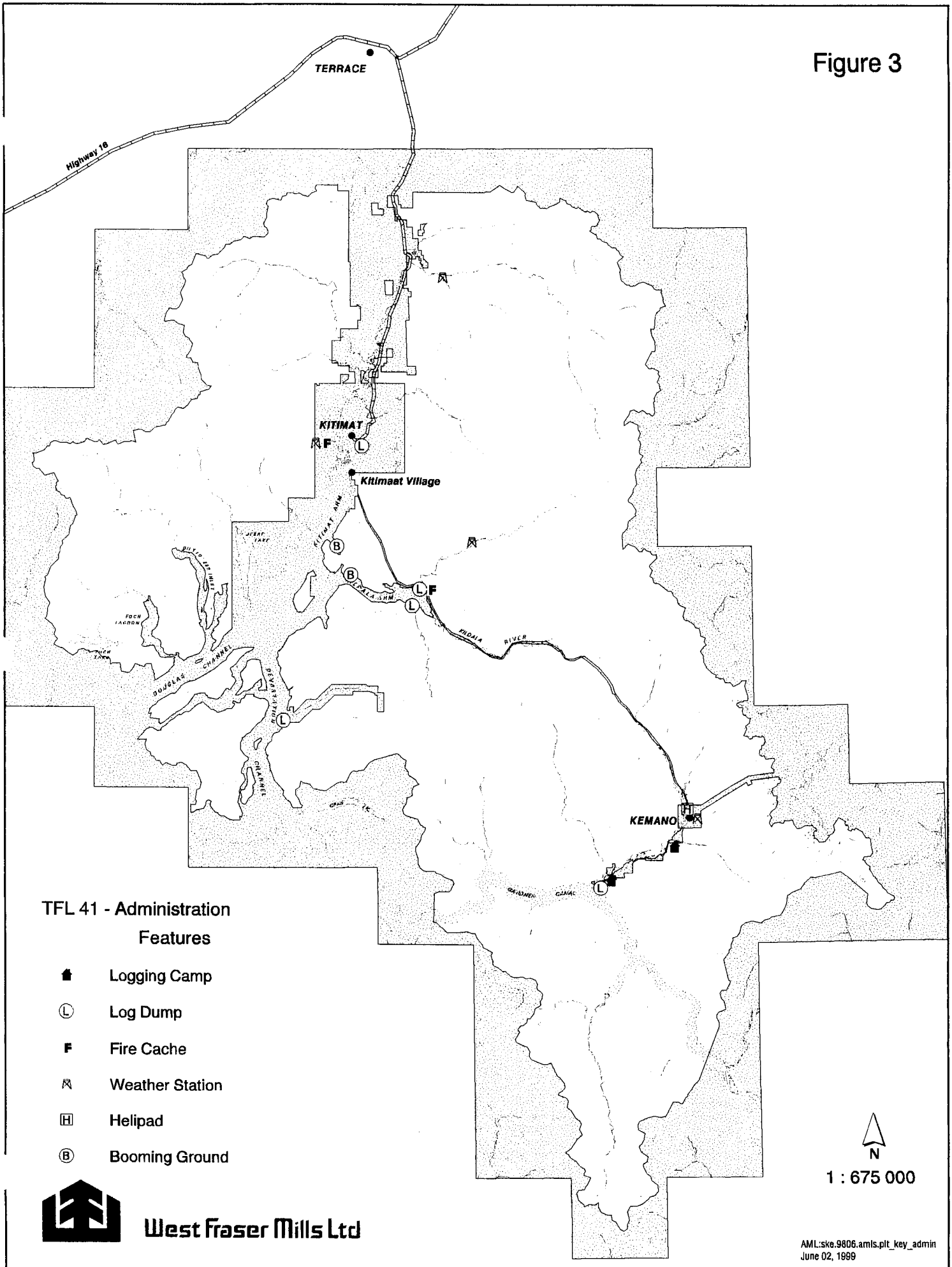
In northwestern British Columbia, West Fraser operates a speciality lumber mill at Prince Rupert, a dimension sawmill at Terrace and a pulpmill at Kitimat. Logs and fibre for these facilities are supplied from TFL 41 (47%) and from three forest licences in the Kalum, Nass and North Coast timber supply areas. The combined allowable annual cut (AAC) of these licences in 1998 was 799,914 m^3. TFL 41 is managed by Skeena Sawmills Division from its woodlands office in Terrace.

1.5 DEPENDENT COMMUNITIES

Communities associated with the TFL are Terrace (population 13,372), Kitimat (population 11,700), Kemano (population 220) and Kitamaat Village (population 676) (figure 3).

The local economy of these communities is resource-based dependent: there is an aluminum smelter, pulp and papermill and a methanol and ammonia production plant at Kitimat. Terrace is the service sector for the northwest communities and has a more diversified economic base than Kitimat. Direct employment generated by West Fraser's business is 850; employing approximately 221 people at its woodlands and sawmilling operations, and approximately 611 people at the Eurocan pulp and paper mill in Kitimat. The contract work force in woodlands provides about 400 direct jobs in logging, road construction, trucking and silviculture operations. The estimated gross annual income from these operations is $270 million. West Fraser makes donations and supports local events that young people participate in, such as sports teams, social events, cultural events and education scholarships.

Figure 3



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June 02, 1999

1.6 ADMINISTRATION

TFL 41 is administered by the MoF under authority of the *Forest Act* and the Code. The licence lies in the southern portion of the Kalum Forest District of the Prince Rupert Forest Region.

The Code (hereinafter referring to the Act and Regulations) became law in July 1995. Its implementation has had a significant influence on the operation of the tree farm licence, adding administrative complexity and increasing delivered log costs. This is because it is a process-oriented system controlled by regulations. There have been some subsequent amendments to the Code, the most recent being the *Forest Statutes Amendment Act* in June 1997 and attendant regulation changes in April 1998. West Fraser's goal is to conduct its operation of the TFL in compliance with the Code. An internal self-auditing program has been instituted to monitor compliance. The goals and strategies outlined in MP 6 have a result-oriented focus.

West Fraser has the responsibility for ensuring that TFL 41 is managed in accordance with the *Forest Act*, the Code and with the approved management plan. The district manager of the Kalum Forest District has a mandate to monitor compliance and enforcement. Before West Fraser can begin harvesting, cutting permits and roads permits must be obtained from the district manager. These are issued upon completion of a detailed series of operational plans, which are also referred to the Ministry of Environment, Lands and Parks (MELP) and the federal Department of Fisheries and Oceans. (DFO)

In the event of any mineral exploration, these activities are authorized by *the Mineral Tenure Act*, *Coal Act*, *Petroleum and Natural Gas Act*. These are administered by the Northwest Regional office of the Ministry of Energy and Mines in Smithers.

1.7 COMPARISON WITH MP 5

Similarities and differences between MP 6 (1999-2004) and the previous MP 5 (1994-1998) are summarized in this section. Items in section 2.25 of the TFL document are covered. Note, the comparison is made prior to the AAC determination by the provincial chief forester.

Management Goals

The management goals in MP 6 are similar to those included in the previous plan. The company has built on the successes of previous plans by adapting and refining its objectives and strategies to accommodate change. The overriding goal is to provide a sustained, economical supply of logs and fibre to its processing facilities. The natural productivity and biodiversity of both timber and non-timber resources will be sustained.

The resources within TFL 41 and management issues remain largely unchanged. New and more complete timber and non-timber inventories in MP 6 have provided current and more detailed descriptions of the resources.

Harvest Level

West Fraser is proposing to continue with the same AAC of 400,000 m^3. This is shared with the SBFEP (378,500/21,500 m^3). Compared to MP 5, there is no onshore/offshore geographic partition of the AAC.

Although the AAC would be unchanged, compared to MP 5 there is a decrease in gross area and an increase in net operable area. The TFL gross area has decreased from 1,019,738 ha in MP 5 to 703,745 ha in MP 6, a decrease of 315,993 ha since MP 5. This is primarily due to the withdrawal of 321,120 ha for the Kitlope Heritage Conservancy Area. The Kitlope drainage had already been excluded from the timber harvesting landbase used for MP 5. Re-mapping of the TFL boundary to conform to TRIM contours and inclusion of the Claque Mountain Park reserve (1514 ha) resulted in a net increase in area. The areas affected by the TRIM mapping (2669.5 ha) were alpine non-forest land. There was also a land exchange in 1997 to enlarge the Kitimat Indian Reserve (139.5 ha).

The company will use similar logging methods and equipment configuration as used over the past five years. The increase in offshore logging will continue. Harvesting of over-mature, decadent timber stands remains a priority. An increase in heli-logging from the non-conventional operable landbase is projected for MP 6. Temporary roads will be rehabilitated, where feasible, to maintain the productive land base. The difference between MP 5 and MP 6 would be:

	MP 5	**MP 6**
Gross area	1,019,738	703,745
Net operable	64,619	69,686
West Fraser AAC	378,500	378,500
Onshore/offshore partition	45/55%	n/a

Employment and Contractors

The economic conditions over the past three years (1996-1999) have been difficult for the forestry sector province-wide. This has forced the company to temporarily shut down mills and to reduce direct employment and contracting. Under normal operating conditions, direct and indirect employment is, to a large extent, a function of the annual cut. Employment should remain at the same level during MP 6 assuming there is no decrease to the AAC and that market conditions improve or at least remain stable.

Economic Opportunities

Economic opportunities are anticipated to remain stable or improve. This assumes that the difficult economic climate that has been experienced since 1997 has bottomed out. Providing that market related shutdowns are not required, job opportunities in the woods and sawmill will at least remain stable.

The multi-year agreement (1988-2002) with Forest Renewal BC will provide employment opportunities in various land management, silviculture and watershed restoration projects. The employment level for these projects is directly related to the funding provided.

Protection and Conservation of Non-timber Values

The improved inventories available for MP 6 means that the company has more information for integrated resource planning. Specifically, inventories of fish and fish habitat, potentially unstable terrain, visual landscape and recreation and archaeological potential covering much of the TFL have been completed. On-going additional non-timber inventory work is planned. The company will continue to use these inventories in refining landscape level plans. These inventories mean that West Fraser will also able to identify or anticipate the presence of non-timber values with more confidence when preparing operational plans.

1.8 SUMMARY OF GOALS AND COMMITMENTS

Commitments made in MP 6 are listed below. Specific strategies and additional details regarding commitments are provided in the relevant section of the text.

Strategic Planning

- Continue to participate in Kalum Land & Resource Management Plan (LRMP) planning meetings.
- Strive to incorporate management objectives for TFL 41 into the Kalum LRMP process.
- Manage the TFL on the basis of current landscape units and planning cells.
- Continue to co-operate with the MoF to ensure that the planning and administration of the small business program is carried out in concert with TFL operations, strategies and objectives.

Resource Inventories

- Maintain an updated timber inventory for depletion and other changes.
- Secure funding from Forest Renewal BC to complete stream assessments and fish inventories.
- Acquire or refine non-timber inventory information as it becomes available.

- Complete terrain hazard mapping of all operable areas over the next three years for use in MP 7 timber supply analysis.

Operational Planning

- Submit updated forest development plan to district manager for annual or two year approval.
- Submit annual report each year to the district manager.

Harvesting

- Conduct operations in accordance with requirements of the Code and cutting permit obligations.
- Log 378,500 m^3/yr between 2000 and 2004 in compliance with cut control.
- Harvest 160,875 m^3 from the non-conventional landbase over five years.
- Select harvesting and silviculture methods to minimize site disturbance and meet other resource objectives.
- Assign harvesting priorities that reflect forest health, timber profile, forest landscape, biodiversity and other resource objectives.
- Utilize coniferous species as per Kalum Forest District standards.

Transportation

- Construct, maintain and deactivate forest roads and crossings in a manner that minimizes impacts to the environment.
- Maintain a road network that provides economical access to timber and is safe for industrial and public use.

Silviculture

- Regenerate all blocks within 2-3 years on average after completion of harvesting using a combination of artificial and natural regeneration techniques.
- Carry out basic silviculture activities as per the forecast Table 22 or annual updates.
- Reforest recently logged blocks with ecologically suitable species in accordance with prescribed stocking standards in the silviculture prescriptions.
- Collect sufficient conifer seed, and maintain adequate inventory to satisfy seedling and stock types requirements and preserve genetic diversity .
- Meet free growing dates by treating competing vegetation on regenerated areas.
- Provide labour-intensive employment opportunities through incremental silviculture activities at a level determined by Forest Renewal BC funding.
- Meet the requirements of the *Silviculture Regulation.*

Forest Health

- Monitor insect and disease activities at both forest and stand levels.
- Plant weevil resistant Sitka spruce seedlings where available.
- Employ sanitation spacing and other preventative measures in managed stands to reduce risk of infestation and disease.

- Prompt salvage of stands damaged by windthrow, fire, pest or disease attack where economically feasible.

Fire Protection

- Submit an updated fire preparedness plan annually to the district manager.
- Implement appropriate fire prevention measures and fuel management practices to reduce risk of and mitigate impact of forest fires.
- Conduct preparedness and suppression activities in accordance with the *Forest Fire Prevention and Suppression Regulation.*

Recreation

- Continue to provide recreation opportunities for the public and co-operate with the MoF in the district recreational program.
- In partnership with the MoF, maintain roads that provide access to recreation destinations and maintain company recreational sites.

Visual Landscape

- Use forest landscape design principles to meet the visual quality objectives assigned to viewscapes visible from Kitimat townsite, Kitamaat Village, the highway corridor between Terrace and Kitimat, and the main Douglas Channel.
- Employ appropriate silviculture systems, harvest methods and road building practices to meet goals of visual landscape design.

Soils and Terrain Stability

- Minimize the number of roads located through potentially unstable terrain.
- Use harvesting systems and road construction where necessary to prevent soil degradation and to maintain stability and conserve productivity.

Biodiversity

- Plan and manage operations to maintain biological diversity over the landbase.
- Participate with MoF and MELP in developing landscape unit biodiversity objectives.
- Implement appropriate practices and measures to maintain landscape and stand level biodiversity.

Watersheds

- Implement strategies for riparian zone management, road building and maintenance to ensure minimal adverse impact to water quality.
- Conduct a watershed assessment of Wathl Creek prior to any development.

Fisheries

- Refine and complete stream classification of all streams within the five-year development plan area.
- Prescribe appropriate riparian reserves and management zones in accordance with the Code.
- Follow standard operating procedures for logging, road building and maintenance, and employ appropriate measures to maintain streambank integrity and protect fish.
- Co-operate with the Haisla Nation in their eulachon management program.

Wildlife Habitat

- Co-operate with MELP in refining habitat capability mapping for grizzly bears and identifying and mapping mountain goat winter range or other ungulate species winter range.
- Incorporate available assessments of wildlife occurrence and habitat features in cutblock design to address wildlife tree patch, special retention and cutting pattern requirements.
- Co-operate with MELP in identifying wildlife habitat areas where necessary to protect threatened or endangered species.

First Nations

- Continue to maintain on-going dialogue with Haisla and Tsimshian first nations bands.
- Refer forest development plans to local first nations through the MoF.
- Protect known and newly discovered cultural/heritage sites and resources, as required by Archaeology Branch regulations, in co-operation with local first nations.
- Report newly discovered local sites to first nations and the government Archaeology Branch.

Public Consultation

- Be available for discussions with other Crown tenure holders, stakeholders and the public concerning operational plans and practices on the TFL.
- Conduct public reviews to provide opportunities for the public to comment on operational plans and to develop the understanding of management practices and issues.

Economic and Employment Opportunities

- Encourage and support competitive local engineering, forestry consultants and contractors.
- Expand silviculture program commensurate with Forest Renewal BC funding commitments.
- Support forest worker skills training programs.

2.0 MANAGEMENT GOALS AND OBJECTIVES

Management goals and objectives for MP 6 are essentially a continuation of those established for previous management plans.

2.1 MANAGEMENT GOALS

The overriding goal in managing TFL 41 is to provide a continuous supply of timber for the company's lumber and paper manufacturing operations. This will be accomplished in a sustainable manner by recognizing and considering economic, environmental, social and cultural needs of the regional communities.

The goals of forest management which drive the resource management objectives are:

- To produce an economical supply of sawlogs and fibre for West Fraser's manufacturing facilities in the region while utilizing the full profile of the timber resource available from the TFL.
- To sustain the natural productivity and biodiversity of the forest landbase including timber and non-timber resources within the licence and adjacent environs through planned environmentally sound forest management and harvesting operations.
- To manage for and consider multiple forest resource values in co-operation with other stakeholders, first nations and government resource agencies.
- To sustain a continual harvest from the TFL over the long term, thereby providing stable economic and social benefits for the work force and local communities.
- To conduct all operations in the TFL in accordance with the *Forest Act*, the Code, the tree farm licence document and other applicable government resource legislation.

Maintaining the ecosystems inherent within the forest landbase is crucial towards realizing these objectives. Additional land use and resource management objectives outlined in the Kalum LRMP, when it is approved by government as a higher level plan, will also provide direction in managing the tree farm licence.

2.2 MANAGEMENT OBJECTIVES

The management goals are linked to specific objectives for all timber and non-timber resources.

Environmental

- Comply with the Code.
- Adhere to the Forest Alliance of British Columbia *Principles of Sustainable Forestry.*
- Maintain forest practices in compliance with environmental regulations.

Timber

- Harvest the approved AAC of 400,000 m^3 within cut control and contracting requirements.
- Develop and harvest annual volume in balance with the volume contribution from the net operable area on the landbase.
- Maximize the economic utilization of timber and species from the operable landbase in the short term.
- Enhance timber supply in the future by harvesting the stands greater than 140 years or damaged stands as a first priority and re-establishing young vigorous forests.
- Convert the operable forest to a more even age class distribution to reduce fluctuations in harvest level.
- Implement an enhanced silviculture program when funding is available or economically feasible in order to improve timber quality and value of regenerated stands.

Biological Diversity

- Plan and manage operations to maintain biological diversity over the landbase, which includes establishing maintenance of adequate areas of old growth over the landscape and provision for stand level diversity by meeting wildlife tree retention requirements.

Recreation

- Provide access to recreation destinations and maintain recreational areas for use and enjoyment when funding is available.
- Co-operate with the MoF in determining significant recreation features for potential development. The recreation analysis report (1998) will be used as a guide for recreation planning and potential activities on the TFL.

Visual Quality

- Manage the scenic quality of viewscapes visible from Kitimat townsite, Kitamaat Village, the highway corridor between Terrace and Kitimat, and the main Douglas Channel.
- Use forest landscape design principles where operations are proposed in landscapes with high sensitivity ratings.

Water

- Manage to maintain water quality and quantity through appropriate use of road construction techniques and drainage structures to mitigate any potential adverse impact on the stream networks from harvesting practices.
- For the Wathl Creek community watershed, and watersheds with known domestic water licences, use planning procedures and practices required by the Code for these specific watersheds.

Soils

- Use harvesting systems and road construction techniques commensurate with terrain hazard classification to prevent soil degradation and to maintain stability and productivity.
- Maintain all in-service roads in stable condition by controlling surface run-off and maintaining natural drainage patterns.
- Deactivate roads no longer in use to facilitate stability and natural drainage patterns.

Fish and Wildlife

- Co-operate with MELP and DFO in identifying and maintaining diversity of habitats capable of supporting existing fish and wildlife species.
- Co-operate with the MELP and MoF in the establishment of wildlife habitat areas for the management of identified wildlife in accordance with *Identified Wildlife Management Strategy* .
- Continue updating existing stream inventories and classification.
- Integrate fish habitat protection measures, by using appropriate stream-side protection and buffers required by the Code and by using measures recommended in *the Riparian Management Guidebook* where feasible.

First Nations

- Continue consultation and co-operation with the Haisla Nation at Kitamaat Village to develop strategies for protecting their aboriginal rights.
- Protect known cultural, traditional use and heritage sites identified from archaeological inventories or discovered during field operations in accordance with

the *Heritage Conservation Act,* as well as consultation with first nations as per government policy on the protection of aboriginal rights.

Public Consultation

- Conduct public reviews to provide the opportunities for the public to comment on operational plans and to develop their understanding of management practices and issues.

Silviculture

- Regenerate all openings by fulfilling basic silviculture obligations in accordance with the *Silviculture Regulation* and silviculture prescriptions.
- Manage regenerated stands to realize an increase in long-term yields through the application of appropriate stand tending treatments.
- Manage immature stands considering the ecosystem characteristics, productivity and species for optimum volume production and quality while ensuring that there are opportunities to realize intermediate yields by commercial thinning.

Forest Health

- Implement effective forest health management practices that minimize damage and losses from insects, diseases, windthrow and mammals.
- Monitor forest health conditions of old growth and regenerated stands and implement salvage and sanitation treatments when necessary to limit timber losses when economical to do so.

Fire Protection

- Protect the forest resources from damage by wildfire by maintaining a fire suppression program during fire season.
- Respond to and extinguish any fire in a timely manner as per the fire preparedness plan.

2.3 RESOURCE ISSUES

The statement of management objectives, options and procedures (SMOOP) (Appendix III) for MP 6 listed a number of issues when it was prepared in August 1997. Other issues have emerged since. The list of resource issues below describes those around which management strategies and actions need to be undertaken within the context of this management plan. West Fraser does not expect that all of these issues will or can be resolved during the term of this plan.

1. Poor profitability and return on investment has resulted from high logging costs due to a combination of expensive offshore operations and average to poor quality timber stands. The economics of operating in remote locations continues to be marginal and is exacerbated during periods of low lumber commodity prices.

2. The weakening of traditional markets on the US eastern seaboard for green hembal lumber during 1998 is not easily replaced. Stumpage charged by government for Crown timber is not market-driven and logging costs have increased considerably due to the Code.

3. The majority of the merchantable timber is more than 140 years old. The age class distribution and imbalance constrains the flexibility to maintain even-flow harvesting levels through the mid-term. A case can be made for a declining harvest level until a significant volume of second growth timber becomes available.

4. Government land use allocation strategies and aboriginal land claims have created a level of uncertainty concerning the long term security and integrity of the TFL landbase. Deletion of the Kitlope drainage was a major reduction in timber supply. Any further significant land withdrawals from the TFL would seriously affect the productive harvest level and undermine the economic log supply available for the company's manufacturing facilities.

5. The Kalum LRMP planning process is on-going and will not be completed until sometime after MP 6 is approved. The outcome of the LRMP and the impact on TFL 41 is not predictable at this time. It has the potential to exert considerable downward pressure on the AAC.

6. Road access and deactivation is an issue with some recreationists and local people who want to have logging roads maintained and kept driveable rather than being deactivated.

7. There is considerable scope for operational flexibility and administration by the MoF without compromising forestry practices and environmental standards. Approval procedures could be streamlined for a number of activities, e.g., timber cruising, road construction standards, road permit amendments, deactivation, windthrow, salvage applications and waste assessments.

8. Planning for biodiversity including retention of old-growth management areas should be focussed at the landscape level. Outside of critical habitat for identified species, the attendant issues of forest connectivity and wildlife habitat protection should be dealt with at this level.

9. The visual sensitivity ranking of the forest landscape advocated by the MoF takes a conservative approach and assumes a high degree of visibility and a large viewing public. West Fraser contends that the remote location of much of the operating area warrants a strategy that enables more merchantable timber to be available for harvesting than a visual constraint allows.

3.0 RESOURCE INVENTORIES

In the past four years (1995 - 1998) West Fraser has made a major effort to revise and update both timber and non-timber resource inventories. This has involved collating existing information and entering them into a digital inventory database as well as collecting new information. The work has been undertaken both with company funding and by the resources inventory program funded by Forest Renewal BC. All of the information collected has been entered into the inventory database and is accessible through MicroStation GIS (geographical information system).

Inventory information available for TFL 41 presently consists of:

- TRIM NAD 83 contour base maps.
- Landscape units.
- Planning cells.
- Timber inventory.
- Operability classification.
- Environmentally sensitive area classification.
- Biogeoclimatic classification.
- Recreation features inventory.
- Recreation opportunity spectrum classification.
- Visual landscape inventory.
- Terrain hazard class mapping.
- Stream inventory and riparian classification.
- Anadromous fish escapement data.
- Threatened and endangered species list.
- Guide outfitter/trapline boundaries.
- Archaeological overview assessment.
- Community watershed and water licences.
- Mineral claims.

The present status of this information as summarized in table 2 indicates the extent of coverage provided and plans for further refinement and updating during MP 6. More detailed resource inventory information is in section 3.2 and Appendix II.

There is no cattle range use on the TFL. Mineral prospecting has been limited.

Table 2: Summary of Resource Information

Resource	Specification	Data Source	Data format	Coverage	Date	Comments/Updates
TRIM contour	82 maps 1:20,000 NAD 83	Ministry of Forests RIB	MELP	100%	1997	Cadastre of Municipality & Kitimat Province Forest boundary to be updated by MoF
Landscape Units	1:250,000 scale	Kalum Forest District	Digital	100% by 14 LU	1998	Minor revisions are anticipated. Prepared for Kalum LRMP.
Planning Cells	Topographic boundaries defined using 1:20,000 scale TRIM contours	West Fraser	Digital	100%	1998	37 geographically defined cells.
Forest Cover	MoF standard inventory to RIB standard	1996/97 B&W photos (S1/2 N1/2) Forest Measurement Systems Ltd.	Digital FIP/FCI files	100%	1998	Periodic updates for depletion and regeneration. 37,394 polygons on 82 mapsheets, 200 volume plots in mature, 900 air calls; 78 ground calls in older immature; 198 ground calls in immature.
Environmentally Sensitive Areas	MoF standard inventory for Ea, Es, Ep, Ew, E_r, E_h	1996/97 B/W photos, and previous 1992/93 ESA mapping dates	Digital	100%	1998	--
Operability Classification	Three operability classes	West Fraser, 1998 forest cover maps	Digital	100%	1998	As needed.
Terrain Hazard Classification	RIC standards for TSIL D	Photo interpretation/ field sampling	Digital, handcopy	80%	1996-1998	Balance in progress during 1999-2003.
Recreation Opportunity Spectrum	MoF Recreation manual 1994 - 1:50,000 scale	Simon Reid Collins	Digital	100%	1997	
Recreation Resource Inventory	MoF Recreation manual 1994 - 1:50,000 scale	Simons Reid Collins	Digital	100%	1997	Includes ROS mapping.
Visual Inventory	1:50,000 scale	DLL Doug Leavers Consulting	Digital	100%	1997	
Biogeoclimatic Classification	Zones, subzones and variants of AT, MT, CWH	MoF	Digital	100%	1997	As needed.
Streams	RIC standards	Triton Environmental Consultants	Digital		1996-1998	Balance in progress during 1999 - 2003
Anadromous Fish	n/a	DFO escapement records 1996 -97	Digital	Major rivers	1998	On request.
Community Watershed	Legal administrative boundary	MELP	Digital	100%	1998	Wathl Creek watershed.
Archaeological Overview	Mapping sites and traditional use areas 1:20,000 scale maps	The Bastion Group	Digital	100%	1997	
Wildlife	Kalum FD Red/Blue list	Conservation Data Centre	Digital	n/a	1997	As needed.
Guides/Trappers	Licence boundaries	MELP	Digital	100%	1998	As needed.
Minerals	Legally registered location	MINFILE database	Digital	100%	1997	Maintained by MEM

3.1 LANDBASE

The gross area of TFL 41 is 703,745 hectares. This is derived from the TRIM map base provided by the MoF. The cadastral information is not considered to be entirely accurate by the MoF as the boundaries of the Kitimat Municipality and the Kitimat Provincial forest were plotted as a best fit. The MoF has undertaken to update the cadastral base when new TRIM files are available, although the timing is not known. Also the Claque Mountain Park reserve (1,514 hectares), which was under a 15-year lease to the Kitimat Municipality, expired in 1984 and is now assumed to be part of the gross area. Prior to these changes, the gross area was 1,019,739 hectares. An accounting for the changes in gross area is in Appendix I.3.

As table 3 shows, a high proportion of TFL 41 is either non-forest alpine area, or not suitable for timber harvesting. Only 21% of the productive forest area is classified as net operable and used as the net harvesting landbase for the AAC determination. (figure 4)

Table 3: TFL 41 Landbase (hectares)

Gross Area	703,745
Non forest	333,833
Non-productive forest (alpine, swamp)	36,988
Productive forest	332,924
Reduction for inoperable ESAs, riparian, roads etc.	263,238
Net timber harvesting landbase	**69,686**

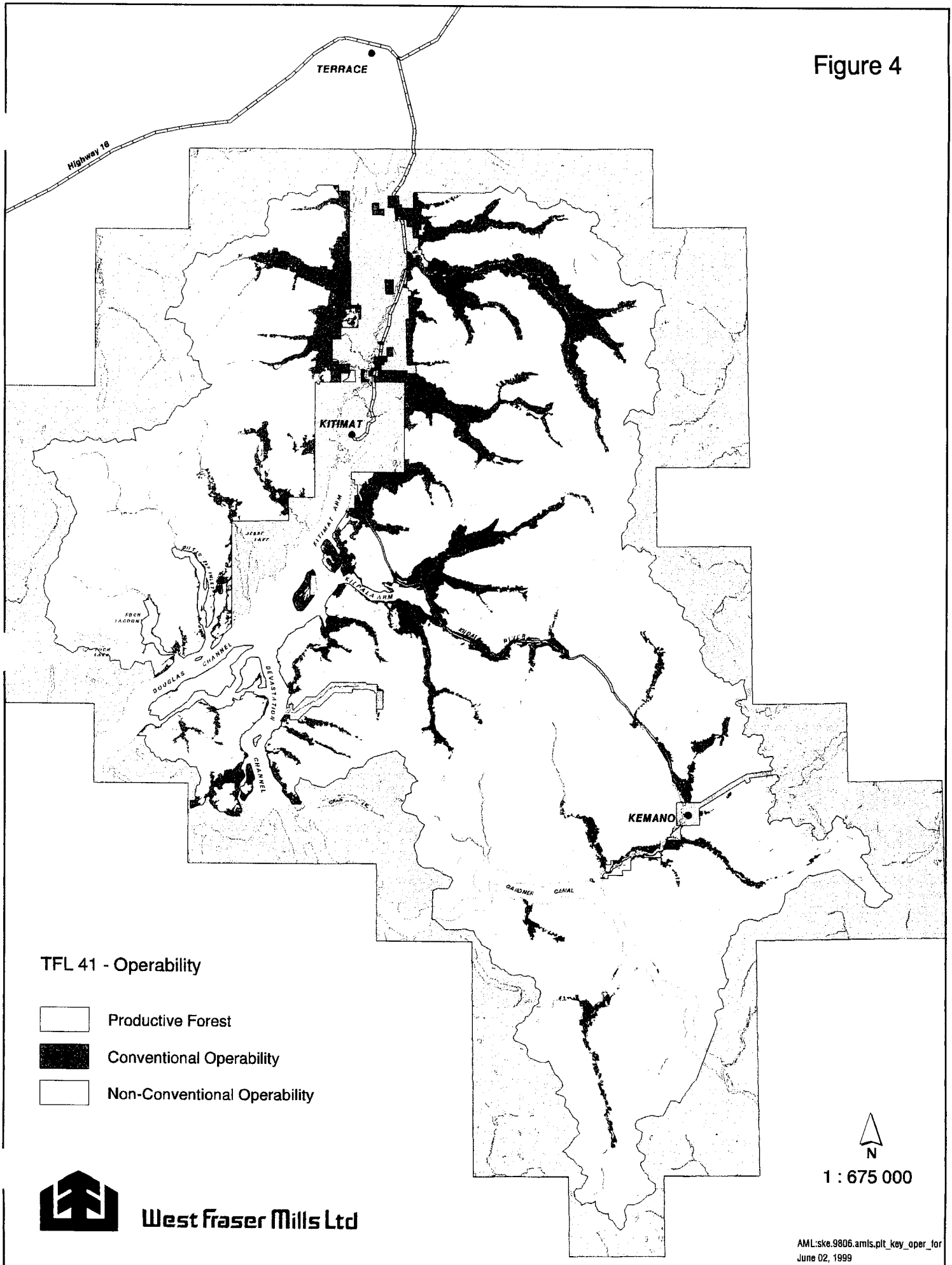
The net timber harvesting landbase of 69,686 hectares has increased from 64,619 hectares used in MP 5. Removal of the Kitlope reserve resulted in a loss of 8,960 hectares net operable. However, the revised operability mapping increased the net conventional area by 8,866 hectares and added a net non-conventional area of 5,161 hectares.

Landscape Units

TFL 41 is covered in whole or partially by 14 of the landscape units provisionally defined for the Kalum TSA. The district manager established these in November 1998, for use in the Kalum LRMP planning process. These are illustrated in figure 5 and an area breakdown is in table 4. It is possible that there will be some refinement of these boundaries prior to the LRMP being completed.

In June 1999 the district manager proposed changes to eight landscape units in the Kalum forest district. These would cause boundary revisions to the Weedene, Dala, Kemano-Kildala landscape units and the creation of a Hirsch landscape unit as well as revision to allocated biodiversity emphasis option. These revisions are included with Appendix VII with revised areas summaries.

Figure 4



TFL 41 - Operability

- Productive Forest
- Conventional Operability
- Non-Conventional Operability

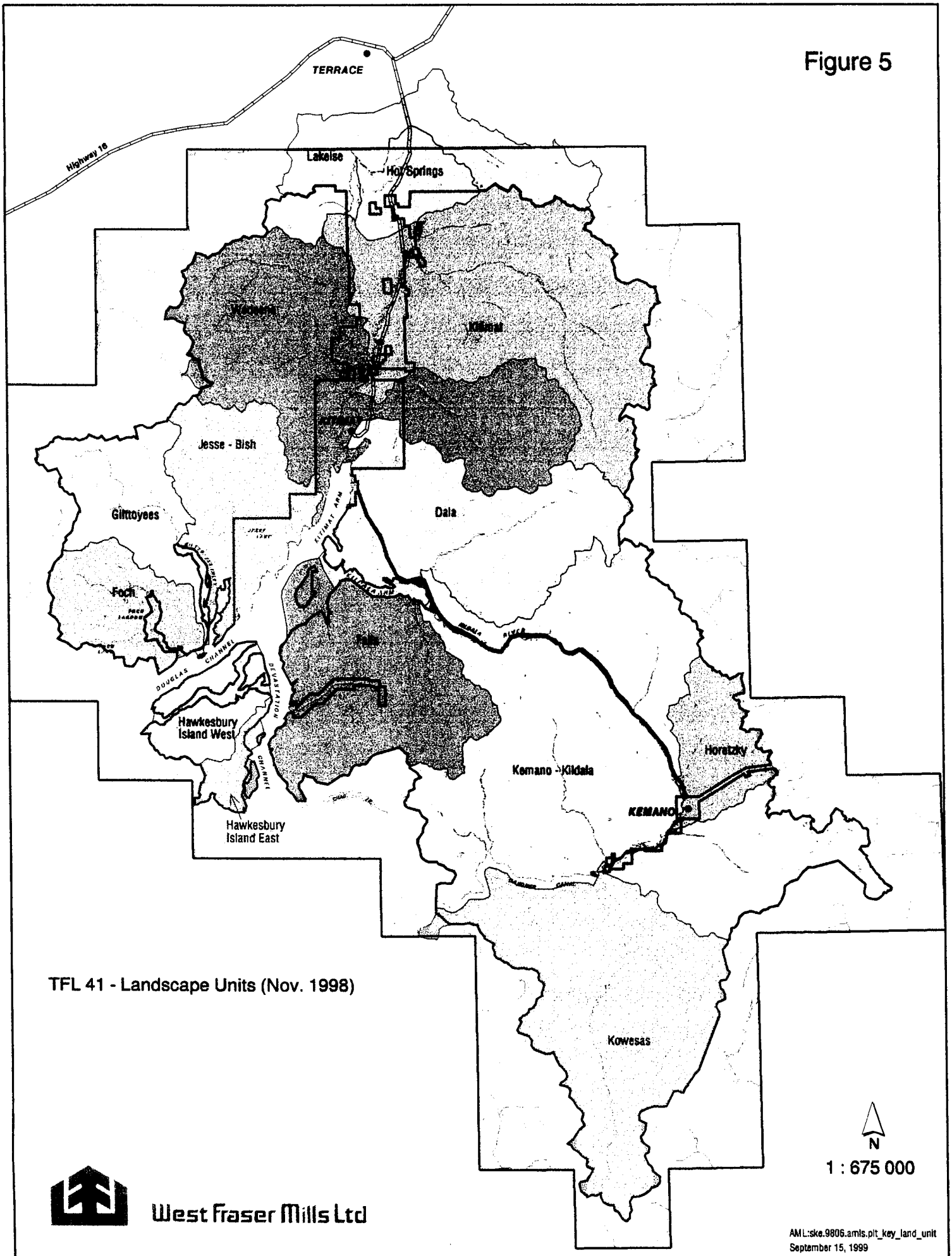
N

1 : 675 000

West Fraser Mills Ltd

AML:ske.9806.amls.plt_key_oper_for
June 02, 1999

Figure 5



TFL 41 - Landscape Units (Nov. 1998)

West Fraser Mills Ltd

AML:ske.9806.amls.plt_key_land_unit
September 15, 1999

Table 4: Gross Area by Landscape Unit (hectares)

LANDSCAPE UNIT	GROSS	INOPERABLE	OPERABLE		Conventional		Non-conventional	
			Gross	Net	Gross	Net	Gross	Net
Dala	64,397	48,505	15,892	11,035	13,147	10,377	2,745	658
Falls	59,412	45,959	13,453	8,597	10,041	7,468	3,411	1,129
Foch	25,891	24,548	1,344	850	687	575	657	275
Gilttoyees	30,325	30,045	280	174	154	116	125	58
Hawkesbury Island East	6,057	3,128	2,929	1,658	2,388	1,419	541	239
Hawkesbury Island West	15,283	12,900	2,383	1,435	1,144	881	1,240	554
Horetzky	19,930	18,036	1,894	1,200	1,659	1,168	236	32
Hot Springs	3,367	1,667	1,700	1,200	1,700	1,200		
Jesse-Bish	32,237	27,749	4,488	3,191	4,039	3,049	449	141
Kemano - Kildala	173,342	161,438	11,903	5,984	8,216	4,994	3,687	990
Kitimat	91,868	68,750	23,118	17,595	22,851	17,488	267	106
Kowesas	87,031	82,209	4,822	2,689	2,654	1,838	2,168	851
Lakelse	6,048	5,180	869	682	869	682		
Wedeene	88,556	69,735	18,820	13,397	18,462	13,269	359	128
TFL 41	**703,745**	**599,849**	**103,895**	**69,686**	**88,011**	**64,525**	**15,884**	**5,161**

* Boundaries defined in Nov 1998 version

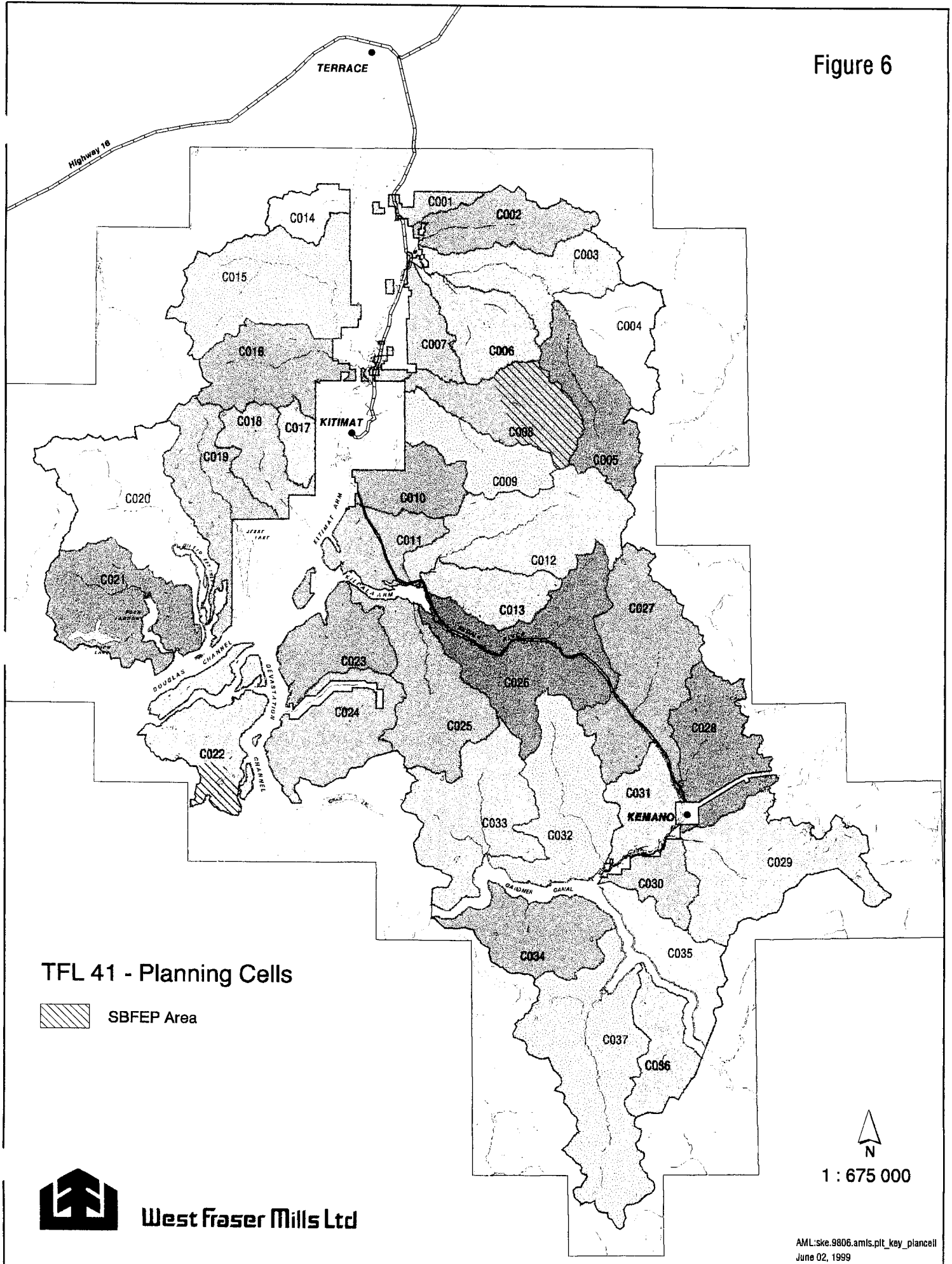
Planning Cells

For administrative and planning control purposes the gross landbase is divided into 37 planning cells. As depicted in figure 6 these are geographically defined, based on watershed boundaries and heights of land. The planning cells range in size from 2,063 hectares to 40,898 hectares. Statistics from the inventory database can be reported by planning cell. The distribution by operability category is listed in table 5. The operability classes are described below. Not all of the operable area is included in the timber harvesting landbase. For example, riparian buffers and portions of ESAs are withdrawn from harvesting.

Operability

The projection of the operable area was revised for MP 6 based on the 1998 inventory maps and updates the previous operability mapping that was last done in 1982. The revised mapping recognizes improvements in cable logging techniques since that time and use of helicopter logging over the past five years. It has meant that more merchantable timber has become economically accessible with advances in logging techniques and during periods of higher market conditions. The landbase is stratified into three operability classes (table 6) for use in timber supply forecasting and strategic planning.

Figure 6



TFL 41 - Planning Cells

SBFEP Area

N

1 : 675 000

West Fraser Mills Ltd

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June 02, 1999

Table 6: Operability of Productive Forest (hectares)

Operability	Definition	Gross Area	Non-Productive	Productive
Conventional	Groundbased, cable, A-frame	88,011	2,523	85,489
Non-conventional	Helicopter and skyline	15,884	156	15,729
Inoperable	Physically and economically inaccessible	559,849	368,143	231,707
TFL 41		**703,745**	**370,821**	**332,924**

The operability mapping is not intended to define the limits of logging chance that is used in operational plans and when doing field layout. (figure 4) Its purpose is to provide a reasonable definition of the contributing landbase for determining the AAC. For example, the net operable harvesting landbase used in the timber supply analysis for this plan includes only 5,161 hectares (33%) of the 15,729 hectares of productive non-conventional forest area identified in the operable landbase. Actual logging boundaries or limits are determined by field verification during cutblock layout.

Both the non-conventional and inoperable forest area contains merchantable sized timber that is uneconomic to log based on log values realized over the past 10 years. It is conceivable that a rising trend in log prices in the future will bring in an additional portion of the inoperable area from all three operability categories into the economic margin. If there is a wholesale increase in log values at a future date that is sustained, then the operability classification may need to be revised.

Table 5: Area by Planning Cell and Operability Class (hectares)

PLANNING CELL		CONVENTIONAL			NON-CONVENTIONAL			INOPERABLE			TOTAL		
		Prod.	NP	Gross	Prod.	NP	Gross	Prod.	NP	Gross	Prod.	NP	Gross
C001	Scully	481	1	482	--	--	-	850	730	1,581	1,331	732	2,063
C002	Chist	4,666	175	4,840	86	--	86	5,841	5,510	11,352	10,593	5,685	16,278
C003	Lower Kitimat	5,441	136	5,577	18	--	18	6,765	6,694	13,459	12,224	6,830	19,054
C004	Hoult/Davies	3,371	37	3,408	14	--	14	3,609	8,129	11,738	6,994	8,166	15,159
C005	Upper Kitimat	2,805	36	2,841	5	--	5	5,389	9,147	14,536	8,198	9,183	17,382
C006	Bolton/Mckay	3,319	42	3,362	13	--	13	5,853	5,455	11,308	9,185	5,497	14,682
C007	Humphrys	2,149	84	2,234	131	--	131	3,119	2,349	5,468	5,399	2,434	7,833
C008	North Hirsch	5,277	280	5,557	48	--	48	6,385	7,839	14,224	11,710	8,119	19,829
C009	South Hirsch	3,203	72	3,275	--	--	-	5,292	5,638	10,930	8,495	5,711	14,205
C010	Wathl	3,224	25	3,249	274	1	274	4,323	3,917	8,240	7,821	3,942	11,763
C011	Wathlsto/Clio	3,463	63	3,526	533	2	534	4,080	4,143	8,224	8,076	4,208	12,285
C012	Dala	4,342	220	4,561	1,542	8	1,550	9,949	14,438	24,388	15,833	14,666	30,499
C013	Dahlaks	2,296	57	2,353	386	--	386	3,435	5,208	8,643	6,118	5,265	11,383
C014	Coldwater	861	9	870	--	--	-	2,420	2,759	5,180	3,281	2,768	6,049
C015	Wedeene	7,753	228	7,981	25	--	25	11,252	13,055	24,307	19,030	13,283	32,313
C016	Little Wedeene	2,763	113	2,876	283	2	285	8,839	7,529	16,368	11,885	7,643	19,528
C017	Anderson	568	3	571	--	--	-	2,852	1,375	4,228	3,420	1,378	4,798
C018	Bish	2,013	32	2,045	133	--	133	4,193	4,500	8,694	6,339	4,532	10,871
C019	Jesse	1,349	--	1,349	147	--	147	4,997	11,067	16,065	6,493	11,067	17,561
C020	Gilttoyees	683	--	683	196	--	196	11,102	21,476	32,578	11,981	21,476	33,457
C021	Foch	796	8	804	747	9	755	7,328	17,695	25,023	8,871	17,712	26,582
C022	Hawkesbury	3,401	131	3,532	1,765	16	1,781	10,020	6,002	16,021	15,186	6,148	21,334
C023	Eagle/Coste	3,666	57	3,724	641	5	646	6,684	4,547	11,232	10,992	4,610	15,602
C024	Pike/Sleeman	2,365	22	2,387	765	5	770	8,858	8,102	16,961	11,988	8,129	20,117
C025	Falls	3,794	136	3,930	1,971	24	1,995	7,005	10,761	17,766	12,770	10,921	23,691
C026	Kildala	2,844	143	2,987	1,256	18	1,273	11,660	18,501	30,162	15,760	18,662	34,422
C027	Upper Kemano	922	22	944	335	1	336	7,769	22,380	30,148	9,026	22,402	31,428
C028	Caribou	1,731	80	1,811	186	4	190	4,925	10,685	15,609	6,842	10,768	17,611
C029	Seekwyakin	1,357	65	1,423	473	3	476	9,528	23,493	33,021	11,359	23,561	34,919
C030	Wachwas	634	21	655	312	24	336	2,377	4,889	7,266	3,323	4,934	8,257
C031	Lower Kemano	412	92	504	710	20	729	2,905	7,208	10,112	4,026	7,319	11,346
C032	Wahoo	999	18	1,017	363	1	364	7,698	16,956	24,654	9,060	16,975	26,035
C033	Brim		--	-	229	6	235	8,995	19,276	28,271	9,224	19,282	28,506
C034	Barrie	717	17	734	127	--	127	6,063	12,370	18,433	6,907	12,387	19,294
C035	Whidbey	33	--	33	1,200	3	1,204	4,636	8,129	12,766	5,869	8,133	14,002
C036	Egeria	7	--	7	121	--	121	4,206	8,373	12,579	4,335	8,373	12,707
C037	Kowesas	1,782	98	1,880	693	6	700	10,503	27,816	38,318	12,978	27,920	40,898
	TFL 41	**85,489**	**2,523**	**88,011**	**15,729**	**156**	**15,884**	**231,707**	**368,143**	**599,849**	**332,924**	**370,821**	**703,745**

3.2 TIMBER INVENTORY

A new timber inventory was completed in 1998, to MoF standard inventory specifications. The graphics and database files are loaded on an ARC/INFO GIS digital system. The new inventory has improved the stratification and classification of productive forest at higher elevations and has completely updated the classification of regenerated stands less than 40 years old. The inventory consists of:

- 82 forest cover maps (48 full equivalent mapsheets at 1:20,000 scale)
- 37,394 forest cover polygons with attributes.
- 2,506 typed aerial photos. (902 in 1996 and 1,606 in 1997)
- 1176 field samples (900 aircalls and 476 ground plots).
- Gross area and volume statistics by planning cell.

The report on the re-inventory is in Appendix II. The new inventory will be kept updated periodically for changes due to logging depletion, regeneration status and other disturbance during the management plan period.

Table 7 details the gross productive forest area of 332,924 hectares by age class while table 8 shows the volume for this area by age class. Volumes were compiled using the MoF VDYP equations and were localized with the 1977 sample plot database updated to 1997 using a ratio sampling technique. Volumes are close utilization minus DWB, 15 cm top diameter, 17.5 cm dbh, 30 cm stump height.

Inventory summary reports by planning cell for the net operable area and volume by species are listed in Appendix II. These are the volumes used in the timber supply analysis for MP 6.

There are no plans to undertake any further upgrades of the 1998 inventory or to retrofit it to a Vegetation Resources Inventory standard at this time. The timber inventory will be updated for depletion and regeneration status during the period of this plan. Some aspects of the inventory estimate require further study to improve its reliability. These efforts will focus on improving confidence in site index prediction and productivity of regenerated stands.

Table 7: Productive Forest Area by Age Class (hectares)

Type Group	1	2	3	4	5	6	7	8	9	Other	Total
Hemlock	13,440	6,990	2,922	3,032	4,719	6,937	4,745	25,115	162,901	0	230,801
Balsam	1,647	746	191	311	352	550	428	4,103	16,314	0	24,641
Cedar	455	62	14	14	73	157	151	1,909	16,969	0	19,805
Spruce	493	443	112	59	153	552	297	1,618	1,467	0	5,195
Douglas-fir		20				19	4		76	0	119
Pine	290	46			2	21	138	156		0	652
Deciduous	412	1,039	951	519	413	363	190	113		0	4,000
NSR	351	18					2		22	2,054	2,447
NC-Br										45,265	45,265
Total	**17,088**	**9,365**	**4,190**	**3,935**	**5,713**	**8,599**	**5,955**	**33,014**	**197,748**	**47,319**	**332,924**

Table 8: Productive Forest Volume by Age Class (m^3)

Type Group	1	2	3	4	5	6	7	8	9	Total
Hemlock	4,363	155,281	221,521	367,256	323,440	1,323,448	1,142,436	7,216,847	63,476,132	74,230,724
Balsam	20	8,821	24,897	74,601	65,676	148,668	171,363	1,536,595	7,808,633	9,839,274
Cedar	16	23	112	3,138	5,033	32,378	30,880	535,603	5,864,418	6,471,599
Spruce	3673	19,667	41,111	24,226	74,555	297,713	160,135	1,168,171	1,294,018	3,083,269
Douglas-fir		25				2,650	1,197		35,140	39,014
Pine	7	157			100	3,303	39,443	46,227		89,237
Deciduous	12,289	113,342	200,723	130,155	106,212	111,615	50,166	33,647		758,148
NSR	79	44					233		3,495	3,851
Total	**20,448**	**297,359**	**488,362**	**599,376**	**575,016**	**1,919,774**	**1,595,854**	**10,537,089**	**78,481,836**	**94,515,114**

Loss Factors

In 1989 West Fraser co-funded, with Skeena Cellulose Inc. and the MoF, a joint study of the hemlock loss factors being used in the Kalum TSA. The results of this study were inconclusive. The interim loss factors derived by the MoF from the tree and log measurements are not being used at this time. A review of the study by Sterling Wood Group found that the percentage decay varied greatly between trees, but that there was no significant correlation between decay, tree diameter and site attributes. The current loss factors will continue to be used in cruise volume compilation. These are FIZ A (forest inventory zone) for all species except hemlock and balsam. The Skeena local factors are used for hemlock and balsam in the north half only.

Site Index

It has been verified by the MoF that site index assignments for existing age class 8 & 9 hemlock/balsam old growth stands underestimate productivity if they are applied to the same areas once they have been logged. This would result in a lower projection of future yields. An MoF paired plot study of old growth hemlock stands in the Kalum TSA in 1994/95 suggested that, on average, site indices may be under-estimated by 11.3 m. This was corroborated by the TFL 41 1997 inventory sample plots. Site index measurements in 15-30 year regenerated stands averaged 11.5 metres higher than the site index predicted for the old growth stands.

To further substantiate site indices for second growth stands, measurement of site index using the growth intercept technique will be included in conjunction with free growing surveys of regenerated stands. This will enable a database of measured site index to be built up over the next five years, and increase the confidence in the productivity estimates for second growth.

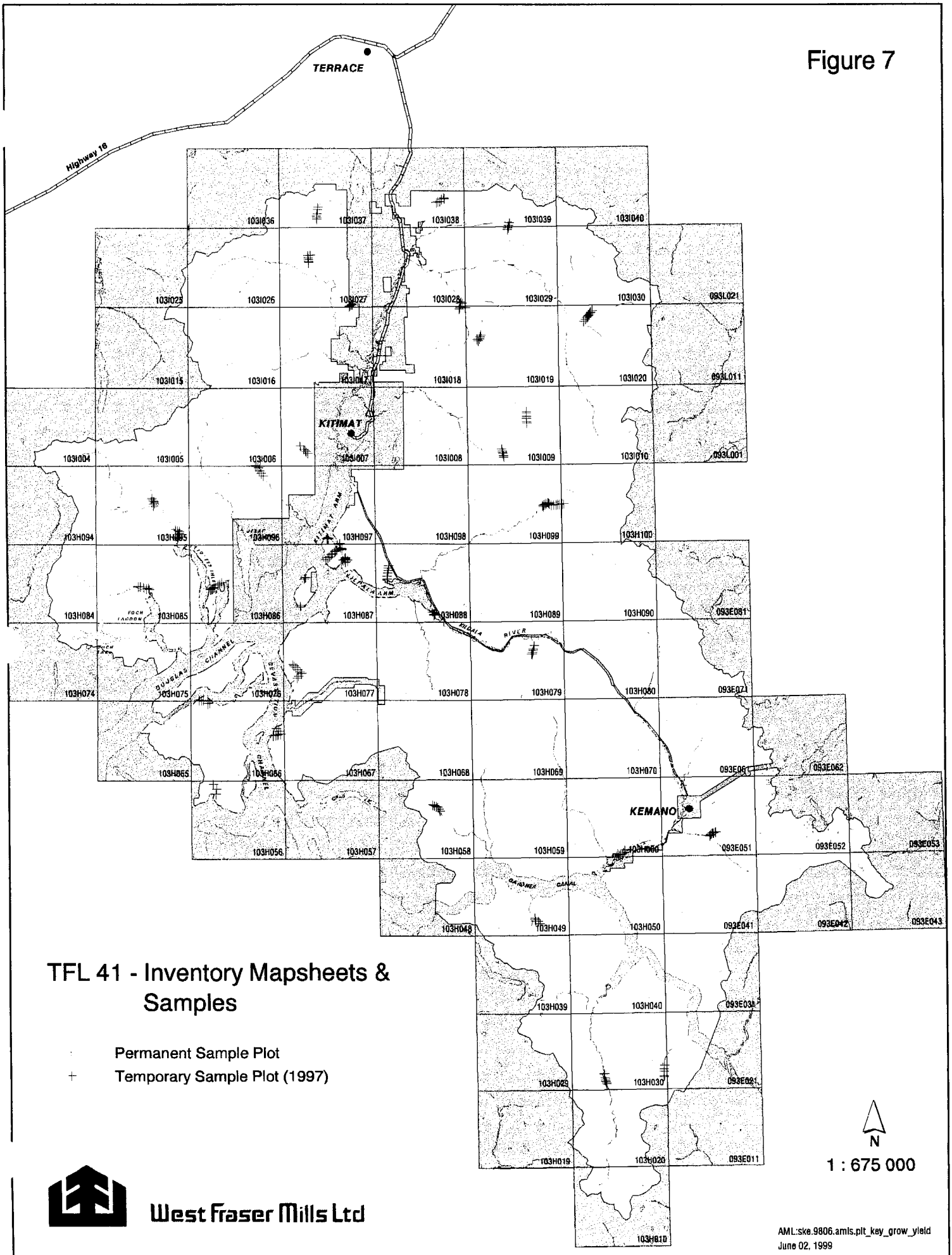
Volume Young Mature Stands

During the reinventory 51 plots were established in stands from 60 to 140 years old. The compiled volume of these samples provided volumes about 28% higher than the volume estimated using VDYP. This is consistent with the expectation that realized yields from regenerated stands in the future may be higher than old growth as there is less decay and associated volume losses. West Fraser will be continuing to validate this preliminary finding from the cruise plots located in age class 5-7 types and from on-going growth and yield studies by the MoF.

Growth and Yield

The MoF maintains growth and yield installations in representative second growth stands throughout the Coastal Western Hemlock zone in the Kalum Forest District. In 1994, 33 growth and yield permanent sample plots (PSPs) were installed in offshore areas of TFL 41. These were located in second growth (amabalis fir and western hemlock) stands offshore at Clio Bay, Gobeil Bay, Kildala River and Coste Island. The stands ranged in age from 34 to 117 years. The location of the PSPs are shown in Figure 7 and they are listed in Appendix II.

Figure 7



TFL 41 - Inventory Mapsheets & Samples

. Permanent Sample Plot

\+ Temporary Sample Plot (1997)

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Environmentally Sensitive Areas

Forest cover polygons have also been assigned an ESA label, using the classification system in the MoF Inventory manual. The information was transferred from the previous inventory. As shown in table 9, most of the ESA areas are on steeper ground in the inoperable forest area with the exception of wildlife and recreation polygons. This classification system serves to identify polygons where timber availability may be constrained due to sensitivity. The application of this classification system in forest planning is being replaced by alternative resource inventories and classification systems as they are completed. For example, terrain hazard mapping is being used as an indicator of unstable soils when preparing operational plans, instead of soils (Es) descriptions. Wildlife habitats requirements are accommodated through netdowns for riparian reserves, wildlife tree patches.

Table 9: Environmentally Sensitive Areas (hectares)*

ESA Category		Conv	Non-Conv	Subtotal	Inoperable	Total
Soils	Es_1	4,068	2,725	6,793	66,904	73,697
	Es_2	7,941	4,486	12,427	25,498	37,924
Regeneration	Ep_1	1,379	116	1,494	20,332	21,826
Difficulty	Ep_2	1,363	155	1,519	2,021	3,540
Avalanche track	Ea	773	227	1,000	10,531	11,531
Wildlife	Ew_1	1,959	129	2,088	293	2,382
	Ew_2	1,984	183	2,167	1,410	3,577
Water	Eh_1	215		215	50	266
	Eh_2	771		771	92	863
Recreation	Er_1	642	15	657	130	787
	Er_2	8,494	1,489	9,983	7,346	17,328
Total		**29,589**	**9,525**	**39,114**	**134,607**	**173,721**

*** Gross ESA areas before netdown**

Inventory Audit

In 1993 and 1995 the MoF completed an audit of the 1974 vintage inventory to assess the overall accuracy. A copy of the report is in Appendix II. The results showed that analysis unit volumes for the mature component and current operable area were overestimated due to both classification and VDYP volume prediction.

The audit found that the site index assignment for young stands was acceptable, and that classification of the non-forest area was within provincial standards. It will be possible for the MoF to apply their audit ground samples to the new 1997 reinventory to test its precision.

3.3 RECREATION INVENTORY

An updated recreation inventory of TFL 41 was completed in 1998 (Appendix IV). The recreation usage and trends showed little change from the previous inventory. Recreation use is primarily by local residents who enjoy hunting, river fishing, day hikes and firewood cutting. The Douglas Channel is a destination area for boating and salmon fishing by residents in northwestern British Columbia and beyond. Most recreation is self-directed. The small number of recreation sites and trails within and adjoining the TFL 41 are listed in table 10.

Table 10: Recreation Sites and Trails

Feature
Campsite at Highway 37 and Kitimat River
Campsite at Kitimat River - just downstream of the junction of McKay Creek.
Robinson Ridge trail head
Mount Elizabeth trail from North Hirsch
Mount Elizabeth camp site off the spur road at 13.5 km on North Hirsch
Enso Park beside Raley Creek
Claque Mountain trail at 3 km on Wedeene Main

The analysis of the recreation opportunity spectrum reflects the large area, (72%) of the licence that has no driveable access, as illustrated in figure 8.

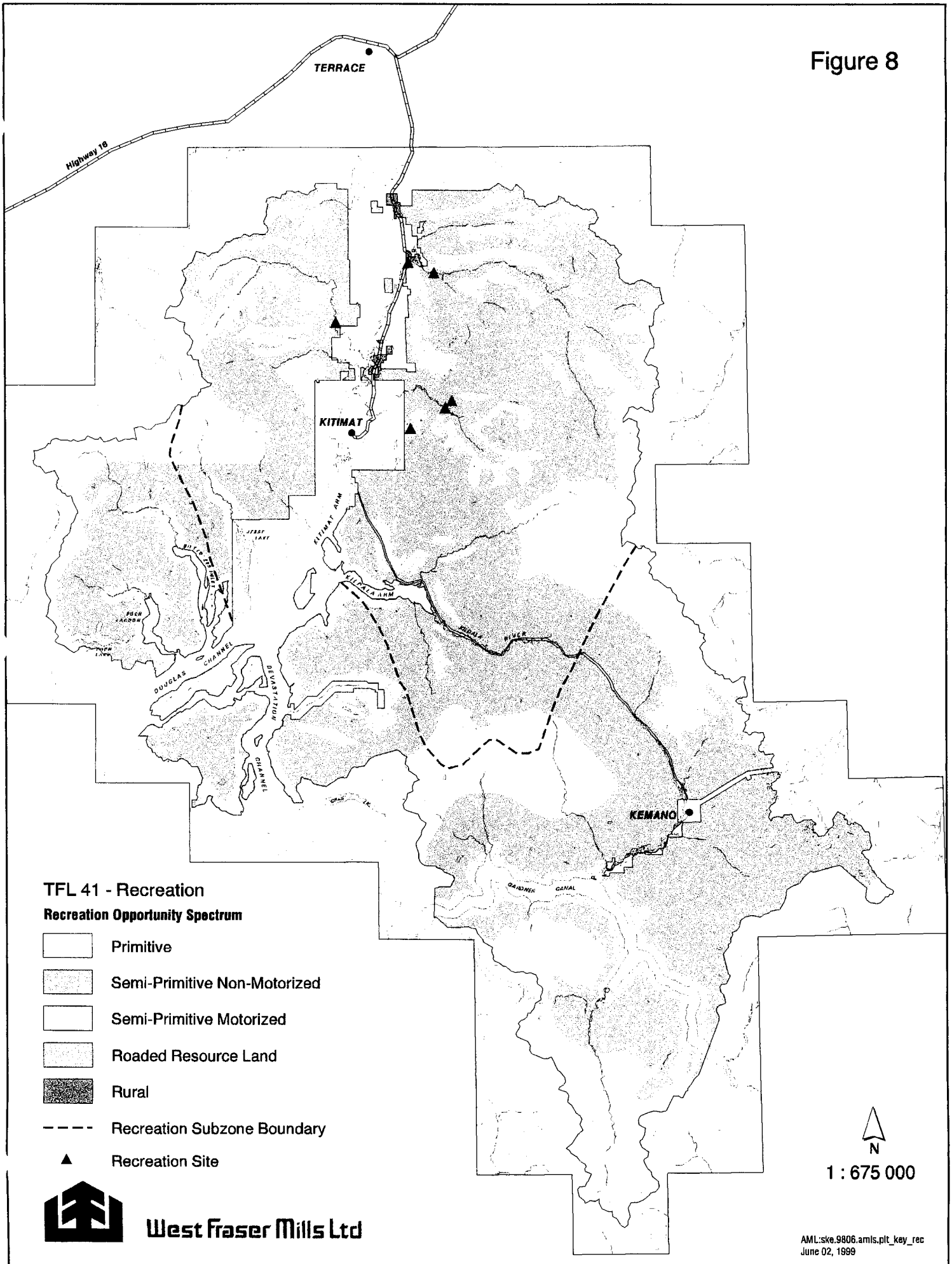
Table 11: Recreation Opportunity Spectrum (hectares)

Code	Category	Area	
		ha	%
1	Primitive	139,950	20%
2	Semi-primitive, non-motorized	361,748	52%
3	Semi-primitive, motorized	106,113	15%
4	Roaded Resource Land	94,616	13%
5	Rural	1,141	0%
6	Urban	--	0%
7	Not assigned	177	0%
Total		**703,745**	**100%**

3.4 VISUAL

Most of the licence area is not easily visible to the general public except for viewscapes that can be seen from the Terrace/Kitimat highway, the head of Douglas Channel from the Kitimat

Figure 8



TFL 41 - Recreation

Recreation Opportunity Spectrum

- Primitive
- Semi-Primitive Non-Motorized
- Semi-Primitive Motorized
- Roaded Resource Land
- Rural
- Recreation Subzone Boundary
- ▲ Recreation Site

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townsite, Kitamaat Village and some foreground views by boat along the Douglas Channel and Gardner Canal. Although there are singularly spectacular landscapes, the rugged forested topography with exposed bedrock mountaintops, is typical of the many scenic areas and inlets along coastal British Columbia. The more noticeable viewscapes have been rated for visual sensitivity. A summary of visual inventory in table 12 shows that less than 20% of the gross area has been assigned a recommended visual quality objective. These have not been finalized.

Table 12: Visual Inventory (hectares)

Code	Inventory VQO		Area	
			Gross	**Operable**
06	Preservation		25,096	709
07	Retention		1,575	389
08	Partial Retention		35,398	6,481
09	Modification		79,029	13,739
		Subtotal	**141,098**	**21,317**
	No VQO		562,647	66,694
		Total	**703,745**	**88,011**

3.5 TERRAIN

Terrain stability classification mapping has been completed for all main operating areas on the TFL. Additional mapping is currently in-progress. By the end of 1999, mapping will have been completed for all operating areas in the 20 year plan. The remaining planning cells will be completed within the next three years (2002). The status of terrain stability mapping is described in more detail in Appendix II.3.

3.6 WATER

There are a total of 15 water licences, one for domestic use, five community water works and nine industrial uses that source water from the Kitimat River and creeks that rise within the TFL. The water intakes or points of diversion are downstream and outside the TFL boundary. The Kitimat Municipality draws the community water supply from deep wells in the bed of the Kitimat River. There is one designated community watershed, Wathl Creek. The Kitamaat Village draws its domestic water supply from an intake in Wathl creek.

Industrial water licences held by Alcan, Eurocan and Methanex are for drawing water from the Kitimat River. The water intakes are along the mouth of the river and beside Anderson Creek and Moore Creek, outside the TFL boundary. A list of the water licences is in Appendix II.

3.7 STREAMS

The major rivers and streams on the TFL are stocked with anadromous and fresh water fish, e.g., species of salmon, steelhead and other trout. The Kitimat, Kildala, Dala, Kemano, Kowesas and Wahoo Rivers are also important eulachon producers. The most suitable fish habitat for spawning and rearing primarily occur in the lower and middle reaches of the rivers. The upper reaches and branches of the main rivers are fed by glacial melt, e.g., Kitimat, Wedeene and Kemano Rivers, providing less suitable habitats at these points.

Stream inventories have been completed or are currently in progress for all the major rivers and streams. These inventories provide specific information on species of fish present and enable classification of the streams by riparian class.

The DFO has been operating a fish hatchery since 1983 on the west bank of the Kitimat River opposite the Eurocan pulpmill. The pulpmill supplies the hatchery with warm water to maintain an ideal temperature for raising salmon fry. This means that the hatchery also realizes substantial savings in energy costs. Approximately 8.5 million salmon and 60,000 steelhead and cutthroat trout are raised each year. Salmon and trout fingerlings are released at predetermined points along the Kitimat River as well as the Hirsch, Kildala and Dala Rivers. Salmon escapement records are illustrated in figure 9 for all the main rivers monitored by DFO. These show the trends in salmon returns over the past 27 years. Refer to Appendix II.

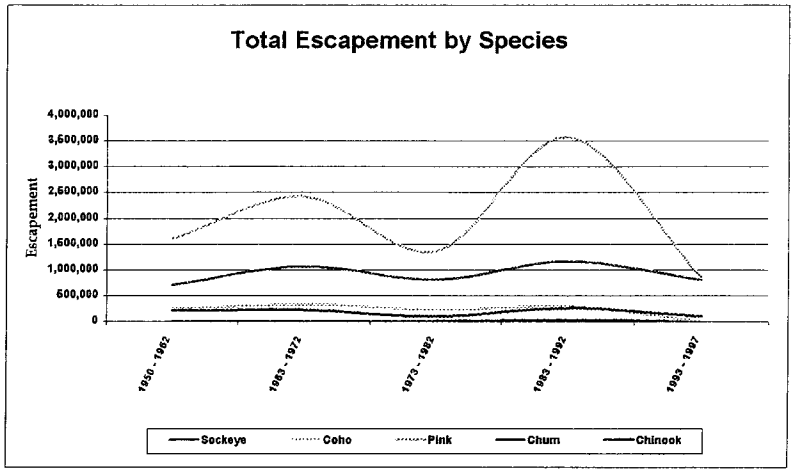
3.8 WILDLIFE

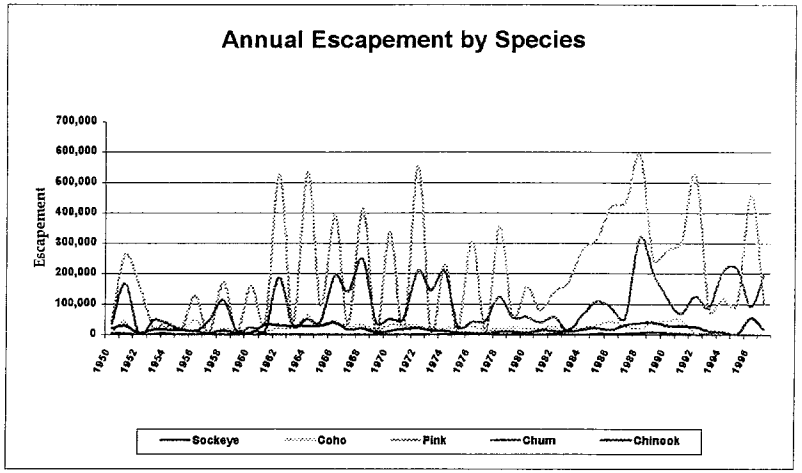
Detailed wildlife information is limited. The licence area supports a wide variety of wildlife. This includes several high profile large mammals including black bear, grizzly bear, mountain goats, blacktailed deer and moose. There are also several small fur bearing mammals, notably wolverine, beaver and marten. Marine animals, seals, dolphins, and otters are abundant in the Douglas Channel, Gardner Canal and river estuaries. There are also a large number of water fowls, seabirds, songbirds and raptors.

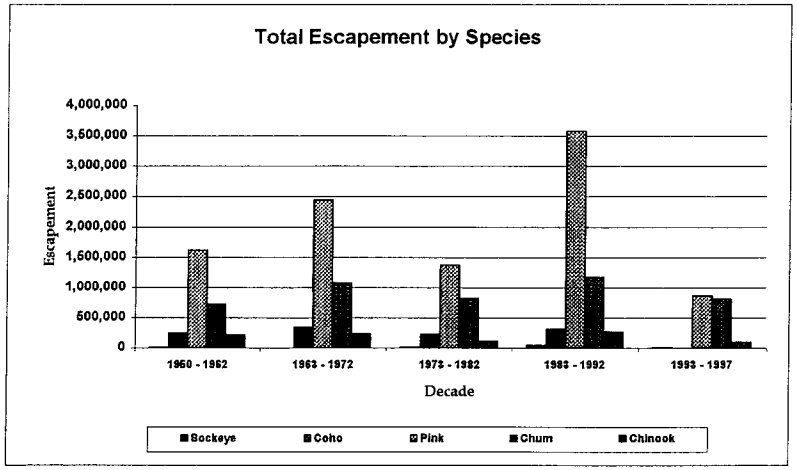
Wildlife information in Appendix II includes an analysis of MELP harvest database and the BC Conservation Data Centre rare species list for the Kalum Forest District.

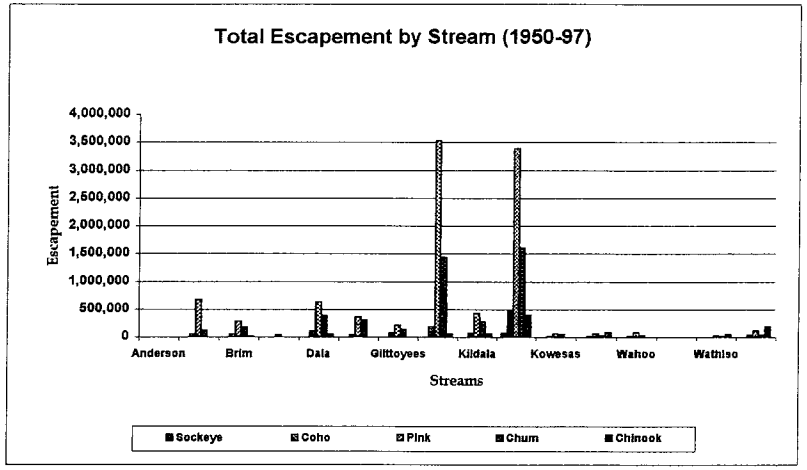
Presently MELP is completing habitat capability and suitability mapping at 1:250,000 scale for grizzly bear, mountain goat, moose and black-tailed deer.

Figure 9: Salmon Escapement for Streams within TFL 41 1950-97









Source: Department of Oceans Canada - Stock Assessment Division: Pacific Biological Station, Nanaimo, BC (data 99-Mar-12)

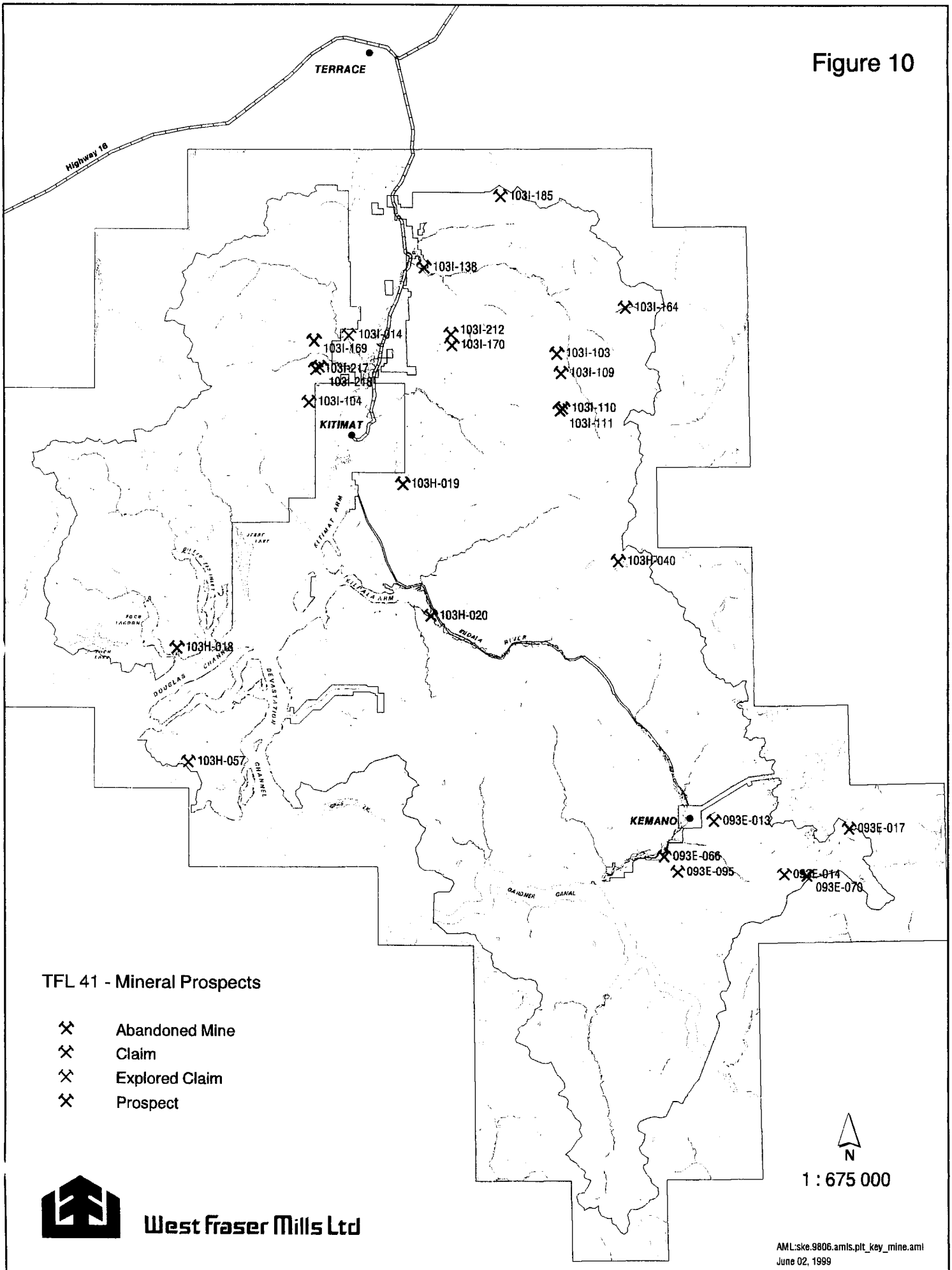
3.9 CULTURAL SITES

An archaeological overview inventory completed in 1998 (Appendix II) identified 14 specific aboriginal sites along the shoreline of the TFL. The features found at these sites include petroglyphs, culturally modified trees, eulachon fishing sites and an abandoned village site. This inventory was completed by The Bastion Group Archaeological Consultants, in co-operation with the Haisla Nation of Kitamaat Village and West Fraser. A copy of the maps and report was provided to the band.

3.10 MINERALS

Mineralization and mineral deposits have been identified within the TFL, primarily in the Kitimat Ranges. None of these have warranted economic exploitation to date. These deposits are metallic veins containing showings of gold, silver, copper, tungsten, lead and molybdenum ore. A search of the Ministry of Energy and Mines MINFILE data revealed that within and around TFL 41 there are two abandoned mines, two explored prospects, five prospects with potential minerals warranting further exploration and 23 showings with minor mineralization. The MINFILE data listing for TFL 41 is in Appendix II. The general areas of various mineral prospects and activities are shown in figure 10.

Figure 10



TFL 41 - Mineral Prospects

- Abandoned Mine
- Claim
- Explored Claim
- Prospect

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4.0 INTEGRATED RESOURCE PLANNING

The Code requires West Fraser to undertake a detailed forest planning process and receive Forest Service approvals and permits before any road construction or logging takes place on the TFL. This is a hierarchical process that steps down from strategic to operational levels of planning with approval of the various plans required at each level. There is considerably more site specific detail in operational level plans. Final authority for road permits and cutting permits is issued by the MoF district manager.

The key components and inputs into this planning process include:

- All forest resource values, timber and non-timber, are assessed in an integrated resource planning approach.
- An open consultative planning process is followed with opportunities for all stakeholders and the public to participate.
- Plans are reviewed by government agencies: MoF, MELP, DFO, before they are finalized.
- Different types of plans are revised regularly both annually and periodically as required.

The various types of strategic and operational plans and permits listed in the following table represent the on-going forest planning undertaken for TFL 41.

Table 13: Listing of Plans and Permits

Type	Purpose	Renewal
Kalum Land & Resource Management Plan	Establishes regional land use objectives and resource management zones for the TFL 41, TFL 1 and the Kalum TSA	In progress , completion during 1999
Landscape Unit Plans	Defines boundaries and objectives and strategies for landscape units	In draft format, and subject to revision
Management Plan	Details the objectives, goals and strategies for managing TFL 41	Updated every five years
Twenty-year Plan	Outlines the potential pattern of harvesting on the licence area for a 20 year period	Updated every five years
Forest Development Plan	Indicates proposed harvest cutblocks and road construction scheduled for a five-year period	Updated annually or every two years in some cases
Road Layout and Design	Specification for location and design of a road section	Renew and amend as needed
Road Permit	Authorizes new road construction under specific terms and conditions	Renew and amend as needed

Type	Purpose	Renewal
Cutting Permit	Approved application authorizes logging of a group of cutblocks under specific terms and conditions	Renewed as needed
Deactivation Prescription	Describes the type of road deactivation work to be undertaken on the road section	Renewed as needed
Fire Preparedness Plan	Action plan that details the operational readiness to prevent, detect and suppress forest fires	Updated annually
Special Use Permit	Application to use or occupy Crown land for gravel pit, sortyard, log dumps and booming ground	Annually or as required
Silviculture Prescription	Prescribes the silvicultural system and regeneration plan for harvesting and reforesting an opening	Amend as needed
Stand Management Prescription	Prescribes silviculture treatments to be carried out on a free growing stand	Amend as needed

The *Operational Planning Regulation* outlines content requirements for the various operational plans. The MoF will be consulted on the specifics needed for each plan and the level of detail required. MoF regional or district format for these various plans are used where they are available. The scope and content of operational plan needs to be consistent with legislative and regulatory requirements and the format will stay abreast with anticipated changes in legislation.

4.1 KALUM LRMP

In 1995 the MoF initiated a process to prepare a land and resource management plan for the portion of the Kalum Forest District including Kalum TSA, TFL 41 and TFL 1. The purpose of this plan is to provide a framework for land and resource use allocation decisions.

The goals of the Kalum LRMP are:

- To negotiate agreements and consensus management direction for Crown land, water and resources from the interests presented in the Kalum LRMP that have broad and durable public support.
- To negotiate a consensus on resource management objectives and strategies for each resource management zone (RMZ) that conforms to provincial legislation, policy and guidelines.
- To develop a plan that reflects the principles of sustainable development with a commitment to short and long term community stability while balancing environmental, social and economic interests.
- To develop a plan that provides direction for more detailed resource planning by government agencies and the private sector.

A complete listing of the goals and objectives are in Appendix VII.1

A public steering committee comprising representatives of the main interest groups (resource users, stakeholders, aboriginal bands, forest licensees and government agencies) has been meeting regularly to prepare the LRMP. It is anticipated that a draft LRMP will be completed by November 1999. Government approval is not expected until some time in 2000.

4.2 LANDSCAPE UNITS

In November, 1998 the Kalum Forest district manager approved the boundaries of 47 landscape units in the Kalum TSA, of which 14 are within or partially within the boundary of TFL 41. For each landscape unit, tentative management objectives and strategies for biodiversity emphasis, old growth retention, protected areas and wildlife tree retention have been proposed. (Appendix VII.2) These are presently under review by the public and the LRMP committee.

A summary of 14 landscape units, their provisionally assigned biodiversity emphasis options (BEO) is listed in table 14.

Table 14: Landscape Units by BEO

Landscape Unit	BEO
Dala	Lower
Falls	Lower
Foch	Higher
Gilttoyees	Intermediate
Hawkesbury West	Intermediate
Hawkesbury East	Lower
Horetzky	Lower
Hot Springs	Lower
Jesse-Bish	Lower
Kemano-Kildala	Intermediate
Kitimat	Lower
Kowesas	Lower
Lakelse	Intermediate
Wedeene	Intermediate

The next phase will test resource objective targets and strategies for each landscape unit. There may also be revisions to the boundaries of some landscape units. This will lead into the preparation of landscape unit plans over the next five years, with participation from the MoF and MELP.

Changes proposed to these landscape units in June 1999 by the district manager are included in Appendix VII with a revised BEO allocation.

4.3 RESOURCE MANAGEMENT ZONES

The productive forest area of the TFL has been divided into five resource management zones (figure 11). Zonation allows key resources to be considered in timber supply and other strategic analysis. The productive forest area in each zone is:

- General 175,685 ha
- Enhanced 47,829 ha
- Riparian 49,629 ha
- Visual 83,992 ha
- Watershed 7,395 ha

The definitions, goals and strategies are described in table 15. These zones are a first iteration and will be subject to modification in line with direction from the forthcoming Kalum LRMP.

4.4 TIMBER SUPPLY ANALYSIS

The timber supply analysis provides a basis for the AAC proposed for MP 6, as well as a projection of timber availability from TFL 41 over the next 250 years. Details of the analysis, including an explanation of the data inputs, management assumptions and yield analysis approaches, are in the TFL 41 data information package (Appendix V.1). The results are outlined in timber supply analysis report (Appendix V.2).

The forest landbase can support different harvest rates depending on the operable landbase and management assumptions used. Harvest forecasts were made for three landbases:

- Gross productive forest landbase.
- Planned management timber harvesting landbase.
- Conventional timber harvesting landbase.

In addition to the three landbase options, a fourth option, constrained conventional, was defined to examine the affects of limiting old growth site index adjustments to Western hemlock only in the conventional landbase, and applying an 8% netdown for unclassified roads older than 35 years.

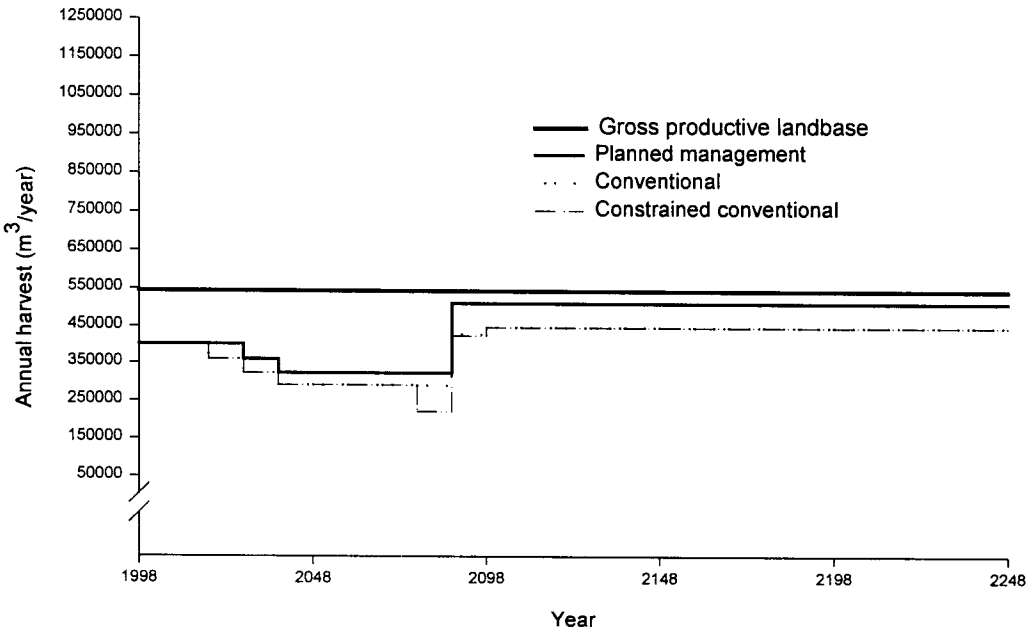
Adjacency and green-up requirements, stand level and landscape level biodiversity requirements were modelled in the timber supply analysis. Riparian reserve and management zone requirements were also met by using GIS to record the area of reserve and management zones in each forest inventory polygon.

Of the total land base of 703,745 hectares, only 332,924 hectares is productive forest. When productive forest in the alpine tundra zone is excluded, the gross productive landbase becomes 281,421 hectares.

The planned management landbase is 69,686 hectares. About 79% of the total productive forest is excluded. Netdowns were made for inoperable areas, non-merchantable areas, riparian reserves and management zones and other areas. These excluded areas contribute to biodiversity, provide habitat for wildlife and afford protection to fisheries values. The planned management option assumes that a portion of the non-conventional landbase is available for harvesting. This included stands defined as height class >3, SI >10 and hemlock $\leq$ 50%. A six percent reduction for unclassified roads, trails and landings and an old growth site index adjustment for hemlock and balsam stands for all zones was applied. The conventional landbase (64,525 hectares) excludes all non-conventional areas.

Harvest levels were calculated for each of the four management options. In addition to maximum even-flow harvest levels, three stepdown harvests were forecast beginning with the present AAC of 400,000 m^3 per year (graph 1). In each case the stepdown in any one decade was restricted to a maximum of ten percent of the previous decade's harvest level.

Graph 1: Benchmark Harvest Forecasts



The projected harvest level from the gross productive forest is about 543,475 m^3 per year. This is the biological potential wood fibre harvest from TFL 41 when forest cover constraints are applied.

The planned management even-flow harvest from the net timber harvesting landbase is about 328,000 m^3 per year. The stepdown under this option forecasts a harvest of 400,000 m^3 per year for 30 years followed by a 10% step down for four decades to 324,000 m^3. After 90 years, the forecasted harvest increases steadily to a long run sustainable level of 510,500 m^3 per year.

As expected, removing landbase reduces the harvest level. The even-flow harvest from the conventional landbase is about 300,000 m^3 per year. An initial harvest level of 400,000 is forecasted for 20 years followed by a 10% step down for five decades to 291,000 m^3. After 80 years the forecasted harvest declines slightly for a decade and then increases steadily to the long run sustainable level of 448,000 m^3 per year.

The constrained conventional option demonstrates the affect of limiting old growth site index adjustment to regenerated hemlock stands only. This results in a slightly lower even-flow harvest level of 292,000 m^3 per year. The stepdown harvest and subsequent increased level follows a pattern similar to the conventional option.

Scenario	Current Landbase (ha)	Maximum even flow (m^3)	Stepdown from present AAC		
			Years to stepdown	Size of falldown	Long run level (m^3)
Gross productive	281,421	543,475	-	-	-
Planned management	69,686	328,000	30	19%	510,500
Conventional	64,525	300,000	20	28%	448,000
Constrained conventional	64,525	292,000	20	44%	448,000

Sensitivity analyses were conducted around the harvest projections for each option. These analyses demonstrate how much the harvest forecasts change as assumptions about the landbase, forest yield and other factors are varied. The inputs changed for the sensitivity analyses included existing and regenerated stand volume, landbase percentage increase and decrease, cover constraint percentage, minimum harvest age, green-up height, visual constraints and site index. The harvest forecast was mostly affected by changes to old growth site index conversions, landbase assumptions and minimum harvest ages.

Timber supplies are expected to be plentiful in the next 20 years and in the long term but are forecasted to be tight in the medium term. This can be alleviated by shortening the minimum harvest age by ten years and increasing the timber harvesting landbase by 10%.

The proposed AAC for TFL 41 in the next five years is 400,000 m^3. This level of harvest is support by the following:

- The planned management option demonstrates that the AAC is sustainable for three decades.
- Every stepdown schedule and sensitivity run also demonstrates the present AAC level of 400,000 m^3 per year can be maintained for at least 20 years.
- The 20-year plan meets adjacency and green-up requirements and demonstrates that

Figure 11

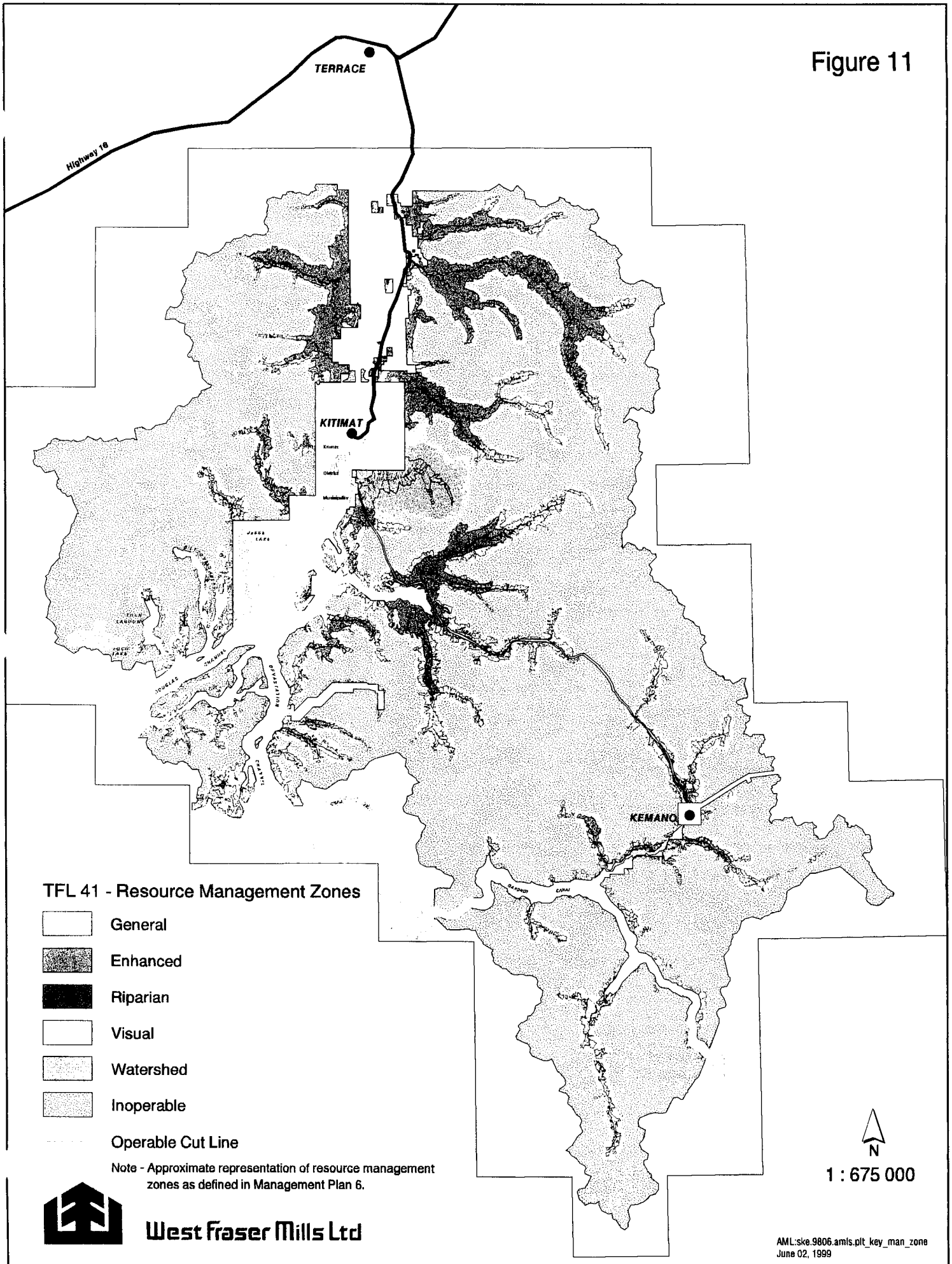

TERRACE
Highway 16
KITIMAT
KEMANO
TFL 41 - Resource Management Zones
General
Enhanced
Riparian
Visual
Watershed
Inoperable
Operable Cut Line
Note - Approximate representation of resource management zones as defined in Management Plan 6.
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Table 15: Resource Management Zones

ZONE DESCRIPTION	GOAL	STRATEGIES
GENERAL		
Areas with diverse array of resources where no single resource warrants specific management.	• Maintain a secure landbase for forest management and sustain supply of timber. • Manage for wide array of resources and values. • Provide for biodiversity.	• Carry out resource inventories. • Manage timber resource in concert with other resources.
ENHANCED FOREST		
Areas suitable for enhanced or intensive forest management.	• Maintain forest landbase for sustainable supply of timber. • Bridge the forest age class imbalance. • Improve timber quality and value of regenerated stands. • Increase economic return. • Provide for biodiversity.	• Carry out economic analysis of potential candidate stands. • Evaluate return under various economic conditions. • Carry out incremental silviculture such as juvenile spacing, pruning and fertilization on sites with positive economic return.
RIPARIAN		
Areas adjacent to fish streams, wetlands and lakes.	• Minimize or mitigate any potential adverse effects. • Minimize impact of forest management activities. • Provide for biodiversity and wildlife management.	• Carry out and update stream inventories and classification. • Protect riparian habitat by establishing reserves and management zones as required by the Code and recommended in the *Fish Stream Identification Guidebook*. • Locate zones along windfirm boundaries where feasible. • Retain important wildlife habitat attributes such as structural diversity and food resources.
VISUAL		
Viewscapes identified in the recreation inventory which are visible from Kitimat townsite, Kitamaat Village, the highway corridor between Terrace and Kitimat, and the main Douglas Channel including Devastation Channel.	• Maintain scenic quality of these important viewscapes.	• Consider use of forest landscape design principles at a cutblock level to satisfy the visual quality objectives assigned to these viewscapes. • Evaluate alternate harvesting systems. • Carry out visual impact assessments where necessary. • Evaluate visual landscape design at the landscape level.
WATERSHED		
Wathl Community Watershed	• Minimize any potential adverse impact to water users. • Maintain water quality and quantity.	• Use planning procedures and practices outlined by the Code. • Carry out watershed assessment prior to any development.

4.5 TWENTY YEAR DEVELOPMENT PLAN

A 20-year development plan has been completed for the period 1999-2018. It is a strategic level plan that illustrates one feasible harvesting option including the SBFEP volume. It was prepared in general accordance with the terms of reference submitted to the district manager. A target harvest level was set at the current AAC of 400,000 m^3 for conventional harvest and 40,000 m^3 for non-conventional harvest methods. The plan provides a link between the non-spatial assumptions used in the yield analysis for MP 6 and the forest management practices, forest cover constraints and planning guidelines of the Code.

Table 16 lists the projected harvest volumes by quarter for each landscape unit by operability class. The volumes per hectare used are derived from the average volume of the mature timber on the net operable landbase for each planning cell. The accompanying maps illustrate by colour-code the spatial distribution of the proposed openings and the associated road development. As described in the report in Appendix VI, the results demonstrate that at the current AAC level there is sufficient flexibility to satisfy annual volume requirements and the planning guidelines of the Code. The harvested level illustrated is not constrained by the resource management factors addressed in the plan.

Table 16: 20 Year Plan Volumes by Landscape Unit (m^3)

Landscape Unit	Operability	1st quarter	2nd quarter	3rd quarter	4th quarter	20 Year Volume
Hot Springs (Schulbuckhand)						
	Conventional	22,890	-	-	-	22,980
Kitimat (Kitimat River)						
	Conventional	551,857	359,266	256,205	584,935	1,752,263
	Aerial	7,776	39,528	-	-	47,034
	Subtotal	**559,633**	**398,524**	**256,205**	**584,935**	**1,799,297**
Wedeene (North Hirsch SBFEP)						
	Conventional	149,042				149,042
Jesse/Bish (Bish, Jesse and portion of Gilttoyees)						
	Conventional	43,206	300,136	180,780	218,238	742,360
	Aerial	-	7,282	40,817	25,010	73,109
	Subtotal	**43,206**	**307,418**	**221,597**	**243,248**	**815,469**
Dala (Wathl, Clio/Wathlsto, Dala and Dahlaks)						
	Conventional	330,576	242,834	814,638	439,849	1,827,898
	Aerial	-	34,156	28,497	28,668	91,320
	Subtotal	**330,576**	**276,990**	**843,135**	**468,517**	**1,919,218**
Falls (Falls, Coste, Eagle and Pike/Sleeman)						
	Conventional	384,660	632,247	145,256	252,750	1,414,913
	Aerial	97,643	91,709	58,980	76,879	352,211
	Subtotal	**482,203**	**723,597**	**204,236**	**329,629**	**1,740,125**
Kildala-Kemano (Upper/Lower Kemano, Wachwas, Seekwyakin, Wahoo and Kildala)						
	Conventional	207,661	155,673	330,408	403,884	1,097,627
	Aerial	-	-	-	-	-
	Subtotal	**207,661**	**155,673**	**330,408**	**403,884**	**1,097,627**
Horetzky (Cariboo)						
	Conventional	42,237	238,856	34,469	-	315,562
	Aerial	-	10,681	-	12,137	22,818
	Subtotal	**42,237**	**249,537**	**34,469**	**12,137**	**338,380**
Kowesas (Kowesas, Barrie and Whidbey)						
	Conventional	189,901	76,694	243,126	-	509,721
	Aerial	-	22,018	84,553	-	106,571
	Subtotal	**189,901**	**98,712**	**327,679**	-	**616,292**
Hawkesbury Is. West (Sue Channel)						
	Conventional	-	-	-	112,599	112,599
	Aerial	83,526	-	-	63,222	146,748
	Subtotal	**83,526**	-	-	**175,821**	**259,347**
Hawkesbury Is. East (Danube Bay)						
	Conventional	83,532			-	83,532
	Aerial	23,276			-	23,276
	Subtotal	**106,808**	-	-	-	**106,808**
Total TFL 41						
	Conventional	2,005,708	2,015,903	2,004,882	2,012,255	8,028,407
	Total/yr	**401,142**	**403,181**	**400,976**	**402,451**	**401,420**
	Aerial	205,104	205,104	212,847	205,915	836,087
	Total/yr	**41,021**	**41,021**	**42,569**	**41,183**	**41,804**
	Total	2,210,811	2,221,006	2,217,729	2,218,170	8,864,494
	Per Year	**442,162**	**444,201**	**443,546**	**443,634**	**443,225**

4.6 SMALL BUSINESS FOREST ENTERPRISE PROGRAM

The SBFEP was introduced to TFL 41 in 1988 and now has an AAC allocation of 21,500 m^3. The MoF in Terrace is responsible for the administration of the small business program including the awarding of timber sale licences (TSL), development planning, harvest inspection, reforestation and protection activities. Once basic silviculture has been completed the TSL areas are turned over to West Fraser for inclusion in the land management program. Close co-operation is required between the MoF and West Fraser to ensure that planning and administration of the SBFEP is co-ordinated with the overall operations of the TFL.

Actual harvesting of the SBFEP volume did not begin until1992. To the end of 1998 the program has harvested 47.4% of the cumulative AAC available since 1988. This undercutting is primarily due to poor markets, resulting in a lack of interest in the relatively low quality timber in the licence area. Table 17 outlines the SBFEP harvesting plan for the next seven years, 1999-2005. It shows an intention to make up the cumulative undercut during that period.

Table 17: SBFEP Harvest Plan (m^3)

Year	AAC	Planned
1999	21,500	67,008
2000	21,500	47,075
2001	21,500	50,209
2002	21,500	48,270
2003	21,500	42,600
2004	21,500	10,350
2005	21,500	37,500
Total	**150,500**	**302,995**

The small business program is administered as follows:

Operating Area

The SBFEP has been allocated two operating areas; one onshore on the north side of Hirsch Creek, and one offshore near Evelyn Lake on the east side of Hawkesbury Island (see Figure 6).

The MoF prepares a five-year SBFEP development plan for these areas that is updated annually. Operational planning needs to be completed in conformance with the guidance in MP 6.

Development

There are no joint-use roads in the SBFEP operating areas at this time. The MoF is responsible for the design and construction of all primary access roads when they are to be used exclusively by the SBFEP. Presently the SBFEP is solely responsible for maintenance of the North Hirsch mainline, as West Fraser has ceased operations in this area for the foreseeable future.

In the Evelyn Lake operating area approximately four km of main roads have been constructed. A further five km of new construction is scheduled during the next five years.

Basic Silviculture

The MoF will prepare silviculture prescriptions that conform to the reforestation strategies and stocking standards referred to in MP 6. Proposed prescribed burning plans will be discussed and jointly inspected with West Fraser prior to their implementation. The MoF is responsible for all post-harvest activities including slash disposal and basic silviculture until free growing status is reached.

Annual Report

By January 31st every year the MoF will provide West Fraser with information on the SBFEP activities completed on TFL 41 for the preceding year. West Fraser will include a section on SBFEP accomplishments in the annual report for the TFL.

5.0 TIMBER RESOURCE MANAGEMENT

TFL 41 has been under a forest management program now for 30 years. During this time road construction, harvesting and reforestation practises have had to be modified and improved in response to changing economic circumstances. It has led to a maturing in forest management techniques that have evolved into a natural forest management system. This system retains the same timber species, vegetation and ecosystems as the natural stands. The low quality timber stands and challenging operating conditions have required a strong reliance on adaptive management. Road construction and logging techniques have had to be found which are both efficient and environmentally responsible. Emphasis during the term of this plan will continue to be placed on efficient economic utilization techniques and the establishment of productive second growth forests.

5.1 ALLOWABLE ANNUAL CUT

West Fraser is proposing that the AAC for the five-year term of MP 6 (1999-2004), be 400,000 m^3. This includes the SBFEP volume of 21,500 m^3 that is already apportioned. The proposed AAC is supported by the results of the timber supply analysis. (summarized in section 4.4)

The West Fraser and the SBFEP AACs would be allocated to conventional and non-conventional operability areas, based on the even-flow harvest level contributions determined in the timber supply analysis. This was 91.5% conventional and 8.5% non-conventional. West Fraser would commit to logging its share of the AAC level from both categories over the five-year period. Annual cut control regulation would only apply to the total AAC.

If this AAC proposal is accepted by the provincial chief forester, then the AAC allocation would be as follows:

	***Proposed* AAC Allocation m^3**		
	Conventional	**Non-conventional**	**Total AAC**
West Fraser	346,325	32,175	378,500
SBFEP	19,675	1,825	21,500
TFL 41	366,000	34,000	400,000

Support and verification for this allocation is provided in the 20-year development plan. The rationale for the AAC determination by the provincial chief forester, is appended in Appendix V.3.

The Schedule A contribution to West Fraser's AAC is 4,000 m^3. This is based on a prorate of the net operable area contribution of 721 hectares of Schedule A land from the total current harvest landbase of 69,686 hectares.

The current cut control period expires in 1999. The next cut control period will be 2000 to 2004. It extends one year beyond the term of MP 6.

5.2 HARVESTING

During MP 5 harvesting was dispersed throughout the operable landbase, with a higher proportion of the total cut coming from the offshore areas than previously. The operability classification completed in 1998 for this MP 6 defines the productive forest land available for economic production of timber in concert with management of non-timber resources.

For the timber supply analysis the productive forest area of 332,924 hectares has been reduced to a current timber harvesting landbase of 69,686 hectares (21 % of the total productive forest area). As detailed in table 18, there is 26.74 million m^3 of merchantable volume in the current timber harvesting landbase available for harvest scheduling.

Table 18: Merchantable Volume (m^3)

	Area (ha)	Volume (000 m^3)
Total landbase	703,745	98,295
Non-forest/non-productive	370,821	3,780
Productive forest	332,924	94,515
Inoperable	240,236	59,463
Riparian/ESA/decid	23,002	8,312
Net operable landbase	69,686	26,740

The objective is to achieve and maintain a two year standing timber inventory (STI). West Fraser has co-signed a fibre flow agreement with Kalum Forest District manager that commits both parties to co-operating in achieving a two year STI. Strategies for harvesting this volume include:

- Harvest timber profile and the allowable annual cut based on the partition.
- Develop the net operable landbase to produce a sustainable economic log supply.
- Plan and design harvesting pattern that integrates riparian, biological diversity, and visual sensitivity of scenic areas.
- Conduct harvesting operations in a safe, economic and environmentally sound manner.

5.2.1 Harvesting Priority

Harvesting will primarily be first pass cutting of mixed hemlock/balsam stands, mostly older than 140 years. Priority will be based on forest health considerations and to create a balanced age class distribution over time:

- Salvage of stands damaged by windthrow, fire, pest or disease attack. This may include younger age classes that are damaged from such events.
- Harvesting of older age classes, i.e., 141 years or more in concert with the timber profile.
- Harvesting of younger age classes, ages 80-140, where road corridor development was necessary to provide an overall dispersed development pattern and to fulfil strategies for managing visual quality.

5.2.2 Harvesting Systems and Methods

Harvesting will continue the pattern of dispersed patch clearcutting. This will be done within the context of achieving economic access and logging of all merchantable timber over the long term. Updates to operability will be continuous as there is a considerable volume of merchantable timber still currently inaccessible. The logging equipment chosen is dictated by several strategies:

- Cutting pattern will reflect guidelines and strategies for the applicable landscape unit.
- Variable block size and shape depending on the natural disturbance type, riparian management and visual quality.
- Minimize the amount of road and soil disturbance.
- Recognition and allowance for windthrow in windthrow-prone areas.
- Match logging equipment capability to the site conditions.
- Maintain appropriate harvesting practices in riparian management areas as required in operational plans.

Openings harvested during MP 6 will be first pass for the most part, unless adjacent areas are damaged by windthrow, disease or fire. Some smaller drainages offshore will be planned for one-pass logging. Ordinarily, second pass logging would be scheduled when the adjacent first pass opening has achieved the minimum green-up height.

In the previous five years (MP 5), tower logging (16%) and grapple yarding (61%) were the main logging systems, followed by wide right-of-way (17%). Ground skidding and hoe-forwarding is limited to about 3%, reflecting the ground conditions. Helicopter logging was approximately 7%. The logging systems used are projected to vary slightly for MP 6, with some increase in heli-logging as shown in table 19.

Table 19: Projected Logging Systems

System	Range	Avg %
Cable	70-75	73
Wide and R/W	15-20	17
Helicopter	5-15	10

5.2.3 Utilization

All coniferous species will be utilized as per the Kalum Forest District standards. These require stumps less than 30 centimetres in height, minimum log lengths of 3 metres to a minimum 15 centimetres top diameter inside bark for old growth.

Table 20: Log Utilization Standards

Specification	Parameter
Minimum tree diameter (dbh)	17.5 cm
Stump height:	30.0 cm
Minimum log length:	3.0 metre
Minimum top diameter:	15.0 cm
Minimum log volume:	50% firmwood

These standards are used for cruise compilation and in cutting permits. It ensures that there is consistency achieved across all levels of planning. Cutting specifications and log utilization standards are stated in individual cutting permits. They may be varied by the district manager for situations such as salvage logging and selection logging. Utilization of lumber rejects (Grade 04) to a 15.0 cm top diameter is mandatory in the Kalum TSA. Discretionary utilization applies to dead and dry sawlogs (Grade 03), dead and dry lumber reject (Grade 05), undersized logs (Grade 06) and firmwood rejects.

Note that cutting permits specify a 15 cm top diameter inside bark whereas the inventory and AAC volume compilation is based on a 10 cm top diameter. The difference in volume must be determined for cut control. Residue surveys measure the volume between 10 and 15 cm top remaining on the logging site. This volume will be reported to the MoF for inclusion in the AAC cut control record although it is exempt from stumpage charges.

Deciduous leading stands, that is, cottonwood and red alder, are non-merchantable and are excluded from the AAC. Harvesting layout avoids these stands, which generally only occur in narrow strips on alluvial sites. They are often within riparian management zones and are usually reserved from cutting.

Scaling

All logs are scaled, according to the *Scaling Regulation* either in the woodyard at Terrace or in the North Coast Timber millyard at Prince Rupert. The one exception is Kildala Arm operations that have weigh scales. Sample loads are scaled prior to watering. To aid the efficiency of the offshore operations, and especially the smaller valleys, some minor variations to scaling practices will be pursued with the district manager:

- Exemption from scaling of timbers used in logging camp construction.
- Exemption from timber marking of boomed logs. These can be tracked and accounted for from the loadslips and boom reports.
- Approval to scale logs barged outside the region at their destination points.

Residue Surveys

Estimates and surveys of timber residue remaining on logged blocks will be completed annually on a sample of cutting permits. For formal surveys, a residue sampling plan is submitted to the district manager prior to commencement of surveys. West Fraser will be proposing an exemption from undertaking waste surveys on all blocks to the district manager. This would be replaced by a combination of barometer block surveys and ocular estimates. The company has an adequate record and database of waste surveys to provide reliable benchmarking of the ocular estimates.

Results provide estimates of residue and waste for both inventory depletion and the cut control record. Avoidable and unavoidable waste volumes are reported to the district manager each year for inclusion in the annual cut control letter. Avoidable waste is billed at the prescribed rate as per the appraisal system.

5.2.4 Contractor Requirement

West Fraser has always exceeded contract harvesting requirements for TFL 41 and will continue to comply with the *Timber Harvesting Contracts and Subcontracts Regulation.* The regulation requires 50% of the Schedule B AAC to be carried out by full and phase logging contractors.

For the period 1994-98, contract performance has averaged over 100%. Since 1997 when the company sold all its logging equipment, all logging on TFL 41 has been by contractor. This situation will continue unchanged through MP 6, thus no calculation of contractor clause compliance is necessary.

5.3 ROADS AND WATER TRANSPORTATION NETWORK

Construction of primary infrastructure began in 1970 with the development of the onshore drainages on the west side of the Kitimat Valley and the Sandifer log transfer system at Kemano, to bring logs from the interior Ootsa Lake forest licence operations to tidewater at Kemano Bay. Since that time approximately 690 km of forest roads and 68 major bridges have been constructed. The main road access to both the east and west side of the Kitimat Valley was complete by the mid-1980s. With the increased harvesting offshore, West Fraser also maintains several log dumps along the Douglas Channel and a de-watering loadout at Minette Bay. From Minette Bay logs are trucked on Highway 37 to Terrace. The goals of the road program are:

- To develop and operate a road network that minimizes environmental impacts and is safe both for industrial traffic and public use.
- To provide a transportation system throughout the TFL to enable log delivery to their designated manufacturing facility economically.
- Maintain all roads in accordance with design specifications and to deactivate or rehabilitate roads that are no longer required.

5.3.1 New Road Construction

New road development is planned on several headings into offshore drainages. Main capital road construction would include extension of the Dala mainline, construction of the Caribou Creek mainline, including a major bridge across Caribou Creek. Secondary roads are scheduled to be built at Hugh Creek, Eagle Bay and Bish Creek.

Planning and design will be done in advance so that potential environmental impacts can be assessed and mitigation plans be incorporated in the final design. Recognizing that road location can potentially impact a variety of resources, West Fraser will ensure that full consideration is given to avoiding unstable terrain, riparian management zones and other sensitive areas, when finalizing road designs. The company will plan and construct on road systems to minimize stream crossings in a watershed. Stream crossings will be selected wherever possible to mitigate disturbance to riparian and in-stream resources. Road construction will use techniques to avoid changes in drainage patterns, prevent soil erosion and take measures to protect sensitive slopes.

New proposed roads are detailed in the annual forest development plan. In the previous five years approximately 33 kilometres of new road were constructed annually.

5.3.2 Road Maintenance

Regular maintenance inspections of the condition of the road network will be carried out commensurate with the frequency of use, public access and road hazard. This is essential for the safe use of the roads by logging trucks, pickups, all-terrain vehicles and motor bikes. These inspections are used to prepare road and bridge maintenance schedules. Maintenance activities normally cover surface maintenance, culvert repair and replacement and bridge non-structural maintenance.

5.3.3 Road Deactivation

When roads are no longer required for regular and frequent use they may be deactivated before their condition deteriorates and has an adverse impact on the environment. This stabilizes the subgrade and restores the natural drainage patterns. Deactivation work involves installing waterbars, cross-ditches, removing culverts and unsafe bridges, pullback of fillslopes, pulldown of cutbanks and facilitating drainage of surface run-off. In many situations, deactivated roads are only passable by four-wheel drive vehicles or ATVs.

West Fraser began deactivating roads in 1995, focussing on the Wedeene side and the South Hirsch as first pass logging is completed in these areas. The level of deactivation depends on future access needs anticipated. There has been some public backlash against permanent deactivation of the onshore road systems as driveable access is important in pursuing a whole range of recreational activities. It is proposed that where there is public demand for an out-of-service road to be maintained, when the company has an obligation to deactivate it that the road maintenance responsibility would be assumed by the MoF.

Three levels of deactivation are undertaken:

Level	Use	Work
Temporary deactivation	• Roads where regular maintenance suspended for up to 3 years. • Drainage control in steep terrain and sensitive areas. • Normally four-wheel drive access.	Waterbars, culvert backups, ditchline maintenance.
Semi-permanent deactivation	• Roads where use is suspended for 1-3 years in remote areas with potential for landslides. • Roads where regular use is suspended for 3 years. • Usually only four-wheel drive access.	Removal of drainage structures at risk of failure, stabilization of cut/fill slopes liable to failure.
Permanent deactivation	• Roads no longer required to be closed permanently. • Only walking or some ATV access.	In addition to semi-permanent work, includes pullback of significant fill or cutslope material, removal of bridges including abutments, and recontouring of the road surface.

5.3.4 Third Party Access

The public may use the logging roads at their own risk. Signs are posted at the start of main roads with identifying markers at each kilometre point. Public access is not controlled under normal circumstances. Access to active logging operations is often restricted by portable locked gates at the start of an operational road. During the fire seasons, if the fire hazard reaches high, road closure may be invoked. This is done in co-operation with the district manager.

The SBFEP uses the North Hirsch mainline, which is now maintained by the MoF as a Forest Service Road. Other parties also use part or all of the road network, e.g., CN Rail, Pacific Northern Gas, licensed trappers, guide outfitters and mining exploration companies.

5.3.5 Log Dumps

Presently West Fraser has five log dumps and booming grounds on tidewater along Douglas Channel. These are located at Atkins Bay, Falls and Pike Creek, Kemano Bay and a loadout at Minette Bay. The company also has log storage sites at or near Clio Bay, Loretta Island and Kildala Arm.

Logs from the offshore operations are bundled and boomed at these sites and towed out to Prince Rupert for processing in the company's North Coast Timber sawmill or to Minette Bay, where they are loaded out and trucked to the company's sawmill in Terrace. New log dumps are planned at Eagle Bay, Kowesas and Barrie Creek during the term of MP 6.

5.4 SILVICULTURE

A silviculture program has been maintained on TFL 41 since 1973, when the first plantations were established. The program has emphasized prompt reforestation of all logged cutblocks and stand tending to maintain highly productive growth of the regenerated forest areas. It has not been difficult to successfully reforest most logged areas, either by planting or from natural regeneration. By the mid-1980s, plantations of Sitka spruce were found to be susceptible to terminal weevil damage so planting of this species is now restricted to a small percentage of the total seedlings planted. As shown in Table 21, reforestation of TFL 41 has been kept in balance with the area harvested or burnt by wildfire so that backlog of not sufficiently restocked (NSR) area is minor.

Table 21: Reforestation Performance

	Activity	1994-98	1976-98
Basic	Planted	3,708	13,856
	Natural	1,690	8,684
	Subtotal	*5398*	*22540*
	Site Prep.	0	180
	Broadcast Burnt	0	865
	Brushed	1,836	3,976
Intensive	Juvenile Spaced	1,813	2,470
	Pruned	28	47
Logged			
	Logged	3,217	20,649
	Wildfire	143	3,249
	Subtotal	*3,360*	*23,898*

A more detailed account of the silviculture performance is outlined in the history of operations in Appendix I.3. It describes silviculture activities completed since 1973.

The overriding goals of the silviculture program are:

- Maintain the forest productivity of all harvested areas through prompt reforestation with ecologically suitable species.
- Manage and tend regenerated forests to realize the biological growth potential.
- Enhance where appropriate the economic value of forest products.

5.4.1 Basic Silviculture

West Fraser will continue maintaining a basic silviculture program that meets the requirements of the *Silviculture Practices Regulation.*

The goals of the program are:

- Reforest all cutblocks promptly (within 2-3 years) after harvesting by the prescribed regeneration dates.
- Establish and maintain healthy crops of ecologically suitable species.
- Manage regenerated cutblocks to target stocking standards.
- Establish free growing regenerated stands within the prescribed free growing dates.

The silviculture activity forecast in table 22 is based on harvesting 378,500 m^3 annually (West Fraser's AAC apportionment) and regeneration success greater than 85%. The forecast is reviewed and updated each year and included in the forest development plan.

Table 22: Silviculture Activity Forecast (hectares)

Activity	1999		2000		2001		2002		2003	
	WF	*FRBC*	*WF*	*FRBC*	*WF*	*FRBC*	*WF*	*FRBC*	*WF*	*FRBC*
Surveys	1000	900	1000	300	1000	200	1000	100	1000	100
Site Preparation	0	0	0	0	0	0	0	0	0	0
Planting	650	15	650	10	650	10	650	5	650	0
Brushing	200	100	200	50	200	50	200	20	200	0
Free Growing Surveys	1000	--	1000	--	1000	--	1000	--	1000	--
Spacing	--	500	--	500	--	500	--	500	--	500
Pruning	--	50	--	50	--	50	--	50	--	50

Basic silviculture means the reforestation activities required after an area is logged to regenerate a new crop of trees until they are growing free of competition from brush. West Fraser pays the cost of basic silviculture for cutblocks harvested after October 1987. Forest Renewal BC funding covers basic silviculture on areas logged between 1982-87.

5.4.1.1 Stand Establishment

The normal approach will be to continue to plant approximately 80% of the area logged each year with ecologically suitable species within two years after logging is completed. Although almost all stands regenerate to a large degree by natural seeding, this strategy ensures that regeneration dates prescribed are met and that full stocking is achieved on all sites. Reforestation is presently in balance with harvesting. At the end of 1998 there were 658 hectares of current NSR area. Small areas of backlog NSR that amount to less than 100 hectares are being filled and planted and there is very little work remaining to ensure they become fully stocked.

Reforestation plans are drawn up depending on the ecological characteristics of each site. Species choice and stocking standards follow the *Establishment to Free Growing Guidebook for the Prince Rupert Region* (1995). Target stocking standard is 900 sph. Generally this means that 1000 - 1200 seedlings are planted per hectare in addition to acceptable naturals.

Deciduous species also grow well on a range of sites series and may be used to fulfil basic silviculture stocking obligations. Generally, when deciduous is considered as a preferred or acceptable species, the resultant regeneration will be a mixture of conifer and deciduous.

Cottonwood would be accepted on alluvial and wetter sites, at stocking levels specified in silviculture prescriptions. The retention or re-establishment of cottonwood either as patches of pure species groups or as a mixed species stand contributes to the diversity of vegetation and wildlife habitat, as well as providing crop trees to be utilized in the future.

Planting is completed in spring and summer. Approximately 700,000 seedlings are planted each year. Species used are: western hemlock, 40%; amabilis fir, 35%; western red cedar, 12%; Sitka spruce, 10%; and other species, 3%. Generally, stock types are PSB 313 styroplugs or similar size with a portion of larger plugs, PSB 415 used for planting on brush hazard sites.

5.4.1.2 Seed Supply

Conifer seed for the reforestation program is provided from cone collections made from natural stands within the licence area. Cone collections are made in accordance with the *Tree Cone, Seed and Vegetative Material Regulation.*

The goal is to maintain sufficient seed inventory of each species to supply projected seedling requirements for a 10 year period. As shown in Table 23 the total seed inventory at August 1998 was equivalent to approximately 17 million seedlings in two seed zones.

Cone collection in any given year will depend on seed needs for specific species and the quality of the cone crop. There are no seed orchards established for coastal species in the seed planning zones that cover the licence area.

Table 23: Seed Inventory

Seed Zone		Species	#Seedlots	Seeding potential (000's)	
Submaritime					
	Ba	Amabilis fir	4	1,410	
	Cw	Western red cedar	3	1,310	
	Fd	Douglas-fir	1	50	
	Hw	Western hemlock	3	1,690	
	Ss	Sitka spruce	1	2,400	
	Pl	Lodgepole pine	1	190	
			Subtotal		**7,050**
Maritime					
	Ba	Amabilis fir	7	1,725	
	Cw	Western red cedar	3	2,790	
	Hm	Mountain hemlock	2	2,000	
	Hw	Western hemlock	3	1,575	
	Ss	Sitka spruce	4	2,325	
	Cy	Yellow cedar	2	13	
			Subtotal		**10,428**

5.4.1.3 Site Preparation

Site preparation prior to planting is rarely necessary. In general, on most cutblocks, it is possible to find adequate numbers of plantable spots without broadcast burning or mechanical scarification.

Broadcast burning has been avoided as a site preparation technique for the past 15 years as West Fraser's experience has been that even a controlled burn is detrimental to successful natural regeneration. Burning exacerbates spread of dense fireweed, which in combination with deep heavy snow, results in snow press and mortality of seedlings. Also, there is such a narrow burning window in the fall that burning objectives are difficult to achieve. Some spot burning of roadside slash accumulated is used to reduce slash loading and to create planting sites along the roadsides. This strategy of not burning contributes to maintaining wildlife habitat values and biodiversity at a stand level, as well as facilitating successful regeneration and leaves the desired woody debris on the site.

5.4.1.4 Silviculture surveys

The regeneration status of cutblocks and progress towards free growing is monitored by various kinds of silviculture surveys. Information collected includes species, stocking level distribution, brush competition and pest incidence. The results are used to schedule follow-up stand treatments if necessary. Regeneration delay dates range from 3 to about 6 years.

The first free growing surveys were undertaken in 1987. These surveys will be an on-going program during MP 6. Free growing periods span from 8 years at the earliest to 14 years at the latest. Table 24 describes the kinds of silvicultural surveys undertaken.

Table 24: Silvicultural Surveys

Survey	Purpose	Timing	Intensity
Regeneration	Assess natural regen species and stocking. All sites scheduled for natural regen.	At midpoint of regen delay.	One plot per 1 ha or > on small blocks
Stocking/Survival	Determine survival and regen status of all plantations.	Two growing seasons after planting.	One plot/ha
Brushing	Determine brush competition at pre-identified brush hazard sites.	Scheduled as necessary after regen/survival surveys.	Minimum 5 plots/stratum.
Regen Performance Assessment	Preliminary assessment of free growing status at all sites.	Three years before early free growing date.	Variable
Free growing	Determine free growing of all sites.	Between early and late FG dates in SP.	Minimum 5 plots/stratum and one plot/3ha

Survey methodology follows the *Silviculture Surveys Guidebook.* Survey results are reported to the MoF using the MLSIS reporting system.

5.4.1.5 Brushing

New plantations may need to be brushed to ensure that they achieve specified free growing standards. The need for a brushing treatment is determined by assessing ecological site series when a silviculture prescription is being prepared and "seedling performance" during silvicultural surveys. Once an area is identified as a candidate for brushing, a brushing survey is scheduled to provide data on competing species so that the preferred treatment can be prescribed.

The main brush species on TFL 41 are fireweed, salmonberry, thimbleberry, elderberry, ferns and red alder. They occur as discontinuous patches and are usually treated by spot manual brushing. Manual treatments can be required up to three times before vegetation control is achieved. Herbicides have not been used to date. Nevertheless, if manual brushing costs become unreasonable and the treatments less effective, herbicide treatments will be considered as an option. Manual treatments will continue to be favoured as long as they remain reasonably cost effective.

5.4.2 Enhanced Silviculture

Enhanced silviculture is any stand level treatment designed to maintain increased timber value sometime in the future. Potential treatments on TFL 41 are juvenile spacing, pruning and fertilization during the next five years. Commercial thinning could begin in 10-15 years approximately. The scope for a large enhanced silviculture program on TFL 41 during MP 6 is limited due to the relatively young age of the regenerated stands.

Initially, the juvenile spacing program began in the early 1980s, funded by various provincial and federal government job creation programs. Approximately 2,500 ha have been spaced since 1983. West Fraser will continue with an enhanced silviculture program as long as government funding is available. The forecasted activity goals for the next five years in table 22 are dependent on continued funding by Forest Renewal BC or other sources. These treatments are labour intensive and provide jobs for local silviculture workers.

For MP 6, goals of the enhanced silviculture program are:

- To maintain productive, healthy regenerated stands.
- To increase recoverable merchantable volume of sawlogs at final harvest.
- To increase piece size and value at final harvest.
- To meet stand level biodiversity objectives.

The proposed AAC in this plan is not predicated on realizing a yield benefit from an enhanced silviculture program. Approximately 14% of the productive landbase (47,829 hectares) is a defined enhanced management zone. This zone has the best growing sites and access, and has the most promising potential for an economic return from silviculture investments. However, not all areas within this zone would receive treatments.

The underlying rationale is for an enhanced silviculture program to improve the value and shorten the merchantable rotation age. Treatments will help mitigate the age class imbalance and increase the timber supply availability in 40-60 years. This approach will broaden fibre supply options in the future and provide an opportunity to recover volumes from commercial thinnings.

Potential benefits from an enhanced silviculture program could be:

- Improvement in the quality and volume yield.
- Increase in stand value.
- Shorten rotation ages.
- Bridge the forest age class imbalance by improving availability of merchantable timber in 40-60 years.
- Create silviculture employment opportunities.
- Enhance and maintain biodiversity over the landscape.

5.4.2.1 Juvenile Spacing

West Fraser expects to juvenile space approximately 2500 hectares of western hemlock/amabilis fir stands during MP 6. Stands are assessed for juvenile spacing once they have reached sufficient age and height. Potential candidate stands would have the following attributes:

Site Index	> 20 m
Age	15-20 years
Height	5-8 metres
Density	> 3500 sph
Health	Low incidence of insects, fungi or mammal damage

The thinning regime is designed to maintain growing space for crop trees, while leaving enough stems to allow an opportunity for commercial thinning. Post-spacing density is in the 850-1000 sph range. Species selection order in preference is Hw, Ba, Cw. Western red cedar is left as it generally makes up a small component of the species in regenerated stands.

Pre-standing surveys will be completed for candidate stands. These are predominantly mixed hemlock/balsam stands on undulating terrain, benches and lower slopes up to 50%. Stands should possess average or better productivity and be exhibiting signs of stand competition for growing space. Stand management prescriptions are prepared for selected stands.

5.4.2.2 Pruning

A limited amount of pruning has been completed since 1993. Hemlock/amabilis fir stands of above average productivity, i.e., $\geq$ SI 27 m are considered to be suitable candidates. The purpose is to produce high quality knot-free wood in the first log length (up to 6 m).

Stands are selected and prioritized in accordance with the *Pruning Guidebook* (1995). Pruning of the bottom log is scheduled in two stages:

- First lift 0-3 m when average stand height is 6-8 m.
- Second lift 3-6 m when average stand height is 10-12 m.

5.4.2.3 Fertilization

To date no operational fertilization has occurred on the TFL. A fertilization trial was established in 1996 and covered seven sites. Re-measurement is scheduled for each year for the next four years to 2000.

5.4.2.4 Commercial Thinning

Second growth stands in the enhanced management zone will be tended and spaced with regimes designed to allow an opportunity for commercial thinning in the future. This opportunity will not be available for another 10-15 years at minimum. By that time there will be approximately 2,700 hectares of second growth hemlock stands on the onshore area that are about 40-45 years old. Those stands on flat to moderate topography could have a first entry commercial thinning. These stands have regenerated from some of the first logging on the TFL in the 1970s.

There are approximately 830 hectares of age class 2 stands in the offshore area that originated from A-frame logging along the Douglas Channel shoreline in the 1950s. Although these stands could be thinned, any operation would be uneconomic at current (1998) log prices. Prior to any actual thinning these stands would be surveyed to provide data for assessing the economic feasibility of any commercial thinning.

5.5 FOREST HEALTH

5.5.1 Status

Numerous pests and diseases are present throughout the forests on TFL 41. The forest health situation has remained relatively stable over the past 20 years and there have been no major epidemic outbreaks of pest activity causing catastrophic volume losses. The exception is the hemlock looper outbreaks on the west side of the Kitimat Valley in the mid 1970s that has been attributed to the weakening of trees in the fume path from the Alcan smelter.

The old growth forests incur on-going damage from abiotic factors such as windstorms, windthrow and extreme temperature fluctuation causing frost cracks. There is also a relatively high occurrence of decay, root disease (Tomentosus and Annosus root disease), butt and stem rots (Indian paint fungus, red belt fungus, red ringrot, Schweinitzii butt rot) and stem conks (quinine conk, artists conk). Infection with hemlock dwarf mistletoe is also common.

Younger regenerated stands also suffer mortality and growth reduction from these agents. In addition, mortality and stem damage from voles, porcupine, moose and deer browsing is an on-going problem. Spruce leader weevil is also active in spruce plantations causing high incidence of terminal leader damage. These pests and diseases have influence on pest management detection and control strategies.

The forest health program is based on the known active pests considered significant on the licence area. These are listed in the following table (adapted from the *Establishment to Free Growing Guidebook for the Prince Rupert Forest Region.* (1995)

Table 25: Pest Occurrence in the CWH Subzones*

		CWHvm1				CWHws1			
		Ba	Cw	Hw	Ss	Ba	Cw	Hw	Ss
Forest Health Agent	**Scientific Name**								
Diseases									
Laminated root rot	Leptographium wageneri		L				L		
Hemlock dwarf mistletoe	Arceuthobium tsugense			M				M	
Pini (red ring) rot	Phellinus pini			M	L			M	L
Rust-red stringy rot	Echinodontium tinctorium	H		M		H		M	
Tomentosus root rot disease	Inonotus tomentosus				?				L
Insects									
Spruce Beetle	Dendroctonus rufipennis				L				L
White Pine (terminal) weevil	Pissodes strobi				M				H
Mammals									
Porcupine	Erethizon dorsatum	L		M	L	L		M	L
Ungulates (moose, deer)	Alces alces, Odocoileus spp.	L	M			L	M		
Vole	Microtus sp	L	M	M	M	L	M	H	H

Occurrence: L = 1-32%, M = 33-65%, H = 66-100%, ? = uncertain, blank = not present
Occurrence relates to potential occurrence of pests in forest stands where indicated tree species is the leading species.

5.5.2 Detection

Detection and reporting of pest incidence activity is an on-going responsibility of operations personnel. All field staff are familiar with pest occurrence, relative activity levels and the stands and species most at risk.

West Fraser monitors the forest health status each year. Information is exchanged co-operatively with the MoF. Pest activity is noted during forest development planning, when collecting data for silviculture prescriptions, and stand management prescriptions and during silviculture surveys. Silviculture survey methodology includes notation of forest health status of individual stands.

Overview flights are used to inspect windthrow events and to monitor areas with known pest activity. More intensive ground surveys are used to assess damage caused by porcupines and voles. Information collected is used to prepare detailed control plan where appropriate.

5.5.3 Prevention and Control

Control strategies are designed to dampen activity and reduce pests to below endemic levels by preventing conditions that favour build-up and spread.

Actions taken are specific to the nature of the pest or disease and are aimed at reducing the risk or hazard. Natural control techniques are favoured whenever suitable. Measures include salvage and sanitation logging, broadcast burning, three-metre knockdown, planting in species mixtures, eradicating infected stems during stand tending (brushing and spacing).

The treatment strategies for young regenerated stands for the most active pests are described in the following table.

Table 26: Pest Treatment Options

Pest	Target Species	Treatment
Hemlock dwarf mistletoe	Hw	3m knockdown/girdling of understorey residuals after logging. Cut infected stems during brushing and spacing.
Voles	Ss, Ba, Hw, Cw	Surveying and fill-planting. Spring planting vs fall planting. Encourage high stock of natural regen.
Spruce terminal weevil	Ss	Mixed species planting with limit of 20% Ss in high hazard areas Plant weevil resistant Ss seedlings where available. Avoid planting in high hazard areas.
Moose/deer browse	Ba, Cw	Encourage mixed species regeneration. Obstacle planting in high hazard areas or avoid planting targeted species. Plant with vexar tubing.
Porcupine	Hw	Maintain high stocking in high hazard area. Monitor damage by surveys. Select other species when planting and spacing.
Beaver	all	Minimize flood damage by regular cleaning of problem blocked culvert intakes. Maintain population numbers through trapping.

5.5.4 Non-recoverable Losses

5.5.4.1 Unsalvaged Losses

These represent the unsalvaged volume loss from trees damaged or destroyed from catastrophic events such as fire, windthrow or epidemic insect attack. There have been no major fires on TFL 41 since the Kat fire in 1978 on the north face of Chist Creek. Prior to that there was a major wildfire in 1958 on the north face of Kitimat River west of Hunter Creek. There have been no significant losses from insect attack outside of the Alcan fume path. Nearly all potential losses from windthrow are salvaged as windthrow tends to be associated with logging. Table 27 shows the estimated average unsalvaged volume loss based on company experience and MoF fire occurrence records. These estimates are deducted from the harvest flow schedule to determine net volume over time.

Table 27: Unsalvaged Losses (m^3/yr)

Cause of Loss	Gross Loss	Net Loss
Fire	2000	500
Windthrow	3000	1000
Insects	1500	500
Total	**6500**	**2000**

5.6 FIRE PROTECTION

West Fraser will continue to maintain a fire control program to protect the timber resource from wildfire damage. The majority of the licence is in the coastal zone that has a moist climate in the summer. Fire danger lies in the low to moderate range for most of the fire season, moving into high or extreme usually only for short periods.

The TFL experiences a low fire frequency. The last major wildfire was on June 29, 1978 when 3,549 hectares of mature forest and cutover were burnt on the north side of Chist Creek and the entrance to Schulbuckhand Creek. Of the 3,549 hectares, 2,821 hectares were on the TFL, the balance was on Crown forest land. The majority of the damaged timber volume was subsequently salvaged. Since that time only minor fires have occurred, but all were quickly controlled.

The goal is to suppress wildfires on the licence and to minimize damage and losses to the forest from uncontrolled fires.

Prevention

The MoF has designated a fire season of April 1 through October 30 each year. A high standard of fire preparedness and an efficient fire control organization is maintained for the duration of the fire season. Fire protection actions taken will be in accordance with the *Forest Fire Prevention and Suppression Regulation.*

Prevention strategies include an annual fire preparedness plan, fuel management and maintaining a network of automatic weather stations. Company and contract personnel have taken fire training in fire prevention and suppression techniques.

Fire Preparedness Plan

This plan is updated annually and submitted to the district manager and the North-West Fire Control Centre in Smithers by April 1st. Copies are distributed to all operations staff and contractors working on the TFL.

The plan outlines all the information needed to mobilize fire suppression in the event of an operational or wild fire. It covers:

- Operating regulations during the fire season, fire duty and standby roster, fire patrol and forest closure criteria.
- Organization and reporting structure in the event of a fire.
- Fire equipment list and cache locations.
- Fire detection and reporting requirements.

Fuel management

Fuel types consist of felled and bucked timber, slash accumulations on logged areas, blowdown, dry ground vegetation and recent juvenile spaced blocks. The risk of fire hazard is reduced by various actions to minimize the build-up of high hazard fuel types.

Logging slash along roadsides and around landings is usually piled and burned in the early fall. Road right-of-way slash and debris is burned or piled on all main and spur roads. Fire hazard assessments are required to be completed after the logging. Exemptions to this requirement will be requested from the district manager where slash loading is low or in remote locations where logging contractors equipment has been moved out. This makes sense as risk of fire is low. The fire fuel component in logging slash decomposes rapidly in about 3-4 years after logging.

Slash from juvenile spacing is only a hazardous concern for a few years as it also decomposes rapidly and is flattened close to the ground by the annual heavy snow loads.

Weather stations

The company does not operate weather stations on the TFL at this time. Indices are received from the North-West Fire Control Centre. A weather station is also operated by Alcan at Kemano and is part of the fire weather grid. All operations personnel are kept informed of changes in the fire weather index (FWI) during the fire seasons. Operations follow the regulations with respect to watchmen and shutdown conditions in all areas as determined by the current FWI readings.

Control

The level of preparedness increases as the FWI increases. Logging operations move to early shift on the third day of high hazard. Conditions may lead to operations being curtailed by the company for site specific areas, i.e., steep, dry, south facing slopes, or dry windy weather in certain valleys. When the fire hazard rating increases to extreme, travel restrictions and forest road closures may be applied, usually by order of the MoF. Ground and air patrols are carried out during periods of extreme fire hazard and sometimes after lightning storms, generally by the MoF.

6.0 MANAGEMENT OF NON-TIMBER RESOURCES

There is a broad array of non-timber resources within the land and marine environment of TFL 41. Public use of these resources, both commercial and non-commercial has been reasonably limited. But this does not detract from their intrinsic and ecological value.

The small percentage of operable forestland, approximately 10% of the total area, means that, for the most part, many of these resources need not be adversely impacted by timber harvesting. The progressive development of road access in the past three years has increased the opportunities for wider public use of the licence area. For example, the rivers are more accessible for anglers and canoeists. At the same time harvesting has created a wider diversity of forest cover type and regenerated forests. This has enabled wildlife to thrive as they adapt to the new habitat created.

6.1 RECREATION

Recreation on the TFL is mainly pursued by local residents, who enjoy land and marine-based activities. The most popular pursuits are camping, hiking and river fishing, hunting and marine sports fishing. Generally, recreation use is low and considerably less than the potential recreational opportunities identified in the recreation analysis report (Appendix IV). This report was accepted in the Regional Manager's letter dated August 7, 1998. Recreational activities mainly involve dispersed day-use. This means it is important that vehicle access to hiking trails and rustic camping spots is maintained. Boaters on the Douglas Channel need anchorage and sheltering spots along the shoreline.

The MoF has overall responsibility for facilitating new recreational opportunities on the TFL. As funding is limited it is not anticipated that any new recreation facilities will be established during the next five years. A recreational strategy that includes the licence area is outlined in the *Kalum Forest District Recreation Management Strategy* - 1998. This strategy divides the TFL into two geographic subzones as shown in figure 8 with objectives for recreational planning established for each subzone.

The following recreation management objectives are designed to emphasize land and marine-based recreation management across the TFL and may not be accomplished until a number of years in the future.

Recreation Management Objectives

Kitimat-Kildala Subzone

1. To apply standards for scenic quality in keeping with LRMP and Ministry-approved recommendations.
2. To focus forest recreation development on improving and expanding opportunities for vehicle access camping and trail use at significant recreation features.
3. To maintain roads that will continue to provide access to important recreation destinations.
4. To recognize significant marine recreation features and provide opportunities for use and enjoyment.

Douglas-Gardner Subzone

1. To emphasize and manage for high quality visual land and marine landscapes consistent with Natural and Semi-Primitive ROS class.
2. To manage significant marine recreation areas/features, providing opportunities that promote natural and cultural heritage appreciation.

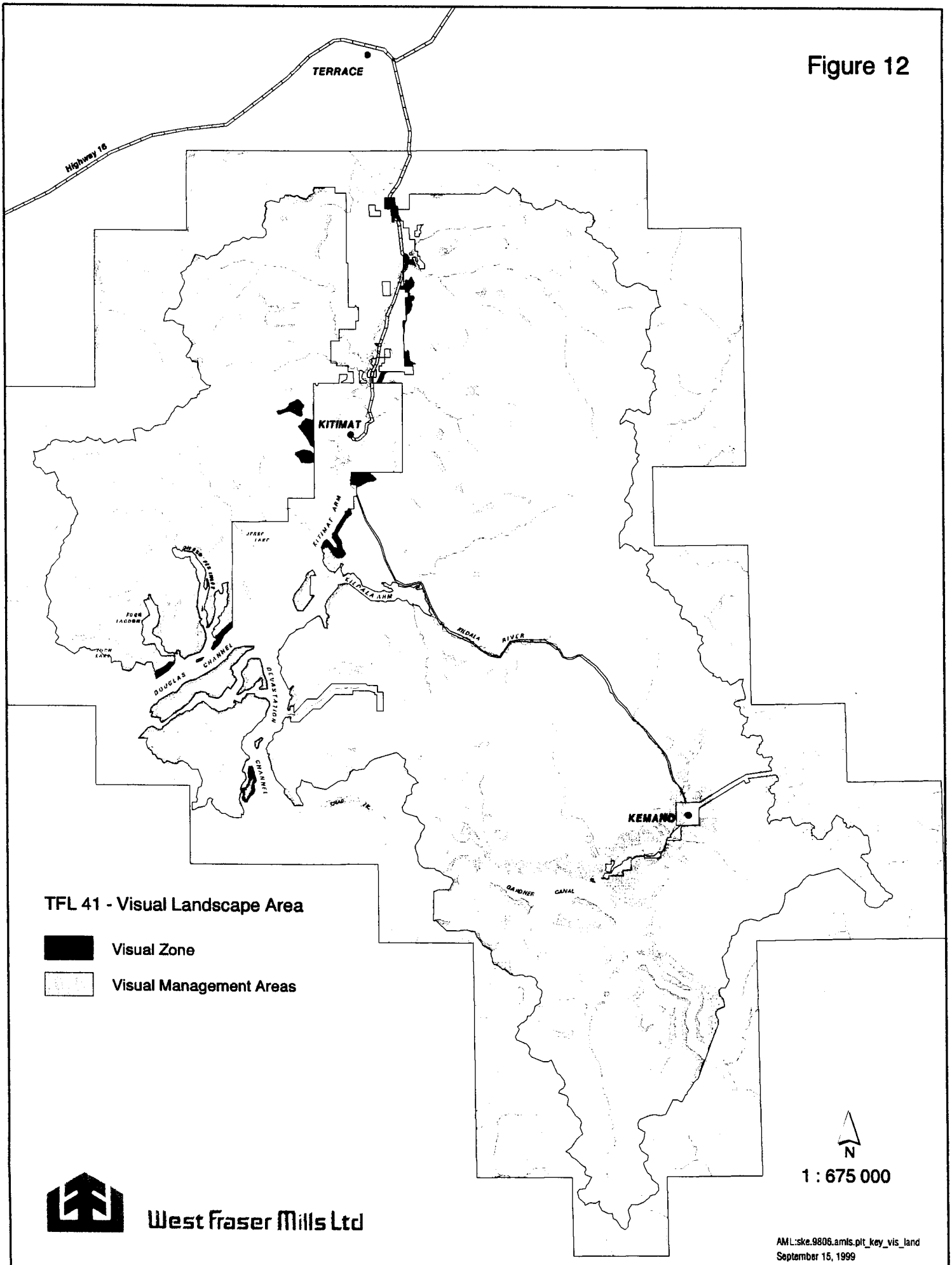
Listed in Appendix IV are accompanying recommendations from the Kalum Forest District strategy for recreation and scenic areas to be conserved, recreation sites and trails to be managed and ROS objectives to be maintained. These recommended management directives are intended to meet existing and forecasted demands for the development of facilities and opportunities. They are to be regarded as a guide when preparing a recreational operational plan and will not necessarily be completed during MP 6.

6.2 VISUAL LANDSCAPE

The landscape inventory has identified some visually sensitive viewscapes throughout the TFL. These are a combination of foreground to background viewscapes noticeable both from land and water. The inventory provides guidance in determining those areas to which a visual management strategy ought to be applied. Two visual landscape area categories were determined, a visual zone and a visual management area (Figure 12).

The goal is to maintain the visual quality of viewscapes visible from the Kitimat townsite, Kitamaat Village, the highway corridor between Terrace and Kitimat, and the main Douglas Channel waterway including Devastation Channel. In this visual zone forest landscape cover constraints that lower timber availability were applied in the timber supply analysis for MP6. The visual management area is less visibly sensitive than the visual zone. In these areas, visual appearance will be considered in cutblock design although visual impact assessment will not be completed.

Figure 12



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September 15, 1999

The visual appearance of viewscapes within the visual zone will be managed using forest landscape management techniques. The strategy includes:

- Cutblock patterns will be designed so that they blend in with the visible landscape when reasonably possible to do so to meet assigned visual quality objectives.
- Cutblocks planned in these areas will be subject to visual impact assessment. Cutblocks in the visual zone areas will be identified in the forest development plan.
- A range of harvesting systems and patterns will be considered in the design.
- Cutblock sizes will be adjusted to correspond with logical landscape features and design will be evaluated at a landscape level.

6.3 SOIL CONSERVATION

On balance, terrain within the operable area is relatively stable. Areas of natural instability have been identified by terrain hazard classification mapping. The objective is to minimize the risk of soil erosion and loss in productive area and capacity from operations. All site disturbance impacts should largely be confined to within road prisms or right-of-way areas where permitted disturbance is marked in operational plans. Strategies to meet soil conservation goals and objectives are grouped into three categories:

- Effective and appropriate operational planning.
- Employing accepted road construction and harvesting techniques.
- Mitigation and post-logging rehabilitation measures.

These management strategies include:

Planning

- Terrain stability field assessments where sensitive soils and steep slopes are indicated in hazard class IV and V, or where indications of potential slope instability are observed during road location surveys, harvest block layout, or during data collection for silviculture prescriptions.
- Minimize the number of roads located through potentially unstable slopes/soils.
- Evaluate the sensitivity of sites to soil degradation from disturbances, e.g., soil compaction and puddling, soil displacement, forest floor displacement, surface soil erosion, mass wasting.
- Choose logging equipment to match site conditions and season of logging.

Techniques

- Employ special road construction techniques to minimize potential impacts by fullbench construction, end-haul, pullback of oversteepened slopes and landings.
- Build roads and stream crossings to minimize mass wasting and erosion.
- Observe shutdown criteria after periods of heavy rainfall and saturated soil conditions.
- Ensure adequate deflection and avoid ground leading.

Rehabilitation

- When unforeseen unstable conditions are encountered, take appropriate mitigation action.
- Rehabilitate trails, landings and disturbed areas where required and reasonable.

6.4 BIOLOGICAL DIVERSITY

A number of strategies and practices to maintain biodiversity over the TFL landbase are being pursued. Biodiversity planning at landscape and stand levels follows the principles and practices outlined in the *Biodiversity Guidebook.* Biodiversity management on TFL 41 is addressed in the Kalum Forest District's draft Landscape Unit report (November, 1998). Strategies will become formalized when the Kalum LRMP is approved (scheduled for late 1999). Landscape unit objectives are expected to become established and declared binding as higher level plans within the next three years (2002).

Landscape Level Biodiversity

To facilitate landscape-level biodiversity planning, 14 landscape units covering all or part of TFL 41 have been established by the district manager. Biodiversity emphasis options (BEO) have been assigned to each (refer to table 14). Tentative biodiversity objectives have been drafted for each landscape unit. These address maintaining forests with a variety of seral stages, patch sizes, forest stand attributes and structures across a variety of ecosystems and landscapes. These draft landscape-level biodiversity objectives and strategies are based on the occurrence of natural disturbance type (NDTs) in each landscape unit. NDTs occurring on TFL 41 are NDT 1 (MHmm, MHwb, CWHvh, CWHvm); NDT 2 (CWHws, ESSFmk) and NDT 5 (AT).

The objectives and strategies for each landscape unit cover:

- Retain representative old-growth areas with target percentages dependent on NDT.
- Designate old-growth management areas large enough to provide forest interior conditions.
- Locate old-growth management areas in non-contributory riparian reserve zones and include contiguous areas of stands that will provide the structural attributes of old seral forests in the future.
- Provide variable patch size and distribution over the landscape unit.
- Locate and designate wildlife tree patches to provide a range of sizes from individual trees to larger patches, with distances between patches not to exceed 500 metres.

The draft Kalum Landscape Unit report covers both priority biodiversity and full biodiversity planning. It is expected that the draft landscape unit objectives will go through a round of testing before a final iteration is recommended for legal establishment. West Fraser will participate with the MoF and MELP in a review of the strategy so that it is consistent with the *Landscape Unit Planning Guide* (March 1999). The draft landscape unit objectives for the 14 landscape units covering the TFL are scheduled to be established over the next three years. West Fraser will prepare recommendations for revisions to these objectives as appropriate.

Stand Level Biodiversity

At a stand level, practices focus on preserving important structural attributes. In particular, this includes retention of wildlife trees as patches or as single trees and recruitment of coarse woody debris. Silvicultural systems are selected in part to provide future structural diversity in regenerated stands. Snags, veteran trees, culls, deciduous trees and shrubs all provide valuable wildlife habitat for cavity nesting birds, small mammals and raptors while contributing to vertical diversity.

Wildlife Tree Patches (WTP)

- Incorporate WTP into block design with size and location dependent on site-specific features.
- Maintain a maximum inter-patch distance of 500 m.

Coarse Woody Debris

- Leave non-merchantable logs of all sizes on site, to provide a host substrate for a variety of organisms and small mammals, and to contribute to nutrient recycling.
- Scatter roadside debris and slash on an opening instead of burning unless the amount and distribution will impede silviculture activities.

- Specific coarse woody debris recruitment measures may be described in silvicultural prescriptions.

Riparian Management Areas

Special attention is given to identifying and managing riparian habitats because of their important ecological value and contribution to biodiversity. They can contribute to meeting objectives for old-growth retention, seral state representation and habitat connectivity.

Where appropriate, strategies to maintain critical habitat features and contributions to post-harvest biodiversity include:

- Establishment of wind-firm boundaries for riparian reserve zones (RRZ).
- Management of riparian management zones (RMZ) with the intent of maintaining wind-firmness of the RRZ.
- Establishment of machine-free buffers adjacent to streams except at designated crossings.
- Fall and yard away from streams, steep gullies or ravines.
- Retention of coarse woody debris in stream channels.

6.5 WATER

Water production is a significant value produced by onshore drainages of TFL 41. The Kitimat community relies on water from the Kitimat River catchment for both domestic and industrial use. The domestic water supply intakes are located outside the TFL boundary as are the main industrial water intakes that are near the mouth of the Kitimat River.

The headwaters of the Kitimat River are within the boundaries of TFL 41 and are an integral part of the Kitimat River catchment. West Fraser recognizes that development activities within the upper Kitimat Valley could potentially have an impact on downstream water quality. However, the likelihood that operations might adversely affect water quality downstream are considered to be low as domestic water supply is pumped from deep wells in the Kitimat River.

Strategies to ensure that this probability remains low for all streams and rivers where operations are taking place:

- Following Code requirements concerning water supply.
- Applying RMZs and buffers to all applicable streams.
- Designing, locating and constructing roads to minimize siltation and associated impacts.
- Carrying out watershed restoration and rehabilitation of roads no longer required.

No operations are planned in the Wathl Creek community watershed during the next five years. A watershed assessment of the Wathl Creek drainage would be undertaken prior to any proposed development.

6.6 FISH HABITAT

Many of the rivers and streams within the licence area provide important habitat for rearing salmon, steelhead and resident trout. The Kitimat and Kemano Rivers are the most significant fish-producing rivers within the licence. Escapement records for the 10 year period ending in 1997 show an estimated return of 7.1 million salmon. Five major rivers are also regionally important producers of eulachon, which are fished by the Haisla Nation.

The DFO and MELP are the two government agencies mandated to manage fisheries resources and to ensure that the productive capacity of fish bearing waters is maintained. The company will continue to co-operate with these agencies in achieving their habitat management objectives.

Fish stream protection continues to be an integral component of habitat management on TFL 41. Stream inventory classification by Coastal Fisheries/Forestry system completed in the 1980s is being converted to the Code riparian classification system using additional data collected by a stream assessment program that began in 1997. It is expected that by the end of 1999 all streams in drainages where development is planned over the next 10 years will have been inventoried and classified.

All streams on the TFL are assumed to be fish bearing unless proved otherwise from detailed stream assessments or they have very steep gradients. Strategies for the protection of fish habitat are followed in both operational planning and in operations. These include:

Planning

- Complete stream assessment and fish inventories for remaining streams with funding from Forest Renewal BC.
- Refine and complete stream classification of all streams within the five-year development plan area.
- Apply riparian reserve zone buffers to all S1 - S3 streams as per the Code and adopt recommended appropriate practices for S4 - S6 streams where feasible.
- Refer operational plans to DFO/MELP and undertake joint field inspections.
- Co-operate with the Haisla Nation in their eulachon fishery program.
- Maintain a high standard in design and layout operations adjacent to fish streams.

Operations

- Ensure that operational plans for fish streams and riparian management are implemented by company personnel and contractors.
- Implement site specific measures to maintain integrity and stability of streambanks.
- Adhere to fish stream work windows as authorized by DFO/MELP.
- Carry out stream cleaning and restoration works under Forest Renewal BC WRP funding where necessary or required in drainages that were logged pre-Code (July 1995).

Eulachon

One species of anadromous fish which attracts special attention is the eulachon (Thaleichthys pacificus). This fish deserves attention because of the species' limited distribution and its significance to the culture of some first nations. To date there appears to be no evidence that resource development is having significant impacts on eulachon. The strategies employed to maintain fish habitat apply equally to eulachon-bearing streams. This fish is found in five of the major rivers within the boundary of TFL 41. They are the Kitimat, Kildala, Kemano, Wahoo and Kowesas Rivers. The fish also utilize the Kitlope River adjoining the southern boundary of the TFL. This is significant as there are only 17 rivers in both Alaska and British Columbia where eulachon are known to occur. Eulachon have been, and still are, an important traditional food source for native people and especially for the Haisla Nation, since about a third of the spawning runs occur in the band's traditional use area.

The current state of knowledge relating to the management of eulachon is limited. Some information has been gathered concerning eulachon in the Kitimat, Kemano, Kitlope and Nass Rivers but generally the data relates only to spawning period, larval emigration, spawning locations and habitat.

6.7 WILDLIFE

The licence area supports abundant wildlife populations of mammals, birds and amphibians who utilize a whole range of marine, shoreline, forested and alpine habitats. The more notable species include grizzly bear, black bear, mountain goat, and bald eagle. The habitat requirements of these species have been the main focus of forest management planning and practices. Moose, black-tailed deer and mule deer occur in low numbers. Habitat protection of these particular species is provided largely through the habitat management activities for the key species mentioned.

The goal is to sustain wildlife populations by maintaining a diversity of habitats and ecosystems across the TFL landbase. The management approach is based on the premise that by maintaining suitable habitat, viable wildlife populations will be maintained, providing hunting and other pressures are regulated.

Prior to the introduction of the Code, habitat protection focussed on practices and mitigation measures applied at a stand level. To move forward with the goal of conserving biodiversity as provided in the Code, more specific habitat management strategies and practices will be determined for TFL 41 during the planning period. This direction will come from a number of planning initiatives that are in progress or have been announced by MELP/MoF. These include:

- Kalum LRMP.
- Kalum Landscape Unit plan.
- Identified Wildlife Management Strategy.

Wildlife habitat is being protected and maintained in a general sense through the implementation of measures and practices recommended in various guidebooks such as *Biodiversity, Riparian Management,* and *Fish Stream Identification.* Guidance for grizzly bear habitat management at a provincial level is outlined in the *BC Grizzly Bear Conservation Strategy.*

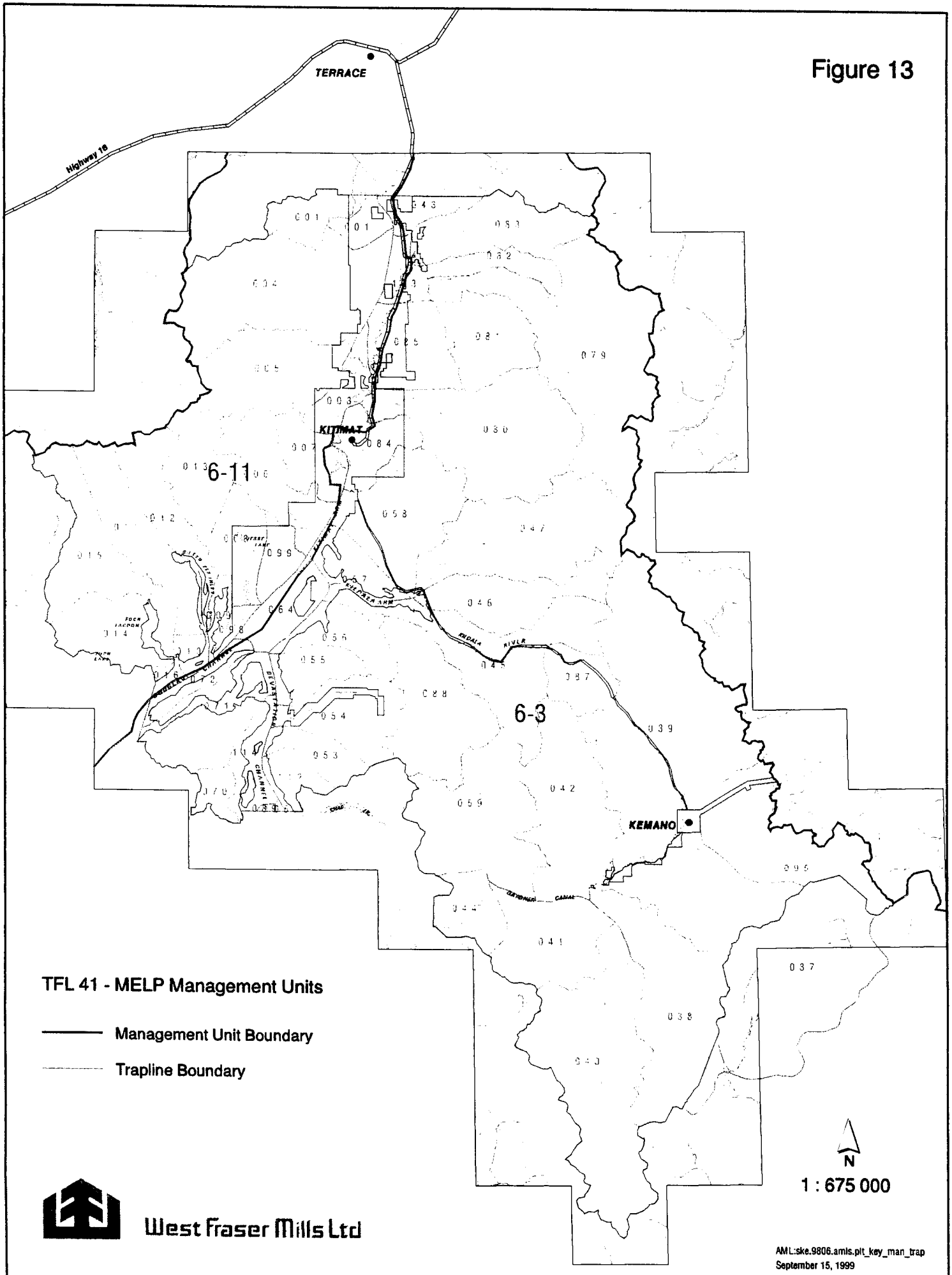
West Fraser will be co-operating with MELP in a number of habitat planning measures that this agency has initiated during the planning period. Their studies are focussing on:

- Refining the habitat capability mapping for grizzly bears.
- Identifying and mapping mountain goat winter range.
- Identifying and mapping other ungulate winter range (moose/deer).

Identified Wildlife

At this time MELP has not identified any regionally significant habitats on TFL 41. The BC Conservation Data Centre rare animal list for the Kalum Forest District lists 12 species (Appendix II). Of these, eight species are designated identified wildlife (table 28). Their presence or abundance on TFL 41 has not been quantified. More inventory information is required on these identified wildlife species so that candidate wildlife habitat areas (WHAs) can be determined.

Figure 13



TFL 41 - MELP Management Units

Management Unit Boundary

Trapline Boundary

N

1 : 675 000

West Fraser Mills Ltd

AML:ske.9806.amls.plt_key_man_trap
September 15, 1999

Table 28: Identified Wildlife

Common Name	KIR*	NAB*	NAR*	APM*
Fish				
Bull trout	x	x	x	
Amphibians				
Tailed frog	x	x	x	x
Birds				
Trumpeter swan	x	x	x	
Northern goshawk ssp. *atricapillus*	x	x	x	x
Marbled murrelet	x	x	x	x
Mammals				
Fisher	x	x	x	x
Grizzly bear	x	x	x	x
Mountain goat	x	x	x	x

* **Ecosection:** **KIR - Kitimat Ranges**
NAB - Nass Basin
NAR - Nass Ranges
APM - Alaska Panhandle Mountain

Stand Level Habitat

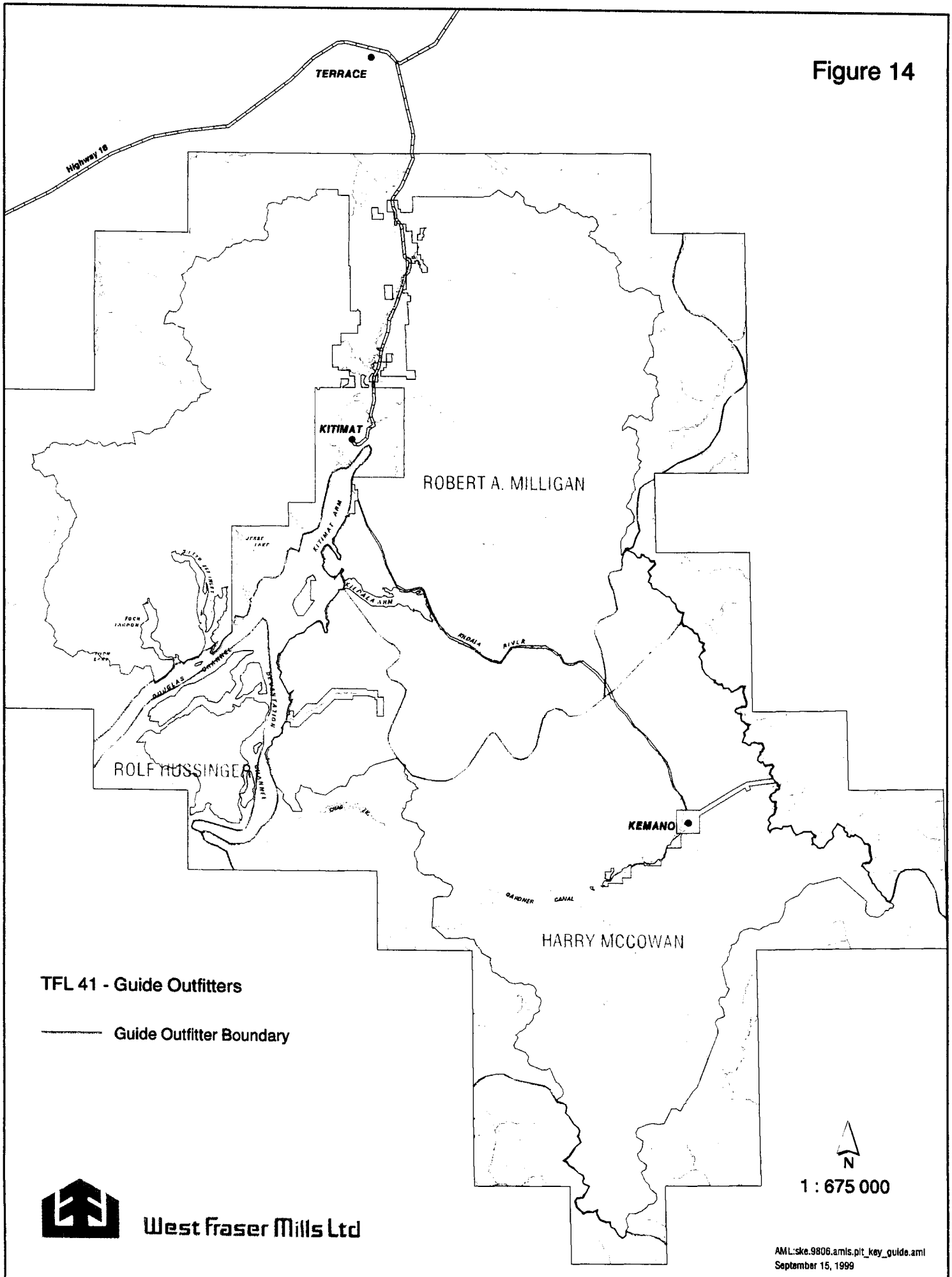
Design of blocks, leave areas and wildlife tree patches will take into account the identification of any wildlife habitat features noted during the gathering of field data for silviculture prescriptions

Traplines

The activity level of trapline holders is believed to be moderately low, as shown by the wild fur harvest statistics in MU 3 in Appendix II. The main species trapped are marten, lynx, beaver, mink and otter.

West Fraser relies on the MoF and MELP to provide specific information and notices of forestry activities to trapline holders. This is because MELP no longer provides updated address listings of trappers to licensees or the public. Trapline holders can still make inquiries to West Fraser concerning activities within their trapping unit. West Fraser will continue to make public advertisements of proposed development activities.

Figure 14



TFL 41 - Guide Outfitters

——— Guide Outfitter Boundary

N

1 : 675 000

West Fraser Mills Ltd

AML:ske.9806.amls.plt_key_guide.aml
September 15, 1999

West Fraser respects the rights of trapline holders and carries out several measures to ensure that they are protected:

- Liaison and consultation, particularly concerning planned developments within their interest areas.
- Endeavour to minimize impacts on the furbearing population.
- Monitor furbearing harvest through analysis of statistics provided by MELP.

The boundaries of the 52 traplines are illustrated in figure 13 and the three guide outfitter areas are depicted in figure 14.

6.8 CULTURAL RESOURCES

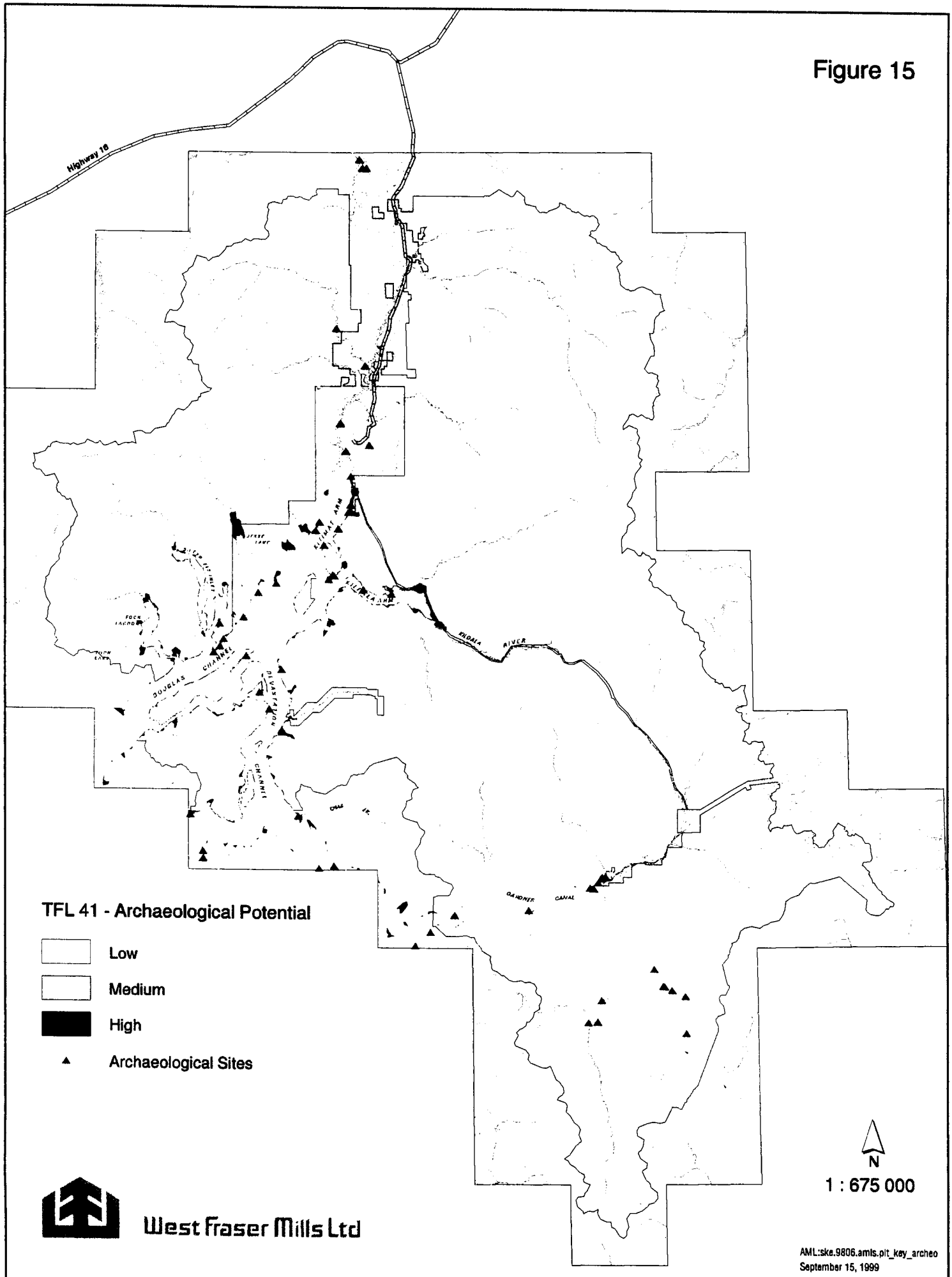
Use and occupation by aboriginal people has been documented through the identification of numerous archaeological sites, petroglyphs, and culturally modified trees along the shoreline. These have been recorded in the archaeological overview and traditional use study completed in 1998 with considerable input from the Haisla Nation from Kitamaat Village. The approximate locations are illustrated in figure 15.

There is little evidence of colonial European activity in the Kitimat area as there were no attempts to establish major settlements in the Douglas Channel area. European activity mainly concerned mineral exploration and trading with aboriginal people.

Strategies to conserve and protect archaeological sites include:

- Known sites will be protected in operational plans.
- Operations staff are trained to recognize and report previously unidentified sites.
- Newly discovered sites will be reported to the Haisla Nation and to the Archaeology Branch as required by regulation.
- Conduct archaeological impact assessments where there are indications of significant aboriginal activity or archaeological sites.
- Referral of forest development plans to first nations bands by the MoF with a request that cultural or sustenance sites be identified.
- Consult aboriginal bands concerning protection and identification of archaeological sites.

Figure 15



TFL 41 - Archaeological Potential

- Low
- Medium
- High
- ▲ Archaeological Sites

N

1 : 675 000

West Fraser Mills Ltd

AML:ske.9806.amls.plt_key_archeo
September 15, 1999

7.0 PUBLIC CONSULTATION

The company will continue to be available for discussions with the public concerning forest management activities on TFL 41. This program has two objectives:

- To ensure that local people, including first nations, stakeholders, organizations and interest groups have meaningful opportunities to comment and provide input on strategic and operational level plans.
- To provide public education opportunities to promote an understanding of logging, reforestation and other land use activities.

An list is kept of fist nations bands, interest groups, organizations and individuals who want to be informed about the TFL management program.

Strategies and activities that company personnel are involved include:

- Maintain active participation in community forums, the Kalum LRMP process and other processes.
- Annual public viewing of the five-year development plan.
- Maintaining information signs on regenerated areas.
- Providing professional foresters to speak to school classes on forestry programs and activities during the annual National Forestry Week.
- Providing information and articles to local media on forestry activities, special projects and items of interest.
- Maintain an updated brochure on recreation sites.

7.1 LICENCED RESOURCE USERS

The company tries to maintain a listing of other licensed resource users that have tenure rights within the TFL area. This includes trapline holders, guide outfitters, water licensee and mineral claims.

These tenure holders are provided an opportunity to review the updated five-year development plan each year. Referrals to them, first nations and to other organizations is handled by the MoF. Written comments are returned to the district office and subsequently passed on to the company.

7.2 FIRST NATIONS

There are two bands that have a direct interest in the operation of TFL 41:

- Haisla Nation at Kitamaat Village.
- Tsimshian Kitsumkalum Nation near Terrace.

These bands are invited to comment on the annual update of the five-year development plan, through the referral process handled by the MoF. The company maintains an on-going dialogue with both bands and meets with them to discuss specific items that arise. For example, issues that have been discussed are:

- Wathl Creek water supply.
- Eulachon fishery.
- Traditional use study protocol agreement.
- Employment opportunities through various funding sources.
- Employment opportunities in company silviculture and harvesting projects.

7.3 REVIEW STRATEGY

Management Plan 6

Preparation of MP 6 included public consultation under the guidance of a review strategy approved by the MoF regional manager (attached in Appendix III). The public was provided an opportunity to comment on the implementation of MP 5, review the draft SMOOP and the draft MP 6 before approval. Responses received were minimal. A report on the consultation process completed for this plan is in Appendix VIII.

Management Plan 7

The next management plan, MP 7, needs to be prepared and approved by 2004. Preparation would begin in 2002. It is West Fraser's intention to use an updated version of the same review strategy and public consultation process used for MP 6 when MP 7 is being prepared.

8.0 EMPLOYMENT AND ECONOMIC OPPORTUNITIES

West Fraser's objective is to maintain a viable forest harvesting and forest products manufacturing business in northwestern BC. These activities are centred around Kitimat, Prince Rupert and Terrace. The operations are major contributors to and have been an integral part of the regional economy in the northwest for over 30 years.

The flow of logs and fibre from TFL 41 is an essential source of fibre supply for the company's processing plants. The goal of maintaining stable operations in all three manufacturing plants contributes to stable economies in all three communities.

The average annual direct employment levels are as follows:

Table 29: Direct Employment Levels

	Staff	Hourly	Contractor
Manufacturing			
North Coast Timber sawmill	5	33	15
Skeena sawmill	12	135	16
Eurocan pulpmill	140	471	50
Forestry			
Logging/woods	14	3	390
Silviculture	2	-	10

The work force is primarily drawn from the three communities and outlying first nations villages.

Strategies to maintain employment levels include:

- Preferential hiring for local residents with the pre-requisite skills when vacancies arise through turnover or retirements.
- Use local contractors wherever possible for road construction, contract logging and forestry work.
- Expand silviculture program activities with funding commitments made by Forest Renewal BC.
- Encourage forest worker skills training programs.
- Encourage and support local engineering and forestry consulting firms to provide the required expertise.

First Nations

There are no specific initiatives to employ first nations people but all are given equal opportunity based on skills and experience. The company is open to discussing employment with the bands. However, this should not detract from the economic viability of West Fraser's operations or displace contractors with whom the company has commitments. Forest Renewal BC encourages partnerships with first nations and generally they are given direct awards for project work. The Haisla Nation was awarded a project for watershed restoration work in the Kitimat Valley including TFL 41. They have also been awarded spacing and pruning projects.

9.0 SPECIAL PROJECTS

West Fraser is currently involved or undertaking several projects that will extend into the MP 6 planning period. Other studies could become necessary during the next five years. Such studies are usually incremental to the contractual obligations in the tree farm licence agreement.

Kalum Land & Resource Management Plan

This public process began in 1996 and may be completed by late 1999.

Kalum Forest District Landscape Unit Plans

The MoF and MELP have begun preparing the first iteration of landscape unit plans. Planning direction is to come from the LRMP.

Forest Renewal BC Agreement

West Fraser has a multi-year agreement (1988-2002) with Forest Renewal BC that will provide funding for various land management, silviculture and watershed restoration projects.

Aboriginal Land Claims

West Fraser is monitoring the draft land claim settlement with the Nisga'a Tribal Council. The Haisla Nation has also had their land claim application, that includes most of TFL 41, accepted for negotiation by the Aboriginal Land Claims Commission. Negotiators are working towards developing an agreement-in-principle with sessions scheduled every two months.

Kalum Timber Supply Area TSR II

Monitoring progress and review/input as required.

TFL Boundary Rationalization

Discussions are on-going with the MoF (Kalum District and Region) to rationalize the boundaries common to TFL 41 and the Kalum TSA. The intent is to avoid the isolation of Schedule B land within the Kalum TSA area. Lots would be traded to create contiguous parcels that would then be under one forest management program.

10.0 MONITORING

10.1 IMPLEMENTATION

MP 6 provides guidance for preparing an annual operating plan, the forest development plan, other operational plans and related resource projects. They are the vehicles by which the goals and strategies are delivered. Performance is monitored through the annual report. Quality assurance concerning compliance with the Code is provided through West Fraser's internal forest practices audit program.

10.2 REVISIONS

During the period of MP 6, situations or events may arise that require a change to this management plan. West Fraser may prepare amendments to the plan on its own initiative. Also, as provided for in section 2.34 of the tree farm licence document, the provincial Chief Forester may require amendments or revisions due to circumstances that render a management plan inadequate. This may include situations where there is:

- Damage to the timber from natural forces.
- Approval and/or replacement of a land and resource management plan.
- Serious or unforeseen damage to the natural environment.
- A change in AAC or other special circumstances.

10.3 ANNUAL REPORT

An annual report is prepared detailing the accomplishments for the calendar year. It describes harvesting, road construction, forestry and silviculture, resource assessments, protection, recreation. It also provides details of activities completed by the SBFEP in TFL 41.

Copies of the annual report are distributed to the provincial chief forester, regional manager, and Kalum Forest District Manager.

REFERENCES

The following is a list of the references used in preparing Management Plan 6.

Ministry of Forests

A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region. Land Management Handbook Number 26, parts 1 and 2. 1993.

Economic Development Opportunities/Barriers: Forest-related Resources in the Kalum LRMP Study Area - draft report. Crane Management Consultants Ltd., Greg Meredith & Associates. 1998.

Kalum Forest District Landscape Units. Nov 1998.

Kalum Forest District Recreation Management Strategy. DLC Leavers Consulting Inc. 1998.

Kalum South Socio-Economic Analysis. G.E. Bridges & Associates Inc., 1994

Kalum TSA Timber Supply Review Data Package. 1998.

Overview Mapping of Archaeological Resource Potential in the Kalum South Timber Supply Area. Millennia Research, Terrace, BC. 1994.

Tree Farm Licence Planning Guidelines. 1993.

TFL 41 Inventory Audit. MoF Resources Inventory Branch. 1998.

Ministry of Environment, Lands and Parks

BC Ministry of Environment Lands and Parks water licences. 1999.

British Columbia Grizzly Bear Conservation Strategy. 1995.

Database of Hunter Harvest and Effort (1976-1998). Wildlife Branch summary statistics.

Database of Wild Fur Harvest for Management Units 6-03 and 6-11, 1976-1997. Wildlife Branch Summary Statistics

Regional Wildlife Management Plan for Skeena Region (draft). 1988.

Hunting and Trapping Regulations Synopsis. 1998-1999

List of Guide Outfitters in British Columbia for MU 6-03, 6-10, 6-11. 1997.

Ministry of Energy and Mines

MinFile Database for selected NTS mapsheets. 1999.

Federal Department of Fisheries and Oceans

Database of Escapement within the Kitimat Arm and Gardner Channel areas. Pacific Biological Station. 1999.

Kitimat Hatchery Brochure. 1999.

Summary of Steelhead Catch for the Kitimat River. Kitimat Hatchery. 1999.

Other Agencies Information

Archive of mining activities within the Kitimat Valley region. Kitimat Centennial Museum. 1999.

British Columbia - A Natural History. Richard Cannings and Sydney Cannings. 1996.

District of Kitimat - Kitimat Facts. The Corporation of the District of Kitimat. 1998.

Haisla Nation population statistics - Village of Kitamaat. 1998.

West Fraser Documents and Reports

Statement of Management Objectives, Options and Procedures for Management Plan 6, TFL 41. 1997.

Review Strategy for Management Plan 6. 1996.

Report on the Re-inventory of TFL 41 1996-1998. Sterling Wood Group Inc. 1999.

Operability Report for TFL 41. 1998.

Timber Supply Analysis report for Management Plan 6. Sterling Wood Group Inc. 1999.

Twenty-Year development plan for Management Plan 6. Skeena Sawmills. 1999.

TFL 41 Forest Recreation Analysis Report. DLC Leavers Consulting Inc. 1997.

Archaeological Overview and Traditional Use Study within TFL 41/Haisla First Nations Territories. The Bastion Group Heritage Consultants. 1998.

Gully Assessment & Technique Supporting Documentation. Madrone Consultants Ltd. 1996.

1997 Forest Development Plan for TFL 41.

Environmentally Sensitive Areas Survey of the Southern Half of TFL 41. Madrone Consultants Ltd. 1988.

Fertilization Screening Trial for West Fraser. Cypress Forest Consultants Ltd. 1997.

1997 Annual Report - TFL 41, Skeena Sawmills Division.

TFL 41 Management Plan 5 (1994 - 1998).