



SKEENA CELLULOSE INC.

**TFL 1
20 YEAR PLAN**

May, 1998

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INTRODUCTION

This 20-year development plan is a component of Management Plan #9 for Tree Farm Licence 1 to be used to support the AAC rationale that will be proposed by Skeena Cellulose Inc. (SCI). The plan provides a linkage between the non-spatial assumptions used in the timber supply analysis and the spatial and temporal operational planning requirements of the Forest Practices Code. It demonstrates that a sufficient volume of timber could be developed to meet the target AAC projected over 20 years under current management practices.

The 20-year plan is not an operational plan. It is a strategic plan intended to illustrate a feasible pattern of development on TFL 1 for a 20-year period. The first five years of the plan, however, have been initialised by the 5-year forest development plan (FDP).

This report sets out the scope of the plan, documents, data and methodology that were used. A separate methodology was used in preparing the Small Business Forest Enterprise Program (SBFEP) portion of the plan due to differences in the availability and content of data. The plan consists of a set of 1:50,000 scale thematic maps, accompanied by tabular summaries. The thematic maps show the location and pattern of cutblock development by quarter for a twenty-year period.

SCOPE

The term of the plan is 1997-2016 and the harvest rate is the present AAC of 720,000 m³. This AAC includes both the SCI and SBFEP apportionments. The SBFEP 20-year volume target also includes an undercut carryover of 101,303 m³ in the first quarter of the plan. The AAC and volume targets is apportioned between SCI and the SBFEP as follows:

Table 1. 20-year Volume Targets (m³).

	AAC	Undercut Carryover	20-Year Target
SCI	690,050	-	13,801,000
SBFEP	29,950	101,303	700,303
TOTAL TFL 1	720,000	101,303	14,501,303

While the present AAC of 720,000 m³ has been used in this plan, it should be noted that the yield analysis for management plan 9 is still in progress. The new AAC will be determined by the provincial Chief Forester before year-end. At this point it is not known what the proposed AAC level will be. The 20-year plan has been linked to the yield analysis as much as possible by using the same netdown and volume localisation procedures.

The plan has been prepared in accordance with the Terms of Reference approved by the District Manager. Operational Planning requirements have been considered in the maximum cutblock size and green-up delay.

The plan has been prepared as an office exercise. The first five years have been initialised by the 1997 FDP. Beyond that no field verification of cutblocks of roads has been done. Roads and cutblocks were mapped using maps and aerial photos as a guide.

DATA

ROADS

The existing and future roads in the 1997 FDP are the basis for the roads in the 20-year plan. Roads to areas not covered by the FDP were mapped using topographic and forest cover maps and from aerial photos.

CUTBLOCKS

In 1992 a Total Chance Plan (TCP) was prepared for each RPU. The TCP cutblocks have been used in this plan. The TCP cutblocks were located on maps based on topography, access, timber typing and past harvesting. Cutblocks were located across the entire physically accessible areas with one block abutting another. Thus cutblocks cover all land cover types including non-forest, non-productive forest and non-merchantable types.

FOREST COVER

The TFL forest inventory maps at 1:20,000 scale were used in the 20-year plan. These maps are updated to 1996 and projected to 1998. The inventory database is identical to that used in the yield analysis.

OPERABILITY

TFL 1 is stratified into four broad operability classes. The classes delineate the operable timber by logging system. The operability definition was created about 10 years ago and is somewhat outdated.

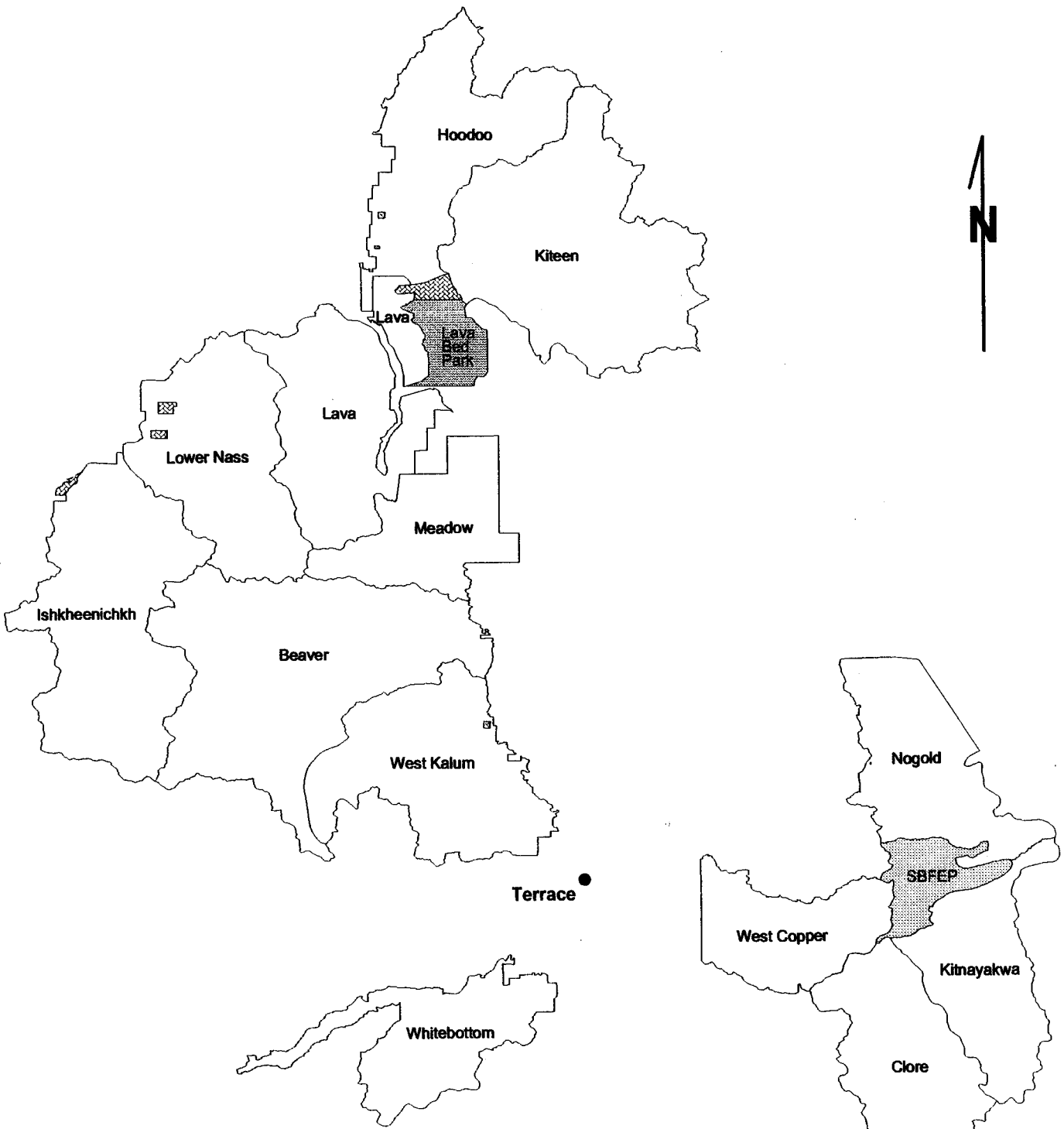
Table 2. Operability Classes

Class	Description
C	Conventional ground and high lead logging systems
L	Non-conventional long line and helicopter
V	Low volume, non-merchantable forest types
X	Inoperable timber




The low volume (V) and inoperable types (X) were excluded with the exception of a few cutblocks or portions of cutblocks. The main exceptions are cutblocks in the first quarter as they were field verified for the FDP. Beyond the FDP any TCP blocks that form a logical operational boundary were also included. These areas are subject to all other netdowns. The net area of V and X classes included in the 20-year plan is reported in the tabular summaries.

RESOURCE PLANNING UNITS

TFL 1 is partitioned into thirteen geographic Resource Planning Units (RPU) plus the SBFEP operating area. These are shown in figure 1. Timber availability is reported by these units plus the SBFEP operating area.



TFL 1 - Resource Planning Units
 Scale: 1 : 750,000

-  SBFEP (Small Business Forest Enterprise Program)
-  Lava Bed Park
-  Non TFL Lands

MANAGEMENT EMPHASIS ZONES

Each block in the plan was assigned to one of five preliminary terrestrial zones:

Table 3. Management Emphasis Zones

MEZ	Code	Description
Enhanced Forestry	E	<p>Areas suitable for enhanced or intensive forestry operations which include the following:</p> <ul style="list-style-type: none"> • sites of medium to high productivity ($SI_{50} \geq 21$) • sites that favour economic road building, harvesting and intensive silviculture practices
General Resource Management	G	<p>Area where integration of a wide array of resource values is the greatest, which can include one or more of the following:</p> <ul style="list-style-type: none"> • areas where no single resource or value has been identified as having such significant values(s) to warrant a separate management strategy • areas that would meet part of the Enhanced Forestry Zone criteria but have greater potential for integration with other resources and/or values
Riparian	R	<p>Areas adjacent to streams, wetlands and lakes which can include one or more of the following:</p> <ul style="list-style-type: none"> • areas dominated by continuous high moisture content • adjacent upland areas
Visual	V	<p>Scenic areas (visually sensitive areas or scenic landscapes). Examples include, but are not limited to, areas visible from Highway # 16 and 37 and the Nisga'a Memorial Lava Bed Park</p>
Wildlife	W	<p>Areas potentially containing important and critical wildlife habitat. Species of focus include moose, mountain goat, grizzly bear, marten, bald eagle and beaver. These areas can include one or more of the following:</p> <ul style="list-style-type: none"> • areas identified as having critical habitat potential • areas of known significance, identified from local knowledge and documented sightings • areas in relatively low conflict with other resources and/or values

The planned harvest is reported by MEZ and an extended green-up delay was used for the Visual Landscape MEZ.

OTHER RESOURCE INFORMATION

Paper prints of TRIM 1:20,000 scale topographics maps were used in reviewing the operability and access to:

- Determine which blocks in the V and X operability classes should be retained.
- Design additional roads.
- Design additional blocks for the SBFEP operating area.

Part of the Beaver RPU was proposed as a protected area in April 1996. No cutblocks in this area are included in the 20-year plan.

SBFEP OPERATING AREA

The SBFEP has been allocated an operating area to the south of the Nogold RPU. The Kalum Forest District supplied a 5-year FDP and a preliminary 20-year development plan. The FDP map shows an operability line that was used for this plan. SCI forest cover and topographic maps have been used.

METHOD

An overview of the process for preparing the 20-year plan is as follows:

- The 1992 TCP cutblocks were overlain with the forest cover maps, operability, resource plan units and management emphasis zones using a GIS.
- Area netdowns were applied to the resultant database.
- A localized net volume per hectare was calculated.
- The 1992 cutblocks were updated to meet a maximum net area limit.
- Working maps showing the TCP cutblocks boundaries and prior logging coded by year of logging were prepared.
- Cutblocks were scheduled to meet the volume targets by quarter after considering green-up of adjacent blocks.
- Area and volumes summaries were prepared from the database.
- The cutblocks were linked to the resultant harvest plan in a GIS and theme maps prepared.

Only mature stands are scheduled for harvest. Stands that might be available for commercial thinning have not been considered in this plan nor have second growth stands that could be harvested on a shortened rotation.

AREA NETDOWNS

The TCP blocks cover all land cover types and forest stand ages. The net operable landbase was calculated using the same assumptions that will be used in the yield analysis. Area netdowns were made for factors such as merchantability, operability, riparian zones, and wildlife tree patches.

Unlike the TCP blocks covering most of the RPU's, the SBFEP blocks were not continuous. The proposed block boundaries have been located so as to avoid non-merchantable timber and riparian management zones. The only netdown required within the SBFEP blocks was for wildlife tree patches.

VOLUME PER HECTARE

The MoF inventory audit plots (1997) for TFL 1 were used to derive a localisation factor for VDYP volumes obtained from the inventory polygon attributes. This factor has been applied to the volumes for stands 60 years and above. For the complete timber

harvesting landbase this procedure produced an average volume net of decay, waste and breakage; of 456 m³/ha for stands older than 140 years. This volume was rounded down to 450 m³/ha for use in the 20-year plan.

CUTBLOCK UPDATE

The maximum cutblock area for the 20-year plan is 60 ha. Any TCP cutblock over 60 ha area was reduced in size. This was done as a GIS update to the block boundaries and the results used to adjust the cutblock areas in the resultant database.

SBFEP CUTBLOCKS

Additional cutblocks were designed for the SBFEP operating area using forest cover maps, topographic maps and aerial photos. As with the cutblocks supplied by the MoF, the boundaries were located to include only available merchantable timber. Some of these new cutblocks were outside of the MoF operability line. The MoF operability appears to include only areas suitable for conventional logging systems. The additional cutblocks outside the MoF operability line included in this plan could be logged by helicopter.

HARVEST SCHEDULING

Cutblocks were assigned into a schedule for harvesting by four quarterly periods. The green-up time in table 4 was the main factor considered in scheduling individual blocks. Reserves of at least 300 m were left between cutblocks for the green-up period. Adjacent cutblocks were scheduled in the same quarter if the combined net area was less than 60 ha.

The first quarter was initialised from the 1997 FDP. The remaining cutblocks were allocated approximately evenly to the remaining three five year periods. Whenever the minimum green-up period allowed, blocks adjacent to those allocated to the first quarter were scheduled for harvest in the fourth quarter. Several iterations were necessary to balance the volume by quarter and this required re-allocating some blocks from the first to the second quarter.

GREEN-UP

As illustrated in table 4, the minimum green-up height was three (3) metres except for the visual MEZ where a five (5) metre green-up was used. The number of years to green-up from year of logging as calculated from the silvicultural survey data ranges from 12 to 22 years depending on elevation and green-up height.

Table 4. Years to Green-up.

Elevation (asl)	3 m green-up	5 m green-up
< 900 m	12 years	16 years
> 900 m	16 years	22 years

RESULTS

The 20-year plan confirms that there is a feasible pattern of harvesting and road development possible over then next 20 years at the present AAC of 720,000 m³. The plan is approximately balanced by quarter (table 5).

Table 5. Volume Targets and Plan m³.

		1	2	3	4	20-YEAR
		1997-2001	2002-2006	2007-2011	2012-2016	TOTAL
SCI	Target	3,450,250	3,450,250	3,450,250	3,450,250	13,801,000
	Plan	3,548,615	3,287,044	3,451,784	3,580,773	13,868,215
	% target	103%	95%	100%	104%	100%
SBFEP	Target	251,053	149,750	149,750	149,750	700,303
	Plan	280,979	170,034	200,459	176,033	827,505
	% target	112%	114%	134%	118%	118%
TOTAL TFL 1	Target	3,701,303	3,600,000	3,600,000	3,600,000	14,501,303
	Plan	3,829,594	3,457,078	3,652,243	3,756,806	14,695,720
	% target	103%	96%	101%	104%	101%

Table 6 sets out the distribution of the planned harvest by RPU and shows the average percent area netdown to be 27%. The areas that are netted out will provide additional reserves between cutblocks and patches of timber within blocks.

The relative low percent netdown for the SBFEP unit of 8% is due to the more detailed block design done for this area. Most area reductions, including those for non-forest types, non-merchantable forest types and riparian zones, do not have to be made as the block location has already considered these factors. The only netdown required is for wildlife tree patches.

Table 6. Area and Volume by RPU

RPU	Block Gross Area (ha)	Block Net Area (ha)	Percent Netdown	20-Year Harvest (m3)
Beaver	1,903	1,362	28%	612,688
Clore	3,372	2,632	22%	1,184,387
Hoodoo	5,379	4,241	21%	1,908,260
Ishkheenickh	3,424	2,588	24%	1,164,716
Kiteen	4,659	2,545	45%	1,145,198
Kitnayakwa	3,069	2,190	29%	985,425
Lava	4,426	3,236	27%	1,456,098
Lower Nass	3,471	2,446	30%	1,100,824
Meadow	3,068	2,471	19%	1,112,061
Nogold	2,912	2,347	19%	1,056,057
West Kalum	1,992	1,321	34%	594,525
West Copper	2,791	2,128	24%	957,600
Whitebottom	2,051	1,312	36%	590,377
TOTAL SCI	42,517	30,818	28%	13,868,215
SBFEP	1,991	1,839	8%	827,505
TOTAL TFL 1	44,508	32,657	27%	14,695,720

As shown in table 7, about 79% of the planned harvest is in the conventional operability class (C). This percentage is not significantly different between the SCI and the SBFEP operating areas. About 20% of the area is in the non-conventional operability class (L) and would be logged by helicopter and long-line systems. Only 1% of the net area included in the plan is in low volume (V) and inoperable (X). This area were included in the plan only where it would be part of a logical unit for operations.

Table 7. Block Area Summary by Operability (ha)

RPU	Block Gross Area	Block Net Area	Net area (ha) by operability class			
			C	L	V	X
Beaver	1,903	1,362	1,118	235	-	8
Clore	3,372	2,632	1,913	681	-	39
Hoodoo	5,379	4,241	3,998	242	-	-
Ishkheenickh	3,424	2,588	2,197	386	-	6
Kiteen	4,659	2,545	1,642	899	-	4
Kitnayakwa	3,069	2,190	1,901	194	43	52
Lava	4,426	3,236	2,255	922	5	54
Lower Nass	3,471	2,446	1,954	450	-	42
Meadow	3,068	2,471	2,064	365	7	35
Nogold	2,912	2,347	1,837	510	-	0
West Kalum	1,992	1,321	828	481	-	12
West Copper	2,791	2,128	1,687	437	-	4
Whitebottom	2,051	1,312	854	453	1	4
TOTAL SCI	42,517	30,818	24,247	6,255	56	260
SBFEP	1,991	1,839	1,492	347	-	-
TOTAL TFL 1	44,508	32,657	25,739	6,602	56	260

The distribution of areas in the 20-year plan across MEZs is set out in table 8.

Table 8. Block Area Summary by MEZ (ha)

RPU	Block	Block	Block net area (ha) by MEZ				
	Gross Area (ha)	Net Area (ha)	E	G	R	V	W
Beaver	1,903	1,362	245	711	37	326	42
Clore	3,372	2,632	1,809	706	30	-	87
Hoodoo	5,379	4,241	2,171	1,251	105	677	35
Ishkheenickh	3,424	2,588	-	2,234	-	-	354
Kiteen	4,659	2,545	346	1,953	-	-	246
Kitnayakwa	3,069	2,190	885	1,127	46	-	131
Lava	4,426	3,236	375	1,019	69	1,630	143
Lower Nass	3,471	2,446	749	1,216	29	88	365
Meadow	3,068	2,471	1,167	718	38	462	88
Nogold	2,912	2,347	1,068	757	72	-	450
West Kalum	1,992	1,321	620	491	45	-	166
West Copper	2,791	2,128	1,362	638	7	-	121
Whitebottom	2,051	1,312	205	462	152	492	-
TOTAL SCI	42,517	30,818	11,004	13,284	629	3,675	2,227
TOTAL SBFEP	1,991	1,839		<i>Not Available</i>			

Table 8. Area (ha) Distribution By RPU and Inventory Age Group

RPU	Block Net Area	TFL 1		TFL 1 productive forest area (ha) by inventory ages groupings						
		Gross Area	Prod. Forest	NC	NSR	0 - 40	41 - 80	81 - 120	121 - 250	251+
Beaver	1,362	80,758	20,432	150	305	4,744	230	599	1,715	12,688
Clore	2,632	42,111	21,298	48	157	2,780	1,416	655	2,454	13,789
Hoodoo	4,241	44,912	33,817	233	572	10,788	307	4,295	6,175	11,446
Ishkheenickh	2,588	62,554	20,475	21	22	1,367	215	735	4,091	14,024
Kiteen	2,545	70,682	25,874	6	273	922	75	327	1,461	22,811
Kinayakwa	2,190	32,949	14,061	-	116	1,426	50	23	3,032	9,414
Lava	3,236	48,708	25,020	9	203	5,253	394	2,220	3,032	13,910
Lower Nass	2,446	45,820	21,303	185	484	5,949	300	827	3,284	10,273
Meadow	2,471	28,930	19,256	25	263	7,113	15	285	653	10,902
Nogold *	4,186	47,194	23,428	5	113	1,010	25	273	1,798	20,205
West Kalum	1,321	47,229	17,352	47	136	8,745	539	146	169	7,570
West Copper	2,128	27,491	17,521	16	130	3,081	246	3,455	546	10,047
Whitebottom	1,312	31,354	12,758	262	289	3,518	1,482	403	211	6,593
TOTAL TFL 1	32,657	610,691	272,597	1,008	3,062	56,696	5,293	14,243	28,622	163,673

* including SBFEP