12.0 TIMBER SUPPLY ANALYSIS

All deciduous and conifer volume estimates and harvest schedules presented in this FMP have been developed using existing provincial resource inventory data. Underlying the current TSA is an inventory of the forest resources to AVI standards. This was completed by SRD based on 2001 photogrametry. Deciduous volumes included aspen and balsam poplar at 15/10 utilization standard.

Net Landbase Determination and Annual Allowable Cut were calculated in cooperation with Mark Townsend, Regional Analyst, Resource Analyst Section, PLFD Peace River based on data provided by GPRC and SRD. Yield curves underpinning the TSA were developed by Greg Greidanus, Resource Analyst, Resource Analyst Section, PLFD Edmonton. The timber supply analysis report for the GPRC forest is located under separate binder entitled, "Forest Management Unit G13: Landbase determination and Timber Supply Analysis", dated January 2005.

Proposed AAC
An AAC (15/10 standard) has been calculated based on Alberta Vegetation Inventory data. The proposed AAC is:

Total coniferous volume:	1,795 m3	
Coniferous		546 m3
Incidental coniferous		1,249 m3
Total deciduous volume :	18,257 m3	
Deciduous		17,806 m3
Incidental deciduous		451 m3

The proposed AAC corresponds to Run 16 of the TSA.

As shown in **Table 12.1**, the revised AAC shows a higher deciduous harvest and a lower coniferous harvest than the interim AAC identified in the PFMP**.** The decline in the coniferous harvest is linked to a smaller active coniferous forest landbase. The increase in deciduous harvest is linked to modified growth and yield curves coupled with relaxation of adjacency requirements in exchange for greater in-block retention.

Table 12.1: FMP AAC versus Interim PFMP AAC

	Primary		Secondary		Total	
	Coniferous	**Deciduous**	**Coniferous**	**Deciduous**	**Coniferous**	**Deciduous**
Proposed FMP AAC (m^3)	546	17,806	1,249	451	1,795	18,257
Interim PFMP AAC (m^3)	1,138	14,958	1,668	140	2,806	15,098
Difference in AAC (m^3)	(592)	2,848	(419)	311	(1,011)	3,159

Source: GPRC and SRD, Forest Management Unit G13 – Landbase Determination, January 2005

FMU Landbase Stratification
The productive land base supporting harvesting accounts for 47 percent of the total training forest area or 11,725 ha. Further details have been presented in section 11.0 Forest Inventory Data.

INVENTORY DATA: The inventory data supporting the AAC calculation is AVI. The source of this data set was Lands and Forest Service.

DELETIONS: Deletions from the Alberta Vegetation Inventory were made following the process identified in **Figure 12.1.** Reductions were made for buffers, access features, unmerchantable and forest land dedicated for non industrial forest purposes.

Buffers: Steep slopes along major water ways (Economy Creek, Smokey River, Simonette River) were identified on aerial photographs and digitized into polygons by the PLFD. Streams were classified based on local knowledge into large permanent and small permanent a and b, and intermittent. Lakes were identified as supporting trumpeter swans or not. Area identified as hydro deletions were then calculated and subtracted from the inventory area by stand. Buffer for lakes were 100 m or 200 m depending on existence of trumpeter swans or not. Buffer for streams below large permanent were either 10 m, 30 m, or 50 m depending on category. Buffer for the large permanent varied with topography.

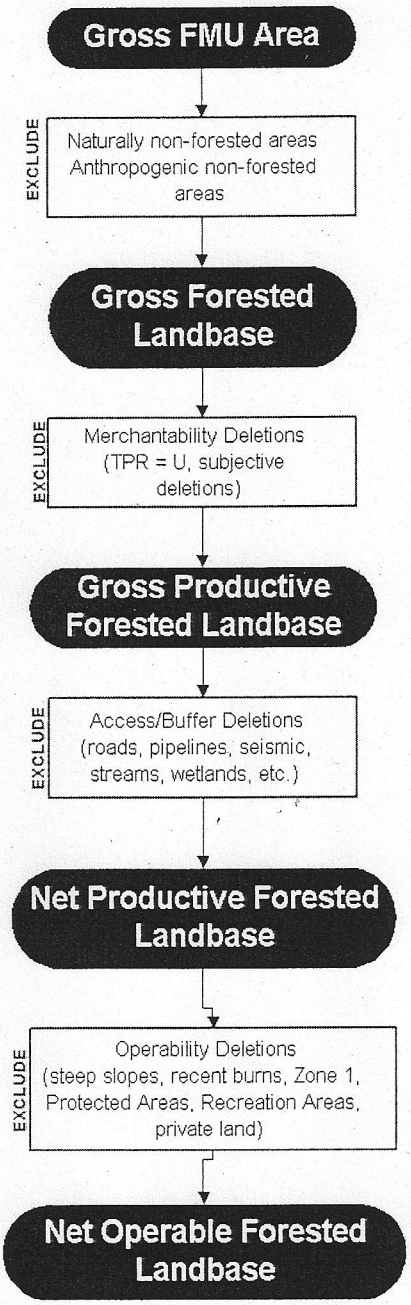
Access features: A variable buffer width was applied to seismic/cut lines, roads and other access features depending on its type. The corresponding areas were deducted from each stand to account for access deletions. Buffer widths were either 4 m, 10 m, or 15 m depending on type of feature with seismic cut lines as 4 m.

Non-forest/unmerchantable stands: Non-productive forested land (coniferous scrub, deciduous scrub, flooded land, and treed muskeg) and Non-productive non-forested (barren soil, clearing, cultivated land, grass, open muskeg, rock barren and sand) were excluded from the productive land base. In addition, all stands with a larch or black spruce leading specie were eliminated from the productive land base.

Growth and Yield Curves
Growth and yield curves were developed in a manner which reflected the goals and objectives. Management intent in the short to medium term is to focus on the deciduous land base as the conifer land base is oriented towards the local community timber program. As most of the coniferous volume is likely to be generated as incidental volume off the deciduous stands, the yield strata were geared towards this purpose.

CANFOR provided data for yield curve development. PSP data from both the central mixed wood and dry mixed wood sub-regions were employed with a guide curve approach used to let data from the dry mixed wood sub region have a stronger influence.

Figure 12.1: Flow chart of deletions to FMU landbase



Data from all stands with a black spruce or larch component and all stands with an "unproductive" AVI TPR were removed. These stands were deleted from the productive land base. Once the subjective deletions were applied to the data, yield strata were developed.

A total of seven yield curves were initially developed. Intermediate curve #6 (that included pine-leading mixed wood data) was dropped for the final analysis. **Table 12.2** shows strata used to develop the yield curve and the net productive land base allocated to each yield strata.

Table 12.2: Net productive landbase by broad forest cover group

Broad Cover Group	Details	Yield Strata	Area (HA)	Percentage of net productive landbase
C and CD	Mixed deciduous AB density	3	48	<1
	Mixed deciduous CD density	4	12	<1
	White spruce based mixed wood	5	144	1
	Conifer, mainly white spruce	7	342	3
	Net productive conifer dominated stands		546	5
D and DC	Pure deciduous AB density	1	3,821	33
	Pure deciduous CD density	2	5,396	46
	Mixed deciduous AB density	3	824	7
	Mixed deciduous CD density	4	746	6
	Yield curve 4 with regen lag	4R	224	2
	White spruce mixed wood	5	168	1
	Net productive deciduous dominated stands		11,179	95
Net productive landbase			11,725	100

Source: GPRC and SRD, Forest Management Unit G13 – Landbase Determination, January 2005

Deductions for decay

The TSA has assumed a 9 percent cull factor for deciduous and a 4 percent cull factor for coniferous. While GPRC does not have any operational data for conifer, seven sample scales were conducted of GPRC deciduous volume harvested in 2002-3 and 2003-4 seasons. Based on the scales, actual cull factor has been significantly higher, amounting to 14 percent of gross volume scaled.

The observed cull factors have varied considerably across species and within species as is evident from **Table 12.3**. Accounting for two-thirds of the scale volume, aspen showed the highest cull factor, more than twice that of poplar. Indeed, it is the significance of aspen in the overall inventory of the harvested volume which pushes the average cull factor into the low teens. GPRC will monitor closely the observed cull factors as harvesting continues in the forest to see if the cull factor employed in the TSA will need to be adjusted.

Table 12.3: Gross and net volumes from the 2002/3 and 2003/4 harvest seasons

Species	**Species distribution (%)**	**Cull factor (%)**	**Gross Vol/ha (m^3/ha)**	**Net Vol/ha (m^3/ha)**
Aspen	66	16	117	98
Black Poplar	33	7	52	49
Birch	1	5	1	1
Total	100	14	170	148

Source: C.A. Backman

Average merchantable volume per hectare

Average volume per hectare over two years of harvest show 170 cubic meters per hectare of gross volume. After making allowances for the cull factor, the average net volume amounts to 148 cubic meters per hectare (Table 12.4). This volume is slightly less than the yield predicted using the area weighted curves for the deciduous land base. Applying the estimated age for the stands (110 years) shows a predicted volume of 160 cubic meters per hectare versus the actual of 148 cubic meters per hectare.

GPRC will monitor closely the observed volume per hectare as harvesting continues in the forest to see if the assumptions underlying the growth and yield curves will need to be adjusted.

13.0 ACTUAL HARVEST TO DATE

Harvest activity is conducted on the training forest under authority of Deciduous Timber Permits granted by the local Grande Prairie PLFD office. To date, GPRC has completed three full harvest seasons (2002-3, 2003-4 and 2004-5) and is starting its fourth. Harvest in 2002-3 and 2003-4 is shown on **Map 13.1**. These harvested stands were selected because of proximity to established road access and age (over mature stands). Stands harvested in 2004-5 were selected in anticipation of the 10 year harvest sequence identified in the TSA.

These harvests have been authorized under DTP G130001, DTP G130002 and DTP G130003. DTPs continue in force until cancelled by the issuing PLFD office. Cancellation occurs once operations have been completed and all clearances have been received and fire hazard has been abated.

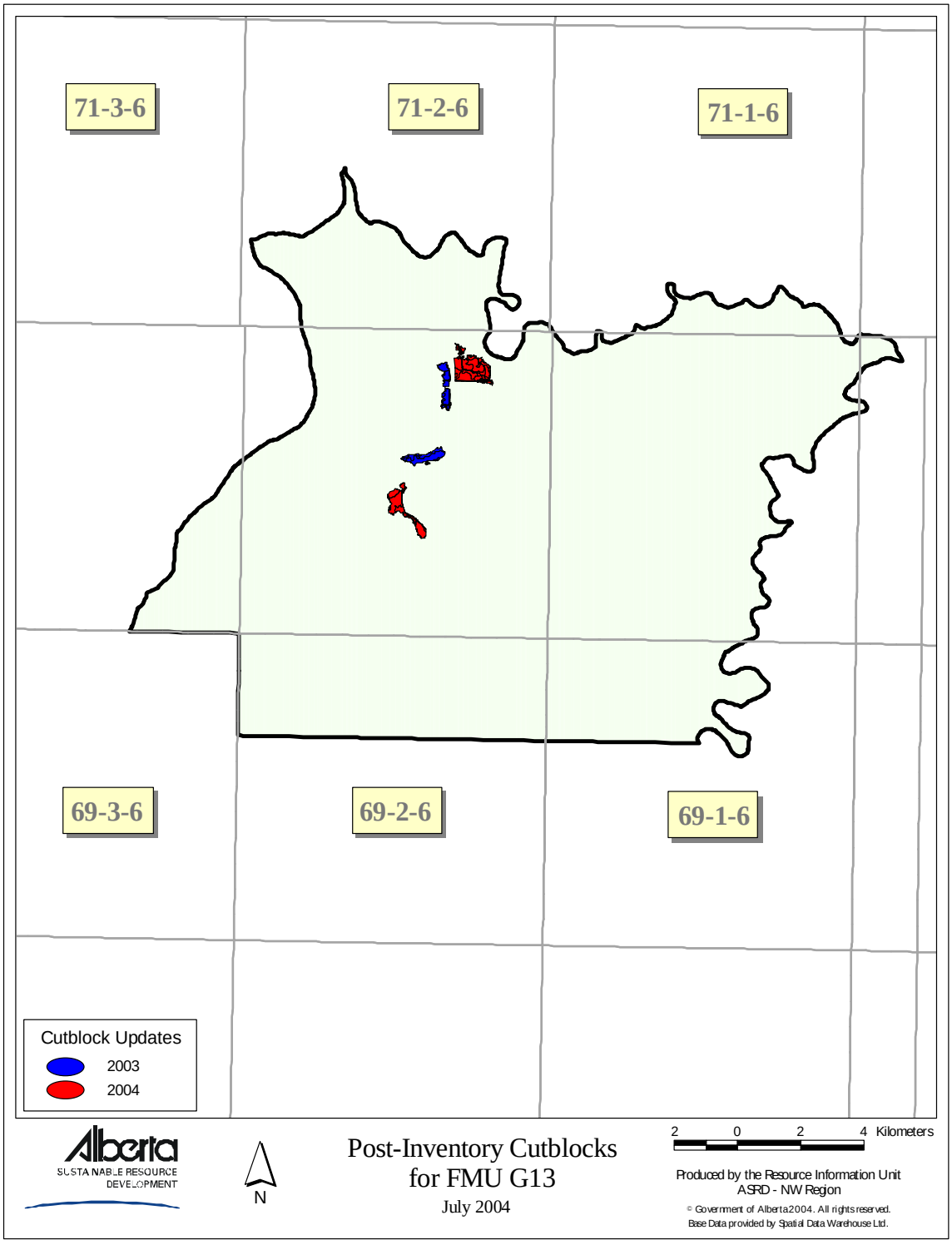
Table 13.1 shows the typical time frame within which the different stages in the harvest process take place assuming an annual disposition of timber.

Table 13.1: Schedule of steps in harvesting process

	Action	Comment	Date
1.	**Approval in principle for block location**	**Taken from 10 year harvest sequence of approved FMP**	**N/A**
2.	**Reconnaissance of proposed block location**	**Usually with students**	**Aug.-Sept.**
3.	**Boundary location/GPS**	**Usually with students**	**Sept.**
4.	**SRD approval in principle of boundary location**	**Has in past included students walking with SRD**	**Sept.**
5.	**AOP preparation**	**Can include students**	**Sept.-Oct.**
6.	**Advertise timber for sale**	**Open for bids for at least 2-3 weeks**	**Oct.**
7.	**Select buyer**	**Usually end of October**	**Oct.**
8.	**AOP submission/approval**	**AOP submission requires location of mill and harvest operator**	**Oct.-Nov.**
9.	**Harvest/haul activities**	**To roadside by Feb. 15 and hauled by Feb. 28**	**Dec.-Feb.**
10.	**Road reclamation**	**Usually takes place immediately following end of hauling**	**Mar.-Apr.**
11.	**Slash abatement**	**Usually responsibility of buyer**	**Dec.-Feb.**
12.	**SRD cancel permit**	**Once piles burned**	**Jan.-Mar.**

Source: Charles Backman

Map 3-1: Post-Inventory Updates for Cutblocks



DTP G130001 and DTP G130002 were one year permits. In the case of DTP G130003, the permit was issued for two years with the volume approved equivalent to two years of the interim deciduous AAC, or 30,000 cubic meters. The two year permit was issued to account for the increased road access required to develop the 10 year operating area on the west side of Economy Creek.

As shown in **Table 13.2**, harvest activity in the first year was quite modest as the College built its capacity to operationalize the harvest. By the second year, harvest volume had increased by some 50 percent to approximately 15,000 cubic meters or nearly 100 percent of the then interim AAC. Harvest volume under DTP G130003 was projected to be 30,000 cubic meters as the College elected to harvest its two year allotment in the first year of the two year permit window. Actual harvested volume exceeded 40,000 cubic meters.

Table 13.2: Harvest volume compared to AOP volume

	2000/1	**2001/2**	**2002/3**	**2003/4**	**2004/5**
	May 1/Apr. 30	**May 1/Apr. 30**	**May 1/Apr. 30**	**May 1/Apr. 30**	**May 1/Apr. 30**
AAC (m^3)	**17,904**	**17,904**	**17,904**	**17,904**	**17,904**
DTP#	**n.a.**	**n.a.**	**G130001**	**G130002**	**G130003**
Duration	**n.a.**	**n.a.**	**1**	**1**	**2**
AOP Vol (m^3)	**n.a.**	**n.a.**	**10,200**	**12,000**	**31,000**
Actual harvest (m^3)	**n.a.**	**n.a.**	**10,829**	**16,243**	**44,599**

Source: C.A. Backman

Block sizes have varied considerably during the three harvest seasons as shown in **Table 13.3**. Area has ranged from a low of 32 hectares and 34 hectares in 2002-3 to a high of 100 hectares in 2004-5. The average block size over the three years is slightly more than 60 hectares.

Table 13.3: Cut block size by year of harvest

	Year	Area (ha)
1	2002-3	32
2		34
3	2003-4	62
4		41
5	2004-5	100
6		100
	Average	62

Source: Charles Backman

14.0 CUT CONTROL PERIOD

The College plans to ensure the cumulative harvest over the cut control period is within plus or minus 5% of five times the approved annual AAC. This will afford the College flexibility to deal with variability in stand characteristics and unexpected fluctuations in demand for the GPRC wood supply.

The first cut control period corresponds to the five year period up to and including 2005/6 operating season. This is the time frame within which GPRC was actively involved in preparing documents (ToR, PIP, PFMP, FMP, TSA) and operationalizing the harvest. The next cut control period would commence in May 1, 2006 and run until April 30, 2011. The AAC during this period would correspond to the proposed AAC identified above.

Tables 14.1a shows the AAC supported by deciduous and deciduous-coniferous stands for the years 2001/2 through to and including 2005/6 at the interim level, the actual harvest taking place in each year (excluding 2005/6), and the estimate for the 2005/6 operating year.

Table 14.1a: Annual harvest versus interim AAC from deciduous and deciduous-conifer stands (cubic meters)

	2001/2	**2002/3**	**2003/4**	**2004/5**	**2005/6**
	May 1/Apr. 30	**May 1/Apr. 30**	**May 1/Apr. 30**	**May 1/Apr. 30**	**May 1/Apr. 30**
ANNUAL					
AAC	**16,626**	**16,626**	**16,626**	**16,626**	**16,626**
Deciduous	**14,958**	**14,958**	**14,958**	**14,958**	**14,958**
Coniferous	**1,668**	**1,668**	**1,668**	**1,668**	**1,668**
Harvest		**10,829**	**16,243**	**44,599**	**3,100**
Deciduous		**10,829**	**16,243**	**43,073**	**3,000**
Coniferous		**4**	**0**	**1,526**	**100**

Source: C.A. Backman

Table 14.1b shows the cumulative harvest versus the cumulative AAC. Incorporating actuals for the 2004-2005 operating season, GPRC cumulative harvest amounts to 70,141cubic meters of deciduous wood and 1,530 cubic meters of incidental coniferous wood. The cumulative AAC during this period amounted to 59,832 cubic meters of deciduous wood and 6,672 cubic meters of coniferous wood.

Table 14.1b: Cumulative harvest versus interim AAC (cubic meters)

	2001/2	**2002/3**	**2003/4**	**2004/5**	**2005/6**
	May 1/Apr. 30	**May 1/Apr. 30**	**May 1/Apr. 30**	**May 1/Apr. 30**	**May 1/Apr. 30**
CUMULATIVE					
AAC	**16,626**	**33,252**	**49,878**	**66,504**	**83,130**
Deciduous	**14,958**	**29,916**	**44,874**	**59,832**	**74,790**
Coniferous	**1,668**	**3,336**	**5,004**	**6,672**	**8,340**
Harvest		**10,829**	**27,072**	**71,671**	**77,120 est.**
Deciduous		**10,825**	**27,068**	**70,141**	**73,141 est.**
Coniferous		**4**	**4**	**1,530**	**1,630**

Source: C.A. Backman

Table 14.1c shows the volume remaining in the first cut control period. While there is significant volume of unutilized conifer volume, GPRC has to date not had operational responsibility for executing its harvest unless it is a by-product of harvesting the deciduous forest. GPRC does have operational responsibility for the deciduous harvest.

GPRC is planning to harvest the remaining unutilized deciduous volume in the first cut control period. A location has been identified and a buyer found. Only some 100 cubic meters of conifer are expected in harvesting the deciduous stand. Harvesting and hauling will take place between December/05 and March /06.

Table 14.1c: Volume remaining in the first cut control period

Species type	Volume
Deciduous (m^3)	4,649
Conifer (m^3)	6,810
TOTAL (m^3)	17,849

Source: C.A. Backman

15.0 PROPOSED HARVEST SEQUENCE

The proposed spatial harvest sequence is based on run 16 of the TSA. The operating region for the 10 year harvest sequence focused on mature and overmature aspen and black poplar stands situated on the west side of Economy Creek. Due to their age and stand characteristics these stands were deemed to be at a point in their development when the risk that merchantable volume would decline increases. Stands scheduled for harvest in the 10 year harvest sequence are shown in **Map 15.1** and **Map C.5** in **Appendix C**.

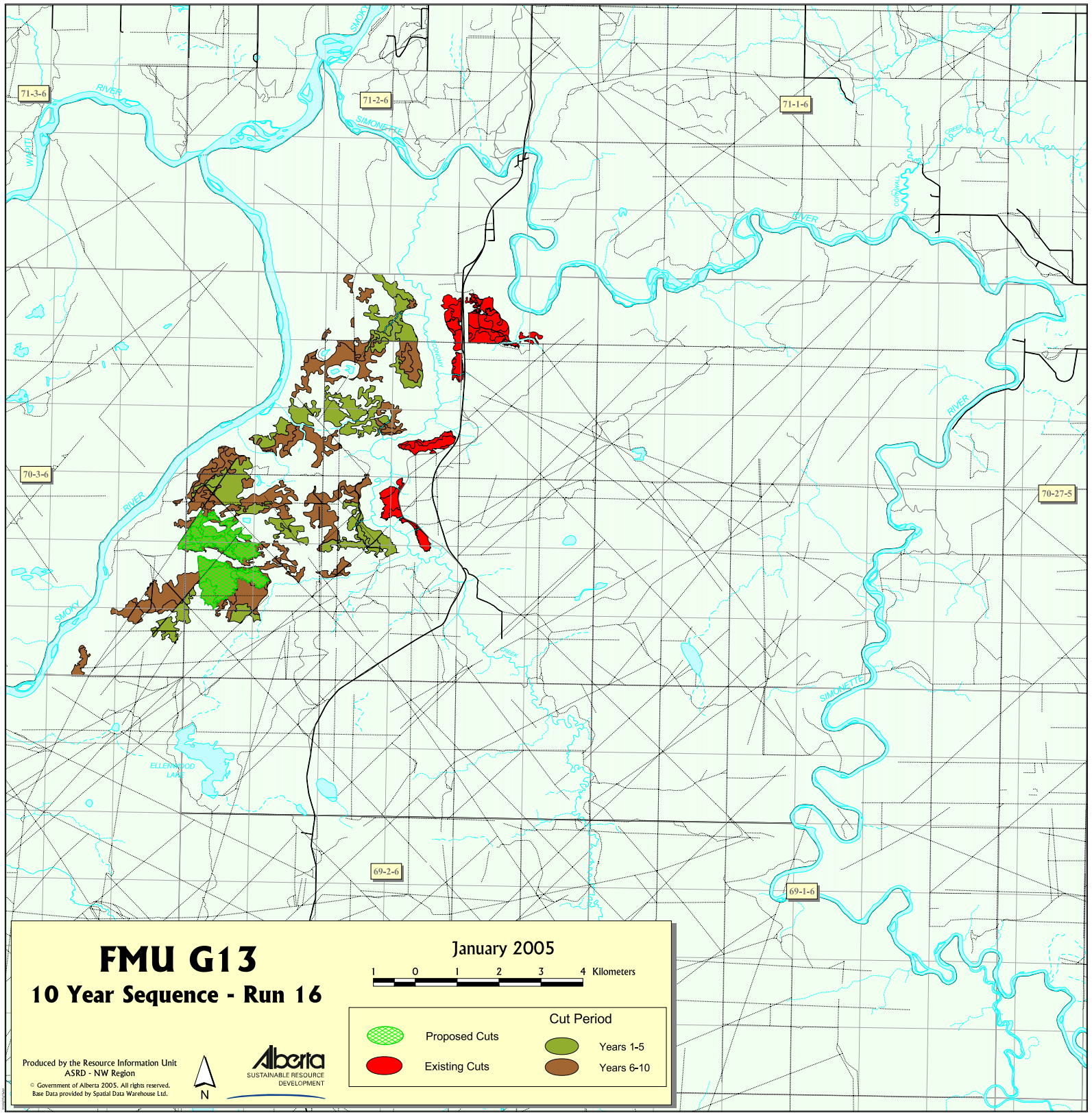
Harvest activity was restricted to two operating areas within the Training Forest in order to reduce the impact of access. The 10 operating areas of the forest have been identified in Map 8.1. In the subsequent 10 year period, harvest activity was shifted to compartments E4 and E5 in order to reduce the impact which a concentration of younger stands could have on wildlife habitat (**Map 15.2** and **Map C.6** in **Appendix C**).

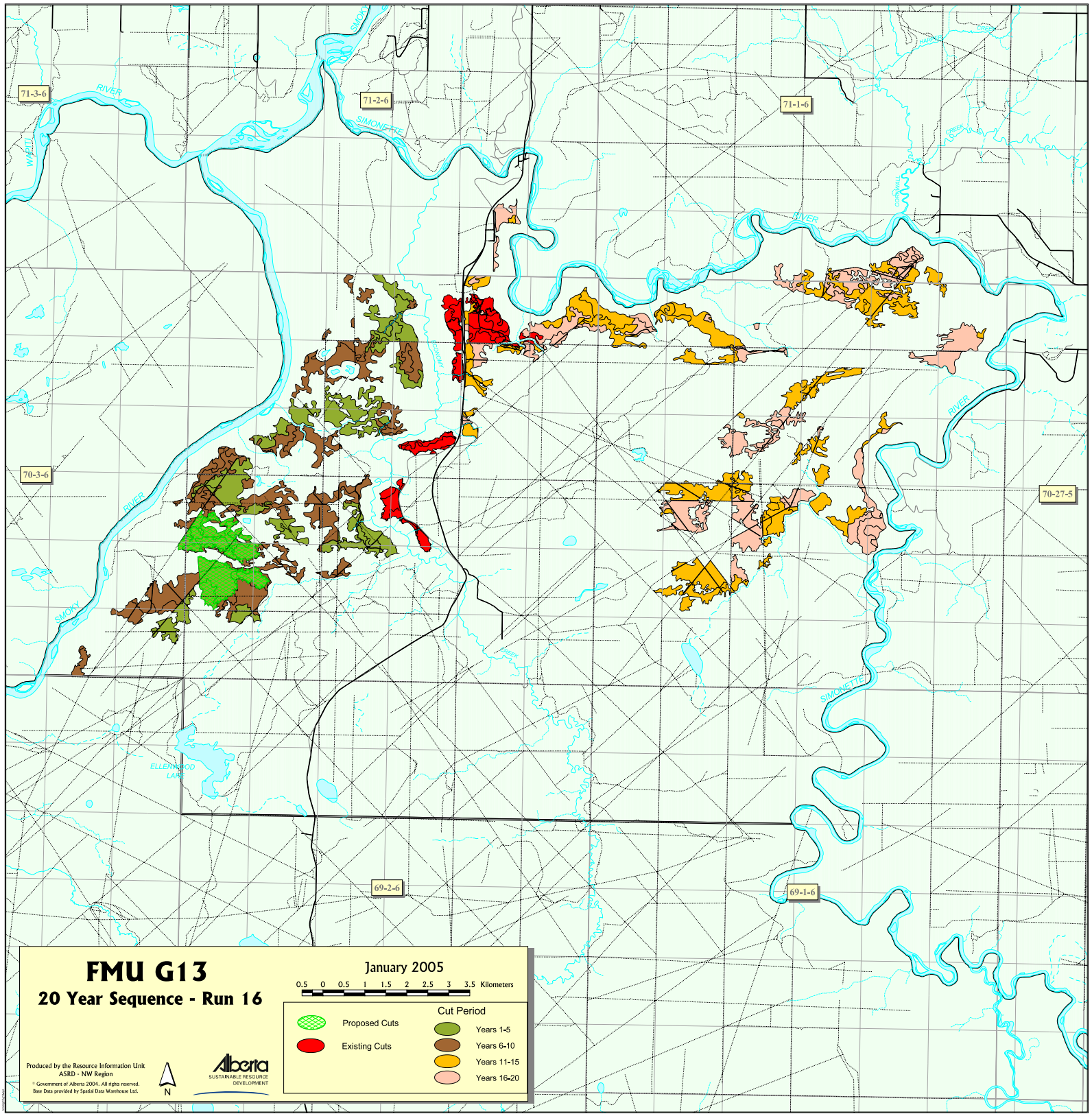
The expected footprint on the landscape from harvesting is shown in **Table 15.1.** Annual harvest area varies from 1.1 to 1.5 percent on a basis of the active landbase area, which is equivalent to 0.5 to 0.8 percent on the basis of the total land area in the Training Forest.

Table 15.1: Footprint on landscape from harvesting by 5 year period

	Landbase (ha) Less 25.21 ha for Horizontal Stand Adjustments								% of Active ha Harvested to Totals		
	Active ha Managed			Passive ha Not Managed		Total			Active ha Man.	Total	
Years	Forested	Harvested	Non-Forested	Forested	Non-Forested	Forested	Non-Forested	All Area	Forested	Forested	All Area
Current	11,724.7	205.8	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	1.8	1.0	0.8
1-5	11,724.7	696.7	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.9	3.3	2.8
6-10	11,724.7	689.7	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.9	3.3	2.7
11-15	11,724.7	768.3	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	6.6	3.6	3.1
16-20	11,724.7	652.9	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.6	3.1	2.6
21-25	11,724.7	865.5	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	7.4	4.1	3.4
26-30	11,724.7	770.8	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	6.6	3.6	3.1
31-35	11,724.7	736.0	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	6.3	3.5	2.9
36-40	11,724.7	693.1	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.9	3.3	2.8
41-45	11,724.7	647.6	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.5	3.1	2.6
46-50	11,724.7	622.2	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.3	2.9	2.5
51-55	11,724.7	672.3	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.7	3.2	2.7
56-60	11,724.7	619.9	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.3	2.9	2.5
61-65	11,724.7	685.5	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	5.8	3.2	2.7
66-70	11,724.7	727.2	0.0	9,461.3	3,959.7	21,186.1	3,959.7	25,145.8	6.2	3.4	2.9

Source: Mark Townsend




71-3-6
71-2-6
71-1-6
70-3-6
70-27-5
69-2-6
69-1-6
RIVER
SMOKY
SIMONETTE
ELLENWOOD LAKE
FMU G13
20 Year Sequence - Run 16
January 2005
0.5 0 0.5 1 1.5 2 2.5 3 3.5 Kilometers
Proposed Cuts
Existing Cuts
Cut Period
Years 1-5
Years 6-10
Years 11-15
Years 16-20
Produced by the Resource Information Unit
ASRD - NW Region
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Base Data provided by Spatial Data Warehouse Ltd.
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Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

16.0 SILVICULTURE STRATEGY

Grande Prairie Regional College has the responsibility for ensuring that forest land covered by its DTPs is reforested following harvest to standards set by the Sustainable Resource Development. At the present time, GPRC has operational responsibility for determining location and timing of harvest in the deciduous (D) and deciduous-coniferous (DC) stands. Consequently, GPRC has the reforestation obligations for activity in these stands. Responsibility for activity in the coniferous (C) and coniferous-deciduous (CD) stands rests with the local SRD, who are responsible to ensure that these lands are satisfactorily restocked following harvest.

GPRC has committed itself to ensuring that D stands are SR no later than 5 years following harvest and DC stands are SR no later than 8 years following harvest. While GPRC has 5 years and 8 years respectively to ensure adequacy of stocking to SRD standards in its cutover lands, the Timber Supply Analysis for the training forest assumes a zero year lag in establishment of deciduous and a four year lag for coniferous.

The difference between the two lies with height criteria for regeneration after a certain length of time. The TSA assumes that once a stand is established, it follows a standard growth and yield curve trajectory. The standard curves are based upon assumed height criteria at specified ages. The 5 and 8 year height (and stocking) thresholds are to ensure that in fact the assumptions of the TSA are being attained.

Recognizing that GPRC does have an obligation to ensure that cut-over lands are reforested to SRD standards, a silviculture reserve fund has been established. Every year, an amount equal to $1.08/c.m. harvested (deciduous plus coniferous) is deposited into this account to recognize these future obligations. As expenses are incurred, money is withdrawn from this fund. When GPRC's obligations are extinguished for each cutover area, the unused amount of dollars set aside for each area can be transferred out of the reserve into the general operating training forest account and used for other purposes.

Silviculture regimes

The dominant species in our D and DC stands are aspen and poplar. These two species are pioneer species and can successfully regenerate naturally through suckering and sprouting after harvesting. However the success of their natural regeneration relies on full sunlight exposure and warm soil temperature – conditions which can not be met through selective harvesting system. A clearcut silvicultural system combined with well planned retention areas, which would help to protect critical wildlife habitats, is thus an effective means to ensure the establishment of the next crop followed by a LFN strategy. Establishment of harvested C and CD stands will use a combination of artificial (i.e. planting) and/or natural regenerations.

Table 16.1 below shows the silvicultural regimes according to 10 growth and yield curves. The trajectories for which GPRC has responsibility are those with a strata standard designation of D, and DC.

Table 16.1: Grande Prairie Regional College DFMP Silviculture Prescription Table

1	2	3	4	5	6	7	8	9	10	11	12	13
Regenerated Yield Trajectory	**Strata Standard (C, CD, DC, D)**	**Transitions Toward Climax**	**Species Proportions (Broad Cover Group)**	**Climatic/Site Limitations**	**Silviculture System**	**Site Prep**	**Seedling Establishment (includes LFN)**	**Seedling Density**	**Reforestation Stage Intervention**	**Post-Reforestation Stage Intervention**	**Seed/Vegetative Collection**	**Timing**
YC 1-D-A/B density	D	to D-C/D density	>80% Aw/Pb/Bw <20% conifer Incidental conifer proportions to be maintained.	Vegetative competition, potential droughtiness, windthrow	clearcut	none	LFN (deciduous); plant Sw on in-block roads	≥ 7,000 stems/ha deciduous at Year 5 Conifer not less than 1400 stems/ha.	none anticipated	none anticipated	Appropriate Sw seed lots collected from local forest industry.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.
YC 2-D-C/D density	D	to D-C/D density	>80% Aw/Pb/Bw <20% conifer Incidental conifer proportions to be maintained.	Vegetative competition, potential droughtiness, windthrow	clearcut	none	LFN (deciduous); plant Sw on in-block roads	≥ 7,000 stems/ha deciduous at Year 5 Conifer not less than 1400 stems/ha.	none anticipated	none anticipated	Appropriate Sw seed lots collected from local forest industry.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.
YC 3-Mixed D-A/B density	D	to Mixed D - C/D density	>80% Aw/Pb/Bw <20% conifer Incidental conifer proportions to be maintained.	Vegetative competition, potential droughtiness, windthrow	clearcut	none	LFN (deciduous); plant Sw on in-block roads	≥ 7,000 stems/ha deciduous at Year 5 Conifer not less than 1400 stems/ha.	none anticipated	none anticipated	Appropriate Sw seed lots collected from local forest industry.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.
YC 4-Mixed D-C/D density	D	to Mixed D - C/D density	>80% Aw/Pb/Bw <20% conifer Incidental conifer proportions to be maintained.	Vegetative competition, potential droughtiness, windthrow	clearcut	none	LFN (deciduous); plant Sw on in-block roads	≥ 7,000 stems/ha deciduous at Year 5 Conifer not less than 1400 stems/ha.	none anticipated	none anticipated	Appropriate Sw seed lots collected from local forest industry.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.
YC 5-Sw Mixedwood	CD	to Sw leading,C/D density	>50% Conifer (leading species) - >30% Decid = CD	Vegetative competition, cold soils on subhygric/hygric, periodic moisture in rooting zone on subhygric/hygric	clearcut	Elevated microsite, scalp or straight plant for conifer according to site specific conditions.	Plant Sw on in-block roads, protect and promote understory conifer. Plant conifer (Sw) to supplement existing understory and to maintain target species proportions. LFN for deciduous.	>7,000 stems/ha deciduous at Year 5. >1600 stems/ha for conifer or to fill all mechanical microsites created. Conifer density not to fall below 1200 stems/ha.	May require post-establishment vegetation controls for competition to conifer.	none anticipated	Assess conifer seed supply immediately. Planning cone and seed collection before starting to harvest any CD stands. Appropriate conifer seedlots collected from local forest industry or from FMU G13 area.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.
YC 5-Sw Mixedwood	DC	to Decid leading,C/D density	>50% Decid. (leading species) - >30% Conifer = DC	Vegetative competition, cold soils on subhygric/hygric, periodic moisture in rooting zone on subhygric/hygric	clearcut	Elevated microsite, scalp or straight plant for conifer according to site specific conditions.	Plant Sw on in-block roads, protect and promote understory conifer. Plant conifer (Sw) to supplement existing understory and to maintain target species proportions. LFN for deciduous.	>7,000 stems/ha deciduous at Year 5. >1600 stems/ha for conifer or to fill all mechanical microsites created. Conifer density not to fall below 1200 stems/ha.	May require post-establishment vegetation controls for competition to conifer.	none anticipated	Assess conifer seed supply immediately. Planning cone and seed collection before starting to harvest any DC stands. Appropriate conifer seedlots collected from local forest industry or from FMU G13 area.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.
YC 4R	Regenerated yield curve applied to existing cutovers, productivity assumed already established. Future prescription and treatment required if reforestation standard not achieved.											
YC 7- C-Sw/Pl	C	to C C/D density	>80% Sw/Pl <20% Decid. Incidental deciduous proportions to be maintained.	Vegetative competition, cold soils on subhygric/hygric, periodic excessive moisture in rooting zone on subhygric/hygric	clearcut	Raised bed or scalp for conifer. May choose drag for Pl.	Plant Sw, Pl allowed to naturally seed after drag. If Pl component imperative, plant Pl.	≥ 1600 stems/ha or to fill all mechanical microsites created. Not to fall below 1200 stems/ha.	May require post-establishment vegetation controls for competition to conifer.	none anticipated	Assess conifer seed supply immediately. Planning cone and seed collection before starting to harvest any C stands. Appropriate conifer seedlots collected from local forest industry or from FMU G13 area.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.

Table 16.1: Grande Prairie Regional College DFMP Silviculture Prescription Table (cont'd)

Pl leading Mixed-A/B crown closure **NOTE:** Regenerated yield objective is YC-3 Mixed A/B Density	CD	to CD C/D density	Pl leading - >50% Conifer/>30% Decid	Vegetative competition, potential droughtiness, windthrow	clearcut	Drag for spread of Pl cones. May choose scalp if specific microsite required. May require disking/plowing to set back deciduous suckering competition.	Natural seeding of Pl after drag. If vegetative competition too limiting to establishment densities and survival, plant Pl. LFN for deciduous.	If choosing plant for Pl, > 1600 stems/ha or to fill all mechanical microsites created. Conifer densities not to fall below 1200 stems/ha. If drag & seed, should expect > 5000 stems/ha. as a healthy initial, regenerating stand subject to natural cull.	May require post-establishment vegetation controls for competition to Pl.	none anticipated	Assess conifer seed supply immediately. Planning cone and seed collection before starting to harvest any CD stands. Appropriate conifer seedlots collected from forest industry or from G13 Area. May have to assess availability and viability of Pl cones and seeds if choosing drag/seed strategy.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.
Pl leading Mixed-C/D crown closure **NOTE:** Regenerated yield objective is YC-4 Mixed C/D Density	CD	to CD C/D density	Pl leading - 50% Conifer/>30% Decid	Vegetative competition, potential droughtiness, windthrow	clearcut	Drag for spread of Pl cones. May choose scalp if specific microsite required. May require disking/plowing to set back deciduous suckering competition.	Natural seeding of Pl after drag. If vegetative competition too limiting to establishment densities and survival, plant Pl. LFN for deciduous.	If choosing plant for Pl, > 1600 stems/ha or to fill all mechanical microsites created. Not to fall below 1200 stems/ha. If drag & seed, should expect > 5000 stems/ha. as a healthy initial, regenerating stand subject to natural cull.	May require post-establishment vegetation controls for competition to Pl.	none anticipated	Assess conifer seed supply immediately. Planning cone and seed collection before starting to harvest any CD stands. Appropriate conifer seedlots collected from forest industry or from G13 Area. May have to assess availability and viability of Pl cones and seeds if choosing drag/seed strategy.	This prescription to be applied to appropriate stands harvested in the 2006/2007 timber year and into the future.

Column Explanations/expectations:

1. **Regenerated Yield Trajectory:** The regenerated stand should be pure or mixed, and may have a secondary species.
Each of these regenerated yield trajectories should be found contributing to the cut via the TSA.

2. **Strata Standard:** Alberta uses C, CD, DC and D as an active lable/designation. Translate the the Regenerated Yield Trajectory into one of these strata standards.

3. **Transitions Towards Climax:** Will the regenerated stand move through another stand structure before ending up at what's projected? What is the stand projected to develop into? May have implications on future cut calculations, balancing and initial silviculture prescriptions.

4. **Species Proportions:** proportions of each species group or particular species expected in the regenerated stand, usually expressed in terms of AVI Broad Cover Group (BCG) but my also be articulated as a specific proprtion objective outside of the AVI BCG parameters.

5. **Climatic/Site Limitations:** what factors in climate and on the site, are expected to significantly increase the risk of NOT reaching the regenerated yield objective. These will become the justification (good science) for the treatments chosen.

6 **Silviculture System:** formerly "harvest system", but now tied to regenerated yield achievement. Could be clearcut, shelterwood, seed-tree partial cut, understory protection, depending on the regenerated yield objective.

7. **Site Prep:** linked to site limitation and/or species to be established. Could be elevated microsite, scalp, drag, mixing.

8. **Seedling Establishment:** how will the seedling be put on the site: planting, artificial seeding, LFN.

9. **Seedling Density:** linked to the regenerated yield objective. This is one of the major indicators of silviculture commitment along with the proposal to plant a site.

10. **Reforestation Stage Intervention:** the Reforestation Stage is Year 0 to Year 14. The objective is to get the regenerated stand to FTG.
In the Reforestation Stage there is the Establishment Phase and Performance Phase and in each of these Phases one might choose some type of intervention to ensure the objective is reached. This could include herbicide (chemnical or mechanical) for grass, herbicide for competition, fill-in-plant for mortality, etc.
This is a major part of the reforestation commitment.

11. **Post Reforestation Stage Intervention:** after Year 14, could be Pre-commercial Thin, Commercial Thin, fertilization.
Part of a longer term commitment.

12. **Seed/Vegetative Collection:** intentions for cone collection, seed collection/extraction/storage, cuttings, transplants, etc.
Part of the detail required from the Planning Standard and in keeping with expectations of the STIA.

13. **Timing:** another major part of the commitment. When they expect to be able to deliver on the silviculture task.

In these five trajectories, the objective is to replace the present stand structure with stands of similar strata. Stands which presently have a A/B density are assumed to transition to C/D density stands. Proportions of the incidental conifer will be maintained in the replacement stands through a combination of protection of existing spruce understorey, judicious fill planting as required, and planting of conifer along the reclaimed in-block roads.

Silvics of major species

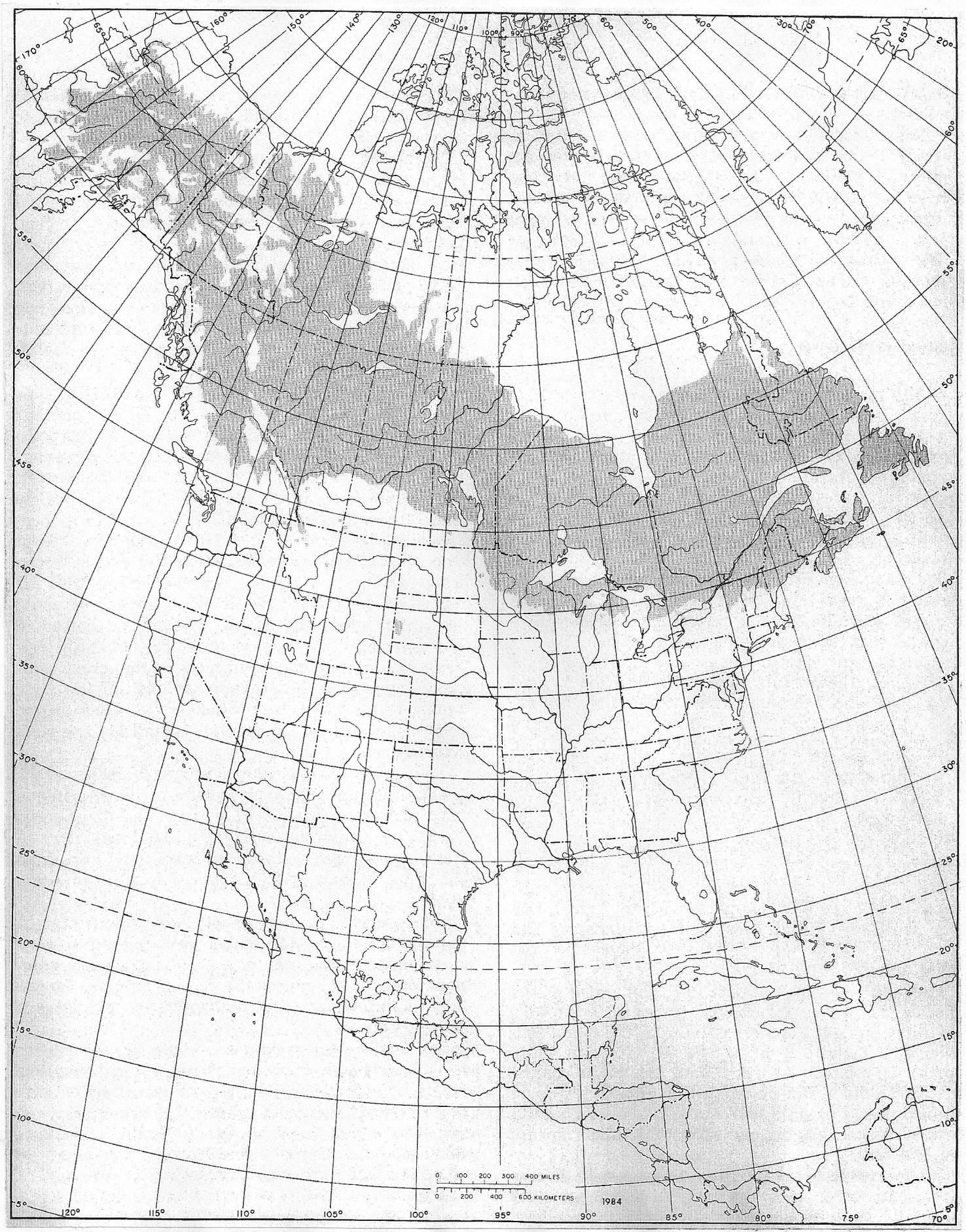
A better understanding of the regeneration yield trajectories can be had with a brief review of the silvics of the three major species of the training forest subject to denudation. These species are: (1) aspen; (2) black poplar; and (3) white spruce.

Aspen: Aspen is widely distributed across Canada and parts of the United States as shown in the figure below. It tolerates a wide range in winter and summer temperatures. Average temperatures in January range from -30 degrees C to -7 degrees C and in July from 16 degrees C to 23 degrees C. Aspen generally occurs where annual precipitation exceeds evapotranspiration which varies across its range. Within the training forest however, moisture deficits are not the limiting factor where aspen forests dominate.

Aspen grows on a variety of soil conditions with poor growth often associated with sandy soils because of low moisture and nutrient levels. Internal drainage is critical to aspen growth and development. Heavy clay soils do not promote good growth because of limited availability of water and poor soil aeration. Poor growth is also evident on soils with poor physiographic exposure and excessive drought. Poor growth is also evident where excessive moisture is present. Indeed, as moisture regime increases, a greater share of the forest is occupied by black poplar.

Aspen regenerates well via vegetative reproduction. The suckering are produced from the shallow lateral root structure lying within 2 to 10 cm of the top of the soil. As such soil compaction can have a negative impact on suckering ability. It is this risk of compaction that leads to harvest activity during frozen ground conditions to ensure that the vegetative reproductive ability of the aspen stands is not impaired. Substantial cost would be incurred if artificial regeneration means were required to restock the aspen stands. Furthermore, it is far from clear if aspen forest could in fact be reestablished given the general lack of experience with this specie.

Map 16.3: The native range of White Spruce



Source: Silvics of North America, Volume 1, p. 205