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SUPPLEMENTAL TIMBER SUPPLY ANALYSIS PROCEDURES & RESULTS

SILVACOM REFERENCE #: F-057

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SEPTEMBER 10, 2001

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FORWARD

The work presented in this report has evolved over a number of years. Alberta Newsprint Company (ANC) has been working in close consultation with Land and Forest Service Division of Alberta Sustainable Resource Development (LFS) to ensure that the results presented are practical, realistic and will meet the guidelines and expectations of the Province. This report is a supplemental to the June 1999 submission, its purpose is to present additional analysis which ties operational practices to the timber supply analysis. Several important milestones have been achieved which will facilitate the review and approval process:

- The timber supply analysis (TSA) has been submitted and reviewed by LFS (June 1999);
- The growth and yield estimates derived for the FMA area have been reviewed and approved for use in the timber supply analysis;
- The net landbase analysis has been reviewed and approved (June 1999). A revised net landbase (net landbase areas remain the same) spatial coverage and associated database file have been submitted for review (July 2001);
- As a result of several meetings with LFS regarding the FMA timber supply, many of the fundamental timber supply assumptions have been discussed. LFS is aware of the approach that ANC has taken in the analysis and has had opportunities to review the interim results and provide feedback. LFS staff have been an important part of the entire timber supply analysis process.

1.0 NET LANDBASE REVIEW

1.1 INVENTORY

1.1.1 FOREST INVENTORY (AVI 2.1 & AVI 2.2)

ANC committed to AVI forest inventory protocols in 1990 and presented results for audit, in GIS format, in 1993 (with submission of the Detailed Forest Management Plan). The original AVI inventory, which passed the Provincial audit in 1994, involved a complete stratification of all forest stands and non-forested polygons in the FMA (i.e. each township in the FMA was interpreted to AVI specifications and loaded into GIS). This census of the FMA landbase accommodated complete FMA-wide area and volume summaries by Forest Management Unit (FMU), compartment, township, species combination, age class, sampling strata and other important inventory attributes. Complete GIS coverage also facilitated long and short-term planning such as net landbase determination and adjustments for deletions, revised AAC estimation, harvest scheduling and the preparation of annual operating plans.

Since the completion of the original AVI[1] inventory, ANC has acquired air photos, on an annual basis, for updating harvesting and landuse activities. In 1997, ANC initiated a "continuous forest inventory and maintenance" program to update and maintain the company's GIS inventory and database system. Over a period of five consecutive years, ANC has committed to re-interpreting the forest cover for the entire FMA to the latest AVI specification**.** FMU W8 and portions of E6 and W1 have already been updated using 1:15,000 scale 1997 photography and AVI 2.2. MAP 1-2: 1999 Orthophoto Update Map on page 2-6 identifies the area updated to AVI 2.2.

Net landbase database structure and description for both AVI 2.1 and AVI 2.2 can be found in Appendix B.

1.2 GROSS LANDBASE

ANC's FMA consists of approximately 378,726 ha; of which 354,909 ha (94%) are classified as forest. After temporary deductions for hydrological buffers, and the application of subjective deletions and merchantability tests (described in the following sections), approximately 75% (282,683 ha) of the gross area remains to produce timber.

In terms of biophysical characteristics, the FMA intersects four main Natural Regions (see Map 2-1). The Upper Foothills Region (48% of the landbase) and Lower Foothills Region (46%) predominate. Small areas associated with the Sub-Alpine (4%) and Central Mixedwood (2%) Regions are also found in the FMA. Parent materials are dominated by morainal, glacial-fluvial and colluvial deposits, and organic material (bogs, fens). Dominant soils include mesisols, brunisolic gray luvisols, and orthic gray luvisols.

The extent of the landbase under consideration for ANC includes original LFS FMU's W8, E6, E7, and W1.

[1] *Original AVI was based on 1990 aerial photography.*

1.3 LANDBASE DETERMINATION

ANC staff examined the FMA area and assigned the landbase to one of a number of categories. Ground rule buffers, were applied to lakes, rivers and permanent streams across the entire FMA. Areas identified as cutovers under AVI remain in the net productive landbase.

1.3.1 RECREATION AREAS

Identified recreational areas within the extents of the FMA, primarily around lakes (i.e. Crooked Lake) – Identified in the net landbase database as: "NETDOWN = 1".

1.3.2 NON-FORESTED AREAS

The following non-forested areas were identified under AVI:

- Natural non-forested areas - Includes lakes, double-line rivers, flooded areas, grasslands, shrubs, etc. (AVI codes: NWR, NWL, NWF, NMB, NMC, NMS, HG, HF, SO, SC, BR) – "NETDOWN = 2" (An override was applied to all cutover areas; these areas were re-assigned to the net productive landbase);
- Anthropogenic non-forested areas - "Man-caused" influences on the land. Areas such as well sites, roads and pipelines have been classified in this category. (AVI codes: CA, CP, CPR, CIP, CIW, ASC, ASR, AIH, AIG, AIF, AII) – "NETDOWN = 3".

1.3.3 WATERCOURSE BUFFERS

Watercourses were buffered, as per current operating ground rules:

- Lakes > 4 ha: 100 metre buffer width surrounding the lake – "NETDOWN = 4;
- Rivers: 60 metre buffer width on each side, for a total of 120 metres – "NETDOWN = 5";
- Large Permanent Streams: 60 metre buffer width on each side, for a total of 120 metres – "NETDOWN = 6";
- Small Permanent Streams: 30 metre buffer width on each side, for a total of 60 metres – "NETDOWN = 7";
- Lakes ≤ 4 ha: 20 metre buffer width surrounding the lake – "NETDOWN = 8".

1.3.4 SUBJECTIVE DELETIONS

Includes areas identified by ANC staff as inoperable and/or inaccessible. These areas were digitized from 1:50,000 topographic maps – "NETDOWN = 9".

1.3.5 MERCHANTABILITY TESTS

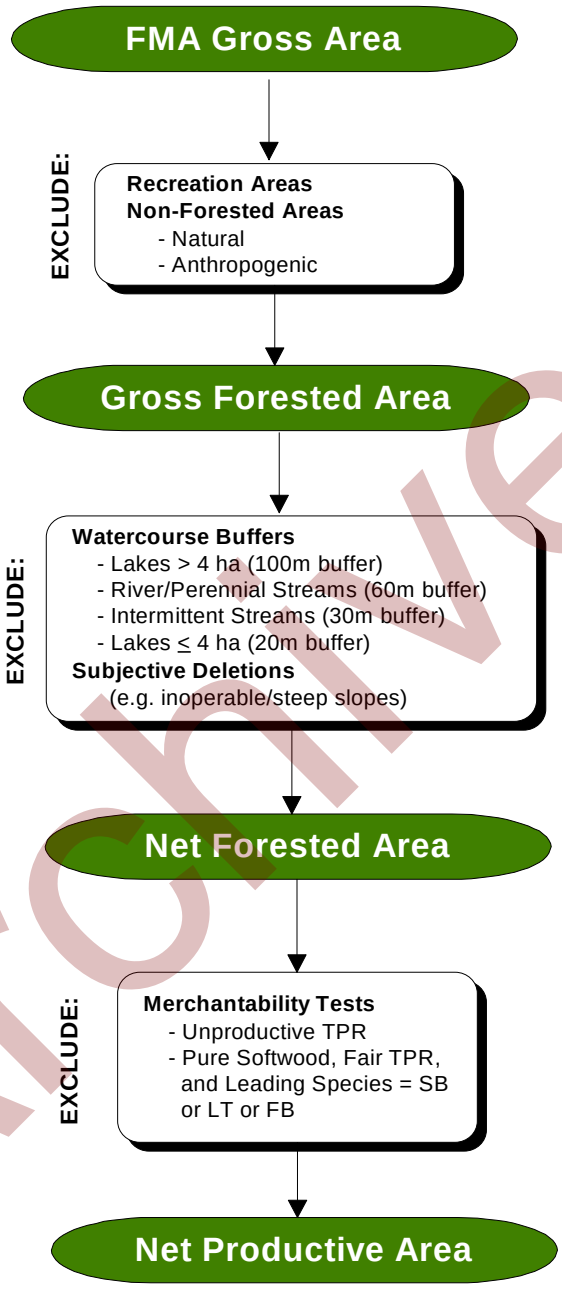
The following merchantability tests were applied to all stands[2] within the FMA:

- Stands with an unproductive Timber Productivity Rating (site) – "NETDOWN = 10";
- Stands with black spruce, larch or balsam fir as primary species, a fair timber productivity rating, and a pure softwood species group – "NETDOWN = 11".

The following flow chart explains the net down process applied to the ANC FMA. An FMA-wide net landbase map and an FMA-wide 1999 orthophoto update map are presented on pages 2-5 and 2-6 respectively.

[2] *Horizontal stands were split into two "separate" stands and areas were adjusted to reflect the relative proportion of each stand type. The COMPONEN field identifies the priority of each horizontal component (assigned using the proportional area of each component). In the case of identical areas AVI attributes were used to assign priority.*

FIGURE 1-1: PRODUCTIVE FOREST CLASSIFICATION PROCEDURES[3]



[3] *The forest classification was derived from the AVI overstorey (except for veteran stands in the AVI v2.2 database, where the second storey was used) and recent landuse updates. Cutovers remain in the net productive landbase.*

Rge 5 Rge 4 Rge 3 Rge 2 Rge 1 6th MER Rge 27 Rge 26 Rge 25 Rge 24 Rge 23 Rge 22 Rge 21 Rge 20 Rge 19 Rge 18 Rge 17

Twp 64 Twp 63 Twp 62 Twp 61 Twp 60 Twp 59 Twp 58 Twp 57 Twp 56 Twp 55

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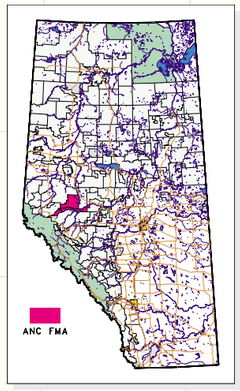
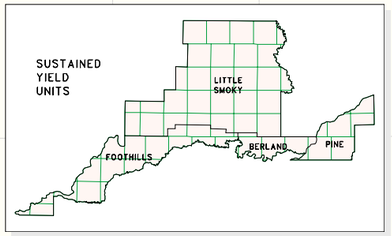
FOREST MANAGEMENT AREA

LANDBASE CATEGORIES





MAP SCALE 1:400 000

LANDBASE CATEGORIES

- RECREATION AREA
- 100m LAKE BUFFER
- 60m RIVER BUFFER
- 60m STREAM BUFFER
- 30m STREAM BUFFER
- 20m BUFFER ON SMALL LAKES (≤ 4 ha)
- SUBJECTIVE DELETION
- NATURALLY NON-FORESTED
- ANTHROPOGENIC NON-FORESTED
- UNPRODUCTIVE SITE
- FAIR SITE SB/LT/FB *
- LAKES/RIVERS

* Sites in this landbase category have all of the following attributes:
- fair timber productivity rating
- pure softwood species group
- 'SB', 'LT', or 'FB' leading species

Map Production: Silvacom Ltd
Map Date: June 5, 1999
Map Scale: 1:400000
Silvacom Ref.: G-049
Map File:
.../g-049/maps/report_maps/net_land1

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Rge 5 Rge 4 Rge 3 Rge 2 Rge 1 6th MER Rge 27 Rge 26 Rge 25 Rge 24 Rge 23 Rge 22 Rge 21 Rge 20 Rge 19 Rge 18 Rge 17

Twp 64 Twp 63 Twp 62 Twp 61 Twp 60 Twp 59 Twp 58 Twp 57 Twp 56 Twp 55

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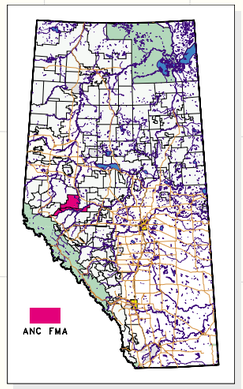
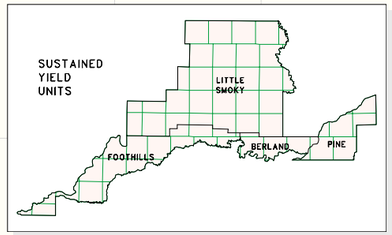
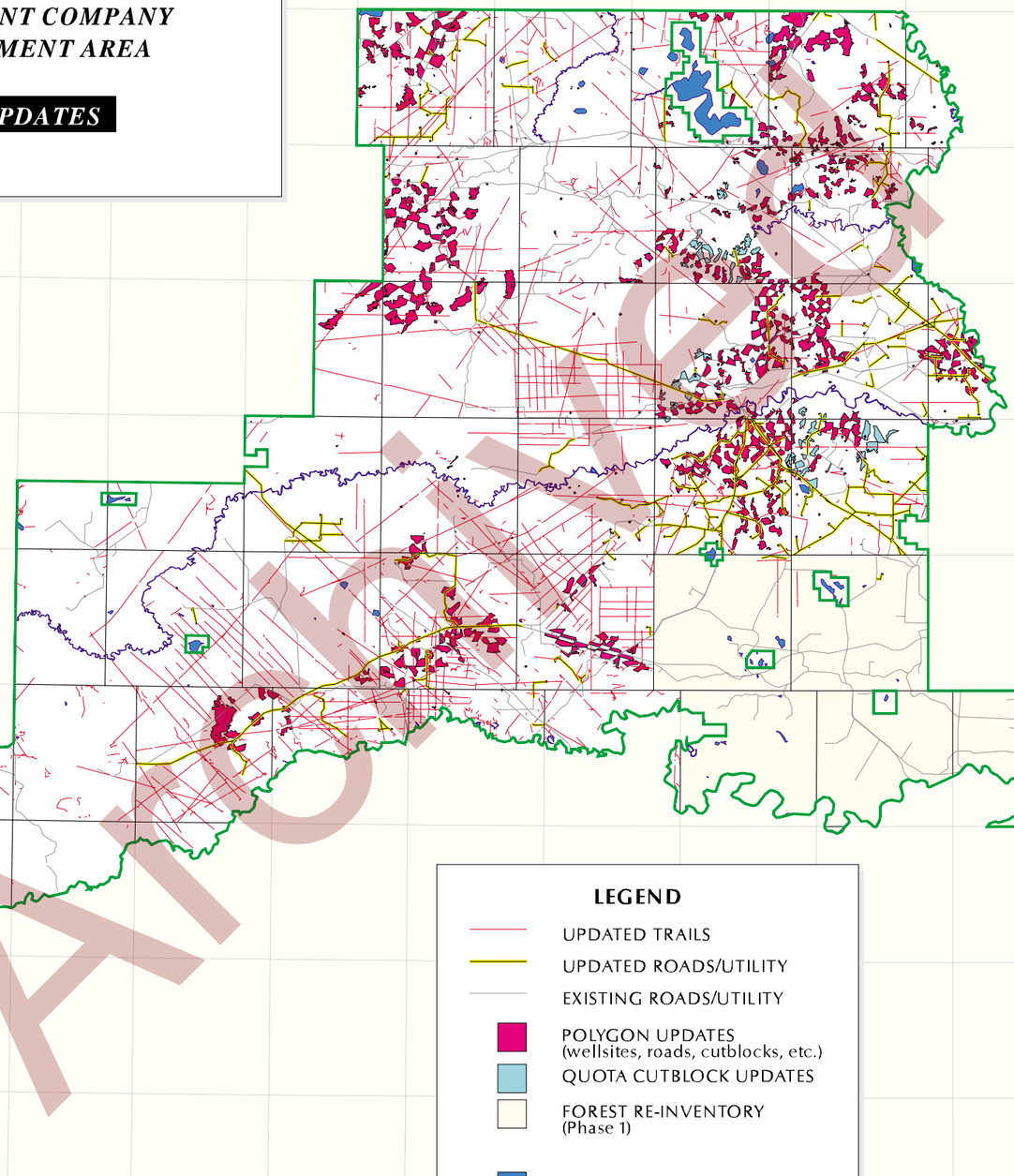
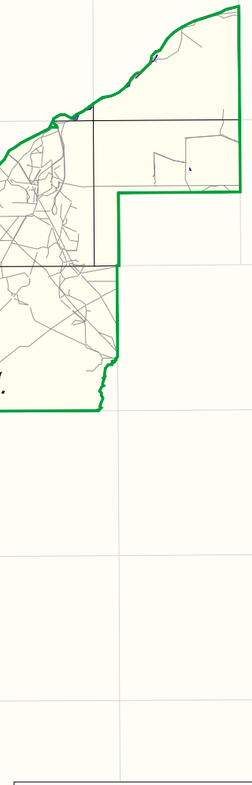
FOREST MANAGEMENT AREA

INVENTORY UPDATES









LEGEND

- UPDATED TRAILS
- UPDATED ROADS/UTILITY
- EXISTING ROADS/UTILITY
- POLYGON UPDATES (wellsites, roads, cutblocks, etc.)
- QUOTA CUTBLOCK UPDATES
- FOREST RE-INVENTORY (Phase 1)
- LAKES/RIVERS

Map Production: Silvacom Ltd
Map Date: June 7, 1999
Map Scale: 1:400000
Silvacom Ref.: G-049
Map File:
.../g-049/maps/report_maps/updates1

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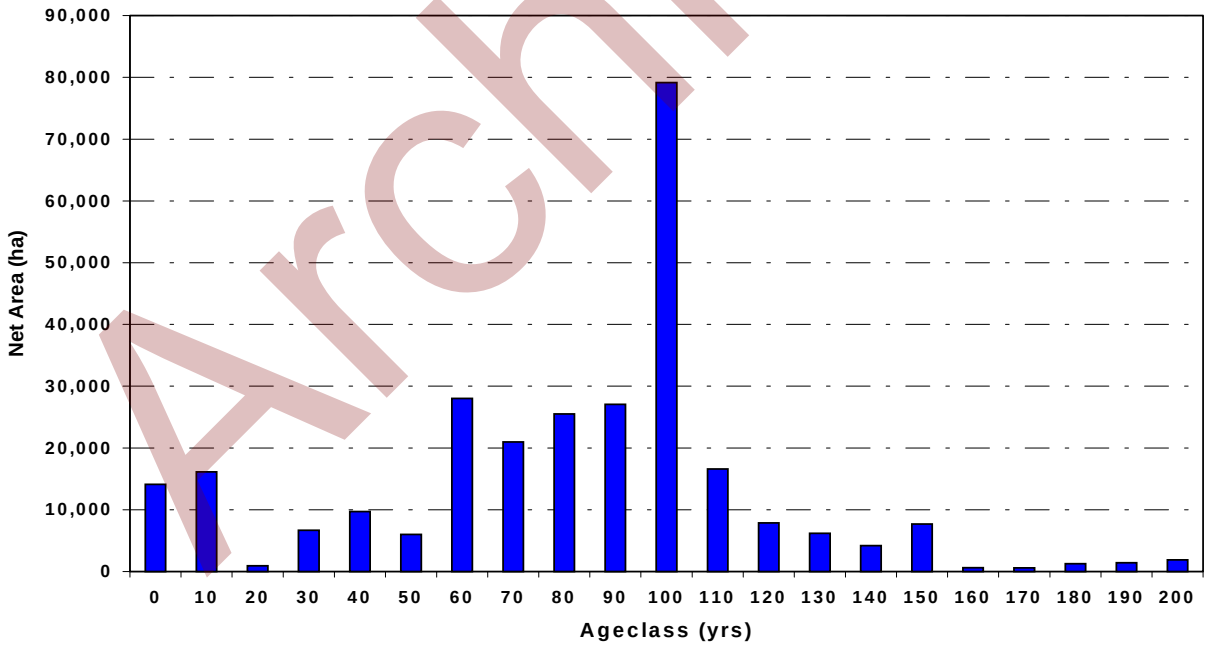
1.4 NET LANDBASE ESTIMATES

The following profiles provide a detailed description of landbase categories on an FMA-wide and individual FMU basis. Deductions from the "gross" area were calculated in the sequence shown (i.e. the hierarchy of decision rules produced a cumulative, non-duplicating result). Graphs accompanying the net landbase tables illustrate the age class distribution for the residual "net productive landbase."

TABLE 1-1: FMA LANDBASE CATEGORY SUMMARY: ENTIRE FMA

LANDBASE CATEGORY	AREA (HA)[4]	PERCENT AREA
Gross Area	**378,726**	**100%**
Recreation Areas	4,899	1.3
Non-forested/Unproductive Areas		
Natural	11,668	3.1
Anthropogenic	7,250	1.9
Sub-Total	18,918	5.0
Gross Forested Area	**354,909**	**93.7**
Hydrological Buffers		
Lake Buffers (100m)	541	0.1
River Buffers (60m)	3,503	0.9
Stream Buffers (60m)	1,652	0.4
Stream Buffers (30m)	5,925	1.6
Lake Buffers (20m)	34	0.01
Sub-Total	11,655	3.1
Net Forested Area	**343,253**	**90.6**
Subjective Deletions	3,356	0.9
Unmerchantable Areas		
Unproductive Timber Productivity Rating	41,689	11.0
Fair site Sb, Lt, or Fb leading species, and pure softwood species group	15,525	4.1
Sub-total	57,214	15.1
Net Productive Area[5]	**282,683**	**74.6**

FIGURE 1-2: AGECLASS DISTRIBUTION: ENTIRE FMA



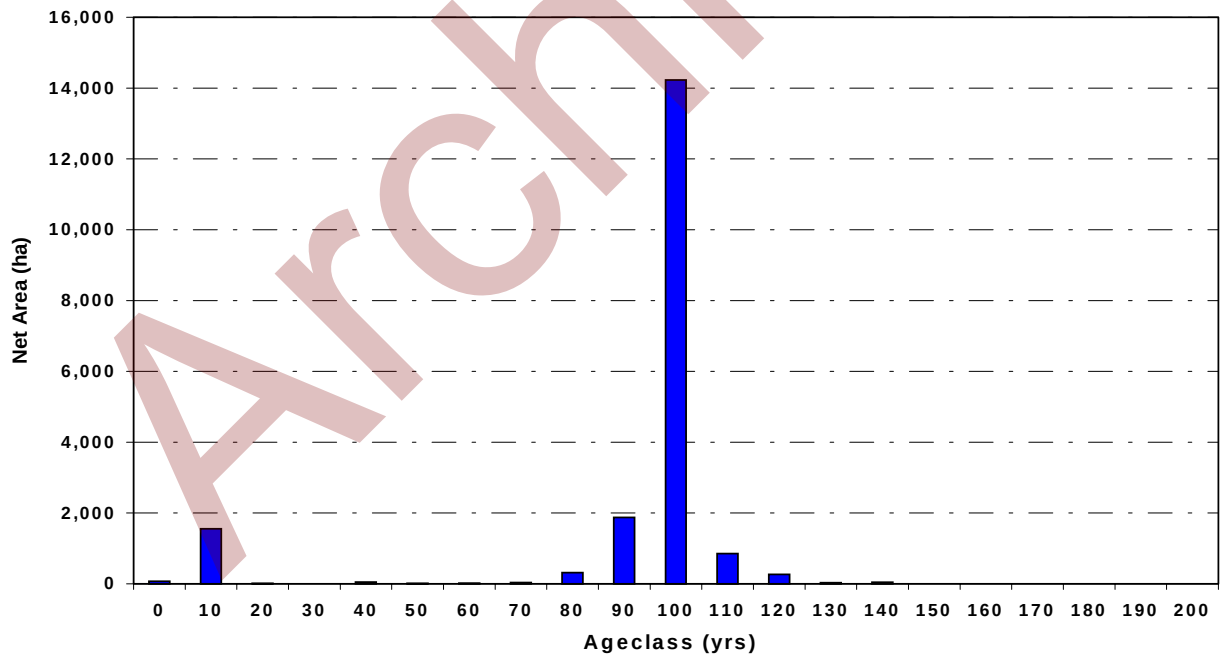
[4] *Some minor differences in totals may exist due to rounding.*

[5] *Cutovers remain in the net productive landbase.*

TABLE 1-2: FMA LANDBASE CATEGORY SUMMARY: BERLAND[6] SYU (FMU E6)

LANDBASE CATEGORY	AREA (HA)[7]	PERCENT AREA
Gross Area	**23,588**	**100%**
Recreation Areas	262	1.1
Non-forested/Unproductive Areas		
Natural	467	2.0
Anthropogenic	410	1.7
Sub-Total	877	3.7
Gross Forested Area	**22,449**	**95.2**
Hydrological Buffers		
Lake Buffers (100m)	114	0.5
River Buffers (60m)	367	1.6
Stream Buffers (60m)	0	0
Stream Buffers (30m)	337	1.4
Lake Buffers (20m)	2	0.01
Sub-Total	820	3.5
Net Forested Area	**21,629**	**91.7**
Subjective Deletions	755	3.2
Unmerchantable Areas		
Unproductive Timber Productivity Rating	854	3.6
Fair site Sb, Lt, or Fb leading species, and pure softwood species group	659	2.8
Sub-total	1,512	6.4
Net Productive Area[8]	**19,361**	**82.1**

FIGURE 1-3: AGECLASS DISTRIBUTION: BERLAND SYU (FMU E6)



[6] *Original LFS FMU E6*

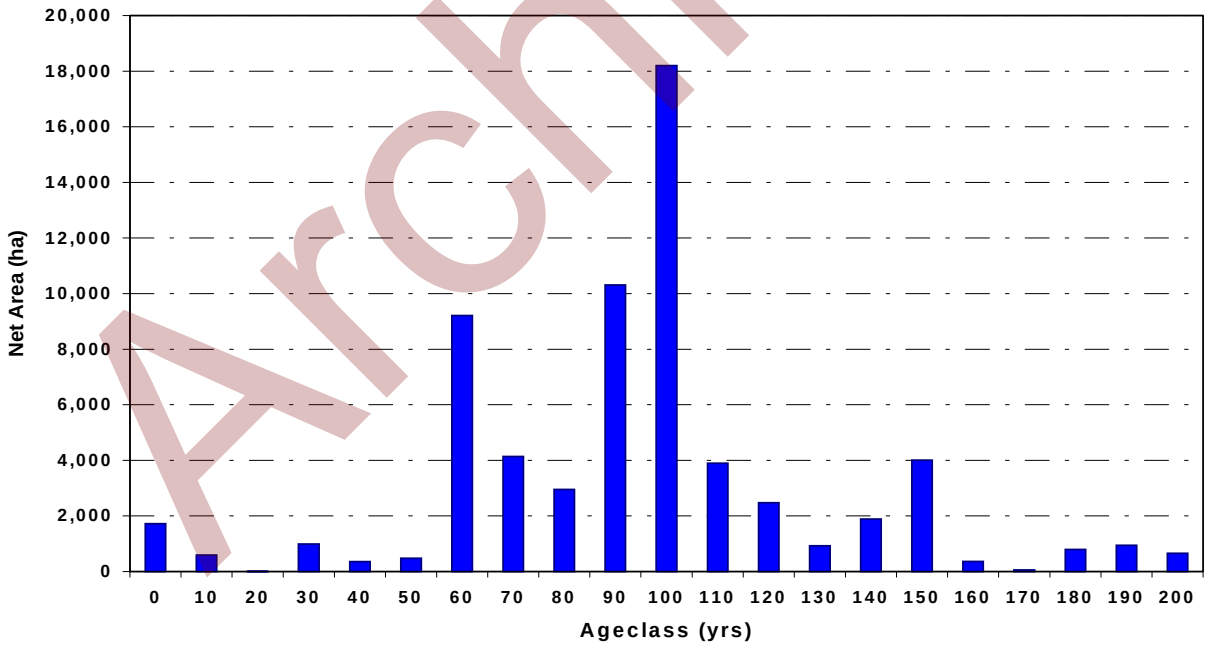
[7] *Some minor differences in totals may exist due to rounding.*

[8] *Cutovers remain in the net productive landbase.*

TABLE 1-3: FMA LANDBASE CATEGORY SUMMARY: FOOTHILLS[9] SYU (FMU E7)

LANDBASE CATEGORY	AREA (HA)[10]	PERCENT AREA
Gross Area	**86,528**	**100%**
Recreation Areas	332	0.4
Non-forested/Unproductive Areas		
Natural	3,329	3.8
Anthropogenic	751	0.9
Sub-Total	4,080	4.7
Gross Forested Area	**82,116**	**94.9**
Hydrological Buffers		
Lake Buffers (100m)	63	0.1
River Buffers (60m)	503	0.6
Stream Buffers (60m)	644	0.7
Stream Buffers (30m)	1,378	1.6
Lake Buffers (20m)	9	0.01
Sub-Total	2,598	3.0
Net Forested Area	**79,518**	**91.9**
Subjective Deletions	598	0.7
Unmerchantable Areas		
Unproductive Timber Productivity Rating	8,912	10.3
Fair site Sb, Lt, or Fb leading species, and pure softwood species group	5,067	5.9
Sub-total	13,979	16.2
Net Productive Area[11]	**64,941**	**75.0**

FIGURE 1-4: AGECLASS DISTRIBUTION: FOOTHILLS SYU (FMU E7)



[9] *Original LFS FMU E7.*

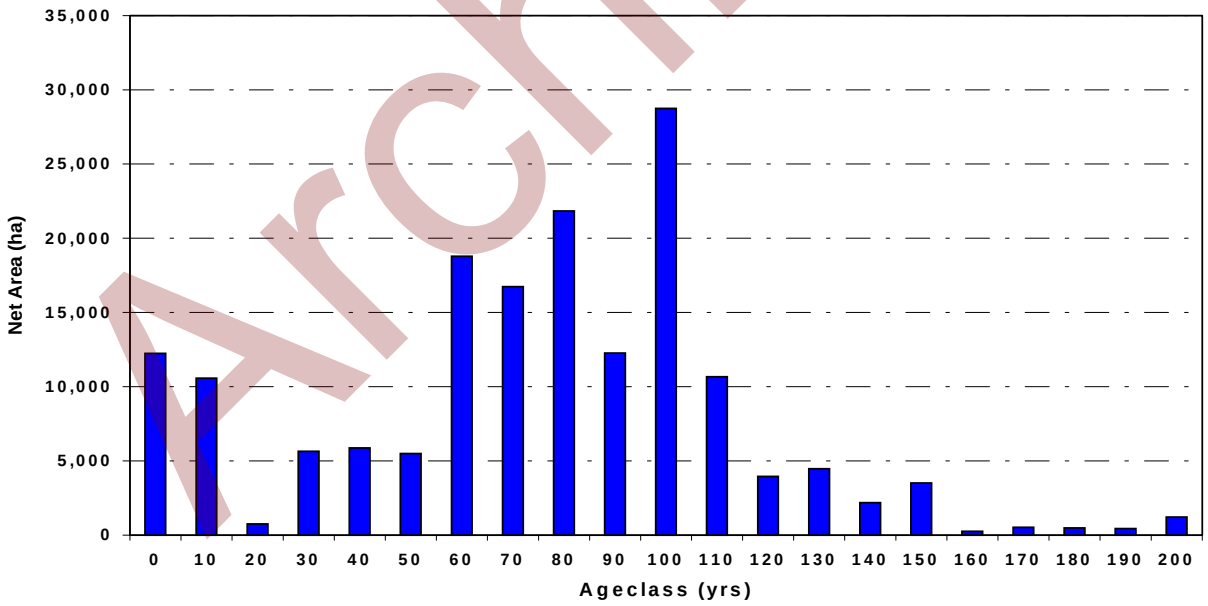
[10] *Some minor differences in totals may exist due to rounding.*

[11] *Cutovers remain in the net productive landbase.*

TABLE 1-4: FMA LANDBASE CATEGORY SUMMARY: LITTLE SMOKY[12] SYU (FMU W1)

LANDBASE CATEGORY	AREA (HA)[13]	PERCENT AREA
Gross Area	**229,950**	**100%**
Recreation Areas	4,305	1.9
Non-forested/Unproductive Areas		
Natural	7,095	3.1
Anthropogenic	4,099	1.8
Sub-Total	11,194	4.9
Gross Forested Area	**214,451**	**93.2**
Hydrological Buffers		
Lake Buffers (100m)	352	0.2
River Buffers (60m)	2,354	1.0
Stream Buffers (60m)	846	0.4
Stream Buffers (30m)	3,480	1.5
Lake Buffers (20m)	17	0.01
Sub-Total	7,049	3.1
Net Forested Area	**207,402**	**90.2**
Subjective Deletions	527	0.2
Unmerchantable Areas		
Unproductive Timber Productivity Rating	30,951	13.5
Fair site Sb, Lt, or Fb leading species, and pure softwood species group	9,278	4.0
Sub-total	40,229	17.5
Net Productive Area[14]	**166,647**	**72.5**

FIGURE 1-5: AGECLASS DISTRIBUTION: LITTLE SMOKY SYU (FMU W1)



[12] *Original LFS FMU W1*

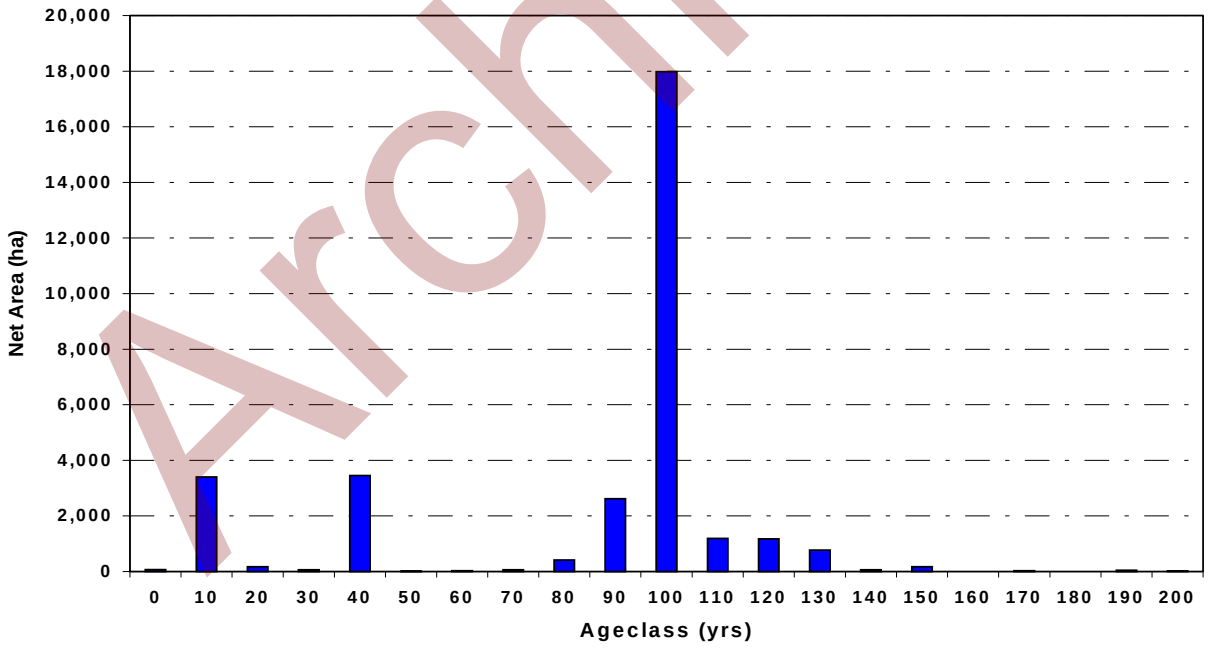
[13] *Some minor differences in totals may exist due to rounding.*

[14] *Cutovers remain in the net productive landbase.*

TABLE 1-5: FMA LANDBASE CATEGORY SUMMARY: PINE[15] SYU (FMU W8)

LANDBASE CATEGORY	AREA (HA)[16]	PERCENT AREA
Gross Area	**38,660**	**100%**
Recreation Areas	0	0
Non-forested/Unproductive Areas		
Natural	777	2.0
Anthropogenic	1,990	5.1
Sub-Total	2,767	7.2
Gross Forested Area	**35,893**	**92.8**
Hydrological Buffers		
Lake Buffers (100m)	12	0.03
River Buffers (60m)	279	0.7
Stream Buffers (60m)	162	0.4
Stream Buffers (30m)	730	1.9
Lake Buffers (20m)	6	0.02
Sub-Total	1,189	3.0
Net Forested Area	**34,703**	**89.8**
Subjective Deletions	1,476	3.8
Unmerchantable Areas		
Unproductive Timber Productivity Rating	972	2.5
Fair site Sb, Lt, or Fb leading species, and pure softwood species group	521	1.3
Sub-total	1,494	3.9
Net Productive Area[17]	**31,734**	**82.1**

FIGURE 1-6: AGECLASS DISTRIBUTION: PINE SYU (FMU W8)



[15] *Original LFS FMU W8.*

[16] *Some minor differences in totals may exist due to rounding.*

[17] *Cutovers remain in the net productive landbase.*

2.0 GROWTH AND YIELD REVIEW

2.1 VOLUME SAMPLING

The volume sampling program, which was designed in consultation with ANC, included the collection of detailed field information describing the density and volume, by species, for individual sample strata. The objective was to acquire data sufficient to calculate conifer and deciduous volume estimates, at 15/10 utilization standard, for specific subpopulations of the productive forest landbase. The field program was also intended to provide temporary plot information relevant to the construction of empirical yield curves.

2.1.1 SAMPLE DESIGN

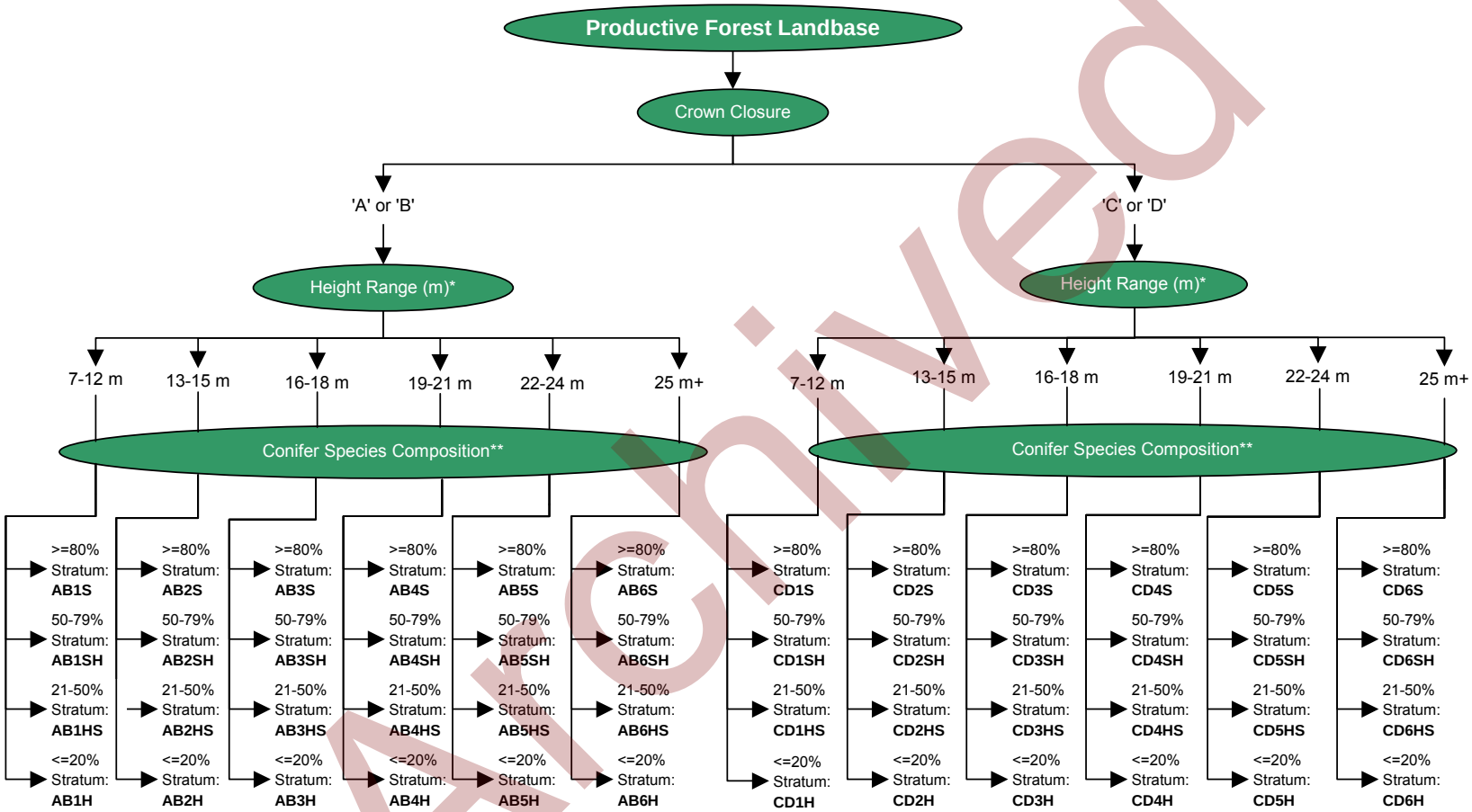
A stratified sample design was initiated in 1992 to obtain estimates of gross and net merchantable volume for each species encountered within each stratum. Sample estimates for each stratum were originally based on a single-stage stratified sample design with fixed-area plots allocated to a subset of townships and distributed in proportion to each stratum's relative area and preliminary estimate of variability. A random allocation routine was used to distribute plots proportionally (to area) to specific stands falling within each stratum and township.

In addition to the regional sampling program, ANC has continued to collect operational timber cruise data on an annual basis. These plots, which have been distributed widely and without bias throughout many compartments in the FMA, provide important data to improve and strengthen strata estimates. A review of the distribution could be pooled to provide more precise estimates of volume and piece-size by species for each stratum. There was no compelling evidence to suggest that the operational cruise plot data was biased or unrepresentative of conditions in the target strata.

2.1.2 LANDBASE STRATIFICATION

Forest stands with similar characteristics were aggregated into a finite set of sampling strata to aid in plot allocation and to increase sample precision. Strata were assigned by evaluating overstorey attributes for forest stands on the productive landbase. The three characteristics of the AVI overstorey used to assign stratum are listed in Figure 2-1.

FIGURE 2-1: VOLUME SAMPLING STRATIFICATION



**Stands less than 7m tall were not assigned a stratum and were not sampled.*

*** The leading species determines whether the composition is HS or SH in cases where the species composition is 50% conifer.*

2.1.3 STAND SELECTION / PLOT ALLOCATION

Fixed area plots were initially allocated to individual sample strata in proportion to relative strata area. Within each stratum, stands were randomly selected on a township basis and a minimum of 2 plots located at random within the polygon's perimeter. In some cases, the plot placement may have coincided with natural clearings or seismic lines (i.e. non-delineated features or linear features with no implied area). The plot was not moved if it landed on (or near) a seismic line or natural clearing.

2.1.4 FIELD PROCEDURES

Field plots were configured as follows:

TABLE 2-1: CRUISE PLOT CONFIGURATION

VARIABLE	CONFIGURATION
Plot size	100m^2 (5.64m radius)[1]
Plot Shape	Circular
DBH limits	12.5cm*
Measurement records	Tree Species
	DBH (to nearest 0.1cm)
	Total height
	Condition code
Sample tree	Age (at 1.3m)

Additional information recorded at each plot included the following:

- Administrative data (date, cruisers, township, range, meridian, stand number, stratum, field type)
- Tie point location and traverse distance/bearing
- Plot disturbance indicator
- Traverse notes

2.1.5 QUALITY CONTROL

ANC staff "check-cruised" survey plots to ensure that the highest quality standards possible were achieved. The field staff was notified of all findings of the check plots. If significant problems were found, the field crew responsible returned to the site to correct the errors.

2.1.6 DATA ENTRY AND VERIFICATION

Silvacom's propriety data entry software was used to keypunch the volume sampling data. Any inconsistencies, or concerns the data-entry personnel had were identified and addressed by technical

[1] *A nested 50m^2 plot was established within the outer plot to capture small tree information in strata with complex structures.*

* *More stringent diameter limits were applied within nested plots and for some operational cruising.*

forestry staff. Silvacom's QC program was used to examine each tree in the keypunched file for validity and consistency. Validation checks included:

- Ratio of dbh to height
- Species and cull suspect class
- Valid entry of plot number, stand number and stratum label
- Valid entry of plot size (i.e. reasonable area for plot type)

2.1.7 CRUISE COMPILATION

Individual tree volumes were calculated through SILVACRUZ using:

- New Natural Region-based, individual tree volume equations (for the Upper Foothills and Lower Foothills Natural Regions);
- The original Phase 3 VSR 4 coefficients.

All data was complied to the 15/10 utilization standard (i.e. minimum stump diameter=15 cm, minimum top diameter=10cm) based on the Natural Region, quadratic dbh-to-stump conversion formula $DOB_{stp}=b_o+b_1D+b_2D_2$ (by species). Total and merchantable volume equations used in the analysis are described below:

Method 1: Natural Region Taper Equation and Variable Definitions

$$d = a_0 D^{a_1} a_2^{D} X^{b_1 z^2 + b_2 1n(z+0.001) + b_3\sqrt{Z} + b_4 e^z + b_5 (D/H)}$$

Where:

$x = (1-\sqrt{h/H})/(1-\sqrt{P})$

And

d = diameter inside bark (cm at h)

h = height above the ground (m), $0 \leq h \leq H$

H = total tree height (m)

D = diameter at breast height outside bark (cm)

Z = h / H

p = location of the inflection point, assumed to be at 22.5% of total height above the ground

e = base of the natural logarithm (≈ 2.71828)

a_0, a_1, a_2, b_1, b_2, b_3, b_4, b_5, = parameters to be estimated

Method 2: Phase 3 Tree Volume Estimation

Merchantable Tree Volume

$$MV = TV \times MR$$

Where:

MV	=	Merchantable tree volume (m^3)
TV	=	Total tree volume
MR	=	Merchantable ratio

Total Tree Volume

$$TV = b_0 D^{b1} H^{b2}$$

Where:

TV	=	Total tree volume (m^3)
D	=	Diameter outside bark (cm) at 1.3m
H	=	Total tree height (m)
b_0, b_1, b_2	=	Species and region specific coefficients

Merchantable Ratio

$$MR = b_3 + b_4 G + b_5 G_2$$

Where:

MR	=	Merchantable ratio
G	=	$(H\text{-}hs)^2/H^2\text{-}(dib^4/D^4)$
H	=	Total tree height (m)
hs	=	Stump height (m)
dib	=	Diameter inside bark (cm) – based on utilization
D	=	Diameter outside bark (cm) at 1.3m
b_3, b_4, b_5	=	Species and region specific coefficients

2.1.7.1 MINIMUM DIAMETER

All trees were compiled to the 15/10 utilization standard (i.e. 15 cm minimum stump diameter, 10 cm minimum top diameter). The minimum DBH assumed to equate to a 15 cm stump diameter[2], by natural region, are provided in the following table:

[2] *Source: "Report #3. Summary of equations and estimated coefficients for ecologically based individual tree volume estimation in Alberta". Huang, S. Alberta Environmental Protection. Land and Forest Services. Forest Management Division. 1994.*

TABLE 2-2: MINIMUM DBH FOR 15 CM STUMP

SPECIES	CENTRAL MIXEDWOOD SUB-REGION	LOWER FOOTHILLS SUB-REGION	UPPER FOOTHILLS SUB-REGION	SUBALPINE SUB-REGION
White spruce (SW)	13.5	13.5	13.6	13.6
Black spruce (SB)	13.7	13.6	13.6	13.6
Lodgepole pine (PL)	13.3	13.6	13.9	14.2
Balsam fir (FB)	13.5	13.5	13.8	13.8
Larch (LT)	13.7	13.6	13.6	13.6
Trembling aspen (AW)	13.7	13.7	13.7	13.7
Balsam poplar (PB)	13.5	13.4	13.4	13.4
White birch (BW)	13.6	13.7	13.6	13.6

2.1.7.2 AGGREGATION OF INDIVIDUAL TREE DATA

Individual tree volumes were aggregated for each plot to determine total conifer and deciduous volume in the plot. Plot volumes were expanded to per hectare estimates and strata estimates computed as the average of plot volumes within each stratum.

2.2 YIELD STRATA DEFINITIONS

AVI overstorey attributes for each stand in the net productive landbase were used to assign individual sample plots to specific yield strata (see Figure 2-2) within each of the primary natural regions of the FMA (upper foothills and lower foothills). Yield strata labels were defined using a combination of the following stand attributes:

- Crown closure;
- Species group;
- Timber productivity rating (TPR).

Species group was calculated from the AVI overstorey label in the following manner:

- The percent contribution to the total crown closure of the stand was determined for the coniferous and deciduous species separately;
- Stands were assigned to one of four classes based on species percentages as follows:
  - Pure Conifer ("S"): 80% to 100% of the stand crown closure is dominated by conifer species;
  - Mixedwood - Conifer Dominant ("SH"): 50% to 79% of the stand crown closure is composed of conifer species;
  - Mixedwood - Deciduous Dominant ("HS"): 21% to 50% of the stand crown closure is composed of conifer species;
  - Pure Deciduous ("H"): 0% to 20% of the stand crown closure is composed of conifer species.

TABLE 2-3: YIELD CURVE STRATIFICATION

AVI OVERSTOREY CHARACTERISTIC	AVI OVERSTOREY ATTRIBUTE VALUE	CLASSIFICATION
CROWN CLOSURE CLASS	A or B	AB
	C or D	CD
SPECIES COMPOSITION	Contribution of all conifer species to the overstorey crown closure is 80% to 100%	S
	Contribution of all conifer species to the overstorey crown closure is 20% to 80%	MX
	Contribution of all conifer species to the overstorey crown closure is 0% to 20%	H
NATURAL REGION[3]	Upper Foothills	10
	Lower Foothills	11
	All	A
TIMBER PRODUCTIVITY RATING	Good	G
	Medium	M
	Fair	F
	All	A

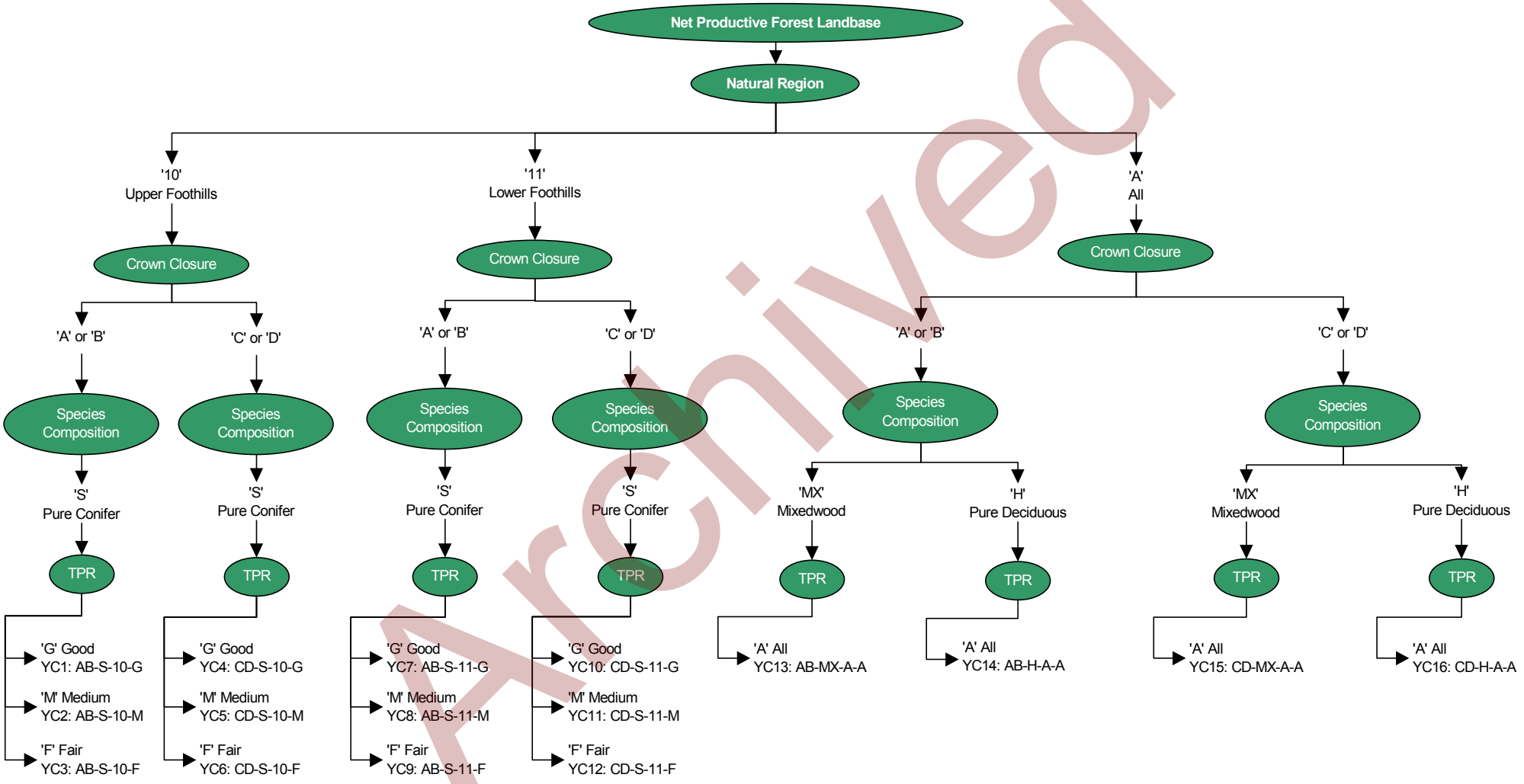
TABLE 2-4: YIELD STRATA ASSIGNMENTS AND NUMBERS[4]

YIELD CURVE NUMBER	CROWN CLOSURE	SPECIES GROUP	NATURAL REGION	TPR
1	AB	S	10 (Upper Foothills)	G
2	AB	S	10	M
3	AB	S	10	F
4	CD	S	10	G
5	CD	S	10	M
6	CD	S	10	F
7	AB	S	11 (Lower Foothills)	G
8	AB	S	11	M
9	AB	S	11	F
10	CD	S	11	G
11	CD	S	11	M
12	CD	S	11	F
13	AB	MX	A	A
14	CD	MX	A	A
15	AB	H	A	A
16	CD	H	A	A

[3] *Individual plots were assigned, by township, to either Natural Region 10 or Natural Region11 (based on pro-rated areas by township). Due to sample size limitations, plots in Natural Region 8 (Subalpine) were pooled with the Upper Foothills plots (NR 10) and plots in the Central Mixedwood (NR 1) were pooled with Lower Foothills plots (NR 11).*

[4] *All existing cutblocks were assigned to yield curve number 5 or 11.*

FIGURE 2-2: YIELD CURVE STRATIFICATION



2.3 YIELD CURVE DEVELOPMENT

Temporary timber cruise plots from a variety of sources, including ANC's regional and operational volume sampling programs, as well as Forest Service quota plots, were compiled to generate strata estimates using VSR-referenced individual-tree volume and merchantable ratio equations. All strata estimates, and individual yield curves, were compiled on an FMA-wide basis (i.e. a single set of yield curves was used for all areas in the FMA).

In an effort to conform to enhance and localize yield estimation, ANC has incorporated numerous improvements in its yield curve methodology. The following changes reflect an incremental evolution rather than a radical departure from earlier procedures:

- Provincial "natural region" boundaries were superimposed over the FMA to provide meaningful geographic, site-related divisions of the landbase. Additional work was undertaken by ANC to verify and fine-tune the ecological classification (see Natural Regions and Subregions map on page 2-10);
- New LFS "natural region"-based, individual tree volume equations were used to compile temporary sample plot volumes (by species);
- An empirical "plot-based" methodology (vs. area-weighted techniques), was used to develop conifer and deciduous volume/age relationships;
- The two parameter models were used to fit curves to sample data;
- The source of temporary plot data used to develop the yield curves was simplified and localized to include only ANC cruise information.

Rge 5 Rge 4 Rge 3 Rge 2 Rge 1 6th MER Rge 27 Rge 26 Rge 25 Rge 24 Rge 23 Rge 22 Rge 21 Rge 20 Rge 19 Rge 18 Rge 17

Twp 64 Twp 63 Twp 62 Twp 61 Twp 60 Twp 59 Twp 58 Twp 57 Twp 56 Twp 55

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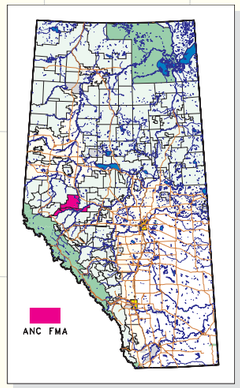
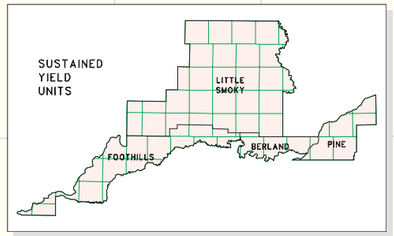
FOREST MANAGEMENT AREA

NATURAL REGIONS AND SUBREGIONS





MAP SCALE 1:400 000

REGION	SUBREGION
BOREAL FOREST	CENTRAL MIXEDWOOD
FOOTHILLS	LOWER FOOTHILLS
FOOTHILLS	UPPER FOOTHILLS
ROCKY MOUNTAIN	SUB-ALPINE

Natural Regions Data Source:
Geographic Dynamics Corp.
Ecosite Map
Prepared for ANC Ltd.
CD - November 11, 1999

Map Production: Silvacom Ltd
Map Date: June 7, 1999
Map Scale: 1:400000
Silvacom Ref.: G-049
Map File:
.../g-049/maps/report_maps/nat_reg2

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2.3.1 YIELD CURVE MODEL

Empirical yield tables (15/10 utilization standard) were developed directly from the volume sampling data in combination with the AVI forest classification. Empirical plot-based yield curves were generated for each yield strata. Conifer and deciduous yields (volume by age) were then predicted from a statistical fit of the non-linear model presented below[5].

Non-linear Model Used in Yield Curve Development[6]

$$y = b_0 x^{b_1} e^{(-b_2 x)}$$

Where:

y	=	predicted merchantable volume (m^3/ha)-conifer or deciduous
b_0, b_1, b_2	=	predicted non-linear regression coefficients
x	=	10 year ageclass
e	=	base of the natural logarithm (≈2.71828)

2.4 YIELD CURVE COEFFICIENTS AND FIT STATISTICS

Non-linear regression procedures were used to fit the specified yield curve model to conifer and deciduous plot volumes, by ageclass, for each yield strata. Table 2-5 provides coefficients and fit statistics for the 16 empirical yield curves at 15/10 utilization (plots calculated using Natural Region tree volume equations). VSR tree volume equations were also used for yield curve validation (see Table 2-6). Area-weighted yield curves, for the same combinations of Natural Region, density, species and site, were also developed as a check on the plot-based curves. Area-weighted average yields (conifer and deciduous) were generated for each yield strata and ageclass combination then fit to the identical non-linear model. Net yield curve/yield table profiles are presented in Appendix D.

[5] *Individual plots were assigned, by township, to either Natural Region 10 or Natural Region11 (based on pro-rated areas by township). Due to sample size limitations, plots in Natural Region 8 (Subalpine) were pooled with the Upper Foothills plots (NR 10) and plots in the Central Mixedwood (NR 1) were pooled with Lower Foothills plots (NR 11).*

[6] *The two parameter, non-linear LFS curve, was used to fit most data sets (i.e. in the formula above, the b_0 and b_2 coefficients are identical). The intercept, b_0 was added to guide the curve fit of conifer and deciduous volumes on fair sites (yield curves 3, 6, 9, 12) and deciduous volumes on AB density, good site conifer (yield curve 1).*

TABLE 2-5: YIELD TABLE COEFFICIENTS (15/10 UTILIZATION STANDARD) NATURAL REGION TREE VOLUME EQUATIONS USED IN CRUISE COMPILATION

LABEL		CONIFER SUMMARY				DECIDUOUS SUMMARY			
		COEFFICIENT b_0	COEFFICIENT b_1	COEFFICIENT b_2	r^2	COEFFICIENT b_0	COEFFICIENT b_1	COEFFICIENT b_2	r^2
1	10-AB-S-G	0.011681029	2.354569496	0.011681029	0.087	0.000000017	3.394484687	0.011712602	0.036
2	10-AB-S-M	0.006789848	2.262929059	0.006789848	0.093	0.028901663	1.798303626	0.028901663	0.006
3	10-AB-S-F	0.001802883	2.493615688	0.008442724	0.159	0.000008172	3.410257013	0.049206286	0.015
4	10-CD-S-G	0.020695572	2.531501060	0.020695572	0.145	0.006454283	1.727843258	0.006454283	0.009
5	10-CD-S-M	0.012390348	2.379866690	0.012390348	0.139	0.007184655	1.563554714	0.007184655	0.001
6	10-CD-S-F	0.000414283	3.200713962	0.022003804	0.196	0.000052669	2.501721678	0.015600676	0.006
7	11-AB-S-G	0.011883937	2.360853746	0.011883937	0.079	0.011189284	1.918153259	0.011189284	0.009
8	11-AB-S-M	0.011036005	2.298631855	0.011036005	0.019	0.025317659	1.962600883	0.025317659	0.001
9	11-AB-S-F	0.001656153	2.431004715	0.012374141	0.090	0.000021338	3.016904844	0.015805943	0.011
10	11-CD-S-G	0.022841467	2.542810082	0.022841467	0.012	0.012118670	2.072434820	0.012118670	0.003
11	11-CD-S-M	0.018612675	2.445816611	0.018612675	0.024	0.019201931	1.935916417	0.019201931	0.002
12	11-CD-S-F	0.013783792	2.465995132	0.021587034	0.048	0.000243670	2.570531181	0.016686215	0.032
13	A-AB-MX-A	0.027085387	2.418104864	0.027085387	0.013	0.014169562	2.105017026	0.014169562	0.023
14	A-CD-MX-A	0.011484161	2.344956307	0.011484161	0.045	0.024597749	2.383649298	0.024597749	0.020
15	A-AB-H-A	0.006519575	2.183901762	0.006519575	0.116	0.011239586	2.187476473	0.011239586	0.053
16	A-CD-H-A	0.015536145	2.192726387	0.015536145	0.022	0.017250326	2.424579830	0.017250326	0.054

TABLE 2-6: YIELD TABLE COEFFICIENTS (15/10 UTILIZATION STANDARD) VSR VOLUME EQUATIONS USED IN CRUISE COMPILATION

LABEL		CONIFER SUMMARY				DECIDUOUS SUMMARY			
		COEFFICIENT b_0	COEFFICIENT b_1	COEFFICIENT b_2	r^2	COEFFICIENT b_0	COEFFICIENT b_1	COEFFICIENT b_2	r^2
1	10-AB-S-G	0.011658700	2.364640187	0.011658700	0.086	0.000000582	3.014966264	0.019919385	0.049
2	10-AB-S-M	0.006466892	2.271507352	0.006466892	0.099	0.029832675	1.826927574	0.029832675	0.006
3	10-AB-S-F	0.001766253	2.499507144	0.008290518	0.162	0.000030893	3.423482252	0.047320400	0.016
4	10-CD-S-G	0.019939946	2.520745241	0.019939946	0.147	0.006430280	1.737741660	0.006430280	0.009
5	10-CD-S-M	0.011671085	2.371410286	0.011671085	0.147	0.007244633	1.580351177	0.007244633	0.001
6	10-CD-S-F	0.001666935	2.802780857	0.017777599	0.201	0.000005361	3.303190359	0.021568847	0.006
7	11-AB-S-G	0.011642381	2.367977492	0.011642381	0.080	0.009071889	1.934013526	0.009071889	0.011
8	11-AB-S-M	0.011175285	2.308645842	0.011175285	0.019	0.027031994	2.001664841	0.027031994	0.001
9	11-AB-S-F	0.001452334	2.461746189	0.012482205	0.092	0.000304611	2.715468290	0.033540847	0.008
10	11-CD-S-G	0.022184166	2.536437866	0.022184166	0.014	0.012310595	2.085642574	0.012310595	0.003
11	11-CD-S-M	0.018007010	2.436326231	0.018007010	0.025	0.019146394	1.948245205	0.019146394	0.002
12	11-CD-S-F	0.012360049	2.470279172	0.021066989	0.054	0.001674735	1.895503407	0.011042120	0.032
13	A-AB-MX-A	0.027736735	2.436904064	0.027736735	0.013	0.014505196	2.121252248	0.014505196	0.023
14	A-CD-MX-A	0.011190393	2.349900453	0.011190393	0.047	0.025605804	2.410008691	0.025605804	0.019
15	A-AB-H-A	0.006571873	2.197298701	0.006571873	0.116	0.011797517	2.202559143	0.011797517	0.050
16	A-CD-H-A	0.015555376	2.202360076	0.015555376	0.022	0.016480579	2.428000379	0.016480579	0.058

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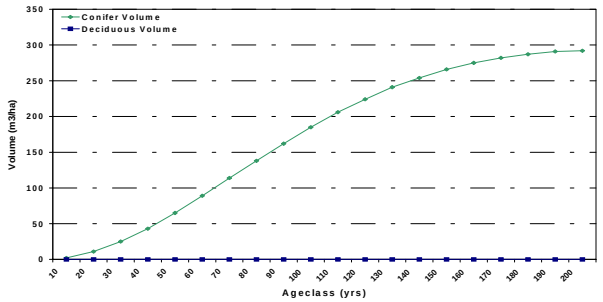
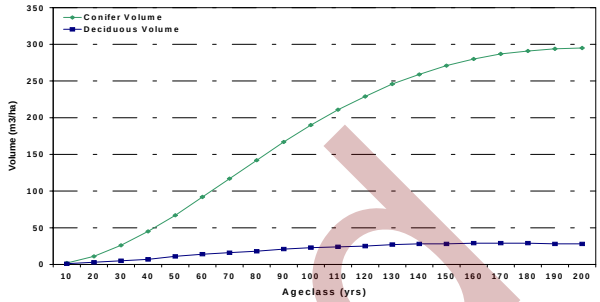
TABLE 2-7: YIELD CURVES: AB CROWN CLOSURE

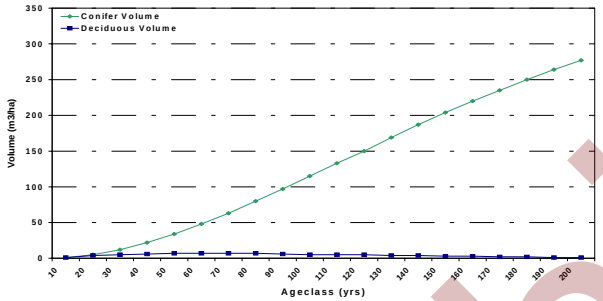
10-AB-S-G



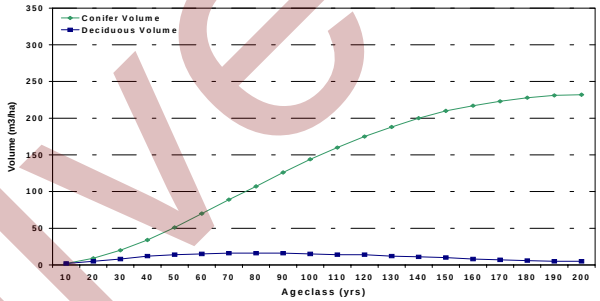
11-AB-S-G



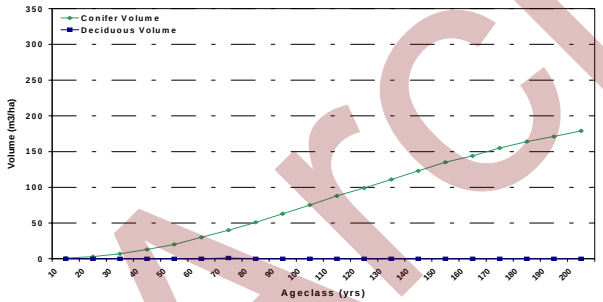
10-AB-S-M



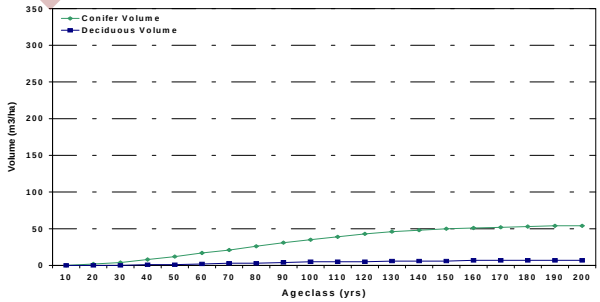
11-AB-S-M



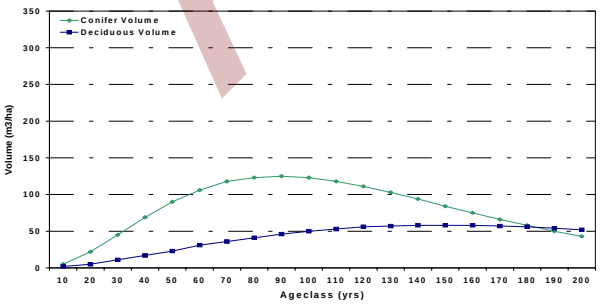
10-AB-S-F



11-AB-S-F



A-AB-MX-A



A-AB-H-A

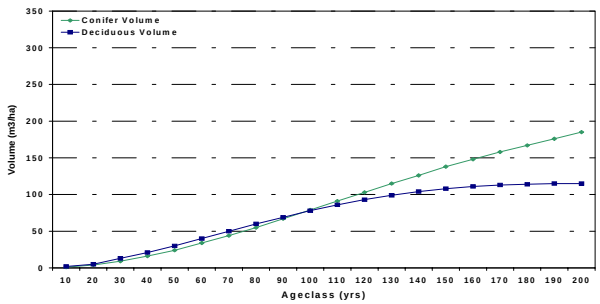


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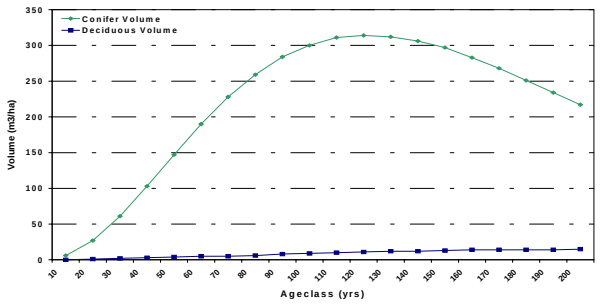
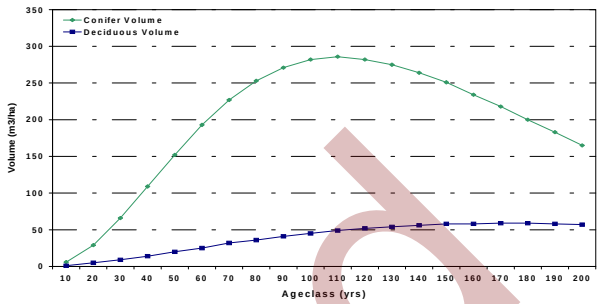
TABLE 2-8: YIELD CURVES: CD CROWN CLOSURE

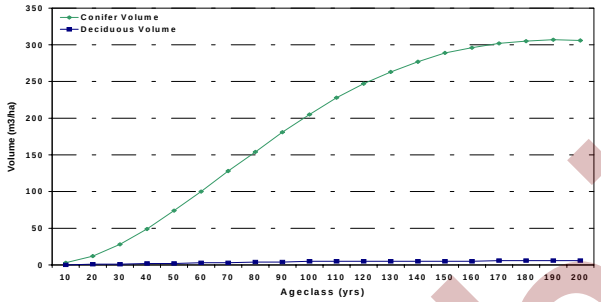
10-CD-S-G



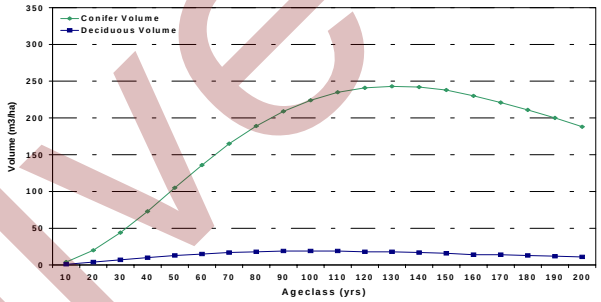
11-CD-S-G



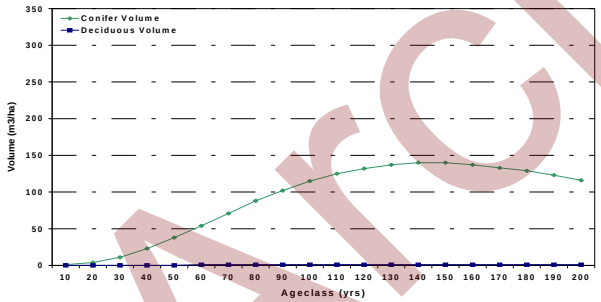
10-CD-S-M



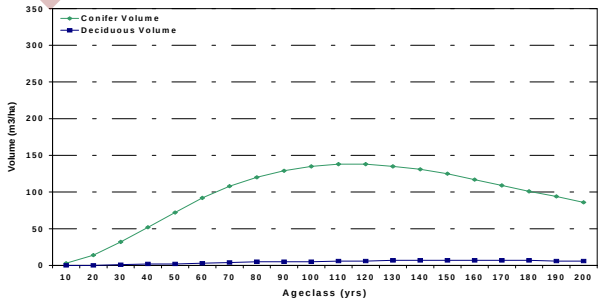
11-CD-S-M



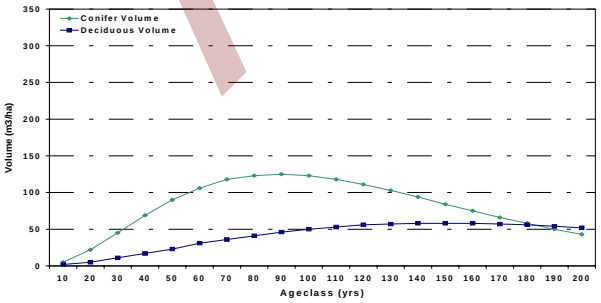
10-CD-S-F



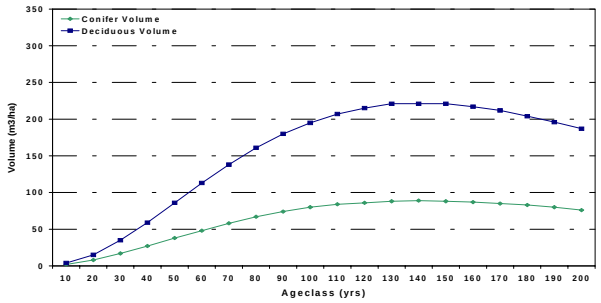
11-CD-S-F



A-CD-MX-A



A-CD-H-A



2.4.1 CULL DEDUCTION

All of the gross empirical yield curves used to calculate the annual allowable cut have been reduced by the following percents to account for losses due to cull.

TABLE 2-9: CULL DEDUCTION

AGECLASS	CONIFER CULL DEDUCTION %	DECIDUOUS CULL DEDUCTION %
10	0.0	10.0
20	0.0	10.0
30	0.0	10.0
40	0.0	10.0
50	0.0	10.0
60	0.0	10.0
70	0.0	10.0
80	0.5	10.0
90	0.5	10.0
100	0.5	10.0
110	0.5	10.0
120	1.0	10.0
130	1.0	10.0
140	1.0	10.0
150	1.0	10.0
160	1.5	10.0
170	1.5	10.0
180	1.5	10.0
190	1.5	10.0
200	1.5	10.0

For example, if the gross conifer volume at 90 years is 286 m^3/ha, then the net conifer volume at 90 years would be reduced by 0.5% to yield 285m^3/ha.

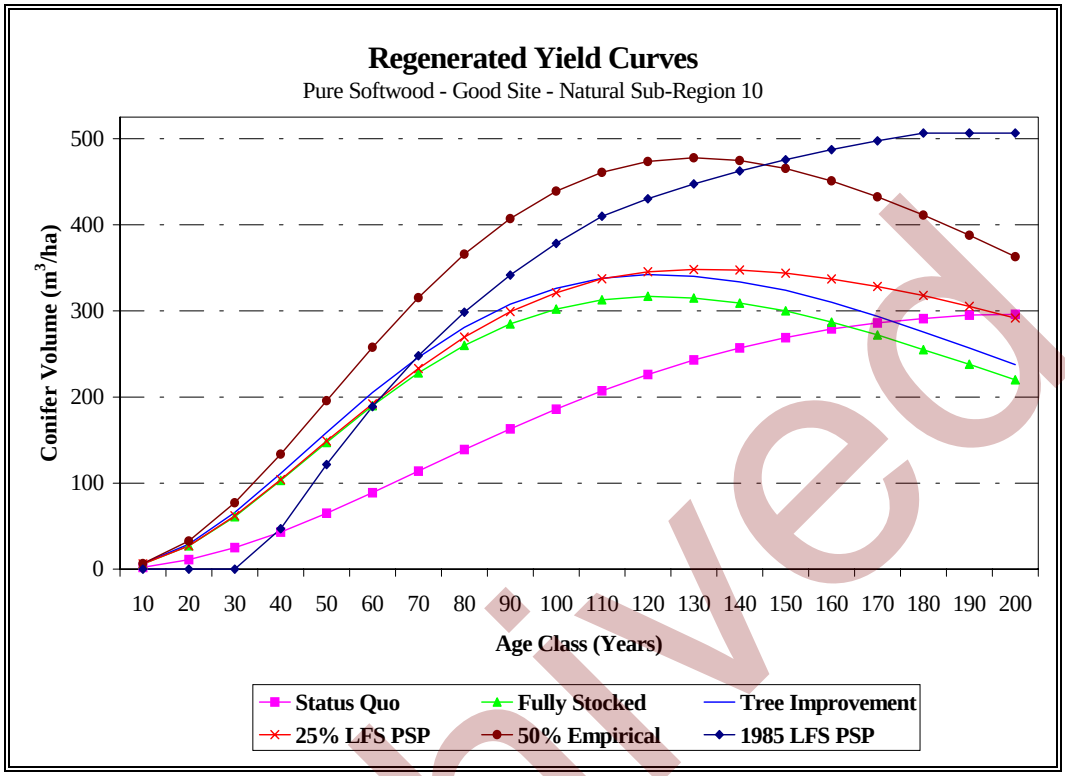
2.4.2 REGENERATED YIELDS

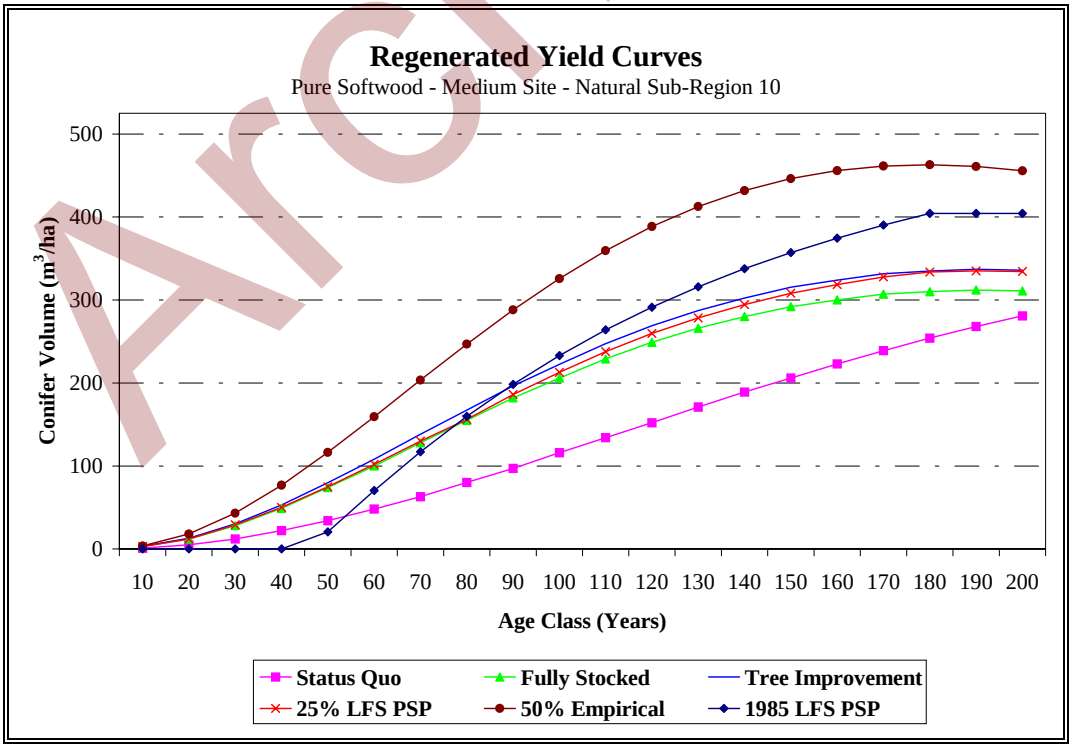
The effect of five regeneration strategies was simulated through the use of various yield curves and yield transition assumptions. The following regenerated yield scenarios were developed to conduct sensitivity analysis of ANC's timber supply. Graphs on the following pages provide comparisons of the regenerated yield scenarios applied to good and medium sites in Natural Regions 10 and 11. Yield curve transitions used in the timber supply analysis are presented in Appendix E.

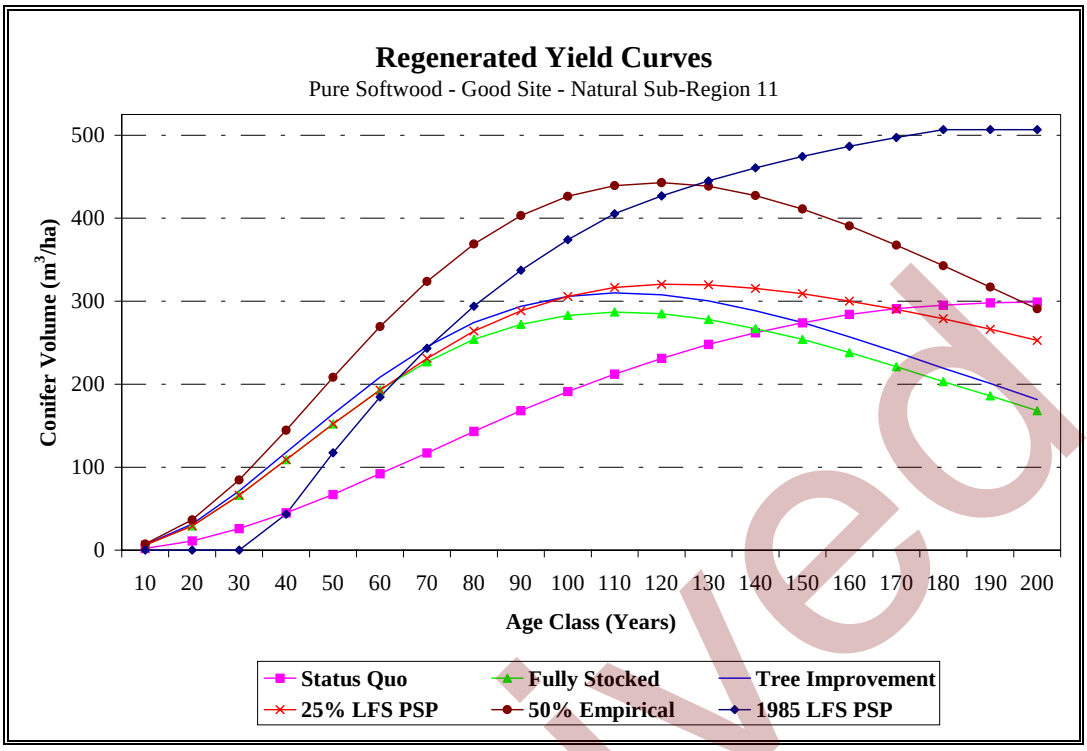
TABLE 2-10: REGENERATED YIELD SCENARIOS

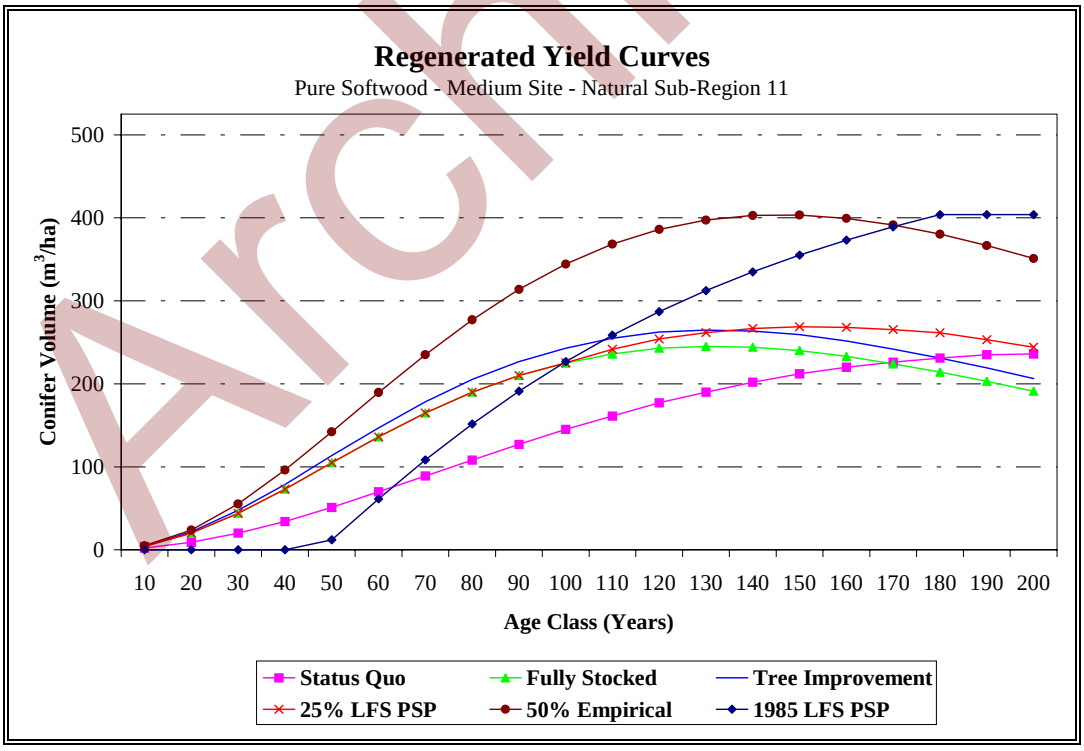
SCENARIO	DESCRIPTION
Status Quo (SQ)	Stands regenerate on the current yield curve and are assumed to maintain the same overstorey density (i.e. AB density regenerates to AB density), species composition and TPR.
Fully Stocked (FS)	Stands regenerate on the fully stocked yield curve (i.e. AB density regenerates to CD density) with the same species composition and TPR.
25% LFS PSP	Fully stocked (CD density) conifer yields are assumed to improve, through silvicultural intervention, and increase to 25% of the difference between the empirical CD density yield curve and an area-weighted average (pine vs. white spruce by site index) of the 1985 LFS PSP-based (fully stocked, natural stand) yield curves.
50% Empirical	Fully stocked conifer yields are assumed to improve, through silvicultural intervention and aggressive or “enhanced” forest management practices, and attain stand growth equivalent to the top 50% of the highest observed yields by ageclass.
Tree Improvement (TI)	Fully stocked (CD density) conifer yields are assumed to improve by 8% across good and medium sites in both Natural Regions.

FIGURE 2-3: REGENERATED YIELD CURVES









3.0 TIMBER SUPPLY ANALYSIS – PROCEDURES & RESULTS

3.1 MODELS USED

This section summarizes the procedures, results and assumptions applied in the determination of the annual allowable harvest level for the ANC FMA area.

3.1.1 LRSYA

Long run sustained yield average (LRSYA) is a measure of forest productivity and is calculated as the sum of growth per year of regenerated stands at a selected rotation age. It is derived from the theoretical concept of a regulated forest with static and uniform ageclass distribution, a single rotation age and a single yield function operating across equally productive sites. Under this assumption, the annual harvest equates the annual growth in the oldest ageclass. LRSYA was calculated using the following formula:

$$LRSYA = \sum_{1}^{i} MAI_i \bullet A_i$$

Where:

LRSYA=		long run sustained yield average (m3/yr)
MAIi	=	mean annual increment (m3/ha/yr) for yield class 'i'
Ai	=	net area (ha) for yield class 'i'

The LRSYA estimates for the various yield curve regeneration transitions are provided in Table 3-1 through Table 3-5.

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TABLE 3-1: PRELIMINARY LRSYA ESTIMATES FOR ANC FMA – STATUS QUO REGENERATION TRANSITION

YIELD CURVE	AREA (HA) BY YIELD CURVE						MAI (M^3/HA/YR) @ 90 YEARS	PRELIMINARY LRSYA (M^3/YR)				
	DESCRIPTION	BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA		BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA
1	AB-S-10-G	118	826	1,456	231	2,630	1.81	213	1,495	2,637	418	4,763
2	AB-S-10-M	120	5,881	8,946	454	15,401	1.08	130	6,339	9,642	489	16,599
3	AB-S-10-F	83	2,435	2,155	216	4,888	0.70	58	1,704	1,508	151	3,421
4	CD-S-10-G	172	4,059	9,399	1,862	15,492	3.17	545	12,853	29,763	5,896	49,057
5	CD-S-10-M	713	31,344	43,756	2,356	78,169	2.02	1,441	63,384	88,485	4,765	158,076
6	CD-S-10-F	85	13,428	5,386	529	19,427	1.14	97	15,367	6,164	606	22,234
7	AB-S-11-G	499	218	2,619	655	3,990	1.87	931	406	4,889	1,222	7,449
8	AB-S-11-M	1,355	802	8,658	1,504	12,319	1.41	1,912	1,132	12,217	2,122	17,383
9	AB-S-11-F	124	49	1,619	714	2,506	0.34	43	17	558	246	863
10	CD-S-11-G	1,463	667	8,455	5,640	16,225	3.02	4,421	2,016	25,554	17,046	49,037
11	CD-S-11-M	6,422	3,421	38,654	9,194	57,690	2.33	14,984	7,981	90,193	21,452	134,610
12	CD-S-11-F	729	544	4,090	1,407	6,769	1.44	1,052	785	5,908	2,032	9,777
13	AB-MX-A-A	1,106	162	3,537	976	5,781	1.40	1,549	226	4,952	1,367	8,094
14	CD-MX-A-A	4,567	437	8,493	4,378	17,875	1.73	7,916	757	14,722	7,588	30,983
15	AB-H-A-A	337	22	4,637	480	5,477	0.74	251	17	3,452	357	4,078
16	CD-H-A-A	1,469	649	14,786	1,140	18,043	0.82	1,208	533	12,157	937	14,836
Totals		19,361	64,941	166,647	31,734	282,683		36,751	115,013	312,801	66,692	531,259

TABLE 3-2: PRELIMINARY LRSYA ESTIMATES FOR ANC FMA – FULLY STOCKED REGENERATION TRANSITION

YIELD CURVE	AREA (HA) BY YIELD CURVE						MAI (M^3/HA/YR) @ 90 YEARS	PRELIMINARY LRSYA (M^3/YR)				
	DESCRIPTION	BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA		BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA
1	AB-S-10-G	118	826	1,456	231	2,630	3.17	372	2,614	4,611	730	8,327
2	AB-S-10-M	120	5,881	8,946	454	15,401	2.02	243	11,893	18,090	918	31,144
3	AB-S-10-F	83	2,435	2,155	216	4,888	1.14	95	2,786	2,466	247	5,594
4	CD-S-10-G	172	4,059	9,399	1,862	15,492	3.17	545	12,853	29,763	5,896	49,057
5	CD-S-10-M	713	31,344	43,756	2,356	78,169	2.02	1,441	63,384	88,485	4,765	158,076
6	CD-S-10-F	85	13,428	5,386	529	19,427	1.14	97	15,367	6,164	606	22,234
7	AB-S-11-G	499	218	2,619	655	3,990	3.02	1,508	658	7,915	1,978	12,060
8	AB-S-11-M	1,355	802	8,658	1,504	12,319	2.33	3,162	1,872	20,201	3,508	28,744
9	AB-S-11-F	124	49	1,619	714	2,506	1.44	180	70	2,338	1,031	3,620
10	CD-S-11-G	1,463	667	8,455	5,640	16,225	3.02	4,421	2,016	25,554	17,046	49,037
11	CD-S-11-M	6,422	3,421	38,654	9,194	57,690	2.33	14,984	7,981	90,193	21,452	134,610
12	CD-S-11-F	729	544	4,090	1,407	6,769	1.44	1,052	785	5,908	2,032	9,777
13	AB-MX-A-A	1,106	162	3,537	976	5,781	1.73	1,918	280	6,131	1,692	10,021
14	CD-MX-A-A	4,567	437	8,493	4,378	17,875	1.73	7,916	757	14,722	7,588	30,983
15	AB-H-A-A	337	22	4,637	480	5,477	0.82	277	18	3,813	395	4,504
16	CD-H-A-A	1,469	649	14,786	1,140	18,043	0.82	1,208	533	12,157	937	14,836
Totals		19,361	64,941	166,647	31,734	282,683		39,419	123,870	338,513	70,821	572,622

TABLE 3-3: PRELIMENARY LRSYA ESTIMATES FOR ANC FMA – 25% LFS PSP REGENERATION TRANSITION

YIELD CURVE	AREA (HA) BY YIELD CURVE						MAI (M^3/HA/YR) @ 90 YEARS	PRELIMINARY LRSYA (M^3/YR)				
	DESCRIPTION	BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA		BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA
1	AB-S-10-G	118	826	1,456	231	2,630	3.32	391	2,744	4,840	766	8,741
2	AB-S-10-M	120	5,881	8,946	454	15,401	2.07	249	12,161	18,498	938	31,846
3	AB-S-10-F	83	2,435	2,155	216	4,888	1.17	96	2,840	2,514	252	5,702
4	CD-S-10-G	172	4,059	9,399	1,862	15,492	3.32	572	13,492	31,242	6,189	51,495
5	CD-S-10-M	713	31,344	43,756	2,356	78,169	2.07	1,474	64,811	90,478	4,872	161,636
6	CD-S-10-F	85	13,428	5,386	529	19,427	1.17	99	15,666	6,284	617	22,665
7	AB-S-11-G	499	218	2,619	655	3,990	3.20	1,598	698	8,390	2,097	12,782
8	AB-S-11-M	1,355	802	8,658	1,504	12,319	2.33	3,162	1,872	20,201	3,508	28,744
9	AB-S-11-F	124	49	1,619	714	2,506	1.44	180	70	2,338	1,031	3,620
10	CD-S-11-G	1,463	667	8,455	5,640	16,225	3.20	4,686	2,137	27,085	18,067	51,975
11	CD-S-11-M	6,422	3,421	38,654	9,194	57,690	2.33	14,984	7,981	90,193	21,452	134,610
12	CD-S-11-F	729	544	4,090	1,407	6,769	1.44	1,052	785	5,908	2,032	9,777
13	AB-MX-A-A	1,106	162	3,537	976	5,781	1.73	1,918	280	6,131	1,692	10,021
14	CD-MX-A-A	4,567	437	8,493	4,378	17,875	1.73	7,916	757	14,722	7,588	30,983
15	AB-H-A-A	337	22	4,637	480	5,477	0.82	277	18	3,813	395	4,504
16	CD-H-A-A	1,469	649	14,786	1,140	18,043	0.82	1,208	533	12,157	937	14,836
Totals		19,361	64,941	166,647	31,734	282,683		39,862	126,846	344,794	72,434	583,936

TABLE 3-4: PRELIMENARY LRSYA ESTIMATES FOR ANC FMA – 50% EMPIRICAL REGENERATION TRANSITION

YIELD CURVE	AREA (HA) BY YIELD CURVE						MAI (M^3/HA/YR) @ 90 YEARS	PRELIMINARY LRSYA (M^3/YR)				
	DESCRIPTION	BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA		BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA
1	AB-S-10-G	118	826	1,456	231	2,630	4.53	532	3,736	6,588	1,043	11,900
2	AB-S-10-M	120	5,881	8,946	454	15,401	3.20	385	18,823	28,632	1,452	49,292
3	AB-S-10-F	83	2,435	2,155	216	4,888	1.17	97	2,851	2,523	253	5,724
4	CD-S-10-G	172	4,059	9,399	1,862	15,492	4.53	779	18,367	42,531	8,425	70,102
5	CD-S-10-M	713	31,344	43,756	2,356	78,169	3.20	2,281	100,317	140,045	7,542	250,185
6	CD-S-10-F	85	13,428	5,386	529	19,427	1.17	99	15,725	6,307	620	22,752
7	AB-S-11-G	499	218	2,619	655	3,990	4.48	2,234	975	11,731	2,932	17,873
8	AB-S-11-M	1,355	802	8,658	1,504	12,319	3.49	4,724	2,797	30,182	5,242	42,945
9	AB-S-11-F	124	49	1,619	714	2,506	1.45	180	70	2,343	1,033	3,626
10	CD-S-11-G	1,463	667	8,455	5,640	16,225	4.48	6,552	2,987	37,872	25,262	72,673
11	CD-S-11-M	6,422	3,421	38,654	9,194	57,690	3.49	22,387	11,924	134,753	32,050	201,114
12	CD-S-11-F	729	544	4,090	1,407	6,769	1.45	1,054	787	5,919	2,036	9,796
13	AB-MX-A-A	1,106	162	3,537	976	5,781	1.73	1,918	280	6,131	1,692	10,021
14	CD-MX-A-A	4,567	437	8,493	4,378	17,875	1.73	7,916	757	14,722	7,588	30,983
15	AB-H-A-A	337	22	4,637	480	5,477	0.82	277	18	3,813	395	4,504
16	CD-H-A-A	1,469	649	14,786	1,140	18,043	0.82	1,208	533	12,157	937	14,836
Totals		19,361	64,941	166,647	31,734	282,683		52,624	180,950	486,249	98,501	818,324

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TABLE 3-5: PRELIMENARY LRSYA ESTIMATES FOR ANC FMA – TREE IMPROVEMENT REGENERATION TRANSITION

YIELD CURVE	AREA (HA) BY YIELD CURVE						MAI (M^3/HA/YR) @ 90 YEARS	PRELIMINARY LRSYA (M^3/YR)				
	DESCRIPTION	BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA		BERLAND (E6)	FOOTHILLS (E7)	LITTLE SMOKY (W1)	PINE (W8)	FMA
1	AB-S-10-G	118	826	1,456	231	2,630	3.42	402	2,824	4,979	788	8,993
2	AB-S-10-M	120	5,881	8,946	454	15,401	2.18	263	12,845	19,538	991	33,636
3	AB-S-10-F	83	2,435	2,155	216	4,888	1.24	102	3,009	2,663	267	6,041
4	CD-S-10-G	172	4,059	9,399	1,862	15,492	3.42	589	13,881	32,144	6,367	52,982
5	CD-S-10-M	713	31,344	43,756	2,356	78,169	2.18	1,557	68,455	95,564	5,146	170,722
6	CD-S-10-F	85	13,428	5,386	529	19,427	1.24	105	16,597	6,657	654	24,012
7	AB-S-11-G	499	218	2,619	655	3,990	3.26	1,628	711	8,549	2,137	13,024
8	AB-S-11-M	1,355	802	8,658	1,504	12,319	2.52	3,415	2,022	21,818	3,789	31,044
9	AB-S-11-F	124	49	1,619	714	2,506	1.56	194	76	2,525	1,114	3,909
10	CD-S-11-G	1,463	667	8,455	5,640	16,225	3.26	4,775	2,177	27,599	18,409	52,960
11	CD-S-11-M	6,422	3,421	38,654	9,194	57,690	2.52	16,183	8,620	97,409	23,168	145,379
12	CD-S-11-F	729	544	4,090	1,407	6,769	1.56	1,136	848	6,381	2,194	10,560
13	AB-MX-A-A	1,106	162	3,537	976	5,781	1.73	1,918	280	6,131	1,692	10,021
14	CD-MX-A-A	4,567	437	8,493	4,378	17,875	1.73	7,916	757	14,722	7,588	30,983
15	AB-H-A-A	337	22	4,637	480	5,477	0.82	277	18	3,813	395	4,504
16	CD-H-A-A	1,469	649	14,786	1,140	18,043	0.82	1,208	533	12,157	937	14,836
Totals		19,361	64,941	166,647	31,734	282,683		41,667	133,652	362,648	75,637	613,605

3.1.2 AREA VOLUME CHECK

Area volume check is an additional tool in the timber supply analysis. It is useful in determining theoretical unconstrained harvest levels, and is used in conjunction with LRSYA to bracket the harvest simulation analysis.

Calculations were done for an amalgamated (single) landbase, and for split (conifer vs. deciduous) landbase across the FMA and within each FMU. Separate conifer and deciduous yield curves were developed for each landbase. Table 3-6 through Table 3-8 present the area volume check results.

TABLE 3-6: AREA VOLUME CHECK RESULTS: ENTIRE FMA

	ROTATION LENGTH (YEARS)	CONIFER AAC (REGEN: SQ)		CONIFER AAC (REGEN: FULLY STOCKED)	
		1ST R (M^3/YR)	2ND R (M^3/YR)	1ST R (M^3/YR)	2ND R (M^3/YR)
Total Net Landbase Conifer AAC. Total Net Landbase Area=282,683 ha	70	892,498	592,287	892,498	615,935
	80	794,140	603,119	794,140	632,991
	90	716,415	597,012	716,415	632,037
	100	653,852	583,735	653,852	625,430
	110	599,007	564,309	599,007	608,199
Net Conifer Landbase Conifer AAC. Total Net Conifer Landbase Area=259,162 ha	70	850,876	591,299	850,876	613,538
	80	755,004	600,919	755,004	624,644
	90	679,895	588,516	679,895	623,042
	100	616,529	570,201	616,529	611,905
	110	560,481	543,667	560,481	590,483
Net Deciduous Landbase Conifer AAC. Total Net Deciduous Landbase Area=23,520 ha	70	28,277	20,898	28,277	21,164
	80	25,729	20,514	25,729	21,122
	90	23,600	20,828	23,600	20,850
	100	21,820	19,976	21,820	20,069
	110	20,182	19,781	20,182	19,745
Total Net Landbase Deciduous AAC. Total Net Landbase Area=282,683 ha	70	164,694	182,126	164,694	182,033
	80	143,226	169,459	143,226	168,846
	90	126,544	158,431	126,544	158,519
	100	113,683	143,531	113,683	142,757
	110	102,484	128,864	102,484	127,748
Net Conifer Landbase Deciduous AAC. Total Net Conifer Landbase Area=259,162 ha	70	118,150	114,028	118,150	112,266
	80	103,535	105,038	103,535	108,680
	90	92,258	101,371	92,258	101,500
	100	82,920	93,551	82,920	93,173
	110	74,696	85,274	74,696	85,498
Net Deciduous Landbase Deciduous AAC. Total Net Deciduous Landbase Area=23,520 ha	70	70,162	45,638	70,162	51,435
	80	63,386	47,104	63,386	52,361
	90	57,739	47,275	57,739	52,134
	100	53,184	46,920	53,184	51,174
	110	49,097	45,677	49,097	49,097

TABLE 3-7: AREA VOLUME CHECK RESULTS: BERLAND SYU (FMU E6)

	ROTATION LENGTH (YEARS)	CONIFER AAC (REGEN: SQ)		CONIFER AAC (REGEN: FULLY STOCKED)	
		1ST R (M^3/YR)	2ND R (M^3/YR)	1ST R (M^3/YR)	2ND R (M^3/YR)
Total Net Landbase Conifer AAC. Total Net Landbase Area=19,361 ha	70	62,634	40,680	62,634	41,938
	80	55,652	41,103	55,652	43,030
	90	49,845	41,103	49,845	43,358
	100	44,861	40,179	44,861	42,702
	110	41,091	38,522	41,091	41,726
Net Conifer Landbase Conifer AAC. Total Net Conifer Landbase Area=17,555 ha	70	58,819	40,290	58,819	41,245
	80	51,861	40,710	51,861	42,357
	90	46,099	40,099	46,099	42,357
	100	41,489	38,896	41,489	41,339
	110	37,717	37,009	37,717	40,087
Net Deciduous Landbase Conifer AAC. Total Net Deciduous Landbase Area=1,806 ha	70	2,226	1,621	2,226	1,629
	80	1,929	1,424	1,929	1,425
	90	1,720	1,405	1,720	1,440
	100	1,548	1,430	1,548	1,394
	110	1,405	1,365	1,405	1,393
Total Net Landbase Deciduous AAC. Total Net Landbase Area=19,361 ha	70	11,935	12,269	11,935	12,598
	80	9,846	11,811	9,846	11,787
	90	8,375	10,676	8,375	10,874
	100	7,306	9,702	7,306	9,839
	110	6,653	8,797	6,653	8,610
Net Conifer Landbase Deciduous AAC. Total Net Conifer Landbase Area=17,555 ha	70	8,394	7,598	8,394	7,709
	80	7,158	7,115	7,158	7,317
	90	6,214	6,685	6,214	6,738
	100	5,488	6,070	5,488	6,337
	110	4,948	5,719	4,948	5,724
Net Deciduous Landbase Deciduous AAC. Total Net Deciduous Landbase Area=1,806 ha	70	5,483	3,479	5,483	3,958
	80	4,834	3,598	4,834	4,028
	90	4,297	3,641	4,297	3,998
	100	3,867	3,598	3,867	3,937
	110	3,516	3,525	3,516	3,789

TABLE 3-8: AREA VOLUME CHECK RESULTS: FOOTHILLS SYU (FMU E7)

	ROTATION LENGTH (YEARS)	CONIFER AAC (REGEN: SQ)		CONIFER AAC (REGEN: FULLY STOCKED)	
		1ST R (M^3/YR)	2ND R (M^3/YR)	1ST R (M^3/YR)	2ND R (M^3/YR)
Total Net Landbase Conifer AAC. Total Net Landbase Area=6,491 ha	70	211,866	135,575	211,866	140,848
	80	186,784	137,987	186,784	144,886
	90	167,566	137,987	167,566	145,356
	100	151,295	133,847	151,295	143,857
	110	137,541	129,791	137,541	139,426
Net Conifer Landbase Conifer AAC. Total Net Conifer Landbase Area=64,270 ha	70	217,276	146,662	217,276	151,197
	80	190,117	148,357	190,117	155,599
	90	168,993	146,998	168,993	154,866
	100	152,093	141,518	152,093	152,093
	110	137,230	135,156	137,230	146,303
Net Deciduous Landbase Conifer AAC. Total Net Deciduous Landbase Area=671 ha	70	768	513	768	510
	80	672	603	672	604
	90	597	597	597	588
	100	537	537	537	537
	110	488	488	488	484
Total Net Landbase Deciduous AAC. Total Net Landbase Area=64,941 ha	70	34,301	42,347	34,301	42,309
	80	29,635	39,651	29,635	39,688
	90	26,203	35,529	26,203	36,456
	100	23,324	32,911	23,324	32,428
	110	20,982	29,422	20,982	29,583
Net Conifer Landbase Deciduous AAC. Total Net Conifer Landbase Area=64,270 ha	70	28,404	28,283	28,404	28,259
	80	24,584	26,898	24,584	26,124
	90	21,690	24,187	21,690	24,913
	100	19,384	23,218	19,384	22,632
	110	17,394	21,199	17,394	21,184
Net Deciduous Landbase Deciduous AAC. Total Net Deciduous Landbase Area=671 ha	70	1,911	1,300	1,911	1,478
	80	1,672	1,337	1,672	1,497
	90	1,486	1,352	1,486	1,498
	100	1,338	1,337	1,338	1,460
	110	1,216	1,306	1,216	1,410

TABLE 3-9: AREA VOLUME CHECK RESULTS: LITTLE SMOKY SYU (FMU W1)

	ROTATION LENGTH (YEARS)	CONIFER AAC (REGEN: SQ)		CONIFER AAC (REGEN: FULLY STOCKED)	
		1ST R (M^3/YR)	2ND R (M^3/YR)	1ST R (M^3/YR)	2ND R (M^3/YR)
Total Net Landbase Conifer AAC. Total Net Landbase Area=166,647 ha	70	511,228	347,516	511,228	361,169
	80	457,648	353,851	457,648	371,544
	90	416,162	352,279	416,162	374,545
	100	380,377	344,910	380,337	368,927
	110	351,027	332,835	351,027	357,521
Net Conifer Landbase Conifer AAC. Total Net Conifer Landbase Area=147,224 ha	70	473,300	336,579	473,300	346,988
	80	423,216	339,938	423,216	354,217
	90	381,965	335,850	381,965	354,401
	100	349,045	323,856	349,045	346,366
	110	319,748	310,155	319,748	334,657
Net Deciduous Landbase Conifer AAC. Total Net Deciduous Landbase Area=19,423 ha	70	22,716	14,832	22,716	14,821
	80	20,656	17,471	20,656	17,413
	90	19,033	17,221	19,033	16,776
	100	17,610	16,821	17,610	16,814
	110	16,021	15,239	16,021	15,113
Total Net Landbase Deciduous AAC. Total Net Landbase Area=166,647 ha	70	95,938	108,548	95,938	108,491
	80	84,204	101,680	84,204	101,777
	90	75,199	93,485	75,199	91,390
	100	67,587	84,808	67,587	83,685
	110	61,566	76,005	61,566	75,859
Net Conifer Landbase Deciduous AAC. Total Net Conifer Landbase Area=147,224 ha	70	66,222	64,907	66,222	64,853
	80	58,575	61,487	58,575	61,629
	90	52,311	56,608	52,311	57,520
	100	47,407	53,134	47,407	53,096
	110	43,095	48,241	43,095	48,456
Net Deciduous Landbase Deciduous AAC. Total Net Deciduous Landbase Area=19,423 ha	70	56,679	37,563	56,679	42,509
	80	51,128	38,700	51,128	43,166
	90	46,878	38,954	46,878	43,283
	100	43,166	38,662	43,166	42,190
	110	40,208	37,775	40,208	40,713

TABLE 3-10: AREA VOLUME CHECK RESULTS: PINE SYU (FMU W8)

	ROTATION LENGTH (YEARS)	CONIFER AAC (REGEN: SQ)		CONIFER AAC (REGEN: FULLY STOCKED)	
		1ST R (M^3/YR)	2ND R (M^3/YR)	1ST R (M^3/YR)	2ND R (M^3/YR)
Total Net Landbase Conifer AAC. Total Net Landbase Area=31,734 ha	70	100,762	66,370	100,762	68,751
	80	89,559	67,753	89,559	70,848
	90	80,829	67,358	80,829	71,039
	100	73,305	65,656	73,305	69,997
	110	66,640	63,145	66,640	68,178
Net Conifer Landbase Conifer AAC. Total Net Conifer Landbase Area=30,114 ha	70	99,361	68,953	99,361	71,086
	80	87,738	69,446	87,738	72,684
	90	78,621	68,589	78,621	72,451
	100	71,306	66,346	71,306	71,276
	110	64,824	63,230	64,824	68,367
Net Deciduous Landbase Conifer AAC. Total Net Deciduous Landbase Area=1,620 ha	70	2,075	1,461	2,075	1,455
	80	1,837	1,277	1,837	1,278
	90	1,663	1,280	1,663	1,254
	100	1,537	1,286	1,537	1,285
	110	1,416	1,264	1,416	1,273
Total Net Landbase Deciduous AAC. Total Net Landbase Area=31,734 ha	70	20,064	20,669	20,064	20,652
	80	16,680	18,928	16,680	19,359
	90	13,903	17,511	13,903	17,817
	100	12,384	16,144	12,384	16,128
	110	11,145	14,420	11,145	14,466
Net Conifer Landbase Deciduous AAC. Total Net Conifer Landbase Area=30,114 ha	70	14,427	13,209	14,427	13,276
	80	12,311	12,621	12,311	12,510
	90	10,606	11,728	10,606	11,803
	100	9,501	10,885	9,501	10,586
	110	8,613	9,918	8,613	9,899
Net Deciduous Landbase Deciduous AAC. Total Net Deciduous Landbase Area=1,620 ha	70	5,107	3,135	5,107	3,537
	80	4,572	3,225	4,572	3,612
	90	4,126	3,260	4,126	3,613
	100	3,748	3,227	3,748	3,521
	110	3,423	3,153	3,423	3,376

3.1.3 HARVEST SIMULATION

SILVASYM is Silvacom's proprietary timber supply simulation model. The model simulates the effect of management strategies on sustainable harvest levels over a specified planning horizon. In its most basic form, SILVASYM is a model which cuts and grows each stand in the forest, according to user-defined yield functions and forest policy constraints. SILVASYM maintains a full spatial link to the net landbase GIS coverage and attribute file over the entire planning horizon. Compartment sequencing can also be introduced to reflect "real-world" limitations such as accessibility and multi-pass harvesting rules. Adjacency constraints can also be applied on a stand-by-stand basis to:

- Control the distribution (or concentration) of the harvest and;
- Mimic operational planning strategies.

A number of sorting rules are available which define the harvest priorities assigned to each stand (e.g. cut oldest first). The simulation model uses binary search methods to assess harvest levels. Average harvest age and post harvest forest conditions are evaluated at the end of each simulation to determine whether the even-flow harvest levels are too low or too high. Reports and GIS map products can be produced for each scenario to evaluate the condition of the forest throughout, and at the end of, the planning horizon.

Standard run control parameters are defined below:

TABLE 3-11: RUN CONTROL PARAMETER DEFINITIONS

CONSTRAINT	DEFINITION
FMA/FMU	Description of the administrative area under analysis.
Planning horizon:	Total time period for the analysis scenario (years).
Targeted average harvest age at the end of the planning horizon:	Average age (years) of stands scheduled for harvest in the last twenty years of the planning horizon, typically with a specified tolerance.
Minimum harvest age:	Minimum age of stands that are eligible for harvest scheduling, may vary by yield stratum (years).
Landbase:	Landbase available for analysis (discrete, single…).
Sorting rules:	Factors used to prioritize stands for harvest sequencing (e.g. oldest first).
Harvest flow constraint:	Scheduled harvest level of the primary species between harvest periods (may have tolerances applied).
Yield curve sets:	Predicted yields for individual strata (15/10 utilization standard).
Cull deductions:	Percent reduction of predicted yields, to account for losses due to defect.
Regeneration transition:	Assumptions applied for the regeneration of stands scheduled for harvest.
Regeneration lag:	Assumed time period required for the establishment of regeneration after harvest.
Introduce harvest plans:	Incorporation of existing harvest plans into the harvest sequence.
Spatial stand adjacency:	Defined in section 4.2.2.
Adjacency: Time horizon:	Total time period that stand adjacency is incorporated into the analysis (years).
Adjacency: Green-up:	Defined in section 4.2.2.

Adjacency: Accumulate adjacent stands:	Maximum total area of adjacent stands scheduled for harvest in the same harvest period.
Age normalization:	The process which addresses the biological differences in species maturity (conifer vs. deciduous).
Compartment sequencing:	Prioritization of administrative planning units for harvest scheduling.
Number of compartments open simultaneously:	Number of compartments available for harvest scheduling at any given time.

3.2 TIMBER SUPPLY ASSUMPTIONS

The following assumptions apply to the runs chosen for the preferred forest management plan.

3.2.1 INCORPORATION OF AOP

Existing Annual Operating Plans (AOP's) were introduced into the timber supply analysis (includes both ANC and quota holder harvest designs) to maintain consistency between the harvest simulation and currently planned operations. ANC's AOP blocks were forced through the harvest simulation based on area weighted average stand age of each block.

3.2.2 ADJACENCY / GREEN-UP

Adjacency is the process of protecting other resource values by spatially identifying and scheduling inventory polygons (stands) that share a boundary. Thus "real-world" decision rules can be introduced into the timber supply analysis. Two different decision rules are typically analysed:

- Allowing the accumulation of adjacent stands into larger harvest units (cutblocks);
- Applying a delay factor (green-up) which restricts the harvest of adjacent polygons.

Green-up is defined as the time required to re-establish vegetation after a disturbance (Interim Forest Management Planning Manual, April 1998). 20 year green-up constraints were applied to stands adjacent to planned blocks within any given compartment.

3.2.3 HARVEST COMPARTMENTS AND CUT SEQUENCING

Compartment areas have been defined for the entire FMA; these units are used by ANC for operational harvest planning. With the introduction of the fully spatial approach to timber supply analyses, many of the constraints which were approximated using an aspatial method can now be explicitly defined. The harvest compartments have been used to summarize the individual stand sequence results. These results have been summarized in Appendix F. They will be used to ensure ANC's future harvest activities reflect the area scheduled in the sequence.

3.2.4 ACCESS AND DEVELOPMENT LIMITATIONS

Due to the long history of forestry and oil and gas activities on ANC's FMA, access has not been a limiting factor for operational or strategic planning. Compartment sequencing was not required to reflect access limitations.

3.2.5 BLOCK SIZE LIMITATIONS

Cutblock size limitations were not applied in the current timber supply analysis. The minimum and maximum contiguous harvest areas are reported and reviewed for selected timber supply scenarios in the TSA results section.

3.2.6 MERCHANTABILITY / ECONOMIC LIMITATIONS

The current utilization standard for the FMA is 15/10 (minimum 15 cm stump diameter and 10 cm top diameter).

3.2.7 OTHER LANDSCAPE MANAGEMENT CONSTRAINTS

A Caribou harvest sequence was used in the Foothills SYU, resulting in larger cut units. In addition, compartment E7-14 yield curve volumes were reduced by 15% in order to allow for structure retention in this area.

3.3 TIMBER SUPPLY ANALYSIS SUMMARY OF RESULTS

Even and non-even flow harvest levels are presented for each simulation in Appendix A. Simulation analysis, detailed profiles of simulated harvest flows and post harvest forest conditions are presented for the three required runs for each SYU (as outlined in the 1998 TSA supplemental quidelines). These results are summarized in Table 3-12, and the runs selected for the preferred forest management strategy are highlighted in yellow.

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TABLE 3-12: SIMULATION CONTROL PARAMETERS AND RESULTS OF REQUIRED ANALYSIS

Run #	Area	Yield Curve Transition	Planning Horizon	Compartment Sequence Table	% Area Basis (all net landbase or area ≥min age)	Open Comp	Adjacency	Adj Horizon	Adj Elapsed	Conifer AAC	Deciduous Flow (20yr average)	Net Area	Implied MAI
183	W8	Tree Imp	180	W8_93d_aop	>= min age	4	Applied-to planned blocks only	20	20	75,500	11,697	31,734	2.38
186	E6	25% PSP	180	N/A	N/A	N/A	Applied-to planned blocks only	20	20	41,000	16,251	19,361	2.12
187	E7	25% PSP	180	E7_CAR2_a5	>= min age	4	Applied-to planned blocks only	20	20	139,500	5,189	64,941	2.15
190	W1	25% PSP	180	W1_93f	>= min age	12	Applied-to planned blocks only	20	20	357,000	38,613	166,647	2.14
191	W1	25% PSP	180	N/A	>= min age	N/A	N/A	N/A	N/A	357,750	42,341	166,647	2.15
192	E7	25% PSP	180	N/A	>= min age	N/A	N/A	N/A	N/A	140,500	3,494	64,941	2.16
193	E6	25% PSP	180	N/A	>= min age	N/A	N/A	N/A	N/A	41,500	5,621	19,361	2.14
194	W8	Tree Imp	180	N/A	>= min age	N/A	N/A	N/A	N/A	75,500	10,713	31,734	2.38
195	W1	25% PSP	180	W1_93f	>= min age	12	Applied-to planned blocks only	20	20	372,500 to 90 years, then step down to 344,794	39,546	166,647	2.24
196	E7	25% PSP	180	E7_CAR2_a5	>= min age	4	Applied-to planned blocks only	20	20	155,500 to 90 years, then step down to 126,846	5,615	64,941	2.15
197	E6	25% PSP	180	N/A	N/A	N/A	Applied-to planned blocks only	20	20	44,000 to 90 years, then step down to 39,862	16,450	19,361	2.22
198	W8	Tree Imp	180	W8_93d_aop	>= min age	4	Applied-to planned blocks only	20	20	75,000 to 90 years, the step up to 75,637	11,680	31,734	2.36

3.3.1 REQUIRED ANALYSIS: FMU E6

As outlined in the Interim Forest Management Planning Manual-Supplemental Guidelines, a summary of the required timber supply runs is presented in the following tables. The required runs include:

- One pass even flow over two rotations
- Two pass even flow over two rotations
- Two pass even flow for one rotation, step up/down to LRSYA.

3.3.1.1 ONE PASS EVEN FLOW OVER TWO ROTATIONS – RUN #193

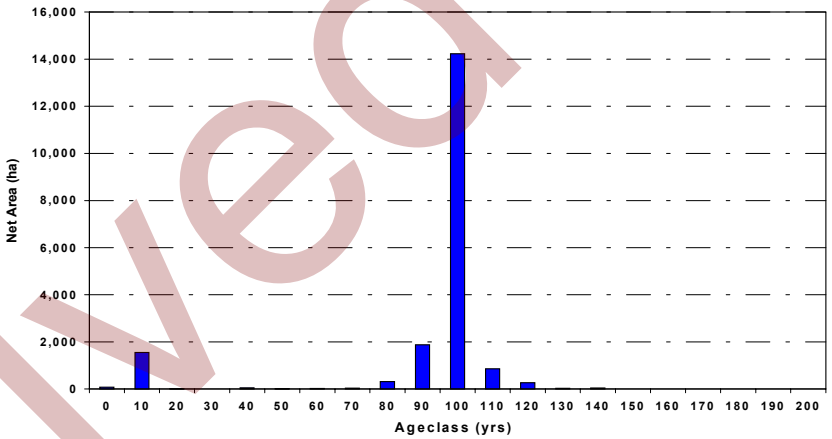
TABLE 3-13: HARVEST SIMULATION CONTROL PARAMETERS – RUN #193

CONSTRAINT	SIMULATION PARAMETER
FMU	E6
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Not Applied
Spatial stand adjacency:	Not Applied
Adjacency: Time horizon:	Not Applied
Adjacency: Green-up:	Not Applied
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Not applied
Number of compartments open simultaneously:	Not applied

TABLE 3-14: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #193

NET LANDBASE SUMMARY (HA)	
Gross Area	**23,588**
Recreation Areas	262
Non-forested/Unproductive Areas	
Natural	467
Anthropogenic	410
Sub-Total	877
Gross Forested Area	**22,449**
Hydrological Buffers	
Lake Buffers (100m)	114
River Buffers (60m)	367
Stream Buffers (60m)	0
Stream Buffers (30m)	337
Lake Buffers (20m)	2
Sub-Total	820
Net Forested Area	**21,629**
Subjective Deletions	755
Unmerchantable Areas	
Unproductive Timber Productivity Rating	854
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	659
Sub-total	1,512
Net Productive Area	**19,361**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

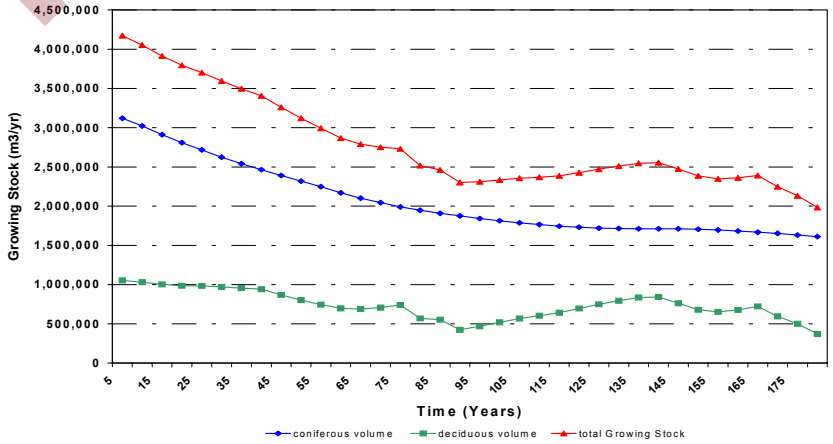
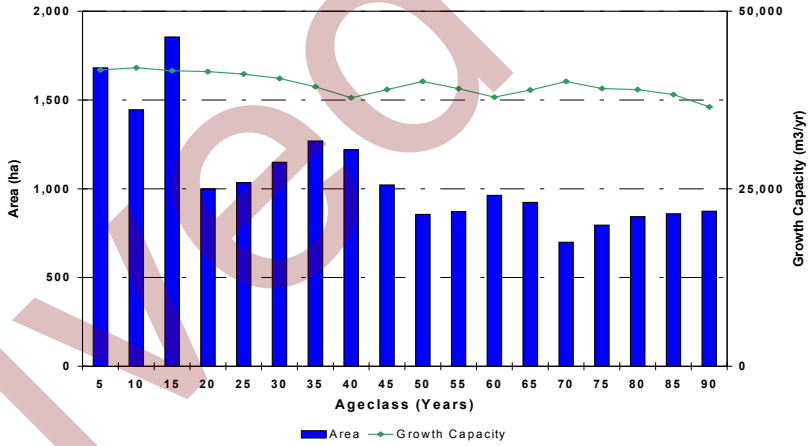


TABLE 3-15: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #193

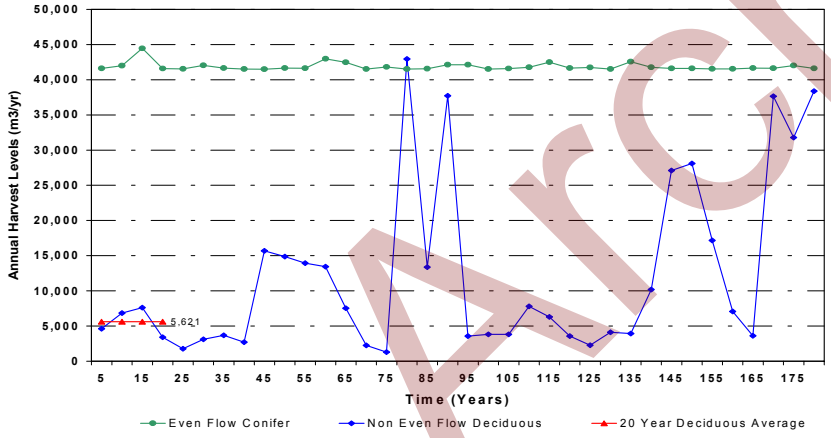
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	39,862	
Unsequenced Simulation	41,500	5,621 (20 year average)

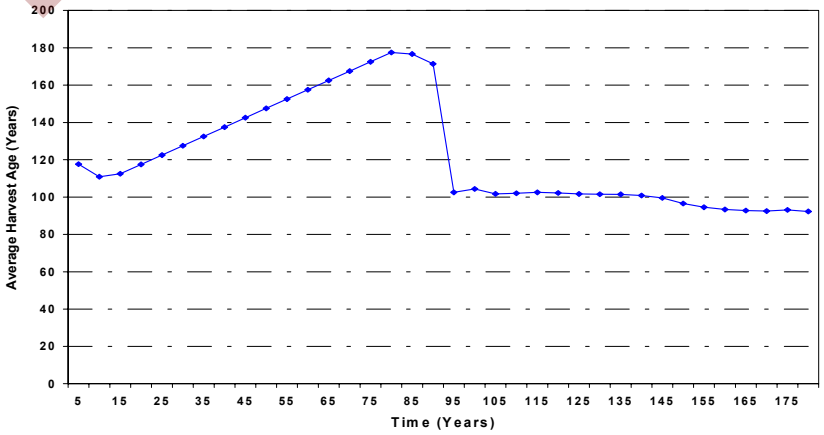
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.1.2 TWO PASS EVEN FLOW OVER TWO ROTATIONS – RUN #186

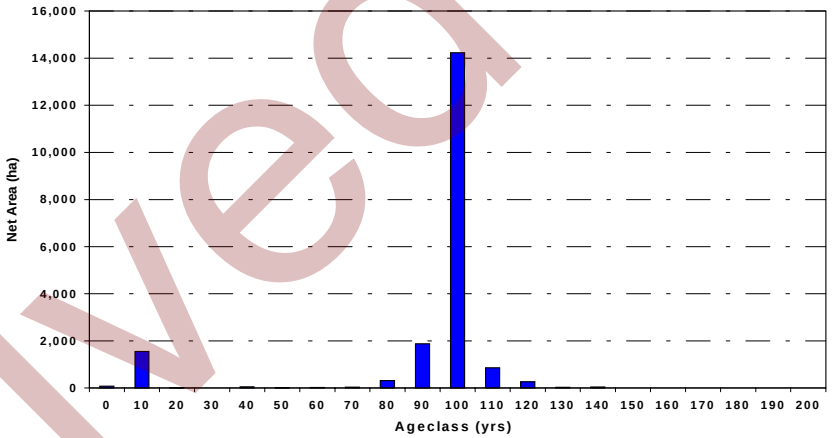
TABLE 3-2: HARVEST SIMULATION CONTROL PARAMETERS – RUN #186

CONSTRAINT	SIMULATION PARAMETER
FMU	E6
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Not applied
Number of compartments open simultaneously:	Not applied

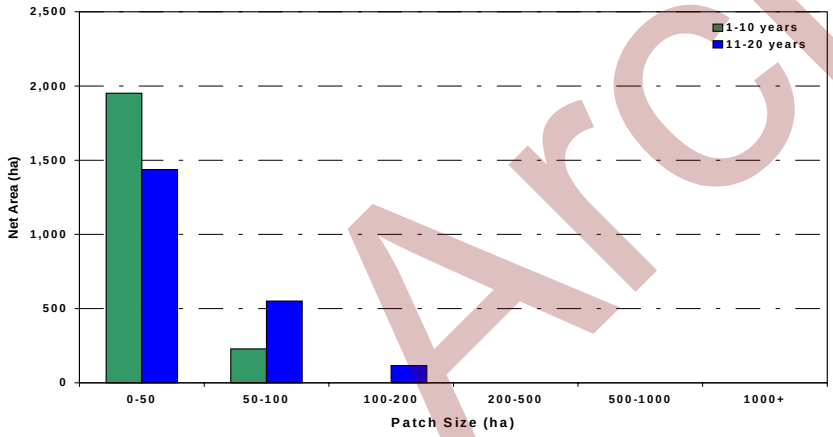
TABLE 3-3: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #186

NET LANDBASE SUMMARY (HA)	
Gross Area	**23,588**
Recreation Areas	262
Non-forested/Unproductive Areas	
Natural	467
Anthropogenic	410
Sub-Total	877
Gross Forested Area	**22,449**
Hydrological Buffers	
Lake Buffers (100m)	114
River Buffers (60m)	367
Stream Buffers (60m)	0
Stream Buffers (30m)	337
Lake Buffers (20m)	2
Sub-Total	820
Net Forested Area	**21,629**
Subjective Deletions	755
Unmerchantable Areas	
Unproductive Timber Productivity Rating	854
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	659
Sub-total	1,512
Net Productive Area	**19,361**

INITIAL AGECLASS DISTRIBUTION



CONTIGUOUS HARVEST AREAS



GROWING STOCK

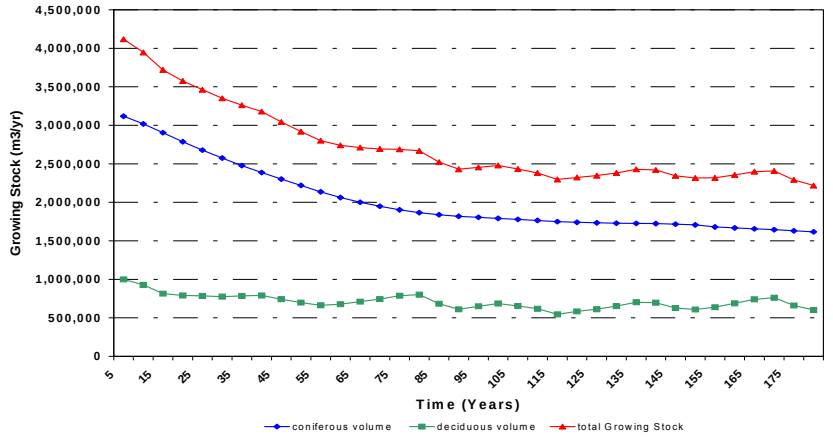
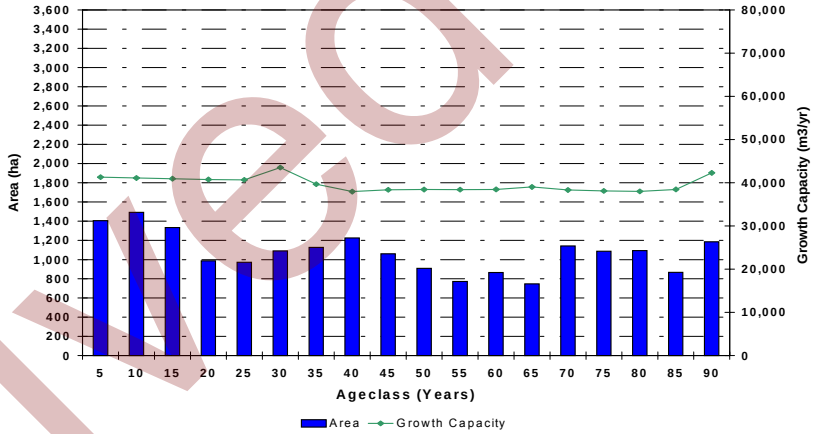


TABLE 3-4: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #186

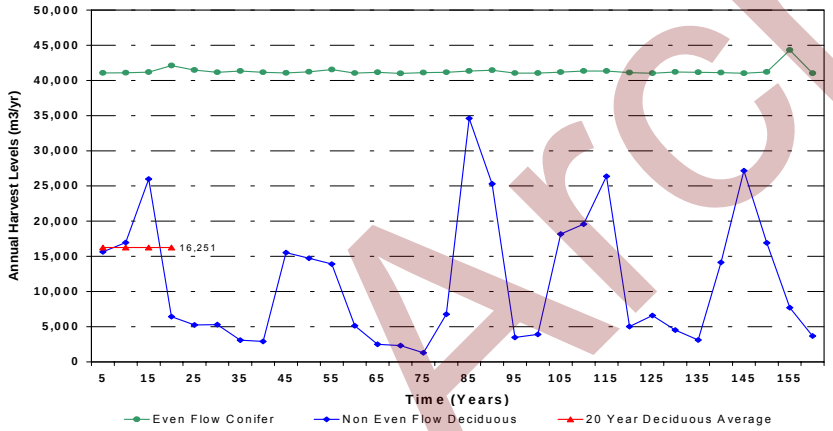
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	39,862	
Sequenced Simulation	41,000	16,251 (20 year average)

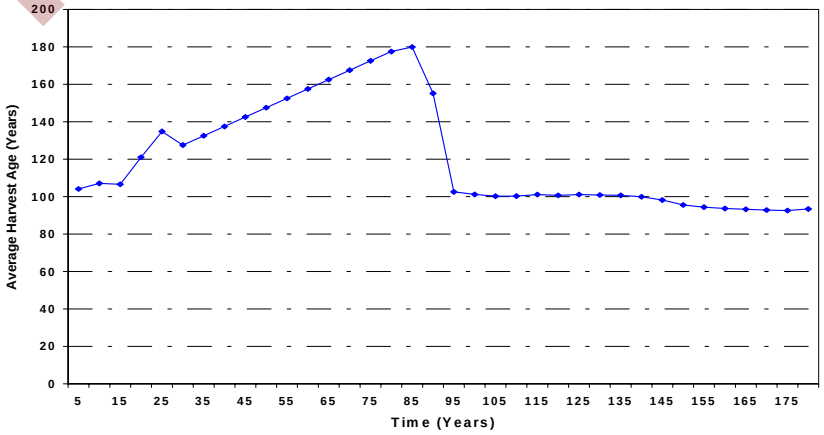
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.1.3 TWO PASS EVEN FLOW FOR ONE ROTATION, STEP DOWN TO LRSYA – RUN #197

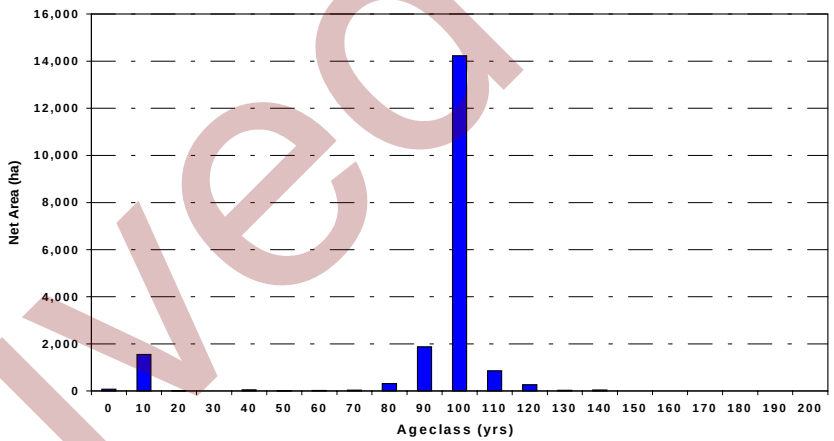
TABLE 3-5: HARVEST SIMULATION CONTROL PARAMETERS – RUN #197

CONSTRAINT	SIMULATION PARAMETER
FMU	E6
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow to 90 years, then step down to LRSYA.
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Not applied
Number of compartments open simultaneously:	Not applied

TABLE 3-6: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #197

NET LANDBASE SUMMARY (HA)	
Gross Area	**23,588**
Recreation Areas	262
Non-forested/Unproductive Areas	
Natural	467
Anthropogenic	410
Sub-Total	877
Gross Forested Area	**22,449**
Hydrological Buffers	
Lake Buffers (100m)	114
River Buffers (60m)	367
Stream Buffers (60m)	0
Stream Buffers (30m)	337
Lake Buffers (20m)	2
Sub-Total	820
Net Forested Area	**21,629**
Subjective Deletions	755
Unmerchantable Areas	
Unproductive Timber Productivity Rating	854
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	659
Sub-total	1,512
Net Productive Area	**19,361**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

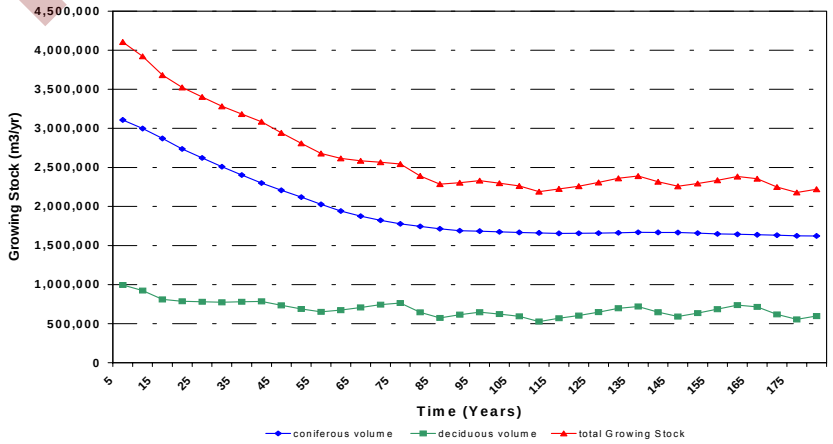
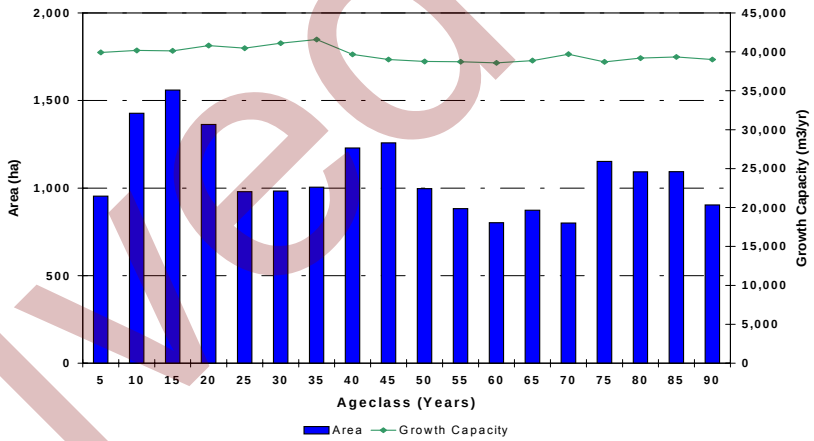


TABLE 3-7: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #197

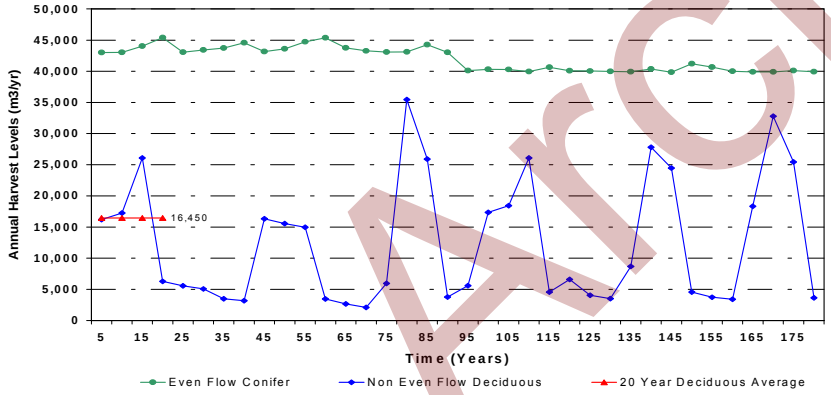
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	39,862	
Sequenced Simulation	44,000 to 90 years, then step down to 39,862	16,450 (20 year average)

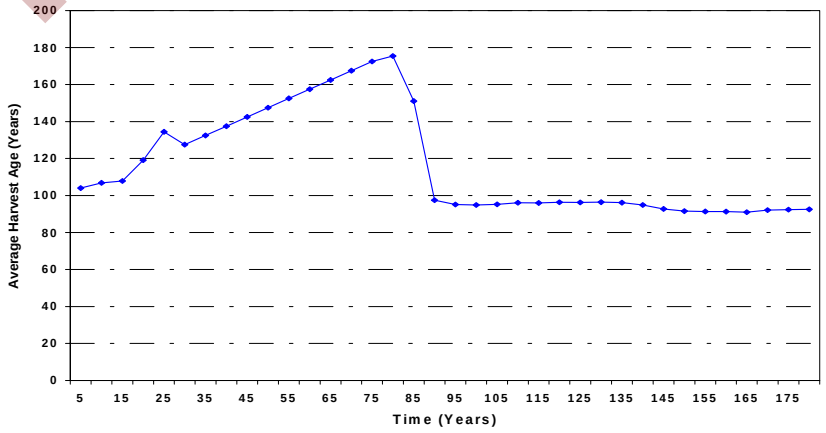
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.2 REQUIRED ANALYSIS: FMU E7

3.3.2.1 ONE PASS EVEN FLOW OVER TWO ROTATIONS – RUN #192

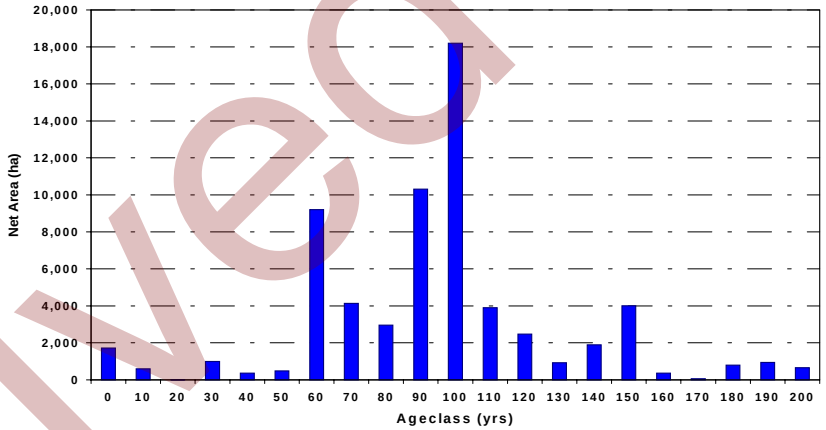
TABLE 3-8: HARVEST SIMULATION CONTROL PARAMETERS – RUN #192

CONSTRAINT	SIMULATION PARAMETER
FMU	E7
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest First 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Not applied
Spatial stand adjacency:	Not applied
Adjacency: Time horizon:	Not applied
Adjacency: Green-up:	Not applied
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Not applied
Number of compartments open simultaneously:	Not applied

TABLE 3-9: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #192

NET LANDBASE SUMMARY (HA)	
Gross Area	**86,528**
Recreation Areas	332
Non-forested/Unproductive Areas	
Natural	3,329
Anthropogenic	751
Sub-Total	4,080
Gross Forested Area	**82,116**
Hydrological Buffers	
Lake Buffers (100m)	63
River Buffers (60m)	503
Stream Buffers (60m)	644
Stream Buffers (30m)	1,378
Lake Buffers (20m)	9
Sub-Total	2,598
Net Forested Area	**79,518**
Subjective Deletions	598
Unmerchantable Areas	
Unproductive Timber Productivity Rating	8,912
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	5,067
Sub-total	13,979
Net Productive Area	**64,941**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

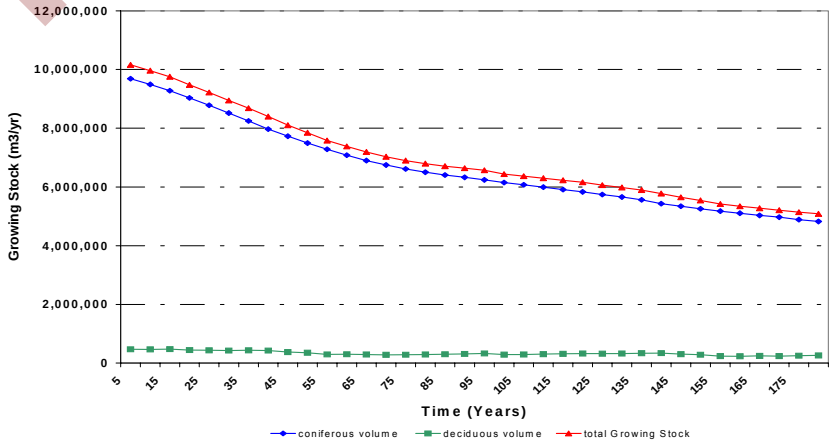
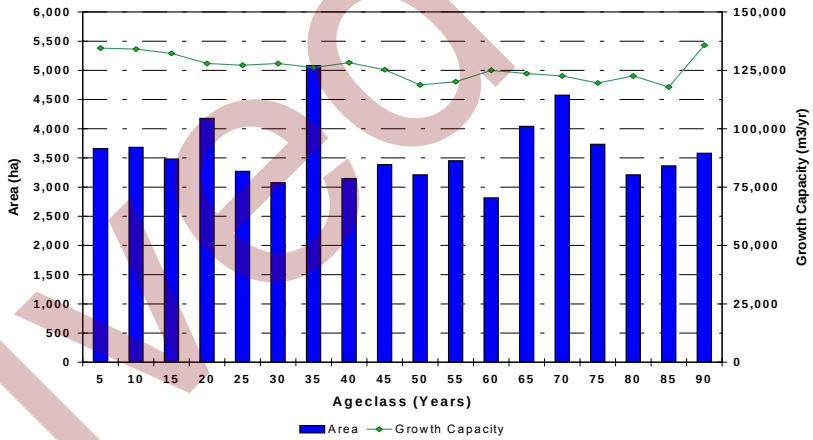


TABLE 3-10: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #192

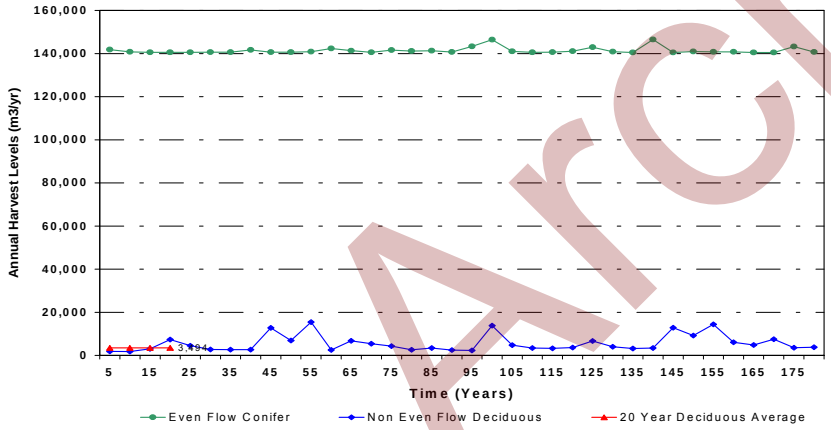
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	126,846	
Unsequenced Simulation	140,500	3,494 (20 year average)

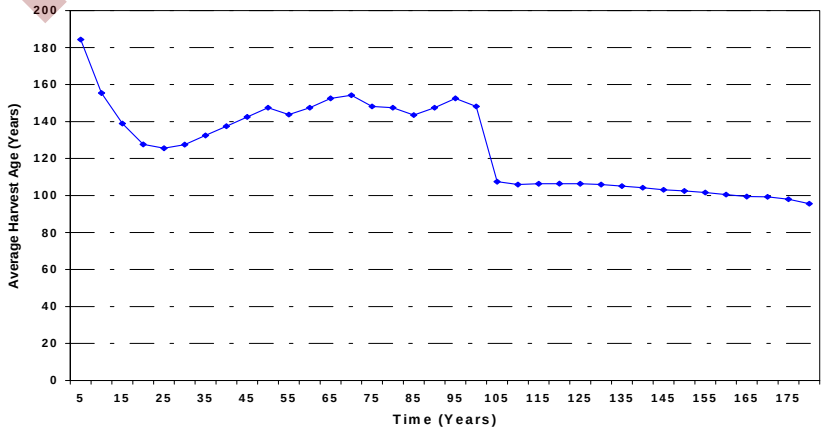
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.2.2 TWO PASS EVEN FLOW OVER TWO ROTATIONS – RUN #187

TABLE 3-11: HARVEST SIMULATION CONTROL PARAMETERS – RUN #187

CONSTRAINT	SIMULATION PARAMETER
FMU	E7
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest First 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Applied
Number of compartments open simultaneously:	4

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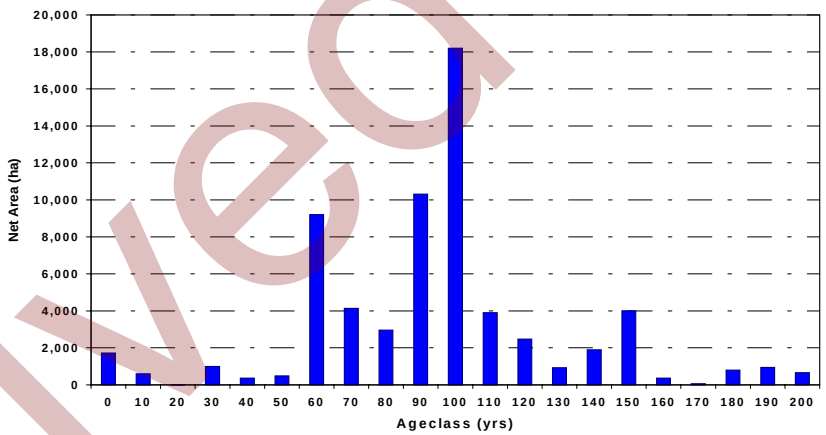
TABLE 3-12: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #187

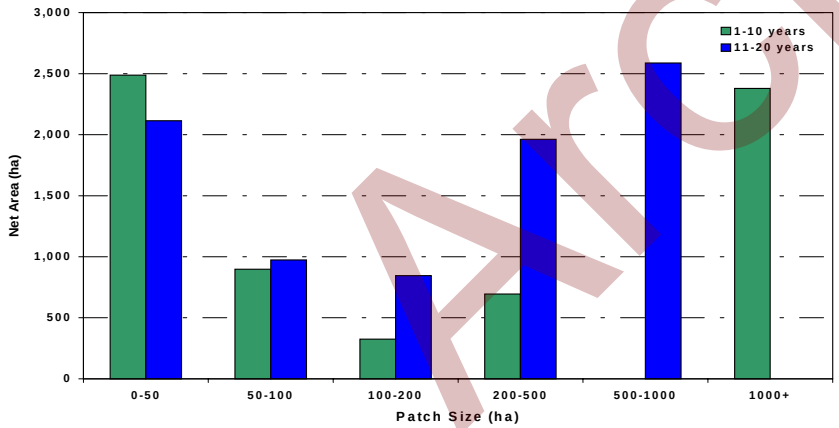
NET LANDBASE SUMMARY (HA)

Gross Area	**86,528**
Recreation Areas	332
Non-forested/Unproductive Areas	
Natural	3,329
Anthropogenic	751
Sub-Total	4,080
Gross Forested Area	**82,116**
Hydrological Buffers	
Lake Buffers (100m)	63
River Buffers (60m)	503
Stream Buffers (60m)	644
Stream Buffers (30m)	1,378
Lake Buffers (20m)	9
Sub-Total	2,598
Net Forested Area	**79,518**
Subjective Deletions	598
Unmerchantable Areas	
Unproductive Timber Productivity Rating	8,912
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	5,067
Sub-total	13,979
Net Productive Area	**64,941**

INITIAL AGECLASS DISTRIBUTION



CONTIGUOUS HARVEST AREAS



GROWING STOCK

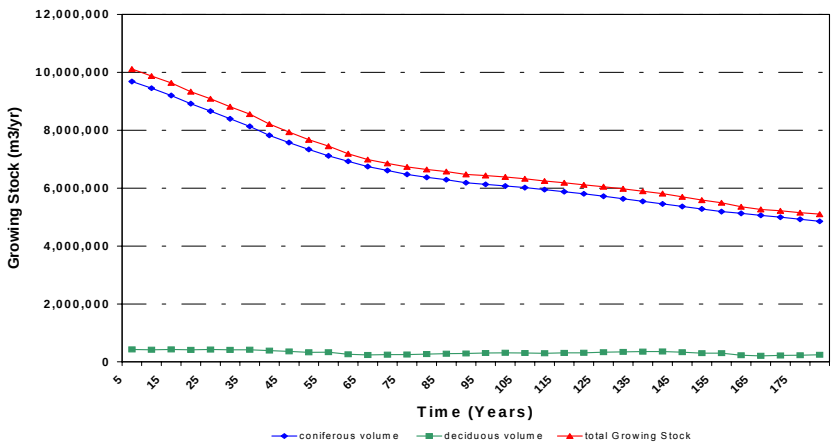
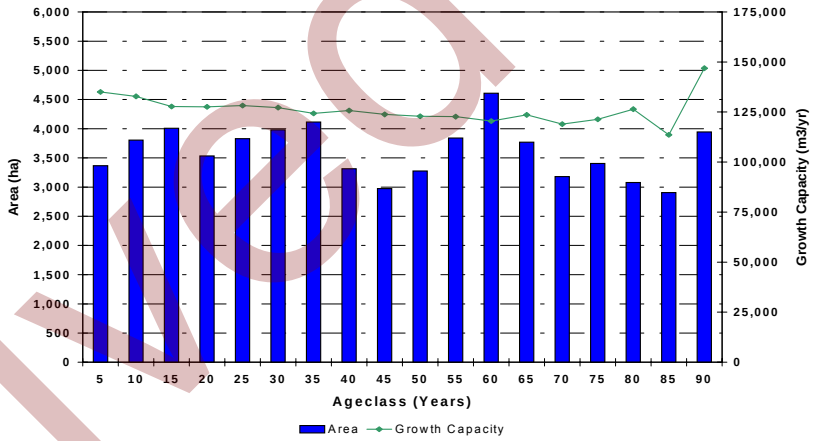


TABLE 3-13: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #187

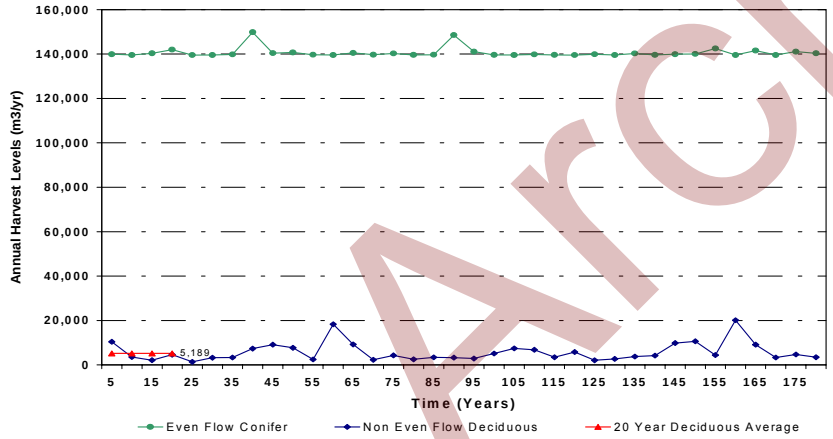
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	126,846	
Sequenced Simulation	139,500	5,189 (20 year average)

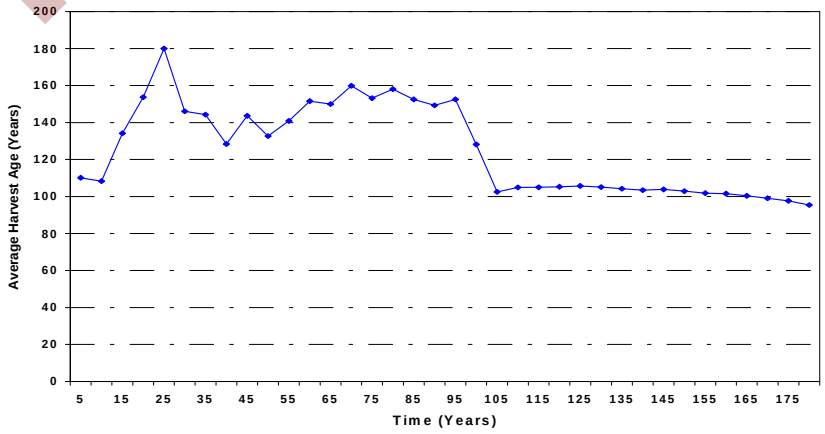
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.2.3 TWO PASS EVEN FLOW FOR ONE ROTATION, STEP DOWN TO LRSYA – RUN #196

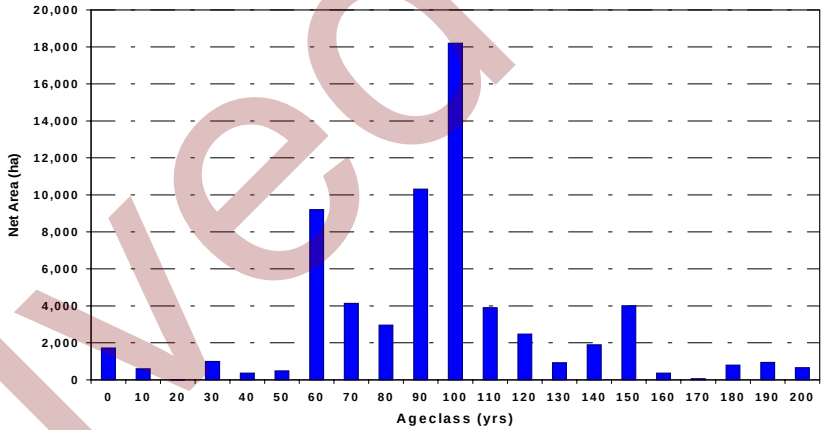
TABLE 3-14: HARVEST SIMULATION CONTROL PARAMETERS – RUN #196

CONSTRAINT	SIMULATION PARAMETER
FMU	E7
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest First 2) Maximize conifer harvest
Harvest flow constraint:	Even flow to 90 years, then step down to LRSYA
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Applied
Number of compartments open simultaneously:	4

TABLE 3-15: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #196

NET LANDBASE SUMMARY (HA)	
Gross Area	**86,528**
Recreation Areas	332
Non-forested/Unproductive Areas	
Natural	3,329
Anthropogenic	751
Sub-Total	4,080
Gross Forested Area	**82,116**
Hydrological Buffers	
Lake Buffers (100m)	63
River Buffers (60m)	503
Stream Buffers (60m)	644
Stream Buffers (30m)	1,378
Lake Buffers (20m)	9
Sub-Total	2,598
Net Forested Area	**79,518**
Subjective Deletions	598
Unmerchantable Areas	
Unproductive Timber Productivity Rating	8,912
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	5,067
Sub-total	13,979
Net Productive Area	**64,941**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

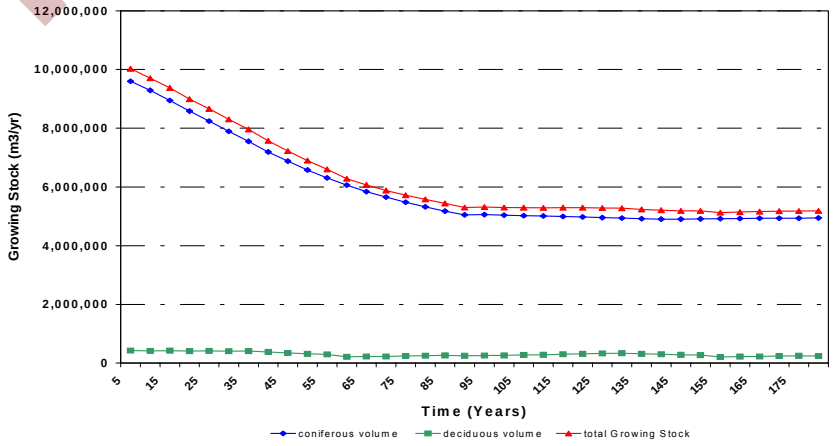
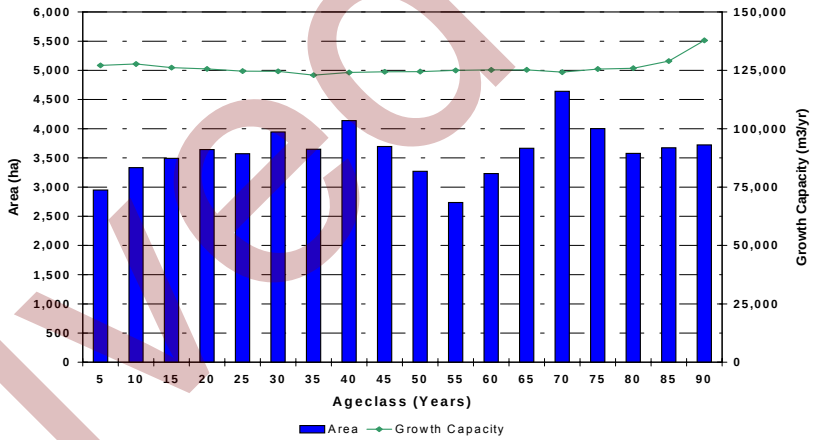


TABLE 3-16: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #196

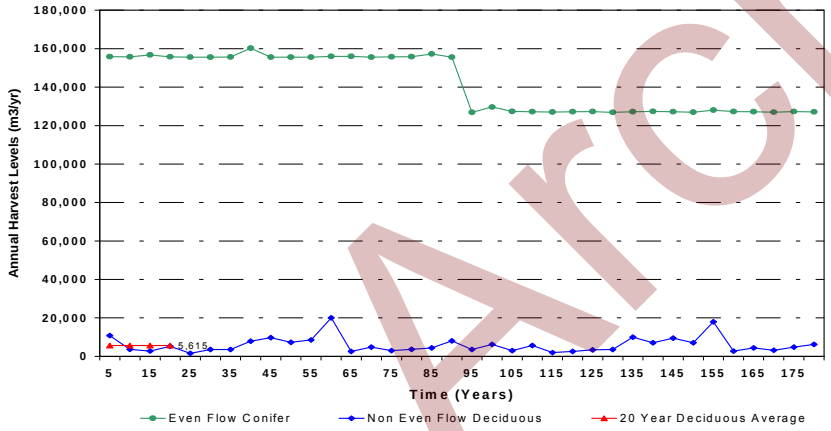
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	126,846	
Sequenced Simulation	155,500 to 90 years, then step down to 126,846.	5,615 (20 year average)

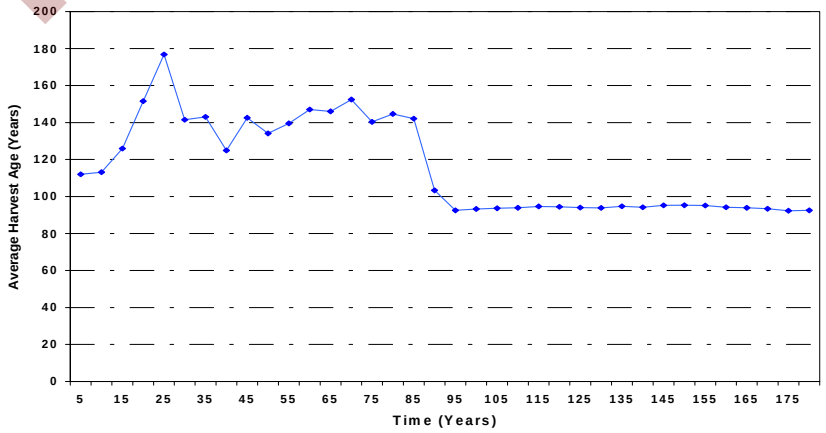
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.3 REQUIRED ANALYSIS: FMU W1

3.3.3.1 ONE PASS EVEN FLOW OVER TWO ROTATIONS – RUN #191

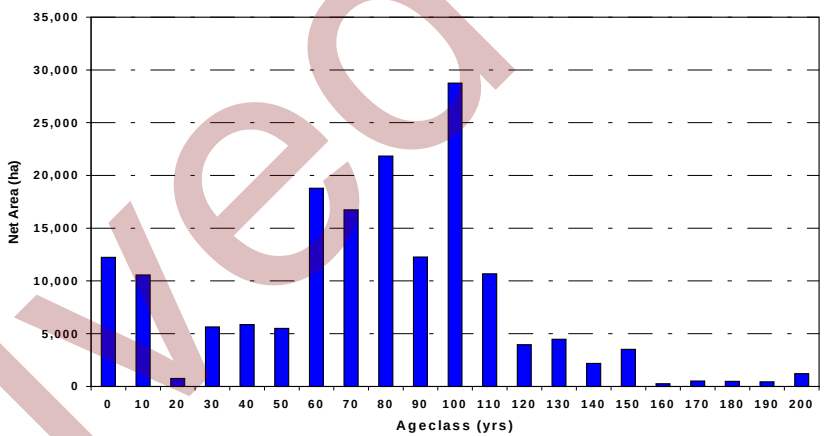
TABLE 3-17: HARVEST SIMULATION CONTROL PARAMETERS – RUN #191

CONSTRAINT	SIMULATION PARAMETER
FMU	W1
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Not applied
Spatial stand adjacency:	Not applied
Adjacency: Time horizon:	Not applied
Adjacency: Green-up:	Not applied
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Not applied
Number of compartments open simultaneously:	Not applied

TABLE 3-18: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #191

NET LANDBASE SUMMARY (HA)	
Gross Area	**229,950**
Recreation Areas	4,305
Non-forested/Unproductive Areas	
Natural	7,095
Anthropogenic	4,099
Sub-Total	11,194
Gross Forested Area	**214,451**
Hydrological Buffers	
Lake Buffers (100m)	352
River Buffers (60m)	2,354
Stream Buffers (60m)	846
Stream Buffers (30m)	3,480
Lake Buffers (20m)	17
Sub-Total	7,049
Net Forested Area	**207,402**
Subjective Deletions	527
Unmerchantable Areas	
Unproductive Timber Productivity Rating	30,951
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	9,278
Sub-total	40,229
Net Productive Area	**166,647**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

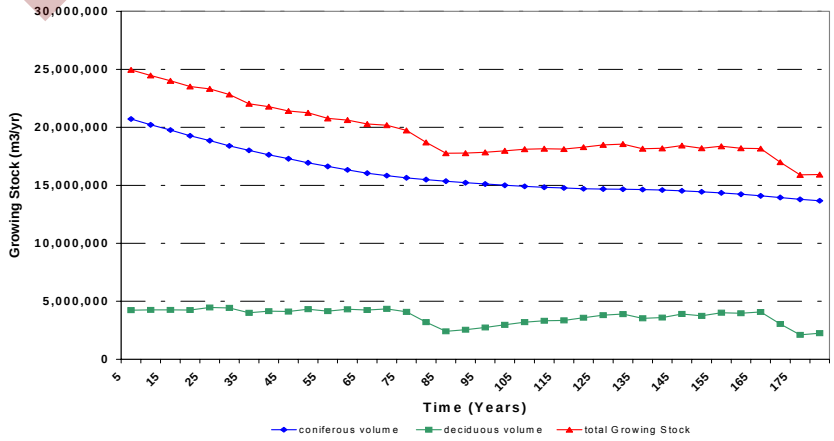
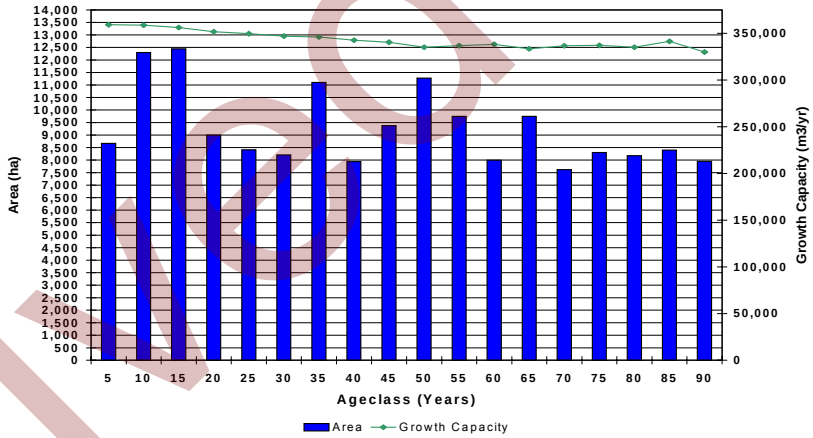


TABLE 3-19: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #191

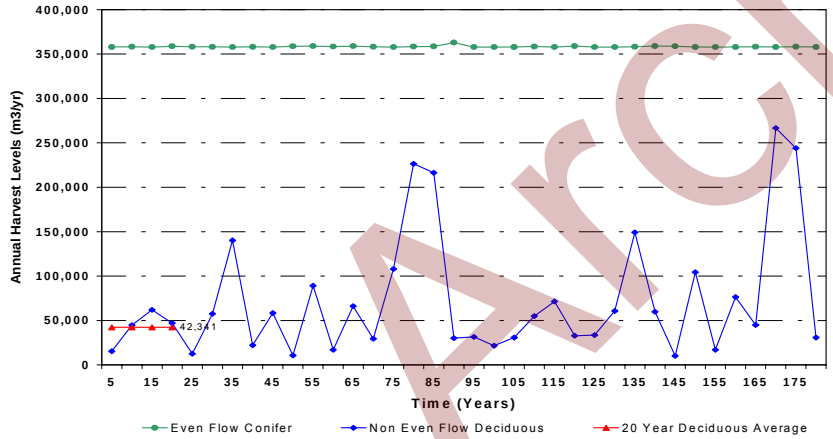
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	344,794	
Unsequenced Simulation	357,750	42,341 (20 year average)

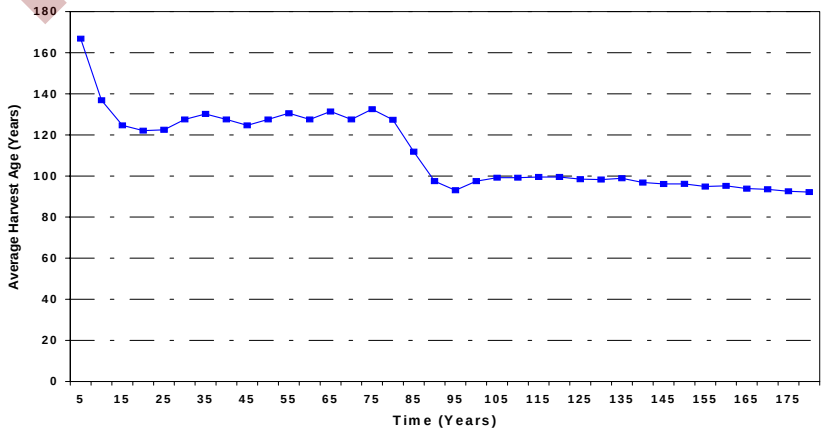
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.3.2 TWO PASS EVEN FLOW OVER TWO ROTATIONS – RUN #190

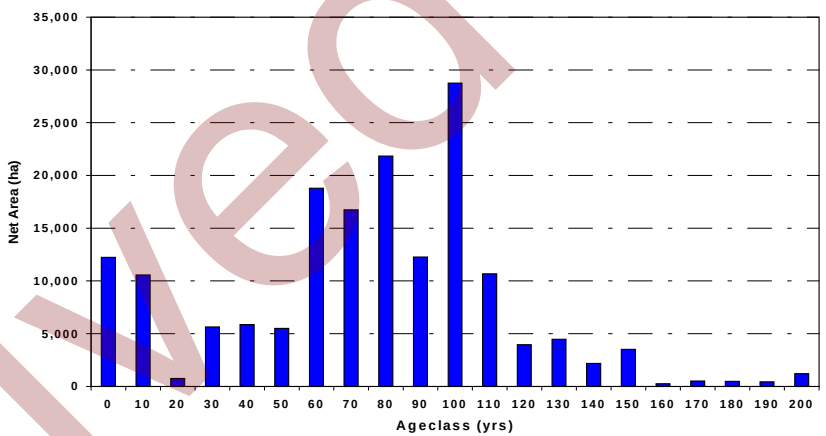
TABLE 3-20: HARVEST SIMULATION CONTROL PARAMETERS – RUN #190

CONSTRAINT	SIMULATION PARAMETER
FMU	W1
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Applied
Number of compartments open simultaneously:	12

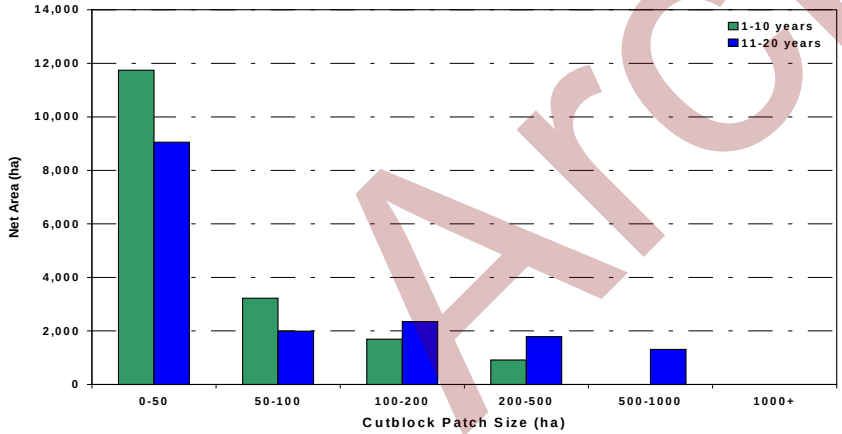
TABLE 3-21: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #190

NET LANDBASE SUMMARY (HA)	
Gross Area	**229,950**
Recreation Areas	4,305
Non-forested/Unproductive Areas	
Natural	7,095
Anthropogenic	4,099
Sub-Total	11,194
Gross Forested Area	**214,451**
Hydrological Buffers	
Lake Buffers (100m)	352
River Buffers (60m)	2,354
Stream Buffers (60m)	846
Stream Buffers (30m)	3,480
Lake Buffers (20m)	17
Sub-Total	7,049
Net Forested Area	**207,402**
Subjective Deletions	527
Unmerchantable Areas	
Unproductive Timber Productivity Rating	30,951
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	9,278
Sub-total	40,229
Net Productive Area	**166,647**

INITIAL AGECLASS DISTRIBUTION



CONTIGUOUS HARVEST AREAS



GROWING STOCK

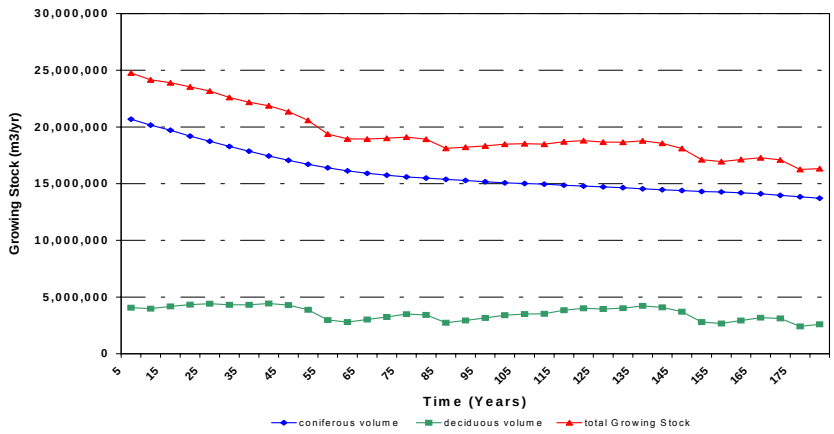
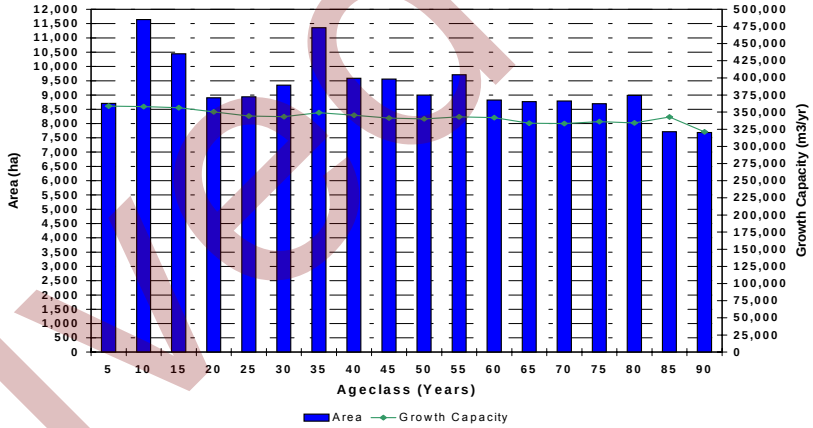


TABLE 3-22: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #190

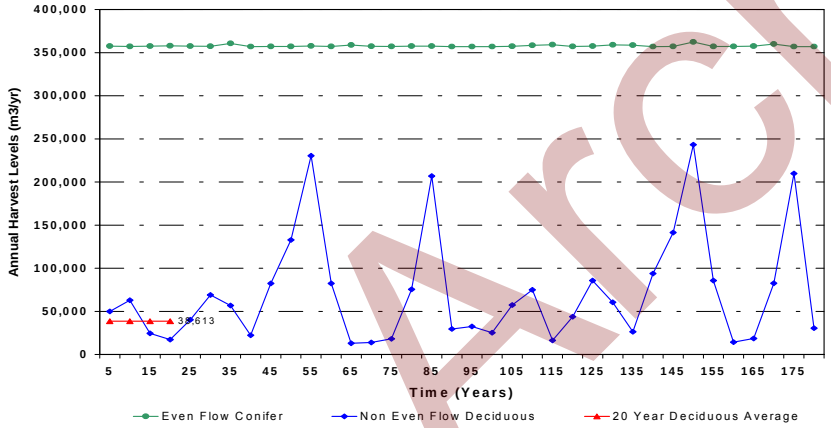
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	344,794	
Sequenced Simulation	357,000	38,613 (20 year average)

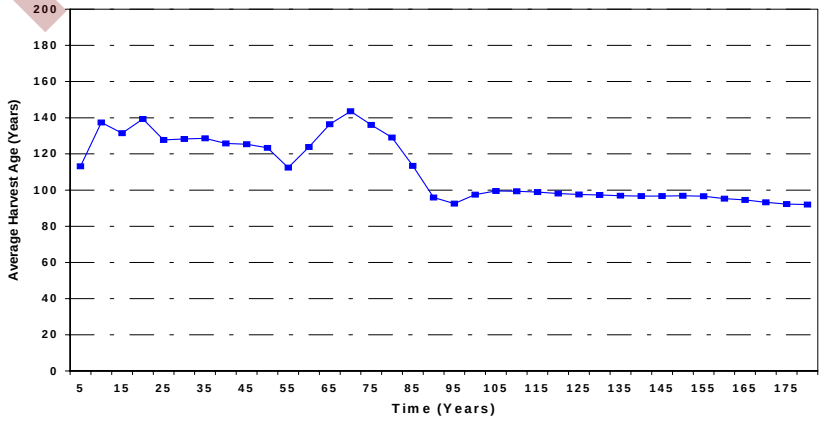
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.3.3 TWO PASS EVEN FLOW FOR ONE ROTATION, STEP DOWN TO LRSYA – RUN #195

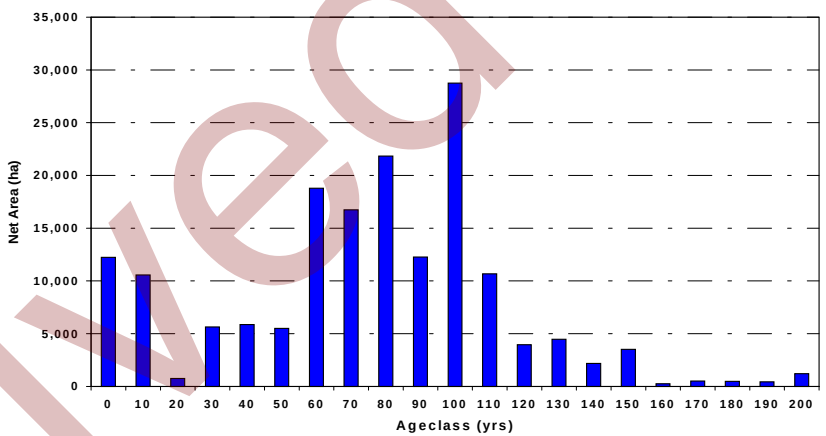
TABLE 3-23: HARVEST SIMULATION CONTROL PARAMETERS – RUN #195

CONSTRAINT	SIMULATION PARAMETER
FMU	W1
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow to 90 years, then step down to LRSYA
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	25% LFS PSP
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Applied
Number of compartments open simultaneously:	12

TABLE 3-24: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #195

NET LANDBASE SUMMARY (HA)	
Gross Area	**229,950**
Recreation Areas	4,305
Non-forested/Unproductive Areas	
Natural	7,095
Anthropogenic	4,099
Sub-Total	11,194
Gross Forested Area	**214,451**
Hydrological Buffers	
Lake Buffers (100m)	352
River Buffers (60m)	2,354
Stream Buffers (60m)	846
Stream Buffers (30m)	3,480
Lake Buffers (20m)	17
Sub-Total	7,049
Net Forested Area	**207,402**
Subjective Deletions	527
Unmerchantable Areas	
Unproductive Timber Productivity Rating	30,951
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	9,278
Sub-total	40,229
Net Productive Area	**166,647**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

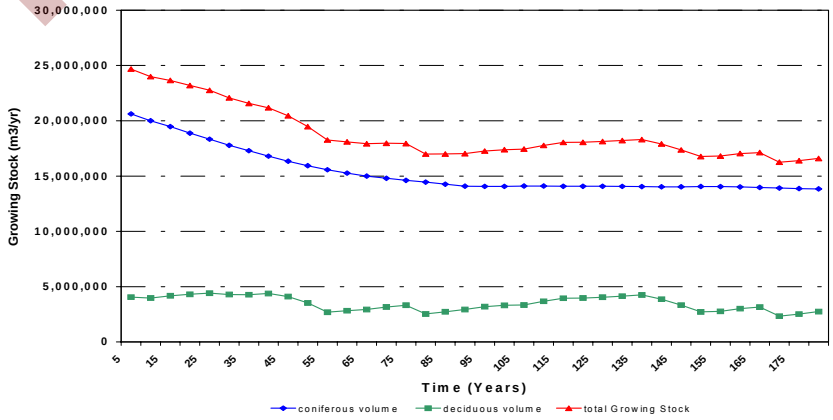
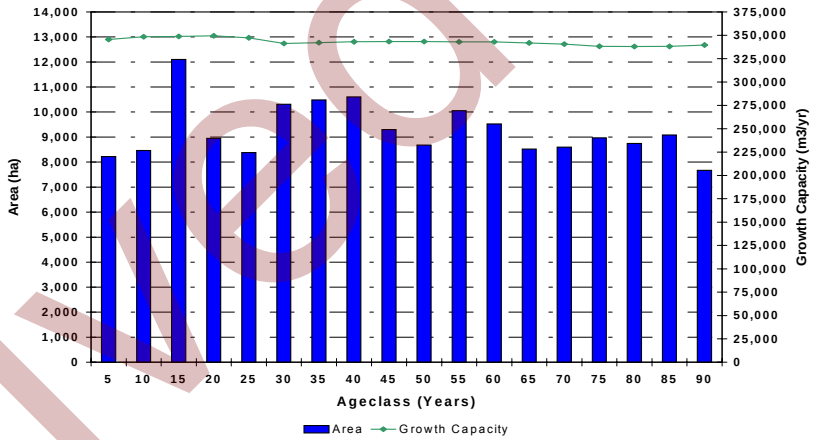


TABLE 3-25: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #195

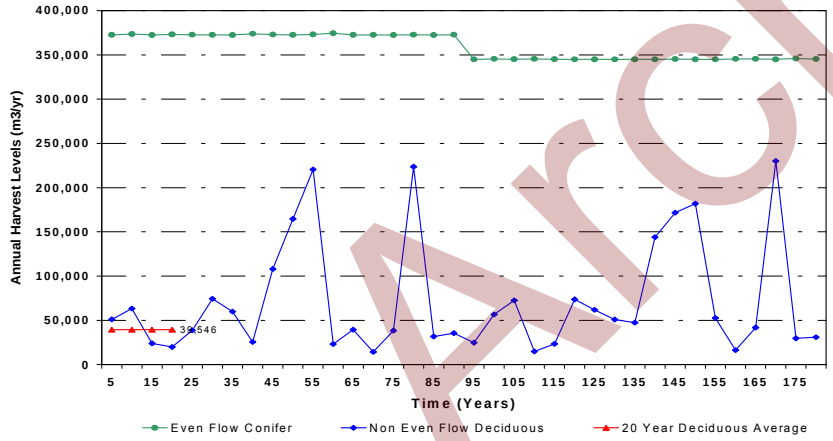
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	344,794	
Sequenced Simulation	372,500 to 90 years, then step down to 344,794.	39,546 (20 year average)

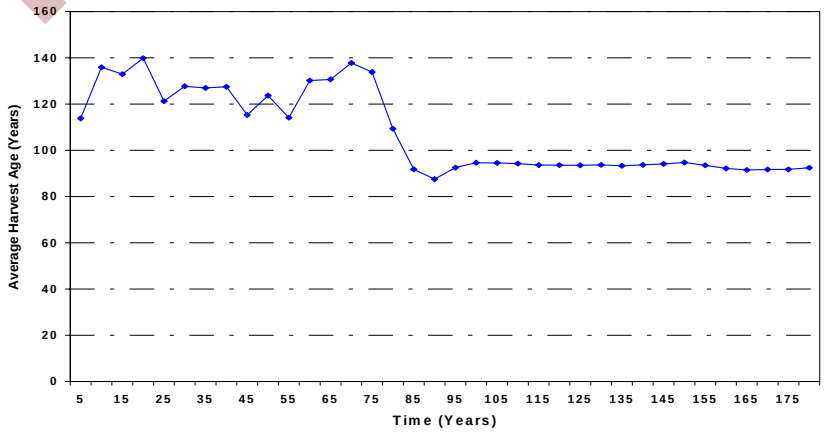
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.4 REQUIRED ANALYSIS: FMU W8

3.3.4.1 ONE PASS EVEN FLOW OVER TWO ROTATIONS – RUN #194

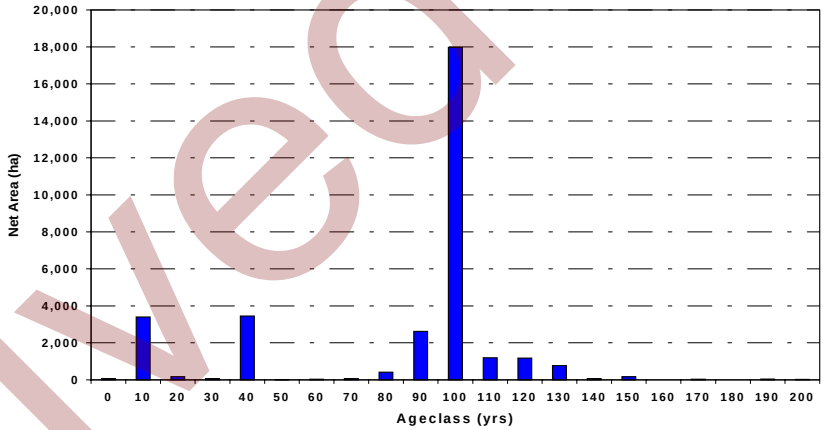
TABLE 3-26: HARVEST SIMULATION CONTROL PARAMETERS – RUN #194

CONSTRAINT	SIMULATION PARAMETER
FMU	W8
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	Tree Improvement
Regeneration lag:	Not applied
Introduce harvest plans:	Not applied
Spatial stand adjacency:	Not applied
Adjacency: Time horizon:	Not applied
Adjacency: Green-up:	Not applied
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Not applied
Number of compartments open simultaneously:	Not applied

TABLE 3-27: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #194

NET LANDBASE SUMMARY (HA)	
Gross Area	**38,660**
Recreation Areas	0
Non-forested/Unproductive Areas	
Natural	777
Anthropogenic	1,990
Sub-Total	2,767
Gross Forested Area	**35,893**
Hydrological Buffers	
Lake Buffers (100m)	12
River Buffers (60m)	279
Stream Buffers (60m)	162
Stream Buffers (30m)	730
Lake Buffers (20m)	6
Sub-Total	1,189
Net Forested Area	**34,703**
Subjective Deletions	1,476
Unmerchantable Areas	
Unproductive Timber Productivity Rating	972
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	521
Sub-total	1,494
Net Productive Area	**31,734**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

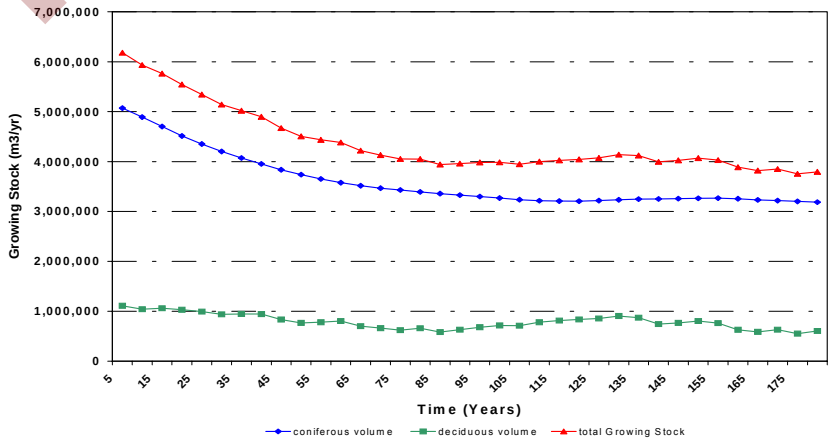
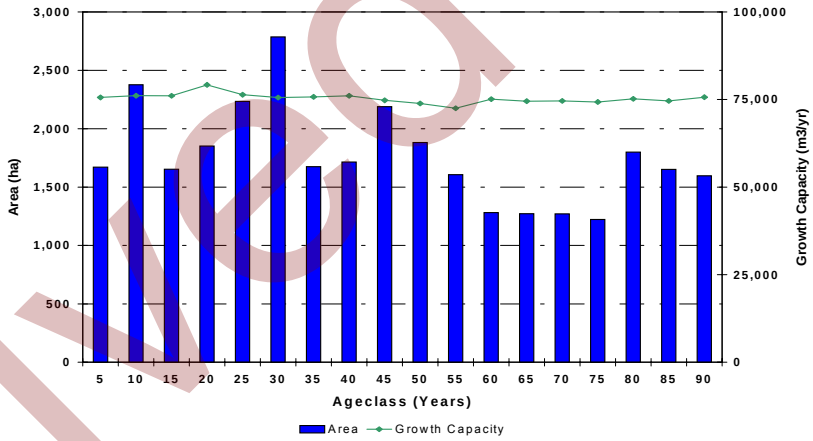


TABLE 3-28: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #194

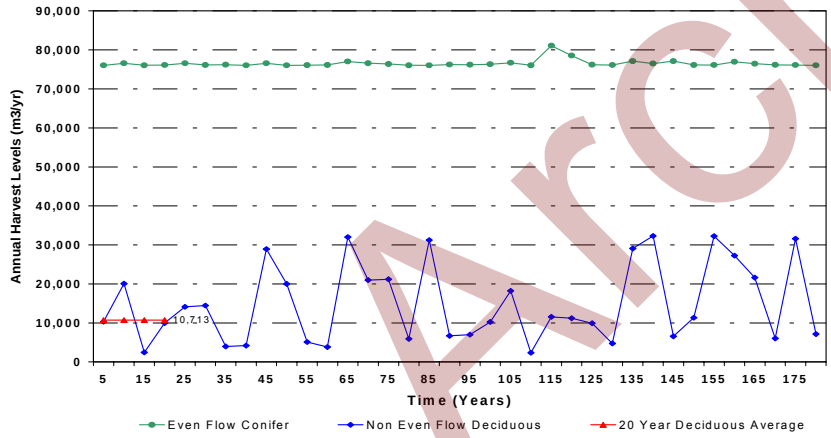
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	75,637	
Unsequenced Simulation	75,550	10,713 (20 year average)

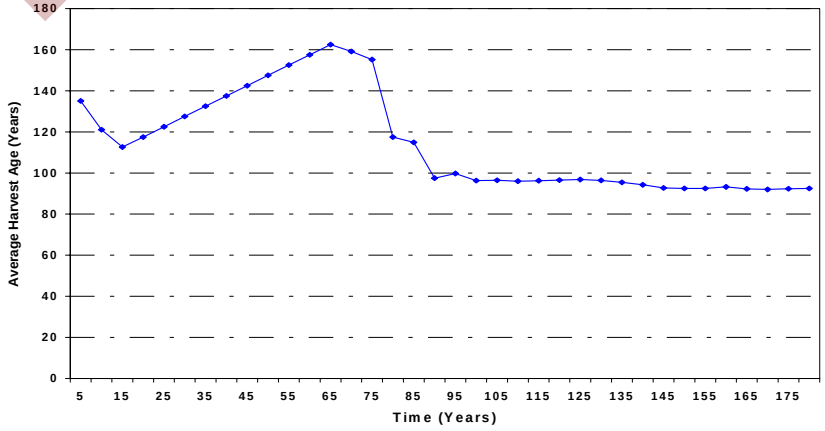
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.4.2 TWO PASS EVEN FLOW OVER TWO ROTATIONS – RUN #183

TABLE 3-29: HARVEST SIMULATION CONTROL PARAMETERS – RUN #183

CONSTRAINT	SIMULATION PARAMETER
FMU	W8
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	Tree Improvement
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Applied
Number of compartments open simultaneously:	4

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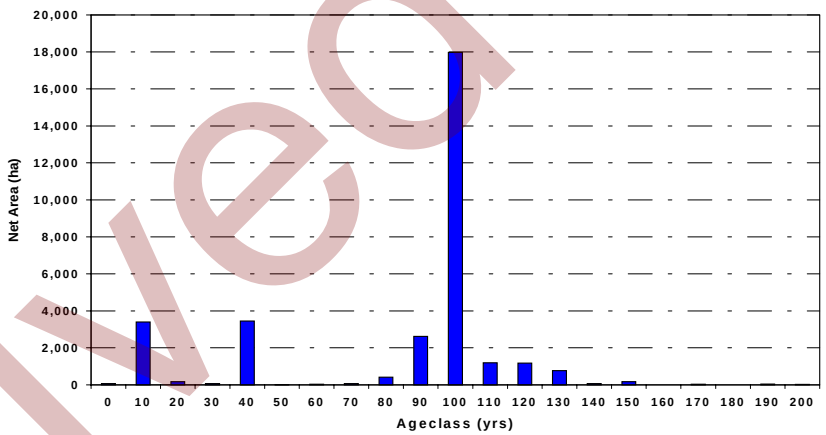
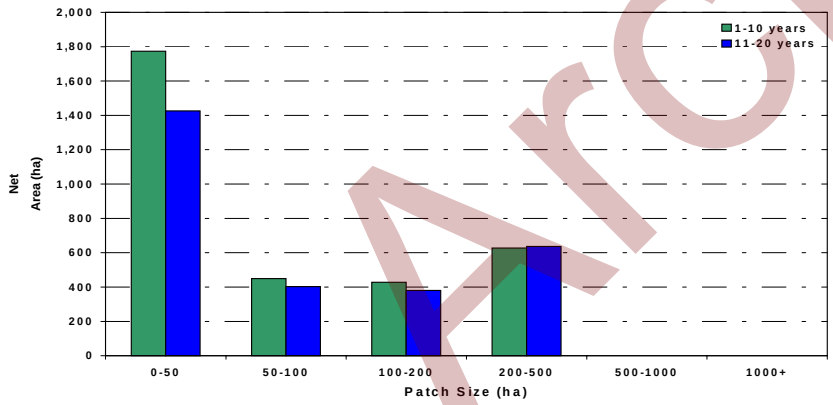
TABLE 3-30: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #183

NET LANDBASE SUMMARY (HA)	
Gross Area	**38,660**
Recreation Areas	0
Non-forested/Unproductive Areas	
Natural	777
Anthropogenic	1,990
Sub-Total	2,767
Gross Forested Area	**35,893**
Hydrological Buffers	
Lake Buffers (100m)	12
River Buffers (60m)	279
Stream Buffers (60m)	162
Stream Buffers (30m)	730
Lake Buffers (20m)	6
Sub-Total	1,189
Net Forested Area	**34,703**
Subjective Deletions	1,476
Unmerchantable Areas	
Unproductive Timber Productivity Rating	972
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	521
Sub-total	1,494
Net Productive Area	**31,734**

INITIAL AGECLASS DISTRIBUTION



CONTIGUOUS HARVEST AREAS



GROWING STOCK

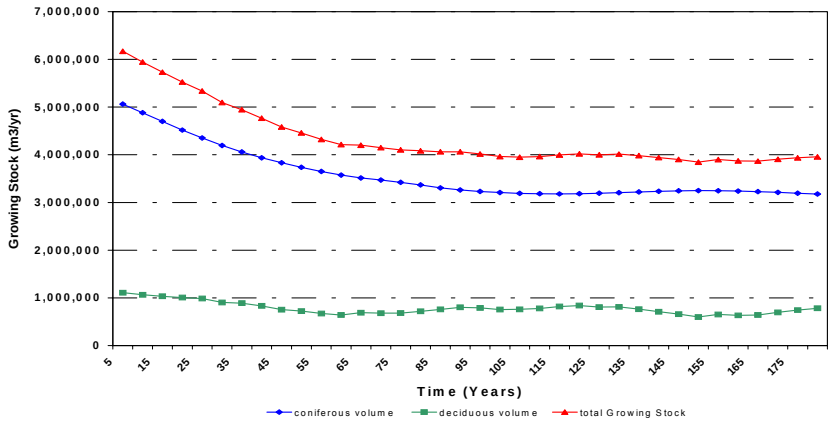
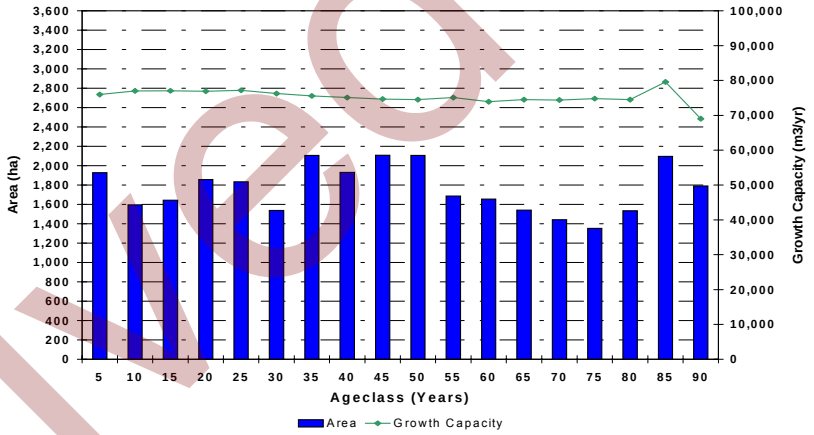


TABLE 3-31: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #183

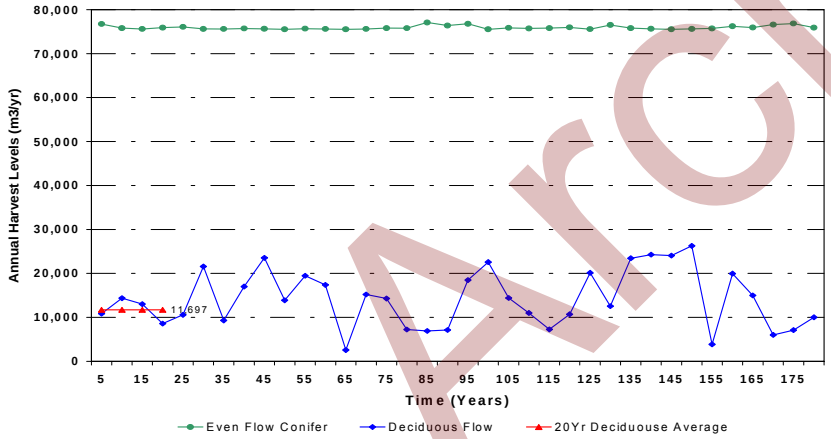
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	75,637	
Sequenced Simulation	75,500	11,697 (20 year average)

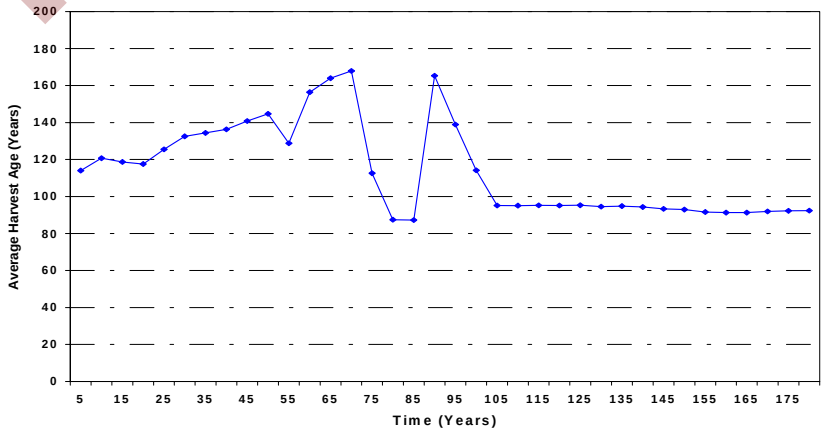
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.3.4.3 TWO PASS EVEN FLOW FOR ONE ROTATION STEP UP TO LRSYA – RUN #198

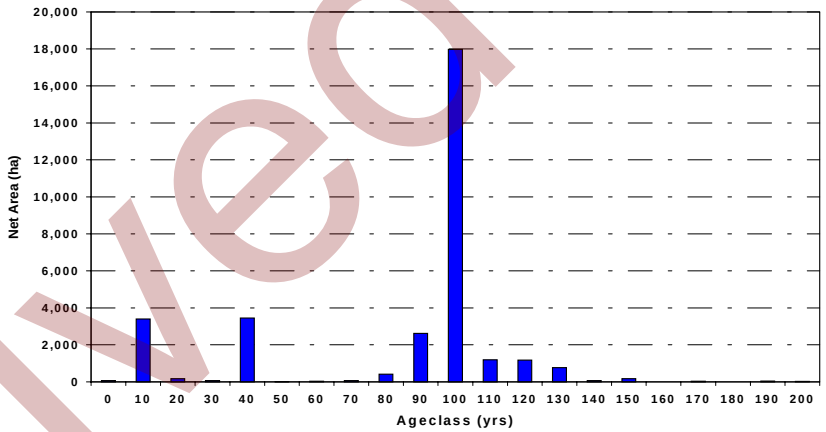
TABLE 3-32: HARVEST SIMULATION CONTROL PARAMETERS – RUN #198

CONSTRAINT	SIMULATION PARAMETER
FMU	W8
Planning horizon	180 YEARS
Targeted average harvest age at the end of the planning horizon:	90 ± 5
Minimum harvest age:	70
Landbase	Net productive landbase
Sorting rules:	1) Oldest first 2) Maximize conifer harvest
Harvest flow constraint:	Even flow to 90 years, then step down to LRSYA
Yield curve sets:	Nonlinear plot based - 15/10 utilization
Cull deductions:	Applied (Variable (0-1.5%) Conifer and 10% Deciduous)
Yield curves:	Net yield curves
Regeneration transition:	Tree Improvement
Regeneration lag:	Not applied
Introduce harvest plans:	Applied
Spatial stand adjacency:	Applied-to planned blocks only
Adjacency: Time horizon:	20 years-to planned blocks only
Adjacency: Green-up:	20 years-to planned blocks only
Adjacency: Accumulate adjacent stands:	Not applied
Age normalization:	Not applied
Age normalization factor:	Not applied
Compartment sequencing:	Applied
Number of compartments open simultaneously:	4

TABLE 3-33: HARVEST SIMULATION RESULTS (1 OF 2) – RUN #198

NET LANDBASE SUMMARY (HA)	
Gross Area	**38,660**
Recreation Areas	0
Non-forested/Unproductive Areas	
Natural	777
Anthropogenic	1,990
Sub-Total	2,767
Gross Forested Area	**35,893**
Hydrological Buffers	
Lake Buffers (100m)	12
River Buffers (60m)	279
Stream Buffers (60m)	162
Stream Buffers (30m)	730
Lake Buffers (20m)	6
Sub-Total	1,189
Net Forested Area	**34,703**
Subjective Deletions	1,476
Unmerchantable Areas	
Unproductive Timber Productivity Rating	972
Fair site Sb, Lt, or Fb leading species, & pure softwood species group	521
Sub-total	1,494
Net Productive Area	**31,734**

INITIAL AGECLASS DISTRIBUTION



GROWING STOCK

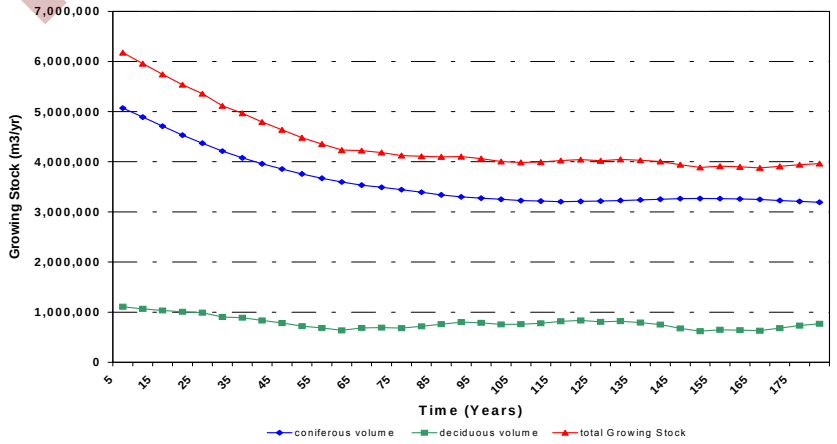
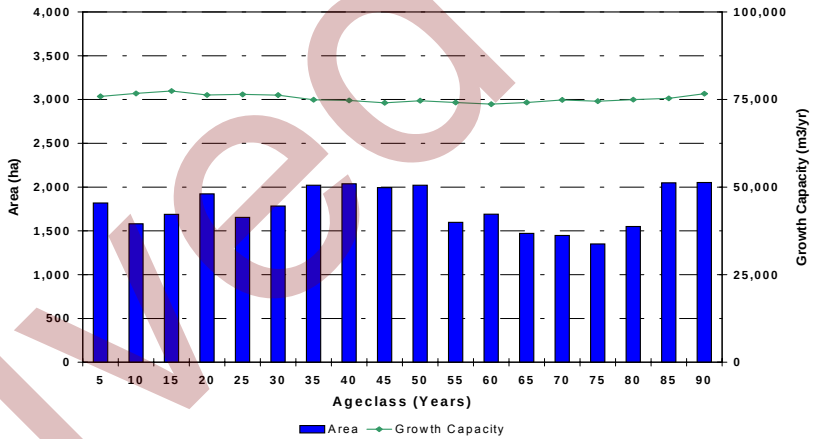


TABLE 3-34: HARVEST SIMULATION RESULTS (2 OF 2) – RUN #198

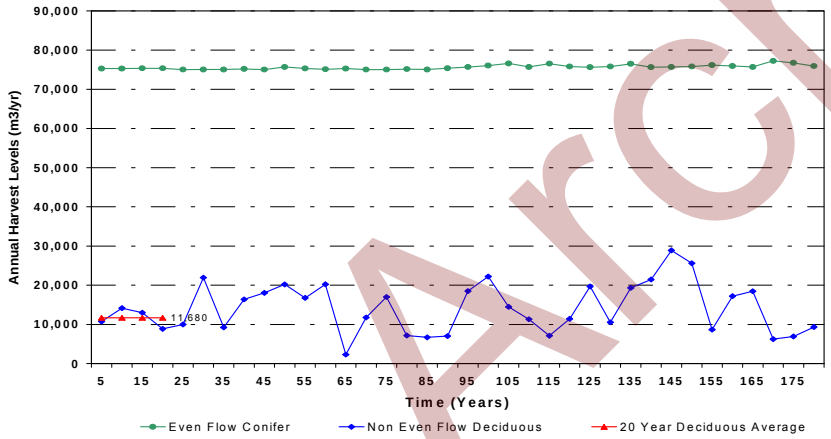
NET TIMBER SUPPLY SUMMARY

AAC Method (15/10 utilization)	Conifer Even Flow	Deciduous Non-Even Flow
LRSYA	75,637	
Sequenced Simulation	75,000 to 90 years, the step up to 75,637	11,680 (20 year average)

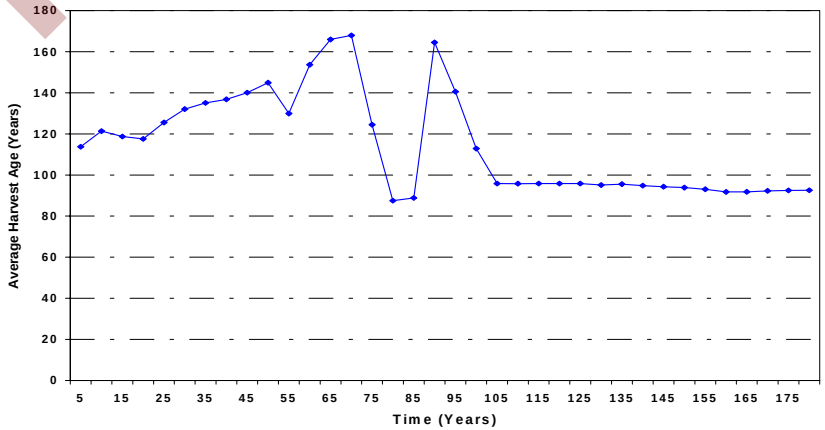
POST HARVEST FOREST CONDITIONS



HARVEST FLOW SUMMARY



AVERAGE HARVEST AGE BY 5 YEAR ITERATION



3.4 SUPPLEMENTAL ANALYSIS

Numerous runs were completed using a variety of scenario's. The results of the harvest simulation analysis are presented in Appendix A.

3.5 RISK ANALYSIS

Risk analysis regarding yield curve transitions was conducted. The analysis was performed in order to determine if status quo harvest levels could be maintained for the remainder of the planning horizon after harvesting at the 25% LFS PSP and tree improvement yield curve transitions levels. The analysis showed that the fully stocked harvest levels could be maintained for the duration of the planning horizon. Results are presented in Table 3-35: Risk Analysis.

TABLE 3-35: RISK ANALYSIS

RUN #	FMU	REGENERATION	ADJACENCY	SEQUENCE	% AREA BASIS	OPEN COMPARTMENT	CONIFER EVEN FLOW	DECIDUOUS EVEN FLOW (20 YR. AVG.)
126	E6	Status Quo	On	N/A	N/A	N/A	40,000 for 10 yrs then step down to 38,625 for 170 yrs	4,759
127	E7	Status Quo	N/A	E7_CAR2	≥ min age	4	140,750 for 10 yrs then step down to 133,750 for 170 yrs	4,690
128	W1	Status Quo	N/A	W1_93B	≥ min age	12	357,000 for10 yrs then step down to 335,000 for 170 yrs	41,949
129	W8	Status Quo	N/A	W8_93B	≥ min age	4	78,000 for 10 yrs then step down to 70,000 for 170 yrs	10,717

4.0 PREFERRED FOREST MANAGEMENT STRATEGY

The net productive forest landbase used in the AAC calculations has been approved by LFS. Decision rules used in the "net down' reflected forest management and wildlife guidelines, the imposition of operating ground rules and the application of merchantability criteria. Cutblocks identified in the new AVI, as well as those used during the orthophoto update, were assigned to fully stocked, pure conifer yield strata on medium sites (yield curves 5 and 11). Plot-based yield curves used in the analysis were developed from temporary sample plot data collected by ANC in the company's volume sampling program and were approved by LFS.

Theoretical timber supply estimates were generated for merchantable conifer and deciduous species at a 15/10 utilization standard for ANC's FMA as a whole, as well as for individual FMU's within the FMA (FMU's W1, W8, E6, and E7). The selected preferred forest management strategy is based on individual FMU harvest levels which are summarized in Table 4-1.

TABLE 4-1: PREFERRED FOREST MANAGEMENT STRATEGY HARVEST LEVEL SUMMARY

Run #	Original FMU	Sustainable Yield Unit	Conifer Even Flow (m^3/yr)	Deciduous 20 Year Average (m^3/yr)
186	E6	Berland SYU	41,000	16,251
187	E7	Foothills SYU	139,500	5,189
190	W1	Little Smoky SYU	357,000	38,613
183	W8	Pine SYU	75,500	11,697
FMA Total			**613,000**	**71,750**

Specific aspects of the preferred forest management strategy and its implementation are outlined in this section.

4.1 DEVELOPMENT OF THE PREFERRED FOREST MANAGMEMENT STRATEGY

4.1.1 SPECIES INCLUDED IN CONIFEROUS AND DECIDUOUS AAC DETERMINATION

All currently commercial species were included in the AAC determination. These include:

- Lodgepole pine (*Pinus contorta var. latifolia*)
- White spruce (*Picea glauca*)
- Black spruce (*Picea mariana*)
- Fir (*Abies* spp.)
- Larch (*Larix laricina*)
- Trembling aspen (*Populus tremuloides*)

- Balsam poplar (*Populus balsamifera*)
- White birch (*Betula paperifera*)

4.1.2 HARVEST SYSTEM

The harvest system assumed in the current timber supply analysis is a clearcut system. The assumption is that, unless otherwise specified, all commercial trees of a merchantable size will be harvested within each polygon when it is scheduled for harvest.

4.1.3 ALLOWANCES OR ANALYSIS FOR NATURAL DISTURBANCES

There have been no allowances for future natural disturbances. As per current Provincial policy, the impact of significant natural disturbances on sustainable timber harvest levels will be evaluated when they occur.

4.1.4 THE CHRONOLOGY AND RATIONALE FOR ALTERNATE RUNS

A series of timber supply scenarios were evaluated and presented in the sensitivity analyses of Appendix A. The rationale for completing alternate runs was based on the desire of ANC to meet Provincial requirements and expectations, along with evaluation of a number of different management approaches across the FMA.

4.1.5 LONG TERM RATE OF FLOW OF TIMBER AND NON-TIMBER RESOURCES

The long term rate of the flow of timber is presented in section 4. Sustainability of the long term harvest level is a fundamental constraint on the timber supply determination process. Non-timber resources are assumed to be maintained over the long term by adherence to existing, accepted Provincial policies and regulations.

4.1.6 LINK BETWEEN PREFERRED FOREST MANAGEMENT STRATEGY AND DFMP GOALS AND OBJECTIVES

Linkages between the preferred forest management strategy and the DFMP goals and objects are outlined in ANC's 2001 DFMP report.

4.2 HARVEST SEQUENCE

The compartment sequence used in the timber supply analysis is outlined in Appendix G.

4.2.1 PROCEDURES FOR DETERMINING THE HARVEST SEQUENCE

A detailed harvest schedule for each individual polygon is a standard product resulting from the implementation of a fully spatial harvest simulation approach to AAC determination. All stands scheduled within currently approved AOP's have been prioritized for harvesting; a 20 year green up constraint was applied to stands adjacent to currently approved AOP blocks (within a compartment). Detailed procedures regarding operational planning and its adherence to the harvest sequence are outlined in ANC's 2001 DFMP report.

4.2.2 FINAL FMA / QUOTA HARVEST SEQUENCE

Maps describing the final 20 year harvest sequence for the FMA are provided in Appendix C. All harvest areas will be monitored by yield strata on an operating unit basis in order to implement the preferred forest management strategy. Tables outlining area harvested by yield strata and compartment are provided in Appendix F. Detailed procedures regarding operational planning and its adherence to the harvest sequence are outlined in ANC's 2001 DFMP report.

5.0 FUTURE ENHANCEMENTS TO ANALYSIS

ANC will continue to explore opportunities to enhance future analyses through the following mechanisms:

- Incorporate new information or methods that arise from new research and increased understanding of forest dynamics;
- Monitor the consistency between operational planning and areas scheduled for harvest in the simulation;
- Develop additional decision rules to improve the operational feasibility of the individual stand sequence;
- Improve the reliability of predicted yields across ANC's FMA through the incorporation of additional sample plots;
- Complete the currently ongoing continuous forest inventory.