Spray Lake Sawmills

Detailed Forest Management Plan
2001 – 2026

Chapter 6 - Net Land Base Technical Report

December 15, 2006

Chapter 6 - Net Land Base Technical Report

The “primary use” of the FMA is to establish, grow, harvest and remove timber. However it is recognized the entire FMA is not available for timber harvesting for a number of social, economic and environmental reasons. The first step in accounting for these factors is to “net” the land base down from the gross land base to the net productive forest land base. The net land base then becomes the focus of the timber supply analysis to determine a sustainable timber harvest.

Following is the Net Land Base Technical Report prepared for Spray Lake Sawmills by Tesera Systems Inc. Spray Lake Sawmills oversaw the development of the net land base and the technical report. Tesera Systems Inc. also communicated directly with representatives from Sustainable Resource Development (SRD) to acquire and understand digital data sets. SRD reviewed previous versions of the net land base and provided valuable feedback towards correcting and improving the product. Digital data sets are included on the CD for review.

Net Land Base Report

Detailed Forest Management Plan

Spray Lake Sawmills (1980) Ltd.

Prepared for:

Ed Kulcsar, R.P.F.
Forestry Manager
Spray Lake Sawmills (1980) Ltd.

Submitted by:

Dwight Crouse, R.P.F.
Resource Analysis Manager
Tesera Systems Inc.

March 23, 2006
Revised: December 8, 2006

TESERA SYSTEMS INC.
Box 1078 Cochrane Alberta Canada • T4C 1B1
Phone: 403.932.0440 • Fax: 403.932.9395 • www.tesera.com

Table of Contents

List of Tables

List of Figures

Appendices

1.0 Introduction

This document outlines the procedures and assumptions which were applied to determine the Net Land Base for Spray Lake Sawmills (1980) Ltd.'s (SLS) Detailed Forest Management Plan (DFMP). A number of summaries of the land base are also provided.

The NLB process and document were developed using data and guidance from consultants, (Golder Associates Ltd. and Tesera Systems Inc.), the Resource Analysis Branch of Alberta Sustainable Resource Development (ASRD) and Spray Lake Sawmills Ltd (SLS). Golder Associates had performed the bulk of the GIS, database work and provided assistance in writing this document. Tesera Systems provided Golder Associates with technical input and data as it pertained to the Timber Supply Model used in the Timber Supply Analysis.

For more information, please contact Dwight Crouse, the Resource Analysis Manager at Tesera Systems or Ed Kulcsar, the Forestry Manager at Spray Lake Sawmills using the contact information provided below.

Contact Information:

Dwight Crouse, R.P.F.
Resource Analyst Manager
Tesera Systems Inc.
Box 1078, Cochrane
Alberta, T4C 1B1
Direct Phone: (403) 932-0446
Main Office Phone : (403) 932-0445
Fax: (403) 932-9395
E-mail: dwight.crouse@tesera.com

Ed Kulcsar, R.P.F.
Forestry Manager
Spray Lake Sawmills Ltd.
305 Griffin Road West,
Cochrane, AB, T4C 2C4
Direct Phone: (403) 851-3311
Main Office Phone: (403) 932-2234
Fax: (403) 932-6675
E-mail: ed.kulcsar@spraylakesawmills.com

2.0 Data Input Layers

The layers contributing to the land base came from a variety of sources including ASRD, Spray Lake Sawmills Ltd. and GAIA Consultants Inc. (now a part of Golder Associates Ltd. and will be referred to as Golder Associates within the rest of this document). These data layers were integrated within a GIS environment to generate a resultant for use in subsequent net land base calculations. The data used in this project was of varying scale, quality, and currency. The analysis relied heavily on:

1. Existing base data supplied by ASRD as of April 5, 2002;
2. An updated depletion layer provided by ASRD in August 2005; and
3. Golder Associates/SLS/Tesera layers current to April 2005.

The base year for the analysis is 2001, the year in which the Spray Lake Sawmills Forest Management Agreement (FMA) was approved. It is important to note that SLS, ASRD and various Community Timber Use (CTU) Disposition holders have provided all available cutblock updates current to 2001 and all available proposed cutblocks to 2007 for integration into the net land base analysis. Table 1, provides the data source and the vintage of the data used for this analysis.

Table 1. Input Data Description

Data Layer	Data Source	Vintage	Scale	Comments
Alberta Vegetation Inventory (AVI)	ASRD & Sunpine Forest Products	1987	1: 20,000	No known issues
Updated Cutblock Depletions	ASRD	2005	1: 20,000	No known issues
Existing/Planned Cutblocks	SLS/CTU Holders	2004/2005	1: 20,000	No known issues
Historical Cutblocks	ASRD	Variable	1: 20,000	No known issues
FMU Boundaries	ASRD	2002	1: 20,000	No known issues
IRP Layer	ASRD & Golder Associates	1986 – 1989	1: 100,000 – 1: 250,000	See section 2.4
IRP RMA ‘A’ Layer	Golder Associates	1986	1: 100,000	See section 2.4
Provincial Recreation Areas	ASRD	Unknown	1: 50,000	No known issues
Permanent Sample Plots	ASRD	2001	1: 20,000	No known issues
Water – Non-Buffered Lakes	ASRD	2000	1: 50,000	Data was originally derived from older 1: 20 000 product – date unknown
Slope and Operability	ASRD	1982	1: 60,000 air photos, interpolated to 25m pixels (scale ~ 1:50,000)	The Slope layer was generated by Golder Associates from the Alberta Government supplied Digital Elevation Model (DEM)
SLS Subjective Deletions	SLS	2001	1: 60,000	No known issues
Buffered Paved Roads	ASRD	1982 and 1993	1: 50,000	No known issues
Buffered Gravel Roads	ASRD	1982 and 1993	1: 50,000	No known issues
Buffered Pipelines	ASRD	1982	1: 50,000	No known issues
Buffered Truck Trails	ASRD	1982 and 1993	1: 50,000	No known issues

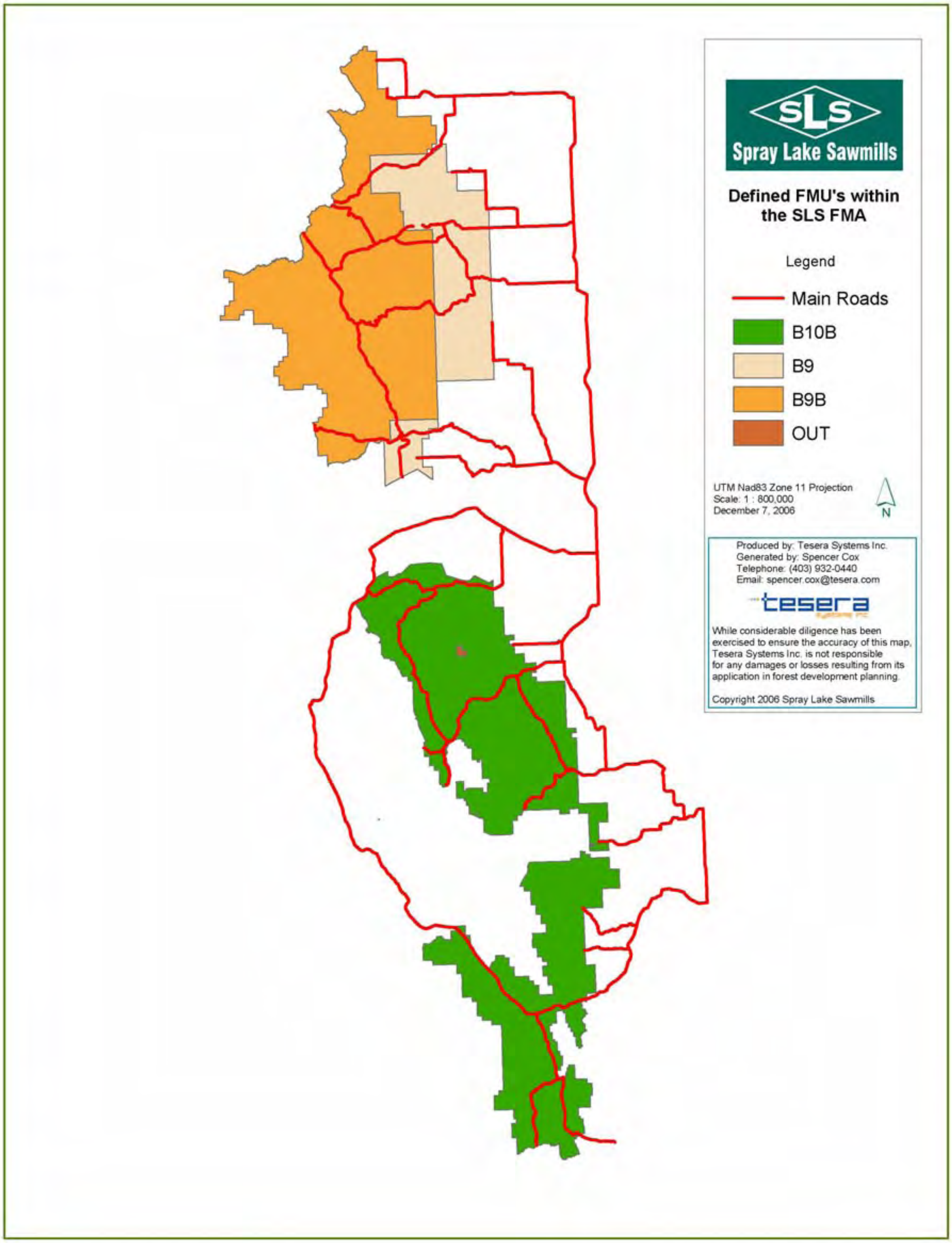
Data Layer	Data Source	Vintage	Scale	Comments
Buffered Trails/Cutlines/Seismic	ASRD	1982 and 1993	1: 50,000	No known issues
Buffered Streams/Rivers	ASRD	2000	1: 50,000	Data was originally derived from older 1: 50,000 Microstation based product – date unknown
Buffered Lakes	ASRD	2000	1: 50,000	Data was originally derived from older 1: 50,000 Microstation based product – date unknown
Treatment Units	Tesera	2005	1:20,000	No known issues
SLS Compartments Layer	Golder	2002	1:20,000	Derived by Golder in 2002. No known issues.
Community FireSmart Boundaries	ASRD	2005	Unknown	No known issues
Watershed Boundaries	Wildland Disturbance Consulting	2004	Unknown	No known issues.
Mountain Pine Beetle Priority Areas	ASRD	2004	Unknown	No known issues

The following sections contain descriptions and known issues associated with each input layer. Although normally included in the net land base process, there were no airstrips, runways, railways, ski hills, commercial lagoons, dugouts, water-filled quarries, native reserves, intermittent oxbows, or pits (as defined in AB Base Features) in the FMA/B9 Quota area.

2.1 FMU Boundaries

The Forest Management Unit (FMU) Boundaries layer was provided by ASRD. A consolidated layer of the FMA boundary and the B9 quota was created from the government provided files (filenames fma_gt.e00, fmu_gt.e00, spray_ats.e00 and spray_utm.e00) to create FMUNITS2 and contains information about the FMU boundaries. Figure 1 provides a map of the FMU boundaries within the FMA.

Figure 1. FMU Boundaries within the SLS FMA



2.2 AVI Inventory Layer

Spray Lake Sawmills' land base determination was based on a compiled forest cover of Alberta Vegetation Inventory (AVI) data which was used to identify the forest stand composition. This is one of the key layers used in determining each polygons inclusion or exclusion from the net land base.

The majority of the forest cover information was supplied by ASRD in 2002. However, there were four partial townships for which the government data was not available. To fill in data gaps for these areas, Spray Lake Sawmills acquired Sundre Forest Products Ltd.'s (formerly Sunpine Forest Products Ltd.) AVI data. Data creation dates of the AVI data varied and are summarized in Table 2 and Figure 2 as supplied by Forest Management Branch, Land and Forest Division, Sustainable Resource Development and Sundre Forest Products Ltd.

The AVI data supplied by the ASRD was in ArcInfo format in both NAD27 and NAD83 projections (filenames B7B01_27.e00, B7B01_83.e00, B6B8_27.e00 and B6B8_83.e00). The files in NAD83 projection were labeled as *_83.e00. The AVI files from Sundre Forest Products were merged into the dataset, so the final result was one complete AVI dataset for SLS's FMA area.

The AVI layer was clipped to the FMA boundary and the AVI attribute definitions were normalized to meet government standards for AVI 2.1. (For example, moisture attribute values (MOIST and UMOIST fields) were adjusted from upper case to lower case and species identification (SP1-SP5 and USP1-USP5) were changed from being all upper case to title case (e.g., SB ➲ Sb)).

During this process, one polygon was discovered that contained a value in SP1 and in ANTH_VEG. This polygon was coded as being in the passive land base as a conservative approach to managing this data–related issue.

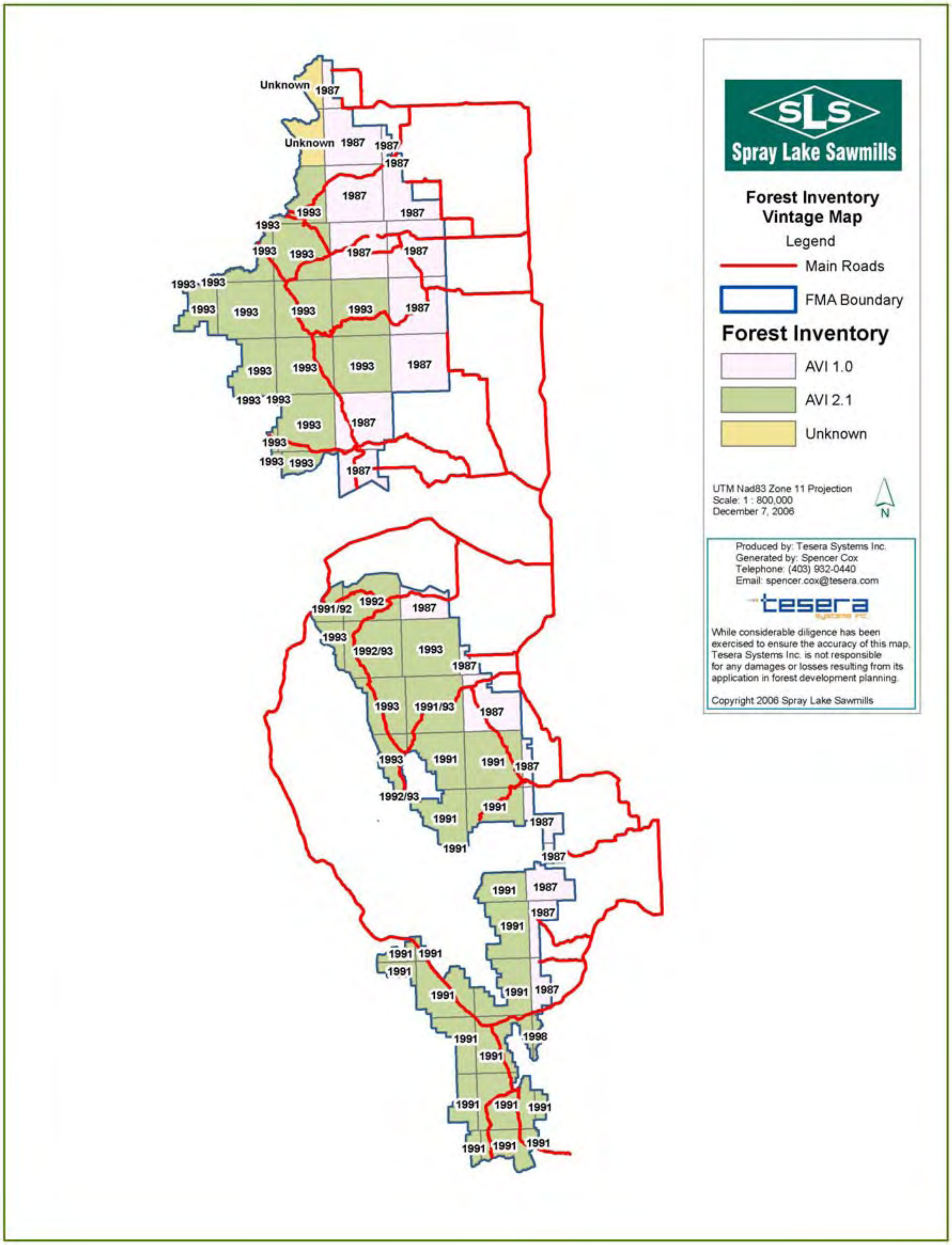
Table 2. Listing of AVI Data Sources by Township, Range, Meridian

Twp.-Rge.-Mer.	Version	Photo Used	Data Source
14-4-5	2.1	1991	ASRD
14-5-5	2.1	1991	ASRD
14-6-5	2.1	1991	ASRD
15-4-5	2.1	1991	ASRD
15-5-5	2.1	1991	ASRD
15-6-5	2.1	1991	ASRD
16-4-5	2.1	1998	ASRD
16-5-5	2.1	1991	ASRD
16-6-5	2.1	1991	ASRD
16-7-5	2.1	1991	ASRD
17-4-5	1.0	1987	ASRD
17-5-5	2.1	1991	ASRD
17-6-5	2.1	1991	ASRD
17-7-5	2.1	1991	ASRD
18-4-5	1.0	1987	ASRD
18-5-5	2.1	1991	ASRD
18-6-5	2.1	1991	ASRD
18-7-5	2.1	1991	ASRD
18-8-5	2.1	1991	ASRD
18-9-5	2.1	1992	ASRD
19-4-5	1.0	1987	ASRD
19-5-5	2.1	1991	ASRD
19-6-5	2.1	1991	ASRD
19-7-5	2.1	1991/92	ASRD
19-8-5	2.1	1992	ASRD
19-9-5	2.1	1992	ASRD

Twp.-Rge.-Mer.	Version	Photo Used	Data Source
19-10-5	2.1	1992	ASRD
20-4-5	1.0	1987	ASRD
20-5-5	2.1	1991	ASRD
20-6-5	2.1	1991	ASRD
20-7-5	2.1	1992/93	ASRD
20-8-5	2.1	1992/93	ASRD
20-9-5	2.1	1992/93	ASRD
20-10-5	2.1	1992/93	ASRD
21-4-5	1.0	1987	ASRD
21-5-5	2.1	1991	ASRD
21-6-5	2.1	1991	ASRD
21-7-5	2.1	1993	ASRD
21-8-5	2.1	1993	ASRD
21-9-5	2.1	1993	ASRD
21-10-5	2.1	1993	ASRD
21-11-5	2.1	1993	ASRD
22-5-5	1.0	1987	ASRD
22-6-5	2.1	1991/93	ASRD
22-7-5	2.1	1993	ASRD
22-8-5	2.1	1993	ASRD
22-9-5	2.1	1993	ASRD
22-10-5	2.1	1993	ASRD
22-11-5	2.1	1993	ASRD
23-5-5	1.0	1987	ASRD
23-6-5	2.1	1993	ASRD
23-7-5	2.1	1992/93	ASRD
23-8-5	2.1	1993	ASRD
23-9-5	2.1	1991/93	ASRD
23-10-5	2.1	1993	ASRD
23-11-5	2.1	1992/93	ASRD
24-6-5	1.0	1987	ASRD
24-7-5	2.1	1992	ASRD
24-8-5	2.1	1991/92	ASRD
24-9-5	2.1	1991/92	ASRD
24-10-5	2.1	1991/92	ASRD
24-11-5	2.1	1992	ASRD
25-8-5	2.1	1991/92	ASRD
25-9-5	2.1	1992	ASRD
25-10-5	2.1	1991/92	ASRD
25-11-5	2.1	1991/92	ASRD
26-7-5	1.0	1987	ASRD
26-8-5	2.1	1993	ASRD
26-9-5	2.1	1993	ASRD
26-10-5	2.1	1993	ASRD
27-7-5	1.0	1987	ASRD
27-8-5	2.1	1993	ASRD
27-9-5	2.1	1993	ASRD
27-10-5	2.1	1993	ASRD
27-11-5	2.1	1993	ASRD
28-6-5	1.0	1987	ASRD
28-7-5	2.1	1993	ASRD
28-8-5	2.1	1993	ASRD
28-9-5	2.1	1993	ASRD
28-10-5	2.1	1993	ASRD
28-11-5	2.1	1993	ASRD
29-6-5	1.0	1987	ASRD
29-7-5	2.1	1993	ASRD

Twp.-Rge.-Mer.	Version	Photo Used	Data Source
29-8-5	2.1	1993	ASRD
29-9-5	2.1	1993	ASRD
29-10-5	2.1	1993	ASRD
29-11-5	2.1	1993	ASRD
30-6-5	1.0	1987	ASRD
30-7-5	1.0	1987	ASRD
30-8-5	2.1	1993	ASRD
30-9-5	2.1	1993	ASRD
30-10-5	2.1	1993	ASRD
30-11-5	2.1	1993	ASRD
31-6-5	1.0	1987	ASRD
31-7-7	1.0	1987	ASRD
31-7-5	1.0	1987	ASRD
31-8-5	2.1	1993	Sunpine Inventory
31-9-5	2.1	1993	Sunpine Inventory
32-6-5	1.0	1987	ASRD
32-7-5	1.0	1987	ASRD
32-8-5	Unknown	Unknown	Sunpine Inventory
33-7-5	1.0	1987	ASRD
33-8-5	Unknown	Unknown	Sunpine Inventory

Figure 2. AVI Vintage Map for the SLS FMA



2.3 Inventory Updates

The following sections outline the datasets used to update the AVI inventory for harvesting activities on the FMA.

2.3.1 ASRD Cutblock Updates

ASRD provided cutblock updates (filenames b7cuts_n83.e00 and b6b8cuts_n83.e00) to Golder in 2002 at the same time the AVI was delivered. In August of 2005, ASRD provided Tesera with additional locations of harvest depletions using scanned images of hard copy maps (TIFFs). Tesera GIS staff then digitized these block updates and labeled cutblocks with the appropriate year of harvest. The data from these sources were combined into a single ASRD cutblock coverage.

The data provided by ASRD was restricted to harvesting activities, no updates associated with fire on the FMA were provided. During the GIS processing, the data had undergone quality control to ensure that everything was topologically correct (i.e. no dangles, ensure that blocks were attributed with the harvest year, etc.)

These cutblocks were used to develop the Comprehensive Cutblock layer described in section 2.15.1.

2.3.2 SLS Existing and Proposed Cutblocks

SLS had provided their existing and proposed cutblocks in shapefile format. These layers were converted to coverage format and checked for data quality to ensure that everything was topologically correct (i.e. no dangles, ensure that blocks were attributed with the harvest year, etc.).

These cutblocks were used to develop the Comprehensive Cutblock layer described in section 2.15.1

2.3.3 Commercial Timber Permit Holders (CTP) Existing and Proposed Cutblocks

The existing and proposed cutblocks from the CTP Holders (four long-term CTP holders since converted to Coniferous Timber Quotas under the Community Timber Use (CTU) program) were provided by Trees Consulting Inc., who developed the cutblocks for the CTP Holders. The same QA procedures as outlined above for SLS blocks were also performed for the CTP Holders cutblocks.

These cutblocks were used to develop the Comprehensive Cutblock layer described in section 2.15.1

2.4 Integrated Resource Plans

The following sections will outline the steps taken to develop an IRP layer used for the NLB process.

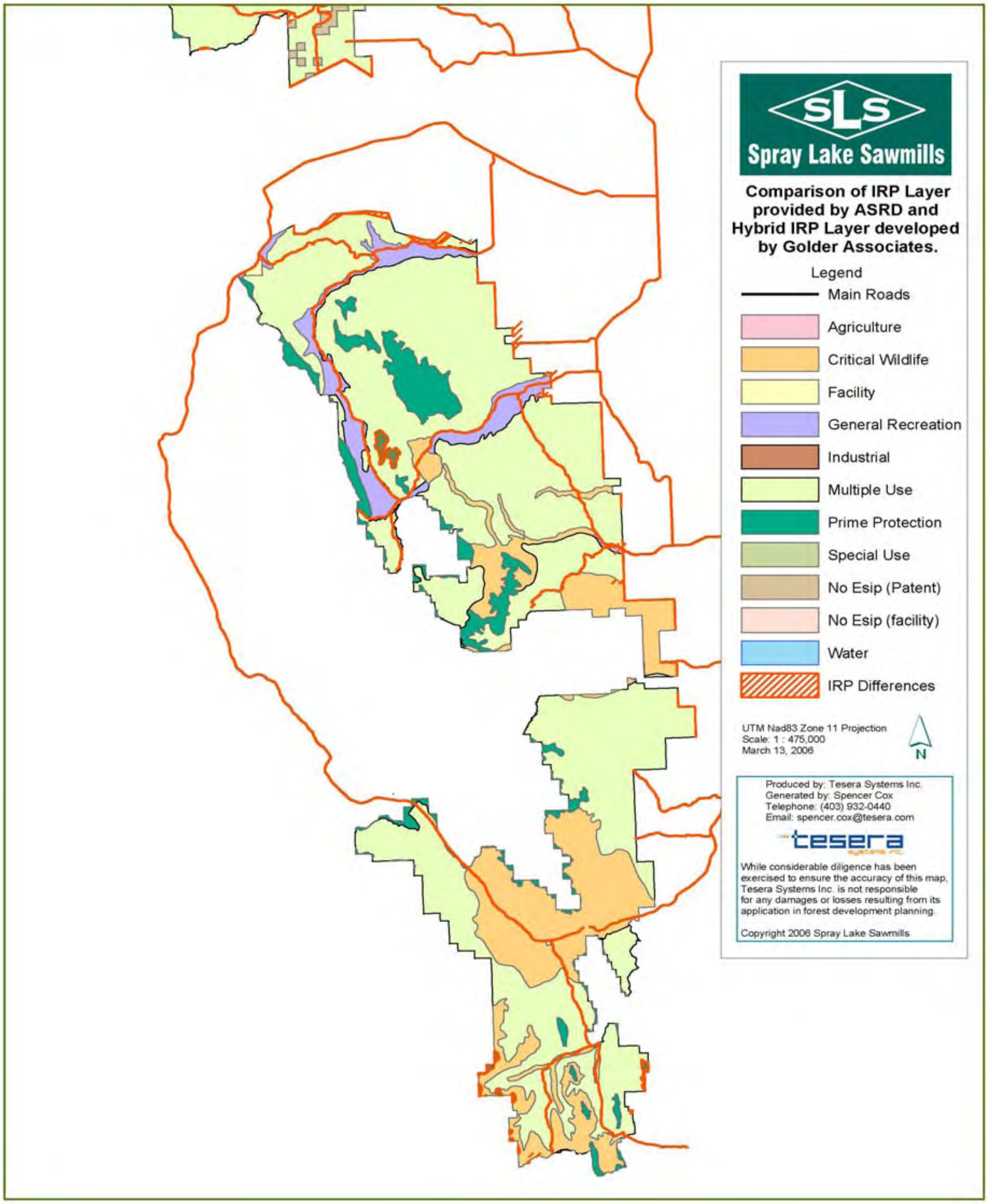
2.4.1 Integrated Resource Plan Layer

The original Integrated Resource Plan (IRP) data was provided by ASRD in November of 2001 (filenames sls_irp.e00 and sls_esip.e00). There were some inconsistencies with the IRP and ESIP layers provided by ASRD and the information contained in the Kananaskis Country Sub-Regional IRP as well as the Ghost River Sub-Regional IRP. As a result, Golder created a hybrid IRP layer, incorporating the ESIP and IRP layer information from ASRD into one coverage but also made the appropriate changes to reflect the intent of the Kananaskis Country Sub-Regional IRP and Ghost River Sub-Regional IRP plans. Only the IRP_TYPE field was changed in the hybrid IRP layer, the ESIPZONE field was not adjusted. The IRP_TYPE field was used in the NLB process, the ESIPZONE field was not used. This data validation process resulted in additional Prime Protection polygons being added to the hybrid IRP layer that was used in this analysis. The inclusion of the additional polygons had little impact to the active land base. See Table 3 for the amount of area that was reclassified in the Golder IRP adjustment process. Figure 3 also provides the location of these inconsistencies.

Table 3. Area Comparison Between ASRD and reclassified Hybrid IRP Layers

ASRD_ESIPZONE	ASRD_DESCRIPTION	SLS_ESIPZONE	SLS_IRP_TYPE	GROSS HECTARES
0		1	Prime Protection	314.95
0		2	Critical Wildlife	11.54
0		4	General Recreation	3.43
0		5	Multiple Use	82.13
3	Special Use	4	General Recreation	86.40
3	Special Use	5	Multiple Use	310.34
4	General Recreation	5	Multiple Use	0.11
5	Multiple Use	1	Prime Protection	444.34
5	Multiple Use	2	Critical Wildlife	0.10
5	Multiple Use	4	General Recreation	3.85

Figure 3. Comparison of ASRD provided IRP layer and the Hybrid IRP layer used in this analysis



The IRP zones that are capable of being harvested are:

- Critical Wildlife (Zone 2);
- Multiple Use (Zone 5); and
- General Recreation (Zone 4).

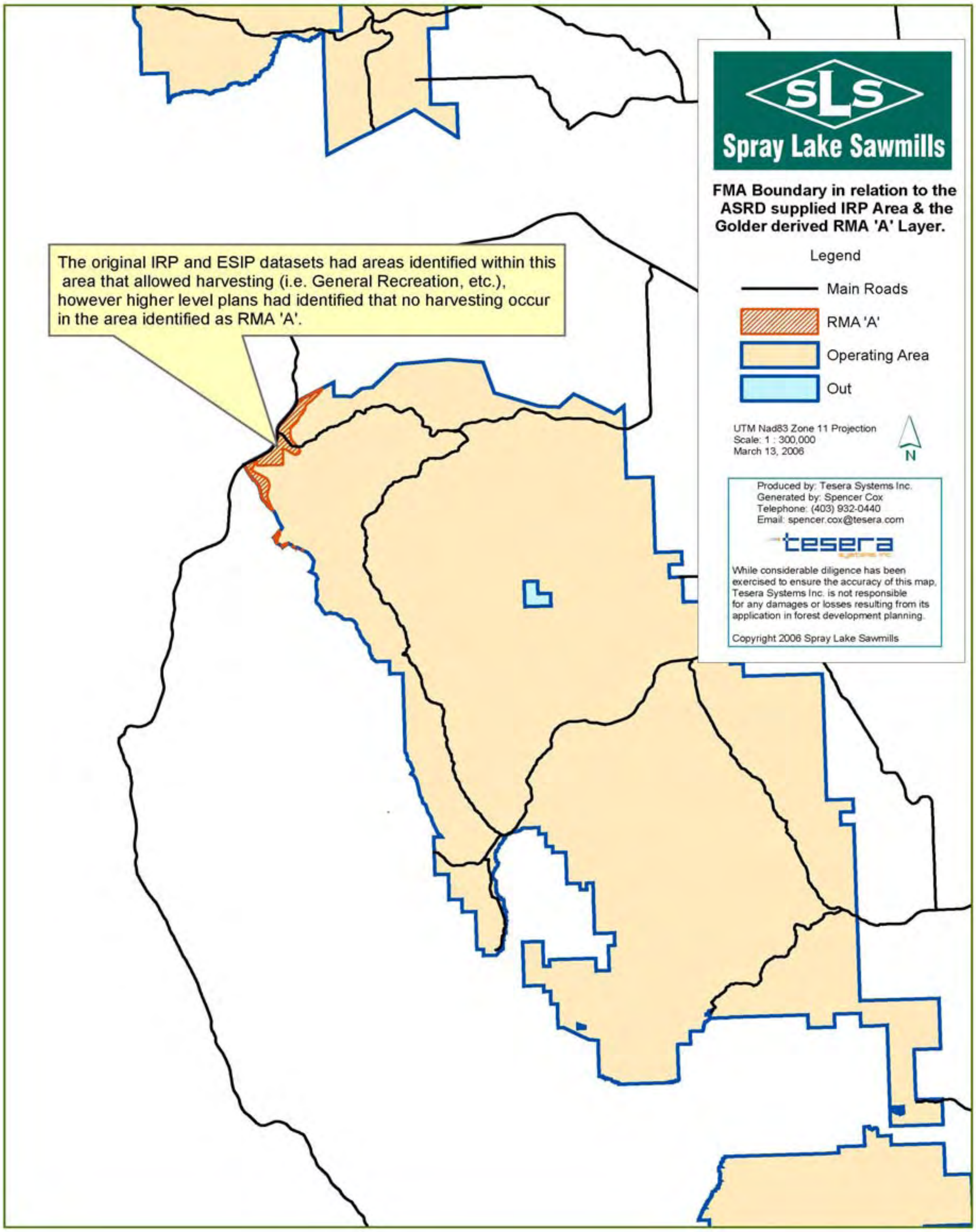
The rest of the IRP zones were assigned to the Passive land base, since harvesting was not allowed in these areas.

2.4.2 Integrated Resource Plan RMA 'A' Layer

The IRP Resource Management Area 'A' layer (RMA_A) was created by Golder Associates based on the source IRP and ESIP layers provided by the ASRD (sls_irp.e00 and sls_esip.e00). A portion of the ASRD IRP and ESIP layers were erroneously included within the boundary of the FMA layer provided. As a result, a separate RMA layer was created to ensure that within the NLB process the polygons would be coded as being in the passive land base, since harvesting is not permitted within the Regional Management Area 'A'. See Figure 4 for an illustration of the issue.

Valid codes for the RMA 'A' field are 0 and 100. The value of 0 indicates that the polygon is outside the RMA 'A' area and was considered for harvest; a value of 100 indicates the polygon is within the RMA 'A' area and was removed from the active land base.

Figure 4. Map Showing the Extent of the FMA and the Overlap Between the IRP Resource Management Area ' A' layer



2.5 Provincial Recreation Areas

This layer outlines provincial recreation areas within the FMA and B9 Quota area. The Provincial Recreation Areas layer (REC) was provided by ASRD in November of 2001 (filename sls_pra.e00). No modifications were made to this file.

There are no legislated protected areas within the boundaries of the FMA. Provincial REC Areas were removed from the net land base as harvest activities will not be occurring in these regions.

Valid codes for this attribute are 0 and 100. The value of 0 indicates the absence of a recreation area; a value of 100 indicates the polygon is within a recreation area.

2.6 Permanent Sample Plots

The Permanent Sample Plot (PSP) layer was provided by ASRD in polygon topology and no modifications were made to this coverage. PSP's are specified plot locations where the natural forest processes are allowed to dominate so that the growth of the forest can be measured and used in growth & yield programs. These areas were removed from the land base as harvest activities will not occur in these regions due to current regulations.

The AVI data provided by ASRD indicated that approximately 15.3 hectares within the PSP plots were clearcut, (MOD1 or MOD2 = CC) however no harvest date was specified (MOD1_YR or MOD2_YR = 0). For these stands, the ages of the stands were set to 1 year old as described in section 3.3.3. These areas within old existing cutblocks are part of the Passive Land Base.

Valid codes for this attribute are 0 and 100. The value of 0 indicates the absence of a PSP; a value of 100 indicates the polygon is within a PSP.

2.7 Riparian Features

The following sections provide information on how riparian features were developed, buffered and assessed as part of the NLB process. See Figure 5 for an example of a non-buffered lake, and the accompanying buffers surrounding the lakes and streams.

2.7.1 Non-Buffered Lakes

The Lakes layer was extracted by Golder Associates from the ASRD supplied base data (s_hpoly.e00 and s_slnet.e00). Based on the metadata provided by ASRD, the polygon features from s_hpoly or the linework which formed a closed polygon from the s_slnet data layer were extracted in linear format and built into polygons creating the HYDRO_P layer.

Islands within the Lake features were included in this deletion as it is not SLS' s intention to harvest on islands within the FMA – B9 Quota area. Therefore the islands were dissolved into the non-buffered lakes layer and assigned to the passive land base.

This layer was integrated into the resultant as a means to track the lake features in future analysis and modeling and to remove their areas from the gross land base. Such removals included canals, lakes, oxbows, reservoirs, and major rivers and streams.

Valid codes for this attribute are 0 and 100. The value of 0 indicates the absence of a non-buffered lake; a value of 100 indicates the polygon is classified as a lake. The buffering of these features is described in the following section, section 2.7.2.

2.7.2 Buffered Lakes

Using the HYDRO_P layer created in section 2.7.1, the polygons within the coverage were buffered using the criteria contained in Table 4 to create a separate polygon buffer coverage, B_HYDRO_P.

Once this layer was buffered, it was clipped to the FMA boundary and integrated into the resultant. The buffered lake areas were removed from the gross land base. These areas do not contribute to the net land base because it is SLS' intention to maintain this buffer around these water bodies.

Table 4. Buffered Lakes and Standing Water

Feature (FEATURE_TYPE in source file)	Buffering Parameter	Total Buffer Width (Metres)
Island-River (ISLAND_RIV); River-Stream-Major (RIV-MAJ)	CCOGIF code = GA08850500, GA08850000, GA08850520, GA08850700, GA08850720, GA61850500, GA61850520, GA61850700, GA61850720, GE36300000, GA61850000	60
Lake-Recurring (LAKE_RECUR); Lake-Perennial (LAKE_PER); Reservoir (RESERVOIR)	CCOGIF code = GB60300000, GB60300200, GB37800000, GB37800200, GB37950000, GB37950200, GE36250000, GE36050000	100
Oxbow-Perennial (OXBOW_PER)	CCOGIF code = GB49850000, GB49850200	30
Wetland (WETLAND)	CCOGIF code = GB21400000, GB21400200, GB37500000, GB37500200, GB49800000, GB49800200, GB56300000, GB56300200, GA80100000, GA80100200, GD37400000	0

2.7.3 Buffered Streams and Rivers

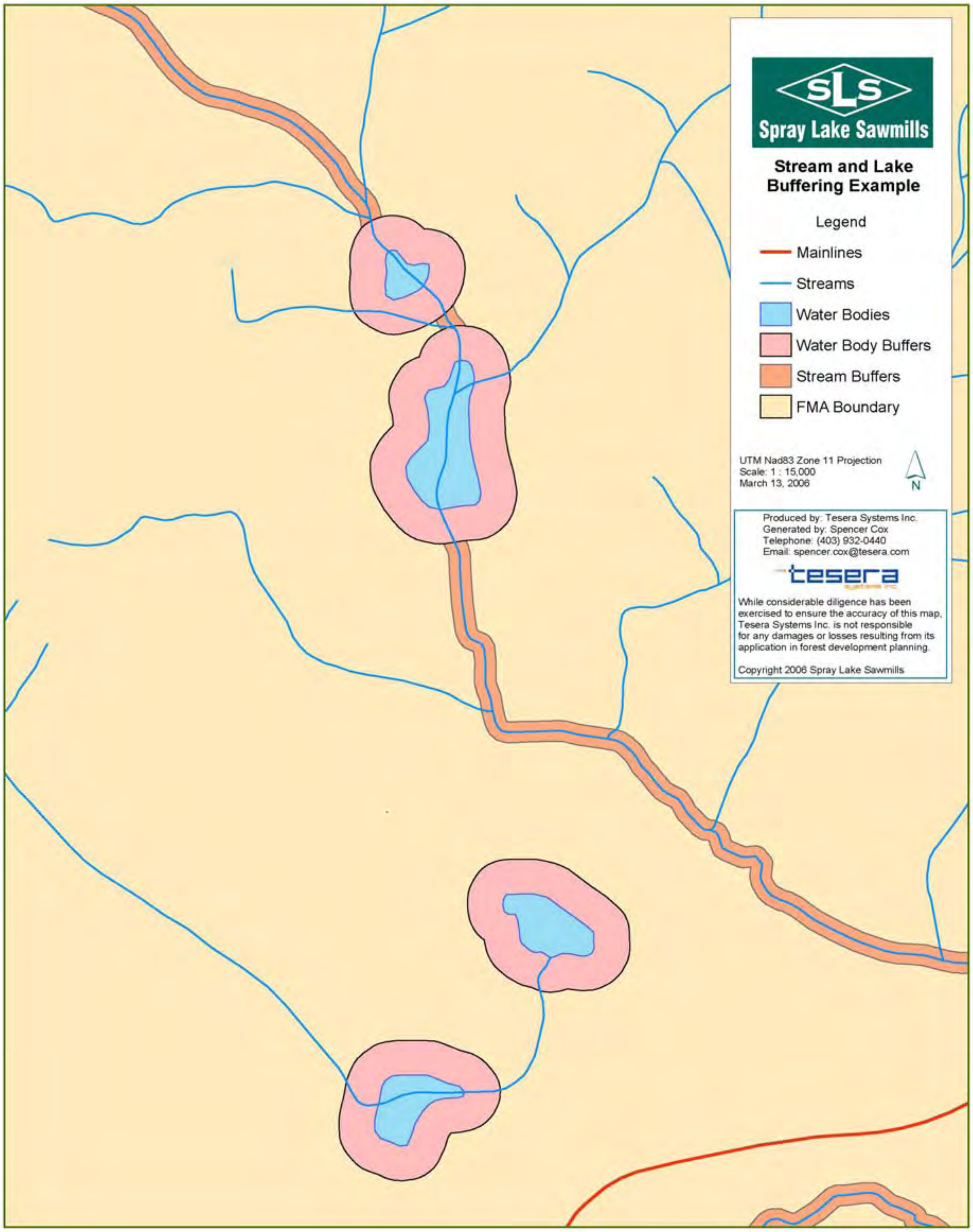
The streams and rivers layer was developed by Golder Associates from the ASRD supplied base data (s_slnet.e00). The linear features from s_slnet were extracted in a linear format and built into linear streams and rivers creating the HYDRO_L layer. The HYDRO_L layer was subsequently buffered using the criteria contained in Table 5 to create the B_HYDRO_L layer.

Once this layer was buffered, it was clipped to the FMA area and integrated into the resultant. The area within buffered features was removed from the gross land base. These areas do not contribute to the net land base because it is SLS' intention to maintain these buffers around these water bodies.

Table 5. Buffered Rivers and Streams

Feature	Buffering Parameter	One-sided Buffer (meters)	Total Buffer (metres)
River-Stream Indefinite, River-Stream Disappearing, River-Stream Intermittent	CCOGIF code = GA61700000,GA61700200, GA61750000,GA61750200, GA61550000,GE15870100, GE15870150,GB49800000, GA20700000	0	0
Aqueduct, Canal-Irrigation, Ditch-Irrigation, River-Stream Perennial	Name <> ' ' (therefore all named creeks that don't already have a buffer width from step1 above, received a buffer)	30	60
Wilkinson Creek	Wilkinson Creek	60	120

Figure 5. Riparian Features and Accompanying Buffers



2.8 Slope and Operability

The Slope layer (SLOPE_POLY2) was generated by Golder Associates from the Alberta Government supplied Digital Elevation Model (DEM) provided in 2002 as part of the Base Features DEM request (image files were from the 82J_DEM and 82O_DEM file groups). These files were merged into one DEM image file and processed to derive a slope layer.

The processing that had occurred to develop the slope layer included filtering the DEM using a 3X3 median filter. The filtered, classified slope layer was ‘filled’ from the classified slope coverage when duplicate modal values occurred within the analysis neighborhood. After polygonizing (creating polygons from the raster), polygons with an area less than 3000m^2 were dissolved with their nearest, largest neighbor. As a result, many of the slivers and small polygons were removed. This process could change the available land base; however, most of the features eliminated occurred on ridges, where AVI calls were non-vegetated (e.g. NMR).

The purpose of this layer was to provide information about the slope of the land in order to identify areas in which SLS would likely have accessibility issues. The slope polygons were classified into 4 classes:

- 1 - slope values of 0 to 35%;
- 2 - slope values of 36 to 45%;
- 3 - slope values of 46 to 55%; and
- 4 - slope values of greater than 55%.

Within the resultant, polygons having a SLOPE_CODE of >=3 (>45%) were considered inoperable using SLS’ current harvest methods and the corresponding SLOPE field was classified as “100”. These polygons were removed from the net land base.

2.9 SLS Spatial Subjective Deletion Layer

The Subjective Deletions layer (SLS_DEL) was provided by Spray Lake Sawmills (1980) Ltd. The purpose of this layer was to identify areas that may have merchantable timber, but will not be harvested due to constraints, such as accessibility, visual impact, etc.

Valid codes for this attribute are 0 and 100. The value of 0 indicates the absence of a subjective deletion; a value of 100 indicates the polygon did have a subjective deletion.

2.10 Reductions for Access

The following sections provide information on how access-related features were developed, buffered and assessed as part of the NLB process.

2.10.1 Buffered Paved Roads

ASRD supplied access data to SLS in 2002. This access-related data was delivered in 89 ArcInfo interchange files (*.e00) and was based on 1:50,000 Mircostation data in NAD27 projection. Using the metadata provided by ASRD, Golder Associates extracted the paved roads from the various coverages and converted it to NAD83 projection. The paved roads were extracted in a linear format and subsequently buffered to create the B_PAVED coverage using the buffer widths specified in Table 6. Valid codes for this attribute are 0 and 100. The value of 0 indicates the absence of a paved road; a value of 100 indicates the polygon is a paved road.

Once this layer was buffered, it was clipped to the FMA and integrated into the resultant. The area of the buffered features was removed from the gross land base. These areas do not contribute to the net land base.

Table 6. Buffered Paved Roads

Feature (FEATTYPE in source)	One-Sided Buffer (Metres)	Total Buffer Width (Metres)
Bridge-Road-Paved-2Lane	30	60
Bridge-Road-Paved-4Lane	50	100
Interchange-Ramp	50	100
Overpass-Underpass	50	100
Road-Paved-Divided	50	100
Road-Paved-Undivided-2Lane (ROAD-PAVED-UNDIV-2LANES)[1]	30	60
Road-Paved-Undivided-4Lane	30	60
Road-Paved-Undivided	30	60
Tunnel-Roadway	50	100

2.10.2 Buffered Gravel Roads

ASRD supplied access data to SLS in 2002. This access-related data was delivered in 89 ArcInfo interchange files (*.e00), was based on 1:50,000 Mircostation data and was in NAD27 projection. Using the metadata provided by ASRD, Golder Associates extracted the gravel roads from the various coverages and converted it to NAD83 projection. The gravel roads were extracted in a linear format and subsequently buffered using criteria contained in Table 7 to create B_GRAVEL coverage. The value of 0 indicates the absence of a gravel road; a value of 100 indicates the polygon is a gravel road.

Once this layer was buffered, it was clipped to the FMA boundary and integrated into the resultant. The buffered gravel roads were removed from the gross land base. These areas do not contribute to the net land base. Gravel roads falling within previously harvested areas are excluded from the land base as it is assumed that these areas will remain as gravel roads. The current gross area of gravel roads within cutblocks (planned or existing) is 18.15 ha. This area will not correspond to the Gravel Roads line item in the netdown table, since deletions higher up in the hierarchy also occur on these polygons. Also the line item in Table 13 considers all gravel roads that have not been associated with another deletion, not just those gravel roads within cutblocks.

Table 7. Buffered Gravel Roads

Feature (FEATTYPE in source)	One-Sided Buffer (Metres)	Total Buffer Width (Metres)
Bridge-Road-Gravel-1Lane	10	20
Bridge-Road-Gravel-2Lane	15	30
Road-Gravel-1Lane[1]	10	20
Road-Gravel-2Lane[1]	15	30

[1] The only classification that was within the SLS FMA. The rest of the classifications were outside the FMA.

2.10.3 Buffered Pipelines

ASRD supplied access data to SLS in 2002. This access-related data was delivered in 89 ArcInfo interchange files (*.e00), was based on 1:50,000 Mircostation data in NAD27 projection. Using the metadata provided by ASRD, Golder Associates extracted the pipelines from the various coverages and converted it to NAD83 projection. The pipelines were extracted in a linear format and subsequently buffered using the criteria contained in Table 8 to create the B_PIPELN coverage. The value of 0 indicates the absence of a pipeline; a value of 100 indicates the polygon is within a pipeline buffer.

Once this layer was buffered, it was clipped to the FMA area and integrated into the resultant. The pipeline buffers were removed from the gross land base. These areas do not contribute to the net land base because there is no intention to re-forest them.

Table 8. Buffered Pipelines

Feature (FEATTYPE in source)	One-Sided Buffer (Metres)	Total Buffer Width (Metres)
Major Pipeline	15	30

2.10.4 Buffered Truck Trails

ASRD supplied access data to SLS in 2002. This access-related data was delivered in 89 ArcInfo interchange files (*.e00), was based on 1:50,000 Mircostation data in NAD27 projection. Using the metadata provided by ASRD, Golder Associates extracted the truck trails from the various coverages and converted it to NAD83 projection. The truck trails were extracted in a linear format and subsequently buffered using the criteria contained in Table 9 to create the B_TRKTRL coverage. The value of 0 indicates the absence of a truck trail; a value of 100 indicates the polygon is a truck trail.

Once this layer was buffered, it was clipped to the FMA boundary and integrated into the resultant. The buffered truck trails were removed from the gross land base. These areas do not contribute to the net land base because there is no intention to reforest them. Truck trails falling within previously harvested areas are excluded from the land base as it is assumed that these areas will remain as truck trails. The current gross area of truck trails within cutblocks (planned or existing) is 27.18 hectares. This area will not correspond to the truck trails line item in the netdown table, since deletions higher up in the hierarchy also occur on these polygons. Also the line item in Table 13 considers all truck trails that have not been associated with another deletion, not just those truck trails within cutblocks.

Table 9. Buffered Truck Trails

Feature (FEATTYPE in source)	One-Sided Buffer (Metres)	Total Buffer Width (Metres)
Bridge-Road-Unimproved	2	4
Bridge-Trail-Truck	2	4
Road-Unimproved [2]	2	4
Trail-Truck [2]	2	4

[2] The only classification that was within the SLS FMA. The rest of the classifications were outside the FMA.

2.10.5 Buffered Trails, Cutlines, Seismic Lines

ASRD supplied access data to SLS in 2002. This access-related data was delivered in 89 ArcInfo interchange files (*.e00), was based on 1:50,000 Mircostation data in NAD27 projection. Using the metadata provided by ASRD, Golder Associates extracted the trails, cutlines and seismic data from the various coverages and converted it to NAD83 projection. The trails were extracted in a linear format and subsequently buffered using the criteria contained in Table 10 to create the B_TRAIL coverage. The value of 0 indicates the absence of a trail (cutline or seismic line); a value of 100 indicates the polygon is a trail (cutline or seismic line).

Once this layer was buffered, it was clipped to the FMA boundary and integrated into the resultant. The attributes with the data provided by ASRD did not have a date when these features were established and SLS or ASRD do not currently have a tracking system for reporting on the dates of establishment of trails, cutlines or seismic lines or the current status of these linear disturbances. Since the actual dates of establishment and level of activity on trails is unknown – the conservative approach is to not consider harvesting these areas until more data is available. Therefore these areas are excluded from the active land base.

The result was that the current gross area within trails, cutlines or seismic within cutblocks (planned or existing) was 410.18 hectares. This area will not correspond to the trails, cutlines or seismic line item in the netdown table, since deletions higher up in the hierarchy also occur on these polygons. Also the line item in Table 13 considers all trails, cutlines or seismic that have not been associated with another deletion, not just those trails, cutlines or seismic lines within cutblocks.

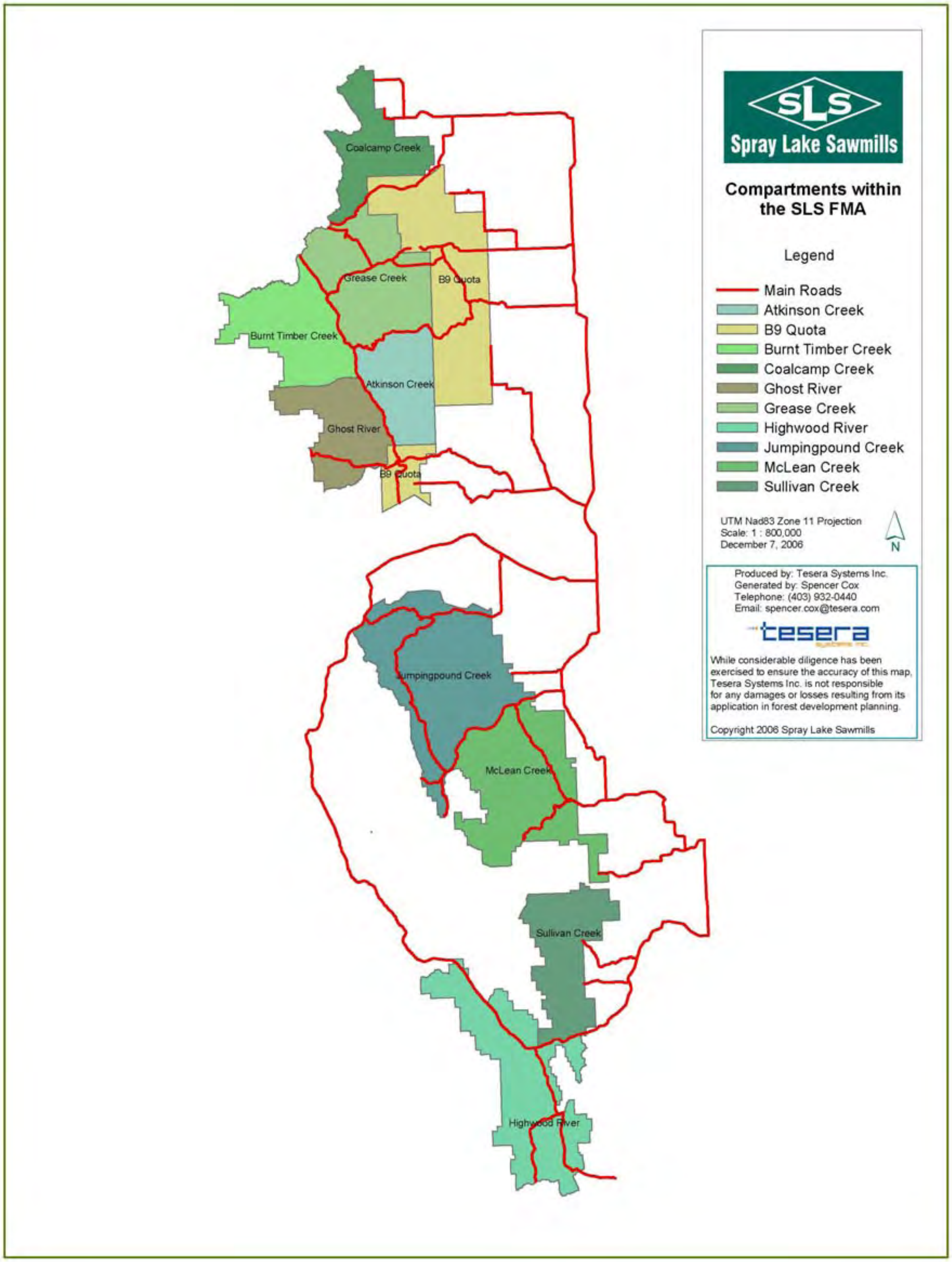
Table 10. Buffered Trails, Cutlines, Seismic Lines

Feature	One-Sided Buffer (Metres)	Total Buffer Width (Metres)
Trail/Cutline/Seismic	2	4

2.11 Spray Lake Sawmill Compartments

The Compartments layer was provided by Spray Lake Sawmills (1980) Ltd and was built by GAIA (now Golder). The purpose of this layer was to identify operating compartments. The integration of the compartment layer into the land base file for reporting in the Timber Supply Analysis and it is not considered in determining if a stand is in/out of the net land base. Figure 6 provides an illustration of the compartment boundaries.

Figure 6. SLS Compartment Boundaries on the FMA



2.12 Watershed Boundaries

To further refine the land base and allow for easier operational implementation of spatial harvest areas, the watersheds were used to prioritize the harvest during the 200-year planning horizon. This coverage was developed from the SLS Fire Regime Study performed by Wildland Disturbance Consulting. From the initial coverage provided by SLS, only the watershed and valley fields were incorporated into the resultant.

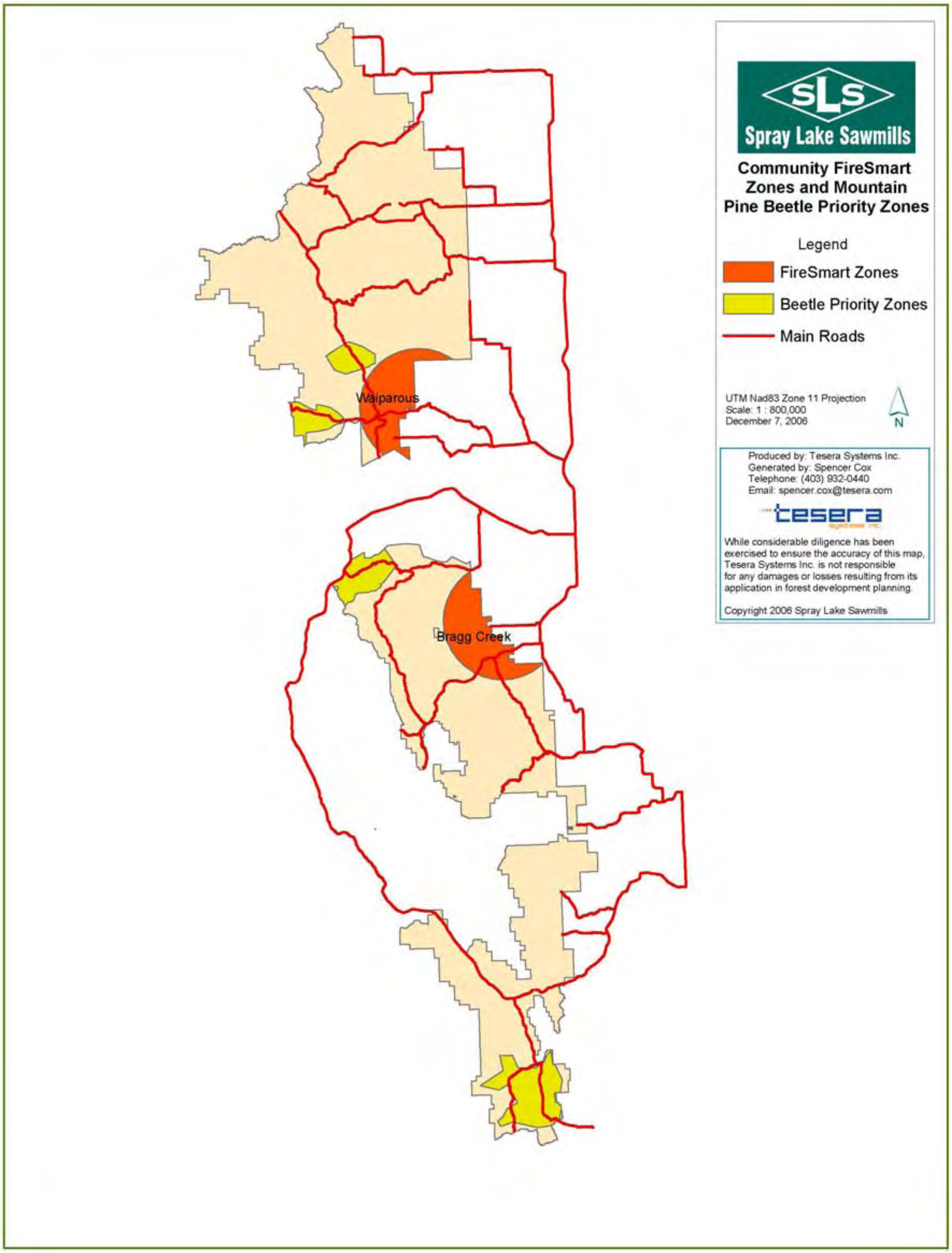
Using the watershed and valley information allows the Timber Supply Model to sequence stands to a finer resolution rather than only using compartments, thereby providing a more realistic operational plan. For example, the model could sequence stands based on drainages (following heights of land, etc.) thereby allowing easier operational implementation of the resulting management plan.

2.13 Community FireSmart Boundaries

The Community FireSmart areas are identified as a 10 kilometer radius buffer around communities. The Community FireSmart boundaries for West Bragg Creek and Waiparous were provided by ASRD in July of 2005. These were provided in two separate ESRI shapefiles (WestBragg_CPZ and Waiparous_CPZ_UTM11). These files were merged together and attribute tagged such that within the resultant field FIRESMARTBUFFER, the West Bragg Creek 10km radius could be identified as “WestBragg“ and the Waiparous Village 10km radius could be identified as “Waiparous“. See Figure 7 for an illustration of the Fire Smart Zones within the FMA.

Within these areas, the intent is to reduce the wildfire threat by removing the fuels having higher hazard rates through harvesting. These areas are predominately pine of various age ranges and any stands within these areas, which meet the minimum harvest ages will be assessed for harvesting opportunities prior to stands outside the FireSmart zones.

Figure 7. FireSmart and MPB Zones on the FMA



2.14 Mountain Pine Beetle Priority Areas

The Mountain Pine Beetle (MPB) epidemic is a growing concern and is resulting in re-allocation of timber supply Allowable Annual Cut (AAC)'s in many parts of British Columbia. Currently, MPB is found in sections around Banff, as well as the Bow River Valley, outside the SLS FMA.

In 2004, ASRD identified 3 regions within the SLS FMA that are high potential entry points for MPB and provided an ESRI shapefile "Beetle_Priority_Zones". The shapefile did not have specific attributes to identify each of the zones separately – therefore this was added so each of the 3 spatial units can be queried within the resultant. Using the SRD_MPB_PRIORITY field, each of the three units can be spatially identified using the values 1-3. There's also a BTL_RSK field whereby the MPB zones are identified with a value of 1.

In the summer of 2006, during field site visits ASRD and SLS added another high priority beetle zone to the FMA, however due to logistics in timing, the entire Net Land Base overlay process was not re-initiated. The additional MPB Zone was included in the Timber Supply Analysis by manually selecting and attributing the corresponding polygons in the existing land base file the required attribute codes: SRD_MPB_PRIORITY field value of 4 and BTL_RSK field value of 1.

ASRD and SLS agreed to the timing of harvest within these units as well, so harvesting operations within these zones have been fixed within the model, and mostly occur within periods 2 or 3. This is based on a concerted effort to stop the spread of MPB into the FMA from areas adjacent to the FMA – whereby targeting mature to over-mature timber stands within the high potential entry points will be utilized. With the exception of the stands within the 10 km FireSmart buffers, any stand that meets the harvest criteria will be assessed for harvest prior to other stands within the FMA. MPB susceptible stands and the FireSmart areas will be assigned the highest harvest priority (1) available within the Timber Supply Model. See Figure 7 for an illustration of the MPB Zones on the FMA.

2.15 Total Chance Planning for the FMA

2.15.1 Comprehensive Cutblock Layer

A Comprehensive Cutblock layer was developed from the cutblock updates described in section 2.3. Cutblocks from each of these data sources were merged into a single cutblock layer where many inconsistencies between data sources were identified and corrected.

The only exception to the above was the inconsistencies between blocks provided by the CTU disposition holders. Subsequent to the CTU data being provided the CTU disposition holders indicated that the harvest sequence had changed, this will be addressed in the Timber Supply Analysis.

The hierarchical order in resolving block data from the various sources was:

1. Spray Lake Sawmill's data was deemed to be the most accurate, on the basis that they are the FMA holder and have the best local knowledge of the area and a majority of their harvest depletions were captured digitally by GPS and orthophotography update process with Golder;
2. ASRD's July 2005 historical cutblock information;
3. The ASRD cutblock updates which were provided in conjunction with the AVI dataset for the FMA; and
4. Cutblocks listed in the original AVI were used to identify blocks.

The discrepancies in existing or proposed harvest dates were updated manually in the net land base file during the summer of 2006, when blocks were being added/identified to account for additional MPB areas and agreements with CTU disposition holders.

The blocks harvested prior to 2001 can be identified by using the field HARVDATE, the values in that field indicate year of harvest. The proposed blocks can be identified by using the PROPDATE field. The dates within the PROPDATE field are based on the period of harvest, and are 2001, 2006, 2011, 2016, 2021 and 9999. These dates represent the 5-year periods, i.e. 2001-2006, 2006-2011, 2011-2016, 2016-2021 and 2021-2026. The 9999 value is used to indicate that it's a block that it is currently flagged as a second-pass block within the SLS/CTU holder's datasets. The Timber Supply Model will sequence the second-pass blocks based on the harvest priorities set forth in the Timber Supply Model.

Additionally there were two (2) other fields that were added, WTP_Proposed and WTP_Harvested. These were used to track small patches within the planned/existing cutblocks. A value of "YES" within either field indicates that there's a small patch within the cutblock. If they were forested based on the AVI and capable of being harvested based on the NLB code (SLS_NET_BASE = "ActiveLB") then they would be considered in future harvest scheduling of the Timber Supply Model. If they were not forested or not capable of being harvested, then they were coded with a non-forest strata attribute for modelling. The area within WTP_Proposed and WTP_Harvested is 93.32 ha, which represents 0.0418% of the active land base.

2.15.2 Development of the Treatment Unit Layer

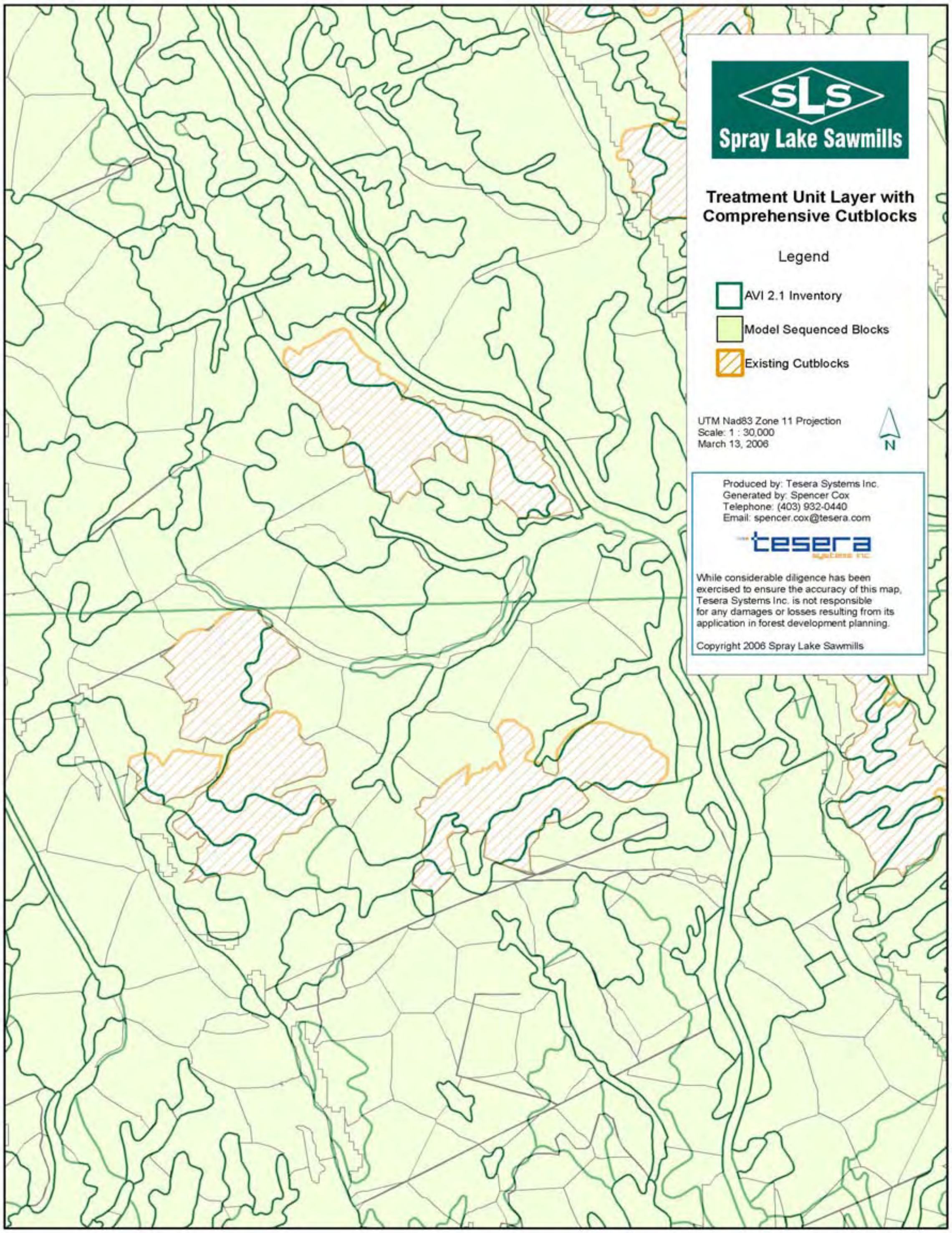
A Treatment Unit layer was generated for this analysis, which consisted of polygon units (treatment units) being developed for the entire FMA to a maximum block size of 20 hectare. These treatment units were developed whereby units would not span any of the spatial elements involved in developing the active land base, such as major creeks buffers, road buffers, IRP constraints, slope > 45 %, etc. The treatment units also considered timber type and other inventory criteria such as leading species, areas of non-productive, etc.

The rationale for using Tesera's proprietary Treatment Unit Model to prepare a future treatment unit block design was to ensure that the AVI polygons were sufficiently broken-up into multiple polygons to allow TSM to have the maximum flexibility to develop as much of an operationally-realistic block/future patch design as possible. Using a 20 ha maximum size allows the Timber Supply Model to form future blocks into an array of configurations and sizes.

Tesera had integrated the existing/planned Comprehensive Cutblock Layer (section 2.15.1) into the Treatment Unit layer. Any overlapping linework between the Treatment Units and the existing/proposed blocks were "erased" in ArcInfo to ensure that the blocks that already existed or were planned would be harvested in their entirety. The resulting treatment unit layer only contains a unique treatment unit number and code, and the information from the Comprehensive Cutblock layer – other than that none of the source data is maintained in the Final Treatment Unit Layer.

The Treatment Unit layer, complete with the Comprehensive Cutblock layer was integrated into the land base resultant. See Figure 8 for an example of the cutblocks and the Treatment Unit layer with roads and other features.

Figure 8. Treatment Unit Layer and Associated Cutblocks



3.0 Methodology

This analysis was designed to calculate Spray Lake Sawmills' Timber Harvesting Land Base. The objective was to create a single spatial layer that contained information about harvest availability, administrative boundaries and other determining factors. This information included operability constraints such as slope, access limitations and forest composition, as well as regulatory constraints such as Integrated Resource Plan boundaries and Recreation Areas.

The strategy was to obtain all of the available information that contributes to determining harvest levels and availability, prepare the raw data into a useable format through buffering operations (as mentioned in the previous section) and subsequently combine this information into a single layer to perform tabular summaries and calculations.

3.1 Resultant Preparation and Data Integration Tolerances

The tolerance used in the merging of all data map sheets was 0.001 metres; for all buffering operations: 0.001 metres; for lake extraction: 0.0000001 metres; for the geometric union of all input data: 0.000000001 metres. These tolerance levels were used to ensure that the smallest common tolerance was used at all times to ensure the highest possible accuracy for the resultant. More information about which functions used the tolerances in all geometric manipulation as well as specific AMLs can be found on the DVD/CD submitted as Appendix 1. All input data was projected to UTM Zone 11 NAD83, using NTV2.

After the datasets were cleaned, modified and checked for quality assurance they were merged together to form the resultant dataset using ArcInfo. Table 11 provides a listing of the individual coverages that were combined together to form the resultant.

Table 11. Coverages that were Unioned to Create a Resultant File

Data Layer	Comment
Alberta Vegetation Inventory (AVI)	Used "As Delivered" (i.e. no significant modifications) – however incorporated additional Sundre FP AVI to comprised a complete dataset to cover the entire FMA. See section 2.2 for more details.
Treatment Units	Modified as per section 2.15.2
FMU Boundaries	Used a consolidated FMU layer based on govt. base data. See section 2.1 for more details.
IRP RMA ' A' Layer	Used a hybrid IRP layer that Golder developed, see section 2.1
Provincial Recreation Areas	Used "As Delivered" (i.e. no significant modifications).
Permanent Sample Plots	Used "As Delivered" (i.e. no significant modifications).
Water – Non-Buffered Lakes	Used "As Delivered" (i.e. no significant modifications).
Slope and Operability	Used "As Delivered" (i.e. no significant modifications).
SLS Subjective Deletions	Used "As Delivered" (i.e. no significant modifications).
Buffered Paved Roads	Used source data "As Delivered" (i.e. no significant modifications). See section 2.10.1 for details.

Data Layer	Comment
Buffered Gravel Roads	Used source data “As Delivered” (i.e. no significant modifications). See section 2.10.2 for details.
Buffered Pipelines	Used source data “As Delivered” (i.e. no significant modifications). See section 2.10.3 for details.
Buffered Truck Trails	Used source data “As Delivered” (i.e. no significant modifications). See section 2.10.4 for details.
Buffered Trails/Cutlines/Seismic	Used source data “As Delivered” (i.e. no significant modifications). See section 2.10.5 for details.
Buffered Streams/Rivers	Used source data “As Delivered” (i.e. no significant modifications). See section 2.7.3 for details.
Buffered Lakes	Used source data “As Delivered” (i.e. no significant modifications). See section 2.7.2 for details.
SLS Compartments Layer	Used “As Delivered” (i.e. no significant modifications).
Community FireSmart Boundaries	Used “As Delivered”.
Watershed Boundaries	Used “As Delivered”.
Mountain Pine Beetle Priority Areas	Used “As Delivered”.

3.2 Sliver Polygons

Sliver polygons are usually small, narrow polygons erroneously created at the data entry point or through an overlay/mapjoin process. Golder removed all slivers prior to the overlay process and after the overlays were completed. In the final coverage, a small number of sliver polygons were identified as having no forest cover information. Since these small polygons cannot be correctly classified, they were eliminated into their nearest, largest neighbor based on area. No further eliminates were performed on the resultant coverage to reduce the number of polygons.

The resultant file’s polygon attribute table (PAT) was then exported to MS Access to enable classification of the Net Land Base.

3.3 VBA Coding to Define the Net Land Base

Once the resultant files PAT table was exported to MS Access a number of VBA code modules were created to correctly assign attributes required for the NLB and Timber Supply Analysis process.

The following sections will outline the logic for the VBA coding and the resulting NLB classification. Each of the fields were appended to the resultant PAT table in MS Access so that the calculated values could be populated using the decision rules within the VBA coding found in Appendix 2.

In addition, the reasons for exclusion from the land base, deletion type and hierarchy were tracked. The hierarchy was calculated in order to determine the dominant reason for deletion and to avoid double counting deleted areas.

See the resultant file data dictionary (Appendix 3) for further information regarding these fields.

3.3.1 Cov_Type

The Cov_Type field was created to track the broad cover group of forested stands. The cover type is used in the assignment of yield strata. It is also a required field in the land base file. There are five possible values for this field: NF, C, D, CD and DC and are listed below:

- NF – indicates a non-forested polygon where the AVI did not have any species information and the stands was not within an existing/proposed harvest unit. This provides additional error capturing and quality control of the cover type coding;
- C - indicates that the dominant cover in the overstory is conifer (80% or greater conifer overstory);
- D - indicates the cover group is deciduous (80% or greater in deciduous overstory);
- CD - indicates a mixedwood cover group with more than 50% conifer; and
- DC - indicates mixedwood cover group with more than 50% deciduous.

In cases when there was 50% coniferous and 50% deciduous stands, the leading species determines the cover type assignment (e.g. leading species coniferous would be assigned CD). There are no summaries directly based on this attribute.

The interim fields used to derive the COV_TYPE field were also maintained in the resultant file, those fields are FOR1-FOR5; CONPERCENT1- CONPERCENT5; and DECPERCENT1- DECPERCENT5, PERC and PERD. These interim fields tracked the types and percentage of coniferous or deciduous in each forested polygon.

3.3.2 Yield

The Yield field was created to track the yield strata associated with each forest stand for input into the Timber Supply Model. This yield stratum is used to estimate the volume of timber related to the forest types in the FMA-Quota area. This attribute was calculated considering stand species composition and location in the FMA-Quota area. There were seven possible yield classes:

- **B9B Pine -** includes Conifer dominant stands (80% or greater conifer overstory composition) with a dominant pine species and occurring in the B9B or B9 Quota area.
- **B9B Spruce -** includes Conifer dominant stands with a dominant spruce or fir species and occurring in the B9B or B9 Quota area.
- **B10B Pine -** includes Conifer dominant stands with a dominant pine species and occurring in the B10B area.
- **B10B Spruce -** includes Conifer dominant stands with a dominant spruce or fir species and occurring in the B10B area.
- **Mixedwood -** includes stands composed of 30% to 70% conifer in the overstory occurring anywhere in the FMA-Quota area.
- **Deciduous -** includes those areas composed of 80% or greater deciduous stands.

- **Composite -** assigned to polygons containing cutblock information without corresponding leading species information. For these stands Golder Associates had created a composite yield curve which will be used to project volumes on these stands. See the growth & yield document submitted by Golder Associates for more information with how the composite curve was generated.
- **B10B Larch and B9B Larch stands** as identified in the AVI. The leading larch stands were considered as forested stands and were part of the passive land base but modelled with a null-volume yield curve. The larch leading stands were removed from the active land base through AVI Subjective deletions, see section 3.3.7. The gross area of larch **leading** stands was 279.91 ha within the B10B and B9B quota areas. This should not be confused with the subjective deletion, "AVI Subjective Deletions – Larch" in the Netdown Category field since this considers both **leading and secondary larch species** in developing the active land base area, which amounts to removing 516.42 ha from the active land base (i.e. 516.42 ha is in the passive land base).
- **Non-Forested -** Polygons without forested attributes or polygons with land base reductions that were not accounted for in the AVI where it's assumed the vegetation of the polygons have been removed. Non-Forested includes polygons having the following attributes:
    - No forested attributes within the AVI, with the exception of the polygon coded as FMA Composite curves, see above;
    - Roads and their associated buffers, including paved, gravel, truck trail;
    - Areas identified as being outside the FMA;
    - Pipelines and it's associated buffer;
    - Cutlines, Seismic lines, Trails and their associated buffers where no species data is present within the AVI;
    - Water Features and their associated buffers where no species data is present within the AVI; and
    - IRP areas, specifically zones identified within the IRP dataset as agriculture, facility, industrial, no esip (facility), no esip (patent), water and special use; and
    - Recreation Areas.

It is important to note that 28 ha of black spruce were assigned the Conifer Spruce Leading yield class. Since these particular stands occur in pre-harvested cutblocks a yield curve must be assigned. It was determined that the Conifer Spruce Leading yield curves was the best fit for these stands based on SLS's reforestation plan for these areas. See Figure 11 and Table 16 for the yield strata summaries.

3.3.3 Combined_HarvDate

The Combined_HarvDate field was used to account for any discrepancies in harvest dates between the AVI activity modifiers and the actual dates from the harvest depletion records from SLS, ASRD, or quota holders. The Combo_HarvDate field was used in developing the age calculation in section 3.3.4.

3.3.4 Age

The Age field was designed to track the stand age. It is a required field in the resultant file for use in timber supply calculations and is used by the Timber Supply Model. The age field is also essential in defining the active land base.

Typically, the origin of the overstory is subtracted from the reference date (2001) to calculate the stand age and that was the calculation performed on most of the stands to determine age. However there were instances where other considerations were required:

- For stands that were identified as previously being harvested (COMBINED_HARVDATE >0), the age was calculated by subtracting the reference year (2001) from the harvest date (COMBINED_HARVDATE).
- For stands in the AVI data that had a clearcut modifier (MOD1 or MOD2 = ‘ CC’) and no harvest year (COMBINED_HARVDATE = 0 or is null) and invalid modifier years (i.e. MOD1YR or MOD2YR = null or ‘ ’) then the stand was set to 1 year of age.
- It was noted that some stands within the AVI had a burn code (MOD1 = “ BU”), a known year of the burn (MOD1_YR >0) but the origin of the stands were not adjusted to reflect the burned year. In reviewing the C5 Management Plan, the same approach to update the inventory was taken whereby the modification extent breakpoint of greater than or equal to 3 was used. Any stand that was burned (MOD1 = “ BU” and MOD1_YR >0 and MOD1_EXT >=3) had the age calculated as 2001- MOD1_YR.

This is a conservative approach, but does not overestimate the expected volume within the TSA. SLS will be performing inventory updates within the next 10 years in time for the next round of NLB process and DFMP submissions so any issues related to calculating ages should be resolved.

3.3.5 Age_Class

The Age_Class field provides the age class for the above calculated ages. Age class was derived by dividing the age of each stand by 10 and rounding up to the nearest integer. Possible values for this field range from 0 for stands with no associated origin to the oldest 10 year age class in increments of 1. The age class is not used in the Timber Supply Model and is provided merely for information & summary purposes.

If comparing the age classes from the 2004 Netdown and Timber Supply Analysis to the work done in 2006 (net land base process and the revised Preferred Management Strategy analysis) there is a difference in Age Classes 0 and 1. This difference is age classes was due to the fact that during the 2004 analysis, stands with an age of 1 were included in the zero (0) age class whereas in this version (2006 vintage) of the age classification & net land base processing, stands with an age of 1 are included in the one (1) age class.

3.3.6 IRP

The IRP field was created to track whether a polygon was deleted as a result of IRP zone deletion. For IRP areas, if the polygons were coded as anything other than Critical Wildlife, Multiple Use or General Recreation, they were removed from the land base.

Valid codes for this attribute are 0 and 100. The value of 0 indicates that there was no IRP deletion; a value of 100 indicates the polygon was within an IRP deletion area.

3.3.7 Deriving the AVI Subjective Deletions

These AVI Subjective deletions are based on the attribute data within the AVI file as well as the calculated ages within the net land base process. See section 3.3.4 to review how ages were calculated within the NLB process.

Subjective deletions of forested regions were based on decision rules provided by SLS. The subjective deletions applies to all stands, except historical cutblocks harvested prior to 2001 where the assumption is that if a stand was previously harvested it can be harvested again unless other constraints such as a hydro buffer, trail buffer, etc. are acting on it. The criteria for subjective deletions are:

- Timber Productivity Rating of 'U' or is NULL;
- Values in ANTH_VEG or ANTH_NON;
- There is no leading species and not an existing cutblock;
- The leading or second species is Larch;
- The leading species is Black Spruce;
- The leading species is Pine but it is less than 6 metres tall and age is older than 55 years (at year 2001). This age corresponds to a stand origin (i.e. ORIGIN field within the AVI) of < 1945; and
- The leading species is Pine but the height is between 6 and 12 metres and older than 75 years (at year 2001). This age corresponds to a stand origin (i.e. ORIGIN field within the AVI) of < 1925.

Stands having an AVI Subjective Deletion are identified in the dataset using the SUBJ_DEL field. If there is a vale of 100 in the SUBJ_DEL field then the stand has an AVI-based subjective deletion, whereas a value of 0 means that no deletion occurred on the polygon.

3.3.8 SLS_Net_Base

The SLS_NET_BASE field is the master net land base field. This field indicates whether or not the polygon is in or out of the net land base. SLS_NET_BASE has two possible values: “PassiveLB” or “ActiveLB”. A value of “PassiveLB” indicates the polygon was excluded from the net land base and the value of “ActiveLB” indicates that it was included in the net land base. This field does not depend on a hierarchy because if any one deletion category caused the polygon to be considered outside the land base, it was calculated as such.

All of the land base deletions, mentioned below, were used in calculating this attribute. Each polygon was analyzed separately and if any of the deletion categories were applied then the polygon was not included in the land base and it was reflected as a value of “PassiveLB”. For example, if a road existed in a polygon (indicated by a value of 100 for the road attribute), SLS_NET_BASE will receive a value of “PassiveLB”, indicating it was out of the land base.

This process applies to:

- Buffered Dams
- Buffered Linear Hydrography
- Buffered Gravel Roads
- Buffered and Non-Buffered Hydrography (Riparian Zones)
- Buffered Paved Roads

- Buffered Pipelines
- Buffered Railways
- Buffered Spillways
- Buffered Trails
- Buffered Truck Trails
- Permanent Sample Plots
- Regional Management Areas (RMA ‘A’)
- Provincial Recreation Areas
- SLS’s Predetermined Inoperable Areas

For some netdowns the calculation of whether a polygon was in the land base or not is a little more complicated. For the following datasets, additional criteria were necessary to evaluate whether a polygon was in/out of the active land base.

- For Slope, if the slope code was greater than 2 (greater than 45 degrees) it was considered inoperable and excluded from the land base.
- The AVI Subjective Deletion classification has a number of rules to evaluate whether a polygon should be considered part of the active land base. See section 3.3.7 for the criteria.

It is important to note that all previously cut areas were considered to be part of the net land base. The premise is that if they were once cut, they could be regenerated and cut again in the future, unless there was an over-riding hydro buffer or access feature. In those cases, the portion of the cutblock not within a hydro buffer or not part of an access feature can be part of the active land base, but not the buffer or access feature itself.

3.3.9 Horizontal Stands

This section will deal with the Horizontal stand reductions within the FMA. SLS personnel had reviewed the AVI with respect to the horizontal stand requirements using database summaries and visual inspection of orthophotos of the stands having horizontal structural values and verified which blocks will be managed for timber production (i.e. are considered to be within the net land base). The review centered on polygons within the AVI that had a structural value (STRUC_VAL) less than 5. SLS staff felt that many of the stands were of non-merchantable status and therefore will not be managed for timber production. This is further validated since many of the stands deemed to have horizontal structures are netted out of the analysis due to other deletions, in that they are not forested or do not have species codes for applying the secondary dominant strata (USP1 = ‘ ‘ or null).

Based on the above process assessing horizontal stands, SLS staff felt that stands having a structural value (STRUC_VAL) less than 4, should be assigned to the passive land base. For structure values 4 or greater, only the overstory stand component is considered. For example, a horizontal stand with a structural value of 4 will have a net stand area of 40% of the total polygon area.

The reductions due to horizontal stands is the difference between the total stand area (Area_ha) and the net stand area (SLS_NetArea_ha) within the land base. The fields, SLS_HorizontalFlag, SLS_HoStandRed, SLS_HoArea, SLS_NetArea_ha and SLS_NetArea_m were added to the database to track the horizontal stand reductions.

The active land base was calculated using the proposed SLS horizontal stand reductions rules and the ASRD horizontal reduction rules. The active land base using the SLS Horizontal Reduction criteria was 223,152.47 ha and the active land base using the ASRD Horizontal Reduction criteria was 223,264.48 ha resulting in a difference of 112.01 ha or 0.031% of the gross FMA landbase between both horizontal stand reduction methodologies.

Appendix 4 outlines the horizontal stand calculations in more detail.

3.3.10 SLS_NetArea_ha, SLS_NetArea_m and SLS_PassiveArea_Ha

The fields SLS_NetArea_ha and SLS_NetArea_m were created to track the net stand area (i.e. NLB). SLS_NetArea_m represents net stand area in square metres while SLS_NetArea_ha represents the stand area in hectares. Each of these fields considered the horizontal stand reductions, described in section 3.3.9.

The SLS_PassiveArea_Ha field was added to easily summarize the Passive land base area on the FMA. Using a combination of the above area field with the SLS_NET_BASE and NETDOWN_CATEGORY field enables users to easily summarize the NLB process and associated area reductions for the FMA.

3.3.11 Del_Reason

The DEL_REASON field was created to track all of the possible reasons a polygon is deleted from the land base. It contains a delimited line of abbreviations which correspond to reasons why the polygon was removed from the net land base. It is primarily used in detailing the hierarchy of deletions in the database. An advantage of this field is that the list can be useful for subsequent modeling. This field was created by analyzing each deletion applied to a polygon. If the deletion was present, a corresponding code was placed in this field. As an example, if a polygon contained both a paved road and an IRP deletion, a value of ‘Pv|’ (representing paved roads) and a value of ‘IRP|’ was added to this field. Possible values are pipe delimited and are detailed as follows:

- G = Gravel Road
- HL= Linear Hydrography (Rivers and Streams)
- HP = Polygonal Hydrography (Lakes and Standing Water)
- Pv = Paved Road
- Pi = Pipeline
- R = Rail
- Sp = Spillway
- Tr = Cutline/Trail
- TT = Truck Trail
- PSP = Permanent Sample Plot
- IRP = Integrated Resource Plan
- Sl = Slope
- Rec = Recreation Area
- SLS = SLS deletion
- Subj = Subjective AVI deletion

3.3.12 Del_Type

The DEL_TYPE field was created for SLS to track the types of deletion, i.e. "hard" deletion or "soft" deletion as defined by SLS. Hard deletions are deletions that were not likely to change in the near future (e.g. removal of paved roads) and soft deletions were deletions that could be modified depending on policy or harvest capability (e.g. slope inoperability). The data within the DEL_TYPE field was not used within the NLB process and it will not be used for the timber supply analysis – it is provided merely for information purposes. If a deletion was considered "hard", the polygon was assigned a code of "H"; if the deletion was considered "soft", the polygon was assigned a code of "S". If there were no deletions in the polygon, no value was assigned.

3.3.13 Hierarchy

This field is the master hierarchy field in the resultant. Hierarchy tracks the class for which each deletion is assigned. It was calculated by assessing each deletion applicable to a particular polygon and assigning the value of the highest deletion in the hierarchy to the field. The following is a list (in order, of the hierarchy used) of these classes (see above for netdowns contained within each classification):

- Land Status
- Polygon Hydrography
- Non-forested
- Slope and Operability
- Access
- Subjective Deletion and Hydro Buffers

This hierarchy allows the determination of the overriding reason a polygon was not included in the land base.

3.3.14 Position & Netdown Classification

Each deletion was classified into a structured hierarchy allowing the user to determine which deletion type was dominant. For each hierarchal class derived there could be several input layers contributing. This field tracks these more detailed hierarchies. The valid codes for this field are detailed in Table 12.

Table 12. Netdown Positions & Classifications

Hierarchy	Position & Netdown Classification
Land Status	1 – IRP Zones
	2 – Recreation Areas
	3 – Permanent Sample Plots
Polygon Hydrography	4 - Non-buffered polygon hydrography
Non-Forested	5 - Non-forested land
Slope and Operability	6 – Slope
	7 – SLS Deletion
Access (Linear Buffers)	8 – Paved Roads
	9 – Railways
	10 – Gravel Roads

	11 – Pipelines
	12 – Truck Trails
	13 – Trails/Cutlines/Seismic
Subjective Deletions and Hydrography Buffers	14 – Spillways Buffers
	15 – Polygon Hydrography Buffers
	16 – Linear Hydrography Buffers
	17 – AVI Subjective Deletions
Horizontal Stands Reductions	18 - Horizontal Stands Reductions

3.3.15 Mountain Pine Beetle Susceptibility and Rankings

During October of 2006, MPB susceptibility and Rankings were built into the net land base file to enhance targeting of MPB susceptible stands in the timber supply analysis. The MPB_SSI model was received from ASRD and ran based on the AVI file. Since the MPB_SSI model was based on the AVI polygons, the results from the MPB_SSI model were joined to the Net Land Base file based on the AVI forestkey id.

The MPB Rankings were assigned to the polygons within the net land base using the outputs from the MPB_SSI model and VBA coding to rank the polygons and as per the *Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations, version 2.6 September 2006.* The only deviation from the Interpretive Bulletin was that the Compartment Priority Rankings were modified to have an additional spatial classification based on leading pine strata. This deviation in compartment priority ranking was approved by Christie Ward, the MPB Coordinator for Southern Alberta. In summary the Compartment Risk Rankings were:

1. Four of the identified MPB zones = High
2. Spatial representation of leading pine strata = Moderate
3. All other stands = Low

The matrix used in developing the MPB Ranking strategy is shown in Figure 9. The matrix has been modified from the version in the planning document (referenced above) to show the criteria used in assigning the compartment risk rates specific to SLS' s case. The VBA coding using to assign the MPB Rankings can be found in Appendix 5.

Polygons within the dataset that did not have a value (were left blank), were given a value of " No Ranking" in the summary tables in this report as well as the Timber Supply Addendum report. These were stands that the MPB_SSI model determined the climate was not suitable for MPB and therefore did not develop a climate factor for those stands. During the process of updating the MPB Rankings due to harvest operations that had occurred on the land base, stands that were previously harvested were not considered susceptible to MPB attack since in all cases less these stands were harvested between 1965 and 2005, so the regenerating stands were less than 41 years old.

Figure 9. MPB Ranking

Climate Factor (per stand)					Compartment Risk
Very Suitable 1.0	Rank 1	Rank 1	Rank 1	Rank 1	High (4 Identified MPB Zones)
	Rank 2	Rank 1	Rank 1	Rank 1	Moderate (Leading Pine Strata)
	Rank 2	Rank 2	Rank 1	Rank 1	Low (All Other Stands)
Highly Suitable 0.8	Rank 1	Rank 1	Rank 1	Rank 1	High (4 Identified MPB Zones)
	Rank 2	Rank 2	Rank 1	Rank 1	Moderate (Leading Pine Strata)
	Rank 2	Rank 2	Rank 2	Rank 1	Low (All Other Stands)
Moderately Suitable 0.5	Rank 2	Rank 1	Rank 1	Rank 1	High (4 Identified MPB Zones)
	Rank 2	Rank 2	Rank 2	Rank 1	Moderate (Leading Pine Strata)
	Rank 3	Rank 2	Rank 2	Rank 2	Low (All Other Stands)
Low Suitablity 0.2	Rank 2	Rank 1	Rank 1	Rank 1	High (4 Identified MPB Zones)
	Rank 3	Rank 2	Rank 2	Rank 2	Moderate (Leading Pine Strata)
	Rank 3	Rank 2	Rank 2	Rank 2	Low (All Other Stands)
Very Low Suitablity 0.1	Rank 3	Rank 2	Rank 2	Rank 2	High (4 Identified MPB Zones)
	Rank 3	Rank 3	Rank 2	Rank 2	Moderate (Leading Pine Strata)
	Rank 3	Rank 3	Rank 3	Rank 3	Low (All Other Stands)
	0 to 30	31 to 50	51 to 80	81 to 100	
	Pine Rating				

Maps of the MPB Rankings on the FMA can be found in Appendix 6.

The intent within the timber supply model is to use the rankings to target the harvesting within the FMA, where stands with a Rank 1 and 2 will be prioritized over Rank 3 stands.

3.3.16 Timber Supply Modelling Parameters and Fields

Pertinent modelling– related fields were assigned based on information within the net land base data. These fields are necessary to convert the net land base dataset to the timber supply modelling dataset. For additional information related to these fields please refer to Appendix 3, the timber supply modelling fields that were appended to the end of the Resultant Data Dictionary.

Many of the parameters have been added to the net land base coverage and database, however some information required for modelling will not be incorporated into the database. An example of the types of data would be the yield curve information or the adjacency files, since that data is not polygon specific or would create too much redundancy in the coverage and database. All the information that is used to support the DFMP will be provided in the final Timber Supply Analysis work.

4.0 Results

The following sections provide the results of the NLB process, including a detailed Net Land Base summary table (Table 13) and land base area summaries (Tables 14 to 19; Figures 10 to 14). A set of maps outlining the Active/Passive land base has also been provided in Appendix 7. Additionally a set of maps depicting the Age Class at Time0 (2001) on the FMA has also been provided in Appendix 8.

4.1 Netdown Summary

In reviewing the netdown summary in Table 13, there were some changes in how features were classified, and the associated areas had changed accordingly. For example, in the previous NLB submission in March 2006 the Non-Forested land was 28,156.92 ha whereas in this submission of Non-Forested land is 32,278.17 ha. The difference in this submission was due to adjusting assumptions regarding how Non-Forest land was classified. This adjustment also has a ripple effect throughout the rest of the classifications.

Proposed harvest units from approved plans were treated the same way as existing harvest units within the NLB process. If the following features:

- FMU = Out;
- Access Features = Paved, Gravel, Trail and Truck-Trails;
- IRP Areas = Prime Protection, No ESIP (Patent), Facility, Industrial, Special Use;
- PSPs and RMA_A areas; and
- Hydro Features and Buffers

had overlapped an identified harvest unit, then the area of overlap was removed from the block' s mapped area and considered as part of the passive land base. The portion of the block that did not have any overlaps with the above features was part of the active land base.

Once all of the above netdown categories were considered and the land base was reduced appropriately, the final timber harvesting land base was **223,152.47** ha as outlined in the table below:

Table 13. Netdown Summary

Netdown Category	Position Number	Description	Area (ha)	Percent of Land base
Gross FMA/Quota Land Base	N/A	Total Resultant Gross Area	337,677.71	N/A
	N/A	Area outside the FMA	230.45	N/A
		Gross FMA Area	**337,447.26**	**100.00%**
Gross Areas of Restricted Operability Due to Land Status	1	IRP – Agriculture	67.00	0.02%
	1	IRP – Facility	171.77	0.05%
	1	IRP – Industrial	265.09	0.08%
	1	IRP - No esip (facility)	19.59	0.01%
	1	IRP - No esip (Patent)	9,006.65	2.67%
	1	IRP - Prime Protection	13,317.92	3.95%
	1	IRP – RMA 'A'	343.74	0.10%
	1	IRP - Special Use	2.03	0.00%
	1	IRP – Water	0.00	0.00%

	2	Recreation Areas	1,893.07	0.56%
	3	Permanent Sample Plots	90.00	0.03%
		Subtotal	**25,170.18**	**7.46%**
			312,277.08	**92.54%**
Gross Hydrography	4	Water (Non-Buffered Lakes)	1,298.02	0.38%
			310,979.06	**92.16%**
Non-Forested Land (excludes cutblocks)	5	Non-Forested Land	32,278.17	9.57%
			278,699.59	**82.59%**
Accessibility and Slope Constraints	6	Slope 46-55%	9,745.64	2.89%
	6	Slope 55+%	6,500.20	1.93%
	7	SLS Deletion	578.99	0.17%
		Subtotal	**16,823.55**	**4.99%**
			261,876.04	**77.60%**
Access Features (not captured in AVI)	8	Paved Roads	33.63	0.01%
	9	Railway	0.00	0.00%
	10	Gravel Roads	129.70	0.04%
	11	Pipelines	34.86	0.01%
	12	Truck Trails	109.47	0.03%
	13	Cutline/Seismic/Trail	1,881.19	0.56%
		Subtotal	**2,185.86**	**0.65%**
			259,690.18	**76.95%**
Riparian/Hydrography Buffers	14	Spillway Buffers	0.00	0.00%
	15	Buffered Lakes	1,578.04	0.47%
	16	Buffered Streams/Rivers	3,810.15	1.13%
		Subtotal	**5,382.59**	1.60%
			254,307.59	**75.36%**
Subjective Deletions (excludes cutblocks)	17	Non-merchantable	11,688.11	3.48%
	17	Larch Component	516.42	0.15%
	17	Black Spruce	1,115.77	0.33%
	17	Pine (<=6m & older than 1945)	5.30	0.00%
	17	Pine (6<=x<=12m & older than 1925)	17,575.72	5.21%
	17	Subjective Deletion – invalid AVI calls	9.37	0.00%
		Subtotal	**31,010.03**	**9.16%**
			223,297.56	**66.20%**
Horizontal Stand Reductions		Horizontal Stands	229.13	0.07%
Timber Harvesting Land Base		**Total Net Timber Harvesting Land Base**	**223,152.47**	**66.13%**

[3] Calculation of netdown hectares.

[3] All calculations used to determine netdown hectares must include the criteria where FMU <> “ OUT”

Table 14. Forested vs. Non-Forested Summary

Description	Area (ha)	Percent of Land Base
Gross Forested Land	295,232.14	87.49
Gross Non-Forested Land	42,215.12	12.51
Total Gross Stand Area	**337,447.26**	**100.00**

Table 15. FMU Boundaries Summary

FMU	Total Ha in Land Base	Acitve Land Base Ha	Percent of FMU in Active Land Base
B10B	163,778	99,634	61%
B9	50,816	33,577	66%
B9B	122,854	89,941	73%

Figure 10. Time 0 FMU Distribution

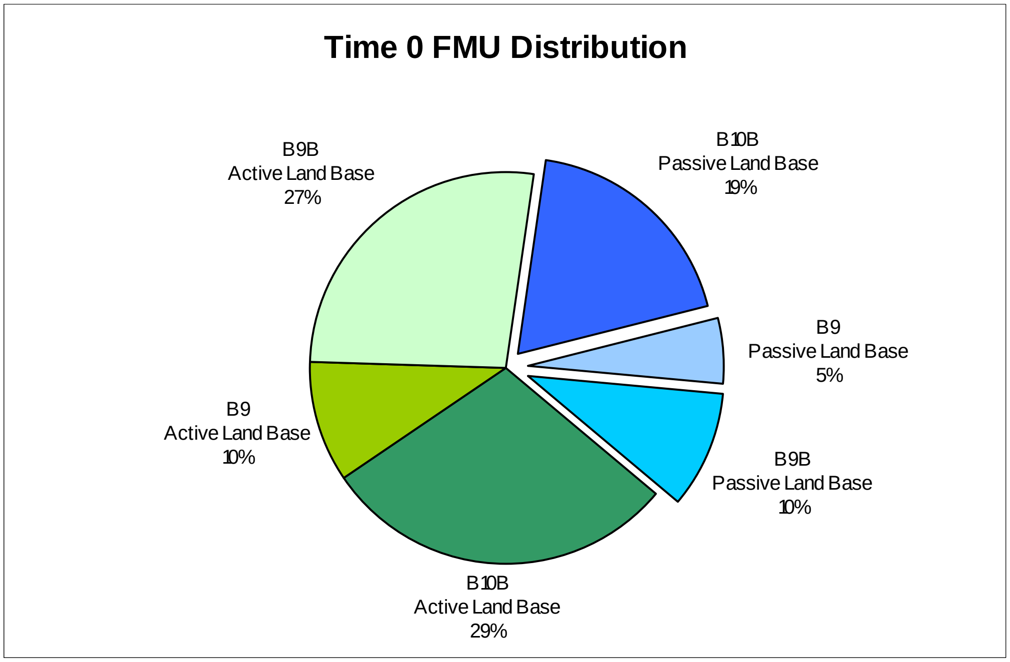
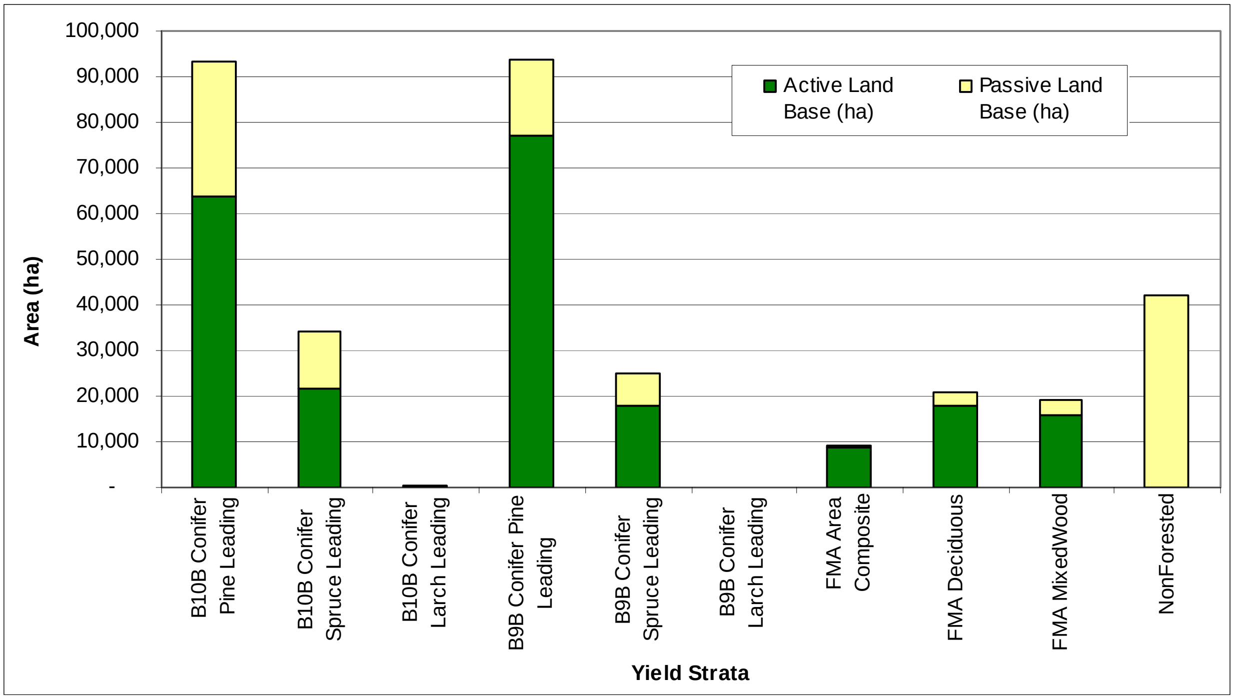


Figure 11. Time 0 Area Summary By Strata



Note: Non-Forested strata includes areas that are under some type of access use, water features (excluding buffers) as well as the Non-Forested areas depicted in the AVI data.

Table 16. Time 0 Strata Area Data Table

Strata	Active Land Base (ha)	Passive Land Base (ha)	% in Active	% in Passive	% Gross	Chapter 7 Active Areas	Chapter 7 % in Active	% Difference Chapter 7 and Revised Tesera NLB
B10B Conifer Pine Leading	63,925	29,501	28.6%	25.8%	27.7%	63,537	28.5%	0.12%
B10B Conifer Spruce Leading	21,748	12,400	9.7%	10.8%	10.1%	21,757	9.8%	-0.02%
B10B Conifer Larch Leading	0	251	0.0%	0.0%	0.0%	0	0.0%	0.00%
B9B Conifer Pine Leading	77,170	16,465	34.6%	14.4%	27.7%	76,778	34.5%	0.12%
B9B Conifer Spruce Leading	17,752	7,103	8.0%	6.2%	7.4%	17,937	8.1%	-0.10%
B9B Conifer Larch Leading	0	29	0.0%	0.0%	0.0%	0	0.0%	0.00%
FMA Area Composite	8,826	198	4.0%	0.2%	2.7%	8,909	4.0%	-0.04%
FMA Deciduous	17,847	3,019	8.0%	2.6%	6.2%	17,937	8.1%	-0.05%
FMA MixedWood	15,885	3,114	7.1%	2.7%	5.6%	15,913	7.1%	-0.03%
NonForested	-	42,215	0.0%	36.9%	12.5%	0	0.0%	0.00%
Totals	**223,152**	**114,295**	**100.0%**	**100.0%**	**100.0%**	**222,768**	**100.0%**	**0.00%**

Note: 198 ha of FMA Area Composite Yield Stratum within the Passive Land Base due to that particular stratum overlapping with features that were netted from the land base, (e.g. cutlines/seismic lines/trails, gravel & paved roads, hydro (riparian) buffers, IRP Zones, pipelines, slope constraints and truck trails).

Figure 12. Time 0 Area Summary By Compartment

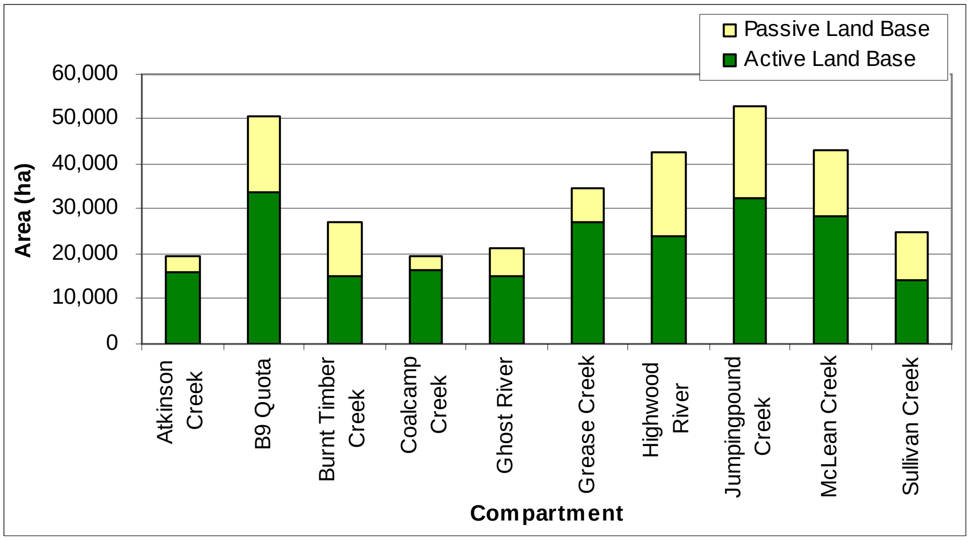


Table 17. Time 0 Compartment Area Data Summary

Compartment	Active Land Base (ha)	Passive Land Base (ha)
Atkinson Creek	16,112	3,661
B9 Quota	33,577	17,238
Burnt Timber Creek	15,184	12,112
Coalcamp Creek	16,488	3,238
Ghost River	14,907	6,554
Grease Creek	27,248	7,348
Highwood River	24,161	18,702
Jumpingpound Creek	32,517	20,338
McLean Creek	28,568	14,615
Sullivan Creek	14,389	10,488
Totals	**223,152**	**114,294**

Figure 13. Time 0 Age Class Distribution of Forested Stands

Note: This graph does not include non-forested stands because they don't have an age (i.e. age is 0).

Table 18. Time 0 Age Class Data Table

Age Class	Age Range (years)	Active Land Base (ha)	Passive Land Base (ha)	% Active	% Passive
0	0	21	-	0	-
1	1-10	22,124	1,158	7	0
2	11-20	4,602	100	2	0
3	21-30	216	28	0	0
4	31-40	1,419	106	0	0
5	41-50	1,003	312	0	0
6	51-60	2,580	983	1	0
7	61-70	13,499	4,252	5	1
8	71-80	21,344	5,287	7	2
9	81-90	26,459	21,595	9	7
10	91-100	37,785	11,514	13	4
11	101-110	23,835	7,252	8	2
12	111-120	30,201	5,442	10	2
13	121-130	13,978	3,153	5	1
14	131-140	4,366	1,609	1	1
15	141-150	11,295	3,152	4	1
16	151-160	1,029	614	0	0
17	161-170	1,550	502	1	0
18	171-180	826	813	0	0
19	181-190	580	395	0	0
20	191-200	1,793	329	1	0
21	201-210	1,006	430	0	0
22	211-220	124	104	0	0
23	221-230	452	699	0	0
24	231-240	103	658	0	0
25	241-250	398	654	0	0
26	251-260	89	70	0	0
27	261-270	278	695	0	0
28	271-280	192	49	0	0
29	281-290	3	21	0	0
30	291-300	1	0	0	0
33	321-330	-	102	-	0
38	371-380	1	3	0	0
Totals		**223,152**	**72,080**	**76**	**24**

Figure 14. MPB Ranking Area Summary at Time 0

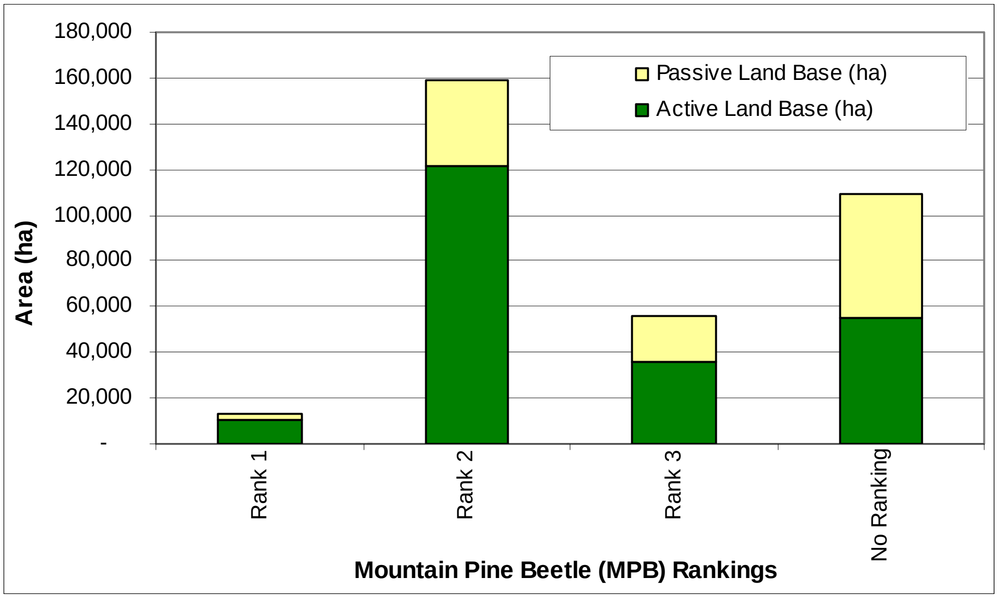


Table 19. MPB Ranking Areas Data Table for Time 0

Mountain Pine Beetle (MPB) Ranking	Active Land Base (ha)	Passive Land Base (ha)	% Active Land Base	% Passive Land Base	% Total Land Base
Rank 1	10,155	2,874	4.6%	2.5%	3.9%
Rank 2	121,502	37,292	54.4%	32.6%	47.1%
Rank 3	36,144	19,996	16.2%	17.5%	16.6%
No Ranking	55,352	54,133	24.8%	47.4%	32.4%
Total Area/Percent	**223,152**	**114,295**	**100%**	**100%**	**100%**

5.0 Conclusion

Tesera Systems with assistance from Golder Associates has provided Spray Lake Sawmills Ltd. with the net land base document, the spatial files and the associated database as part of Spray Lakes Sawmills Detailed Forest Management Plan. This document provides information about the data details and descriptions used to generate the spatial data, the database tables, results of required queries and metadata for all input data.

If you have any questions, require additional details or further clarification on the contents of this report or the processing methods, please contact Dwight Crouse at (403) 932-0446 or dwight.crouse@tesera.com.

.

Yours truly,
Tesera Systems Inc.

Dwight Crouse, RPF
Resource Analysis Manager
Tesera Systems Inc.

Appendices

Appendix 1

GIS Processing Routines
(on enclosed DVD)

Appendix 2
MS Access VBA Processing Routines

Appendix 3

Resultant & Source File Data Dictionaries

Appendix 4

Horizontal Stand Comparisons

- SLS Method
- ASRD Method

SLS Horizontal Netdown Strategy

SLS_NET_BASE	Netdown Category	STRUC	STRUC_VAL	Overstory Yield Strata	Gross Area (ha)	Overstory Area (ha)	SLS Horizontal Reduction Area (ha)	SLS Net Land Base Area (ha)	Overstory Volume (m3)
0	ActiveNLB	H	4	B10BSpruce	3.52	1.41	2.11	1.41	262.99
0	ActiveNLB	H	4	Deciduous	63.72	25.49	38.23	25.49	3,562.03
0	ActiveNLB	H	5	Deciduous	13.99	7.00	7.00	7.00	526.89
0	ActiveNLB	H	6	B10BPine	2.51	1.51	1.00	1.51	312.46
0	ActiveNLB	H	6	Deciduous	12.25	7.35	4.90	7.35	1,021.51
0	ActiveNLB	H	6	Mixedwood	27.52	16.51	11.01	16.51	1,603.65
0	ActiveNLB	H	7	B10BPine	16.29	11.41	4.89	11.41	2,700.85
0	ActiveNLB	H	7	B10BSpruce	23.58	16.50	7.07	16.50	3,082.31
0	ActiveNLB	H	7	Deciduous	4.28	3.00	1.28	3.00	419.02
0	ActiveNLB	H	8	B10BPine	65.62	52.49	13.12	52.49	7,594.02
0	ActiveNLB	H	8	B10BSpruce	15.35	12.28	3.07	12.28	2,400.27
0	ActiveNLB	H	8	B9BPine	57.39	45.91	11.48	45.91	7,977.10
0	ActiveNLB	H	8	Deciduous	50.01	40.01	10.00	40.01	5,296.90
0	ActiveNLB	H	9	B10BPine	132.20	118.98	13.22	118.98	19,727.40
0	ActiveNLB	H	9	B10BSpruce	26.66	23.99	2.67	23.99	4,619.34
0	ActiveNLB	H	9	Deciduous	109.81	98.83	10.98	98.83	12,170.81
100	Horizontal Deletion LT4	H	1	B10BSpruce	4.47	4.47	4.47	-	-
100	Horizontal Deletion LT4	H	1	Mixedwood	3.42	3.42	3.42	-	-
100	Horizontal Deletion LT4	H	2	B10BPine	5.75	5.75	5.75	-	-
100	Horizontal Deletion LT4	H	2	B10BSpruce	58.39	58.39	58.39	-	-
100	Horizontal Deletion LT4	H	2	Deciduous	0.07	0.07	0.07	-	-
100	Horizontal Deletion LT4	H	3	B10BSpruce	2.44	2.44	2.44	-	-
100	Horizontal Deletion LT4	H	3	Deciduous	5.46	5.46	5.46	-	-
100	Horizontal Deletion LT4	H	3	Mixedwood	7.10	7.10	7.10	-	-
Total Areas & Volumes					**711.80**	**569.76**	**229.14**	**482.66**	**73,277.56**

The SLS calculation of Horizontal stands does not consider Non-Forested Areas (i.e. strata) or existing cutblocks

ASRD Horizontal Netdown Strategy

STRUC_VAL	SP1	Overstory Yield Strata	USTRUC_VAL	USP1	Assigned Understory Yield Strata	In/Out of Net Land Base	Gross Area (ha)	Potential ASRD Horizontal Reduction Area (ha)	Potential Overstory Area (ha)	Potential Understory Area (ha)	Actual ASRD Horizontal Reduction Area (ha)	Overstory Volume (m3)	Understory Volume (m3)
1.00		NonForested	9.00			Out	14.288	1.429	-	12.859	14.288	-	-
1.00	Aw	Mixedwood	9.00			Out	3.417	0.342	-	3.075	3.417	-	-
1.00	Aw	NonForested	9.00			Out	0.065	0.007	-	0.059	0.065	-	-
1.00	Sb	NonForested	9.00			Out	0.127	0.013	-	0.114	0.127	-	-
1.00	Sw	B10BSpruce	9.00			In	3.877	0.388	-	3.489	3.489	-	-
1.00	Sw	B10BSpruce	9.00			Out	4.474	0.447	-	4.027	4.474	-	-
1.00	Sw	NonForested	9.00			Out	0.209	0.021	-	0.188	0.209	-	-
2.00		NonForested	8.00			In	0.001	0.000	-	0.001	0.000	-	-
2.00		NonForested	8.00			Out	152.289	30.458	-	121.831	152.289	-	-
2.00	Aw	Deciduous	8.00			Out	0.074	0.015	-	0.060	0.074	-	-
2.00	Aw	NonForested	8.00			Out	6.309	1.262	-	5.047	6.309	-	-
2.00	P	B10BPine	8.00	P	B10BPine	Out	5.954	1.191	-	4.763	5.954	-	466.048
2.00	P	NonForested	8.00	P	B10BPine	Out	0.305	0.061	-	0.244	0.305	-	23.852
2.00	Sw	B10BSpruce	8.00	Aw	Mixedwood	Out	17.410	3.482	-	13.928	17.410	-	3,166.705
2.00	Sw	B10BSpruce	8.00	Sw	B10BSpruce	Out	40.978	8.196	-	32.783	40.978	-	6,122.303
2.00	Sw	NonForested	8.00	Aw	Mixedwood	Out	0.242	0.048	-	0.193	0.242	-	43.930
2.00	Sw	NonForested	8.00	Sw	B10BSpruce	Out	0.100	0.020	-	0.080	0.100	-	14.954
3.00		NonForested	7.00			Out	88.695	26.608	-	62.086	88.695	-	-
3.00	Aw	Deciduous	7.00	Sw	B10BSpruce	Out	5.465	1.639	-	3.825	5.465	-	680.675
3.00	Aw	NonForested	7.00	Sw	B10BSpruce	Out	0.037	0.011	-	0.026	0.037	-	4.615
3.00	Pb	Mixedwood	7.00			Out	7.095	2.129	-	4.967	7.095	-	-
3.00	Pb	NonForested	7.00			Out	0.078	0.023	-	0.054	0.078	-	-
3.00	Sw	B10BSpruce	7.00	Aw	Deciduous	Out	2.444	0.733	-	1.711	2.444	-	232.618
3.00	Sw	NonForested	7.00	Aw	Deciduous	Out	0.012	0.004	-	0.008	0.012	-	1.133
4.00		NonForested	6.00			In	0.524	0.210	-	0.314	0.210	-	-
4.00		NonForested	6.00			Out	171.566	68.626	-	102.939	171.566	-	-
4.00	Aw	Mixedwood	6.00	A	Deciduous	In	0.000	0.000	-	0.000	0.000	-	0.000
4.00	Pb	Deciduous	6.00			In	68.232	27.293	-	40.939	27.293	-	-
4.00	Pb	NonForested	6.00			Out	0.518	0.207	-	0.311	0.518	-	-
4.00	Sw	B10BSpruce	6.00			In	2.985	1.194	-	1.791	1.194	-	-
4.00	Sw	B10BSpruce	6.00	Aw	Deciduous	In	0.535	0.214	-	0.321	0.214	-	43.923
4.00	Sw	NonForested	6.00			Out	0.203	0.081	-	0.122	0.203	-	-
4.00	Sw	NonForested	6.00	Aw	Deciduous	Out	0.032	0.013	-	0.019	0.032	-	2.667
5.00		NonForested	5.00			Out	391.238	195.619	195.619	-	391.238	-	-
5.00	Aw	Deciduous	5.00			In	16.120	8.060	8.060	-	8.060	1,126.454	-
5.00	Aw	Deciduous	5.00	Pl	B10BPine	In	13.992	6.996	6.996	-	6.996	526.893	-
5.00	Aw	NonForested	5.00			Out	0.082	0.041	0.041	-	0.082	-	-
5.00	Sb	B9BSpruce	5.00			In	6.861	3.431	3.431	-	3.431	663.846	-
5.00	Sb	NonForested	5.00			Out	0.100	0.050	0.050	-	0.100	-	-
6.00		NonForested	4.00			In	0.005	0.002	0.003	-	0.003	-	-
6.00		NonForested	4.00			Out	588.075	235.230	352.845	-	588.075	-	-
6.00	Aw	Deciduous	4.00			In	4.412	1.765	2.647	-	2.647	338.408	-
6.00	Aw	Deciduous	4.00	Aw	Deciduous	In	3.151	1.261	1.891	-	1.891	258.698	-
6.00	Aw	Mixedwood	4.00			In	27.518	11.007	16.511	-	16.511	1,603.653	-
6.00	Aw	NonForested	4.00			Out	0.465	0.186	0.279	-	0.465	-	-

6.00	Aw	NonForested	4.00	Aw	Deciduous	Out	0.000	0.000	0.000	-	0.000	-	-
6.00	P	B10BPine	4.00	Aw	Deciduous	In	2.512	1.005	1.507	-	1.507	312.465	-
6.00	P	NonForested	4.00	Aw	Deciduous	Out	0.121	0.048	0.072	-	0.121	-	-
6.00	Pb	Deciduous	4.00			In	9.094	3.638	5.457	-	5.457	762.814	-
6.00	Pb	NonForested	4.00			Out	0.066	0.026	0.039	-	0.066	-	-
7.00		NonForested	3.00			In	0.217	0.065	0.152	-	0.152	-	-
7.00		NonForested	3.00			Out	461.149	138.345	322.804	-	461.149	-	-
7.00	Aw	Deciduous	3.00			In	10.490	3.147	7.343	-	7.343	841.348	-
7.00	Aw	Mixedwood	3.00			In	3.586	1.076	2.510	-	2.510	440.270	-
7.00	Aw	NonForested	3.00			Out	0.243	0.073	0.170	-	0.243	-	-
7.00	P	B10BPine	3.00	Aw	Deciduous	In	16.293	4.888	11.405	-	11.405	2,700.852	-
7.00	P	NonForested	3.00	Aw	Deciduous	Out	0.599	0.180	0.419	-	0.599	-	-
7.00	Sw	B10BSpruce	3.00	Aw	Deciduous	In	23.578	7.073	16.505	-	16.505	2,780.812	-
7.00	Sw	NonForested	3.00	Aw	Deciduous	Out	0.253	0.076	0.177	-	0.253	-	-
8.00		NonForested	2.00			In	0.003	0.001	0.003	-	0.003	-	-
8.00		NonForested	2.00			Out	484.339	96.868	387.472	-	484.339	-	-
8.00	Aw	Deciduous	2.00			In	7.841	1.568	6.273	-	6.273	720.893	-
8.00	P	B9BPine	2.00	Aw	Deciduous	In	28.292	5.658	22.634	-	22.634	3,932.652	-
8.00	P	B9BPine	2.00	Sw	B10BSpruce	In	29.096	5.819	23.277	-	23.277	4,044.445	-
8.00	P	NonForested	2.00	Aw	Deciduous	Out	0.107	0.021	0.086	-	0.107	-	-
8.00	P	NonForested	2.00	Sw	B10BSpruce	Out	1.496	0.299	1.197	-	1.496	-	-
8.00	Pb	Deciduous	2.00			In	45.059	9.012	36.047	-	36.047	4,898.928	-
8.00	Pb	NonForested	2.00			Out	0.912	0.182	0.730	-	0.912	-	-
8.00	Pl	B10BPine	2.00	Aw	Deciduous	In	64.607	12.921	51.686	-	51.686	7,457.771	-
8.00	Pl	B10BPine	2.00	Pl	B10BPine	In	1.011	0.202	0.809	-	0.809	136.250	-
8.00	Pl	NonForested	2.00	Aw	Deciduous	Out	0.793	0.159	0.634	-	0.793	-	-
8.00	Pl	NonForested	2.00	Pl	B10BPine	Out	0.012	0.002	0.009	-	0.012	-	-
8.00	Sw	B10BSpruce	2.00	Aw	Deciduous	In	15.350	3.070	12.280	-	12.280	2,068.976	-
8.00	Sw	NonForested	2.00	Aw	Deciduous	Out	0.033	0.007	0.027	-	0.033	-	-
9.00		NonForested	1.00			Out	523.153	52.315	470.838	-	523.153	-	-
9.00	Aw	Deciduous	1.00			In	62.216	6.222	55.995	-	55.995	6,435.415	-
9.00	Aw	Deciduous	1.00	Aw	Deciduous	In	32.958	3.296	29.663	-	29.663	3,792.002	-
9.00	Aw	Deciduous	1.00	Sw	B10BSpruce	In	20.045	2.004	18.040	-	18.040	2,521.204	-
9.00	Aw	NonForested	1.00			Out	0.801	0.080	0.721	-	0.801	-	-
9.00	Aw	NonForested	1.00	Aw	Deciduous	Out	0.438	0.044	0.394	-	0.438	-	-
9.00	Aw	NonForested	1.00	Sw	B10BSpruce	Out	0.058	0.006	0.052	-	0.058	-	-
9.00	P	B10BPine	1.00			In	37.006	3.701	33.305	-	33.305	5,611.661	
9.00	P	B10BPine	1.00	Aw	Deciduous	In	15.863	1.586	14.276	-	14.276	2,086.008	-
9.00	P	B10BPine	1.00	P	B10BPine	In	90.619	9.062	81.557	-	81.557	13,741.728	-
9.00	P	NonForested	1.00			Out	0.352	0.035	0.317	-	0.352	-	-
9.00	P	NonForested	1.00	Aw	Deciduous	Out	0.171	0.017	0.154	-	0.171	-	-
9.00	P	NonForested	1.00	P	B10BPine	Out	2.088	0.209	1.880	-	2.088	-	-
9.00	Sw	B10BSpruce	1.00			In	0.028	0.003	0.025	-	0.025	4.212	-
9.00	Sw	B10BSpruce	1.00	P	B10BPine	In	26.633	2.663	23.969	-	23.969	4,038.378	-
9.00	Sw	NonForested	1.00			Out	0.006	0.001	0.005	-	0.006	-	-
9.00	Sw	NonForested	1.00	P	B10BPine	Out	0.079	0.008	0.071	-	0.079	-	-
Sub Totals							**3,670.23**	**1,438.868**	**2,231.359**	**422.17**	**3,506.27**	**73,847.03**	**10,803.42**
Total Areas & Volumes							**3,670.23**	**1,438.868**	**2,231.36**	**422.17**	**3,506.27**		**84,650.46**

Appendix 5
VBA Code for MPB Ranking Process