P14 2009-2018
Forest Management Plan

Appendix III:
Landbase Development

October 15, 2009

EXECUTIVE SUMMARY

This document describes the creation of the landbases used in the development the P14 2009-2018 Forest Management Plan (FMP). It describes the raw data collected, the manipulation of the data to create submission and input datasets, the processes used to merge the spatial information into a single Forest Management Unit wide dataset and the processing of attributes to achieve the requirements of the Alberta Forest Management Planning Standard (Alberta, 2006) for forecasting and FMPs. Separate documents describe the development of the yield curves and the forecasting stages of the 2009-2018 FMP. Final versions of all three documents are included in the final submission.

To address specific modeling and reporting requirements, landbases in three formats were created, which contain essentially the same information:

- Classified landbase – with the highest spatial detail;
- TSA landbase – with a lower level of spatial detail; and
- Modeling landbase – with special modeling attributes added.

All three landbases cover the same extent and contain the same description of the forest. For instance, the information contained in the greater spatial detail of the classified landbase (*e.g.* seismic lines) is carried in attributes on the TSA and modeling landbases. Unless otherwise noted, this document describes the classified landbase.

The classified landbase describes the condition of the forest as of the effective date of June 30, 2009. The physical extent of the landbase was all lands within the outer boundaries of Forest Management Unit P14.

The landbase defines the area available for forest management activities (managed landbase) and the area excluded from forest management activities (unmanaged landbase). The gross area covers an extent of 127,331 ha. The managed landbase, the area available for harvest, covers 69% of the classified landbase or 87,827 ha.

Table 1 summarizes the classified landbase area by final deletion code for the unmanaged landbase and by species yield strata for the managed landbase.

Table 1. Classified landbase summary

Description(F_DEL)	F_DEL	Area(ha)	% Unmanaged Landbase	% Gross Landbase
Area outside FMU	XDFA	166	0%	0%
Linear features	LINEAR	469	1%	0%
Roads	ROADS	442	1%	0%
Seismic	SEIS	1,173	3%	1%
Utility corridors	UTIL	12	0%	0%
Government reservations	GOVRES	193	0%	0%
Mineral and surface leases	LEASE	222	1%	0%
Areas burnt since AVI	FIRE	453	1%	0%
Nonproductive areas	TPR	7,435	17%	6%
Nonforest area	NF	16,892	40%	13%
Water buffers	GRBUF	2,487	6%	2%
River break area	BREAK	3,089	7%	2%
Larch stands	LT	33	0%	0%
Non-commercial stands	NC	257	1%	0%
'A' density black spruce	SB_ADENS	1,674	4%	1%
Black spruce on wet sites	SB_WET	4,466	11%	4%
Nonforest harvest areas	CC_SC	41	7%	0%
Unmanaged Landbase	**Total**	**39,505**	**100%**	**31%**

Description (F_YC)	F_YC	Area(ha)	% Managed Landbase	% Gross Landbase
Deciduous	DEC	43,461	49%	34%
Deciduous, conifer understory	DU	15,720	18%	12%
Deciduous mixedwood	DC	8,578	10%	7%
Conifer mixedwood	CD	4,594	5%	4%
Pine	PL	745	1%	1%
Black spruce	SB	1,985	2%	2%
White spruce	SW	12,745	15%	10%
Managed landbase	**Total**	**87,827**	**100%**	**69%**

Table of Contents

List of Tables

List of Figures

1. Introduction

1.1 Background

This document describes the creation of the landbases used in the development the 2009-2018 Forest Management Plan (FMP) for Forest Management Unit (FMU) P14. It describes the raw data collected, the manipulation of the data to create submission and input datasets, the processes used to merge the spatial information into a single FMU wide dataset and the processing of attributes to achieve the requirements of the Alberta Forest Management Planning Standard (Planning Standard) (Alberta, 2006) for forecasting and FMPs. Separate documents describe the development of the yield curves and the forecasting stages of the 2009-2018 FMP. Final versions of all three documents are included with the final submission.

The landbase is only one part of the forecasting process required to compete FMPs. Forecasting is an explicit statement of the expected future condition of an indicator (CSA 2002) and is undertaken to determine the tradeoffs required for forest management decisions. Three primary components are required for forecasting; a spatial landbase file with attributes to document the current condition (described in this document); yield curves (described in Appendix II: Yield Curve Development (TFC, 2009)); and the objectives for long term management (described in Chapter 6: Forecasting and Management Implications (TFC, 2009)).

The landbase documents the condition of the area to be forecasted at a specific point in time. The attributes refer to the indicators of interest and also contain the information necessary to apply management activities to specific areas in order to achieve management objectives. Yield curves describe the amount of an indicator and how the amount may change through time and in response to management activities and natural forces. Management objectives show the desired levels of the indicators through time. To develop forecasts, these three components are assembled into a model using a forecasting tool (*i.e.* Woodstock or Patchworks). The linkages between the three forecasting components are critical for successful forecasting and these linkages are described in each of the three related documents. An important part of forecasting is the timber supply analysis (TSA), which predicts the supply of timber available for harvesting.

The broader term forecasting is used throughout the plan documents but references to TSA are used as appropriate and in some of the database field names.

To address specific modeling and reporting requirements, landbases were created in three formats, all of which contain essentially the same information:

- Classified landbase – the highest spatial detail;
- TSA landbase – a lower level of spatial detail; and
- Modeling landbase – special modeling attributes added.

All three landbases cover the same extent and contain the same description of the forest. For instance, the information contained in the greater spatial detail of the classified landbase (*e.g.* seismic lines) is carried in attributes on the TSA and modeling landbases. Unless otherwise noted, this document describes the classified landbase.

The landbase describes the condition of the forest as of the effective date of June 30, 2009. The physical extent of the landbase is all lands within the outer boundaries of FMU P14.

The landbase defines the area available for forest management activities (managed landbase) and the area excluded from forest management activities (unmanaged landbase). The gross area covers an extent of 127,331 ha. The managed landbase, the area available for harvest, covers 69% of the classified landbase or 87,827 ha.

This document meets the Landbase Description Standards as outlined in Annex 1, item 3.0 of the Planning Standard that state “describe the procedure and steps required to establish the net landbase and report the spatially classified landbase” (Alberta, 2006). Figure 1 summarizes the landbase classification process.

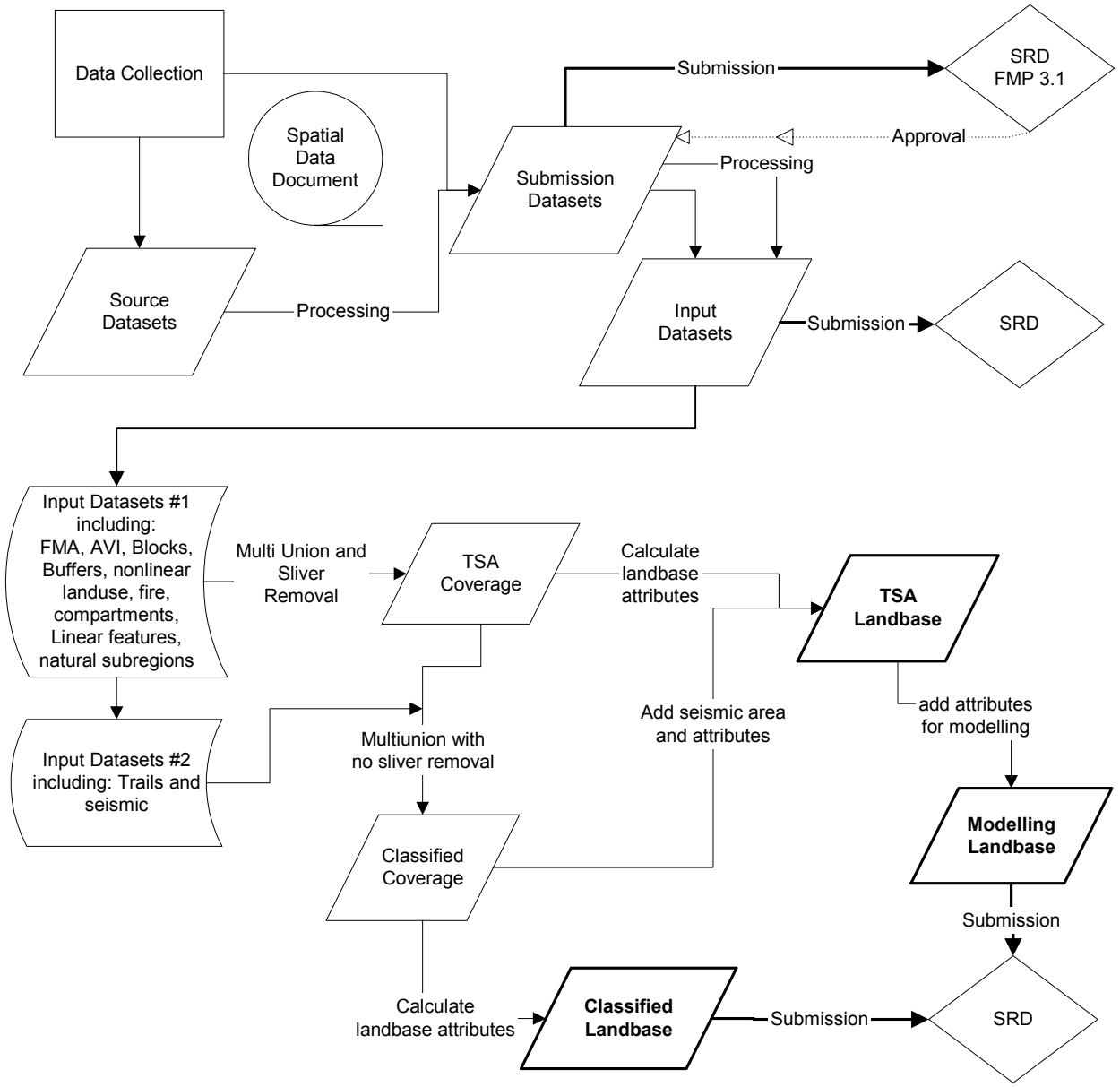

Figure 1. Landbase classification process.

1.2 Spatial Landbases

The landbase classification process defines the managed landbase and the unmanaged landbase. The Forestry Corp. has generated three separate landbases that represent the same information in slightly different ways. Each landbase is designed to most efficiently meet a specific purpose and has the same extent, areas under deletions and species distribution. The extent of the gross landbase for all was the full extent of the lands within the P14 FMU. Descriptions of the spatial landbases follow:

1. **Classified landbase**. This landbase was developed to satisfy the requirements listed in the Planning Standard. The landbase has the greatest spatial detail and includes linework for seismic features. The classified landbase is also used to calculate the areas and identify the locations of seismic features on the landbase and to generate the attributes for the TSA and modeling landbases. This landbase carries the largest number of polygons.

2. **TSA landbase**. This landbase forms the basis for TSA modeling. The TSA landbase caries all information in the classified landbase but does not include spatial linework for seismic features but rather attributes are used to represent the areas of these features. The unique key for the TSA landbase is carried on the classified landbase. The area of seismic features within each TSA landbase polygon is carried in the *AREAHA_SEIS* field on the TSA landbase.

3. **Modeling landbase**. This landbase was developed to make the landbase suitable for both strategic and operational modeling. This landbase has the same spatial features as the TSA landbase but has a specific set of themes and attributes to meet modeling requirements.

Specific descriptions and documentation of the unique characteristics of each landbase are described in more detail in Section 4.3.

1.3 Process Overview

A spatial landbase is the basis for all forecasting. To optimize the analysis capabilities of the software, the spatial landbase should contain all information needed for the model to proceed toward a solution but carry a minimum number of polygons needed to clearly characterize the landbase. The spatial landbase created for input to the forecasting is termed the TSA landbase. This landbase is augmented with seismic spatial information to create the classified landbase as required for submission under the Planning Standard. The TSA landbase is expanded with additional attribute data to generate the modeling landbase. Each landbase is carries the common attribute of UKEY#_TSA. This field is unique for the TSA and modeling landbases, which have the identical polygons, and is carried as an attribute on the classified landbase.

This section outlines the spatial and attribute data processing used to generate the P14 landbase. As shown in Figure 1, seismic data was added separately from the rest of the input data. Input Datasets #1 holds all the datasets required to generate the TSA landbase. Input Datasets #2 contains the seismic spatial data. The seismic data from the classified landbase is summarized by the UKEY#_TSA to generate the area within the seismic polygons for each

polygon on the TSA landbase. This area is stored as a non-spatial attribute in the *AREAHA_SEIS* field on the TSA landbase (See Section 6.4.3).

1.4 Spatial Landbase Process

Developing the spatial landbase has 6 phases that continue through the development of the plan. The main phases are:

1. Obtain and create submission datasets;
2. Create input datasets for spatial processing from submission datasets;
3. Spatial processing of input datasets generate spatial landbase;
4. Process AVI for strata assignment;
5. Process generated attributes to characterize landbase and feed the forecasting models; and
6. Generate summary tables to describe the landbases.

Each phase is addressed in the following sections, Figure 2 illustrates the process:

- **Submission Datasets** (Section 2). All datasets used in the landbase classification stage of the TSA must be submitted for approval by Alberta. Each dataset was described fully and the processing steps required to generate the data were outlined. All spatial data used were processed within an ArcGIS file geodatabase. Attribute data were stored in tables within the file or Oracle geodatabases.
- **Input Datasets and Tables** (Section 3). With some initial processing or grouping of submission datasets the datasets used in the spatial data processing were generated. The actual file geodatabase layers were exported to ArcInfo coverage format for landbase creation. The coverages and attributes used to classify the landbase and the specific fields used in the classification process are described.
- **Spatial Data Processing** (Section 4). The spatial processing of input datasets used to generate the landbase coverages and further processing to generate the TSA and modeling landbases are described.
- **AVI Attribute Processing** (Section 5). The processing and definition of AVI attributes to calculate composite stand attributes, generate species groupings, define landbase classifications and assign strata are described in Section 5.
- **Generated Attribute Processing** (Section 6). The processing and definition of landbase attributes to generate a final landbase classification is described in Section 6. This includes attributes for the classified landbase and additional attributes required for TSA and modeling landbases.
- **Landbase Summaries** (Section 7). The managed landbase and unmanaged landbase form the final classified landbase and are described in Section 7. This section also includes summaries for the TSA landbase.

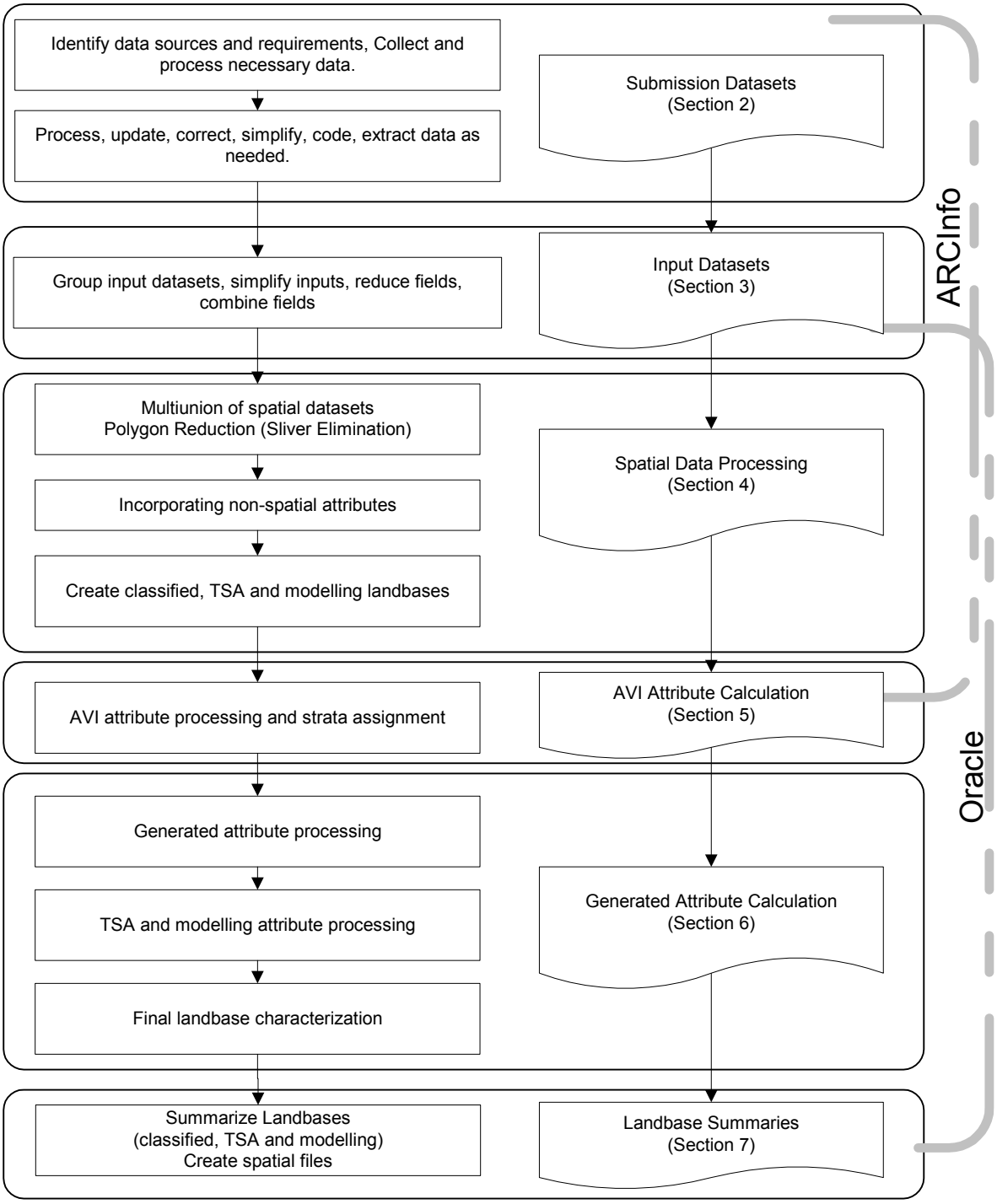

Figure 2. Classified landbase process flow.

1.5 Effective Date

This classified landbase described the condition of the forest as of the effective date of June 30, 2009. Spatial data for landuse, harvest and fire regeneration updated the condition of the forest defined in AVI to the effective date.

1.6 Terminology

In this document the following terms are used to classify the gross (full extent) landbase:

- Classified Landbase: The spatial landbase (including linework representing seismic dispositions) and attribute classification with the greatest number of polygons.

- Deletions: This identified all areas excluded from the managed area and assigned a code identifying the reason for deletion.

- Input Datasets: Datasets used in multi-union processing to generate spatial landbases.

- Managed: That portion of the gross landbase that is available for forest management activities: It may include some areas where the current availability for timber harvest was uncertain. These areas will be evaluated in the forecasting stage and during review of the Spatial Harvest Sequence.

- Modeling Landbase. The spatial landbase developed from the TSA landbase with additional attribute fields required by the forecasting tools.

- Submission Datasets: Datasets submitted for Alberta's approval for use in landbase creation.

- Timber Supply Analysis (TSA): A part of the forecasting processing where calculations/computer models with assumptions regarding forest growth patterns are used to predict the annual allowable cut. The landbase classification was the first of the stages in TSA. The broader term forecasting is applied to processes with a wider range of non-timber values.

- Timber Supply Landbase: The spatial landbase developed to support forecasting. Spatial linework for trails and seismic was not included in this landbase however the area and type of features was carried in attribute fields.

- Unmanaged: That portion of the gross landbase that is not available for forest management activities.

1.7 Document Standards

The following standards are used throughout this document:

- # sign when used with landbase name or ukey. This was a generic identifier for the spatial landbase iteration. The landbase classification process may have numerous iterations and a consecutive number was assigned to each multi-union of the input datasets. This ensured attribute and related spatial files could always be linked to the proper spatial landbase files. In the document the # sign was used to represent all or any of the iterations.

- All dataset names are presented in **lowercase** bold font in the text.

- All field names in the body text are presented in *UPPERCASE* italic font. Generally in tables and in titles the italics are not used.

- All scripts (SQL and AML) are presented in *lowercase* italic font.

- Table 2 outlines the default table organization. Where possible tables follow this format.

Table 2. Default table layout.

Name	Description	Fields or Decision rules	As needed	As needed
Dataset name	Additional descriptive	Fields for classification	DATA[1]	
Field Name	information	Summary groupings		
Item Name		Decision rules		
Data group of interest				
Classification				

[1] Text to clarify or additional information may be contained in footnotes

- Figure 3 defines the shapes used in all flowcharts.

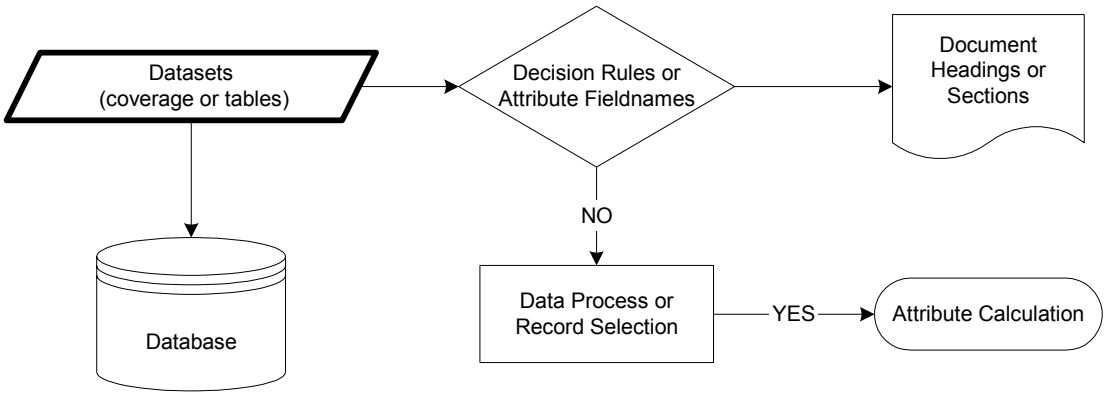

Figure 3. Shape definition for figures.

2. Submission Datasets

The data collection for the 2009-2018 FMP identified a set of spatial and tabular datasets for the P14 area. The process also formulated the decision rules for classification. This section describes the collected datasets used in the landbase classification process. It lists all datasets used including the interim datasets created. It defines the information used to classify the landbase and lists the processing steps to generate the input datasets described separately in Section 3. Also identified are datasets which were used to determine the managed landbase and those datasets that provide additional information for modeling.

Daishowa-Marubeni International Ltd. (DMI), Peace River Pulp Division holds all spatial and attribute data on behalf of Boucher Bros. Lumber Ltd. (Boucher Bros). GIS staff at DMI provided most of the spatial and attributes files used in the landbase. Data was supplied in a file geodatabase. SRD provided attributes and information for government reservations and sample plot data. SRD also provided attribute information for some existing cutblocks.

Table 3 lists the submission datasets. These spatial data and attributes are used to generate the input datasets and classify the landbase. Input datasets are described in Section 3.

Table 3. Submission datasets.

Dataset Name	Description	Data Type	Source	Date
Administrative boundaries				
p14	FMU Boundary	FGDB	DMI	2009
caribou	Caribou zone boundary	FGDB	DMI	2009
moose	Moose zone boundary	FGDB	DMI	2009
natural	Natural subregion boundaries	FGDB	DMI	2009
AVI				
P14_forest	AVI inventory	FGDB	DMI	2007
net_strata_lb	Generated attibutes from AVI including strata	FGDB	AVI	2009
Cutblocks				
blocks	P14 planned and future blocks	FGDB	DMI	2009
P14_blks	P14 existing blocks	shapefile	DMI	2009
CC_SC_BlkRegen.dbf	ARIS block information	table	SRD	2009
Landuse and seismic				
dids_GovRes	Government landuse reservations	FGDB	DMI	2008
dids_Linear	Linear landuse dispositions	FGDB	DMI	2008
roads_buffer	Linear landuse dispositions	FGDB	DMI	2008
utility_buffer	Nonlinear landuse dispositions	FGDB	DMI	2008
seismic5m	Cutlines buffered to 5m width	FGDB	DMI	2005
Hydrology buffers and fire				
hydrobuf	Combined stream, river and lake buffers	FGDB	DMI	2005
breaks	River breaks area	FGDB	DMI	2005
post_avi_fire	Fire boundaries since AVI creation	FGDB	DMI	2005

2.1 Administrative Boundaries

2.1.1 FMU Boundary

The boundary for the 2009-2018 FMP is the P14 FMU boundary, which is comprised of 13 parts. The original source for the boundary was Alberta provincial base data and no alterations were made.

2.1.2 Caribou Special Management Zone

The boundary of the Caribou management zone within P14 represents area within the Woodland Caribou range. The original data was obtained by DMI from SRD. The caribou zone boundary was added to the landbase. The Caribou special management zone is delineated by blue hatching in Figure 4.

2.1.3 Moose Management Zone

The boundary of the Moose management zone within P14 was added to the landbase. This zone represents areas of importance to moose populations. The original data was obtained by DMI from SRD. Figure 4 shows the boundary of the moose zone in yellow hatching.

2.1.4 Natural Subregion

The natural subregion boundaries were generated from the 2005 Natural Regions and Subregions dataset obtained from the Alberta Government. The natural subregion name was added to the landbase. Figure 4 shows the natural subregion boundaries in shading.

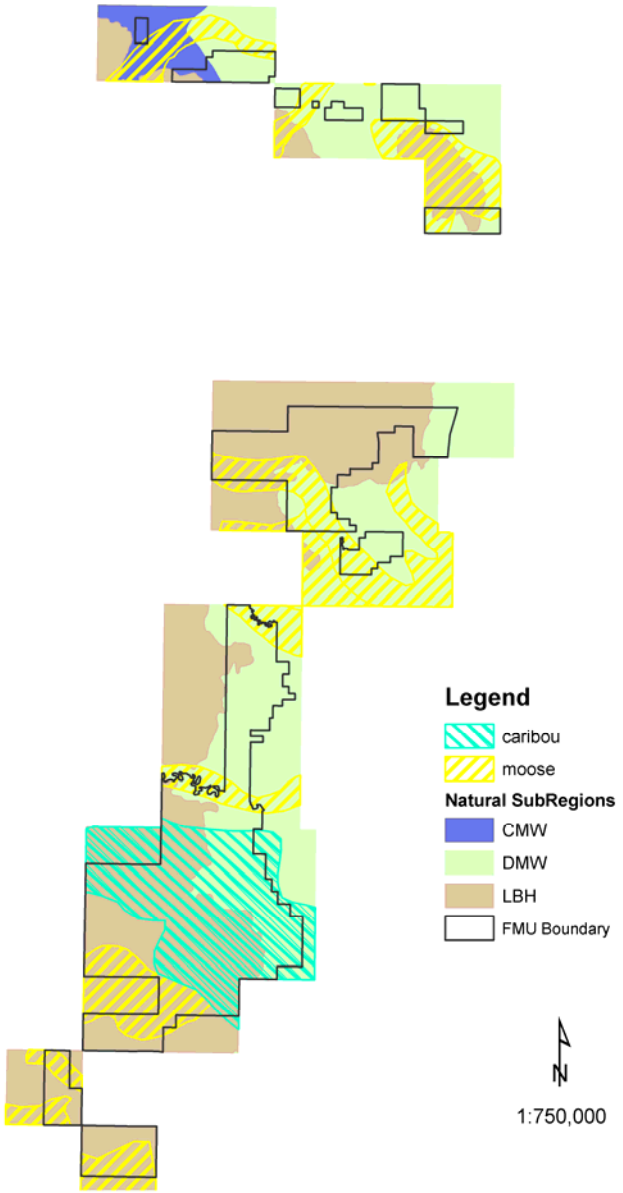

Figure 4. Caribou zone, Moose zone and Natural subregion boundaries.

2.2 Alberta Vegetation Inventory (AVI)

The P14 area has complete AVI classification. Inventory approval was received in February 2007 (See Appendix I). The reference years for AVI photography varied from 1998 to 2007 (See Figure 5).

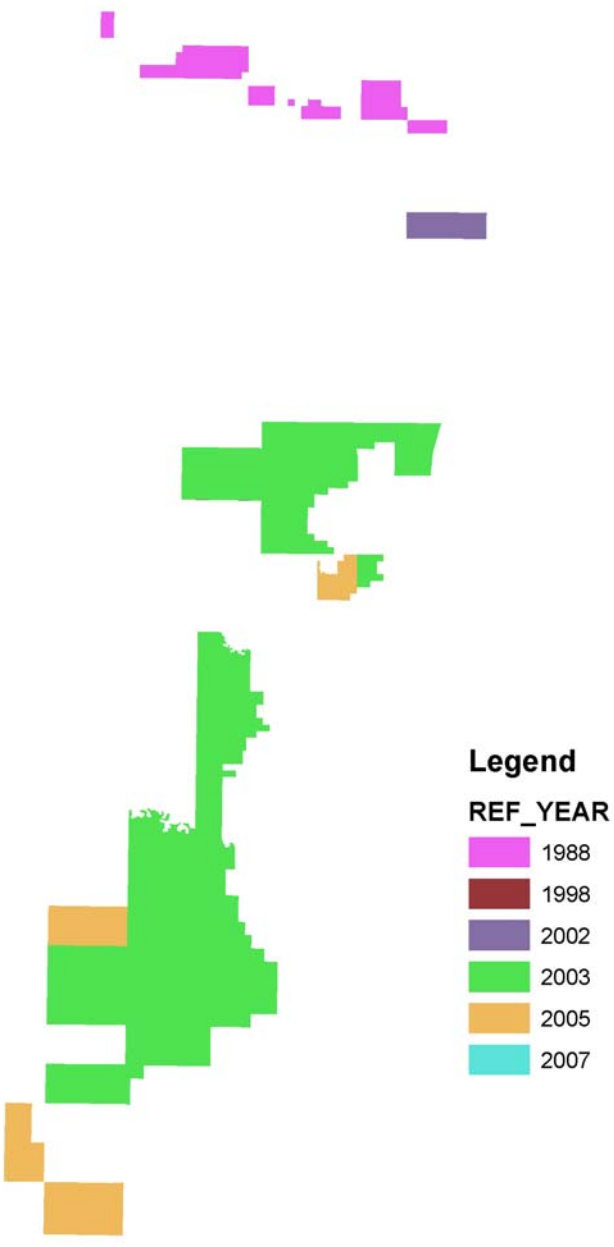

Figure 5. AVI photo reference years.

2.2.1 Spatial Data

The P14 AVI file is stored in a file geodatabase (FGDB) as layer P14forest.

2.2.2 Attribute Data

Two different yield strata classifications were assigned to all polygons in the AVI; SRD extended strata and the P14 species strata. The AVI attribute table was loaded into Oracle and both strata were calculated through SQL. Species groups, species distributions, broad cover groups and age were calculated for each stand layer. Deciduous stands with conifer understory and the single layer selected to define the stand were identified. The assignment process is described in Section 5.2. The table **net_strata_lb** holds all calculated values for the AVI attributes. This table joins to the AVI or to the spatial landbase on the field *POLY_ID*. All AVI attribute processing and strata assignment is described in Section 5.

Figure 6 shows the AVI coverage grouped by species strata (as indicated by the AVI overstory attributes).

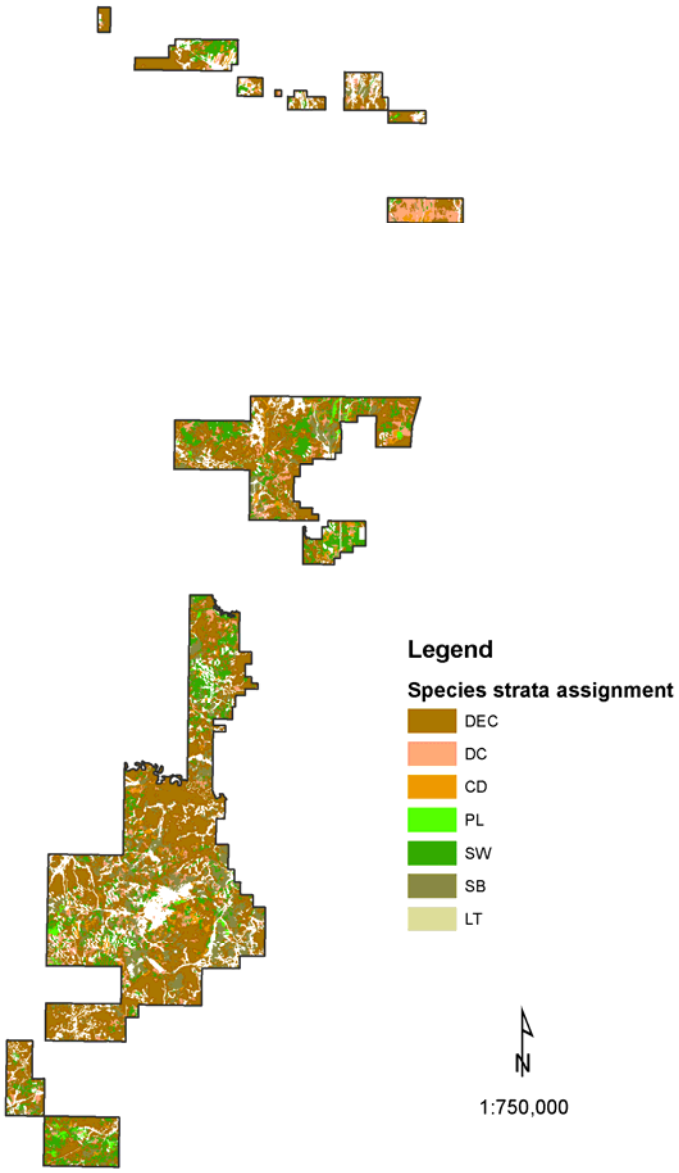

Figure 6. AVI overstory by species strata (p14forest).

2.3 Cutblocks

The cutblock dataset included existing, planned and future cutblocks which are defined by their date relative to the effective date and status in existing harvest plans. Cutblock information was captured by GIS staff at DMI on contract to Boucher Bros. Existing block information was provided in shapefile format to TFC. Planned and future block information was provided in FGDB.

Existing cutblocks within the P14 FMU were harvested under a range of dispositions by a number of operators. The cutblock dataset identifies blocks harvested under coniferous timber leases (CTL), deciduous timber licenses (DTL), miscellaneous timber users (GOVMTU), blocks identified for AVI (PREAVI) and existing harvest blocks under the responsibility of Boucher Bros. (EXIST). This source information is contained in the *BLK_STATUS* field. Current blocks (timber year 2008) were considered as existing blocks in the landbase. For the final landbase SRD provided additional cutblock information for blocks under their responsibility. This included the regenerating strata (ARIS regen_code), opening_number and timber_year.

2.3.1 Classification

Cutblock information used in the landbase classification requires a year of harvest (at minimum) and a regenerating stratum. If strata were not provided with the block, strata information from the AVI overstory was used. There were 3 sources for timber year (listed in order of preference):

- the timber year (May to April) of the skid date;
- The harvest year provided in block information;
- MOD1_YR date in AVI.

Table 4 shows the areas of cutblocks by year and species strata on the landbase. Figure 7 shows the spatial distribution of existing cutblocks on the landbase.

Table 4. Cutblock area by species strata and year for managed landbase.

Timber Year	Source of year	Species strata (F_YC)					
		DEC	DC	CD	PL	SW	Total
< 1990	AVI	626.0	58.9			29.6	714.6
1990 - 1999	AVI	1,044.9	19.6	168.2		227.0	1,459.7
1990 - 1999	Company	451.1	847.2	708.8		140.1	2,147.2
2000 - 2009	Company	1,356.9	304.8	591.9	47.1	697.6	2,998.3
Total		**3,479.0**	**1,230.5**	**1,468.8**	**47.1**	**1,094.3**	**7,319.7**

Boucher Bros. provided the planned blocks for 2009 and identified future stands for harvest, as well as the historical block information. Of the historical blocks, 566 ha do not have a timber year assigned, and thus AVI attributes were used to classify these areas. This was necessary to follow the planning standard rules for assigning block stratification.

Where ARIS information was available, the *REGEN_CODE* assignment was used to assign the species strata for regenerating stands. 'CD-2000', 'DC-2000', 'D-2000' were assigned to CD, DC and DEC strata respectively. 'C-2000' assigned cutblocks were assigned to the 'SW' stratum unless the AVI overstory (*STRATA_YC*) was 'PL'.

The cutblock dataset contains additional information used to characterize the landbase. The *BLK_STATUS* code 'RET_EXT' identifies the area of stand retention which is set aside during harvest and is external or on the edge of the block boundary. The *BLK_STATUS* code 'RET_INT' identifies the area of stand retention internal to the block, area that is within the block boundary. The code 'IN_BLK' indicates small polygons between blocks which are likely artefacts of the boundary capture process and do not actually exist on the landbase. These polygons were identified by TFC to prevent the model from scheduling these areas within existing blocks for harvest.

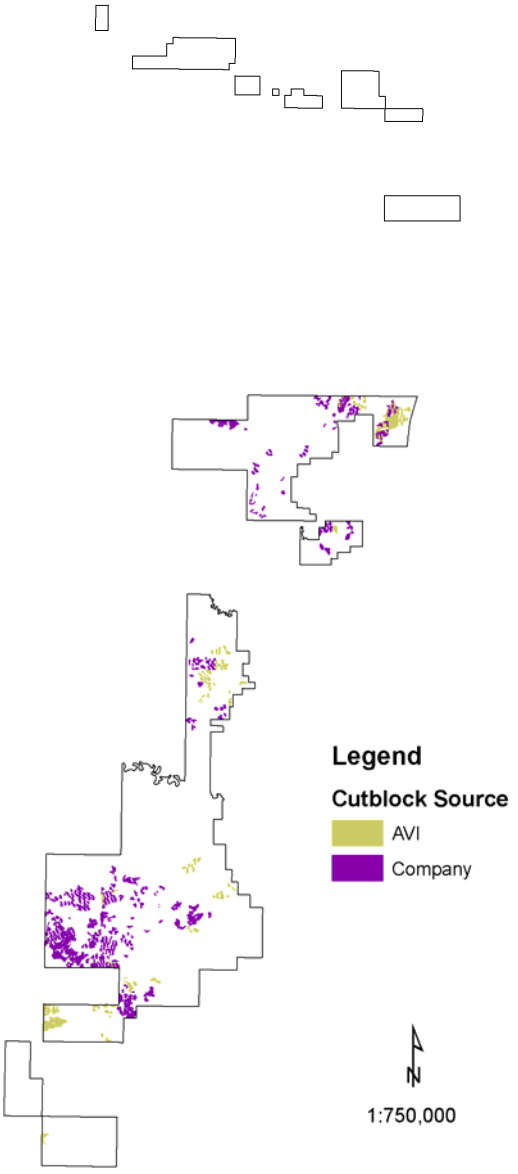

Figure 7. Existing cutblocks in landbase by source.

2.4 Landuse

Boucher Bros. has captured landuse updates for use in operations and the landbase development of the 2009-2018 FMP. All dispositions recorded in the Land Status Automated System (LSAS) to December 2008 which fall within the P14 FMU were identified. Any current dispositions which preclude timber harvest were included in the landbase (Figure 8).

The goal in developing the landuse dataset was to identify disturbances within the FMU boundary before the effective date of the inventory (June 30, 2009) that impact the potential for forest harvesting. The landbase classification process identified all dispositions which precluded timber harvest. This included dispositions which designate non-forest areas (surface leases, roads, pipelines) and dispositions that identify lands committed to other uses and not available for timber harvest (government land reservations).

2.4.1 Dataset Processing.

More than one disposition can exist on a single area of land. Where disposition types overlap the disposition first in the hierarchy listed in Table 5 was assigned. The dataset was split into linear and non-linear disposition groups and dissolved on disposition type to simplify the linework.

Table 5. Landuse disposition codes and hierarchy.

Disposition code	Description	Disposition grouping	Heirarchy
LOC	License of Occupation	Linear	1
PLA	Pipeline Agreement	Linear	2
PIL	Pipeline Installation Lease	Linear	3
MSL	Mineral Surface Lease	Non-linear	4
SML	Surface Mineral Lease	Non-linear	5
MLL	Miscellaneous Lease	Non-linear	6
MLP	Miscellaneous Permit	Non-linear	7
SMC	Surface Mineral License	Non-linear	8
FRD	Forestry Road	Linear	9
RDS	Road	Linear	10
RRD	Registered Roadway	Linear	11
ROE	Right -of-Entry Agreement	Linear	12
EZE	Easement	Linear	13
DRS	Disposition Reservation	Non-linear	14
REA	Rural Electrification Association Easement	Linear	15
RIA	Range Improvement Agreement	Non-linear	16
GRL	Grazing Lease	Non-linear	17
PNT	Protective Notation	Non-linear	18

PNT 950022 is an existing disposition that was assigned to a experimental treatment area for spruce budworm in P14. The project will be completed in August 2012. This disposition was not removed from the managed landbase however the area was deferred from harvest until after 2013.

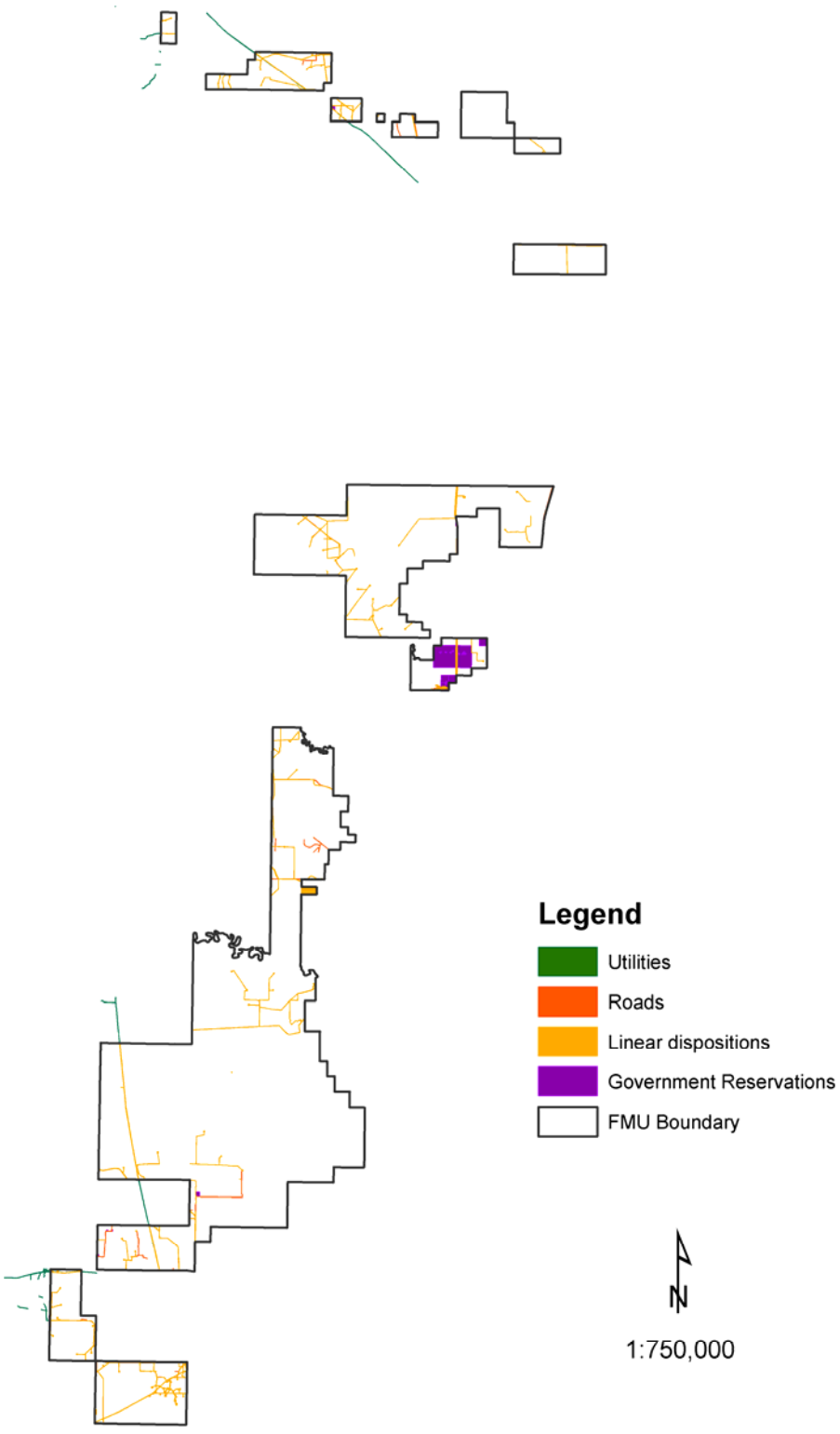

Figure 8. Landuse dispositions.

2.4.2 Seismic

Seismic disturbances are generally not wide enough to differentiate on the source photography as polygon features and are stored as line features. Seismic lines were buffered to spatially capture the areas disturbed which are, on average, 5 metres in width. Seismic line features were buffered by 2.5m per side. Figure 9 shows the full seismic dataset including seismic within cutblocks which were not considered deletions.

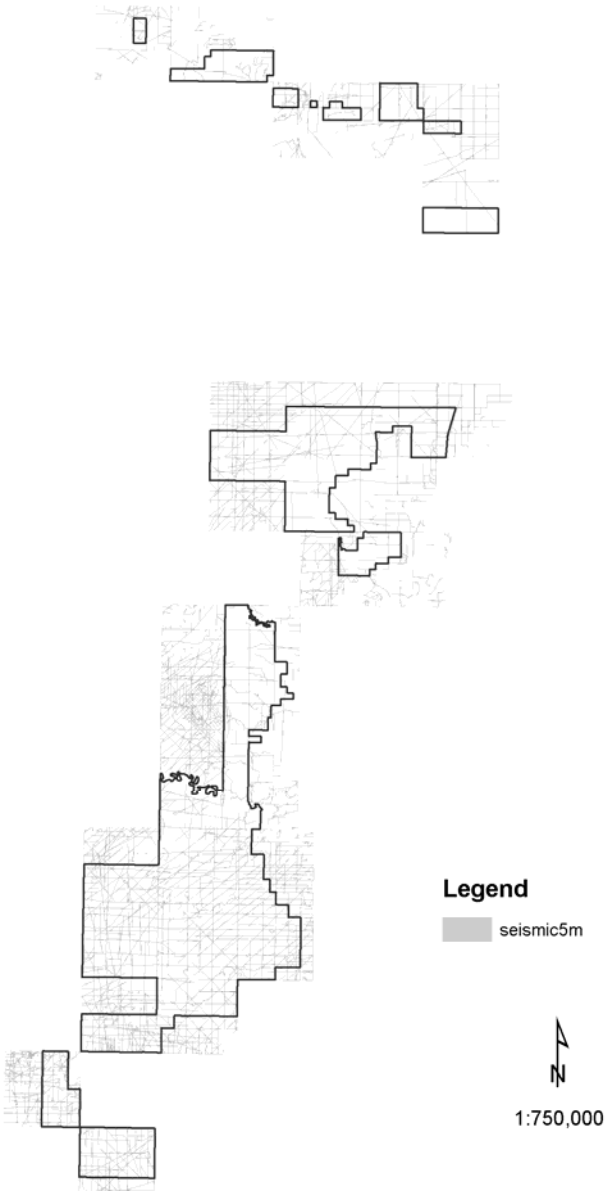

Figure 9. Seismic distribution.

2.5 Water course buffers

The current Alberta Timber Harvest Planning and Operating Ground Rules Framework for Renewal (Alberta Sustainable Resource Development, 2006) excludes harvesting activity in areas adjacent to and surrounding water features. The P14 watercourse buffer was prepared

by DMI as input to their 2000-2009 DFMP. Lakes, rivers and small permanent streams were buffered. Table 6 shows the classification and buffer distances. There were no Wildfowl lakes in P14. Figure 10 shows the distribution of the watercourse buffers.

Table 6. Watercourse classification and buffer distances.

Classification	Code	Description	Distance
Large Permanent streams	LRG_PERM	Large Permanent streams. Double lined river polygons.	60m
Small Permanent streams	SM_PERM	Small permanent streams. (The additional 2m added to the ground rule or 30m allows for an average channel width of 4m).	32m
Lakes	LAKE	Lakes larger than 4 hectares.	100m
Wildfowl lakes	SWAN	Lake identified for Trumpeter Swan Lake designation	200m

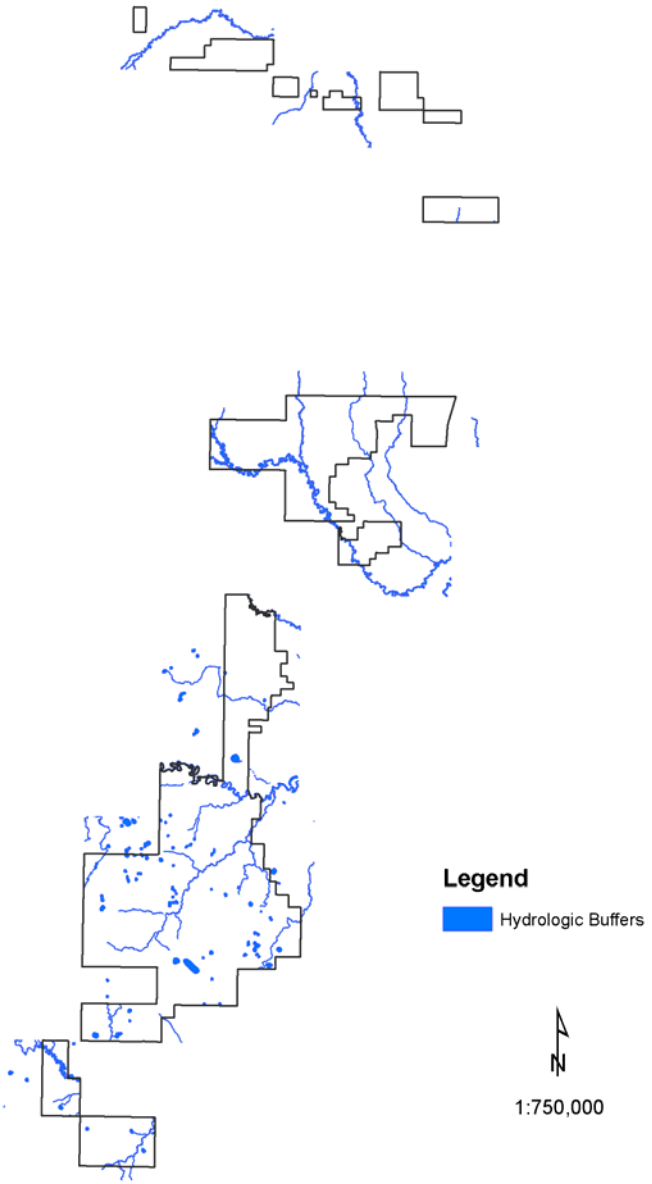

Figure 10. Watercourse buffers.

2.6 River Breaks

P14 is crossed by major rivers which have formed large, steep river valleys. The river break polygons identify total area from the river to the top of the valley wall. It includes the 60m riparian buffer on these large permanent rivers and any additional area to reach the top of the valley where conditions become operable. This land within the river break is identified as too steep or inaccessible for operations. The boundaries were identified using DEM data by DMI as part of their 2000-2009 DFMP process. Figure 11 shows the river break areas. Note that much of the area is on the boundary of the P14 FMU.

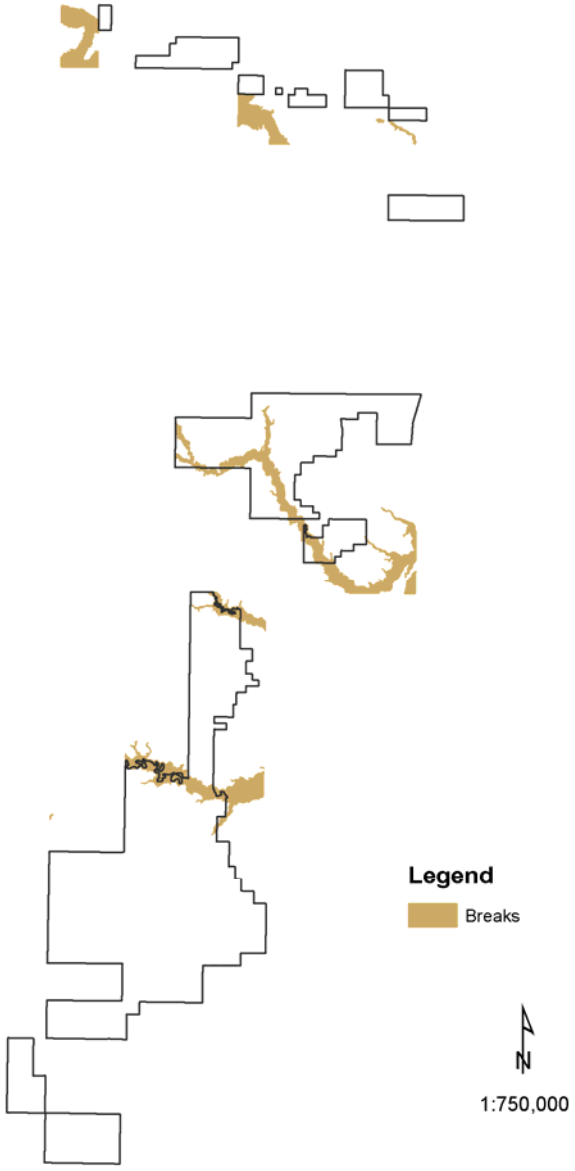

Figure 11. River break areas.

2.7 Wildfire

The impact of fire since AVI was identified in the **post_avi_fire** boundary. AVI also identified 2 major fires on the P14 landbase. Figure 12 shows the fire boundaries.

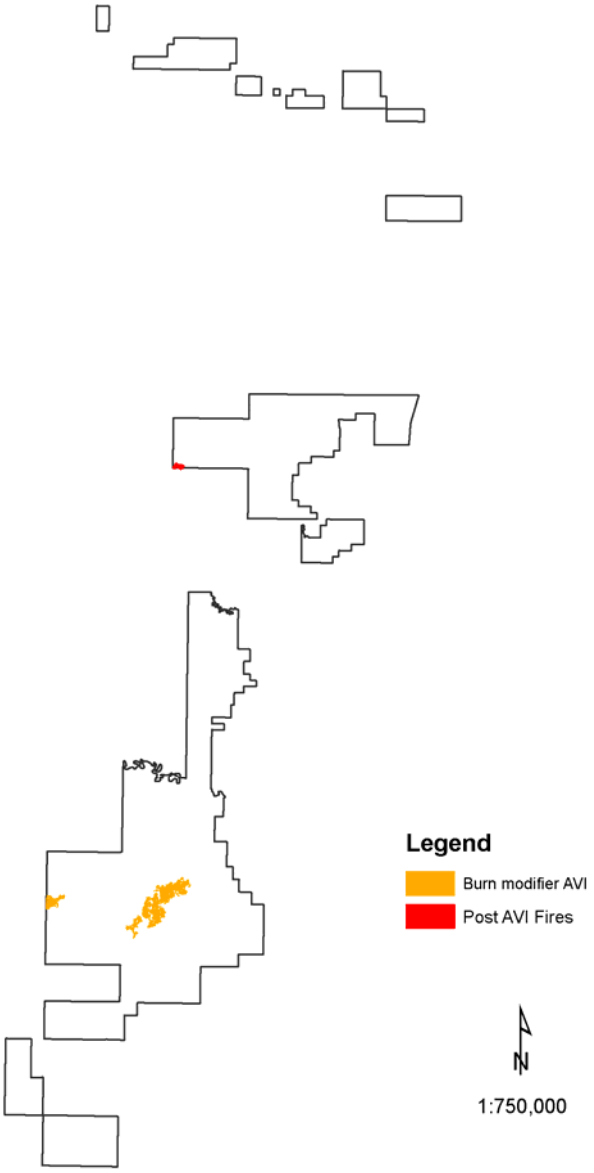

Figure 12. Wildfire locations by source.

3. Input Datasets

3.1 Background

This section outlines the actual coverages, fields and related tables used to classify the landbase. The original data sources that were used to generate these coverages are described in detail in Section 2. Table 7 lists all datasets with a brief description and the landbase attributes on each dataset. These spatial datasets were all in ArcInfo coverage format, converted from the FGDB input layers. Tabular data were ArcInfo or Oracle tables.

Table 7. Input datasets.

Dataset Name	Description	Fields Used
Administrative boundaries		
P14	FMU boundary for landbase	*FMUNAME*
caribou	Caribou wildlife zone boundary	*CARIBOU*
moose	Moose wildlife zone boundary	*MOOSE*
natural	Natural subregion boundary	*NATURAL*
AVI		
forest_elim	AVI inventory and TSA compartments	*POLY_ID* , ZONE and AVI attributes
net_strata_lb	Generated attibutes from AVI including strata	AVI generated attributes
Landuse and seismic		
govres	Non-linear landuse	*NLIN_DISP*
linear	Linear landuse	*LIN_DISP*
utility_buf	Utility centreline buffered 15m each side	*UTILITY*
roads_buf	Road centreline buffered	*ROADS*
seismic5m	Seismic and trails buffered to 5m width	*IN_SEIS*
Cutblocks		
blocks	Existing and planned cutblocks	*CUTBLK07,OPEN_NUM,SKID_DATE, SKID_YEAR REGEN_CODE, BLK_STATUS,YEAR, DISP_TYPE*
lb4_blk_add_aop	Additional blocks from Annual Operating Plan	*ADD_AOP*
lb4_blk_upd_srd	Additional block attributes from SRD	*UPD_TIMBER_YEAR,UPD_REGEN_CODE*
Hydrology buffers and fire		
hydrobuf	Combined stream, river and lake buffers	*HYDROBUF*
breaks	River break boundary	*BREAK*
post_avi_fire	Wildfire boundaries since AVI photography	*FIREYEAR*

3.2 Spatial Input Data (from coverages)

A landbase classification was developed with spatial data from numerous sources. Where required, the input datasets were processed to deal with sliver polygons and simplified if possible. Generally the slivers were created when data was clipped to the boundary of P14. These small polygons (< .01 ha) had no meaning and were dropped from the datasets if they were isolated polygons. This processing was important to create the most efficient TSA landbase for modeling. Many of the input datasets for P14 were part of the Landbase process completed by DMI for their 2000-2009 DFMP. As these data were previously approved for forecasting, minimal processing was done.

3.2.1 Forest_elim

The **P14forest** layer from the FGDB was converted to a coverage format for use in the multiunion process (described in Section 4). The zone attribute was added to the file to identify separate areas for modeling. A number of sliver polygons were found along the fmu edge. Polygons < .01 ha were identified and eliminated into the surrounding polygons with the longest shared border. Only the attribute fields *POLY_ID* and *ZONE* were carried on the input file.

3.2.2 Blocks

Cutblock boundaries from company files and the AVI are combined in the block dataset. Additional block information from company and SRD files was added. All cutblocks within the P14 FMU with an assigned year of harvest are included and were identified as existing blocks on the landbase. In addition, block boundaries which did not have a year of harvest were included in the input spatial file. These blocks are identified on the landbase but must have a year of harvest to be considered an existing cutblock. Additional block information from **lb4_blk_add_aop** and **lb4_blk_upd_srd** Oracle table provided harvest years and regeneration codes for some of these blocks. Without a year of harvest the block designation was ignored and the area was classified based on AVI attributes.

The field *REGEN_CODE* is used to assign blocks to regenerating block strata (see Section 2.3.1). Fields *YEAR, OPEN_NUM, SKID_DATE, LBASE_CODE, REGEN_CODE, FMU, OPERATOR, BLK_STATUS, CUTKEY07, DISP_TYPE, SKID_YEAR* carry cutblock information.

3.3 Attribute data processing

3.3.1 LB_NET_STRATA

The AVI attributes were loaded into the Oracle geodatabase for processing. A table of attributes with the unique key of *POLY_ID* was created by the grouping by all AVI attribute fields for each unique *POLY_ID*. This ensured polygons that were split along boundary lines would be represented only once in the attribute file for processing. This table was the input file for **lb_net_strata** table which holds the AVI generated attributes (See Section 5).

4. Spatial Data Processing

4.1 Overview

This section outlines the spatial processing required to combine the input datasets into a single spatial file for modeling. Spatial processing involved the following steps:

- Multiunion to combine all input datasets (with the exception of seismic);
- Polygon reduction to eliminate sliver polygons;
- Addition of seismic linework to generate the classified landbase;
- Summarize areas of seismic features for TSA landbase; and
- Adding attributes for modeling landbase.

Figure 13 shows the processing steps and interim coverages.

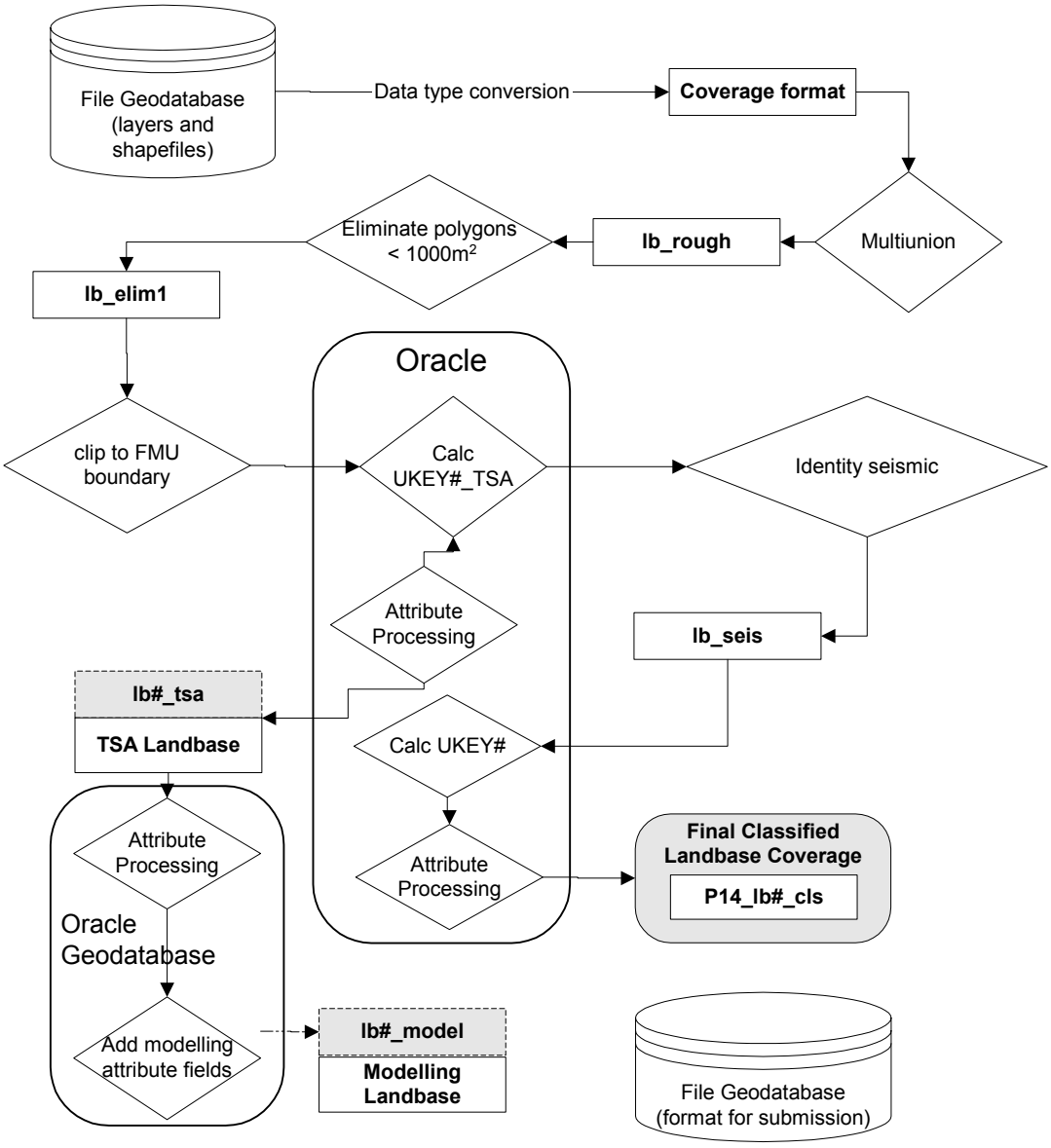

Figure 13. Spatial data processing

4.2 Processing

4.2.1 Multiunion

A list of the input coverages was stored in an Oracle table (**lb_net_table#**) accessed through ArcInfo. This table tracks the input coverages, date of processing and final output dataset for each run.

Table 8 lists the input coverages to the multi-union process for the spatial landbase. The Rank field identifies the order of union and the interim coverages are listed in the Union Cover field.

The second part of the table shows the additional union required to create the classified landbase. This takes place after the elimination of sliver polygons and the calculation of *UKEY#_TSA*.

Table 8. Landbase netdown table.

Input Coverage Name	Cover type	Rank	Union Cover
breaks	poly	1	
govres	poly	2	zu_1_2
hydrobuf	poly	3	zu_2_3
linear	poly	4	zu_3_4
post_avi_fire	poly	5	zu_4_5
roads_buf	poly	6	zu_5_6
utility_buf	poly	7	zu_6_7
forest_elim	poly	8	zu_7_8
natural	poly	9	zu_8_9
moose	poly	10	zu_9_10
caribou	poly	11	zu_10_11
blocks	poly	12	zu_12
Clip to FMU boundary, eliminate slivers			
P14_union1	poly		
P14_elim1	poly		
Polygon reduction process creates **lb4_tsa**, TSA Landbase spatial files			
lb4_tsa	poly		
seismic5m	poly		lb4_seis

Using ArcInfo processing and the *multiunion_gdb.aml* all input datasets are unioned into a single coverage. The AML references the Oracle table to identify the coverages to union, the names to assign to the interim datasets and the order of processing. More than 30% of the polygons are < 1000m^2 in size. These polygons were eliminated by merging with the adjacent polygon which shared the longest border. Table 9 shows the changes in polygon numbers through the spatial processing steps.

Table 9. Coverage polygon numbers through spatial processing

Coverage name	Description	# of polygons
P14_union1	Coverage resulting from multiunion, clipped to FMU	28,200
P14_elim1	Polygons < 0.1ha eliminated	18,751
P14_lb4_tsa	TSA Landbase	18,751
P14_lb4_cls	Seismic landbase	51,852

4.2.2 Polygon Reduction

Sliver polygons generally result from slight differences in boundaries amoung input datasets and do not provide useful information to the landbase classification. Large numbers of polygons in the modeled landbase increases complexity. It also slows the mapping, querying and viewing of the landbase. To reduce the number of polygons in the TSA landbase, measures to address sliver polygons were completed before seismic linework was added.

The TSA landbase was processed to reduce sliver polygons by selecting those polygons less than 1000m^2. The *eliminate* command in ArcInfo (with the *nokeepedge and border* options) was applied. This merged the sliver polygons less than 1000m^2 into the adjacent polygon which shared the longest border with the sliver polygons. The process eliminated 9,449 polygons.

Table 10 shows the area comparison after the eliminate was completed. The sliver removal had a slight impact on the managed landbase. The area was reduced by only 0.03% (43ha). The majority of the slivers were formed around the dispositions and block boundaries added to the landbase.

Table 10. Sliver reduction comparison by preliminary deletion codes.

F_DEL CODE	Before eliminate Area (P14_UNION1) ha	After eliminate Area(LB3_TSA) ha	Difference (ha) (P14_UNION1 - LB3_TSA)	Difference (%)
BREAK	3,083	3,081	1.5510	0.0012%
CC_SC	3,528	3,525	2.4760	0.0020%
FIRE	453	453	-0.0570	0.0000%
GOVRES	193	193	0.1170	0.0001%
GRBUF	2,499	2,487	11.8110	0.0094%
LEASE	224	222	2.2370	0.0018%
LINEAR	484	469	14.7284	0.0117%
LT	33	33	0.0284	0.0000%
NC	257	257	-0.0103	0.0000%
NF	16,405	16,414	-9.3250	-0.0074%
ROADS	464	442	22.1382	0.0175%
SB_ADENS	1,674	1,674	-0.0360	0.0000%
SB_WET	4,465	4,466	-1.7249	-0.0014%
SEIS	0	0	0.0928	0.0001%
TPR	7,373	7,375	-1.5000	-0.0012%
UTIL	13	12	0.7230	0.0006%
XDFA	166	166	0.0470	0.0000%
NONE	84,850	84,893	-43.0099	-0.0341%
Total	126,163	126,162	0.2867	0.0002%

A second comparison summarizes the first species stratum assignment in the coverages before and after elimination. Table 11 shows this summary. The deciduous stratum covers the largest area and also has the second greatest difference in strata area after elimination. The nonforest stratum shows the most difference in area (0.02%). This would correlate with most of the slivers being created along the dispositions and linear features.

Table 11. Sliver reduction comparison by species strata assignment.

		Area		Difference	
		P14_UNION1	LB3_TSA	(P14_UNION1 - LB3_TSA)	
F_YC	Description	ha	ha	ha	%
DEC	Deciduous	47,061	47,080	-18.82	-0.0149%
DU	Deciduous with conifer understory	16,458	16,464	-6.30	-0.0050%
DC	Deciduous leading mixedwood	8,977	8,979	-2.38	-0.0019%
CD	Coniferous leading mixedwood	4,989	4,988	0.64	0.0005%
PL	Pine	751	751	-0.26	-0.0002%
SB	Black spruce	15,725	15,729	-3.80	-0.0030%
SW	White spruce	13,242	13,240	2.65	0.0021%
LT	Larch	35	35	0.04	0.0000%
X	Nonforest	17,729	17,703	26.25	0.0208%
	Unassigned	1,195	1,193	2.21	0.0018%
Total		126,163	126,162	0.24	0.0002%

4.3 Landbase Description

4.3.1 TSA Landbase

The spatial linework generated for the TSA landbase was used as input to create both the classified and modeling landbase. The spatial coverage for the TSA landbase has the same inputs as the classified landbase. The only difference is that no linework for seismic was included in the TSA landbase file. Seismic information was carried as an attribute on the TSA landbase. This simplifies the linework of the TSA landbase yet maintains the area impact of these features by polygon and reduces the area available for harvest.

All polygons in the classified landbase with seismic lines intersecting them were flagged. The area of any polygon where the classified landbase deletion was 'SEIS' was carried as an attribute on the TSA landbase and used to reduce the polygon area and exclude this area from the managed area. The coverage **lb#_tsa** contains the spatial linework for the TSA landbase and carries the unique key *UKEY#_TSA*. With landbase attributes attached, it forms the **P14_lb4_tsa** coverage with a unique key *UKEY4_TSA*.

4.3.2 Classified Landbase

The addition of seismic linework to the TSA landbase to create the classified landbase increased the total number of polygons by 24,652 polygons. Although many of these polygons would be considered slivers a final eliminate was not done in order to maintain the integrity of the seismic polygon boundaries. Also the number of polygons was less of a factor in the classified landbase as this landbase was not used for modeling. The managed landbase area was the same on both the TSA and classified landbases. The classified landbase carries the unique key from the TSA landbase (*UKEY#_TSA*) to link to TSA results. The coverage **lb#_seis** has the spatial linework for the classified landbase. This spatial coverage was combined with the landbase attributes to form **P14_lb4_cls** with a unique key *UKEY4_CLS*.

4.3.3 Modeling Landbase

The Planning Standard requires a strategic model that is also capable of operational modelling. To make a strategic model operational, it is necessary that the model creates block shapes that are feasible to harvest. During the numerous iterations of the P14 landbase process, a number of changes to the TSA landbase were required to make it suitable modeling.

The modeling landbase was developed from the TSA landbase (Section 4.3.1). To make it suitable for operational and strategic modeling, required fields (*e.g.* Woodstock themes) were added (Section 6.5).

This coverage with the modeling attributes is the **P14_lb4_mod** with a unique key of *UKEY4_TSA*.

5. AVI Attribute Processing

5.1 Background

AVI attributes provide the base classification for the landbase. The AVI attribute table was loaded to Oracle and all strata were calculated through SQL. An interim and final strata assignment was applied to all polygons within the AVI. The SQL script *strata_srd_calc.sql* calculated species groups, species distributions, broad cover groups, composite stand values and age for each layer. The final stratification includes landbase updates from a variety of sources and is outlined in Section 6.

The calculated attributes generated from AVI attributes are carried in the *LB_NET_STRATA* table. This table carries the AVI attribute data and all the generated attributes listed in this section. This includes species, species percent, species order, strata decision rules, age, broad cover group, and strata assignments for the overstory and understory layers. Layer 1 (overstory) attributes receive basic field names. Layer 2 (understory) attributes have a 'U' prefix on the basic field name.

The species groupings and distribution are listed in Section 5.2. The defining layer is outlined in Section 5.2.8. The processing of different stand structure types is outlined in Section 5.2.8. The stratification process and decision rules for each stratification type are documented in Section 5.2.9.

5.2 Species Groupings and Distribution

5.2.1 Species percents (PL_PCT, SW_PCT, FB_PCT, FD_PCT, SB_PCT, PB_PCT, AW_PCT, BW_PCT, LT_PCT)

Individual species from AVI species codes were combined into species groups (Table 12). The species percents from AVI where AVI species codes matched the species group were summed

to generate the species distribution. Percent values were the same as AVI classes (*SP1P* to *SP5P*) where classes 1 to 10 represented values 1 to 100 with each class represents 10 percent. Species percent fields for the understory have a '*U*' prefix on the fields listed above.

Table 12. Species groups.

Species Type	Species Group	Description	AVI Species codes
Deciduous	AW	Aspen	A, Aw
	BW	Birch	Bw
	PB	Poplar	Pb
Conifer	FB	True fir	Fb, Fa
	FD	Douglas-fir	Fd
	LT	Larch	Lt, La, Lw
	PL	Pine	P, Pl, Pj, Pa, Pf
	SB	Black spruce	Sb
	SW	White spruce	Sw, Se

For example the aspen percent would be calculated as follows:

$$AW\_PCT = \sum \begin{pmatrix} (\text{SP1P where SP1 IN ('A','AW')}), (\text{SP2P where SP2 in ('A','AW')}), \\ (\text{SP3P where SP3 IN ('A','AW')}), (\text{SP4P where SP4 IN ('A','AW')}), \\ (\text{SP5P where SP5 IN ('A','AW')}) \end{pmatrix}$$

5.2.2 Species Order (PL_ORD, SW_ORD, FB_ORD, FD_ORD, SB_ORD, PB_ORD, AW_ORD, BW_ORD, LT_ORD)

The stratification rules in the following section consider the order of species as one of the decision criteria. To simplify coding the appropriate species order value was updated for each of the species in *SP1* to *SP5* fields. When a species was not present it was assigned an order value of 9. Species order fields for the understory have a '*U*' prefix on the fields listed above.

For example a stand with species and percents 1 to 3 of "SW5PL3AW2" would have *PL_ORD* = 2, *SW_ORD* = 1, *AW_ORD* = 3, *FB_ORD* = 9, *SB_ORD* = 9, *PB_ORD* = 9 and all other species assigned an order of 9.

5.2.3 Species Type Percent (HARDPCT, SOFTPCT)

Deciduous species types (Table 12) were summed to generate the deciduous (*HARDPCT*) and coniferous (*SOFTPCT*) species percents. Species type fields for the understory have a '*U*' prefix on the fields listed above.

5.2.4 Stand Age (AGE, UAGE)

Stand age was calculated from the year of stand origin to the effective date as 2009 – *ORIGIN* for the overstory (layer 1). In the understory, *UAGE* was calculated as 2009 – *UORIGIN* where *UORIGIN* was greater than 0. Non-forested and stands with no origin were assigned a value of 0.

5.2.5 Leading Species by Species Type (LEAD_CON, LEAD_DEC)

The first listed deciduous species was stored as *LEAD_DEC* and can be identified as the minimum species order amoung *AW_PCT*, *BW_PCT* and *PB_PCT*. Where *HARDPCT* was 0, 'NO' was listed as the leading deciduous species. The first listed conifer species was stored as *LEAD_CON* and calculated as the minimum order amoung conifer species. Where *SOFTPCT* was 0, 'NO' was listed as the leading conifer species. Leading species fields for the understory have a '*U*' prefix on the fields listed above.

5.2.6 Broad Cover Group (C_CODE, UC_CODE)

The species group and the species distribution (as calculated from the AVI species percent classes) were used to calculate the broad cover group for a forested layer (Table 13). Species group and distribution in the understory generated *UC_CODE*.

Table 13. Broad cover group assignment using species percents.

C_CODE	Description	Selection Criteria
'D'	Deciduous	*HARD_PCT* >= 8
'DC'	Deciduous-leading	*(HARD_PCT* < *8* and *HARD_PCT* > 5) or
	mixedwood	(*HARD_PCT* = 5 and *SP1* = ('AW', 'BW', 'PB'))
'CD'	Coniferous-leading	*(SOFT_PCT* < *8* and SOFT_*PCT* > 5) or
	mixedwood	*(SOFT_PCT = 5 and SP1 <> ('AW', 'BW', 'PB'))*
'C'	Coniferous	*SOFT_PCT* >= 8
NULL	Non-forested	*SOFT_PCT* = 0 and *HARD_PCT* = 0

5.2.7 Strata Decision Rules (DRULE, CRULE)

To simplify the code developed to assign strata, decision rules to group species and indicate species order were assigned. These strata decision rules group the broad cover group assignment, and leading species (or species group) into a single "rule". The deciduous decision rule (*DRULE*) identifies the first listed (lead) deciduous species in the layer or shows no deciduous species in the layer (i.e. AW_LEAD or NO_D). The conifer decision rule (*CRULE*) identifies both the first listed conifer species or species group in the layer (i.e. 'SW_LEAD', 'SBLT_LEAD') and also whether the layer is a mixedwood cover group (i.e. 'PL_LEAD_MW'). Rules for the understory have a prefix of 'U'. The rules are only used in the data processing for assigning SRD extended strata. Table 14 lists the assignment rules.

Table 14. SRD deciduous (DRULE) and coniferous (CRULE) strata decision rules.

DRULE	Description	Selection Criteria
'AW_LEAD'	Aspen leading deciduous	*HARDPCT* > 0 and *AW_ORD* < *BW_ORD* and *AW_ORD* < *PB_ORD*
'BW_LEAD'	Birch leading deciduous	*HARDPCT* > 0 and *BW_ORD* < *AW_ORD* and *BW_ORD* < *PB_ORD*
'PB_LEAD'	Poplar leading deciduous	*HARDPCT* > 0 and *PB_ORD* < *AW_ORD* and *PB_ORD* < *BW_ORD*
'NO_D'	No deciduous present	*HARDPCT* = 0

CRULE	Description	Selection Criteria
'FBFD_LEAD_MW'	True fir or Douglas-fir leading conifer in mixedwood	*C_CODE* = ('DC', 'CD') and (((*FB_PCT* + *FD_PCT*) > *PL_PCT* and (*FB_PCT* + *FD_PCT*) > (*SB_PCT* + *LT_PCT*) and (*FB_PCT* + *FD_PCT*) > *SW_PCT*) or (*LEAD_CON* = ('FB','FD') and (*FB_PCT* + *FD_PCT*) >= *PL_PCT* and (*FB_PCT* + *FD_PCT*) >= (*SB_PCT* + *LT_PCT*) and (*FB_PCT* + *FD_PCT*) >=
'PL_LEAD_MW'	Pine leading conifer in mixedwood	*C_CODE* = ('DC', 'CD') and ((*PL_PCT* > (*FB_PCT* + *FD_PCT*) and *PL_PCT* > (*SB_PCT* + *LT_PCT*) and *PL_PCT* > *SW_PCT*) or (LEAD_CON = 'PL' and *PL_PCT* >= (*FB_PCT* + *FD_PCT*) and *PL_PCT* >= (*SB_PCT* + *LT_PCT*) and *PL_PCT* >= *SW_PCT*))
'SBLT_LEAD_MW'	Black spruce or larch leading conifer in mixedwood	*C_CODE* = ('DC', 'CD') and (((*SB_PCT* + *LT_PCT)* > (*FB_PCT* + *FD_PCT*) and (*SB_PCT* + *LT_PCT*) > *PL_PCT* and (*SB_PCT* + *LT_PCT*) > *SW_PCT*) or (*LEAD_CON* = ('SB', 'LT') and (*SB_PCT* + *LT_PCT*) >= (*FB_PCT* + *FD_PCT*) and (*SB_PCT* + *LT_PCT*) >= *PL_PCT* and (*SB_PCT* + *LT_PCT*)
'SW_LEAD_MW'	White spruce leading conifer in mixedwood	*C_CODE* = ('DC', 'CD') and ((*SW_PCT* > (*FB_PCT*+*FD_PCT*) and *SW_PCT* > *PL_PCT* and *SW_PCT* > (*SB_PCT* + *LT_PCT*)) or (*LEAD_CON* = 'SW' and *SW_PCT* >= (*FB_PCT*+*FD_PCT*) and *SW_PCT* >= *PL_PCT* and *SW_PCT* >= (*SB_PCT* + *LT_PCT*)))
'FB_LEAD'	True fir leading conifer in pure stand	*C_CODE* = ('C', 'D') and ((*FB_PCT* > *FD_PCT* and *FB_PCT* > *LT_PCT* and *FB_PCT* > *PL_PCT* and *FB_PCT* > *SB_PCT* and *FB_PCT* > *SW_PCT*) or (*LEAD_CON* = 'FB' and *FB_PCT* >= *FD_PCT* and *FB_PCT* >= *LT_PCT* and *FB_PCT* >= *PL_PCT* and *FB_PCT* >= *SB_PCT* and *FB_PCT* >= *SW_PCT*))
'FD_LEAD'	Douglas-fir leading conifer in pure stand	*C_CODE* = ('C', 'D') and ((*FD_PCT* > *FB_PCT* and *FD_PCT* > *LT_PCT* and *FD_PCT* > *PL_PCT* and *FD_PCT* > *SB_PCT* and *FD_PCT* > *SW_PCT*) or (*LEAD_CON* = 'FD' and *FD_PCT* >= *FB_PCT* and *FD_PCT* >= *LT_PCT* and *FD_PCT* >= *PL_PCT* and *FD_PCT* >= *SB_PCT* and *FD_PCT* >= *SW_PCT*))
'LT_LEAD'	Larch leading conifer in pure stand	*C_CODE* = ('C', 'D') and ((*LT_PCT* > *FB_PCT* and *LT_PCT* > *FD_PCT* and *LT_PCT* > *PL_PCT* and *LT_PCT* > *SB_PCT* and *LT_PCT* > *SW_PCT*) or (*LEAD_CON* = 'LT' and *LT_PCT* >= *FB_PCT* and *LT_PCT* >= *FD_PCT* and *LT_PCT* >= *PL_PCT* and *LT_PCT* >= *SB_PCT* and *LT_PCT* >= *SW_PCT*))
'PL_LEAD'	Pine leading conifer in pure stand	*C_CODE* = ('C', 'D') and ((*PL_PCT* > *FB_PCT* and *PL_PCT* > *FD_PCT* and *PL_PCT* > *LT_PCT* and *PL_PCT* > *SB_PCT* and *PL_PCT* > *SW_PCT*) or (*LEAD_CON* = 'PL' and *PL_PCT* >= *FB_PCT* and *PL_PCT* >= *FD_PCT* and *PL_PCT* >= *LT_PCT* and *PL_PCT* >= *SB_PCT* and *PL_PCT* >= *SW_PCT*))
'SB_LEAD'	Black spruce leading conifer in pure stand	*C_CODE* = ('C', 'D') and ((*SB_PCT* > *FB_PCT* and *SB_PCT* > *FD_PCT* and *SB_PCT* > *LT_PCT* and *SB_PCT* > *PL_PCT* and *SB_PCT* > *SW_PCT*) or (*LEAD_CON* = 'SB' and *SB_PCT* >= *FB_PCT* and *SB_PCT* >= *FD_PCT* and *SB_PCT* >= *LT_PCT* and *SB_PCT* >= PL_*PCT* and *SB_PCT* >= *SW_PCT*))
'SW_LEAD'	White spruce leading conifer in pure stand	*C_CODE* = ('C', 'D') and ((*SW_PCT* > *FB_PCT* and *SW_PCT* > *FD_PCT* and *SW_PCT* > *LT_PCT* and *SW_PCT* > *PL_PCT* and *SW_PCT* > *SB_PCT*) or (*LEAD_CON* = 'SW' and *SW_PCT* >= *FB_PCT* and *SW_PCT* >= *FD_PCT* and *SW_PCT* >= *LT_PCT* and *SW_PCT* >= PL_*PCT* and *SW_PCT* >= *SB_PCT*))
'NO_C'	No coniferous present	*SOFTPCT* = 0

5.2.8 AVI Defining Layer (AVI_STORY)

A single defining layer was identified for each AVI stand. This is the layer used to characterize the stand. *AVI_STORY* can be based on layer 1 (overstory) or layer 2 (understory). A special case is the assignment of *AVI_STORY* = 3 that reflects a combination of layer 1 and layer 2 (See Figure 14).

Multi-story stands with a forested understory (*USP1* is not NULL) use *DENSITY* to determine the defining layer. Stands with deciduous overstory and conifer (not 'SB') understory are identified by a special *AVI_STORY* assignment of 3 (See Figure 14). The yield stratum for these stands is 'DU' (See Section 5.2.9).

Stands with a forested understory are evaluated to determine the appropriate layer to use for classification. Multi-storied stands with an overstory density of 'A', a productive understory, understory density higher than 'A' and an understory with no subjective or productivity deletions assigned were classified by layer 2. Multi-storied stands with a deciduous overstory (hardwood percentage >= 80), density higher than 'A' and an understory softwood percentage greater than 20 were assigned *AVI_STORY* = 3 to identify these stands as Deciduous with a conifer understory. Any multi-stored stands remaining are classified using layer 1. Figure 14 outlines the process to determine which information was used to assign strata.

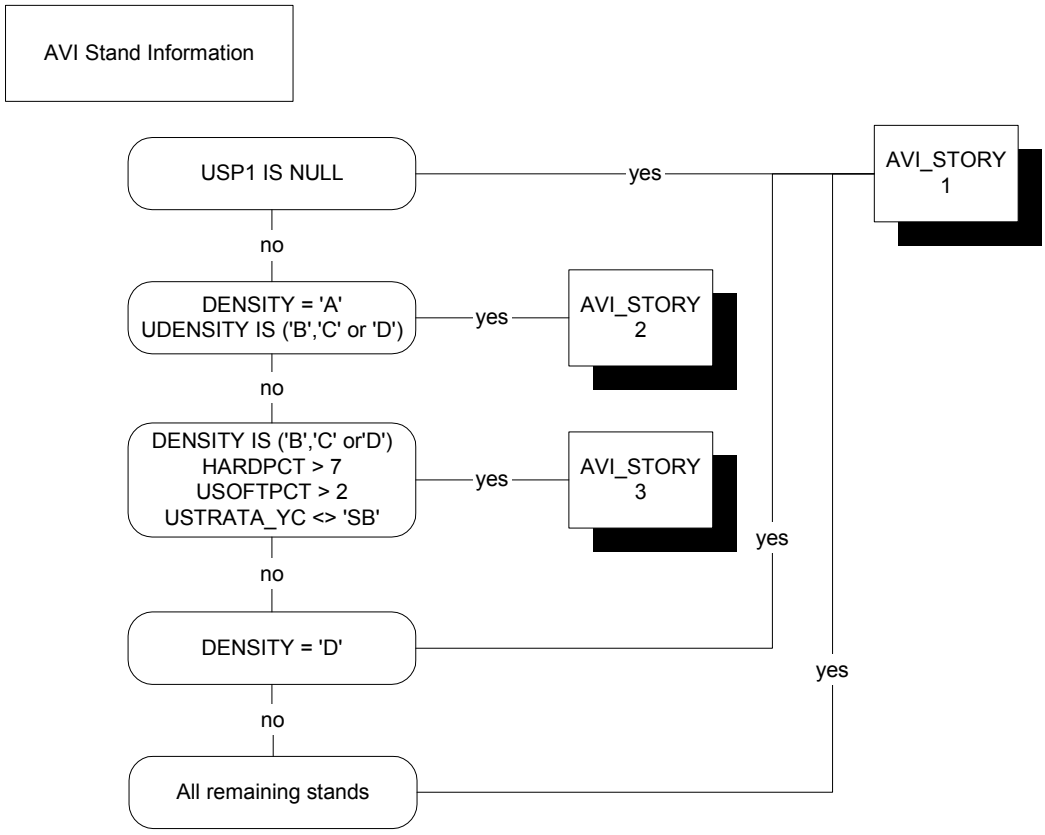

Figure 14. AVI_STORY assignment.

5.2.9 Forested Stratification (STRATA_SRD, STRATA_YC)

Each AVI polygon has two vegetation strata assigned to it. SRD Extended Strata was the most detailed and was generated for each forested layer in the AVI coverage. There are 44 potential SRD strata for forested layers. The species strata grouped the treed strata into species strata (YC). The P14 species strata are derived by aggregating the SRD strata into 7 species strata. Table 15 outlines the relationships between the strata and broad cover group. The stratum DU represents deciduous stands with a conifer understory.

Table 15. Forested strata.

Broad Cover Group	Species Stratum (YC)		SRD Extended Stratum (SRD)
D	DEC		D1, D2, D3, D4, D5
DC	DC		DC1 - DC12 (All DC types)
CD	CD		CD1 - CD12 (All CD types)
C	PL		C4, C5, C6, C7, C8
	SB		C9, C10, C11
	SW		C1, C2, C3, C13, C14, C15, C16, C17
	LT		C12
D(Layer1)	DU	Layer1	D1, D2, D3, D4, D5
C,CD,DC (Layer 2)		Layer2	DC1 - DC12, CD1 - CD12, C1-C8

5.2.10 SRD Extended Strata (STRATA_SRD)

SRD extended strata were assigned to all forested overstory and understory layers for each AVI stand using the decision rules provided in Table 16 These rules define the SRD extended strata as documented in the Interpretive Bulletin – Yield Projection Guidelines for Alberta in the Planning Standard. SRD extended strata for the understory have a prefix of 'U'. Non-forested stands are assigned *STRATA_SRD* code of 'XX0'.

Table 16. SRD extended strata by broad cover group.

STRATA_SRD	Description	Selection Criteria
'D1'	Pure aspen	*C_CODE* = 'D' and *AW_PCT* >= 9
'D2'	Aspen leading with poplar	*C_CODE* = 'D' and *DRULE* = 'AW_LEAD' and *AW_PCT* < 9 and *PB_PCT* > 1
'D3'	Aspen leading without poplar	*C_CODE* = 'D' and *DRULE* = 'AW_LEAD' and *AW_PCT* < 9 and *PB_PCT* <= 1
'D4'	Poplar leading	*C_CODE* = 'D' and *DRULE* = 'PB_LEAD'
'D5'	Birch leading	*C_CODE* = 'D' and *DRULE* = 'BW_LEAD'
'DC1'	Aspen/white spruce	*C_CODE* = 'DC' and *DRULE* = 'AW_LEAD' and *CRULE* = 'SW_LEAD_MW'
'DC2'	Aspen/pine	*C_CODE* = 'DC' and *DRULE* = 'AW_LEAD' and *CRULE* = 'PL_LEAD_MW'
'DC3'	Aspen/black spruce	*C_CODE* = 'DC' and *DRULE* = 'AW_LEAD' and *CRULE* = 'SBLT_LEAD_MW'
'DC4'	Aspen/fir	*C_CODE* = 'DC' and *DRULE* = 'AW_LEAD' and *CRULE* = 'FBFD_LEAD_MW'
'DC5'	Poplar/white spruce	*C_CODE* = 'DC' and *DRULE* = 'PB_LEAD' and *CRULE* = 'SW_LEAD_MW'
'DC6'	Poplar/pine	*C_CODE* = 'DC' and *DRULE* = 'PB_LEAD' and *CRULE* = 'PL_LEAD_MW'
'DC7'	Poplar/black spruce	*C_CODE* = 'DC' and *DRULE* = 'PB_LEAD' and *CRULE* = 'SBLT_LEAD_MW'
'DC8'	Poplar/fir	*C_CODE* = 'DC' and *DRULE* = 'PB_LEAD' and *CRULE* = 'FBFD_LEAD_MW'
'DC9'	Birch/white spruce	*C_CODE* = 'DC' and *DRULE* = 'BW_LEAD' and *CRULE* = 'SW_LEAD_MW'
'DC10'	Birch/pine	*C_CODE* = 'DC' and *DRULE* = 'BW_LEAD' and *CRULE* = 'PL_LEAD_MW'
'DC11'	Birch/black spruce	*C_CODE* = 'DC' and *DRULE* = 'BW_LEAD' and *CRULE* = 'SBLT_LEAD_MW'
'DC12'	Birch/fir	*C_CODE* = 'DC' and *DRULE* = 'BW_LEAD' and *CRULE* = 'FBFD_LEAD_MW'
'CD1'	White spruce/aspen	*C_CODE* = 'CD' and *CRULE* = 'SW_LEAD_MW' and *DRULE* = 'AW_LEAD'
'CD2'	White spruce/poplar	*C_CODE* = 'CD' and *CRULE* = 'SW_LEAD_MW' and *DRULE* = 'PB_LEAD'
'CD3'	White spruce/birch	*C_CODE* = 'CD' and *CRULE* = 'SW_LEAD_MW' and *DRULE* = 'BW_LEAD'
'CD4'	Pine/aspen	*C_CODE* = 'CD' and *CRULE* = 'PL_LEAD_MW' and *DRULE* = 'AW_LEAD'
'CD5'	Pine/poplar	*C_CODE* = 'CD' and *CRULE* = 'PL_LEAD_MW' and *DRULE* = 'PB_LEAD'
'CD6'	Pine/birch	*C_CODE* = 'CD' and *CRULE* = 'PL_LEAD_MW' and *DRULE* = 'BW_LEAD'
'CD7'	Black spruce/aspen	*C_CODE* = 'CD' and *CRULE* = 'SBLT_LEAD_MW' and *DRULE* = 'AW_LEAD'
'CD8'	Black spruce/poplar	*C_CODE* = 'CD' and *CRULE* = 'SBLT_LEAD_MW' and *DRULE* = 'PB_LEAD'
'CD9'	Black spruce/birch	*C_CODE* = 'CD' and *CRULE* = 'SBLT_LEAD_MW' and *DRULE* = 'BW_LEAD'
'CD10'	Fir/aspen	*C_CODE* = 'CD' and *CRULE* = 'FBFD_LEAD_MW' and *DRULE* = 'AW_LEAD'
'CD11'	Fir/poplar	*C_CODE* = 'CD' and *CRULE* = 'FBFD_LEAD_MW' and *DRULE* = 'PB_LEAD'
'CD12'	Fir/birch	*C_CODE* = 'CD' and *CRULE* = 'FBFD_LEAD_MW' and *DRULE* = 'BW_LEAD'
'C1'	Pure white spruce	*C_CODE* = 'C' and *SW_PCT* >= 9
'C2'	White spruce leading with pine	*C_CODE* = 'C' and *CRULE* = 'SW_LEAD' and *SW_PCT* < 9 and *PL_PCT* > 1
'C3'	White spruce leading without pine	*C_CODE* = 'C' and *CRULE* = 'SW_LEAD' and *SW_PCT* < 9 and *PL_PCT* <= 1
'C4'	Pure pine	*C_CODE* = 'C' and *PL_PCT* >= 9
'C5'	Pine leading with white spruce	*C_CODE* = 'C' and *CRULE* = 'PL_LEAD' and *PL_PCT* < 9 and *SW_PCT* > 1 and *SW_ORD* < *FB_ORD* and *SW_ORD* < *SB_ORD*
'C6'	Pine leading with black spruce	*C_CODE* = 'C' and *CRULE* = 'PL_LEAD' and *PL_PCT* < 9 and *SB_PCT* > 1 and *SB_ORD* < *FB_ORD* and *SB_ORD* < *SW_ORD*
'C7'	Pine leading with fir	*C_CODE* = 'C' and *CRULE* = 'PL_LEAD' and *PL_PCT* < 9 and *FB_PCT* > 1 and *FB_ORD* < *SB_ORD* and *FB_ORD* < *SW_ORD*
'C8'	Pine leading without spruce and fir	*C_CODE* = 'C' and *CRULE* = 'PL_LEAD' and *PL_PCT* < 9 and *FB_PCT* <= 1 and *SB_PCT* <=1 and *SW_PCT* <= 1
'C9'	Pure black spruce	*C_CODE* = 'C' and *SB_PCT* >= 9
'C10'	Black spruce leading with pine	*C_CODE* = 'C' and *CRULE* = 'SB_LEAD' and *SB_PCT* < 9 and *PL_PCT* > 1
'C11'	Black spruce leading without pine	*C_CODE* = 'C' and *CRULE* = 'SB_LEAD' and *SB_PCT* < 9 and *PL_PCT* <= 1
'C12'	Larch leading	*C_CODE* = 'C' and *CRULE* = 'LT_LEAD'
'C13'	Pure Douglas-fir	*C_CODE* = 'C' and *FD_PCT* >= 9
'C14'	Douglas-fir leading	*C_CODE* = 'C' and *CRULE* = 'FD_LEAD' and *FD_PCT* < 9
'C15'	Pure balsam fir	*C_CODE* = 'C' and *FB_PCT* >= 9
'C16'	Balsam fir leading with pine	*C_CODE* = 'C' and *CRULE* = 'FB_LEAD' and *FB_PCT* < 9 and *PL_PCT* > 1
'C17'	Balsam fir leading without pine	*C_CODE* = 'C' and *CRULE* = 'FB_LEAD' and *FB_PCT* < 9 and *PL_PCT* <= 1
'XX0'	Non-forested	*C_CODE* = NULL

5.2.11 Non-Forest Classification (NONFOREST, UNONFOREST)

The AVI fields for non-forested areas (*NONFOREST*) are represented in the attribute field *NFL*. These fields in the understory are assigned to *UNONFOREST*.

5.2.12 AVI Species Composition (SP_COMP)

The full AVI species composition was not carried on the TSA landbase. The species composition was a concatenated string of the density, height, species composition, origin and TPR for each layer from the AVI attributes.

5.2.13 Landbase Code (LB_CODE)

The landbase code was assigned from the broad cover group values from the AVI defining layer. Deciduous cover groups are assigned a landbase code of ‘D’ and mixedwood and conifer cover groups are assigned to ‘C’. The DU stratum is assigned to the broad cover group of ‘C’.

6. Generated Attributes

All calculations to generate the final attributes for the classified landbase take place in Oracle and are done using Structured Query Language (SQL). The fields of interest from the polygon attribute table of the classified landbase coverage are loaded into Oracle. The AVI 2.1 attributes were stored in a related table in the database as was the table of attributes calculated from AVI attributes. Some attributes were adjusted or added to create the TSA landbase and then the modeling landbase. This processing is described in Sections 6.4 and 6.5.

6.1 Generated Attributes from Landbase Attributes

6.1.1 Disposition Type and Grouping (DISP_TYPE, DISP_GRP)

The *DISP_TYPE* field holds the disposition types listed in the *NLIN_DISP* and *LIN_DISP* fields in a single attribute field for the classified landbase. To assign a single code to each polygon *DISP_TYPE* was assigned *LIN_DISP* when this was not NULL. Any remaining polygons were assigned NLIN_DISP value. Disposition type codes are defined in Table 5. The *DISP_GRP* field groups the disposition types into broad groupings as outlined in Table 17. Areas without dispositions were assigned NULL.

Table 17. Disposition groupings (DISP_GRP).

DISP_GRP	Description	Selection Criteria
'GOVRES'	Government reservation types	*DISP_TYPE* IN ('DRS','PNT','HRS','RIA','GRL')
'LEASE/PERMIT'	Mineral and surface leases and permits	*DISP_TYPE* IN ('MSL','MLL','SMC','SML','MLP')
'LINEAR'	Utility corridors	*DISP_TYPE* IN ('PLA','PIL','REA')
'ROADS'	Roads	*DISP_TYPE* IN ('LOC','FRD','RDS','RRD','ROE','EZE')
NULL	No dispositions present	

6.1.2 Seismic (WITH_SEIS, STRATA_SEIS)

Seismic area within polygons is removed from the managed landbase. Table 18 shows the rules to identify seismic areas. *WITH_SEIS* was set to 100 for all polygons with seismic (*IN_SEIS* = 100) with one exception. Seismic area within existing cutblocks (harvested since 1991) was assumed to be regenerating and thus not removed from the managed landbase.

Table 18. Areas with seismic assignment (WITH_SEIS).

WITH_SEIS	Description	Selection criteria	Order
0	Blocks with seismic area	*IN_SEIS > 0 and BLK_GRP = 'CUT*	1
0	Blocks with seismic area	*IN_SEIS > 0 and TIMBER_YEAR > 1991*	2
100	Polygons with seismic area	*IN_SEIS > 0*	3
0	Area without seismic		4

The field *STRATA_SEIS* holds the strata for areas within seismic. The strata were assigned based on the defining layer. Where the defining layer had forested strata (*F_STORY* <> 5) the nonforest code 'SC' (Closed Shrub) was assigned and where the defining layer had no forested strata the nonforest code 'HG' was assigned.

6.1.3 Area Field (AREAHA_POL)

This field is the area of the spatial polygon. The ArcINFO calculated area was converted to hectares (*AREA* / 10,000) and stored in the *AREAHA_POL* field. This was referenced as the polygon area or the spatial area of the polygon.

6.1.4 Cutblock Group (BLK_GRP)

This field groups the cutblock information into groups. Cutblocks were assigned block groups based on regeneration standards, year of harvest or AVI harvest dates. *BLK_GRP* = 'CUT' has *TIMBER_YEAR* < 2009 and 'PLANNED' blocks have *TIMBER_YEAR* >= 2009. Polygons characterized by AVI on the managed landbase with the clearcut modifier were identified separately as regenerating stands. Stands characterized by AVI with *MOD1_YR* > 0 were assigned the code 'CC_YR' and those with no year were assigned 'CC_NOYR'. Stands without a year of harvest with a *BLK_STATUS* value were assigned 'DISP_NOYR'. Retention, planned and future harvest areas were assigned based on BLK_STATUS. Table 19 outlines the cutblock group assignment.

Table 19. Cutblock group assignment (BLK_GRP).

BLK_GRP	Description	Selection criteria	Order
'CUT'	Existing blocks	BLK_STATUS IN ('CUT','EXIST') and TIMBER_YEAR >0 and TIMBER_YEAR < 2009	1
'CC_YR'	AVI CC polygons	MOD1_DESC = 'CC' AND TIMBER_YEAR >0 and TIMBER_YEAR < 2009	2
'RETENTION'	Retention area	BLK_STATUS IN ('RET_EXT','RET_INT')	3
'PLANNED'	Planned blocks	BLK_STATUS = 'PLANNED'	4
'FUTURE'	Future blocks	BLK_STATUS = 'FUTURE'	5
'INBLK'	Potential future retention	BLK_STATUS = 'INBLK'	6
'CUT'	Existing blocks	TIMBER_YEAR >0 and TIMBER_YEAR < 2009	7
'CC_NOYR'	AVI CC polygons	MOD1_DESC = 'CC' AND TIMBER_YEAR = 0	8
'DISP_NOYR'	Dispositions	BLK_STATUS IN ('CTL','DTL','GOVMTU','PREAVI') and TIMBER_YEAR = 0	9
NULL	Not a block		

6.2 Attributes to Classify Deletions

To identify the managed and unmanaged landbase, Information from the input datasets used to classify the landbase and polygons were assigned to a list of deletion codes. A polygon may have more than one deletion code assigned. In each field the polygons without the listed deletion code remain NULL.

6.2.1 Landuse Deletion (D_LAND)

This deletion was developed from the disposition code groups. *D_LAND* codes identify the dispositions groups (*DISP_GRP*) that identify unmanaged areas as outlined in Table 20.

Table 20. Landuse deletion assignment (D_LAND).

D_LAND	Description	Disposition Groups
'GOVRES'	Government Reservations	*DISP_GRP* = 'GOVRES'
'ROADS'	Roads	*DISP_GRP* = 'ROADS'
'LINEAR'	Utility corridors	*DISP_GRP* = 'LINEAR'
'LEASE'	Miscellaneous and Surface Leases	*DISP_GRP* = 'LEASE/PERMIT'
NULL	No dispositions assigned	

6.2.2 Seismic Deletion (D_SEIS)

This deletion indicated lands covered by seismic. Any areas classified as *WITH_SEIS* = 100 are seismic deletions and receive the code '*SEIS'*. Seismic area within existing cutblocks (post 1991) is not considered deletions.

6.2.3 Non-forest Deletion (D_NONFOR)

This deletion indicated lands without forest cover. The information came from AVI attributes for non-forest attributes. Areas with *AVI_STORY* = 1 where *NONFOREST* is not NULL were assigned the *NONFOREST* code. Existing harvest blocks with no ARIS Regen_Code assignment and no AVI species information were assigned the CC_SC Code.

Table 21. Non-forest deletion assignment (D_NONFOR).

D_NONFOR	Description	Selection criteria	Order
NONFOREST	Areas classified nonforest in AVI	*NONFOREST* is not NULL and *F_STORY* = 1	1
'CC_SC'	AVI blocks with no species information	*NONFOREST* in ('HG','SC','SO) and *F_STOR* Y = 4 and *F_YC* = 'X'	2
NULL	Not classified nonforested		3

6.2.4 Burn Deletion (D_BURN)

This deletion identified additional stands burnt in the 2006 fire (*FIRENUM* = PWF-117-2006), after the AVI inventory photography was completed. It also identifies burned areas identified in AVI (*MOD1_CODE* = 'BU' and *MOD1_YR* > 1991) that lie outside harvest areas. Areas within fire boundaries were assigned the code 'BURN'.

Table 22. Burned area assignment (D_BURN).

D_BURN	Description	Selection criteria	Order
'BURN'	Areas burned and identified in AVI	MOD1_DESC = 'BU' and F_STORY <> 4 and MOD1_YR >= 1991	1
'BURN'	Areas burned since AVI photography	FIREYEAR >= 1991	2
NULL	Not burned		

6.2.5 TPR Deletion (D_TPR)

This deletion identified all stands characterized as unproductive in AVI. The deletion does not reclassify TPR for lands updated through landuse information. *D_TPR* was assigned to '*U'* for all polygons where the TPR of the defining layer was 'U' (*F_TPR* = 'U').

6.2.6 Riparian Buffer Deletion (D_BUF)

This deletion identified areas within riparian buffers defined in the operating ground rules or within extended riparian buffers on waterfowl lakes. *D_BUF* assigns codes where HYDROBUF is assigned to the code 'LAKE', 'SM_PERM', or 'LRG_PERM'. This identified lands assigned to the ground rule buffers. Lands within existing cutblocks were not considered part of the buffer area.

Table 23. Riparian buffer deletion assignment (D_BUF).

D_BUF	Description	Selection criteria	Order
NULL	Area within existing blocks	HYDROBUF is not NULL and F_STORY = 4	1
'HYDROBUF'	Areas within riparian buffers	HYDROBUF is not NULL	2
NULL	Not within buffer area		3

6.2.7 Subjective Deletion (D_SUBJ)

This deletion identified forested stands that were inoperable (in steep river break areas) or that are not considered productive based on the AVI stand composition. Larch strata and some black spruce strata stands are identified as subjective deletions. Stands which do not meet height / age requirements are also subjective deletions. Table 24 lists the decision rules for subjective deletion codes.

For stands characterized by AVI (*F_STORY* = 1, 2 or 3) the subjective deletion codes are summarized as:

- All stands within the boundaries of the river break areas are assigned 'BREAK';
- All larch strata (*F_YC* = 'LT') are assigned 'LT';
- 'A' density black spruce stands are assigned 'SB_ADENS';
- Wet stands of black spruce with no aspen or pine component are assigned 'SB_WET';
- Deciduous stands with origin before 1920 and height < 12 are assigned 'NC'; and
- Conifer stands with origin before 1920 and height < 13 are assigned 'NC'.

Table 24. Subjective deletion assignment (D_SUBJ).

D_SUBJ	Description	Selection criteria	Order
'BREAK'	Stands in river break areas	BREAK > 0	1
'LT'	Larch stands	*F_YC* = 'LT' and *F_STORY* in (1,2,3)	2
'SB_ADENS'	A density black spruce	*F_DEN* = 'A' and F_YC = 'SB' and F_STORY in (1,2,3)	3
'SB_WET'	Wet black spruce stands	F_YC = 'SB' and F_STORY in (1,2,3) and MOIST = 'w' and	4
		PL_PCT = 0 and UPL_PCT= 0 and AW_PCT = 0 and UAW_PCT = 0	
'NC'	Noncommercial deciduous	F_AGE > (2009-1920) and F_STORY IN (1,2,3) and	5
		F_YC = 'DEC' and F_HGT < 12	
'NC'	Noncommercial coniferous	F_AGE > (2009-1920) and F_STORY IN (1,2,3) and	6
		F_YC <> 'DEC' and F_HGT < 13	

6.2.8 Defined Forest Area Deletion (D_DFA)

This deletion identified areas outside the FMU boundary or without AVI. Areas where *POLY_ID* = 0 were assigned the code 'OUT_FMU'.

6.3 Final Characterization for Classified Landbase

The fields identified by 'F_' indicate the final classification for a polygon and reflect all updates to the inventory. They show the classification based on a single source of information.

6.3.1 Final Defining Layer (F_STORY)

F_STORY identified the source of information used to characterize a polygon. As described in Section 5, each AVI stand had strata calculated for the overstory (layer 1) and the understory (layer 2). For most stands a single layer was identified as the defining layer, the layer used to characterize the AVI stand. This value was stored in *AVI_STORY*. Stands with a deciduous overstory (layer 1) and coniferous understory (layer 2) were defined as the DU strata and assigned a separate *AVI_STORY* of 3. *AVI_STORY* was assigned to *F_STORY* for all polygons that will be characterized by AVI.

The classified landbase also includes areas that have been updated from the AVI attributes. Polygons which fall within existing cutblock groups ('CUT','CC_YR') are assigned *F_STORY* = 4. Linear features (roads and utility corridors) and surface leases established since AVI are assigned *F_STORY* = 5. Seismic polygons carry the *F_STORY* of the underlying stand. Table 25 outlines the assignment of *F_STORY*. This identified the AVI defining layer or source of update information used to assign attributes for stands.

Table 25. F_STORY assignment.

F_STORY	Stand Description	Selection criteria	Order
4	Existing harvest blocks	*BLK_GRP* IN ('CC_YR',CUT')	1
5	Non-forested landuse disposition	*NLIN_DISP* <> ('DRS','PNT','GRL','HRS','RIA')	2
5	Linear dispositions	*LIN_DISP* IS NOT NULL	3
5	Roads or utilities without dispositions	*ROADS* > 0 or *UTILITY* > 0	4
AVI_STORY	Areas assigned by AVI attributes	*AVI_STORY* > 0	5
1	No inventory or other vegetation information		

6.3.2 Final Stand Deletion Code (F_DEL)

A hierarchy of assignment was used to identify the final deletion code for the polygon as indicated in the *F_DEL* attribute. Each polygon in the unmanaged landbase was assigned a single deletion code. This code was derived from the information contained in the fields classifying deletions (the D_ fields). The hierarchy of assignment is listed in Table 26. Those stands with no assigned deletions are given the *F_DEL* = 'NONE' code and are considered the managed landbase. Table 26 lists and describes the deletion codes in order of assignment.

Table 26. F_DEL deletion order and codes.

F_DEL Code	Description	Selection criteria	Order
'XDFA'	Outside FMU or without AVI	D_DFA <> NULL	1
LINEAR	Linear Features and Utility Corridors	D_LAND = 'LINEAR'	2
LEASE	Mineral and Surface Leases	D_LAND = 'LEASE'	3
SEIS	Seismic	D_SEIS = 'SEIS'	4
ROADS	Roads	D_LAND = 'ROADS'	5
UTIL	Utility	D_LAND = 'UTIL'	6
GOVRES	Government Disposition Reservations and Protective Notations	D_LAND = 'GOVRES'	7
CC_SC	Nonforest harvest areas	D_NONFOR = 'CC_SC'	8
NF	Nonforest Areas	D_NONFOR IS NOT NULL	9
FIRE	Areas burned since AVI and not in cutblocks or fire survey areas	D_BURN IS NOT NULL	10
GRBUF	Ground rule water and waterfowl lake buffers	D_BUF IS NOT NULL	11
TPR	Unproductive TPR	D_TPR = 'U'	12
BREAK	Stands in river break areas	D_SUBJ = 'BREAK'	13
LT	Larch stands	D_SUBJ = 'LT'	14
SB_ADENS	A density black spruce stands	D_SUBJ = 'SB_ADENS'	15
SB_WET	Black spruce in wet stands (no pine or aspen)	D_SUBJ = 'SB_WET'	16
NC	Noncommercial black spruce stands	D_SUBJ = 'NC'	17
NONE	Remaining polygons (managed landbase)		

For example, areas within a riparian buffer (*D_BUF* = 'GRBUF') that are part of a government disposition (*D_LAND* = 'GOVRES') would be assigned *F_DEL* = 'GOVRES'.

6.3.3 Final Species Strata (F_YC)

Species strata are only assigned to forested stands, non-forested areas are assigned 'X'. Table 27 shows the assignment rules.

A dedicated field for the assignment of landbase is not present on the classified or TSA landbases. It is assigned to the modeling landbase in Theme1.

Table 27. F_YC assignment for stands.

F_YC	Description	Selection criteria	Order
STRATA_YC	Layer 1 stands	*F_STORY* = 1	1
USTRATA_YC	Layer 2 stands	*F_STORY* = 2	2
'DU'	Layer 3 stands	*F_STORY = 3*	3
'X'	Nonforest dispositions	*F_STORY* = 5	*4*
'CD'	CD regenerating blocks	F_STORY = 4 and REGEN_CODE = 'CD-2000'	5
'DC'	DC regenerating blocks	F_STORY = 4 and REGEN_CODE = 'DC-2000'	
'DEC'	DEC regenerating blocks	F_STORY = 4 and REGEN_CODE = 'D-2000'	
'PL'	PL regenerating blocks	F_STORY = 4 and REGEN_CODE = 'C-2000' and STRATA_YC = 'PL'	
'SW'	Spruce regenerating blocks	F_STORY = 4 and REGEN_CODE = 'C-2000'	
STRATA_YC	Blocks without ARIS info	F_STORY = 4	6
'X'	All remaining stands		7

6.3.4 Final SRD Extended Strata (F_SRD)

This indicated the SRD extended strata (*F_SRD*) calculated from AVI attributes and described in Table 16. Stands not classified by AVI (*F_STORY* in (4,5)) were converted from the assigned YC strata to the SRD strata as listed in Table 28.

Table 28. F_SRD assignment for stands.

F_SRD	Description	Selection Criteria	Order
'X'	Area with nonforest dispositions	*F_STORY* = 5	1
STRATA_SRD	Harvested areas	*F_STORY* = 4	2
X'	Nonforest areas	*NONFOREST IS NOT NULL*	3
STRATA_SRD	Stands characterized by AVI overstory	*F_STORY* = 1 and STRATA_SRD IS NOT NULL	4
USTRATA_SRD	Stands characterized by AVI understory	*F_STORY* = 2 and USTRATA_SRD IS NOT NULL	5
STRATA_SRD	AVI stands classified 'DU'	*F_STORY* = 3	6
'X'	Remaining stands		

6.3.5 Leading Species (F_LEAD_SP)

A single leading species was identified for each polygon. In coniferous and coniferous-leading mixedwood broad cover groups this was the leading conifer species of the defining layer. In deciduous and deciduous-leading mixedwoods it was the leading deciduous species.

In cutblocks *F_LEAD_SP* was generated from the broad cover group as shown in Table 29. In areas characterized by AVI, the species from the appropriate field (*LEAD_CON, ULEAD_CON,* or *LEAD_DEC, ULEAD_DEC*) of the layer's cover group (*C_CODE, UC_CODE*) as indicated by *F_STORY* was assigned.

Table 29. Leading species assignment (F_LEAD_SP).

F_LEAD_SP	Description	Selection criteria	Order
'X'	Nonforest dispositions	F_STORY = 5	1
X'	Deciduous or Deciduous mixedwood blocks	F_STORY = 4 and C_CODE in ('D','DC') and LEAD_DEC = 'NO'	2
LEAD_DEC	Deciduous or Deciduous mixedwood blocks	F_STORY = 4 and C_CODE in ('D','DC')	3
'X'	Coniferous or Coniferous mixedwood blocks	F_STORY = 4 and C_CODE in ('C','CD') and LEAD_CON = 'NO'	*4*
LEAD_CON	Coniferous or Coniferous mixedwood blocks	F_STORY = 4 and C_CODE in ('C','CD')	5
'X'	Deciduous or Deciduous mixedwood stands	F_STORY IN(1,3) and C_CODE IN ('D','DC') and LEAD_DEC = 'NO'	6
LEAD_DEC	Deciduous or Deciduous mixedwood stands	F_STORY IN(1,3) and C_CODE IN ('D','DC')	7
'X'	Coniferous or Coniferous mixedwood stands	F_STORY IN(1,3) and C_CODE IN ('C','CD') and LEAD_CON = 'NO'	8
LEAD_CON	Coniferous or Coniferous mixedwood stands	F_STORY IN(1,3) and C_CODE IN ('C','CD')	9
'X'	Deciduous or Deciduous mixedwood stands	F_STORY = 2 and UC_CODE IN ('D','DC') and ULEAD_DEC= 'NO'	10
ULEAD_DEC	Deciduous or Deciduous mixedwood stands	F_STORY = 2 and UC_CODE IN ('D','DC')	11
'X'	Coniferous or Coniferous mixedwood stands	F_STORY = 2 and UC_CODE IN ('C','CD') and ULEAD_CON = 'NO'	12
ULEAD_CON	Coniferous or Coniferous mixedwood stands	F_STORY = 2 and UC_CODE IN ('C','CD')	13
'X'	All remaining stands		

6.3.6 Final Stand Density (F_DEN)

This indicated the final density (F_DEN) assigned to the polygon. Table 30 shows the fields used to assign density. The source of the information was dependent upon *F_STORY* assignment. Existing cutblocks with ARIS regeneration commitments (*F_STORY* = 4 and *BLK_GRP* = 'CUT') are assigned 'C' density. The remaining existing cutblocks (*F_STORY* = 4 and *BLK_GRP* = 'CC_YR') are assigned to 'B' density as no regeneration commitments are known. Stands characterized by AVI (*F_STORY* = 1, 2 or 3) are assigned the density from the appropriate layer. Areas without assigned density are given the value 'X'.

Table 30. Final density assignment (F_DEN).

F_DEN	Description	Selection criteria	Order
'C'	Existing blocks	*F_STORY* = 4 and BLK_GRP = 'CUT'	1
'B'	AVI blocks	*F_STORY* = 4 and BLK_GRP <> 'CC_YR'	2
DENSITY	Area with density assigned by AVI overstory	*F_STORY* IN (1,3) and *DENSITY* is not NULL	3
UDENSITY	Area with density assigned by AVI understory	*F_STORY* = 2 and *UDENSITY* is not NULL	4
'X'	No density assigned		

6.3.7 Final Age (F_AGE)

This indicated the assigned age (F_AGE) for the polygon. Table 31 shows the fields used to assign age. The source of the information was dependent upon *F_STORY* assignment but all calculations used a base year of 2009, the year of the effective date. Existing cutblocks (*F_STORY* = 4) were assigned an age reflecting the years since harvest. Non-forest polygons had an age of 0 but were assigned an F_AGE of 1 due to modeling requirements for non-zero values. Polygons where age cannot be calculated were assigned a value of –99.

Table 31. Fields used to populate final age (F_AGE) calculation.

F_AGE	Description	Selection criteria	Order
1	Nonforest dispositions	F_STORY = 5	1
2009 - TIMBER_YEAR	Existing clearcut blocks	F_STORY = 4 and TIMBER_YEAR > 0	2
2009 - CC_YEAR	AVI cutblocks	MOD1_DESC = 'BU' and MOD1_YR >= 1991	3
2009 - FIREYEAR	Areas burnt since AVI	FIREYEAR > 0	4
UAGE	AVI Layer 2	F_STORY = 2 and UAGE > 0	5
AGE	AVI Layer 1 age	AGE > 0	6
-99	No age assigned		

6.3.8 Final Timber Productivity (F_TPR)

Table 32 shows the fields used to assign a final timber productivity rating (*F_TPR*). The source of the information was dependent upon *F_STORY* assignment. Stands with *F_STORY* assignment of 1, 2 or 3 are based on AVI assignments of TPR for the layer. Existing cutblocks (*F_STORY* = 4) were assigned to TPR.

Table 32. Fields used to populate final TPR (F_TPR) classification.

F_TPR	Description	Selection criteria	Order
'X'	Nonforest dispositions	*F_STORY* = 5	1
TPR	Existing blocks	*F_STORY* = 4 and TPR IS NOT NULL	2
UTPR	Area with tpr assigned from layer 2	*F_STORY* = 2 and *UTPR* is not NULL	3
TPR	TPR from layer 1	*TPR* IS NOT NULL	4
'X'	No TPR assigned		

6.3.9 Final Stand Origin (F_ORIGIN)

Origin is the disturbance that established the stand. The field *F_ORIGIN* indicates the origin code assigned to the polygon. Table 33 shows the criteria used to assign *F_ORIGIN* and the order of assignment.

Table 33. F_ORIGIN criteria in order of assignment.

F_ORIGIN	Description	Selection Criteria	Order
'X'	Nonforest areas	F_STORY = 1 and NONFOREST IS NOT NULL	1
'X'	Nonforest dispositions	F_STORY = 5	2
'MGD'	Existing cutblocks	F_STORY = 4	3
RECBURN'	Recently burned areas	(MOD1_DESC = 'BU and MOD1_YR >= 1991) or FIREYEAR > 0	4
'X'	Areas without AVI	POLY_ID = 0	5
'NAT'	All remaining areas		

6.3.10 Final Stand Height (F_HGT)

This indicated the height of the stand. Height was based on the defining layer from AVI (or *HEIGHT* if understory height was 0) with some exceptions. Regenerating cutblocks were assigned a height of 0. Any non-forest areas (including linear landuse updates) were assigned a height of 0. Where no height can be assigned a value of –99 was assigned to fill the entries. Table 34 shows the criteria used to assign *F_HGT* and the order of assignment.

Table 34. F_HGT Assignment.

F_HGT	Description	Selection Criteria	Order
0	Nonforest dispositions	F_STORY = 5	1
HEIGHT	AVI height for blocks	F_STORY = 4	2
0	Burned areas since AVI	FIREYEAR > 0	3
0	Burned areas in AVI	MOD1_DESC = 'BU' and MOD1_YR >= 1991 and F_STORY <> 4	4
UHEIGHT	AVI layer 2 height	F_STORY = 2 and UHEIGHT > 0	5
HEIGHT	AVI layer 1 height	HEIGHT > 0	6
-99	No height value		

6.3.11 Final Stand Area (F_AREAHA)

This indicated the final stand area assigned to the classified landbase polygon. This is equivalent to the area of the polygon in hectares. Table 35 shows the *F_AREAHA* assignment.

Table 35. Final stand area assignment.

F_AREAHA	Description	Selection criteria
AREAHA_POL	Final area (ha) of stands	All

6.3.12 Unique Key (UKEY#_CLS)

This indicated unique key for the classified landbase. It was calculated as equal to the coverage # sign on the P14 _CLS_LB4 coverage.

6.4 Additional Fields or Updates for TSA Landbase

6.4.1 Unique Key (UKEY#_TSA)

The unique key for the TSA landbase is calculated from the coverage # sign on the LB4_TSA coverage.

6.4.2 TSA Compartment (ZONE)

This is division of the FMU into three units. The zones were generated by TFC for the forecasting process and are not operational compartments.

6.4.3 Seismic on TSA Landbase (AREAHA_0M, AREAHA_5M, WIDTH_5M, WITH_SEIS, STRATA_SEIS, AREAHA_SEIS)

The seismic information from the classified landbase (Section 6.1.2) is carried on the TSA landbase. The Oracle SQL script *seis_create_sum_table.sql* groups classified landbase polygons by *UKEY#_TSA* and summarizes the area under seismic for each TSA landbase polygon. This information is carried in the fields *AREAHA_0M* (stand area without seismic) and *AREAHA_5M* (stand area crossed by 5 metre wide seismic lines). The *WIDTH_5M* field identified the occurrence of seismic lines (WIDTH_5M is set to 5 if seismic lines cross that particular TSA landbase polygon). The *WITH_SEIS* field is set to 100 for all TSA polygons which contain classified landbase polygons where *F_DEL* = 'SEIS'. The *STRATA_SEIS* field

identifies the species strata assigned to the seismic. The *AREAHA_SEIS* is calculated as the sum of area under seismic within each TSA polygons (AREAHA_5M).

6.4.4 D_SEIS Adjustments

The *D_SEIS* field on the TSA landbase is set to 'SEIS' where *AREAHA_0M* = 0 indicating the full polygon is assigned to 'SEIS' deletion.

6.4.5 F_AREAHA_TSA Calculations

This area identifies the final stand area assigned to the TSA landbase polygon. This is equivalent to the area of the polygon in hectares unless the polygon is crossed by seismic (and not completely covered by seismic). The seismic area is removed from the area to provide the final stand area. Table 36 outlines the calculations.

Table 36. F_AREAHA Calculation.

F_AREAHA_TSA	Description	Selection criteria	Order
AREAHA_POL	All linear features	F_DEL IN ('LINEAR','ROADS','SEIS')	1
AREAHA_POL	Stands with no seismic	WITH_SEIS = 0	2
AREAHA_0M	Stands with seismic	WITH_SEIS = 100	3
AREAHA_POL	All remaining area		

6.4.6 Sliver Polygon F_DEL Adjustment

The sliver removal process on the TSA landbase removed many but not all sliver polygons. Any polygons with a *F_AREAHA_TSA* assignment of 0 were assigned an *F_DEL* = '0_HA'. This ensured the managed landbase had no 0 ha polygons which Patchworks, one of the forecast modeling software, does not easily process.

6.5 Modeling Fields

The fields in this section only appear in the modeling landbase and are not part of the Classified or TSA landbase.

6.5.1 Modeling Action (ACTION)

The action field in the landbase was meant to allow the TSA model to determine what action should occur to each pre-blocked stand. Each action code corresponded to a different action or silvicultural system in the TSA model. Actions included clearcut of deciduous landbase and clearcut of coniferous landbase.

Table 37. ACTION assignment rules.

ACTION	Description	Selection criteria	Order
'CLEARCUT_D'	Deciduous landbase planned blocks	*PREBLOCK* <> null and *THEME3* = 'DEC'	1
'CLEARCUT_C'	Coniferous landbase planned blocks	*PREBLOCK* <> null and *THEME3* <> 'DEC'	2
null	Remaining stands		3

6.5.2 Planned Block Designation in Model (PREBLOCK)

The *PREBLOCK* field identifies areas that were planned for future harvest actions before the start of modeling. The planned blocks identify areas that are planned for harvest in 2009. The *PREBLOCK* assignment rules area listed in Table 38.

Table 38. PREBLOCK assignment rules.

PREBLOCK	Description	Selection criteria	Order
'P'	Planned Block	*F_DEL* = 'NONE' and *BLK_GRP* = 'PLANNED" and *F_CODE* <> 4	1
NULL	Not a planned block		2

6.5.3 Cutting Period (CUT_PERIOD)

The *CUT_PERIOD* field code groups planned harvest into 5 year periods beginning in 2009 for use in TSA modeling. Table 39 shows the *CUT_PERIOD* assignment rules. *CUT_PERIOD* = 1 identifies blocks originally scheduled for 2008 but not yet harvested. These blocks were identified for planned harvest in the first cutting period.

Table 39. CUT_PERIOD assignment rules.

CUT_PERIOD	Description	Selection Criteria	Order
1	Harvest period for planned blocks	*PREBLOCK* = 'P' and skid_year = 2008	1
2	Harvest period for planned blocks	*PREBLOCK* = 'P' and *THEME7* = 'PINE'	2
3	Harvest period for planned blocks	*PREBLOCK = 'P'*	3
null	Remaining stands		4

6.5.4 Theme Assignments (THEME1 to THEME7)

Theme fields are used for input to the forecasting models. These fields are calculated directly from attributes on the landbase or represent groupings of landbase attributes fields.

THEME1

THEME1 identified the coniferous and deciduous landbases. *THEME1* assignment rules are shown in Table 40.

Table 40. THEME1 assignment rules.

THEME1	Description	Selection Criteria	Order
'X'	Non-Forested	*F_YC* = 'X'	1
'DECID'	Deciduous landbase	*F_YC* = 'DEC'	2
'CONIF'	Coniferous landbase		3

THEME2

THEME2 identified the north, south and central portions of the FMU to allow control of harvest volume coming from the three zones. *THEME2* assignment rules are shown in Table 41

Table 41. THEME2 assignment rules.

THEME2	Description	Selection Criteria	Order
'CENTRAL'	Central portion of FMU	*ZONE* = 'CENTRAL'	1
'NORTH'	Northern portion of FMU	*ZONE* = 'NORTH'	2
'SOUTH'	Southern portion of FMU	*ZONE* = 'SOUTH'	3
null	Non-FMU		4

THEME3

THEME3 identified the species strata assignment. Areas with no species strata were assigned to 'X'. Table 42 shows the assignment rules.

Table 42. THEME3 assignment rules.

THEME3	Description	Selection Criteria	Order
F_YC	Yield Strata	*F_YC* <> null	1
'X'	Non-forested		2

THEME4

THEME4 grouped the final density into 2 classes as shown in Table 43.

Table 43. THEME4 assignment rules.

THEME4	Description	Selection Criteria	Order
'AB'	A or B density	*F_DEN* IN('A' , 'B')	1
'CD'	C or D density	*F_DEN* IN ('C' , 'D')	2
'X'	all remaining		3

THEME5

THEME5 identified the operability for polygons and showed the managed landbase (Table 44).

Table 44. THEME5 assignment rules.

THEME5	Description	Selection Criteria	Order
'MAN'	Operable	*F_DEL* = 'NONE'	1
'UNMAN'	Remaining stands		2

THEME6

THEME6 identified the stand origin process as shown in Table 45.

Table 45. THEME6 assignment rules.

THEME6	Description	Selection Criteria	Order
'REGEN'	Regnerating stands	*F_ORIGIN* = 'MGD'	1
'RECBURN'	Recent Burns	*F_ORIGIN* = 'RECBURN'	2
'NAT'	remaining stands		3

THEME7

THEME7 identified the stands with pine to be targeted as part of the MPB strategy. THEME7 is assigned as shown in Table 46.

Table 46. THEME7 assignment rules.

THEME7	Description	Selection Criteria	Order
'DEC_PINE'	Deciduous stands with pine component	*PL_PCT* > 1 and *F_YC* = 'DEC'	1
'PINE'	Pine leading coniferous stands	*PL_ORD* in (1,2)	2
'X'	Remaining stands		3

6.5.5 Patchworks Compartment (PW_COMPART)

Patchworks compartments are used to allow or disallow the Patchworks model to schedule harvest in certain areas during certain periods of times. Table 47 shows the assignment rules.

Table 47. PW_COMPART assignment rules.

PW_COMPART	Description	Selection Criteria	Order
'PLAN_BLK'	Approved planned blocks	*PREBLOCK* = 'P'	1
'FUTURE_' & *THEME1*	Potential planned blocks	*BLK_GRP* = 'FUTURE' and *THEME5* = 'MAN'	2
'FUTURE_' & *THEME1*	Potential planned blocks	*COMPART* = 25 and *THEME5* = 'MAN' and *THEME1* = 'CONIF'	2
'RETENTION'	Block retention patches	*BLK_GRP* = 'INBLK' and *F_AREAHA_TSA* < 2	3
'RETENTION'	Block retention patches	*BLK_GRP* = 'RETENTION'	4
'PNT'	Disposition to be harvested after 2013	*NLIN_DISP* = 'PNT and *THEME5* = 'MAN'	5
'OTHER'			6

6.5.6 Stand Age for TSA Model (TSA_AGE)

TSA_AGE for the TSA landbase was assigned based on *F_AGE* from the classified landbase. Stands with no species strata (i.e. nonforest) were not updated.

6.5.7 TSA Age Represented in 5-year Periods (TSA_PER)

TSA_PER was calculated by dividing the *TSA_AGE* by 5 and then rounding up.

6.5.8 Volume Fields (CONVOL and DECVOL)

The standing merchantable 2009 coniferous and deciduous volumes calculated from the 2009-2018 FMP yield curves are shown in these fields.

6.5.9 Patchworks Results Fields (PROP_TREAT and PROP_DELTA)

The Patchworks PFMS schedule for years 2009 – 2028 are attached to the landbase in these fields. The *PROP_DELTA* field shows the year of harvest and the *PROP_TREAT* field shows the treatment chosen by the model.

6.5.10 Harvest Volume Fields (CONHARVOL and DECHARVOL)

The coniferous and deciduous volume harvested from each polygon, associated with the *PROP_TREAT* and *PROP_DELTA* actions were shown in these fields

6.6 Final SHS Modeling Fields

For the final SHS, additional Patchworks compartment fields and a new pre-blocked schedule were created to allow specific stands to be added or removed from the SHS. The scenario P14_P5006 was field checked and the sequence from this scenario was used as the base for the final SHS. Of these fields, only *PW_COMPART_SHS* is attached to the modeling landbase. All of the other fields are used to create a new pre-blocked schedule file for input into Patchworks.

6.6.1 Manual stand change codes (OPT_PERIOD)

The *OPT_PERIOD* field was manually created by examining the notes on the SHS map for P14_P5006. The codes were assigned based on the desired effect of the notes on the map. Section 6.6.3 shows the code values and the desired SHS change.

6.6.2 DELTA

The Delta field was populated from the delta field from the ***schedule.csv*** file from P14_P5006 scenario. It represents the year of harvest from that scenario.

6.6.3 Patchworks Compartment (PW_COMPART_SHS)

This version of compartments is used to modify the SHS of scenario P14_P5006 to better reflect the operational desires of Boucher Bros. Table 48 shows the assignment rules.

Table 48. PW_COMPART_SHS assignment rules.

PW_COMPART	Description	Selection Criteria	Order
'AFTER10'	Stands to move to second decade	*OPT_PERIOD* = 30 and *DELTA* < 11	1
'AFTER20'	Stands to move out of SHS	*OPT_PERIOD* = 30 and *DELTA* > 10	2
'OPTION2'	Second priority optional stands not currently in SHS	*OPT_PERIOD* = 25	3
'OPTION2'	Second priority optional stands not currently in SHS	*OPT_PERIOD* = 20	4
'OPTION1'	First priority optional stands not currently in SHS	*OPT_PERIOD* = 10	5
'SHS_1_10'	Stands to put into SHS decade 1	*OPT_PERIOD* = 1	6
'SHS_11_20'	Stands to put into SHS decade 2	*OPT_PERIOD* = 2	7
'AFTER20'	Stands to move out of SHS	*OPT_PERIOD* = -1	8
'SHS'	Remaining P14_P5006 SHS stands	*DELTA* > 0	9
'AFTER20'	Remaining stands		10

6.6.4 Revised Delta (DELTA_SHS)

To force the SHS from P14_P5006 where desired, the *DELTA_SHS* field was calculated as *DELTA* where *PW_COMPART_SHS* = 'SHS'.

6.6.5 Revised Action Name (ACTION_NAME_SHS)

To complete the preblocked schedule, the *ACTION_NAME_SHS* field was calculated as *TREATMENT* where *PW_COMPART_SHS* = 'SHS'.

7. Landbase Summary

Summaries for the classified and the TSA landbases are presented in this section. The modeling landbase differs from the TSA landbase only in the attribute list.

7.1 Classified Landbase

The final classified landbase consisted of 49,429 polygons with a total area of 127,331 ha. The managed landbase was 69% of the classified landbase, 87,827 ha. Table 49 and Table 50 summarized the managed and unmanaged landbase by broad groupings. The tables can be duplicated by grouping the landbase on the *F_YC* or *F_DEL* field and summarizing on *F_AREAHA*.

Table 49. Managed classified landbase summary (by F_YC).

Description	F_YC	Area(ha)	% Managed Landbase	% Gross Landbase
Deciduous	DEC	43,461	49%	34%
Deciduous, conifer understory	DU	15,720	18%	12%
Deciduous mixedwood	DC	8,578	10%	7%
Conifer mixedwood	CD	4,594	5%	4%
Pine	PL	745	1%	1%
Black spruce	SB	1,985	2%	2%
White spruce	SW	12,745	15%	10%
Managed landbase	**Total**	**87,827**	**100%**	**69%**

Figure 15 shows the managed classified landbase species strata (*F_YC*).

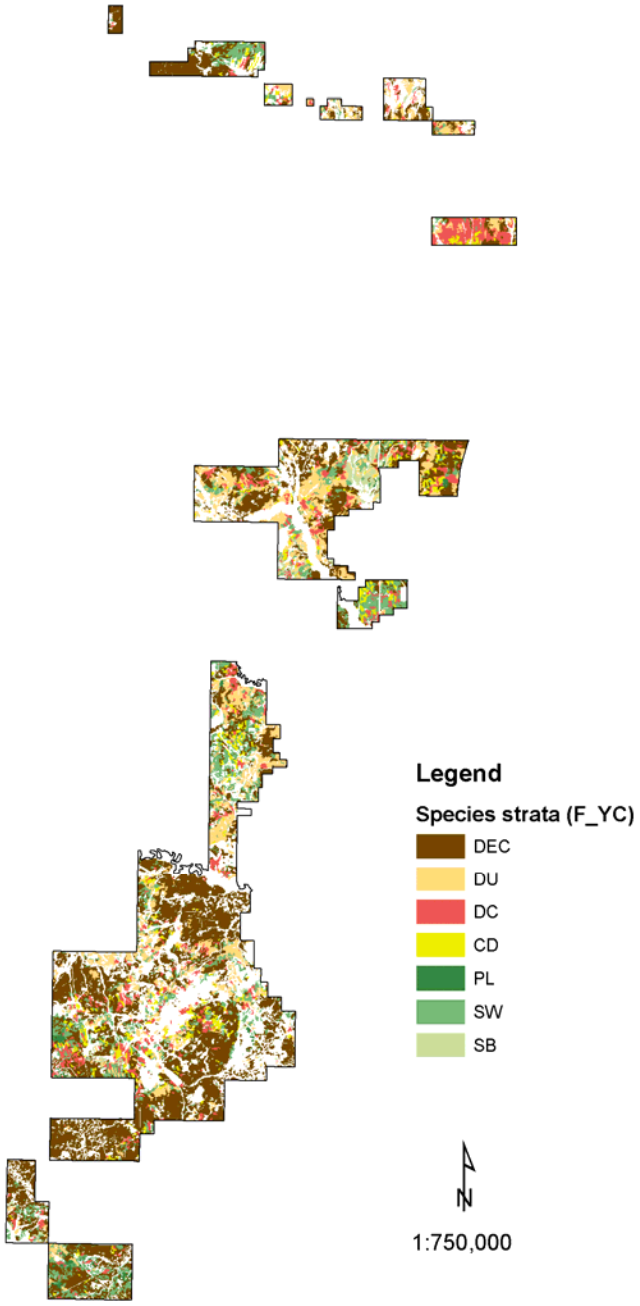

Figure 15. Managed landbase by species strata.

As shown in Table 49, 67% of the managed landbase was deciduous or deciduous with a conifer understory. The deciduous species strata covered over one third of the total landbase area.

Deletions were applied to 31% of the total landbase area or 39,505 ha. Nonforest area constituted 42% of the unmanaged landbase (See Table 50). 41 ha of old clear cuts lacked the information required to assign regenerated strata and were thus excluded from the managed landbase.

Table 50. Unmanaged classified landbase (by F_DEL).

Description	F_DEL	Area(ha)	% Unmanaged Landbase	% Gross Landbase
Area outside FMU	XDFA	166	0%	0%
Linear features	LINEAR	469	1%	0%
Roads	ROADS	442	1%	0%
Seismic	SEIS	1,173	3%	1%
Utility corridors	UTIL	12	0%	0%
Government reservations	GOVRES	193	0%	0%
Mineral and surface leases	LEASE	222	1%	0%
Areas burnt since AVI	FIRE	453	1%	0%
Nonproductive areas	TPR	7,435	19%	6%
Nonforest area	NF	16,892	43%	13%
Water buffers	GRBUF	2,487	6%	2%
River break area	BREAK	3,089	8%	2%
Larch stands	LT	33	0%	0%
Non-commercial stands	NC	257	1%	0%
'A' density black spruce	SB_ADENS	1,674	4%	1%
Black spruce on wet sites	SB_WET	4,466	11%	4%
Nonforest harvest areas	CC_SC	41	0%	0%
Unmanaged Landbase	**Total**	**39,505**	**100%**	**31%**

7.1.1 Classified Landbase Summary

Table 51 shows a detailed summary of the classified managed landbase by stand origin and species strata. The table can be created by grouping *F_ORIGIN* and *F_YC* by *F_AREAHA* for the managed landbase (*F_DEL* = 'NONE').

Table 51. Managed classified landbase summary by stand origin.

Stand origin	F_YC	Area(ha)	% Managed landbase
Natural stands			
	DEC	39,982	46%
	DU	15,720	18%
	DC	7,347	8%
	CD	3,125	4%
	PL	698	1%
	SB	1,985	2%
	SW	11,651	13%
	Natural Total	80,507	92%
Regenerating stands			
	DEC	3,479	4%
	DU	0	0%
	DC	1,231	1%
	CD	1,469	2%
	PL	47	0%
	SB	0	0%
	SW	1,094	1%
	Regenerating Total	7,320	8%
Managed landbase Total		**87,827**	**100%**

7.2 TSA Landbase

The final TSA landbase consisted of 18,751 polygons with a total area of 127,331 ha. The managed landbase was 69% of the TSA landbase, 87,827 ha. Table 52 and Table 53 summarize the TSA landbase.

Table 52. TSA managed landbase summary (by F_YC).

Description	F_YC	Area(ha)	% Managed Landbase	% Gross Landbase
Deciduous	DEC	43,461	49%	34%
Deciduous, conifer understory	DU	15,720	18%	12%
Deciduous mixedwood	DC	8,578	10%	7%
Conifer mixedwood	CD	4,594	5%	4%
Pine	PL	745	1%	1%
Black spruce	SB	1,985	2%	2%
White spruce	SW	12,745	15%	10%
Managed landbase	**Total**	**87,827**	**100%**	**69%**

Table 53. TSA unmanaged landbase summary (by F_DEL).

Description	F_DEL	Area(ha)	% Unmanaged Landbase	% Gross Landbase
Area outside FMU	XDFA	166	0%	0%
Linear features	LINEAR	469	1%	0%
Roads	ROADS	491	1%	0%
Seismic	SEIS	0	0%	0%
Utility corridors	UTIL	12	0%	0%
Government reservations	GOVRES	193	0%	0%
Mineral and surface leases	LEASE	222	1%	0%
Areas burnt since AVI	FIRE	458	1%	0%
Nonforest area	NF	17,059	43%	13%
Nonproductive areas	TPR	7,510	19%	6%
Water buffers	GRBUF	2,501	6%	2%
River break area	BREAK	3,097	8%	2%
Larch stands	LT	33	0%	0%
Non-commercial stands	NC	259	1%	0%
'A' density black spruce	SB_ADENS	1,689	4%	1%
Black spruce on wet sites	SB_WET	4,514	11%	4%
Nonforest harvest areas	CC_SC	41	0%	0%
Seismic area deletion		789		
Unmanaged Landbase	**Total**	**39,505**	**100%**	**31%**

8. References

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Appendix I AVI Approval

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February 21, 2007

Ms. Joanne Smirl
Daishowa-Marubeni International Ltd.
Peace River Pulp Division
Postal Bag 6500
Pulp Mill Site
Peace River, Alberta
T8S 1V5

Dear Ms. Smirl:

Alberta Sustainable Resource Development staff completed a review of the Alberta Vegetation Inventory (AVI) completed by Daishowa-Marubeni International Ltd. for forest management unit P14. The data have successfully passed an audit by Resource Information Management Branch. The final audit report will be completed in the near future.

If you have any questions regarding this process, please feel free to contact Daryl McEwan at (780) 415-0010.

Sincerely,

Craig Barnes, Executive Director
Resource Information Management Branch

c: Doug Sklar, Executive Director
Forest Management Branch

Don Harrison, Director
Wildfire Service Branch

Appendix II Classified Landbase Dataset Description

The P14 classified landbase file is named **P14_CLS_LB4.**

Dataset Information P14_CLS_LB4 (Cover) or P14_CLS_LB4 (FGDB)

Description: Classified landbase for P14 2009-2018 Forest Management Plan

Data Source: Generated by The Forestry Corp.

Date Generated: 24/07/2009

Data Format: ArcInfo Coverage and File Geodatabase

Software Used: ESRI ArcGIS and Oracle

Projection: UTM 11

Datum: GRS80

Units: metres

Data Precision: Double

Tolerance: .001

Extent: All lands within FMU P14.

Appendix III Data Dictionary for Classified Landbase

Dataset Name: P14_CLS_LB4

Description: Table describing P14_CLS_LB4

Column Name	Order	Type	Width	Decimal	Description	
					Value	***Definition***
AREA	1	FloatingPt	38	8	System area (m2)	
MER	2	Integer	4	0	Meridian	
TWP	3	Integer	4	0	Township	
RGE	4	Integer	4	0	Range	
NATURAL	5	Character	3	0	Natural subregion	
					CMW	Central Mixedwood
					DMW	Dry Mixedwood
					LBH	Lower Boreal Highlands
CARIBOU	6	Integer	4	0	Caribou Zones	
MOOSE	7	Integer	4	0	Moose Zones	
HYDROBUF	8	Character	8	0	Polygon identifier for ground rule hydrology buffer	
BREAK	9	Integer	4	0	Polygon identifier for river breaks	
FIRENUM	10	Character	12	0	Forest fire polygon identifier	
FIREYEAR	11	Integer	4	0	Year of wildfire (since inventory)	
UTILITY	12	Integer	0	0	Utility corridor polygon identifier	
ROADS	13	FloatingPt	38	8	Road polygon identifier	
NLIN_DISP	14	Character	3	0	Non-linear disposition type	
					DRS	Disposition reservation
					PNT	Protective notation
NLIN_GRP	15	Character	10	0	Group assignment for non-linear disposition types	
					GOVRES	DRS and PNT dispositions
NLIN_ORD	16	Integer	3	0	Order for assignment of non-linear disposition types	
LIN_DISP	17	Character	4	0	Linear landuse disposition type	
					EZE	Easement
					FRD	Forestry road
					GRR	Provincial grazing reserve
					LOC	License of occupation
					MLL	Miscellaneous lease
					MLP	Miscellaneous permit
					MSL	Mineral Surface lease
					PIL	Pipeline installation lease
					PLA	Pipeline agreement
					ROE	Right-of-entry agreement
					RRD	Road related
LIN_GROUP	18	Character	10	0	Group assignment for linear disposition types	
					GRAZING	Grazing Dispositions
					LEASE	MLL,MLP,MSL,PIL,PNT,SMC,SML
					LINEAR	EZE, FRD, LOC, PLA, RD, RDD, RDS, REA, ROE, RR, RRD, VCE dispositions
LIN_ORD	19	Integer	3	0	Order for assignment of linear disposition types	
DISP_TYPE	20	Character	4	0	Landuse disposition type	
					DRS	Disposition reservation
					EZE	Easement
					FRD	Forestry road
					GRR	Provincial grazing reserve

Column Name	Order	Type	Width	Decimal	Description
					Value **Definition**
					LOC License of occupation
					MLL Miscellaneous lease
					MLP Miscellaneous permit
					MSL Mineral Surface lease
					PIL Pipeline installation lease
					PLA Pipeline agreement
					PNT Protective notation
					ROE Right-of-entry agreement
					RRD Road related
DISP_GRP	21	Character	16	0	Landuse disposition group
DISP_ORD	22	Integer	3	0	Order for assignment of disposition types
BLK_STATUS	23	Character	8	0	Cutblock harvest status
					CTL Harvest under CTL
					DTL Harvest under DTL
					EXIST Existing cutblocks
					FUTURE Future harvest polygons
					GOVMTU Harvest under MTU
					INBLK Sliver areas between harvest blocks
					PLANNED Planned harvest
					PREAVI PreAVI cutblocks
					RET_EXT Retention areas - outside block
					RET_INT Retention areas - inside block
CUTKEY07	24	Integer	0	0	Company cutblock assignment
OPEN_NUM	25	Character	15	0	ARIS cutblock opening number
FMU	26	Character	5	0	FMU
LBASE_CODE	27	Character	2	0	ARIS landbase assignment
					CC Conf M/W to Conf M/W
					CD Conf M/W to Dec M/W
					CS Conf M/W to S/W
					DC Dec M/W to Conf M/W
					DD Dec M/W to Dec M/W
					HH H/W to H/W
					SC S/W to Conf M/W
					SS S/W to S/W
REGEN_CODE	28	Character	10	0	ARIS regeneration standard
					C-2000 Conifer - 2000 standard
					CD-2000 Conifer-deciduous 2000 standard
					D-2000 Deciduous-conifer 2000 standard
					DC-2000 Deciduous 2000 standard
					P530 Unknown code
SKID_YEAR	29	FloatingPt	38	8	Timber year of skid clearance date
BLK_GRP	30	Character	15	0	Cutblock grouping
					CC_NOYR AVI MOD1 = CC polygons with no year
					CC_YR AVI MOD1 = CC polygons with year
					CUT Existing cutblocks
					DISP_NOYR Harvest under timber dispositions with no year
					FUTURE Future harvest polygons
					INBLK In-block retention patches
					RETENTION Other retention Patches
TIMBER_YEAR	31	Integer	4	0	Block origin year
MOD1_DESC	32	Character	2	0	AVI stand modifier 1
					BU Burn
					CC Clear/Partial Cut
					CL Clearing
					CU Clumped Understory
					IK Insect Kill
					OC Older Cut

Column Name	Order	Type	Width	Decimal	Description
					Value: Definition
					SN: Snags
					WF: Windfall
MOD1_YR	33	Integer	4	0	AVI stand modifier year
POLY_ID	34	Integer	4	0	AVI polygon identifier
MOIST	35	Character	1	0	Moisture
STRUC_TYPE	36	Character	1	0	Overstory structure type
STRUC_PCT	37	Integer	0	0	Overstory structure percent
DENSITY	38	Character	2	0	Stand density
					A: Crown closure 6-30%
					B: Crown closure 31-50%
					C: Crown closure 51-70%
					D: Crown Closure 71-100%
HEIGHT	39	Integer	4	0	Stand height
ORIGIN	40	Integer	4	0	Stand origin
TPR	41	Character	2	0	Timber productivity rating
					F: Fair
					G: Good
					M: Medium
					U: Unproductive
USTRUC_TYPE	42	Character	1	0	Understory structure type
USTRUC_PCT	43	Integer	0	0	Understory structure percent
UDENSITY	44	Character	2	0	Stand density (understory)
					A: Crown closure 6-30%
					B: Crown closure 31-50%
					C: Crown closure 51-70%
					D: Crown Closure 71-100%
UHEIGHT	45	Integer	4	0	Stand height (understory)
UORIGIN	46	Integer	4	0	Understory stand origin
UTPR	47	Character	2	0	Timber productivity rating
					F: Fair
					G: Good
					M: Medium
					U: Unproductive
STRATA_SRD	48	Character	5	0	Stand SRD extended strata assignment
					C1: Pure white spruce
					C10: Black spruce leading with pine
					C11: Black spruce leading without pine
					C12: Larch leading
					C2: White spruce leading with pine
					C3: White spruce leading without pine
					C4: Pure pine
					C5: Pine leading with white spruce
					C6: Pine leading with black spruce
					C8: Pine leading without spruce and fir
					C9: Pure black spruce
					CD1: White spruce/aspen
					CD2: White spruce/poplar
					CD3: White spruce/birch
					CD4: Pine/aspen
					CD7: Black spruce/aspen
					CD8: Black spruce/poplar
					CD9: Black spruce/birch
					D1: Pure aspen
					D2: Aspen leading with poplar

Column Name	Order	Type	Width	Decimal	Description
					Value **Definition**
					D3 Aspen leading without poplar
					D4 Poplar leading
					D5 Birch leading
					DC1 Aspen/white spruce
					DC11 Birch/black spruce
					DC2 Aspen/pine
					DC3 Aspen/black spruce
					DC5 Poplar/white spruce
					DC7 Poplar/black spruce
					DC9 Birch/white spruce
					XX0 Non forest
USTRATA_SRD	49	Character	5	0	Stand SRD extended strata assignment
					C1 Pure white spruce
					C10 Black spruce leading with pine
					C11 Black spruce leading without pine
					C12 Larch leading
					C2 White spruce leading with pine
					C3 White spruce leading without pine
					C5 Pine leading with white spruce
					C6 Pine leading with black spruce
					C9 Pure black spruce
					CD1 White spruce/aspen
					CD2 White spruce/poplar
					CD3 White spruce/birch
					CD7 Black spruce/aspen
					CD8 Black spruce/poplar
					CD9 Black spruce/birch
					D1 Pure aspen
					D2 Aspen leading with poplar
					D3 Aspen leading without poplar
					D4 Poplar leading
					D5 Birch leading
					DC1 Aspen/white spruce
					DC5 Poplar/white spruce
					DC7 Poplar/black spruce
					DC9 Birch/white spruce
					XX0 Non forest
AGE	50	Integer	5	0	Stand age (2009 base year)
UAGE	51	Integer	5	0	Understory age (2009 base year)
C_CODE	52	Character	4	0	Broad cover group (overstory)
					C Conifer
					CD Conifer/deciduous mixedwood
					D Deciduous
					DC Deciduous/conifer mixedwood
UC_CODE	53	Character	4	0	Broad cover group (understory)
					C Conifer
					CD Conifer/deciduous mixedwood
					D Deciduous
					DC Deciduous/conifer mixedwood
LEAD_CON	54	Character	2	0	Leading conifer species
					LT Tamarack
					NO No appropriate species present
					PL Lodgepole pine
					SB Black spruce
					SW White spruce
ULEAD_CON	55	Character	2	0	Leading conifer species (understory)
					LT Tamarack

Column Name	Order	Type	Width	Decimal	Description
					Value **Definition**
					NO No appropriate species present PL Lodgepole pine SB Black spruce SW White spruce
LEAD_DEC	56	Character	2	0	Leading deciduous species
					AW Trembling aspen BW White birch NO No appropriate species present PB Balsam poplar
ULEAD_DEC	57	Character	2	0	Leading deciduous species (understory)
					AW Trembling aspen BW White birch NO No appropriate species present PB Balsam poplar
AW_PCT	58	Integer	2	0	Aspen percent in species distribution
UAW_PCT	59	Integer	2	0	Aspen percent in species distribution
PL_PCT	60	Integer	2	0	Lodgepole pine order in species assignment
UPL_PCT	61	Integer	2	0	Lodgepole pine percent in species distribution
SOFTPCT	62	Integer	2	0	Coniferous species percent (overstory)
HARDPCT	63	Integer	2	0	Deciduous species percent (overstory)
USOFTPCT	64	Integer	2	0	Coniferous species percent (understory)
UHARDPCT	65	Integer	2	0	Deciduous species percent (understory)
SP_COMP	66	Character	30	0	AVI overstory string of attributes
USP_COMP	67	Character	30	0	AVI understory string of attributes
NONFOREST	68	Character	4	0	Nonforest code assignment
					AIG gravel pits AIH permanent right of way, roads, highways, railways CA cropland annual CIP pipelines, transmission lines, grass airstrips CIW well sites, geophysical CP cropland perennial HF herbaceous forbs HG herbaceous grasslands NMC cutbank - watercourse related NWF flooded, beaver ponds NWL lakes, ponds NWR rivers SC shrub closed SO shrub open
STRATA_YC	69	Character	5	0	Stand yield strata assignment
					CD Conifer mixedwood DC Deciduous mixedwood DEC Deciduous LT Larch PL Lodgepole pine SB Black spruce SW White spruce
USTRATA_YC	70	Character	5	0	Stand yield strata assignment
					CD Conifer mixedwood DC Deciduous mixedwood DEC Deciduous LT Larch PL Lodgepole pine

Column Name	Order	Type	Width	Decimal	Description
					Value **Definition**
					SB Black spruce
					SW White spruce
AVI_STORY	71	Integer	2	0	AVI layer used for strata assignment
					1 AVI overstory
					2 AVI understory
					3 Deciduous with conifer understory
IN_SEIS	72	Integer	0	0	Polygons with seismic area
WITH_SEIS	73	Integer	4	0	Polygons with seismic area
					0 Outside seismic area
					100 Polygon area intersected by seismic
STRATA_SEIS	74	Character	8	0	Strata assignment to seismic areas
					CD Conifer mixedwood
					DC Deciduous mixedwood
					DEC Deciduous
					HG herbaceous grasslands
					PL Lodgepole pine
					SB Black spruce
					SC shrub closed
					SW White spruce
COMPART	75	Integer	4	0	Compartment Number
ZONE	76	Character	10	0	TSA Compartment assignment
					. CENTRAL
					NORTH
					SOUTH
AREAHA_POL	77	FloatingPt	12	6	Polygon area(ha)
D_TPR	78	Character	4	0	Deletion for unproductive areas
					U Unproductive
D_DFA	79	Character	8	0	Deletion for areas outside DFA
					OUT_FMU Outside FMU boundary
D_LAND	80	Character	8	0	Deletion for landuse
					GOVRES Government assigned dispositions
					LEASE Surface and mineral leases
					LINEAR Road and Line features without linework
					ROADS Roads
D_ACCESS	81	Character	8	0	Deletion for access
					ROADS Roads
					UTIL Utility corridor
D_BUF	82	Character	8	0	Deletion for hydrologic buffers
					GRBUF Ground rule buffers
D_ISO	83	Character	8	0	Deletion for isolated/inaccessible stands
D_SUBJ	84	Character	16	0	Subjective deletions
					BREAK River breaks
					LT Larch stands
					NC Noncommercial forest stands
					SB_ADENS A density Sb stands
					SB_WET Sb stands in wet areas
D_BURN	85	Character	8	0	Deletion for areas burnt since AVI
					BURN Areas burned since inventory
D_NONFOR	86	Character	8	0	Deletion for nonforest lands
					AIG gravel pits
					AIH permanent right of way, roads, highways, railways
					CA cropland annual

Column Name	Order	Type	Width	Decimal	Description
					Value **Definition**
					CC_SC Clearcut areas with shrub cover
					CIP pipelines, transmission lines, grass airstrips
					CIW well sites, geophysical
					CP cropland perennial
					HF herbaceous forbs
					HG herbaceous grasslands
					NMC cutbank - watercourse related
					NWF flooded, beaver ponds
					NWL lakes, ponds
					NWR rivers
					SC shrub closed
					SO shrub open
D_SEIS	87	Character	4	0	Deletion for seismic
					SEIS Seismic area
F_ORIGIN	88	Character	8	0	Final stand origin assignment
					MGD Managed stands
					NAT Natural stands
					RECBURN Recently burned stands (post inventory)
					X Non forest
F_LEAD_SP	89	Character	8	0	Leading species
					AW Trembling aspen
					BW White birch
					LT Tamarack
					NO No appropriate species present
					PB Balsam poplar
					PL Lodgepole pine
					SB Black spruce
					SW White spruce
					X No species found
F_AGE	90	Integer	4	0	Final stand age assignment (2009)
F_YC	91	Character	8	0	Final stand species strata assignment
					CD Conifer mixedwood
					DC Deciduous mixedwood
					DEC Deciduous
					DU Deciduous with conifer understory
					LT Larch
					PL Lodgepole pine
					SB Black spruce
					SW White spruce
					X No strata assigned
F_SRD	92	Character	8	0	Final stand SRD extended strata assignment
					C1 Pure white spruce
					C10 Black spruce leading with pine
					C11 Black spruce leading without pine
					C12 Larch leading
					C2 White spruce leading with pine
					C3 White spruce leading without pine
					C4 Pure pine
					C5 Pine leading with white spruce
					C6 Pine leading with black spruce
					C8 Pine leading without spruce and fir
					C9 Pure black spruce
					CD1 White spruce/aspen
					CD2 White spruce/poplar
					CD3 White spruce/birch
					CD4 Pine/aspen
					CD7 Black spruce/aspen

Column Name	Order	Type	Width	Decimal	Description
					Value / **Definition**
					CD8 — Black spruce/poplar
					CD9 — Black spruce/birch
					D1 — Pure aspen
					D2 — Aspen leading with poplar
					D3 — Aspen leading without poplar
					D4 — Poplar leading
					D5 — Birch leading
					DC1 — Aspen/white spruce
					DC11 — Birch/black spruce
					DC2 — Aspen/pine
					DC3 — Aspen/black spruce
					DC5 — Poplar/white spruce
					DC7 — Poplar/black spruce
					DC9 — Birch/white spruce
					X — No strata assigned
					XX0 — Non forest
F_STORY	93	Integer	4	0	Inventory source used for stand classification
					1 — AVI overstory
					2 — AVI understory
					3 — Deciduous with conifer understory
					4 — Existing cutblock
					5 — Linear features established since AVI
F_DEN	94	Character	8	0	Final stand density assignment
					A — Crown closure 6-30%
					B — Crown closure 31-50%
					C — Crown closure 51-70%
					D — Crown Closure 71-100%
					X — No crown closure
F_TPR	95	Character	8	0	Final stand timber productivity assignment
					F — Fair
					G — Good
					M — Medium
					U — Unproductive
					X — No TPR
F_HGT	96	Integer	5	0	Final stand height assignment
F_DEL	97	Character	12	0	Final stand deletion classification
					BREAK — River break areas
					CC_SC — AVI clearcuts with shrub regeneration
					FIRE — Areas burned since 1994
					GOVRES — Government assigned dispositions (DRS and PNT)
					GRBUF — Ground rule buffers
					LEASE — Government assigned dispositions
					LINEAR — Linear features without linework
					LT — Larch stands
					NC — Noncommercial forest stands
					NF — Nonforest areas
					NONE — Managed area - no deletions
					ROADS — Road polygons
					SB_ADENS — Black spruce A density stands
					SB_WET — Black spruce on wet sites
					SEIS — Areas covered by seismic lines
					TPR — Unproductive timber productivity rating
					UTIL — Utility polygons
					XDFA — Private lands and non-classified areas
F_AREAHA	98	FloatingPt	12	6	Final stand area (ha)
UKEY4_TSA	99	Integer	0	0	Unique key TSA landbase

Column Name	Order	Type	Width	Decimal	Description	
					Value	Definition
UKEY4_CLS	100	Integer	0	0	Unique key Classified landbase	
SUMM_ORD	101	Integer	0	0	Summary order for reporting	
SUMM_DES1	102	Character	50	0	Summary description for reporting	

The Forestry Corp. Project Number: P631
For additional information, please contact:
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