Alberta-Pacific Forest Industries Inc.
2015-2025 Forest Management Plan

Landbase Documentation

July 2017

ALBERTA PACIFIC FOREST INDUSTRIES INC

EXECUTIVE SUMMARY

The Alberta Pacific Forest Industries (Al-Pac) Ltd. Forest Management Agreement (FMA) area includes areas within 12 Forest Management Units (FMUs). For the Forest Management Plan (FMP) process, a netdown landbase has been developed to support the Timber Supply Analysis (TSA).

This document describes the process used to develop the active (managed) landbase for the TSA. Both spatial and tabular datasets are submitted with this analysis. The final spatially classified landbase for Al-Pac consists of 3,288,987polygons. The landbase is split into a coniferous and a deciduous landbase. The base year for this assessment is 2013.

The following table shows a breakdown by class and area resulting from the netdown process, by FMU. The column DEL_GRP in the netdown landbase dataset reflects the classification in the table. These results can be duplicated by summarizing the field F_AREA by the field DEL_GRP. The unique key to the tabular and spatial data is the field CLS_KEY; use CLS_KEY to join spatial and tabular data.

The effective date of the landbase is May 1st, 2013.

Al-Pac was granted Agreement-In-Principle (A-I-P) for the landbase from the Government of Alberta on December 8, 2016. To account for A-I-P conditions and to align with changes required by the TSA, the landbase was updated for FMP submission. This document describes the development of the A-I-P landbase and the subsequent revisions. The table below reflects the FMP submission landbase.

Deletion Category	Forest Management Unit												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Total Landbase Area Remaining (ha)	562,719	746,243	239,993	570,098	247,141	438,463	118,403	270,463	294,896	467,233	705,325	106,766	4,767,743
Aquatic													
Lake	8,489	13,716	19,309	17,984	3,527	7,631	3,899	10,403	7,365	25,562	19,478	6,647	144,011
River	715	2,620	295	2,192	746	3,727	730	144	1,265	554	1,946	840	15,774
Flooded Areas	1,139	2,412	618	1,482	676	531	115	1,151	767	2,502	1,901	109	13,402
River Break	544	1,180	0	0	3,859	8,097	1,635	0	0	0	0	1,298	16,613
Buffers	12,146	14,333	8,144	16,287	3,644	9,984	2,945	7,282	6,656	13,850	17,882	5,991	119,145
SubTotal	23,033	34,261	28,366	37,945	12,452	29,971	9,324	18,980	16,053	42,468	41,207	14,885	308,945
Total Landbase Area Remaining (ha)	539,687	711,982	211,627	532,153	234,689	408,492	109,079	251,482	278,843	424,766	664,118	91,881	4,458,798
In-Operable													
Wet Areas	132,983	144,748	20,761	78,444	23,956	66,496	17,592	22,415	30,203	51,869	104,379	7,850	701,695
Naturally Non-Forested	51,582	47,506	13,508	36,966	19,531	35,702	12,131	21,177	22,333	41,436	65,344	7,976	375,193
Naturally Non-Vegetated	1	19	0	0	9	162	4	0	2	0	1	0	199
Non-Commerical Species	49,167	192,403	57,728	164,583	73,307	34,174	30,077	49,054	51,233	111,217	136,429	17,358	966,732
Timber Productivity Rating	39,940	43,370	6,090	24,690	4,826	32,818	1,623	6,449	17,400	26,007	90,504	1,235	294,952
Non-Commerical Coniferous Stands	104,182	6,364	2,832	8,777	857	88,257	902	3,629	1,447	1,925	5,035	354	224,561
Non-Commerical Deciduous Stands	4,886	5,048	1,510	2,977	2,623	1,630	940	2,503	4,526	3,264	5,901	808	36,616
A Density Stand Deletions	4,091	11,861	2,726	3,132	1,934	1,270	701	2,589	5,037	5,985	6,425	1,298	47,049
Isoloated Stands	769	539	760	1,252	712	988	206	370	454	713	888	245	7,896
Non-Forested CC	2,637	3,124	4,052	7,560	3,509	2,200	1,893	822	421	4,484	1,902	1,094	33,699
SubTotal	390,237	454,983	109,967	328,381	131,266	263,696	66,068	109,009	133,057	246,901	416,809	38,218	2,688,591

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Naturally Non-Vegetated	1	19	0	0	9	162	4	0	2	0	1	0	199
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Deletion Category	Forest Management Unit												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Total Deletions (ha)	1,028,104	1,180,635	257,365	844,004	195,605	443,787	83,826	190,079	218,585	433,083	555,326	73,722	5,504,121
Total Landbase Area Remaining (ha)	**149,450**	**256,999**	**101,660**	**203,772**	**103,423**	**144,796**	**43,011**	**142,474**	**145,786**	**177,865**	**247,309**	**53,663**	**1,770,207**
Operable													
Deciduous	41,464	129,887	58,318	109,190	54,603	28,524	23,438	72,740	80,171	93,869	162,692	36,077	890,972
Deciduous / Coniferous	8,157	14,998	5,800	10,833	7,809	12,760	2,266	11,224	8,043	15,459	14,437	3,073	114,858
Coniferous / Deciduous	9,085	11,437	5,280	6,473	9,426	13,486	2,221	7,307	8,103	16,125	9,360	2,797	101,100
Coniferous	90,745	100,677	32,263	77,277	31,586	90,027	15,085	51,203	49,469	52,412	60,819	11,715	663,277
SubTotal	149,450	256,999	101,660	203,772	103,423	144,796	43,011	142,474	145,786	177,865	247,309	53,663	1,770,207

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1 Overview

1.1 Objective

The purpose of the landbase netdown exercise is to identify and classify the Alberta Pacific Forest Industries Ltd. (Al-Pac) Forest Management Agreement (FMA) area into the lands that are clearly destined for forest management. On those lands, the stands are classified into the strata that will be used to track growth and yield forecasts for the duration of the Forest Management Plan (FMP).

The objective of this documentation is to describe the datasets used to generate the Landbase (LB), describe any processing completed on those datasets to prepare them for the netdown process, and describe the business rules applied to the amalgamated landbase to classify and stratify the land for the purposes of timber and resource allocation.

The level of detail provided in this documentation should be sufficient to allow any qualified Geographic Information System (GIS) Analyst or GIS/Forestry Analyst to repeat the process and achieve the same result as reported in Section 5.

1.2 Landbase Effective Date

The datasets are current, or extracted, as of May 1st, 2013

1.3 Landbase Products

Three separate databases were created, each representing essentially the same information but in different ways, as described below. Each database was developed for a specific purpose and has the same geographic extent, areas under deletion, and distribution of strata.

TSA Landbase

The landbase forms the basis of the Timber Supply Analysis (TSA) modeling. The TSA landbase is spatial and carries all the information of the classified landbase with the exception of the seismic line work. The unique key from the TSA landbase is carried forward to the classified landbase for quality control and validation purposes.

Classified Landbase

The purpose of this landbase is to satisfy the requirements of the Alberta Forest Planning Standard (Alberta Sustainable Resource Development 2006, Version 4.1). This landbase is spatial and is generated by combining the TSA landbase with seismic features. The classified landbase is also used to calculate the area and distribution of all features on the landscape, particularly to generate summaries of seismic detail and carry this into the modeling landbase. The classified landbase carries the greatest number of spatial polygons.

Modeling Landbase

The modeling landbase is both tabular and spatial. The tabular data is created to make the landbase suitable for both strategic and operational TSA modeling. The spatial component is used for harvest scheduling. The goal is to represent the necessary information with simplified assignments (where possible) suitable for forecasting the timber supply. This landbase represents the identical spatial features as the TSA landbase but carries attributes for the modeling component. In addition, records on the modeling landbase contain an attribute describing the area deduction due to seismic for each polygon in the TSA landbase.

1.4 Spatial Landbase Process

Developing the landbase for the Al-Pac FMP has five distinct steps:

- Identify and assemble all available data to support the landbase classification process (see section 2);
- Process input datasets to develop submission datasets that represent the data theme required for inclusion in the landbase (see section 2.3);
- Spatially process input datasets to generate the spatial landbases (see section 3);
- Process attributes to characterize/stratify the landbase (see section 4); and
- Identify area available for forest management activities (see section 5).

Figure 1.1 illustrates the steps of data processing and scripts used throughout. The scripts referenced in this figure are all provided on the delivery media, and are also presented in APPENDIX V.

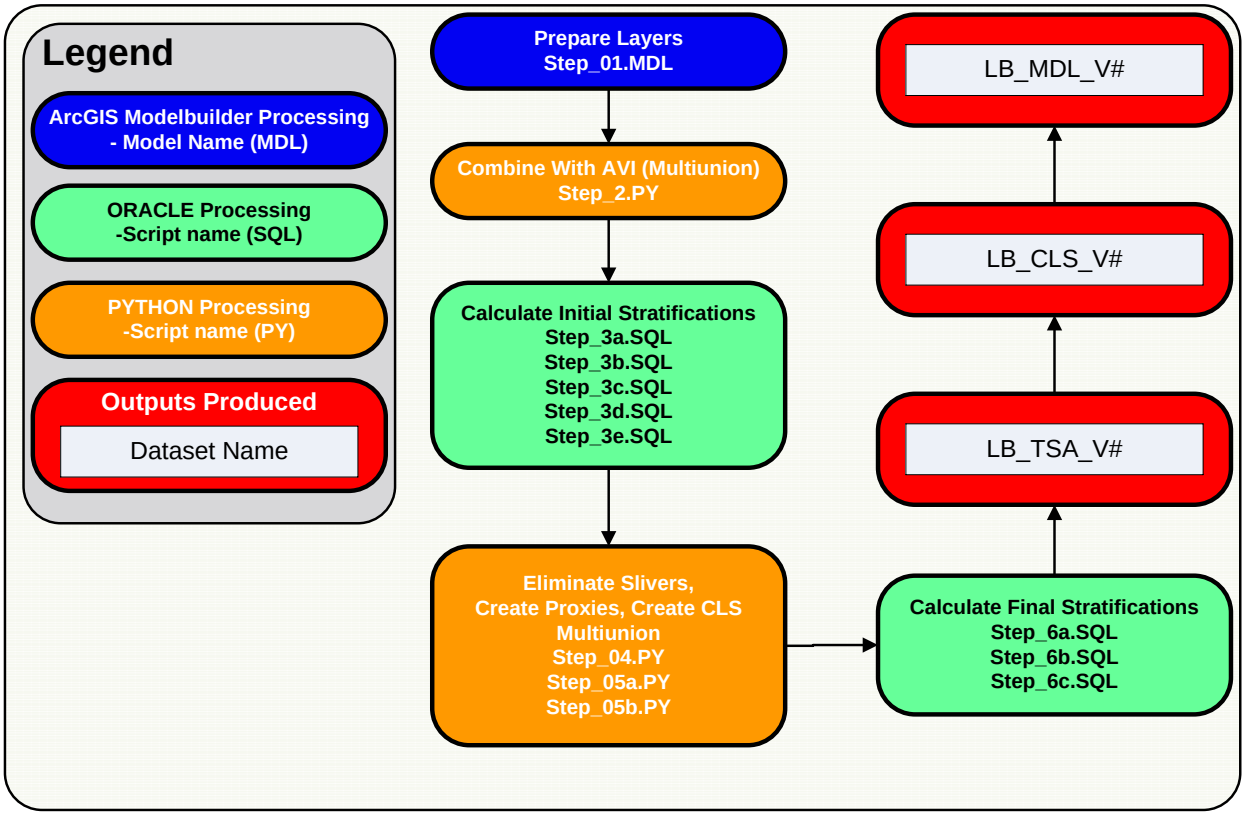


Figure 1.1. Map of data processing and scripts.

2 Summary of Datasets

This section describes all input datasets and the processing necessary to prepare them for inclusion in landbase analysis. Each dataset is described as to its source, content, processing, and important attributes for the netdown process. A full data dictionary of the input datasets is provided in Appendix IV.

2.1 Summary of Input Datasets

The input datasets are the raw, source datasets that are processed and assembled into the spatial landbase. The standard processing of the input datasets involves:

- Ensuring all attribute field names are valid (no reserved words, duplicate keys, etc.);
- Pulling important fields to the output dataset and dropping all non-required fields;
- Clipping to the FMU boundary and projecting to Universal Transverse Mercator (UTM) Zone 12N, North American Datum (NAD) 83, units = meters; and
- Converting to Environmental Systems Research Institute (ESRI™) coverage format, accepting default settings, and cleaning topology when polygonal.

Table 2.1 provides an overview of the input datasets. The list of datasets contains the following:

- Theme Name: a general theme name describing the contents;
- Input Dataset Name(s): the name of the actual dataset(s) used as input to the process;
- Description: a short description of the dataset contents;
- Source(s): the source (supplier) of the input dataset;
- Usage: the method that the dataset is brought to the landbase;
- Reference: the heading number in this document, where this data theme is described in detail.

2.2 Processing of Input Datasets

The loading, converting, reformatting and spatial processing of data was completed by scripting and model creation within *ArcGIS Modelbuilder, PYTHON*, and *Structured Query Language* (SQL). The use of scripts and models to process data from start to finish allows a fully transparent process to be applied, and ensures that the process is repeatable.

Datasets are described in terms of:

- Input Dataset Name(s) The names of the datasets used in the creation of the output;
- Source(s): Where the dataset described in the Dataset Name was sourced from;
- Description: A description of the input layers;
- Processing for Input: Methods of processing to create the landbase layer;

- Assumptions/Processing Issues: Identified issues and assumptions that had to be resolved to create the final layer;
- Programs: A list of the processing tools used to create the layer;
- Output: A description of what the output is utilized for;
- Important Attributes: Attributes that are brought forward to the landbase;
- Delivered Theme Name: The name of the theme that is provided along with the completed landbase files.

Input datasets are typically scale independent, meaning that each layer was derived at a specific level of detail to serve a specific purpose at that time. Large scale datasets, when overlaid and compared to small scale datasets, do not offer the same level of detail and boundaries offered are fuzzy, and can also complicate the landbase process through the creation of slivers. One of the objectives of the landbase netdown process is to minimize the size of the spatial file to make the spatial data easier and faster to query and transfer from system to system as well as to ensure that the polygons created are meaningful in the context of resource management. This creates two types of input data; Input (direct), where line work is preserved, and Proxy (indirect). Table 2.1 distinguishes between these two data types within the "Usage" column. Proxy features are linked to AVI polygons by identifying which AVI polygons have their centroid within the feature to be added.

2.3 Summary of Submission and Landbase Input Datasets

The input datasets are listed in Table 2.1 and are described in the following sections. For each theme, a brief description of the data is provided, along with the steps taken to process the data to make the submission dataset. Note that the column "Reference" in Table 2.1 indicates the heading number in this section which deals with that data theme. For each theme, an overview map is also provided. Overview maps are intended only to put the data into context within the FMA boundary.

Table 2.1. List of input datasets.

Theme	Source	Input Dataset Name	Description	Usage	Reference
Administrative Boundaries					
Forest Management Agreement Area (FMA)	AltaLIS	BF_FMA_Polygon.shp	Boundary describing the area contained within the Al-Pac FMA	Preserve Linework	2.3.1
	Al-Pac	FMA_Erase_UDSR.shp	Urban Development Sub-Region area for the Fort McMurray		
	Al-Pac	FMA_LARPArea.shp	Lower Athabasca Regional Plan area		
Forest Management Units (FMU)	AltaLIS	BF_FMU_Polygon.shp	Boundary describing the Alberta forest management units	Preserve Linework	2.3.2
Municipalities	AltaLIS	BF_Settlement_Polygon.shp	Boundary of areas within the FMA describing municipal limits	Preserve Linework	2.3.3
	Al-Pac	UDSR_Boundary.shp	The expanded Urban Sub region Development Zone created under LARP		
Parks and Protected Areas	AltaLIS	BF_PRA_POLYGON.SHP	Provincial Recreational Areas within the Al-Pac FMA area	Preserve Linework	2.3.14
		BF_PROVINCIAL_PARK_POLYGON.SHP	Provincial Parks within the Al-Pac FMA area		
		BF_PUBLND_REC_TRL_POLYGON.SHP	Public Land Recreational Trails within the Al-Pac FMA area		
		BF_ECO_RESERVE_POLYGON.SHP	Ecological Reserves within the Al-Pac FMA area		

Theme	Source	Input Dataset Name	Description	Usage	Reference
		BF_WILDLAND_PARK_POLYGON.SHP	Wildland Parks within the Al-Pac FMA area		
		BF_NATURAL_AREA_POLYGON.SHP	Natural areas within the Al-Pac FMA area		
		BF_WILDERNESS_AREA_POLYGON.SHP	Wilderness Areas within the Al-Pac FMA area		
Treaty Land Entitlements	Timberline	TLE_2011.shp	Boundary of areas within the FMA describing the location of treaty entitlements	Preserve Linework	2.3.4
	AltaLIS	BF_Indian_Res_Polygon.shp	Known reservations		
Fires Smart	GOA	Firesmart_cz_intersection_Al-Pac.SHP	Fire smart zones for within the FMA area.	Preserve Linework	2.3.10
Private Land	Al-Pac	N/A	Land area modifier calculated through analysis	AAC Adjustment	2.3.5
Disturbance Features					
Harvest Depletion - RSA	Froese Consultants	ABPLY_ARS_S14_QC3.shp	Regeneration survey blocks under RSA for Alberta Plywood within Al-PAC FMA area	Preserve Linework	2.3.6
		ALPA_2009_10_aerial_SU.shp	Regeneration survey blocks under RSA for Alberta Pacific within Al-PAC FMA area		
		ALPA_2010_11_aerial_SU.shp	Regeneration survey blocks under RSA for Alberta Pacific within Al-PAC FMA area		
		ALPA_2011_2012_aerial_interp1.shp	Regeneration survey blocks under RSA for Alberta Pacific within Al-PAC FMA area		
		ALPA_2012_13_AERIAL_interp1.shp	Regeneration survey blocks under RSA for Alberta Pacific within Al-PAC FMA area		

Theme	Source	Input Dataset Name	Description	Usage	Reference
		APLY_S18_ONLY_QC2.shp	Regeneration survey blocks under RSA for Alberta Plywood within Al-PAC FMA area		
		FRIA_2009_10_Al-Pac_aerial_SU.shp	Regeneration survey blocks under RSA for FRIAA within Al-PAC FMA area		
		FRIAA_S11_2012_13_AERIAL_interp1.shp	Regeneration survey blocks under RSA for FRIAA within Al-PAC FMA area		
		MWBO_2009_10_aerial_SU.shp	Regeneration survey blocks under RSA for MWFP within Al-PAC FMA area		
		MWBO_2009_10_aerial_SU_v2.shp	Regeneration survey blocks under RSA for MWFP within Al-PAC FMA area		
		MWBO_2010_11_aerial_SU.shp	Regeneration survey blocks under RSA for MWFP within Al-PAC FMA area		
		S23_RSA.shp	Regeneration survey blocks under RSA from other sources within Al-PAC FMA area		
		supplemental_blocks_20140509.shp	Regeneration survey blocks under RSA from other sources within Al-PAC FMA area		
		VAND_AL-PAC_2010_11_aerial_SU.shp	Regeneration survey blocks under RSA for Vanderwell within Al-PAC FMA area		
Harvest Depletion - Category 1s	Timberline	Category1s.shp	All category 1 blocks as identified through the AVI-ARIS Reconciliation Program	Link to AVI	2.3.7
Harvest Depletion - Cutblocks (1991 - 2013)	Timberline	A14_apr29_14.shp	Cutblocks from Timberline representing data collected from quota holders within the FMA area for the different FMUs	Preserve Linework	2.3.7
		A14_AVI_CC_MWBOv1.shp			
		A14_Opening_By_Category.shp			
		A15_apr29_14.shp			

Theme	Source	Input Dataset Name	Description	Usage	Reference
		A15_AVI_CC_PostMOSA.shp			
		A15_ESRD.shp			
		A15_Opening_By_Category.shp			
		AESRD_L2arecon.shp			
		AESRD_L2brecon.shp			
		AESRD_L2crecon.shp			
		AESRDop.shp			
		blocks_merge_060513.shp			
		bobocel_2011-12.shp			
		bobocel_2012-13.shp			
		CTLL020073_Blocks.shp			
		CTLL020074_Blocks.shp			
		CTLL020075_Blocks.shp			
		CTLL020080_Blocks.shp			
		CTLS040034_Blocks.shp			
		CTLS080026_Blocks.shp			
		CTLS12003_005_Blocks.shp			
		CTPS18J002_Blocks.shp			
		L01_apr29_14.shp			
		l01_asblt_blks_before_2011-2012.shp			
		l02_asblt_blks_before_2011-2012.shp			
		l02_final_apr23.shp			
		L03_apr29_14.shp			
		L08_apr29_14.shp			
		L1_AL-PAC_Category_by_Opening.shp			
		L1_AVI_CC_MWBOv1.shp			
		L11_apr29_14.shp			
		L11_ESRD.shp			
		L11_Opening_by_Category.shp			

Theme	Source	Input Dataset Name	Description	Usage	Reference
		L1MergedESRD.shp			
		l2_AL-PAC_Opening_by_Category.shp			
		L2_AVI_CC.shp			
		L2_VCL_2012_Cutblocks.shp			
		L3_AL-PAC_Opening_by_Category.shp			
		L3_AVI_CC_MWBOv1.shp			
		L3MergedESRD.shp			
		L8_AL-PAC_Opening_by_Category.shp			
		l8_avi_cc_112613.shp			
		L8MergedESRD.shp			
		MWBO_spatial.shp			
		MWBO_spatial_archive.shp			
		opening.shp			
		S07_AL-PAC_Opening_by_Category.shp			
		S08_Blks.shp			
		S11_AL-PAC_Opening_By_Category.shp			
		S11_apr29_14.shp			
		S11_CC.shp			
		S11ESRD.shp			
		S14_Blks.shp			
		S18_APLY_CC.shp			
		S18_apr29_14.shp			
		S18_AVI_CC.shp			
		S18_Blks.shp			
		S18_Opening_by_Category.shp			
		S18_VCL_2011_Cutblocks.shp			
		S22_apr29_14.shp			
		S22_AVI_VCL_CC.shp			
		S22_Opening_by_Category.shp			

Theme	Source	Input Dataset Name	Description	Usage	Reference
		S22ESRD.shp			
		S23_apr29_14.shp			
		S23MergedESRD.shp			
		spruceland_2011-12.shp			
		spruceland_2012-13.shp			
		VCL_Blocks_missing_from_AVI_CC.shp			
		VCL_L2_Cutblocks_newer.shp			
		VCL_L2_Cutblocks_older.shp			
		VCL_S18_Cutblocks_newer.shp			
		VCL_S18_Cutblocks_older.shp			
		VCL_S22_Cutblocks.shp			
	Al-Pac	S14S012_13CompleteBlocks10Jun14.shp			
		FHP_Data.shp			
		Missing_opening.shp			
		Missing_opening2.shp			
		opening.shp			
		TFM_Block.shp			
	St. Jean	2005-2006_shs_harvest_removed.shp	Additional harvest data for the 1991 - 2013 timber years.		
		2005-2014_shs_harvest_combined.shp			
		2006-2008_shs_harvest.shp			
		2009-2014_shs_harvest.shp			
		2013-2014_shs_harvest.shp			
	MWFP	A14_Additions.shp			
		A14_Blks.shp			
		L1_Additions.shp			
		L1_blks.shp			
Harvest Depletion - Cutblocks (2013 - 2015)	Al-Pac	2014_variance_added_shs.shp	Additional harvest data for the 2013 - 2015 timber years.		
		71204_Blocks.shp			
		85074_Blocks.shp			

Theme	Source	Input Dataset Name	Description	Usage	Reference
		93234_Blocks.shp			
	MWFP	S11_2013-14_CompleteBlocks.shp			
		MWFPUpdateCompletedBlocks.shp			
Harvest Depletion - Planned, Deferred, Deletions, Additions	Al-Pac	L1_2014_SHS_Variance.shp	Boundaries describing areas currently under plan, cut, deferred, deleted or added to harvest operations for the different FMUs for Al-Pac	Preserve Linework	2.3.7
		L2_2014_SHS_Variance.shp			
		L3_2014_SHS_Variance.shp			
		S11_2014-15_ContingBlocks.shp			
		S11_2014-15_PlannedBlocks.shp			
		S142014_15PlannedBlocks10Jun14.shp			
		S14_PrelimBlocks_10Jun14.shp			
	St. Jean Lumber	L8_2014_SHS_Variance.shp	Boundaries describing areas currently under plan, deferred, deleted or added to harvest operations for the different FMUs for St. Jean Lumber		
		L11_2014_SHS_Variance.shp			
		S11_2014_SHS_Variance.shp			
		S18_2014_SHS_Variance.shp			
		S22_2014_SHS_Variance.shp			
		S23_2014_SHS_Variance.shp			
		2014_variance_defer_shs_a.shp			
		2014_variance_defer_shs_b.shp			
		2014_variance_defer_shs_c.shp			
		2014_variance_deleted_shs_a.shp			
		2014_variance_deleted_shs_b.shp			
		2014_variance_deleted_shs_c.shp			
	Vanderwell	VCL_L2_PlannedBlocks.shp	Boundaries describing areas currently under plan, deferred, deleted or added to harvest operations for the different FMUs for Vanderwell		
		VCL_S18_plannedBlocks.shp			
	Millar Western	A14_Deferrals.shp	Boundaries describing areas currently under plan, deferred,		
		A14_Preblk.shp			

Theme	Source	Input Dataset Name	Description	Usage	Reference
		A14_Priority_1_10 year.shp	deleted or added to harvest operations for the different FMUs for MWFP		
		A14_SHS_Harvested.shp			
		L1_Deferrals.shp			
		L1_Preblk.shp			
		L1_SHS_Harvested.shp			
		Heart_Lake_L01.shp			
		L3_Deletions.shp			
		CBFA_L03.shp			
		L03_Blocks.shp			
		L03_Pass_One.shp			
	Alberta Plywood	APL_2014_2015_Planned_Harvest.shp	Boundaries describing areas currently under plan, deferred, deleted or added to harvest operations for the different FMUs for Alberta Plywood		
		APL_Future_Planned_2016_2017.shp			
Fire	GOA	AB_fireshistory.shp	Boundaries identifying areas that have been burned within the Al-Pac FMA	Preserve Linework	2.3.9
Digital Integrated Disposition System	DIDS	AB_APPL.shp	Roads, well sites, pipelines, PPA, PNT/CNT, DRS/ISP, Etc.	Preserve Linework	2.3.11
		LSAS.XML	Information for spatial data	Link To DIDS	
Seismic Cut Lines	Timberline	Seismic.shp	Boundaries describing the location of oil and gas cut lines	Area Adjustment	2.3.15
Capital Roads	Al-Pac	CAPTIAL_ROADS.SHP	Linear feature representation of theAl-Pac capital roads	Preserve Linework	2.3.12
Permanent Sample Plots	The Excel Wiz	tsp_psp_information_20150329.XLS	X, Y locations of PSPs	Preserve Linework	2.3.13
Surface Minable Area	Timberline	SMA.SHP	Boundary containing areas that are subject to surface mining	Preserve Linework	2.3.16

Theme	Source	Input Dataset Name	Description	Usage	Reference
Forest Inventory					
AVI - Townships (Spatial)	Timberline	tXrYmZ.E00	784 Township, range, meridian tiles of the spatial inventory of land for forestry and other related applications (access, transport, avi, hydro, hydropoly)	Preserve Linework	2.3.17
AVI - v2.1		avi.avi.dat	Tabular data set for spatial AVI data	Link To AVI	
AVI - Enhanced		avi.enhanced.dat	Tabular data set for spatial AVI data	Link To AVI	
AVI - SUBA		avi.suba.dat	Tabular data set for spatial AVI data	Link To AVI	
AVI		Forest_All.E00	Complete, merged (1 file), updated version of the township based AVI data for use in LB. Contains AVI string attributes.	Preserve Linework	
RSI	Bob Mason - Millar Western	sisrsi_mw83_june2002.shp	Regenerated stand inventory for MWFP cut areas	Preserve Linework	2.3.18
Natural Features					
Hydrology - Water Features	Timberline	Hydropoly.shp	Spatial location of major hydrological features on the Al-Pac FMA area	Preserve Linework	2.3.19
Hydrology - Water Feature Buffers	AltaLIS	BF_SLNET_Arc.shp	Hydrological linear features	Preserve Linework	2.3.20
	AltaLIS	BF_Hydro_Polygon.shp	Hydrological polygonal features		
	Timberline	AVI.shp	The Alberta Vegetation Inventory		
Hydrology - Watersheds	GOA	Watershed.shp	Watershed boundaries	Preserve Linework	2.3.21

Theme	Source	Input Dataset Name	Description	Usage	Reference
Wildlife					
Fur Management Areas	AltaLIS	BF_REG_FUR_MGMT_POLYGON.shp	Provincial boundaries of registered fur management zones	Preserve Linework	2.3.22
Caribou Zones	PLAT	Caribou_2013.shp	Provincially created Caribou habitat boundaries	Proxy	2.3.23
Ungulate Zones	PLAT	Key_Wildlife_Biodiversity.shp	Provincially created Ungulate habitat boundaries	Proxy	2.3.24
Trumpeter Swan Nesting Lakes	PLAT	Trumpeterswan_Buffers.shp	Buffers that are required around trumpeter swan lakes	Preserve Linework	2.3.25
		Trumpeterswan_Water_Locations.shp	Identified Trumpeter Swan nesting lakes requiring special management zones		
Operability					
Slopes	Al-Pac	Slope.shp	Boundary describing slopes above operability limits	Preserve Linework	2.3.26
River Breaks	Timberline	River_Break.shp	Boundary identifying operability constraints within valley areas	Preserve Linework	2.3.27
Tree Improvement Zones	Al-Pac	Seedzones.shp	Boundaries describing seed zones for the Al-Pac FMA area	Preserve Linework	2.3.28
Other					
A Density Switch Stands	MWFP	AVI_A_Density.SHP	Identified A density stands to switch to understory stratum assignment.	Proxy	2.3.29
Cowper Viewscape	Al-Pac	Cowper_Viewshcape.shp	Boundary describing area to be a deletion based on natural non-vegetation	Preserve Linework	2.3.30
Heart Lake Viewscape	Al-Pac	Heart_Viewshcape.shp	Boundary describing area to be a deletion based on natural non-vegetation	Proxy	2.3.31
Derived					
Isolated Stands	N/A	N/A	Identification of isolated stands	Proxy	4.3.3.2

2.3.1 FMA Boundary

2.3.1.1 *Input Dataset Name(s)*

1. BF_FMA_POLYGON.SHP
2. FMA_ERASE_UDSR.SHP
3. FMA_LARPAREA.SHP

2.3.1.2 *Source(s)*

1. The 2011 FMA and FMU boundaries. Source: AltaLIS Spatial Data Warehouse; access 08-13
2. Fort McMurray Urban Development Sub-Region (UDSR)
   Source: GOA Integrated Resource Management Planning Division, Surveys and Technical Services Section
3. Lower Athabasca Regional Plan (LARP) Protected Areas. Source: Al-Pac spatial data warehouse

2.3.1.3 *Description*

Boundary information for defined forest management area under the FMA. The current AltaLIS FMA area boundary does not reflect the recently approved LUF protected areas. Other data layers are used to rectify this issue.

2.3.1.4 *Processing for Input*

1. Erase (remove) the USDR boundary from the 2007 FMA shape
2. Remove the “Lakeland Country Iconic Tourism Destination” feature from the LARP dataset as this area is not a designated land base deletion
3. Erase (remove) the remaining LARP features from the result of step 1
4. Examine the product from step 3 and remove some extraneous polygons from the planning envelope (these three areas are in a separate feature class in the delivered File Geo-Database):
   a) a Theoretical Road Allowance in SW-Sec29-T90-R9-W4M
   b) a Theoretical Road Allowance in SW-Sec4-T89-R8-W4M – this Road Allowance separates the Clearwater River Public Land for Recreation and the Gipsy-Gordon Wildland Park
   c) a 7.24 hectare “island” of land in NW-Sec32-T88-R8-W4M south of the Clearwater River Public Land zone and not adjacent to any other FMA lands

2.3.1.5 *Assumptions/Processing Issues*

Where FMA_STATUS = ‘FMA’ represents the planning landbase for allowable cut calculations. Where FMA_STATUS = ‘LARP’, represents the withdrawals due to LARP approved protected areas. Where FMA_STATUS = ‘DFA+’, represents both LARP approved areas AND other non-DFA areas that will be included for planning objectives related to broad landscape issues (biodiversity, etc.).

2.3.1.6 *Programs*

None

2.3.1.7 *Output Dataset*

Single part shapefile containing the Al-Pac FMA boundary with subdivisions as described above.

2.3.1.8 *Important Attributes*

FMA_STATUS: LARP and Defined Forest Areas (DFA) from area under Forest Management Agreement (FMA) by Al-Pac

1. DFA+ - Defined Forest Area for non-timber value usage within the FMP
2. FMA – Forest Management Agreement area where forest operations may occur
3. LARP – Lower Athabasca Regional Planning area where timber value usage may occur within the FMP

2.3.1.9 *Delivered Theme Name*

LB_FMA

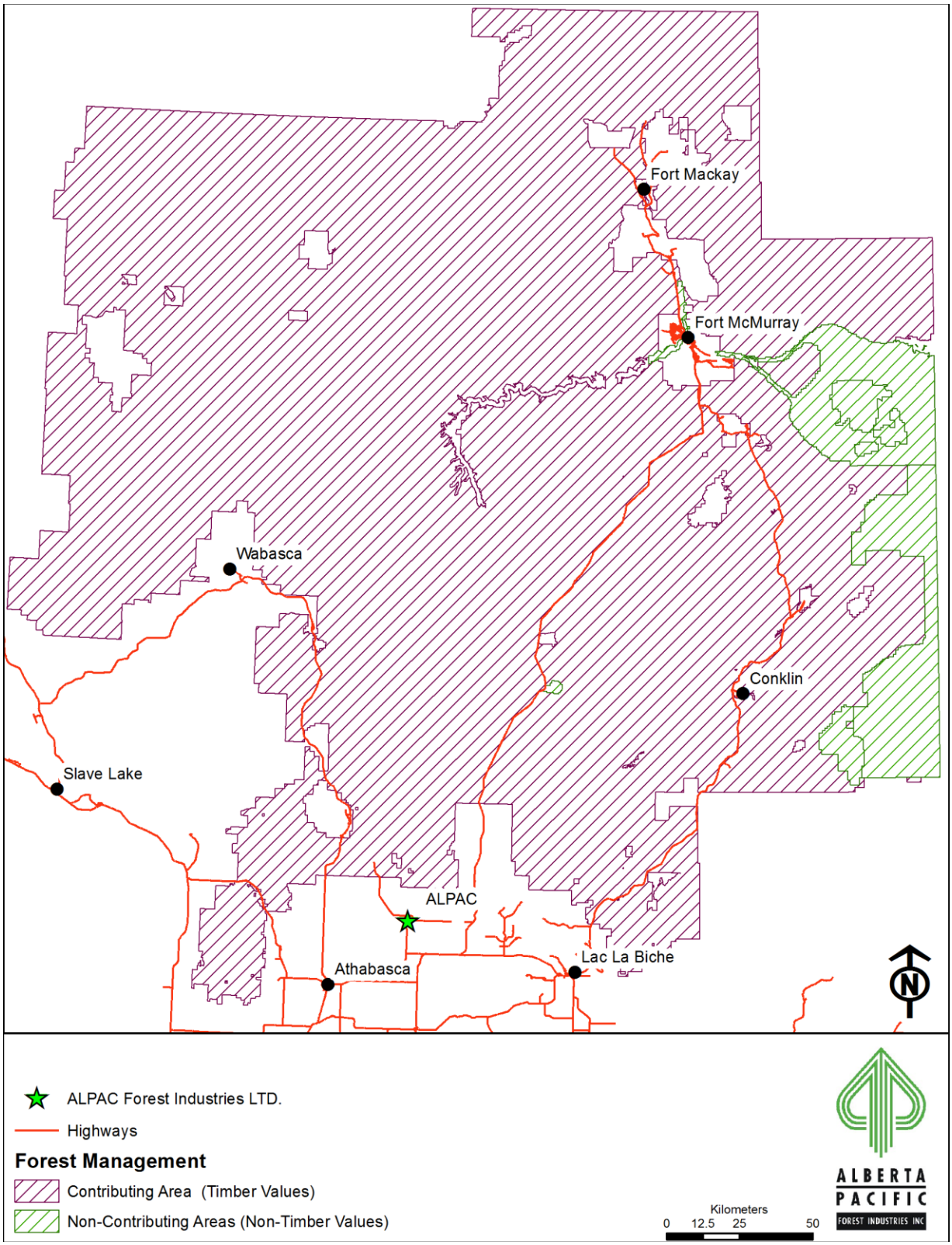


Figure 2.1. Forest Management Agreement boundary with contributing and non-contributing forest areas.

2.3.2 FMU Boundary

2.3.2.1 *Input Dataset Name(s)*

1. BF_FMU_Polygon.SHP

2.3.2.2 *Source(s)*

1. AltaLIS FMU data, access 08-13

2.3.2.3 *Description*

Alberta FMU boundaries effective June, 2010 as distributed by AltaLIS and subsequently updated by Al-Pac. The current FMUs of interest from this dataset are A14, A15, L1, L2, L3, L8, L11, S23, S11, S14, S18, S22

2.3.2.4 *Processing for Input*

1. Select data where *FMU_NAME* is 'A14','A15', 'L1', 'L2', 'L3', 'L8', 'L11', 'S23', 'S11', 'S14', 'S18', or 'S22'
2. Create feature class

2.3.2.5 *Assumptions/Processing Issues*

None

2.3.2.6 *Programs*

None

2.3.2.7 *Output Dataset*

Shapefile containing the FMUs for the Al-Pac FMA area

2.3.2.8 *Important Attributes*

FMU_NAME: FMU unique identifier

2.3.2.9 *Delivered Theme Name*

LB_FMU

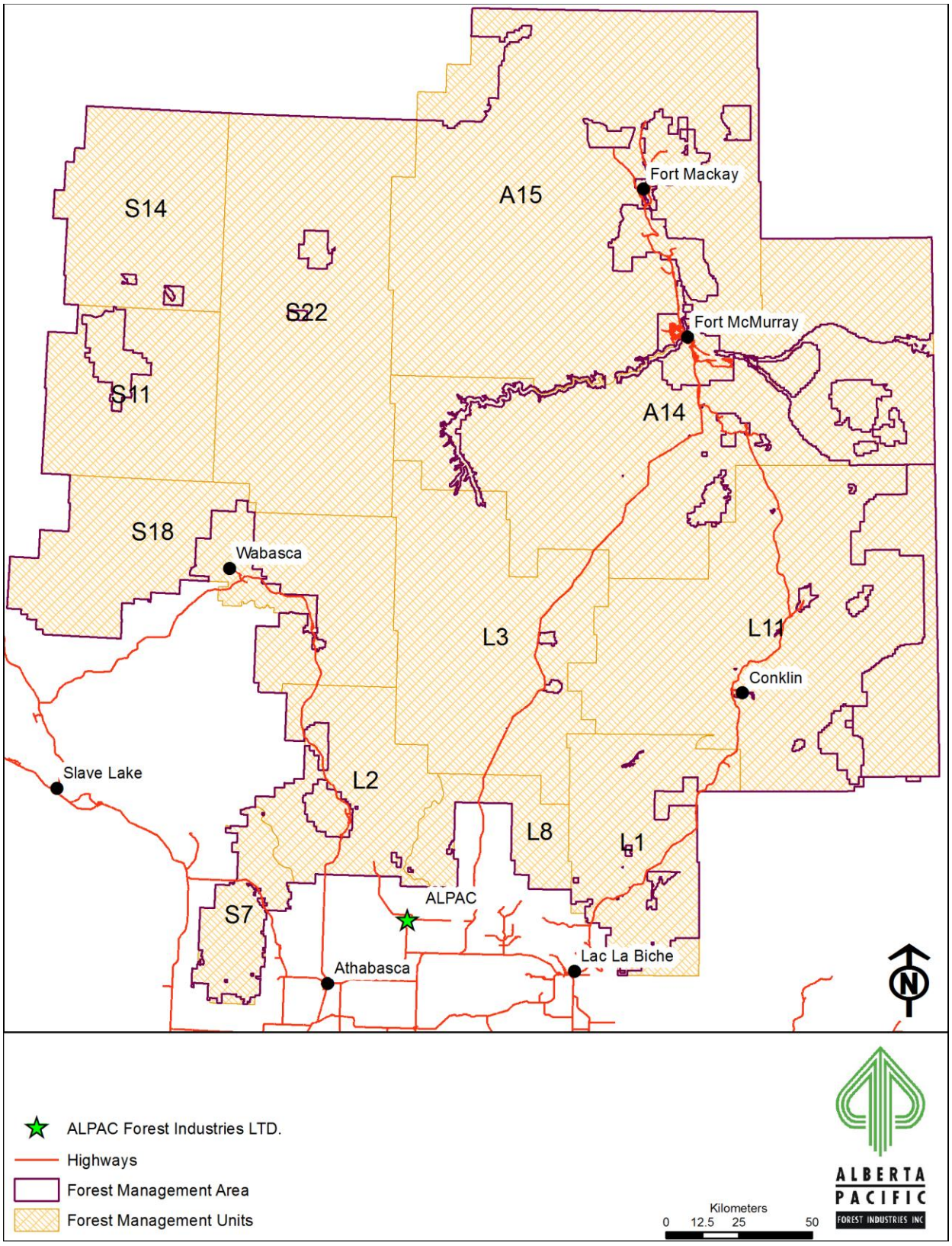


Figure 2.2. Forest Management Units of the Al-Pac FMA area.

2.3.3 Municipal Boundaries

2.3.3.1 *Input Dataset Name(s)*

1. BF_Settlement_Polygon.SHP
2. UDSR_Boundary.SHP

2.3.3.2 *Source(s)*

1. AltaLIS municipal data, access 08-13
2. Al-Pac for revised LARP urban sub-region development zone

2.3.3.3 *Description*

This dataset identifies the spatial location of municipal boundaries within the Al-Pac FMA area. Al-Pac provided data related to new LARP defined zones.

2.3.3.4 *Processing for Input*

Processing for input included a visual check to verify data completeness:

1. Union datasets together
2. Clip to FMU boundary
3. Calculate new fields identifying source characteristics
4. Dissolve by new fields to remove unnecessary linework

2.3.3.5 *Assumptions/Processing Issues*

None

2.3.3.6 *Programs*

None

2.3.3.7 *Output Dataset*

Shapefile with all municipal boundaries included

2.3.3.8 *Important Attributes*

MUNIC_TYPE: Type of municipal area
MUNIC_NAME: Name of the settlement or urban service area

2.3.3.9 *Delivered Theme Name*

LB_MUNICIP

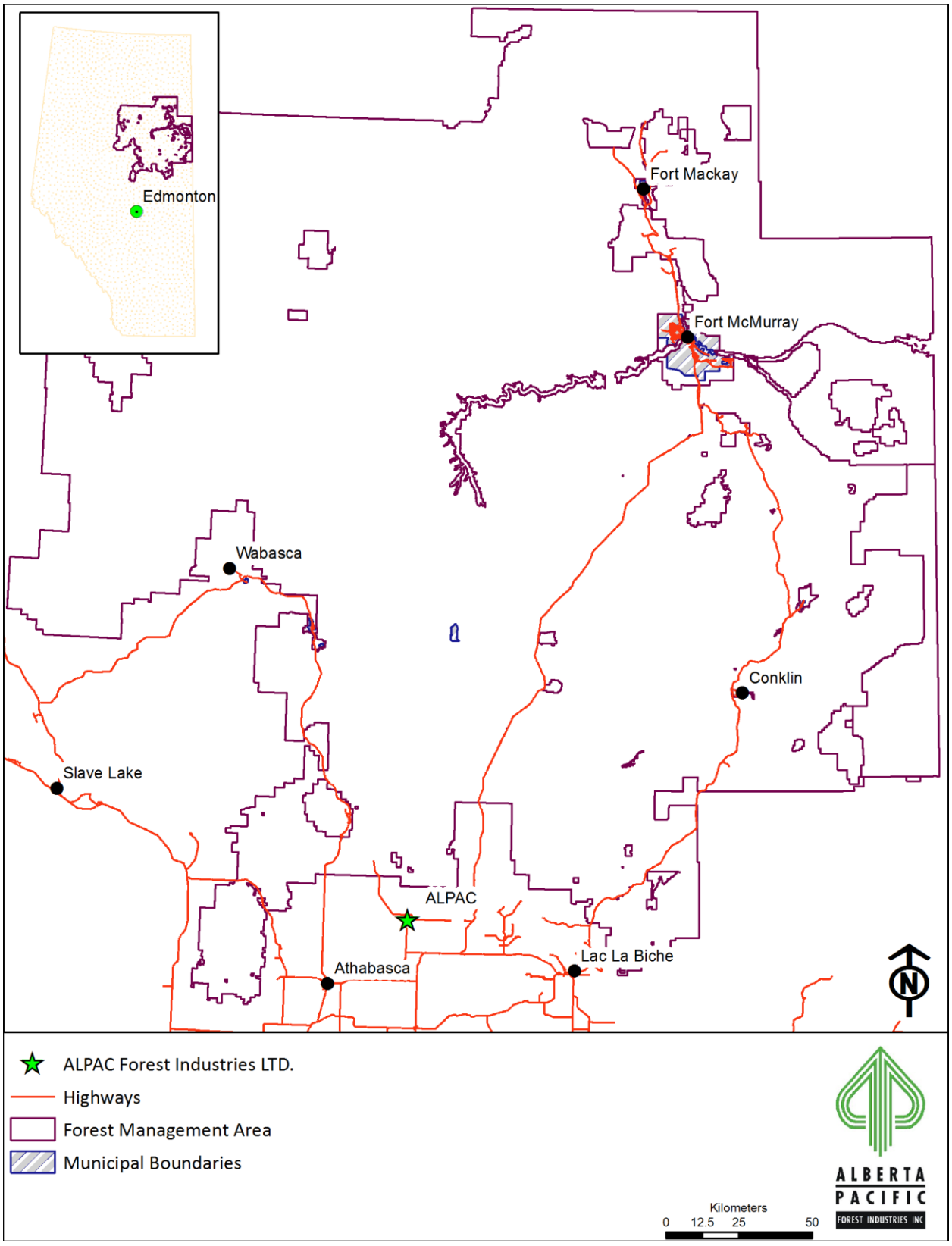


Figure 2.3. Municipalities within the Al-Pac FMA area.

2.3.4 Treaty Land Entitlements

2.3.4.1 *Input Dataset Name(s)*

1. TLE_2011.SHP
2. BF_INDIAN_RES_POLYGON.SHP

2.3.4.2 *Source(s)*

1. From Timberline consultants as part of a 2009 net landbase exercise for Al-Pac reflecting TLE's.
2. AltaLIS known Indian reservations, access 08-13

2.3.4.3 *Description*

Treaty Land Entitlements for the Al-Pac FMA area.

2.3.4.4 *Processing for Input*

Processing included a visual check to confirm the lack of Métis settlements within the FMA boundary.

1. Union datasets together
2. Clip to FMU boundary
3. Calculate new fields identifying source characteristics
4. Dissolve by new fields to remove unnecessary linework

2.3.4.5 *Assumptions/Processing Issues*

Unsure as to how the Timberline data was generated.

Most TLE areas have been excluded from the FMA area. These areas will be carried forward in the landbase file.

Confirmed that there are no Métis settlements.

2.3.4.6 *Programs*

None

2.3.4.7 *Output Dataset*

Shapefile with all recognized Treaty lands.

2.3.4.8 *Important Attributes*

FN_TYPE: Type of First Nations area
FN_NAME: Name of the TLE or IR

2.3.4.9 *Delivered Theme Name*

LB_FN.shp

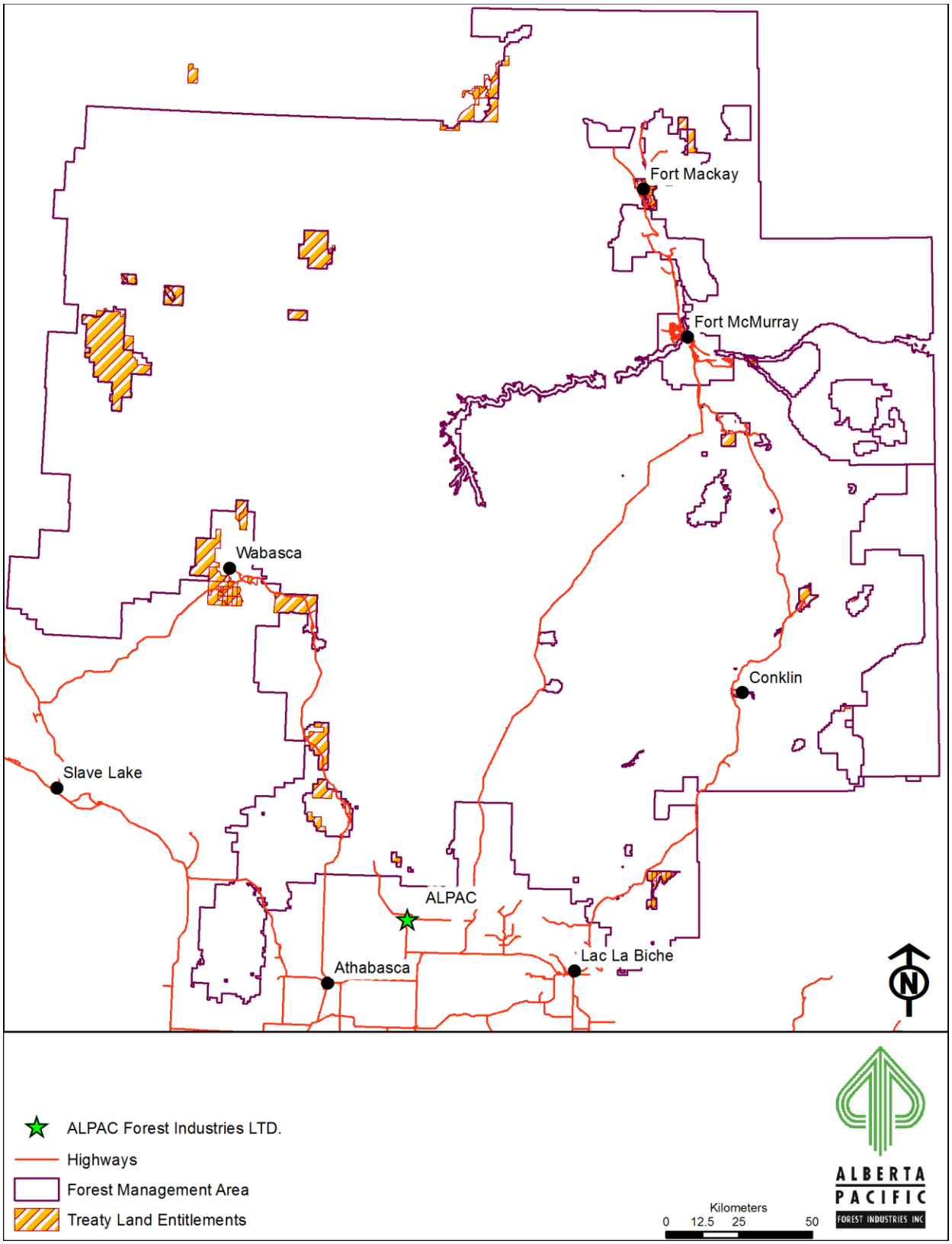


Figure 2.4. Traditional Land Entitlements within the Al-Pac FMA area.

2.3.5 Private Land

Adequate spatial information is not readily available within the Al-Pac FMA area. A study was executed for the 2009 landbase update by Timberline in which it was estimated that each township contains approximately 0.26% private land area. This value will be applied to the end volume calculations on a township basis at the spatial harvest sequencing stage.

2.3.6 RSA Data Amalgamation

2.3.6.1 *Input Dataset Name(s)*

There are 14 individual shapes representing RSA cutblocks; please refer to Table 2.1.

2.3.6.2 *Source(s)*

1. Froese Forestry Consulting Ltd..

2.3.6.3 *Description*

For the description of each dataset, please refer to Table 2.1.

2.3.6.4 *Processing for Input*

The purpose of the RSA data in the net landbase context is to (a) bring spatial linework into the net landbase, and (b) to assign stand characteristics according to the RSA survey information. Both the shapefile and attributes required processing.

2.3.6.4.1 Shapefile

1. Merge all datasets (RSA_FEAT.shp);
2. Eliminate all data fields besides Opening and Polygon;
3. Resolve spatial linework conflicts (addressed in 2.3.6.5);
4. Add field CC_TYPE, OWNERSHIP, STATUS and calculate as ‘RSA’, *owner*, ‘Complete’ respectively
5. Resolve linework conflicts with AVI where MOD1 = ‘CC’:
    a. Process RSA retention
        i. Identify all MOD1 AND MOD2 = CC (AVI_CC)
        ii. Select all Polygons that are 80% overlapped by RSA and create new shapefile (AVI_CC_CAT1.shp)
        iii. Join RSA_FEAT.shp to AVI_CC_CAT1.shp by OPEN_NUM and select features where RSA_FEAT.CC_TYPE IS NOT NULL and then remove the join
        iv. Dissolve the selected features from Step iv by OPEN_NUM field (AVI_CC_RSA.shp)
        v. Add a new field to AVI_CC_RSA.shp called UKEY_AVI and populate with 0, then delete the OPEN_NUM field
        vi. Union RSA_FEAT.shp with no input and using the NO GAPS ALLOWED option to identify all retention (RSA_W_RET.shp)
            1. Calculate CC_TYPE = ‘RETENTION’ where FID_RSA_FE = -1

vii. Union AVI_CC_RSA.shp with RSA_W_RET.shp using the GAPS ALLOWED option (RSA_AVI_UNION.shp)

viii. Calculate new field in RSA_AVI_UNION.shp called UNION_KEY to equal [FID] + 1

ix. Select CC_TYPE = 'RETENTION' AND UKEY_AVI = 0 from RSA_AVI_UNION.shp

x. Run feature to point on selection in RSA_AVI_UNION.shp with point in poly (RET_FEAT_PT.shp)

xi. Intersect RET_FEAT_PT.shp with AVI dataset to create RET_FEAT_AVI.shp

xii. Join RET_FEAT_AVI.shp to RSA_AVI_UNION.shp by UNION_KEY

xiii. Calculate RSA_AVI_UNION .UKEY_AVI = RET_FEAT_AVI.UKEY_AVI_1

xiv. Remove Join and clear any selections

xv. Copy RSA_AVI_UNION.shp to new shapefile (RSA_AVI_UNION_2.shp)

xvi. Select CC_TYPE = 'RETENTION' AND UKEY_AVI > 0 AND FID_ AVI_CC_RSA > -1 from RSA_AVI_UNION.shp

xvii. Select CC_TYPE <> 'RETENTION' from RSA_AVI_UNION_2.shp

xviii. Eliminate RSA_AVI_UNION selected features with RSA_AVI_UNION_2 selected features as exclusion layer (RSA_AVI_ELIM.shp)

xix. Dissolve RSA_AVI_ELIM.shp by all fields and using the option to create single part features(RSA_AVI_ELIMD.shp)

xx. Re-Calculate UNION_KEY as [FID] + 1 in RSA_AVI_ELIMD.shp

xxi. Select CC_TYPE = 'RETENTION' AND FID_RSA_FE = -1 AND FID_ AVI_CC_RSA > -1 from RSA_AVI_ELIMD.shp

xxii. Calculate CC_TYPE = 'RSA_RET' from selected features in RSA_AVI_ELIMD.shp

    1. This identifies RSA retention patches that have no AVI to make strata calls

xxiii. Select CC_TYPE = 'RETENTION' from RSA_W_RET.shp

xxiv. Eliminate selection using longest shared boundary from RSA_W_RET.shp to create RSA_W_RET_Elim.shp

xxv. Select CC_TYPE = 'RSA_RET' from RSA_AVI_ELIMD.shp

xxvi. Run feature to point on the selected features in RSA_AVI_ELIMD.shp with the point in poly option to create RSA_RET_PT.shp

xxvii. Intersect RSA_RET_PT.shp with RSA_W_RET_ELIM.shp to create RSA_RET_PT_INT.shp

xxviii. Join RSA_RET_PT_INT.shp to RSA_AVI_ELIMD.shp by UNION_KEY

xxix. Calculate RSA_AVI_ELIMD.OPEN_NUM = RSA_RET_PT_INT.OPEN_NUM_1

xxx. Calculate RSA_AVI_ELIMD.POLYGON = RSA_RET_PT_INT.POLYGON_1

xxxi. Remove join and selection

b. Process RSA-AVI outer misalignments

i. Select where CC_TYPE = “” from RSA_AVI_ELIMD.shp

ii. Eliminate by longest shared boundary to create RSA_ELIM_FINAL.shp

iii. Select CC_TYPE <> ‘RETENTION’ from RSA_ELIM_FINAL.shp

iv. Dissolve by all non-area, non-ukey fields from selected features in RSA_ELIM_FINAL.shp to create RSA_FINAL.shp

1. This dataset contains the retention areas as separate entities

v. Dissolve by OPEN_NUM, OWNERSHIP, POLYGON, CC_TYPE, and STATUS in the RSA_FINAL.shp to create RSA_BURN.shp

1. This dataset removes the retention areas as they are not required in the landbase

6. Assess new version of RSA (RSA_BURN.shp) to original (RSA_FEAT.shp). Investigate any large changes between the two datasets and fix as required (there were some instances where RSA blocks were neighbours and errors occurred).
7. Process RSA layer with cutblocks as referenced in section 2.3.7 to complete – the final dataset resulting from the processes listed in 2.3.7 will be used as input into the landbase (LB_HARV).

2.3.6.4.2 Attributes

Attributes were assigned according to Froese Forestry Consulting RSA assessment. The resultant table (RSABLKS_V5.DBF) was brought to the strata assignment step within ORACLE as referenced in section 4.2.

Froese Forestry Methodology

As part of yield curve development, Froese Forestry Consulting extracted the GYPSY_INPUT, SU_LEVEL and OPENING_LEVEL data files from the master Regeneration Standard of Alberta (RSA) performance survey dataset (rsa_Al-Pac_fma_data_20130528_edit.mdb) and converted to SAS datasets. See Annex V: Yield Curve Development for more details on the source data. RSA managed stand classification was undertaken within the SAS environment.

Step 1. Re-assign Yield Stratum to Non-photo Subunits (SU)

For non-photo performance survey programs, each SU was re-assigned to a yield stratum based on ground survey data. There were two key reasons for re-assignment:

1. Ground-interpreted labels are sometimes inaccurate relative to observed ground data; and
2. Ground-based labels are at a coarser resolution than aerial labels (e.g., HwPl and PlHw in aerial programs are combined as MxPl in non-photo programs).

Compiled data from the GYPSY_INPUT table were used to re-assign strata to openings surveyed using non-photo protocols. First, broad cover group was assigned using the following rules:

if pct_D>=80 then bcg='D';

if pct_D<80 and pct_D>50 then bcg='DC';

if pct_D<50 and pct_D>20 then bcg='CD';

if pct_D<=20 then bcg='C';

Second, the coniferous species group with the highest compiled density was then used to assign leading conifer. In one instance, SW density was equal to SB density, and SW was assigned as leading conifer. Yield stratum assignments based on ARIS designation codes, with associated descriptions, are provided in Table 2.2.

Table 2.2. Managed stand RSA yield stratum assignment based on RSA data.

Yield Stratum	Broad Cover Group[1]	Leading Conifer[2]
Aw	D	any
AwSx	DC	Sw, Sb
SxAw	CD	Sw, Sb
Sw	C	Sw
SbG[3]	C	Sb
PjMx	CD, DC	Pj
Pj	C	Pj

[1]Based on proportion of coniferous vs. deciduous density from compiled gypsy inputs and RSA rules.

[2]Based on species group-specific coniferous densities from compiled gypsy inputs.

[3]All existing black spruce cutblocks are assumed to be SbG since no Sb-FM have been harvested.

Step 2. Extract Photo-Interpreted Yield Strata for Aerial SUs

For SUs sampled under aerial performance survey programs, yield stratum was obtained from the photo-interpreted species class (SP_CL) assignment located in the SU_LEVEL table.

Step 3. Identify Deletions

During the performance survey process, natural and anthropogenic deletions were identified, and at least in the case of aerial programs, stratified into separate SUs. SUs with a net assessment area (NAA) classification of 1 were assigned to anthropogenic deletions; SUs with an NAA of 2 were assigned to natural deletions.

Step 4. Assign Stand Age

Stand age was calculated using the formulae outlined in section 2.3.8. Because ARIS information was not available for all openings with performance surveys, stand age was calculated for each opening based on skid clearance date in the OPENING_LEVEL table, and an effective year of 2014.

2.3.6.5 *Assumptions/Processing Issues*

There were 2 instances of overlap within RSA data:

1. 5040870336A with 5040870495A
    - FRIAA blocks

- Same species calls
- Different heights and species proportions
- 5040870495A is completely contained by 5040870336A
- 5040870336A surveyed in 2009 and 5040870495A surveyed in 2012
- Deleted 5040870495A

2. 4230800697A (Vanderwell) with 4230800781 (Al-Pac)
    - 4230800697A almost completely contained by 4230800781
    - 4230800697A surveyed in 2010 and 4230800781 surveyed in 2009
    - Species calls show similarities but are not one-to-one
    - Deleted 4230800697A from analysis

2.3.6.6 *Programs*

None

2.3.6.7 *Output Dataset*

Shapefile of RSA cutblocks for the cutblock amalgamation process referenced in section 2.3.7 and an attribute table for linking RSA blocks in Oracle.

2.3.6.8 *Important Attributes*

Shapefile

See section 2.3.7.7.

Attribute Table

Opening: Unique identifier for opening

Polygon: interior linework of opening separated by regeneration differences as observed aerially

SP_CL: strata call for opening number

StandAge: age of opening – named StandAge2 in landbase.

2.3.6.9 *Delivered Theme Name*

RSABLKS_V5.DBF

LB_HARV (section 2.3.7)

2.3.7 Harvest Depletions

2.3.7.1 *Input Dataset Name(s)*

There are over 130 individual shapefile datasets representing harvest depletions (Table 2.1).

2.3.7.2 *Source(s)*

There are 8 data sources (Table 2.1)

2.3.7.3 *Description*

For the description of each dataset, refer to Table 2.1.

These datasets represent the spatial information of harvest depletions on the landbase since at least 1991. Cutblocks are tracked utilizing the Alberta Regeneration Information System (ARIS). Cutblocks that are old enough to be tracked by this system have their stand characteristics sourced from it.

A cutblock-AVI matching process was performed pre-landbase in order to assign an opening number to an AVI polygon where possible. This process was known as the Category 1 assignment where Category 1's are cutblock boundaries that had an acceptable match to AVI polygons. The result of this process is included as an input dataset to the Harvest Depletion accounting process.

2.3.7.4 *Processing for Input*

The end goal of processing cutblock data is to be able to assign feature type (complete, planned, etc.) and opening numbers (where applicable) to the net landbase in order to stratify the landbase and link cutblock openings to ARIS and RSA data.

Al-Pac has more than 8 stakeholders providing opening information for areas under the Al-Pac FMA. Data was received from all quota holders (Table 2.1) and a method was required to process and amalgamate the data towards the end goals of processing.

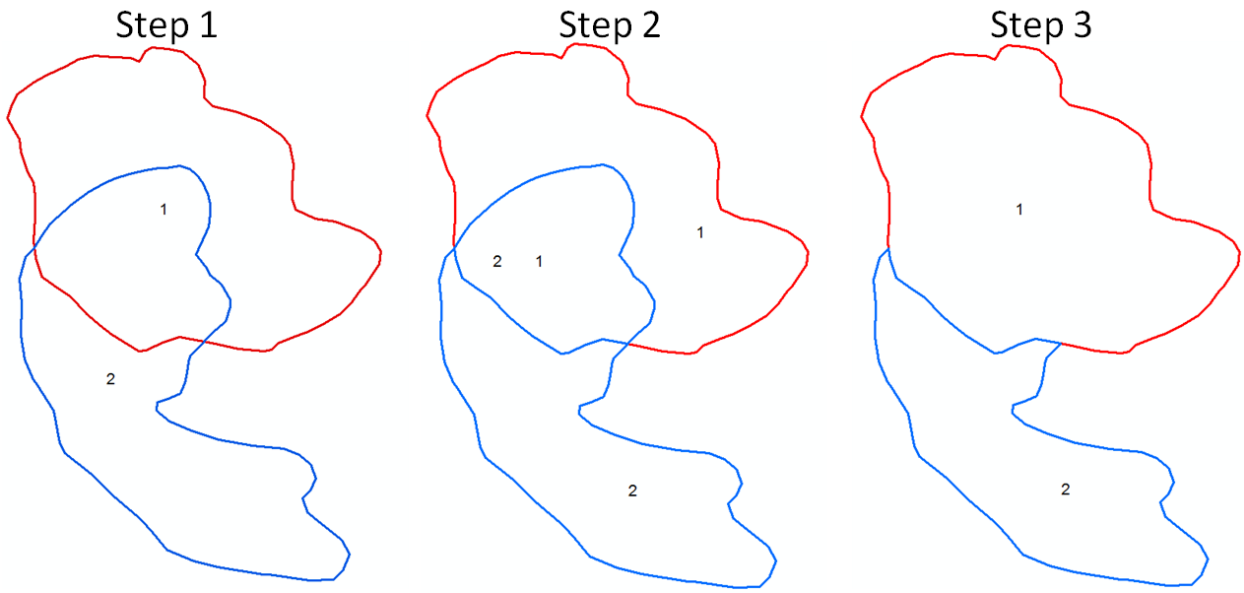
There were 6 classes of shapefile information received that required consolidation; these are listed in priority sequence:

A. Completed blocks;
    i. RSA: cutblocks with a completed performance survey
    ii. Category 1: cutblock boundaries that had an acceptable match to AVI polygon
    iii. Other: all other completed cutblock boundaries that were provided by quota holders
B. Priority blocks;
C. Planned blocks;
D. Contingency blocks;
E. Deferral blocks; and,
F. SHS Deletions.

Datasets for use within the landbase had to be on a single plane, meaning that overlap and conflicts in spatial location and ownership had to be resolved. The process of this step can be observed in Figure 2.5 with a more detailed look at the process in Figure 2.6. Generally, as referenced in Figure 2.5, the process assigns a unique ID to each polygon feature (step 1), copies the dataset and then unions the layer with itself (step 2), and then using the priority sequence, chose the polygon type that has highest priority (step 3). In the example below, RSA cutblocks (red boundary) supersede that of category 1 cutblocks (blue boundary), thus the RSA boundary is maintained.

For class B – F, these assessments were relatively straight forward and resolved according to Figure 2.6. Class A required initial dataset processing (detailed in the following section 'Pre- Processing of Class A Features'), after which point, Class A followed Figure 2.6 as well.

The underlying methodology of Figure 2.6 results in overlapping areas being assigned an ***Owner***, ***Type***, ***Status,*** and ***Open_Num*** through a hierarchal approach. Following the priority sequence, in the event of an overlap between blocks of the same priority, Al-Pac owned blocks will override the other block. If the owner is not Al-Pac and the blocks have the same priority the choice is arbitrary.



ID	Type	Area (ha)
1	RSA	10
2	Category 1	10
		20

Type 1	Type 2	Area (ha)
1	0	5
1	2	5
2	0	5
		15

ID	Type	Area (ha)
1	RSA	10
2	Category 1	5
		15

Figure 2.5. Basics of cutblock overlap rectification.

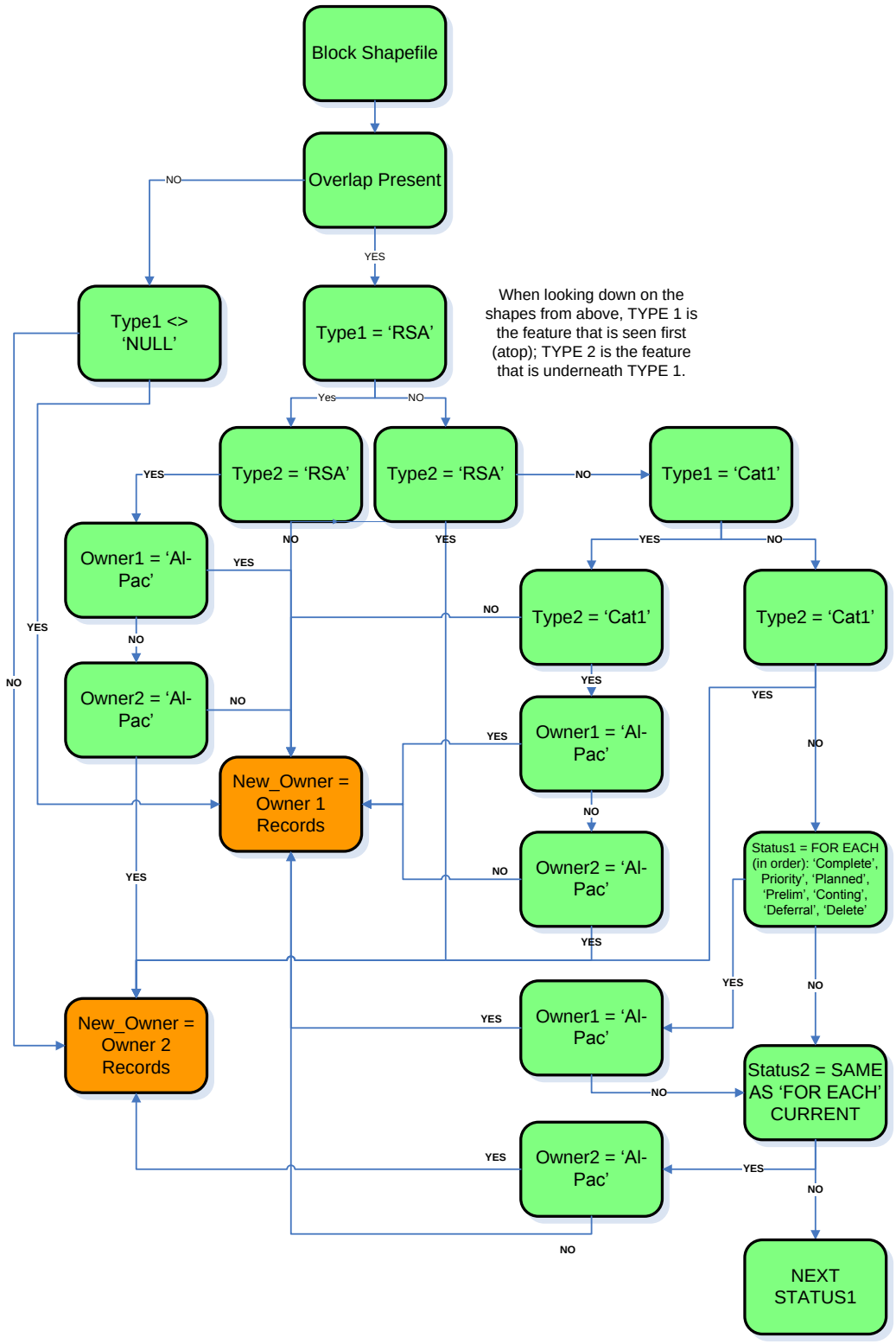


Figure 2.6. Attribute assignment hierarchy for discerning the value to assign to the shape in instances of overlap between blocks.

Pre- Processing of Class A Features

There were 3 main forms of shapefile data provided in relation to Class A features; these are listed in priority sequence:

1. RSA cutblocks;
2. Category 1 cutblocks; and,
3. Other (all other completed cutblocks).

RSA and Category 1 data had replicates and spatial conflicts between each other and with the Other data type. Section 0 details RSA data preparation for input to the process. Category 1 data is a tabular list of AVI polygon number identifiers with links to ARIS opening numbers. The tabular attributes were assigned to the AVI for inclusion of the Category 1 dataset in the process. If any feature in the Category 1 dataset conflicted with an RSA feature, it was discarded from the process. All Other datasets were successively assessed for conflict with the combined RSA and Category 1 dataset. Conflicts were discarded.

Post- Processing of Class B-F Features

Once the process outlined above was completed, Class B-F features were assessed against the AVI polygons for relative conformance in order to reduce the number of features that would have to be burned into the landbase. This processing step assigned each AVI polygon a rating for the percent area of coverage by a Class B-F feature. If a single class feature (B, C, D, E, or F) accounted for 80% of the AVI polygon, the polygon was flagged as representing that feature. The flagged feature was then removed from the dataset so that it would not be burned in and that would be used in the multiunion.

Creating the Final Harvest Depletions Dataset

The tabular ARIS dataset was used to assign attributes to completed cutblocks where the opening is not an RSA block. There are 2 cases where opening numbers were removed from the harvest depletions spatial dataset in order to match the ARIS rules for assignment. The first case involves the removal of all opening numbers from Government of Alberta (GOA), FRIAA, or LFS cutblocks. This was enacted due to direction from the GOA. The second case saw the removal of opening numbers where there was no link to the ARIS population and the lack of link could not be explained by quota holders. Both cases resulted in a non-forested clear cut (NFCC) call in the landbase.

A total of 11,389 records with an ARIS ID were assigned to the landbase.

2.3.7.5 ***Programs***

Flat_File_Creator – ArcMap Model

Flat File Processor - Cutblock_V3.SQL

2.3.7.6 ***Output Dataset***

LB_HARV: A spatially unique shapefile of complete, planned, deletions, and deferrals as related to harvest operations, with ARIS links (where available and applicable) for Al-Pac FMU's. This dataset does not contain the geometry for features identified in Category1_V20. DBF or Poly_IDs_For_CC_V3.DBF**.**

Category1_V20. DBF: A list of Category 1 poly_num's that will link to the Category 1 master list in ORACLE. The master list identifies opening numbers for each opening record (where available).

Poly_IDs_For_CC_V3.DBF: A list of AVI poly_num's representing Class B-F features.

COMPLETE_CC_FOR_LB: This dataset is an amalgamation of LB_HARV**,** Category1_v20 and Poly_IDs_For_CC_v3 datasets, representing all harvest depletion data brought to the landbase. To create this amalgamated dataset, the two DBF tables were linked to the AVI and merged with LB_Harv.

2.3.7.7 *Important Attributes*

Each of the aforementioned datasets contains a selection of the following fields.

Open_num: Unique identifier for opening number

Polygon: interior linework of opening separated by regeneration differences as observed aerially (only for RSA blocks)

Status:

1. Complete – A completed block with a skid clear date
2. Priority - A future harvest block to be scheduled in years 1-5 of the TSA
3. Planned – A future harvest block to be scheduled in years 1-10 of the TSA
4. Contingency – A future harvest area to be harvested in years 1-20 of the TSA
5. Deferral – A future harvest area to be scheduled in years 20+ of the TSA
6. Deleted – A subjective deletion for the net landbase (D_BLOCK)

CC_Type:

1. RSA – Cutblocks with a performance survey as per the Reforestation Standard of Alberta protocols. See section 0
2. None – No special designation
3. New CC 2013 – Identified harvest blocks after data cutoff date of May 1st, 2013
4. Category 1s – Spatial representation of the opening that is contained in the Category 1 list

Ownership:

1. Al-Pac – Alberta Pacific Forest Industries Ltd.
2. ALPLY – Alberta Plywood Ltd. A Division of West Fraser Mills
3. BOBL – Ed Bobocel Lumber Ltd.
4. ESRD – Alberta Environment and Sustainable Resources Development
5. FRIAA – Forest Research Improvement Association of Alberta
6. MWFP – Millar Western Forest Products Ltd.
7. Northland – Northland Forest Products Ltd.
8. S23_RSA – Extra blocks provided by Froese Consulting

9. SPML – Spruceland Millworks Inc.
10. St. Jean – St. Jean Lumber Ltd.
11. VAND – Vanderwell Contractors Ltd.
12. WF – West Fraser Mills Ltd.

POLY_NUM: AVI identifier.

Comment:

1. FIRE – Openings identified as fire salvage blocks to which there is no reforestation responsibility. These blocks do not have a link to ARIS. Identified by MWFP.
2. LARP – Openings identified as being within the LARP area and not having a link to ARIS as identified by MWFP.
3. RSI – Openings identified as being the subject of assessment of the RSI program by MWFP. These blocks have no link to ARIS but were harvested prior to 1991.

CC_ID: Unique identifier or the harvest depletions

2.3.7.8 *Delivered Theme Name*

LB_HARV

Category1_V20. DBF

Poly_IDs_For_CC_V3.DBF

COMPLETE_CC_FOR_LB

2.3.8 ARIS

2.3.8.1 *Input Dataset Name(s)*

1. X_HARVST.csv;
2. X_LFN.csv;
3. X_OPEDIS.csv;
4. X_OPEN.csv;
5. X_PLANT.csv;
6. X_PLANTS.csv;
7. X_PREHAR.csv;
8. X_REFRES.csv;
9. X_REGCOM.csv;
10. X_REGEN.csv;
11. X_SEED.csv;
12. X_SEEDS.csv;
13. X_SITEEQ.csv;
14. X_SITEPR.csv;
15. X_SOILST.csv;
16. X_STAND.csv; and,
17. X_STANDS.csv.

2.3.8.2 *Source(s)*

1. Alberta Government, Agriculture and Forestry

2.3.8.3 *Description*

Files representing ARIS records for Al-Pac, quota holders and FRIAA/LFS which are to be processed for assigning stratum and ages for existing cutblocks in the landbase.

2.3.8.4 *Processing for Input*

Processing of data was performed with the goal of determining the ARIS records, and values, for forest stratum and age assignment. The processing of the input dataset generally followed Figure 2.7. Sections 2.3.8.4.1 and 2.3.8.4.2 detail the processing of the CSV files.

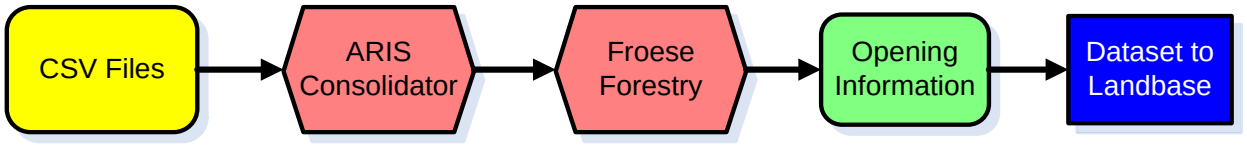


Figure 2.7. General process of ARIS opening assignments.

2.3.8.4.1 ARIS Consolidation and Initial Processing for Quota Holder Data

The GOA provided Al-Pac with the ARIS records for the FMA area in their native ".CSV" format.

An ARIS processing tool (ARIS Consolidator) was used to extract and consolidate the data. This tool brought all CSV files into one Excel workbook where all records for a CSV table, e.g. X_HARVEST, for each company were brought into one spreadsheet under that name. Froese Forestry developed an SAS based coding module to process this dataset. According to Froese Forestry, defining the BCG, strata, and age calls was assessed according to section 2.3.8.4.2.

2.3.8.4.2 Froese Forestry Data Processing of Quota Holder Data

A subset of fields/tables were extracted from the consolidated ARIS data and converted into SAS datasets. ARIS-based managed stand classification was undertaken within the SAS environment and was processed as follows:

Opening (OPEN)

- This table was used as the key identifier: openings were only included in managed stand classification if they had a record present in the OPEN table.

Harvesting (HARVST)

- Where more than one harvesting event was present, the most recent event was selected.

Leave for Natural (LFN)

- Let it Grow (LIG) records were deleted since this was a post-survey event; and
- Where more than one LFN event (besides LIG) was present, the most recent event was selected.

Disturbance (OPEDIS)

- Where more than one disturbance event was present, the most recent event was selected.

Survey (REGEN)

- Where more than one regeneration survey event was present, the most recent event was selected. This information is primarily of interest for identifying performance surveyed blocks.

Seeding (SEEDS)

- Where more than one seeding event was present, the most recent event was selected; and
- Where both Sw and Pj seeding events were present, Sw was preferentially selected over Pj.

Site Prep (SITEEQ)

- Where more than one site preparation event was present, the most recent event was selected (this information was retained but not necessary for classification).

Tending (STAND)

- Where more than one tending event was present, the most recent event was selected; and
- Where multiple tending events occurred in the same year, the event with the largest area treated was kept (this information was retained but not necessary for classification).

Planting (PLANTS)

- Duplicate events were removed where the following fields were all the same: opening, method, species, planting year and number of stems.
- The total number of stems by species was then calculated by summing across all planting events.

Understory Protection Supplemental Data

- A list of understory protection openings were extracted from The Forest Manager (TFM) data provided by Al-Pac; and
- Understory protected openings were assigned UP='Y' where OPEN_TYPE=PC and SILV_SYST=UP.
- Note that in some cases, ARIS data included quota holder information from outside the FMA area: all data were processed and then non-FMA openings were excluded in the final data processing step by assigning a yield stratum of 'XXX' and/or through spatial linkages to opening shapefiles. Pre-91 blocks were also included in the classification process and were dropped at a later point in the landbase netdown process.

Assign Stratum Using ARIS Yield Curve-Specific Declarations

Newer cutblocks (generally with a skid clearance of May 1, 2008 or later) were assigned yield stratum-specific declarations in ARIS. These yield strata are specific to Al-Pac's 2006 Forest Management Plan yield curves, but correspond well with the 2015 yield stratification scheme. The first step in yield stratum assignment was to use these codes where available. Yield stratum assignments based on ARIS designation codes, with associated descriptions, are provided in Table 2.3. Note that understory protection stands were assigned to the AwSx or SxAw yield stratum with understory protection stratum ($AwSw^{UP}$ or $SwAw^{UP}$) tracked in a separate field called "Understory Protection".

Table 2.3. Managed stand yield stratum assignment based on yield-stratum-specific declarations.

Yield Stratum	Understory Protection	ARIS Landbase Designation	FMU	Code Description	Yield Curve Source
Aw		ALPC0501	Not L1 or L11	ALPC 2005 Aw	FMA Yield Curves
AwSx	$AwSw^{UP}$	ALPC0502	Not L1 or L11	ALPC 2005 AwS UP	FMA Yield Curves
SxAw	$SwAw^{UP}$	ALPC0503	Not L1 or L11	ALPC 2005 SAw UP	FMA Yield Curves
AwSx		ALPC0504	Not L1 or L11	ALPC 2005 AwS North	FMA Yield Curves
AwSx		ALPC0505	Not L1 or L11	ALPC 2005 AwS South	FMA Yield Curves
SxAw		ALPC0506	Not L1 or L11	ALPC 2005 Saw North	FMA Yield Curves
SxAw		ALPC0507	Not L1 or L11	ALPC 2005 Saw South	FMA Yield Curves
PjMx		ALPC0508	Not L1 or L11	ALPC 2005 Mx < 50% Pj	FMA Yield Curves
PjMx		ALPC0509	Not L1 or L11	ALPC 2005 Mx 50% Pj >=	FMA Yield Curves
Sw		ALPC0510	Not L1 or L11	ALPC 2005 Sw	FMA Yield Curves
Pj		ALPC0511	Not L1 or L11	ALPC 2005 Pj	FMA Yield Curves
SbG		ALPC0512	Not L1 or L11	ALPC 2005 Sb	FMA Yield Curves
AwSx	$AwSw^{UP}$	ALPCBCG01	Not L1 or L11	ALPC 2005 DC UP	FMA Yield Curves
SxAw	$SwAw^{UP}$	ALPCBCG02	Not L1 or L11	ALPC 2005 CD UP	FMA Yield Curves
Aw		ALPC0513	L1/L11	ALPC 2005 Aw	MGM Yield Curves
AwSx	$AwSw^{UP}$	ALPC0514	L1/L11	ALPC 2005 AwS UP	MGM Yield Curves
SxAw	$SwAw^{UP}$	ALPC0515	L1/L11	ALPC 2005 SAw UP	MGM Yield Curves
AwSx		ALPC0516	L1/L11	ALPC 2005 AwS	MGM Yield Curves
SxAw		ALPC0517	L1/L11	ALPC 2005 SAw	MGM Yield Curves
PjMx		ALPC0518	L1/L11	ALPC 2005 Mx < 50% Pj	MGM Yield Curves
PjMx		ALPC0519	L1/L11	ALPC 2005 Mx 50% Pj >=	MGM Yield Curves
Sw		ALPC0520	L1/L11	ALPC 2005 Sw	MGM Yield Curves
Pj		ALPC0521	L1/L11	ALPC 2005 Pj	MGM Yield Curves
SbG		ALPC0522	L1/L11	ALPC 2005 Sb	MGM Yield Curves
AwSx	$AwSw^{UP}$	ALPCBCG03	L1/L11	ALPC 2005 DC UP	MGM Yield Curves
SxAw	$SwAw^{UP}$	ALPCBCG04	L1/L11	ALPC 2005 CD UP	MGM Yield Curves

Assign Stratum to Remaining Blocks Using Broad Cover Group Declarations Plus Silviculture

Older cutblocks were declared to a broad cover group-based stratum, which was comprised of a two-letter code. The first letter represents the initial broad cover group declaration, and the second letter represents the re-declaration after establishment survey (if any). In cases where an establishment survey has not yet been completed or no re-declaration was required, the first and second letters are the same. For the purposes of yield stratum assignment, declaration was extracted from the second character of this code since this represents the most up-to-date declaration available for the opening. However, broad cover group was of insufficient resolution for assigning yield strata. Leading conifer was therefore assigned using one of 4 sources of information extracted from ARIS data:

1. Where available, leading conifer was assigned based on planting information (total # stems planted):

   if SW≥PJ and SW≥SB then LEAD_CON="SW";

   if PJ>SW and PJ>SB then LEAD_CON="PJ";

   if SB≥PJ and SB>SW then LEAD_CON="SB";

a. If there was no planting information, seeding information was used if available:

   if seed_spp="SW" then LEAD_CON="SW";

   if seed_spp="PL" then LEAD_CON="PJ";

b. If there was no planting or seeding information, leading conifer was assigned based on leave for natural (LFN) records:

   *if lfn_meth="C" then LEAD_CON="SW"; * adequate advance stocking present, assume spruce;*

   *if lfn_meth="D" then LEAD_CON="SW"; * left for deciduous, assume ingress is spruce;*

   *if lfn_meth="B" then LEAD_CON="PJ"; * adequate seedbed and seed source, assume pine;*

c. If no leading conifer was assigned based on the preceding methods, the information on harvested species was used:

   if harv_spp="SW" then LEAD_CON="SW";

   if harv_spp="SB" then LEAD_CON="SB";

   if harv_spp="PN" then LEAD_CON="PJ".

d. If there is no leading conifer assignment, “SW” was assigned.

Declaration plus leading coniferous species was then used to assign yield strata based on the rule set provided in Table 2.4. In the case of understory protection (UnderProt), any openings declared to a mixedwood stratum with an understory protection notation (either UP=’Y’ based on Al-Pac’s TFM data, or HARV_SYS=’UP’ in the ARIS data) were re-assigned to a UP yield stratum regardless of leading conifer assignment.

Table 2.4. Managed stand yield stratum assignment based on declaration plus leading conifer.

Yield Stratum	UnderProt	Declaration[1]	Leading Conifer	Other
Aw		H	any	
AwSx	$AwSw^{UP}$	D	any	UP='Y' or HARV_SYS='UP'
SxAw	$SwAw^{UP}$	C	any	UP='Y' or HARV_SYS='UP'
AwSx		D	Sw, Sb	
SxAw		C	Sw, Sb	
Sw		S	Sw	
SbG[2]		C	Sb	
PjMx		D, C	Pj	
Pj		S	Pj	

[1]Based on the second character from the ARIS field TIMB_SUP_LD_BS_DESIG_CODE.

[2]All existing black spruce cutblocks are assumed to be SbG since no Sb-FM have been harvested.

Identify Openings Outside FMA

Openings clearly outside of the FMA area were assigned a yield group of 'XXX'. These openings had an ARIS declaration indicative of yield curves from other FMA areas (e.g., SLPC0201). Openings outside of the FMA area that were declared to a broad cover group could not be aspatially identified as part of this process, and were later dropped during spatial linkages to the landbase.

Assign Managed Stand Type

Each opening was then assigned to a managed stand type (extensive vs. intensive) using the following rule-set:

if OPEN_RESP='Al-Pac' then YC='EXT';

else YC='INT';

Understory protection stands were identified as those with YC='EXT' with an UNDERPROT modifier.

Assign Stand Age

Stand age was calculated on timber year basis (May 1 to April 30). The age calculation was adapted from the Regeneration Standard of Alberta formulae (AESRD 2014):

SURVEY_YR shall be determined as follows:

1) If SURVEY_MONTH is ≤4, then SURVEY_YR = SURVEY YEAR;

2) If SURVEY_MONTH is >4, then SURVEY_YR = (SURVEY_YEAR + 1).

SKID_YR shall be determined as follows:

1) If SKID_MONTH is ≤4, then SKID_YR = SKID_YEAR;

2) If SKID_MONTH is >4, then SKID_YR = (SKID_YEAR + 1).

Equations were revised as follows:

EFFECTIVE_YR shall be determined as follows:

1) If EFFECTIVE_MONTH is ≤4, then EFFECTIVE _YR = EFFECTIVE YEAR;

2) If EFFECTIVE _MONTH is >4, then EFFECTIVE _YR = (EFFECTIVE _YEAR + 1).

CLOCK_YR shall be determined as follows:

1) If SKID_MONTH is ≤4, then CLOCK_YR = SKID_YEAR;

2) If SKID_MONTH is >4, then CLOCK_YR = (SKID_YEAR + 1).

The landbase effective date is May 1, 2013, which equated to an effective year of 2014. Clock year was obtained directly from ARIS data. Clock year was selected rather than skid clearance year, since there were several instances of missing skid clearance dates within the ARIS dataset. Clock start was compared to skid clearance date, and where clock start did not agree with the formula above, one of two actions were taken:

- Openings with an ARIS clock year that differed from skid year by more than 1 year were individually examined; it was found that all openings had a disturbance event that would have caused clock start to be reset, therefore clock year was left as is.
- Openings with an ARIS clock year within 1 year of skid year were compared to clock year calculated using the full skid clearance date and corrected by adding or subtracting a year as required to align with the formulae presented here.

A total of 41 Alberta-Pacific openings had a clock year of 1900 and a blank skid clearance date; these openings may have been either horse logged or under-planted; a stand age of 0 was assigned to these openings. None of these 41 are represented spatially in the cutblock datasets provided.

2.3.8.5 *Assumptions/Processing Issues*

All existing black spruce cutblocks are assumed to be Sb-G since no Sb-FM has been harvested.

Any openings with a non sufficiently restocked (NSR) status code after performance survey are considered ‘NFCC’ ('4160823214A', '4170821325A', '4220770739', '5010901505A', '5010912918A', '5020911353A', '4220770383', '5050932749A', '5050932635A').

2.3.8.6 *Programs*

ARIS Consolidator – EXCEL VBA

2.3.8.7 *Output Datasets*

Table 2.5 defines the tables in the process.

Table 2.5. ARIS data tables created between Froese Forestry SAS code and FORCORP.

Table	Submission	Description
AllDataConsolidated_RAW_v10.xlsx	N	Consolidated ARIS CSV files for quota holders to be processed utilizing Froese Forestry SAS code
aris_stratification_20141103.dbf	N	Result of Froese Forestry SAS code processing of the consolidated ARIS files
ARIS_v8.dbf	Y	Replicate of aris_stratification_20141103.dbf with selected fields required for landbase assignment purposes

2.3.8.8 *Important Attributes*

Opening_Number: Unique identifier of opening.

YieldGroup: Derived yield stratum of the ARIS information.

BCG: Broad cover group interpretation of the yield group.

UUNDERPROT: Understory protection yield stratum identification.

1. AwS-UP - Aspen Spruce understory protection stands
2. SAw-UP – Spruce Aspen understory protection stands

YC: Identifier of management group.

1. INT – Intensively managed stands
2. EXT – Extensively managed stands

StandAge: Age of opening – named StandAge1 in landbase.

Dates: String Boolean identifier (DATE) to identify all openings that fall outside of the accepted date range for the ARIS population (March 1, 1991 to April 30, 2013).

OpenType: String Boolean identifier (TYPE) to identify all openings that fall outside of the accepted open type list for the ARIS population (Type <> 'WF', 'NH', 'FS', 'LC', 'MO', 'OD', 'PC', 'SW')

2.3.8.9 *Delivered Theme Name*

ARIS_v8.DBF

2.3.9 Fire

2.3.9.1 Input Dataset Name(s)

1. AB_FireHistory.shp

2.3.9.2 Source(s)

1. GOA emergency response and forest protection division; accessed 05-2013

2.3.9.3 Description

Contains the fire history for Alberta. The fire data is used to delete areas from the active landbase.

2.3.9.4 Processing for Input

1. Select where BURNCODE = 'B, BURNCLASS >= 3, YEAR > =1992
2. Delete fire boundary where FIRENUMBER = ‘DL1009’ (AVI data newer than recent fires)
3. Dissolve all interior fire boundary line work
4. Add field FIRE and calculate to = 1

2.3.9.5 Assumptions/Processing Issues

Al-Pac AVI data is not updated at a landscape scale with the earliest AVI update being 1992. This date was used as the date to begin assessment of fire data. A visual assessment confirmed this data to be absent from the AVI.

All fire boundaries within the final landbase will be assigned to a non-forested condition allowing for the dissolving of all interior linework.

2.3.9.6 Programs

None

2.3.9.7 Important Attributes

FIRE: Binary identifier of a fire polygon

2.3.9.8 Output Dataset

Shapefile with all fires since 1992

2.3.9.9 Delivered Theme Name

LB_FIRES

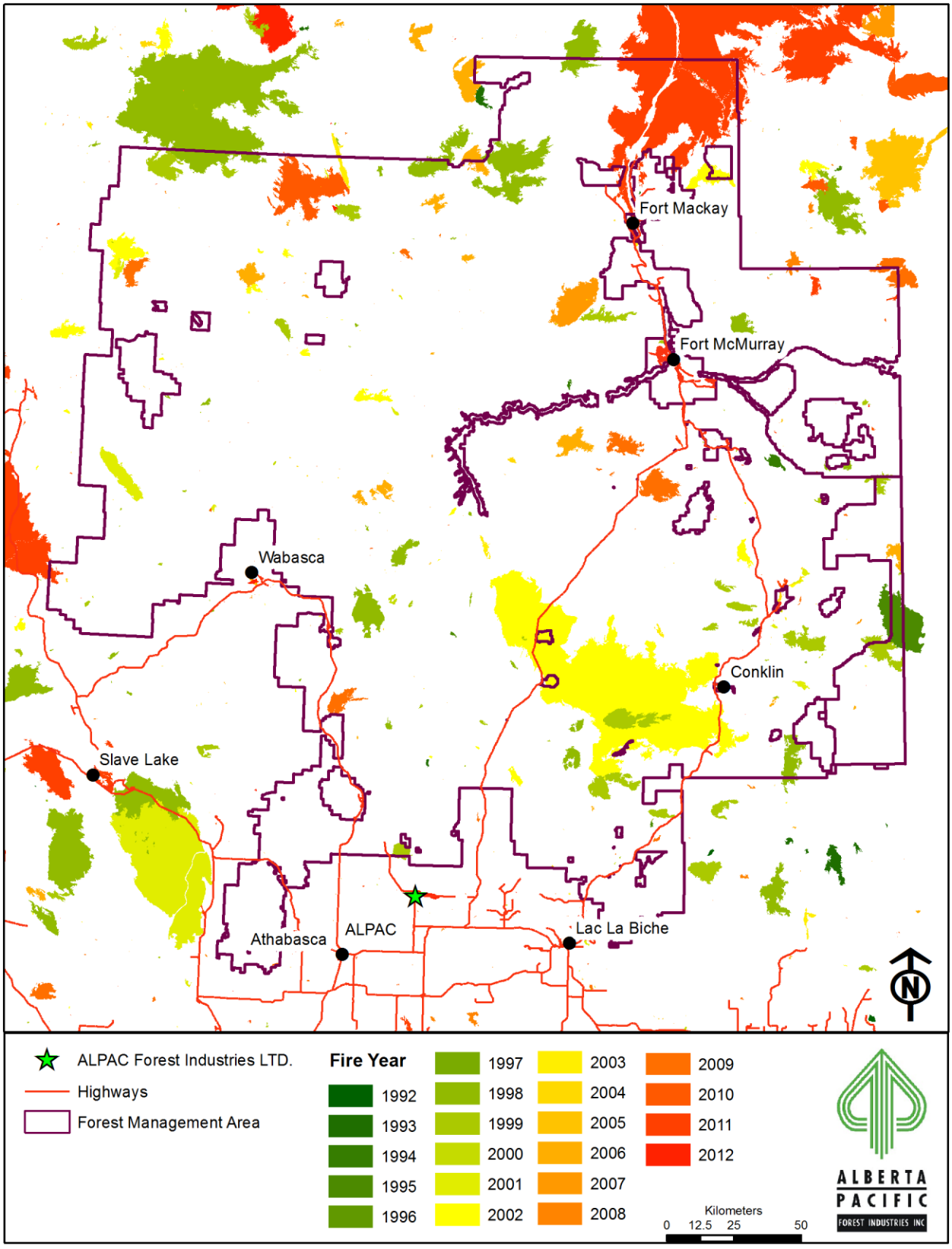


Figure 2.8. Wildfire locations by year within the Al-Pac FMA area.

2.3.10 Fire Smart Community Zones

2.3.10.1 *Input Dataset Name(s)*

1. FireSmart_CZ_intersection_Al-Pac.SHP

2.3.10.2 *Source(s)*

1. GOA, Forestry and Emergency Response Division; 03-2015

2.3.10.3 *Description*

A shapefile identifying areas around communities under the fire smart program.

2.3.10.4 *Processing for Input*

1. Clip to FMU boundary

2.3.10.5 *Assumptions/Processing Issues*

None

2.3.10.6 *Programs*

None

2.3.10.7 *Output Dataset*

Shapefile of community fire smart zones.

2.3.10.8 *Important Attributes*

WMA_NAME: Name of the firesmart zone.

2.3.10.9 *Delivered Theme Name*

LB_FIRESMART

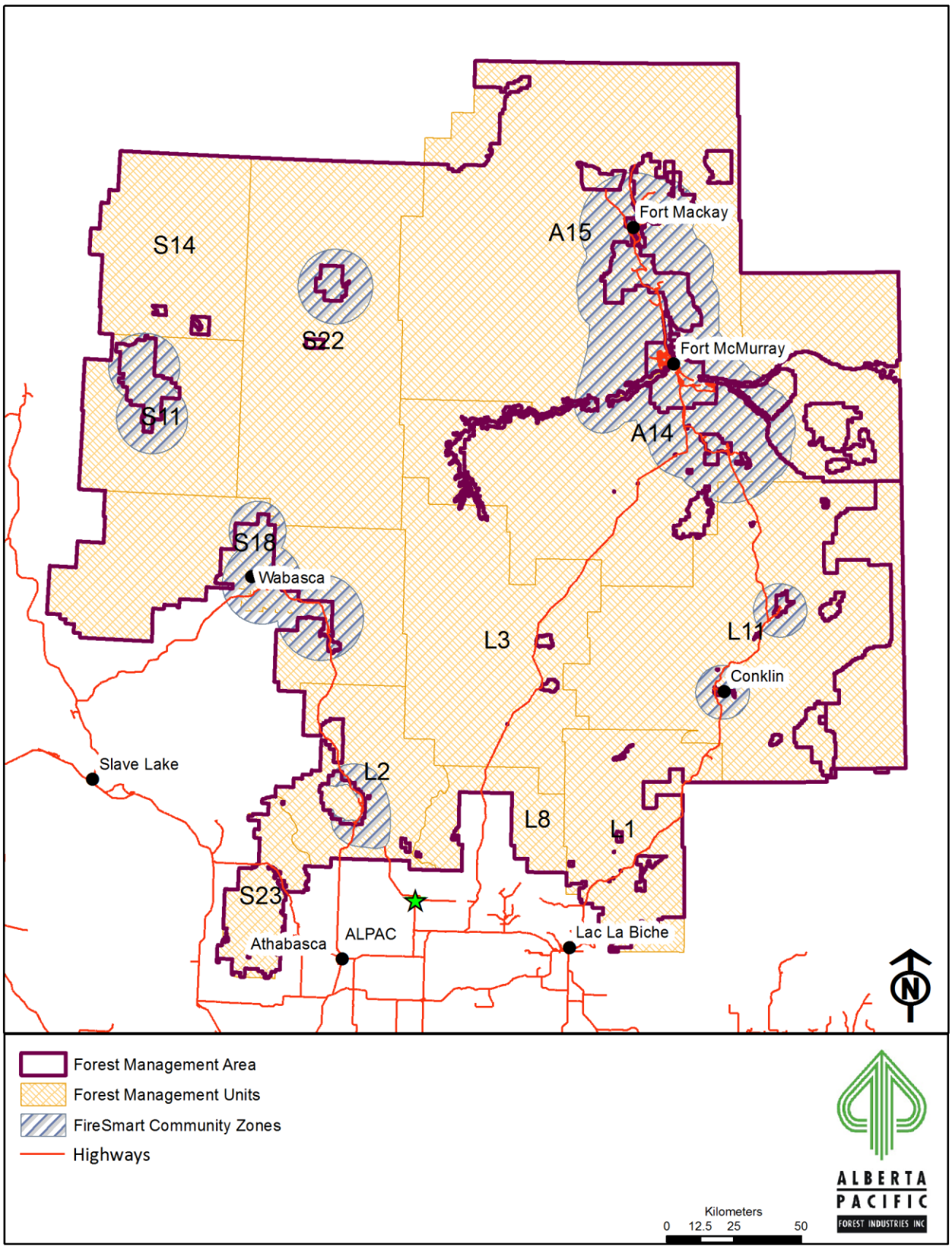


Figure 2.9. Firesmart community zones within the Al-Pac FMA area.

2.3.11 Digital Integrated Disposition System

2.3.11.1 *Input Dataset Name(s)*

1. AB_APPL.shp
2. LSAS.XML

2.3.11.2 *Source(s)*

1. Digitally Integrated Disposition System (DIDS) accessed 08-2013

2.3.11.3 *Description*

DIDs is created by continually adding new surface activities (dispositions), or removing dispositions as they are cancelled, through the Alberta government's disposition approvals process Electronic Disposition Service (EDS) .

Most land withdrawal requests are submitted to the government with a CAD file or shapefile which is created by the surveying company. The digital file must be verified by the Plan Confirmation Service (PCS) to comply with consistent submission standards and to ensure correct geo-referencing. The surveyor receives an encrypted file back from PCS which is used in the application submission. Applicants upload their land withdrawal request (encrypted files and required documents, which vary for each type of disposition) to EDS and the shape is added to DIDS.

DIDs contains 2 key pieces of information for Forest Management Planning:

1. The Identification of landuse withdrawals and activities; and,

2.3.11.4 *The identification of protective notations.*

Table 2.6 details the type codes and their description for created datasets in this section.

Table 2.6. DIDS and DISP type code descriptions.

DISP_TYPE / DIDS_TYPE	DESCRIPTION
AAG	Ancillary Agreement - Grazing Lease
AFS	Agricultural Farm Sale
AHM	Alberta Housing Métis Lease
ARS	Agriculture Research Station
CNC	Consultative Notation - Company
CNT	Consultative Notation
CRP	Conservation and Reclamation Plan
CTL	Coniferous Timber License
CTP	Coniferous Timber Permit
CUP	Cultivation Permit
DHR	Designated Historic Resource

DISP_TYPE / DIDS_TYPE	DESCRIPTION
DRC	Disposition Reservation - Company
DRS	Disposition Reservation
DTL	Deciduous Timber License
DTP	Deciduous Timber Permit
DWD	Drilling Waste Disposal
ECA	Ecological Corridor Agreement
ERR	Ecological Reserve
EZE	Easement
FGL	Forest Grazing License
FRD	Forestry Road
GEO	Geophysical Exploration
GRL	Grazing Lease
GRP	Grazing Permit
GRR	Provincial Grazing Reserve
HRG	Heritage Rangeland
HRS	Holding Reservation
ISP	Industrial Sample Plot
LOC	License of Occupation
MLL	Miscellaneous Lease
MLP	Miscellaneous Permit
MME	Metallic Mineral Exploration
MSL	Mineral Surface Lease
MTS	Miscellaneous Town site Lease
NAA	Natural Area
PIL	Pipeline Installation Lease
PLA	Pipeline Agreement
PLS	Private Land Sale
PNT	Protective Notation
PPL	Public Pit License
PSA	Private Surface Agreement
RDS	Roadway
REA	Rural Electrification Association Easement
REC	Recreation Lease
RIA	Range Improvement Agreement
RMP	Resource Management Operational Plans
ROE	Right-of-Entry Agreement
ROW	Right-of-Way Lease
RRD	Registered Roadway
RSP	Refined Spill

DISP_TYPE / DIDS_TYPE	DESCRIPTION
SGL	Sand and Gravel Lease
SGR	Sour Gas Release
SHL	Staff Housing Land Lease
SMC	Surface Material License
SME	Surface Mineral Exploration
SML	Surface Material Lease
SRS	Study Area Reservation
TEP	Transportation Exploration Program
TFA	Temporary Field Authorization
TPA	Trapping Area
USP	Unrefined Spill
VCE	Vegetation Control Easement
WDL	Water Development License

2.3.11.5 *Processing for Input*

1. Download DIDs data and clip to FMU boundary
2. Link AB_APPL.shp to LSAS.XML using Activity Number
3. Create shapefile and attribute table of PNT/CNT/HRS for review by Al-Pac
4. Create shapefile and attribute table of remainder for review by Al-Pac
5. Apply PNT/CNT/HRS decisions from Al-Pac to DIDS layer and create shape of deletions
    a. Identify PSP plots by selecting DISP_TYPE = 'ISP' (go to section 2.3.13)
    b. Remove ISP from DIDS layer
6. Dissolve PNT/CNT/HRS layer to remove interior linework (LB_PNT.SHP)
    a. Add field PNT and calculate to equal 'PNT'
7. Apply other disposition decisions from Al-Pac to DIDS layer and create shape of deletions
8. Dissolve by disposition type (DIDS_TYPE attribute column within LB_DIDS.shp)

2.3.11.6 *Assumptions/Processing Issues*

Multiple dispositions can occupy the same spatial location. Any dispositions leading to a landbase deletion are placed on the forefront. Other disposition types are automatically assigned precedence via coverage creation with no type priority.

Initial DIDs dataset contained 63,330 records – data downloaded: 17/3/2015

The process was essentially netting out the records that do not represent land-use deletions within the FMA area. The following criteria were used to remove records to provide a final tally of DIDs records that were then inputted into the NLB process.

- Remove all "Status 7" records – these are cancelled and are not applicable with respect to landuse;
- All "Status1" records were removed – these are only an application for landuse and are not an approved disposition;
- Remove all PNTs from database – PNTs have a separate NLB process;
- Remove all records labeled "non-administered records" – these represent plans for activity, thus not a landuse depletion;
- Remove all CNTs – these do not restrict landuse;
- Remove all Timber Licenses – are not land withdrawals;
- Remove all DWDs from database – are not land withdrawals;
- ISPs are dealt with in a separate NLB process (see section 2.3.13);
- All "explorations" were removed –are not land withdrawals; and
- TFAs are removed as they are not spatially located and are not permanent land withdrawals.

Final DIDs records utilized in the NLB was ~35,000.

The NLB process may remove more of these records through the hierarchy of deletions.

2.3.11.7 *Programs*

None

2.3.11.8 *Output Dataset*

Shapefiles containing classified dispositions by landbase withdrawal type.

2.3.11.9 *Important Attributes*

Industrial Dispositions

DIDS_TYPE: Disposition type identifier

Protective Notations

PNT: Binary text Identifier of Protective Notations, Consultative Notations, and Holding Reservations

2.3.11.10 *Delivered Theme Name*

LB_DIDS

LB_PNT

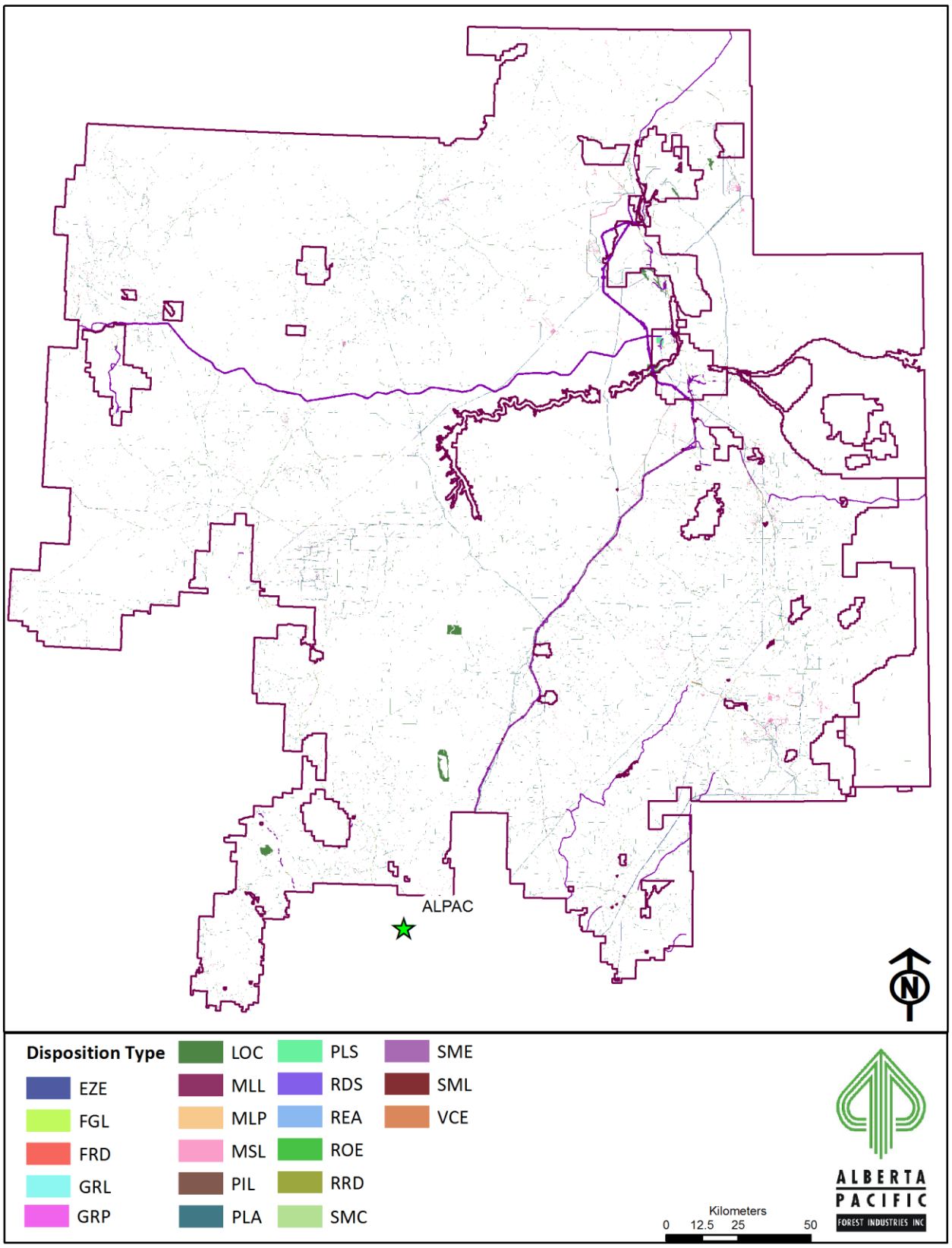


Figure 2.10. Landuse deletions within the Al-Pac FMA area.

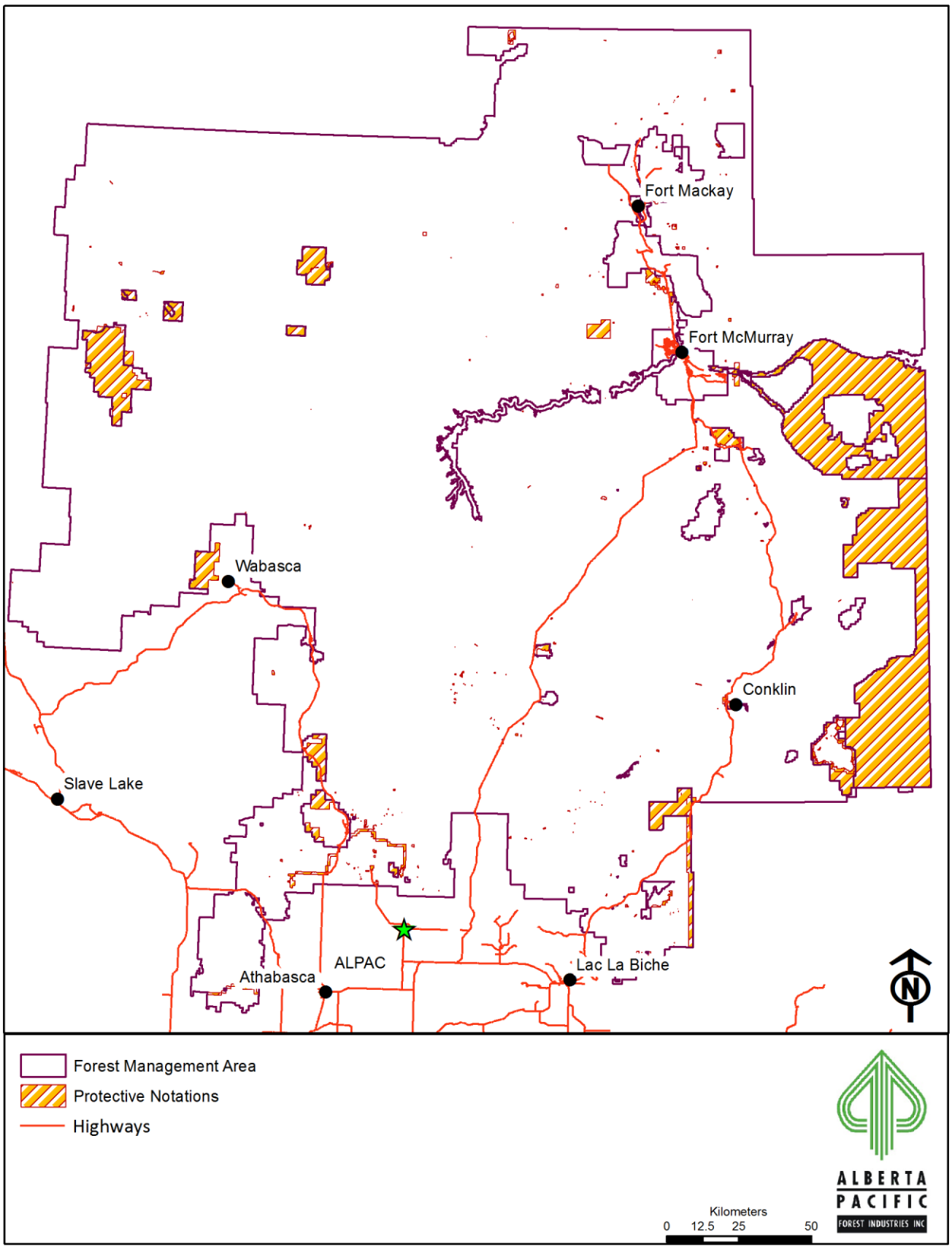


Figure 2.11. Protective Notation considerations within the Al-Pac FMA area (PNT's, CNT's, HRS's).

2.3.12 Capital Roads

2.3.12.1 *Input Dataset Name(s)*

1. CAPTIAL_ROADS.SHP

2.3.12.2 *Source(s)*

1. Al-Pac Data Library

2.3.12.3 *Description*

Polyline feature layer identifying Al-Pac capital roads for the Al-Pac FMA area.

2.3.12.4 *Processing for Input*

1. Buffer all features by 15m on either side
2. Add Field 'ROAD'
3. Calculate ROAD = 1

2.3.12.5 *Assumptions/Processing Issues*

None

2.3.12.6 *Programs*

None

2.3.12.7 *Output Dataset*

Shapefile containing Al-Pac capital roads.

2.3.12.8 *Important Attributes*

ROAD: Binary identifier of Al-Pac capital roads.

2.3.12.9 *Delivered Theme Name*

LB_CAPITALRD

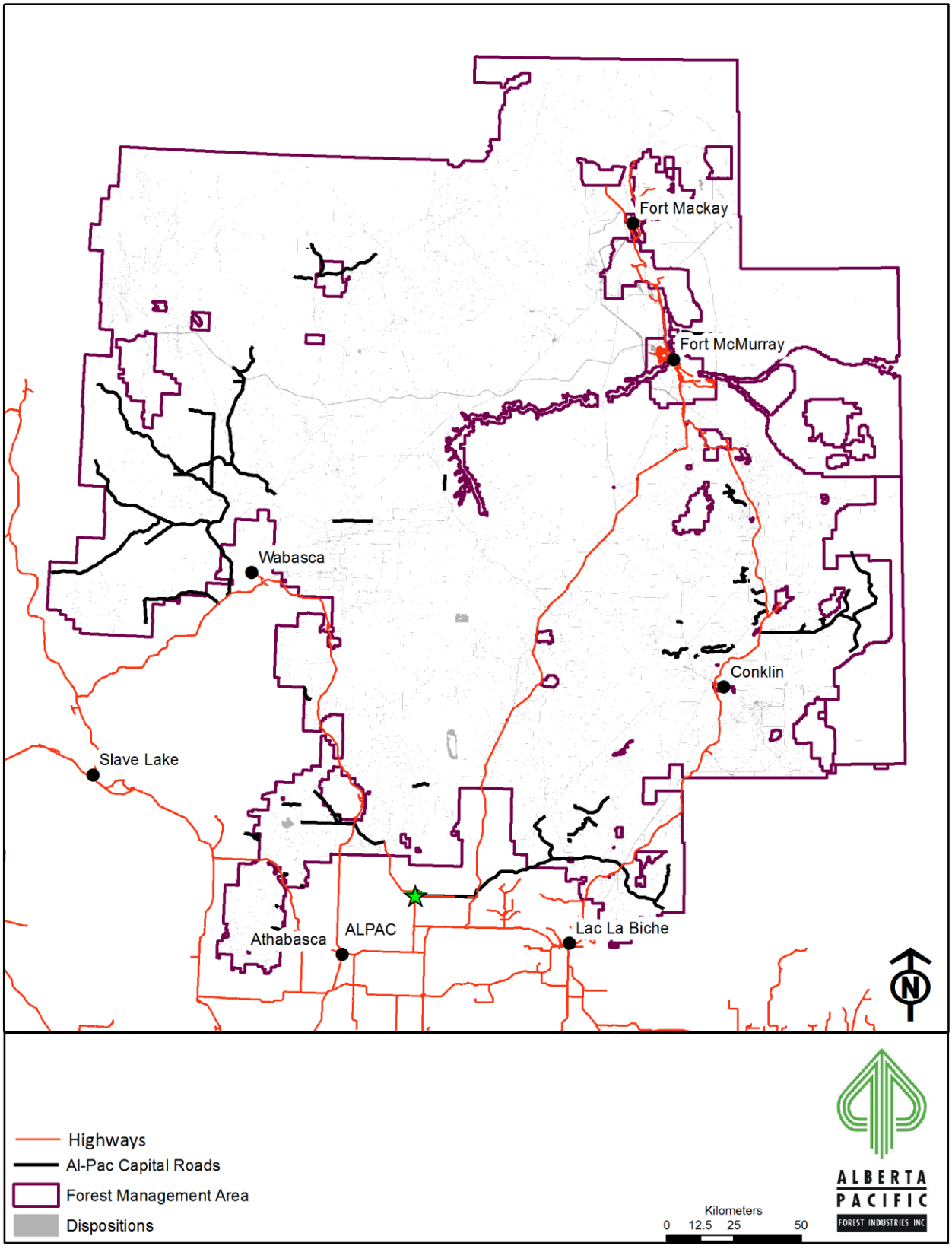


Figure 2.12. Al-Pac capital road network with the DIDS layer in the background for reference.

2.3.13 Permanent Sample Plots

2.3.13.1 *Input Dataset Name(s)*

1. tsp_psp_information_20150329.XLSX

2.3.13.2 *Source(s)*

1. The Excel Wiz Consulting Ltd., received 03-2015

2.3.13.3 *Description*

Excel spreadsheet containing permanent sample plot (PSP) data with X, Y co-ordinates.

2.3.13.4 *Processing for Input*

1. Load table into ArcMap
2. Create points from X, Y locations
3. Buffer by 100m
4. Merge with plots identified in DIDS (ISPs; section 2.3.11)
5. Create field Plot_Type = 'PSP'

2.3.13.5 *Assumptions/Processing Issues*

None

2.3.13.6 *Programs*

None

2.3.13.7 *Output Dataset*

A shapefile representing the location of PSPs.

2.3.13.8 *Important Attributes*

Plot_Type: Binary text field containing the acronym PSP to represent permanent sample plots on the landbase.

2.3.13.9 *Delivered Theme Name*

LB_PSP.SHP

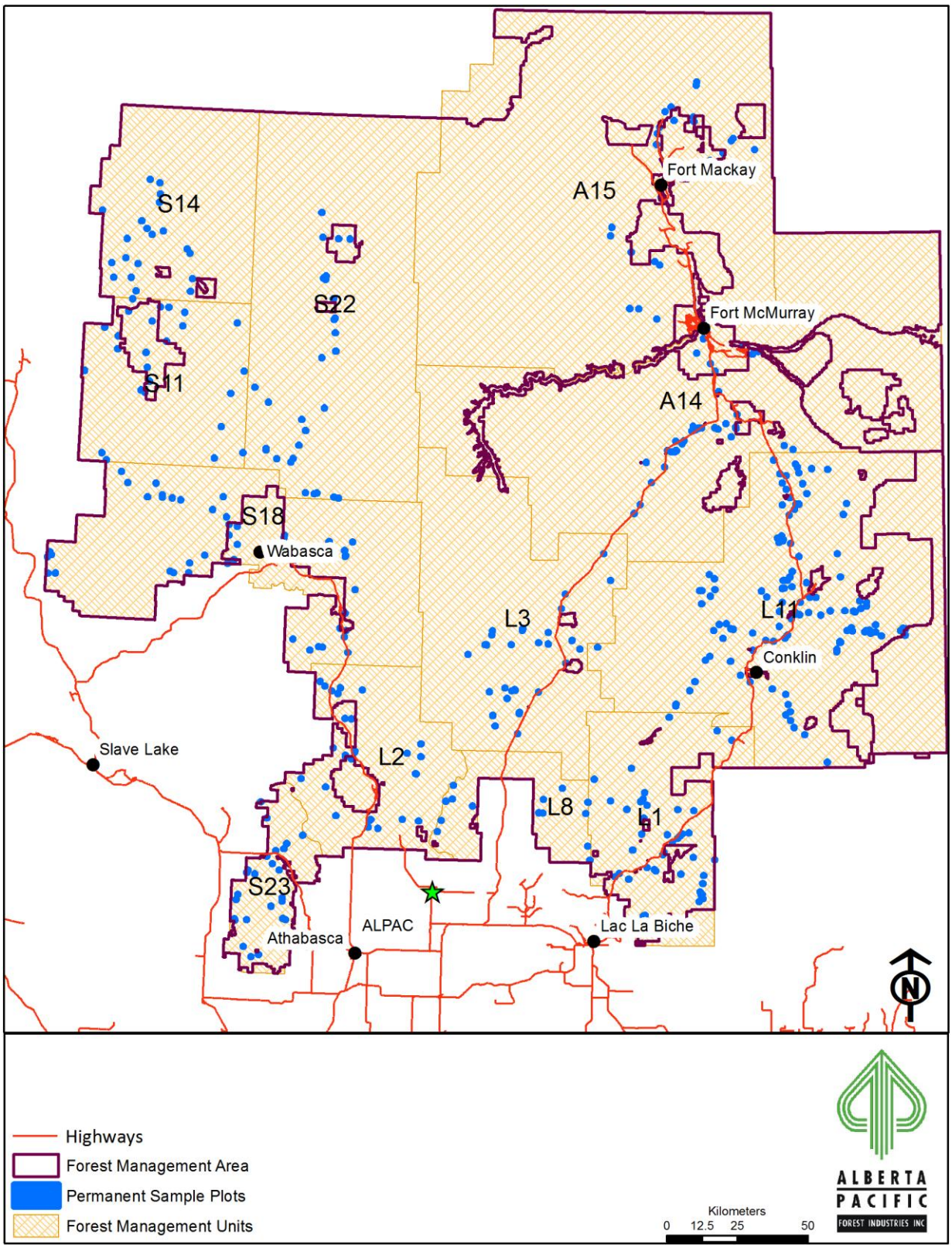


Figure 2.13. Permanent sample plot locations within the Al-Pac FMA area.

2.3.14 Parks and Protected Areas

2.3.14.1 *Input Dataset Name(s)*

1. BF_PRA_POLYGON.SHP
2. BF_PROVINCIAL_PARK_POLYGON.SHP
3. BF_PUBLND_REC_TRL_POLYGON.SHP
4. BF_ECO_RESERVE_POLYGON.SHP
5. BF_WILDLAND_PARK_POLYGON.SHP
6. BF_NATURAL_AREA_POLYGON.SHP
7. BF_WILDERNESS_AREA_POLYGON.SHP
8. SMA_LARPAREA.SHP

2.3.14.2 *Source(s)*

1. AltaLIS data (1-7), accessed 08-2013
2. LARP Protected Areas (8).

a. Al-Pac spatial data warehouse

2.3.14.3 *Description*

Dataset identifying parks and protected areas within the Al-Pac FMA area boundaries; which include provincial parks, provincial recreation areas, public recreational trails, ecological reserves, wildland parks, natural areas, wilderness areas, and LARP protected areas.

2.3.14.4 *Processing for Input*

1. Update feature datasets with the new features from LARP.
2. Merge all datasets together
3. Populate PPA_STAT with related source file attributes
4. Remove features in list below as they are already represented in the PNT layer:

   Select where PPA_STAT =

   a. Clyde Lake
   b. Crow Lake (portions)
   c. Crow Lake Walk in Tenting
   d. Dillon River
   e. Gipsy-Gordon
   f. Goodwin Lake

g. Winefred Lake
h. Winefred Lake remote

5. Dissolve all features to remove any internal line work
6. Erase features that overlap LB_PNT
7. Calculate PPA_STAT = 'PPA'
8. Clip to get only the Parks and Protected areas in the FMU envelope.

2.3.14.5 *Assumptions/Processing Issues*

None

2.3.14.6 *Programs*

None

2.3.14.7 *Output Dataset*

Shapefile of parks and protected areas for the Al-Pac FMA area boundary.

2.3.14.8 *Important Attributes*

PPA_STAT: Text field containing the acronym PPA to represent Parks and Protected Areas in the landbase.

2.3.14.9 *Delivered Theme Name*

LB_PPA

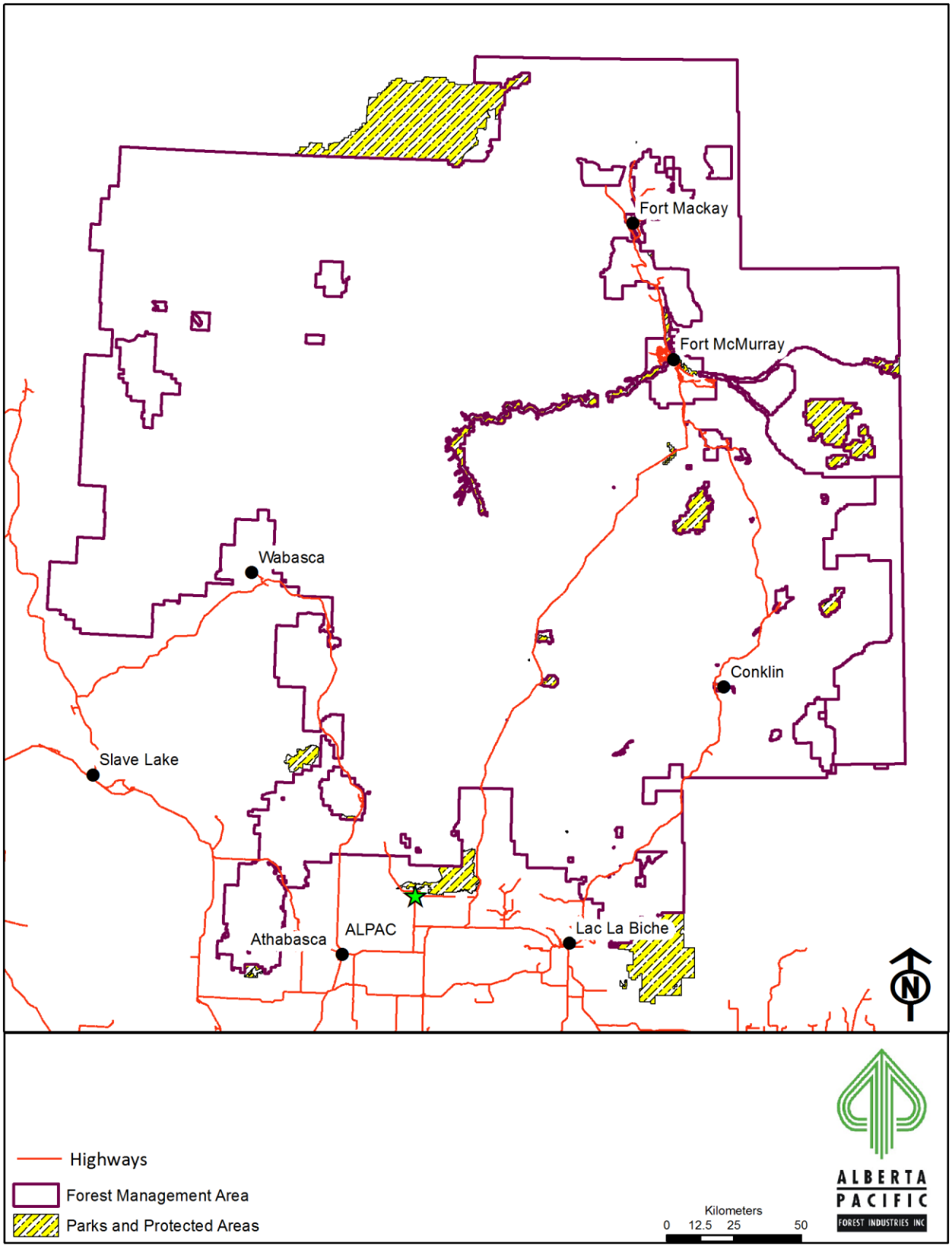


Figure 2.14. Parks and protected areas.

2.3.15 Seismic Cut Lines

2.3.15.1 *Input Dataset Name(s)*

1. TRANSPORT coverage from 784 township E00 Files; received 08-2013

2.3.15.2 *Source(s)*

1. Timberline forest inventory

2.3.15.3 *Description*

Al-Pac provided the forest inventory and other data attributes by township in E00 format. Seismic (cutline) data was extracted from the ACCESS coverage within these files. ACCESS data was provided without a 'width' column to create the seismic polygon layer.

2.3.15.4 *Processing for Input*

1. Import E00 files for the theme ACCESS into coverage in each of the township tile
2. Append all the ACCESS coverages into an SDE feature class
3. Import the feature code lookup table (*LUT_CODE*) into an SDE table
4. Join table with *LUT_CODE* on field "FCODE"
5. Reselect where DESCRIPTION = "CUTLINE"
6. Export seismic line to shapefile
7. Three features contained 'NULL' geometry and were removed from the dataset (length = 0)
    a. Object ID: 71586, 71588, 98649
8. Clip seismic line dataset to FMU boundary
9. Add fields “Buffer” and “SEIS_Y”
10. Buffer Seismic lines by 3m on either side (6m total)
11. Calculate SEIS_Y = 1
12. Clip buffered dataset to FMU boundary

2.3.15.5 *Assumptions/Processing Issues*

It is assumed that 6m is an adequate representation of the average seismic line width on the landbase.

2.3.15.6 *Programs*

None

2.3.15.7 *Output Dataset*

Buffered shapefile of seismic lines within the Al-Pac FMA area.

2.3.15.8 *Important Attributes*

SEIS_Y: Binary identifier of seismic lines. Changed to SEISMIC in landbase.

2.3.15.9 *Delivered Theme Name*

LB_SEISMIC

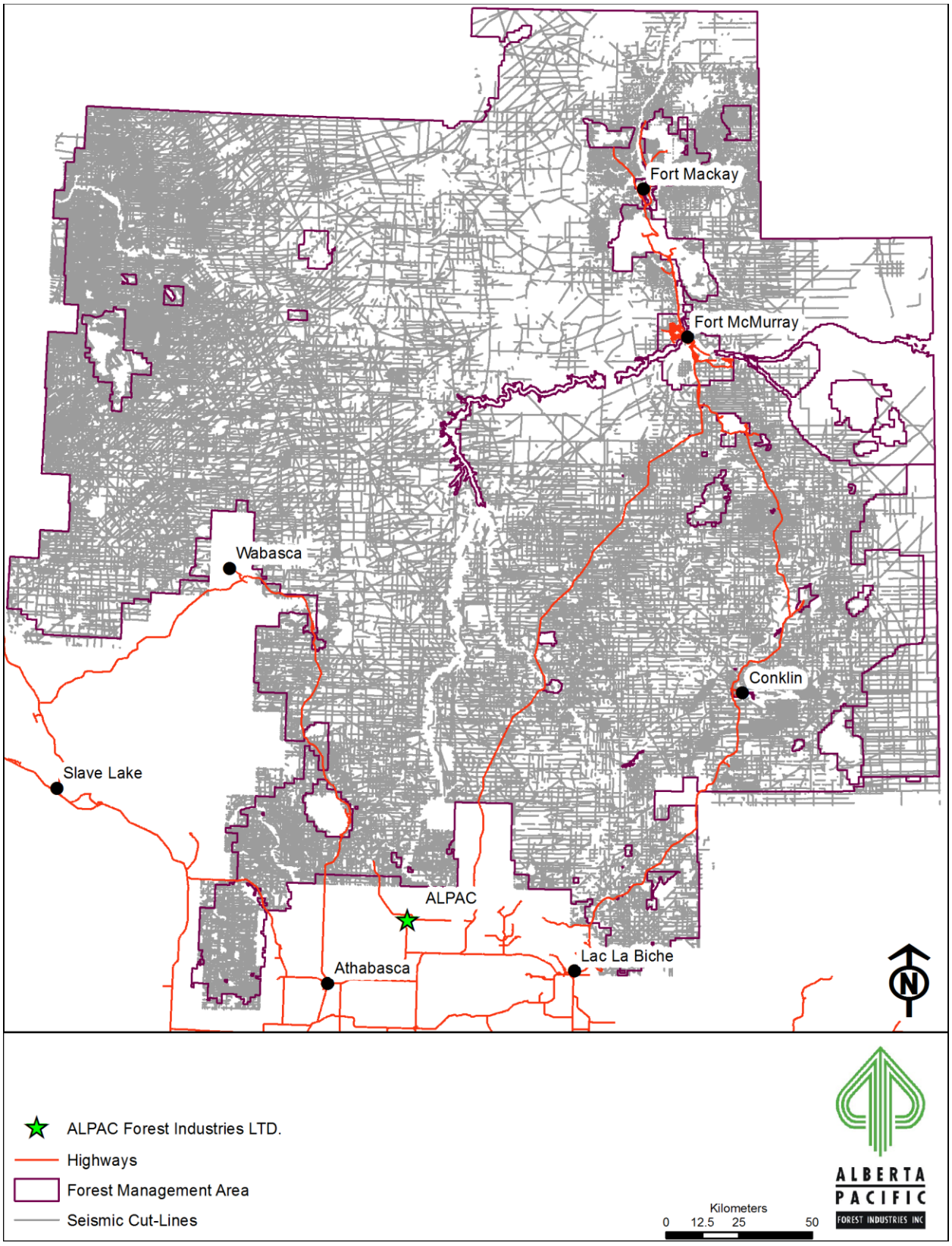


Figure 2.15. Seismic cut lines within the Al-Pac FMA area.

2.3.16 Surface Minable Areas

2.3.16.1 *Input Dataset Name(s)*

1. SMA.SHP

2.3.16.2 *Source(s)*

1. Digitized from GOA map (Q1- 2015)

2.3.16.3 *Description*

Spatial location of 'Surface Mineable Areas' within the Al-Pac FMA area.

2.3.16.4 *Processing for Input*

An image detailing the Surface Mineable Areas (SMA) as compared to township lines was provided by the GOA. This image was used in the selection of townships to represent SMA. Once townships were selected, they were dissolved and a new field MOS was added with a value of 1 to identify the SMA area.

2.3.16.5 *Assumptions/Processing Issues*

The image received is an accurate representation of SMA.

2.3.16.6 *Programs*

None

2.3.16.7 *Output Dataset*

File with all internal linework dissolved.

2.3.16.8 *Important Attributes*

MOS: Binary identifier of oil sands areas

2.3.16.9 *Delivered Theme Name*

LB_SMA

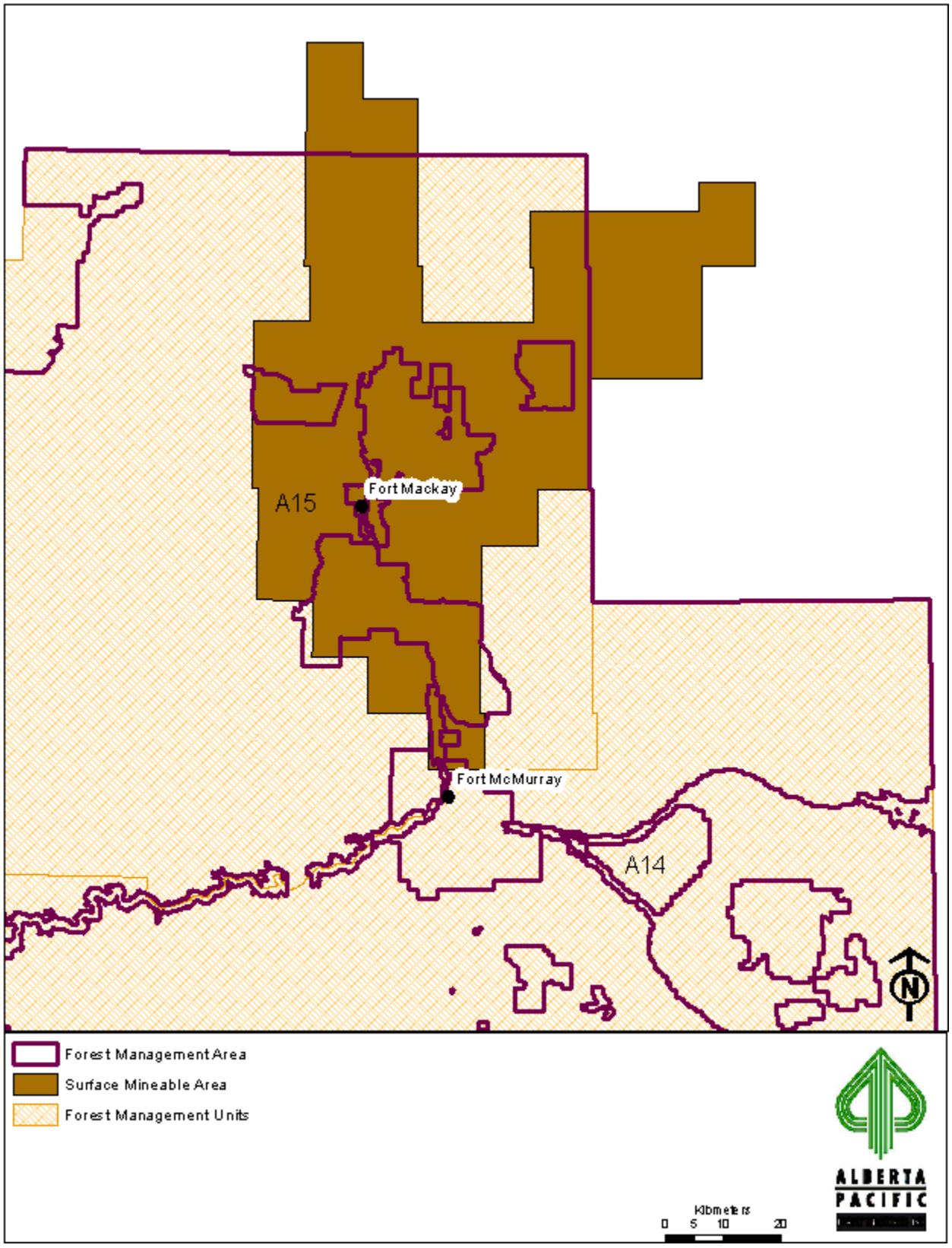


Figure 2.16. Surface Minable Areas within the Al-Pac FMA area.

2.3.17 Alberta Vegetation Inventory

2.3.17.1 *Input Dataset Name(s)*

1. Forest_FM.E00

2.3.17.2 *Source(s)*

1. Timberline forest inventory; received 12-2014

2.3.17.3 *Description*

The original Al-Pac FMA area Alberta Vegetation Inventory (AVI) was completed over a 10-year period from 1993 to 2001 to AVI version 2.1 specifications and was directed at 11 FMUs. The AVI program included extensive field data collection, base updates, and recording enhanced attributes for crown closure, moisture regime and stems per hectare. Hard copy 1:15,000 black and white aerial photographs and ortho-photos were used for photo interpretation and data transfer for input into a digital database. Conifer understory interpretation was incorporated into the AVI using 1:15,000 scale (leaf-off) hardcopy colour infra-red aerial photographs. Final approval of the AVI was obtained from the GOA in 2001, and was used as base data for the 2006 Forest Management Plan and timber supply analysis (TSA).

In 2001 Al-Pac finalized specifications to update the AVI across the entire FMA area. This was completed using scanned hardcopy 1:30,000 scale black and white aerial photographs which were inputted into softcopy systems for digital stereo photo interpretation. This project was referred to as the SAVI (Softcopy Alberta Vegetation Inventory) project. The purpose of SAVI was to bring all FMUs to one standard of enhanced attributes (crown closure, soil moisture regime, stems per hectare), update for fire, depletion and land use, update base data, correct any gross errors, and to meet the GOA's most current AVI 2.1 standards.

One tenth of the FMA area (approximately 64 townships) was scheduled for SAVI each year starting with the earliest FMUs completed in the original AVI. A limited field program emphasized data collection for recent burns older than five years and cutblocks classified with a vegetation cover of grass or shrub. The SAVI program was completed in early 2015 with the addition of FMU S14 into the FMA area after the initiation of the new 2011 FMA.

In units where SAVI was completed (S18, L2, S23 and L8), the inventory was used in the 2006 TSA to compliment the original AVI. The SAVI process and its utilization were approved by the GOA through the subsequent approval of the 2006 FMP. A SAVI process description was included in the 2006 TSA documentation, coverage of the SAVI program is shown in Figure 2.17.

Al-Pac is now embarking on a new AVI process (AVI-II) for a complete polygon and attributes update of 100% of the FMA area. This process received GOA A-I-P in 2014. AVI-II however, will not be available for the 2015 TSA.

2.3.17.4 *Processing for Input*

1. Import E00 file for conversion into coverage.
2. Add field 'UKEY_AVI'

3. Calculate 'UKEY_AVI' = [FID] + 1
4. Export table to ORACLE
5. Remove all fields from spatial file except 'UKEY_AVI'

2.3.17.5 *Assumptions/Processing Issues*

None

2.3.17.6 *Programs*

None

2.3.17.7 *Output Dataset*

File containing all AVI attributes and linework

2.3.17.8 *Important Attributes*

UKEY_AVI: Unique identifier of AVI derived polygons

2.3.17.9 *Delivered Theme Name*

LB_AVI

AVI_ATTR_V3.dbf

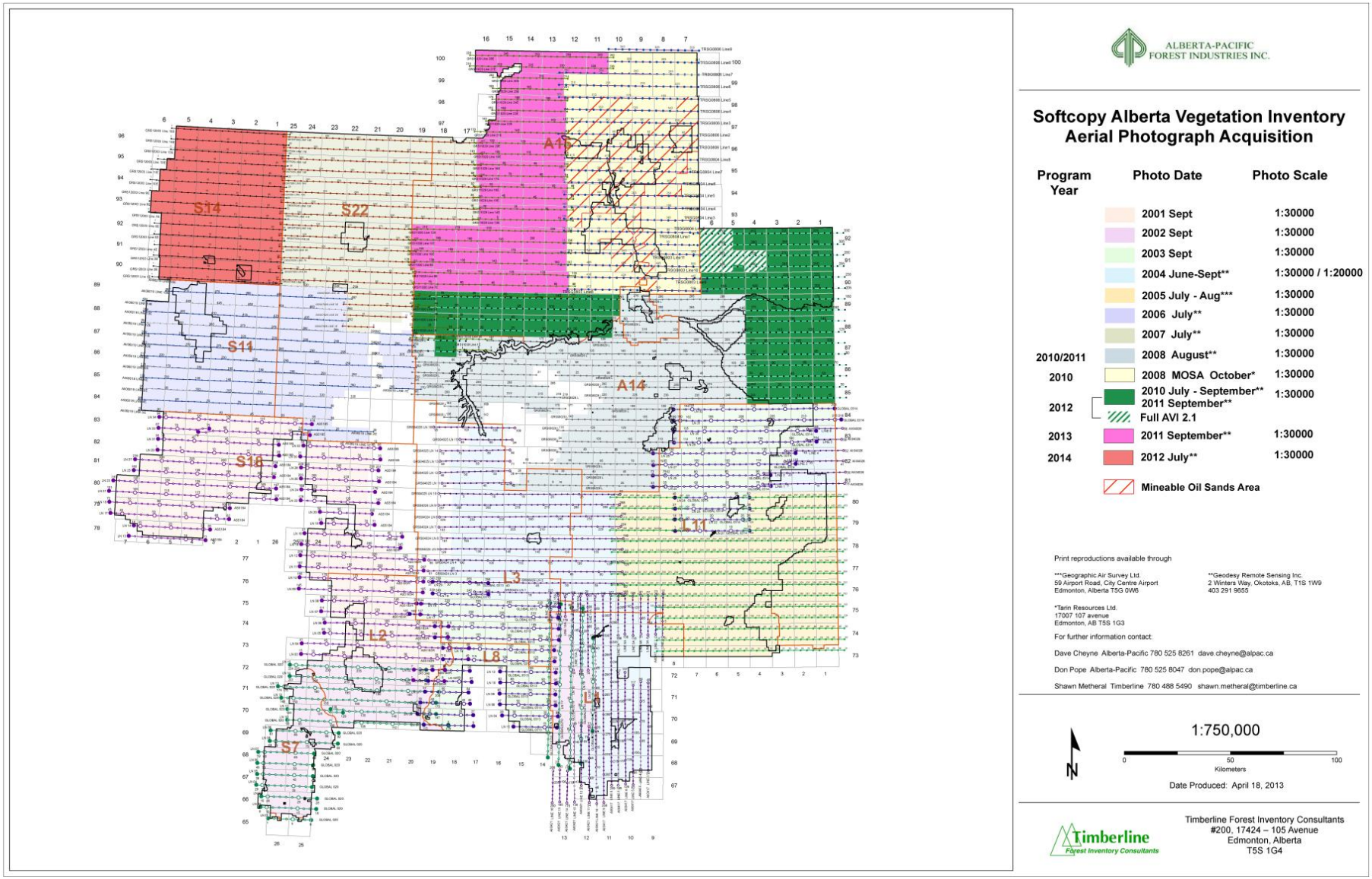


Figure 2.17. Date of aerial photograph acquisition for AVI.

2.3.18 Regenerated Stand Inventory

2.3.18.1 *Input Dataset Name(s)*

1. RSI_Polygons.shp
2. sisrsi_mw83_june2002.SHP

2.3.18.2 *Source(s)*

1. Millar Western Forest Products; received 01-2014

2.3.18.3 *Description*

The regenerated stand inventory (RSI) program was developed to update the AVI; all calls were made by AVI certified interpreters from helicopters hovering over target areas.

The principal purpose of the RSI inventory was to inventory old cutovers to support the development of a management strategy for these areas. The new RSI inventory was designed to replace the previous AVI inventory label to accurately identify stocking levels and stock height in the cutover. Data has been found to include areas outside that of harvested areas.

There were two datasets provided to represent RSI data. Input dataset 1 (ID1) contains all AVI type data fields and associated information. Input dataset 2 (ID2) contains the interpretation of ID1 towards stratification and age calls for RSI polygons.

2.3.18.4 *Processing for Input*

1. Turn ID1 to point feature class using point in feature
2. Select features from ID2 where they intersect the created point feature class
3. Export selection to dataset that will be used in landbase process (LB_RSI)

2.3.18.5 *Assumptions/Processing Issues*

It is assumed that RSI calls are more up-to-date than the underlying AVI information except where new (>1991) cutblocks are found. RSI data will replace the AVI data for the locations to which there is RSI data available.

ID2 does not contain all locations that ID1 has interpreted. This had no net effect on creation of the RSI layer for use in the net down.

ID2 contains extra linework that was not interpreted in ID1. These features were removed from the net down process.

2.3.18.6 *Programs*

NONE

2.3.18.7 *Output Dataset*

File with RSI data that is to be used in place of the AVI.

2.3.18.8 *Important Attributes*

YEAR_CUT: The year in which the RSI polygon was harvested

RSIID: Unique identifier for each RSI polygon

STRATA: MWFP Strata. Field name converted to R_STRATA in landbase. When converted to Al-Pac strata, the interpretation follows:

MWBO Strata	AlPac Strata Interpretation
AW	Aw
AWPJ	PjMx
AW-PJ	PjMx
AW-S-C-S	AwSx
AW-S-O	AwSx
AWS-S	AwSx
AW-S-U-S	AwU
AW-U-FM	AwU
AW-U-G	AwU
NFCC	NFCC
PJAw	PjMx
PJ-C-G	Pj
PJ-O-C-FM	Pj
SAW-S	SxAw
SB-C-FM	SbFM
SB-C-G	SbG
SB-O	SbG
SW-C-FM	Sw
SW-C-G	Sw
SW-O	Sw

2.3.18.9 *Delivered Theme Name*

LB_RSI

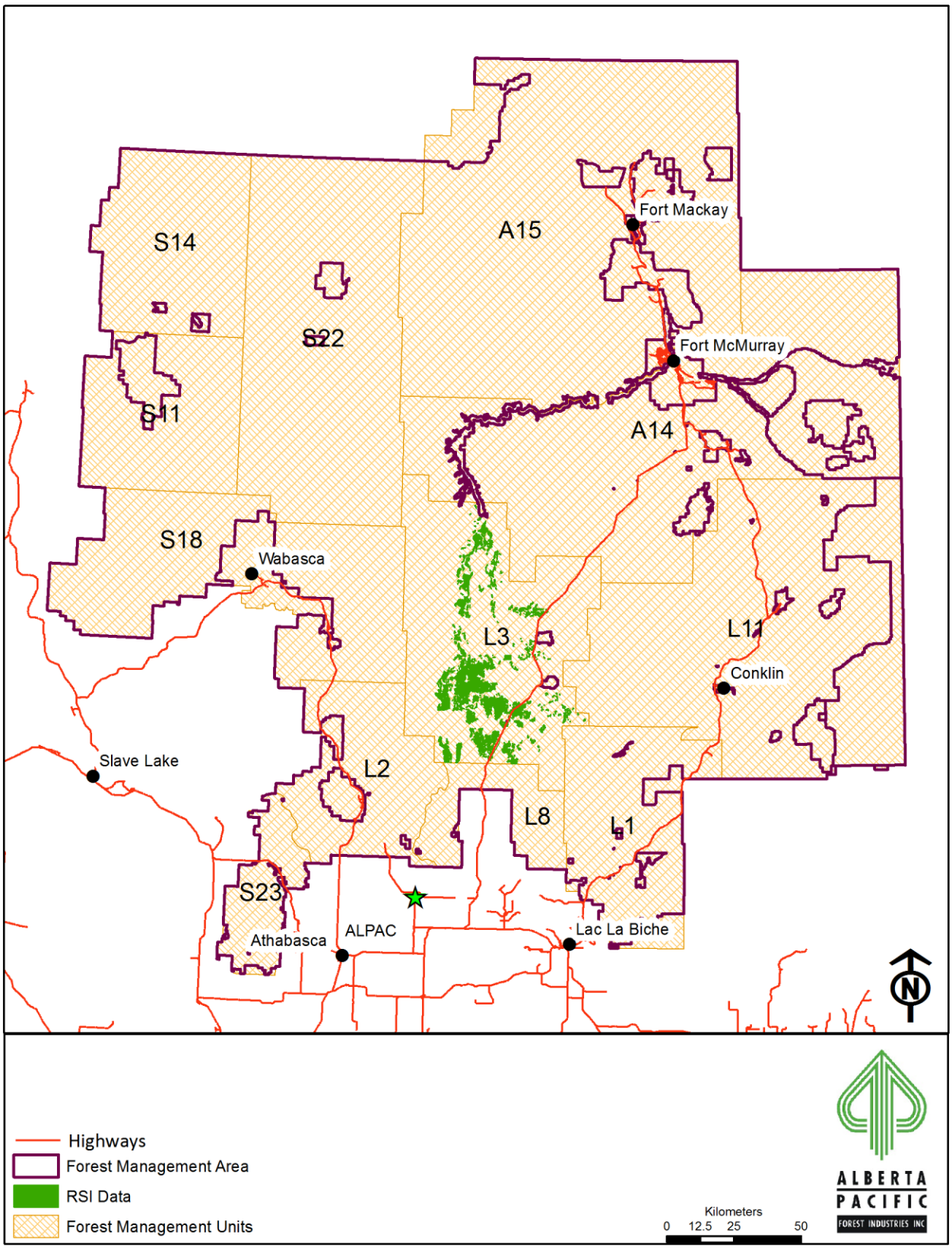


Figure 2.18. Regenerated Stand Inventory data.

2.3.19 Hydrology - Water Features

2.3.19.1 *Input Dataset Name(s)*

1. HYDROPOLY.SHP

2.3.19.2 *Source(s)*

1. AltaLIS data; accessed 08-2013

2.3.19.3 *Description*

Spatial location of major hydrological features within the Al-Pac FMA area.

2.3.19.4 *Processing for Input*

1. Clip to FMU boundary

2.3.19.5 *Assumptions/Processing Issues*

None

2.3.19.6 *Programs*

None

2.3.19.7 *Important Attributes*

HYD_FEAT: Base feature type

2.3.19.8 *Output Dataset*

File with all major hydrological features on the Al-Pac FMA area.

2.3.19.9 *Delivered Theme Name*

LB_HYDROPOLY

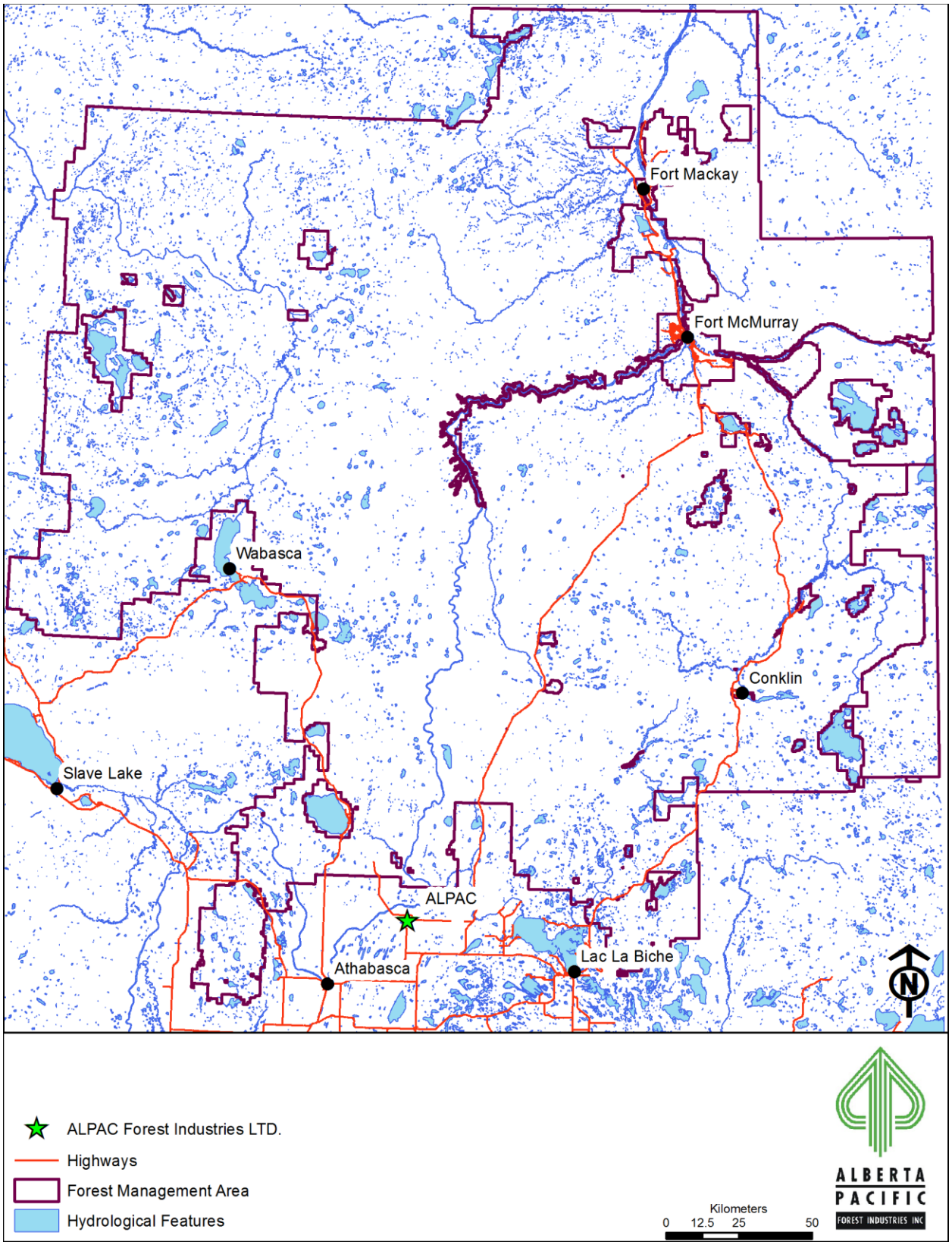


Figure 2.19. Water features within the Al-Pac FMA area.

2.3.20 Hydrology - Water Feature Buffers

2.3.20.1 *Input Dataset Name(s)*

1. BF_HYDRO_POLYGON.SHP
2. BF_SLNET_ARC.SHP
3. AVI.SHP

2.3.20.2 *Source(s)*

1. Timberline 2009 forest inventory
2. AltaLIS data; accessed 08-2013

2.3.20.3 *Description*

Datasets representing water features to be buffered that lie within the Al-Pac FMA area.

2.3.20.4 *Processing for Input*

HYDRO_SLNET_ARC.SHP

1. Clip to the FMA boundary
2. Select only permanent features where FEATURE_TY = 'STR_PER'
3. Add field HY_BUFF and set HY_BUFF = 30 (all features)
4. Buffer by HY_BUFF; Side Type: FULL; End Type: ROUND; Dissolve Type: LIST (FEATURE_CO, FEATURE_TY, NAME, SOURCE, CAPTURE_DA, PS_FLOW, BF_ID, HY_BUFF)

BF_HYDRO_POLYGON.SHP

1. Clip the full province to the FMA boundary
2. Remove sandbars and islands from dataset where FEATURE_TY NOT LIKE 'ISLAND%
3. Dissolve features as map sheet lines intersect water features.
4. Project the dissolved data to UTM ZONE 12N
5. Add field HY_AREA and calculate area in hectares
6. Add field HY_BUFF and set
    a. 60 where FEATURE_TY = 'RIV-MAJ'
    b. 100 where FEATURE_TY = 'LAKE-PER' or 'OXBOW-PER' and HY_AREA >= 4.0
    c. 800 where NAME = Banana, Francis, or Meyer Lake
    d. 400 where NAME = Lawrence or Chain Lakes

7. Buffer by HY_BUFF; Side Type: OUTSIDE_ONLY; Dissolve Type: LIST (Dissolve Fields: FEATURE_CO, FEATURE_TY, HY_AREA, HY_BUFF)

AVI Water Features

1. Import E00 files for the theme AVI into coverage in each of the township tiles and merge together
2. Reselect all lakes (NAT_NON in ('NWL','NWR')
3. Dissolve all features by NAT_NON
4. Select all river features (NWR), and only lake features (NWL) larger than 4 ha and create new dataset
5. Add fields to the above created dataset:
    a. HY_AREA; and,
    b. HY_BUFF
6. Calculate HY_AREA as hectares
7. Calculate HY_BUFF (buffer distance) based on features:
    a. calculate HY_BUFF = 60 where NAT_NON = 'NWR'
    b. calculate HY_BUFF = 100 where NAT_NON = 'NWL'
8. Buffer by HY_BUFF; Side Type: OUTSIDE_ONLY; Dissolve Type: LIST (Dissolve Fields: FEATURE_CO, FEATURE_TY, HY_AREA, HY_BUFF)

Merge Datasets

1. Union the three datasets:
2. Add items to *HY_BUF_UNION* in order to track the source of the chosen feature, its width and feature type:
    a. Add field HY_DIST
    b. Add field HY_SRCE
    c. Add field HY_FEATURE
3. Calculate features:
    a. where FID HY_BUF_POLY > 0: calculate HY_SRCE = 'HYPOLY', HY_DIST = BUFF_DIST, HY_FEATURE = FEATURE_TY
    b. where FID HY_BUF_SLNET > 0: calculate HY_SRCE = 'SLNET', HY_DIST = BUFF_DIST, HY_FEATURE = FEATURE_TY_1
    c. where FID HY_BUF_SLNET > 0: calculate HY_SRCE = 'SLNET', HY_DIST = BUFF_DIST, HY_FEATURE = FEATURE_TY
    d. Dissolve the merged dataset (dissolve type: LIST: HY_SRCE, HY_DIST, HY_FEATURE)
4. Dissolve the resulting output from step 3 with no field selection

5. Add attribute field WBUF and calculate = 1

Table 2.7. Outline for assigning buffer distance to hydrological features.

Table	Descriptor	Area	Buffer Distance (m)
HydroLSLN	Feat_TY = STR_PER		30
HydrolSLN	Feat_TY <> STR_PER		0
Hydro_PY	Feat_TY = Riv_Maj		60
Hydro_PY	Feat_TY = Lake-Per	>= 4ha	100
Hydro_PY	Feat_TY = Oxbow-Per	>= 4ha	100
AVI	Nat_Non = NWR		60
AVI	Nat_Non = NWL	>= 4ha	100

2.3.20.5 *Assumptions/Processing Issues*

The hydrologic classifications used in operational planning are defined in the Company ground rules. These classes are not the same as the hydrologic classes used in the Provincial Base Features data

2.3.20.6 *Programs*

None

2.3.20.7 *Output Dataset*

Feature with all hydrological buffers to be applied to the Al-Pac FMA area.

2.3.20.8 *Important Attributes*

WBUF: Binary type identifier of water buffers

2.3.20.9 *Delivered Theme Name*

LB_HYDROBUF

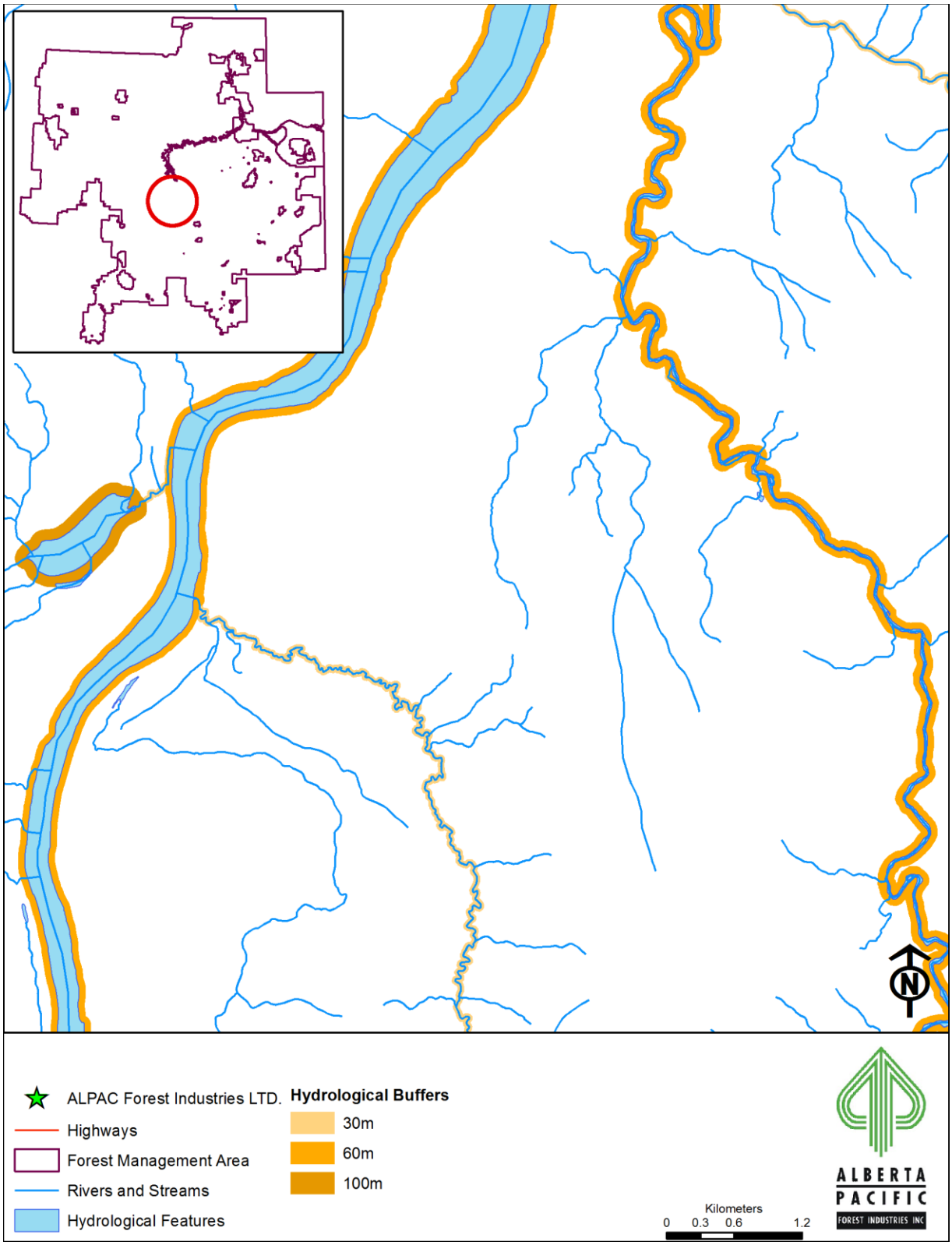


Figure 2.20. An example of hydrological buffers assigned to water features within the Al-Pac FMA area.

2.3.21 Hydrology - Watersheds

2.3.21.1 *Input Dataset Name(s)*

1. WATERSHED.SHP

2.3.21.2 *Source(s)*

1. GOA Forest Management Branch, received 01-2014

2.3.21.3 *Description*

Watershed boundaries for the Al-Pac FMA area generated from 10m Light Detection and Ranging (LiDAR) derived digital elevation model (DEM)

2.3.21.4 *Processing for Input*

None

2.3.21.5 *Assumptions/Processing Issues*

None

2.3.21.6 *Programs*

None

2.3.21.7 *Output Dataset*

Watershed boundaries within the Al-Pac FMA area

2.3.21.8 *Important Attributes*

WTRSHED: Unique identifier

2.3.21.9 *Delivered Theme Name*

LB_WATERSHED

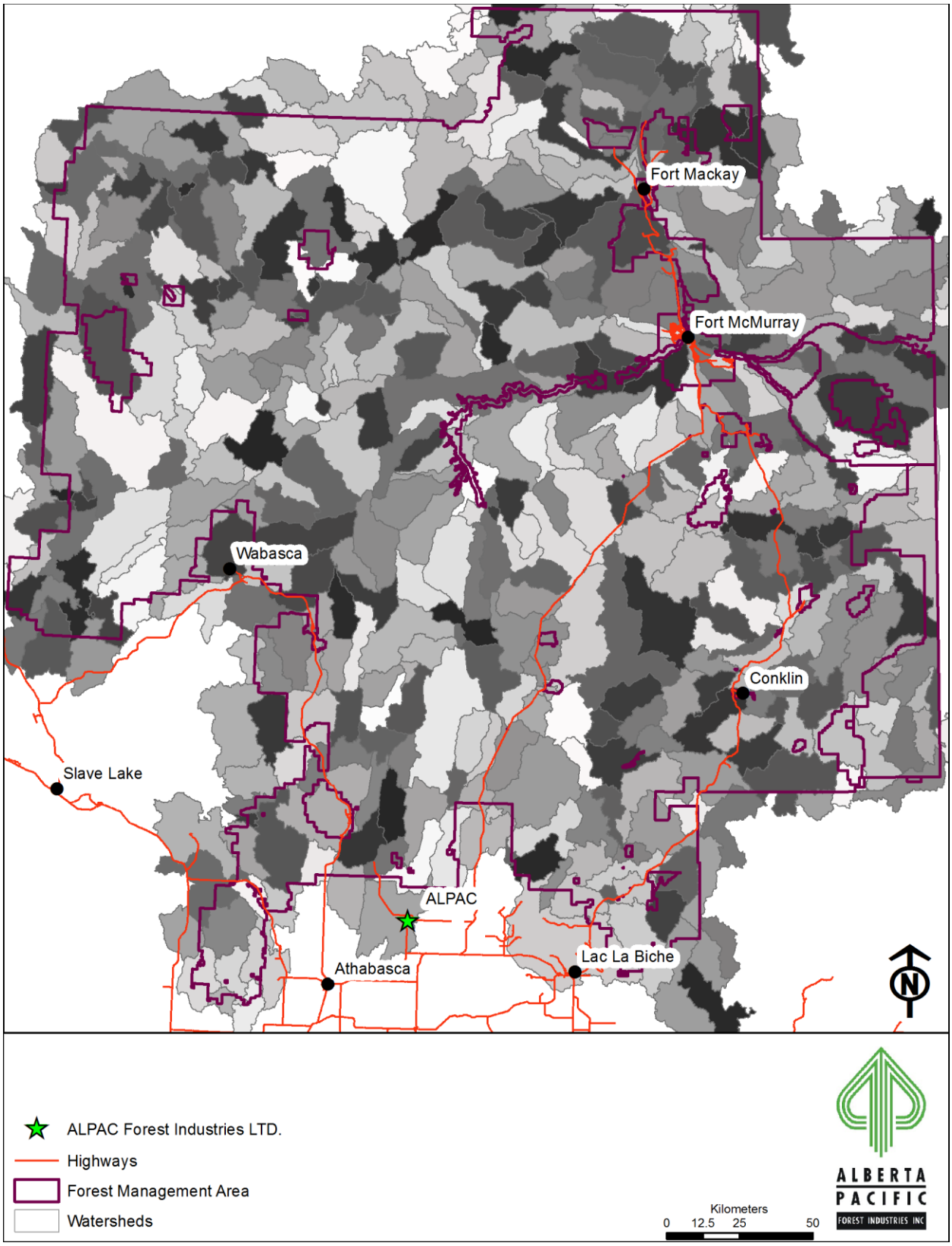


Figure 2.21. Watershed boundaries for the Al-Pac FMA area.

2.3.22 Fur Management Areas

2.3.22.1 *Input Dataset Name(s)*

TRAP.SHP

2.3.22.2 *Source(s)*

AltaLIS Trapper Data, accessed 08-2013

2.3.22.3 *Description*

Shapefile that identifies the boundaries of trap lines on the Al-Pac FMA area.

2.3.22.4 *Processing for Input*

1. Clip to FMU

2.3.22.5 *Assumptions/Processing Issues*

None

2.3.22.6 *Programs*

None

2.3.22.7 *Output Dataset*

Shapefile with all trap lines on the Al-Pac FMA area

2.3.22.8 *Important Attributes*

RFMA_NAME: Registered fur management area name

2.3.22.9 *Delivered Theme Name*

LB_TRAP

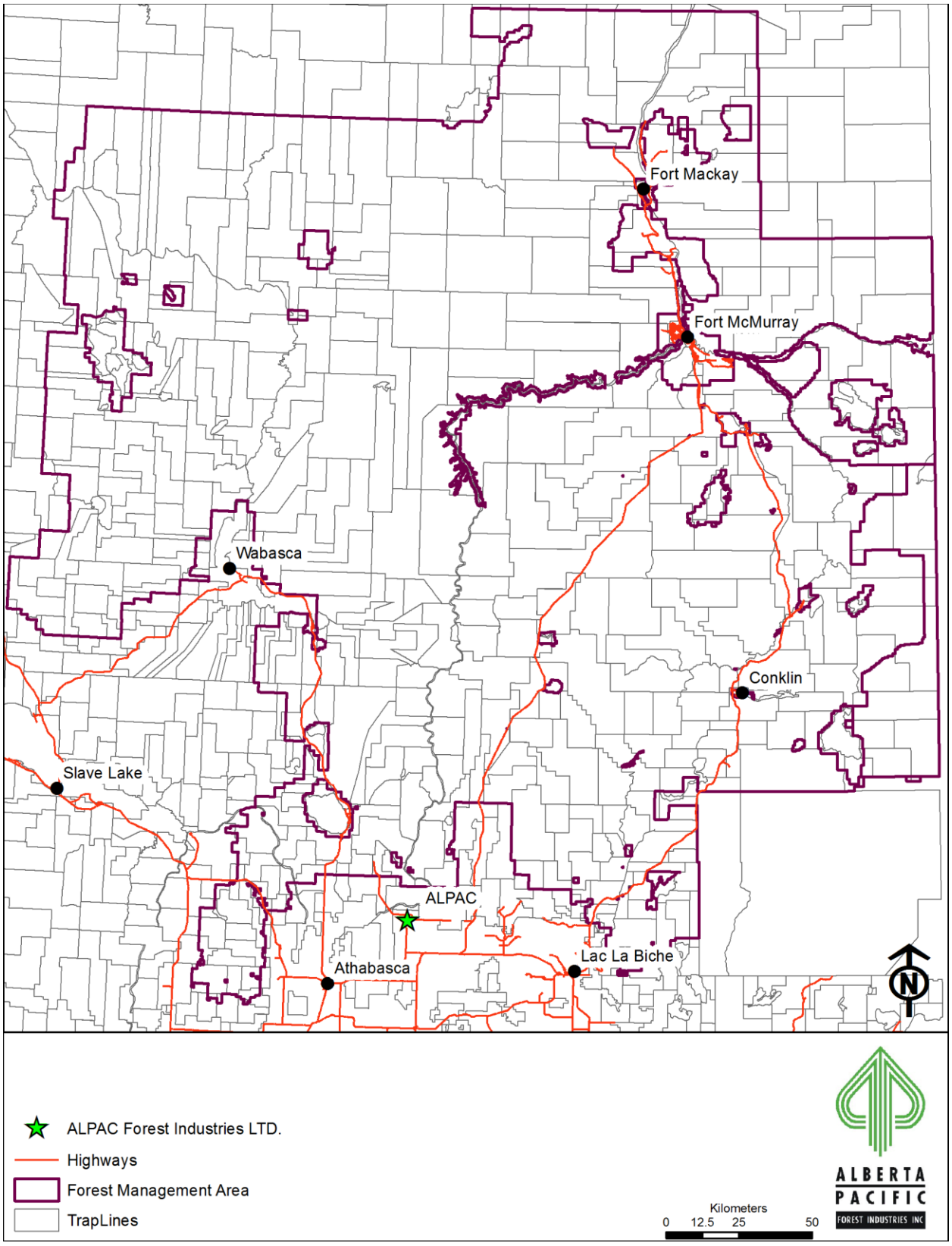


Figure 2.22. Fur management areas within the Al-Pac FMA area.

2.3.23 Caribou Range

2.3.23.1 *Input Dataset Name(s)*

CARIBOU_2013.SHP

2.3.23.2 *Source(s)*

1. Provincial Landscape Analysis Tool (09-2013 access)

2.3.23.3 *Description*

A shapefile detailing the spatial locations of Caribou Range within the Al-Pac FMA area

2.3.23.4 *Processing for Input*

1. Clip to FMU

2.3.23.5 *Assumptions/Processing Issues*

None

2.3.23.6 *Programs*

None

2.3.23.7 *Output Dataset*

Shapefile of Caribou Zones

2.3.23.8 *Important Attributes*

SUBUNIT: Caribou subunit name
LOCALRANGE: Caribou range name

2.3.23.9 *Delivered Theme Name*

LB_CARIBOU

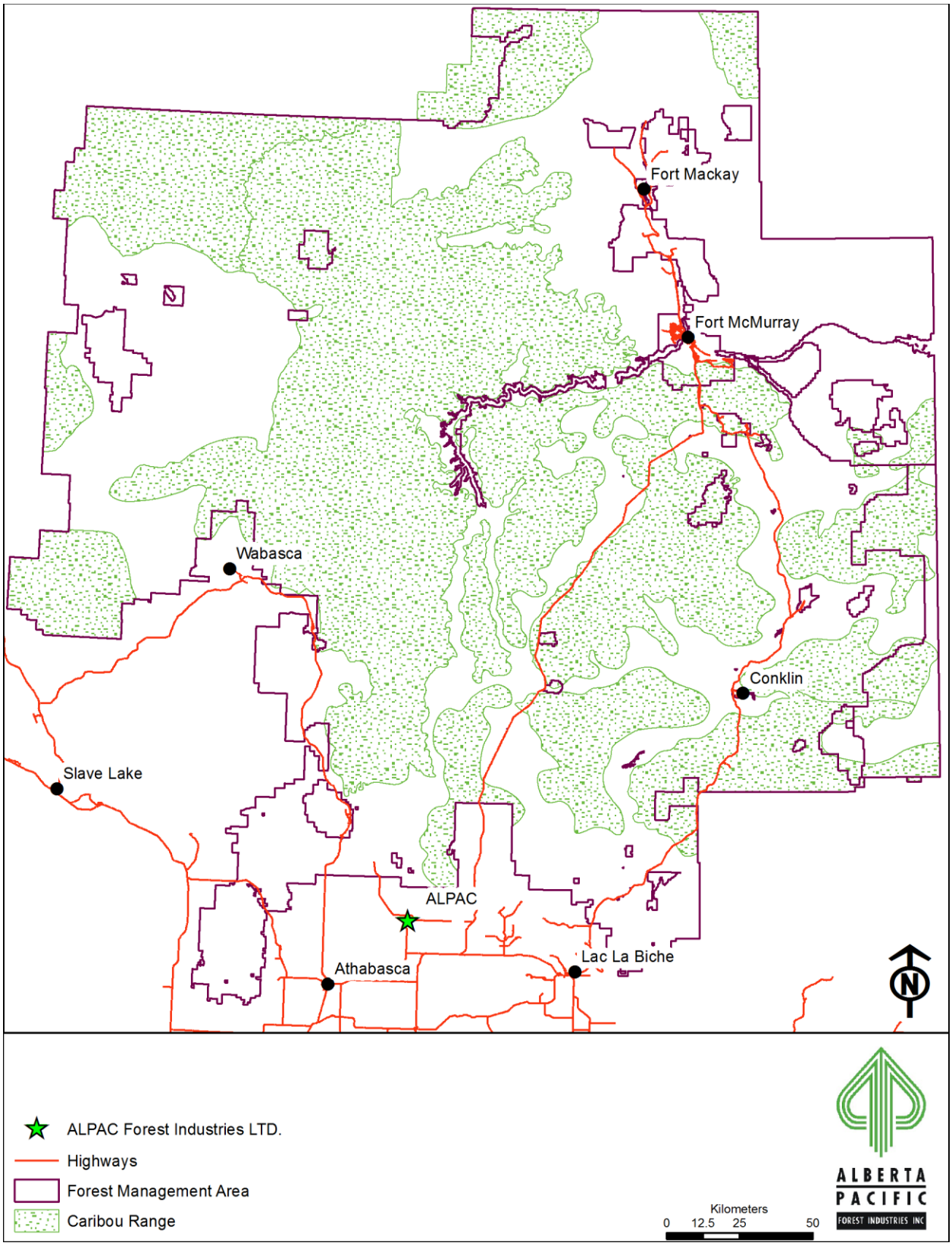


Figure 2.23. Defined Caribou Range within the Al-Pac FMA area.

2.3.24 Ungulate Zones

2.3.24.1 *Input Dataset Name(s)*

KEY_WILDLIFE_BIODIVERSITY.SHP

2.3.24.2 *Source(s)*

1. Provincial Landscape Analysis Tool (Sept-2013 access)

2.3.24.3 *Description*

A shapefile detailing the spatial locations of key wildlife biodiversity zones which include ungulate zones within the Al-Pac FMA area

2.3.24.4 *Processing for Input*

1. Clip to FMU

2.3.24.5 *Assumptions/Processing Issues*

None

2.3.24.6 *Programs*

None

2.3.24.7 *Output Dataset*

Shapefile of Ungulate zones

2.3.24.8 *Important Attributes*

ZONE: Identifier of key wildlife biodiversity zones. Changed to UNG in landbase.

2.3.24.9 *Delivered Theme Name*

LB_KWB

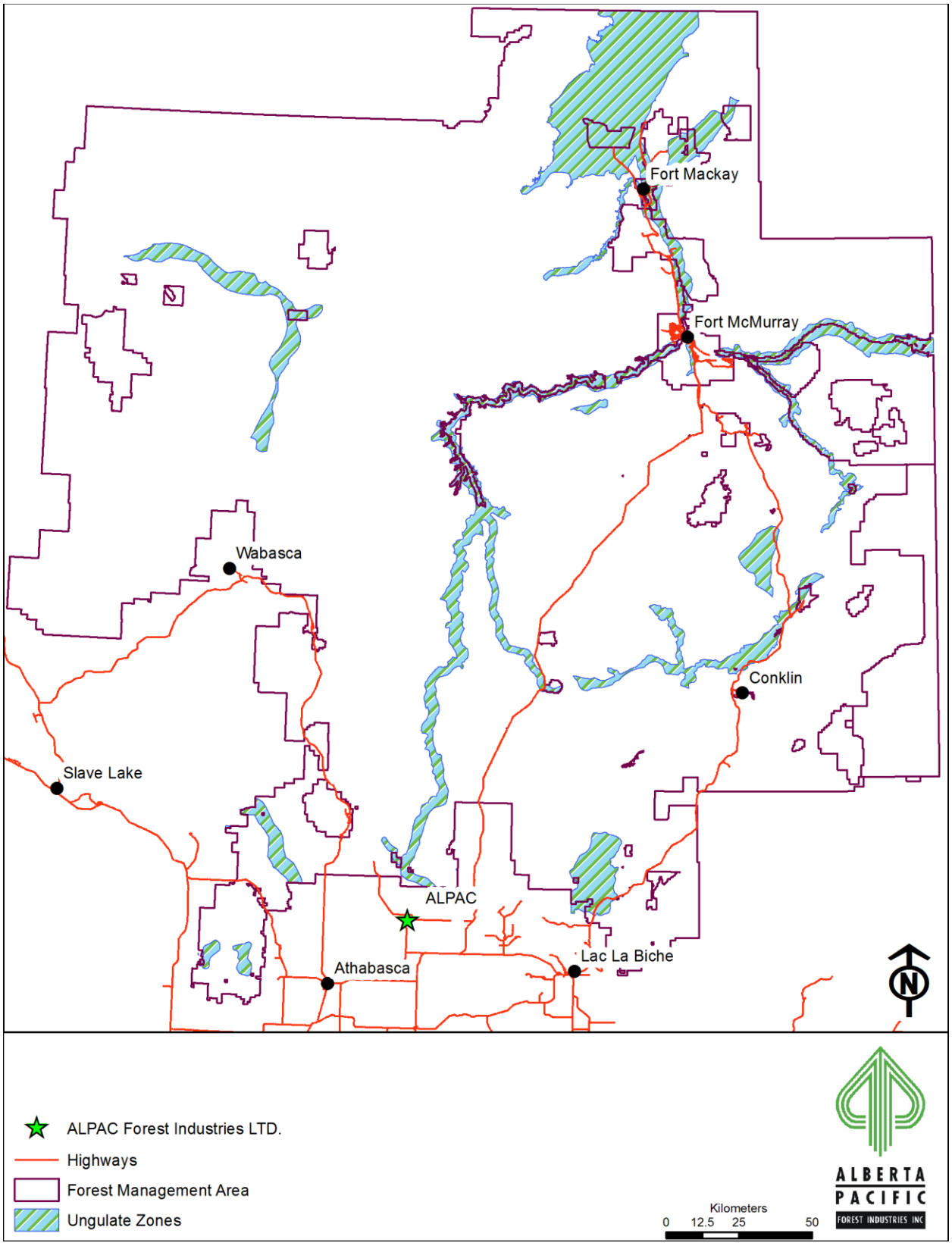


Figure 2.24. Ungulate zones within the Al-Pac FMA area.

2.3.25 Trumpeter Swan

2.3.25.1 *Input Dataset Name(s)*

TRUMPETERSWAN_WATER_LOCATIONS.SHP

2.3.25.2 *Source(s)*

1. Provincial Landscape Analysis Tool (09-2013 access)

2.3.25.3 *Description*

Shapefile identifying Trumpeter Swan lakes

2.3.25.4 *Processing for Input*

1. Buffer by 200m
2. Create field TS_BUFF
    a. Calculate 0 where feature is a lake
    b. Calculate 200 where feature is a buffer
3. Clip to FMU

2.3.25.5 *Assumptions/Processing Issues*

None

2.3.25.6 *Programs*

None

2.3.25.7 *Output Dataset*

Shapefile of Trumpeter Swan (TS) management zones

2.3.25.8 *Important Attributes*

TS_BUFF: Buffer distance

1. 0 m: Water Feature
2. 200 m: TS Deletion

2.3.25.9 *Delivered Theme Name*

LB_TRUMPETER

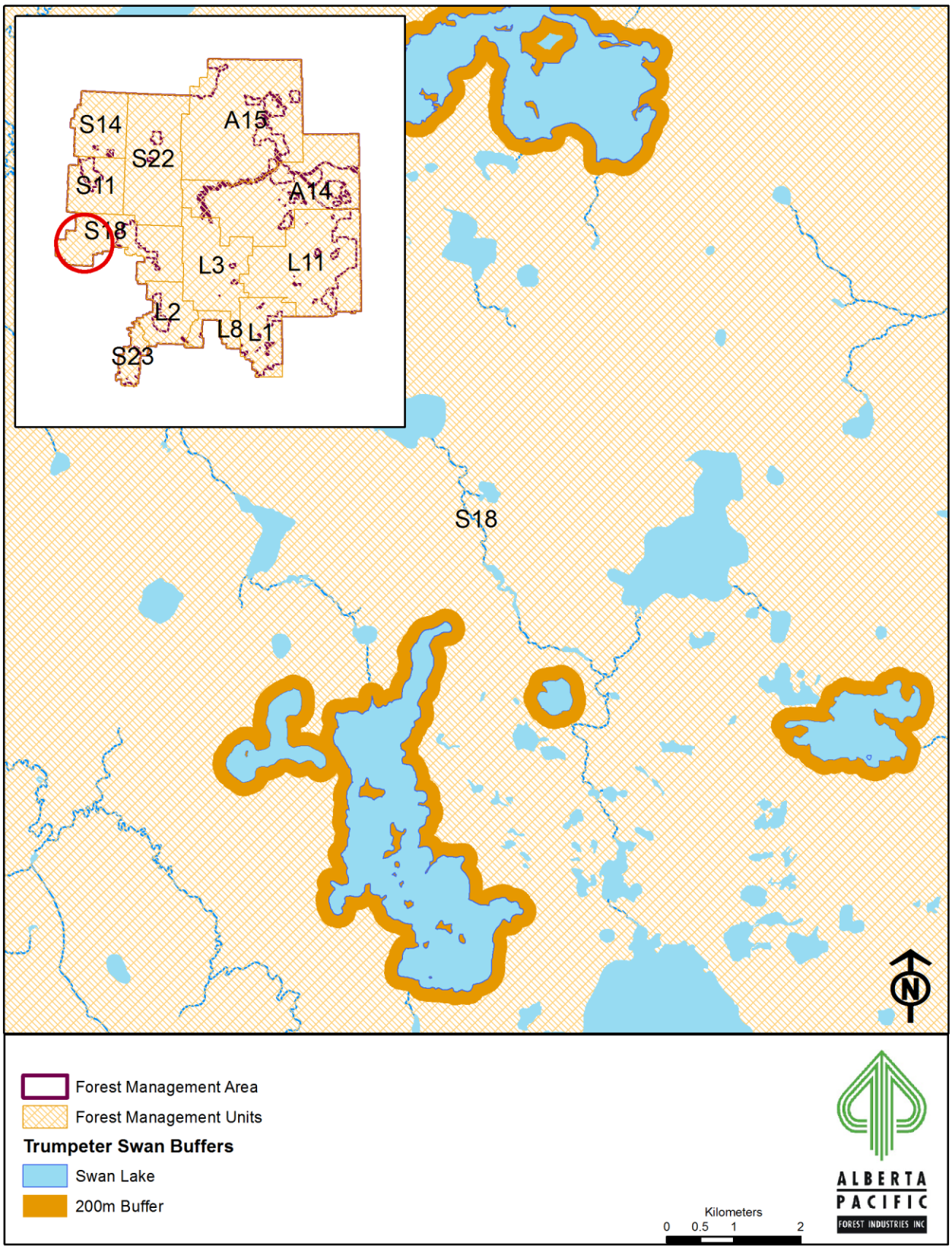


Figure 2.25. An example of Trumpeter Swan Lake buffers for the Al-Pac FMA area.

2.3.26 Slopes

2.3.26.1 *Input Dataset Name(s)*

1. SLOPE.SHP

2.3.26.2 *Source(s)*

1. 2007 AL-PAC DFMP

2.3.26.3 *Description*

Identification of steep slopes where operability is compromised. Utilized to create subjective deletions due to excessive slopes

2.3.26.4 *Processing for Input*

1. Delete any slope areas <= 1ha

2.3.26.5 *Assumptions/Processing Issues*

Source was provided. No additional processing executed. Source was prepared identifying 45% slopes from a 100m elevation model.

2.3.26.6 *Programs*

None

2.3.26.7 *Output Dataset*

Shapefile with all operation limiting slopes for subjective deletions

2.3.26.8 *Important Attributes*

SLOPE: Text field containing the acronym SLOPE to represent locations of operationally infeasible slopes on the landbase.

2.3.26.9 *Delivered Theme Name*

LB_SLOPE

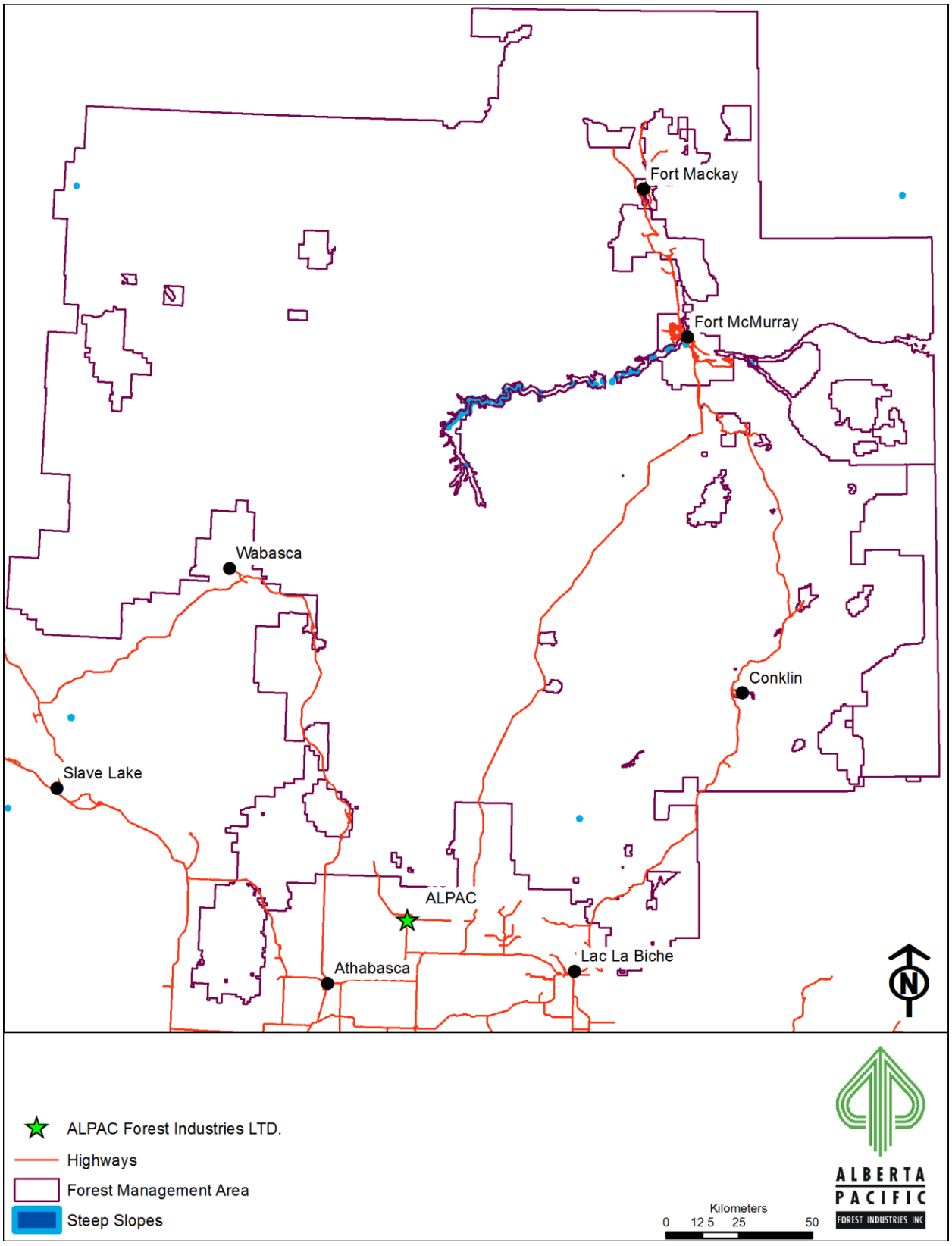


Figure 2.26. Steep slope map with operability limitations within the Al-Pac FMA area.

2.3.27 River Breaks

2.3.27.1 *Input Dataset Name(s)*

1. RIVER_BREAK.SHP

2.3.27.2 *Source(s)*

1. Timberline net landbase exercise from 2009

2.3.27.3 *Description*

A shapefile that identifies areas within the Al-Pac FMA area where there may be operability constraints imposed due to the presence of river valleys

2.3.27.4 *Processing for Input*

1. Clip to FMU boundary
2. Delete areas less than 5ha (small, isolated areas in dataset)

2.3.27.5 *Assumptions/Processing Issues*

Assume data and attribution is correct.

2.3.27.6 *Programs*

None

2.3.27.7 *Output Dataset*

Shapefile identifying river valleys with potential operability limitations

2.3.27.8 *Important Attributes*

RIVBRK: Text field containing the acronym RIVBRK to represent River Breaks in the landbase.

2.3.27.9 *Delivered Theme Name*

LB_RIVBRK

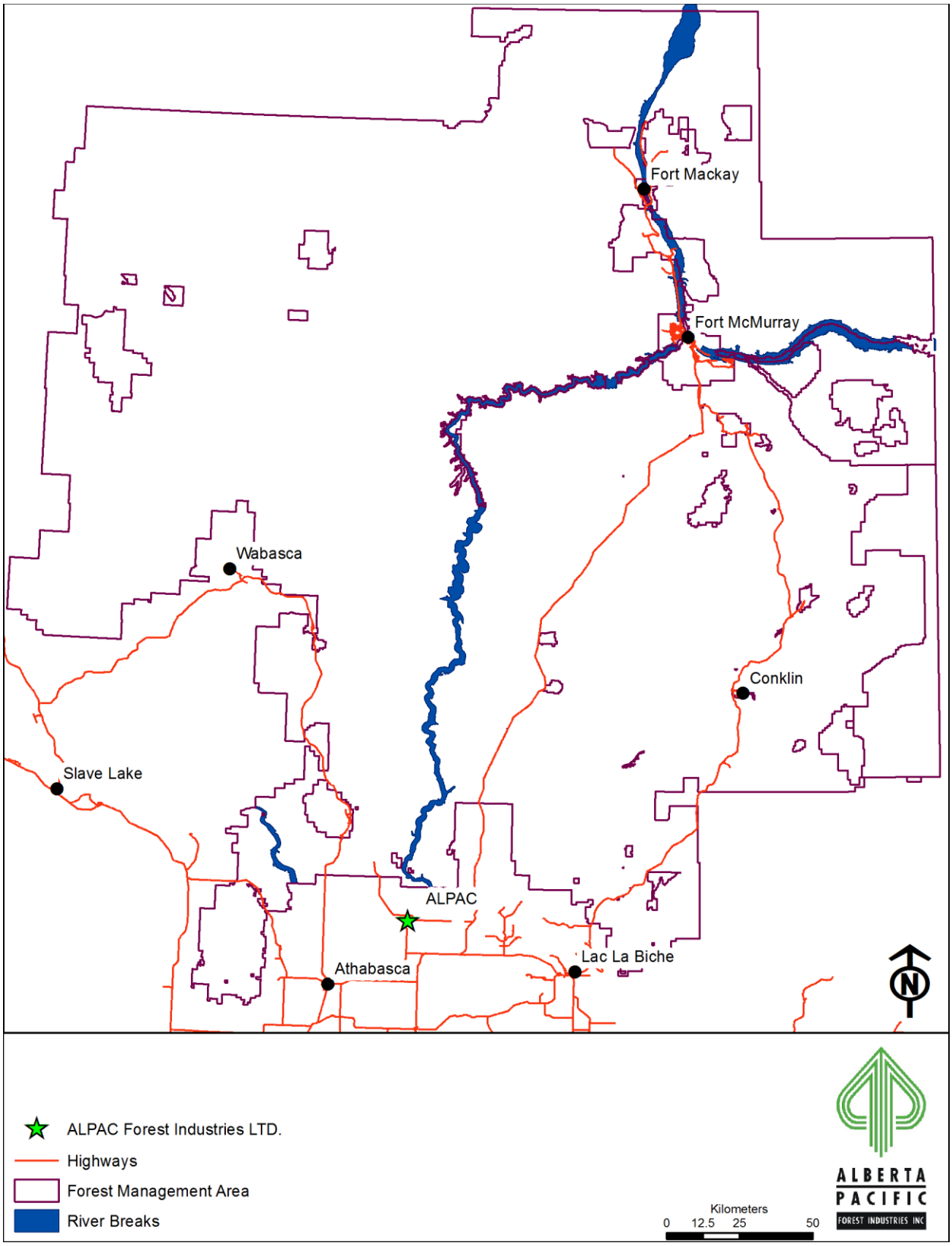


Figure 2.27. River breaks within the Al-Pac FMA area.

2.3.28 Seed Zones

2.3.28.1 *Input Dataset Name(s)*

1. SEEDZONES.SHP

2.3.28.2 *Source(s)*

1. Al-Pac Data library, received 10-2014

2.3.28.3 *Description*

A shapefile that identifies tree improvement zones (seed zones) within the Al-Pac FMA area as well as the Natural Sub-region in which they occur.

2.3.28.4 *Processing for Input*

1. Clip to FMU

2.3.28.5 *Assumptions/Processing Issues*

Assume data and attribution is correct.

2.3.28.6 *Programs*

None

2.3.28.7 *Output Dataset*

Shapefile indentifying tree improvement zones

2.3.28.8 *Important Attributes*

SEEDZONE: contains the natural sub-region code and seedzone identifier.

1. AP 1.1: Athabasca Plain
2. CM 1.2, 2.1, 2.2, 2.3,2.4, 3.1, 3.2, 3.3: Central Mixedwood
3. LBH 1.3, 1.5: Lower Boreal Highlands
4. LF 1.1: Lower Foothills
5. UBH 1.1: Upper Boreal Highlands

NSRNAME: Name of natural sub-region

2.3.28.9 *Delivered Theme Name*

LB_NSRSEED

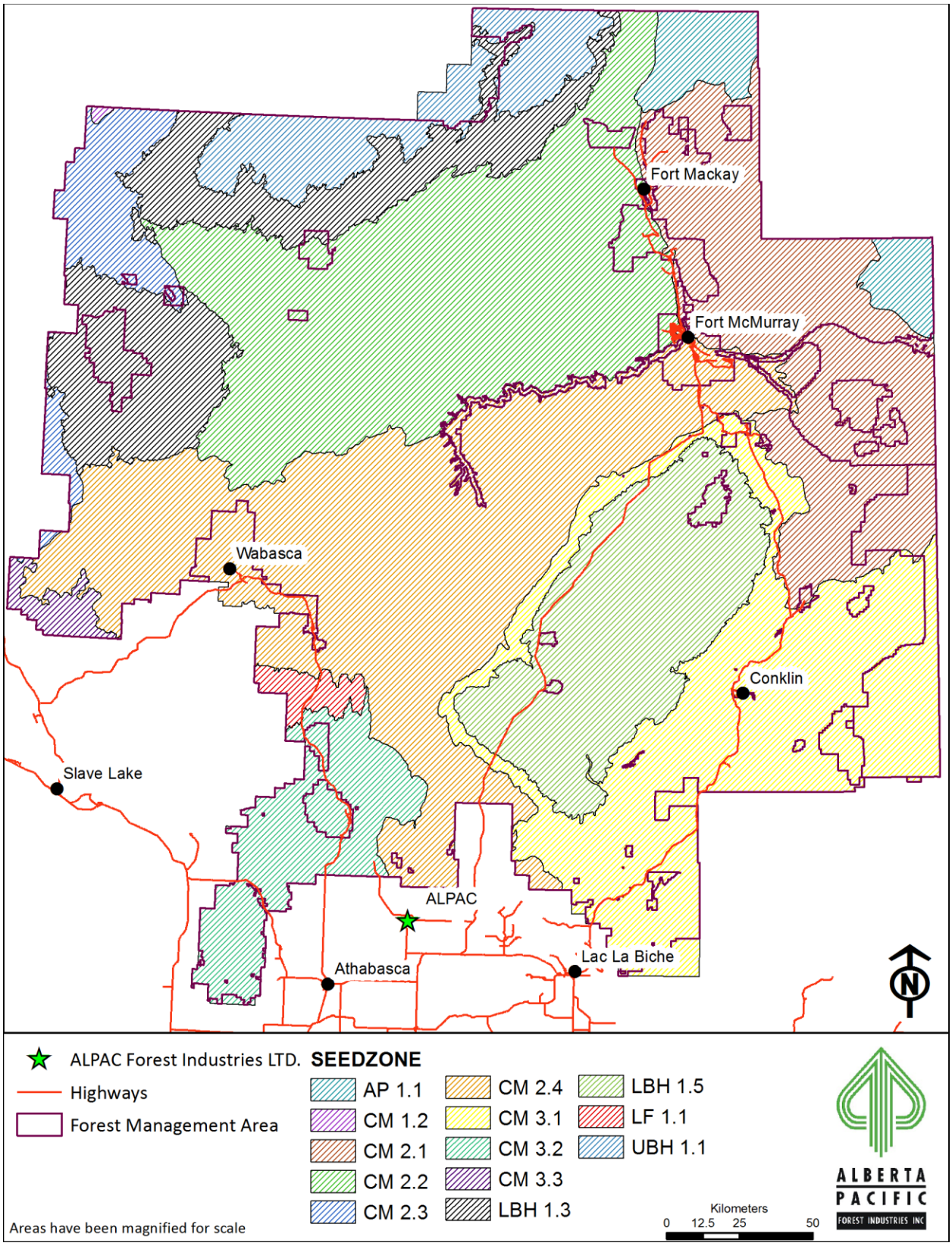


Figure 2.28. Tree improvement zones within the Al-Pac FMA area.

2.3.29 MWFP 'A' Density Stands

2.3.29.1 *Input Dataset Name(s)*

1. AVI_A_DENSITY.SHP

2.3.29.2 *Source(s)*

1. Millar Western Forest Products (MWFP); 03-2015

2.3.29.3 *Description*

Shapefile identifying stands that are to be managed for their understories as identified through ground truthing.

2.3.29.4 *Processing for Input*

1. Create points from feature class
2. Intersect with AVI
3. Create table of poly_num identified as 'A' density
4. Export table to ORACLE SDE.

2.3.29.5 *Assumptions/Processing Issues*

Assume that the understory is an adequate representation of the forested stand condition for management.

2.3.29.6 *Programs*

None

2.3.29.7 *Output Dataset*

Table listing the Poly_Num's identified as being an 'A' density switch stand.

2.3.29.8 *Important Attributes*

POLY_NUM: The AVI polygon number of identified 'A' density switch stands. Changed to ADEN_PNUM in landbase.

2.3.29.9 *Delivered Theme Name*

LB_A_DENSITY.DBF

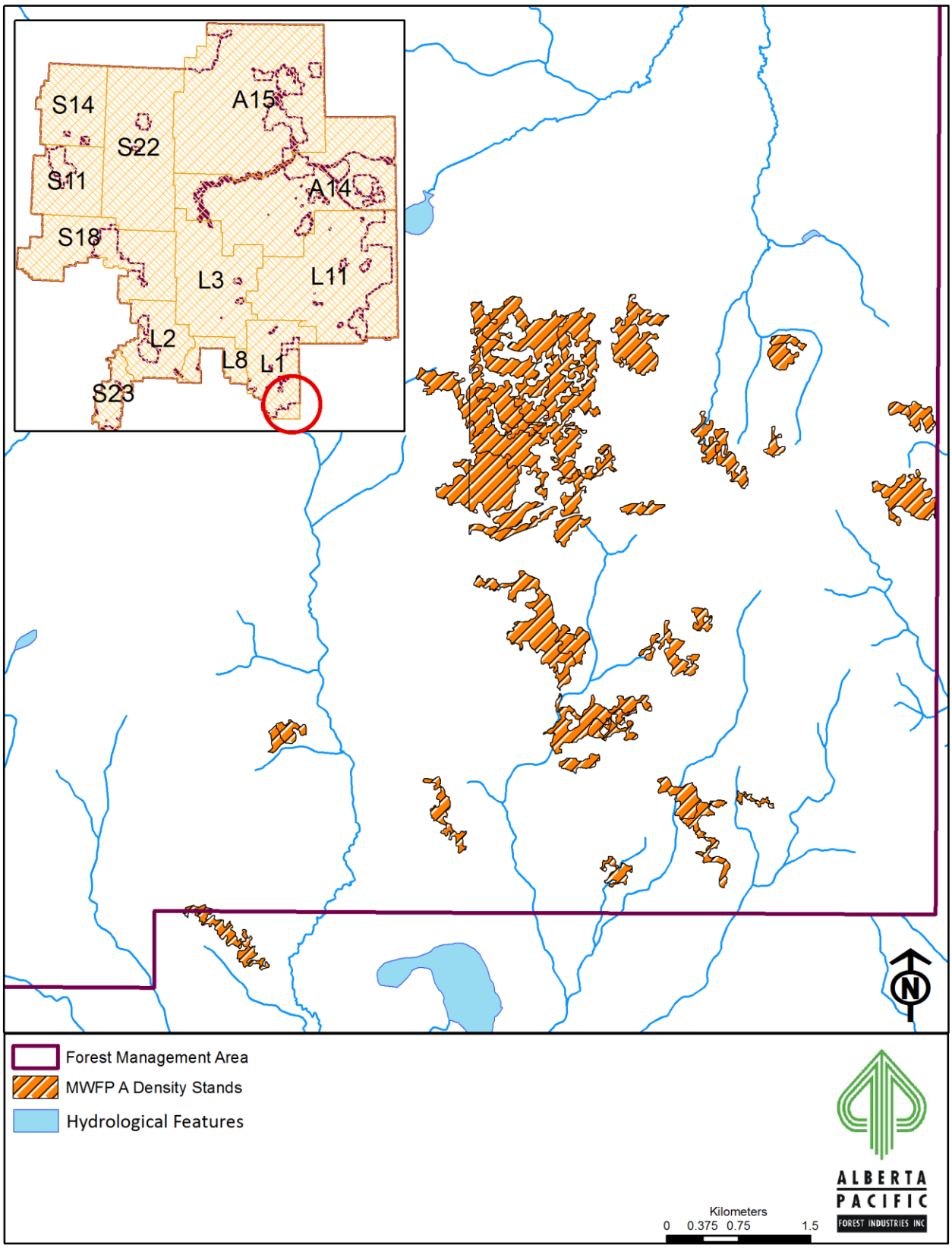


Figure 2.29. 'A' density stands for understory stratum assignment as identified by MWFP.

2.3.30 Cowper Traditional Land Use

2.3.30.1 *Input Dataset Name(s)*

1. COWPER_VIEWSCAPE.SHP

2.3.30.2 *Source(s)*

1. Al-Pac Data Library; received 12-2014

2.3.30.3 *Description*

Identification of area that falls within the Cowper Viewscape

2.3.30.4 *Processing for Input*

None

2.3.30.5 *Assumptions/Processing Issues*

None

2.3.30.6 *Programs*

None

2.3.30.7 *Output Dataset*

Shapefile identifying areas under the Cowper Lake viewscape.

2.3.30.8 *Important Attributes*

COWPER_LOS: Binary identification of the viewscape.

2.3.30.9 *Delivered Theme Name*

LB_COWPER

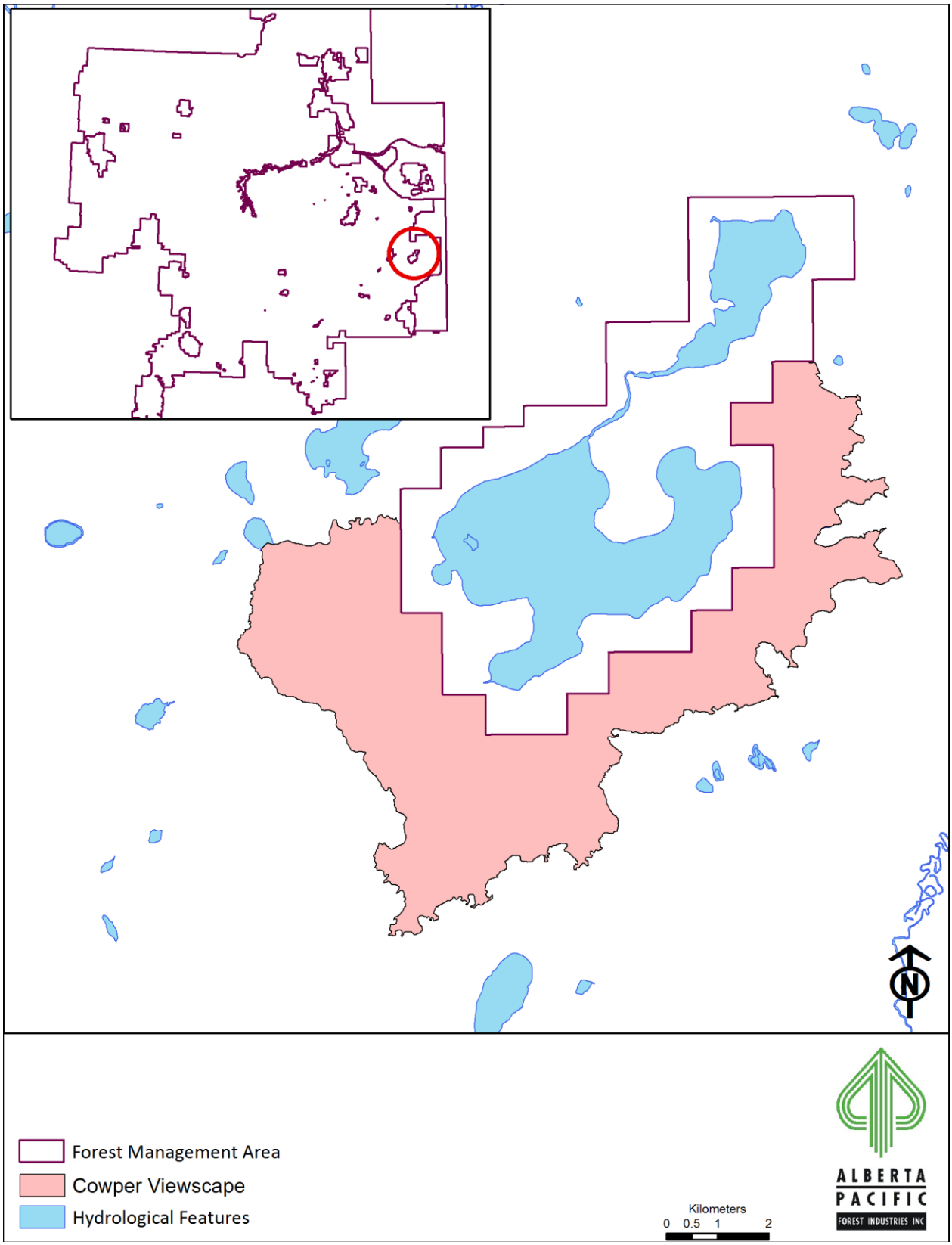


Figure 2.30. The Cowper Viewscape within the Al-Pac FMA area.

2.3.31 Heart Lake Viewscape

2.3.31.1 *Input Dataset Name(s)*

1. HEART.SHP

2.3.31.2 *Source(s)*

1. Al-Pac Data Library; received 12-2014

2.3.31.3 *Description*

Identification of area that falls within the Heart lake viewscape

2.3.31.4 *Processing for Input*

None

2.3.31.5 *Assumptions/Processing Issues*

None

2.3.31.6 *Programs*

None

2.3.31.7 *Important Attributes*

Heart: Binary identification of Heart Lake viewscape.

2.3.31.8 *Output Dataset*

Shapefile and table identifying areas under the Heart lake viewscape

2.3.31.9 *Delivered Theme Name*

LB_HEART

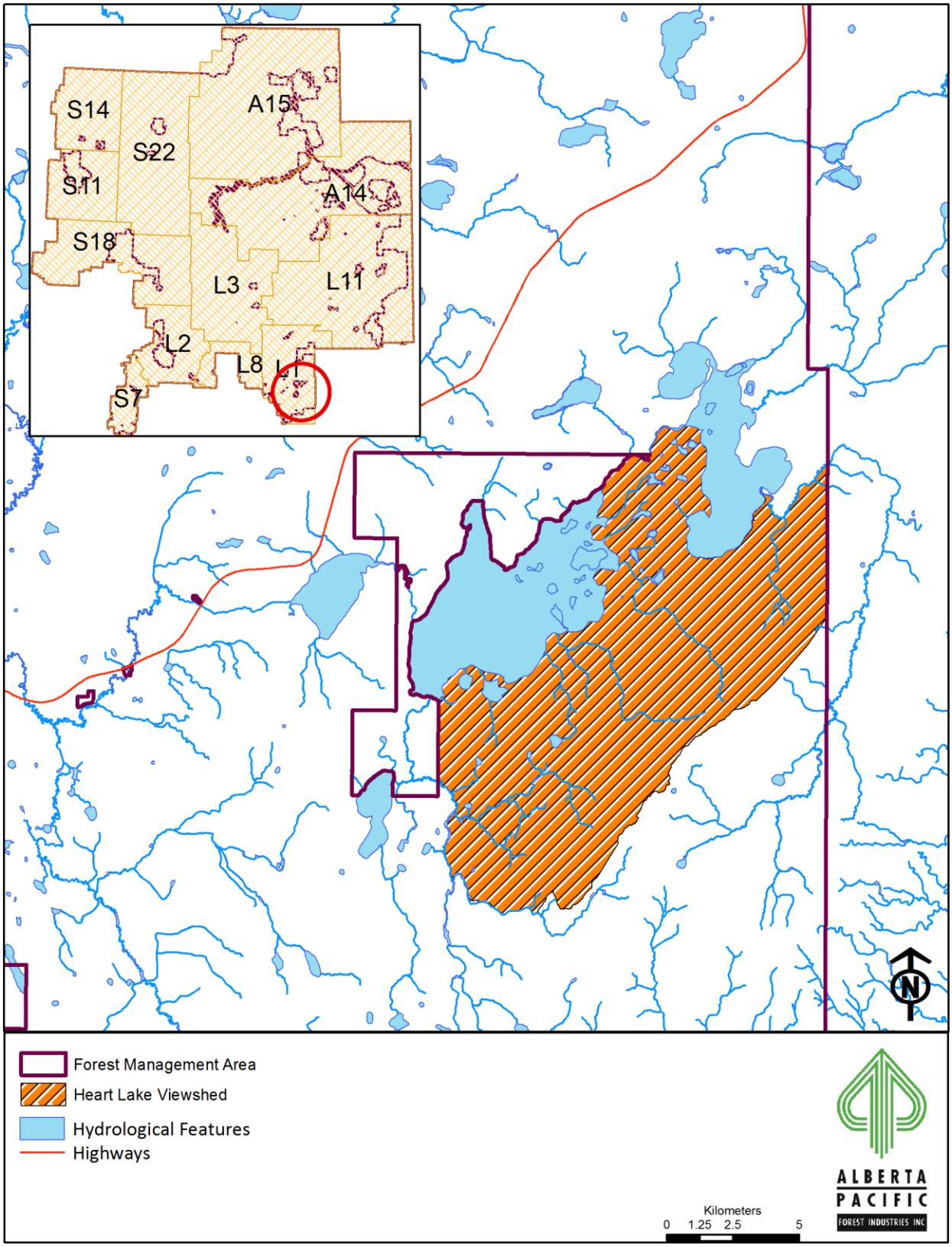


Figure 2.31. Heart lake viewscape falling within the Al-Pac FMA area.

3 Assemble the Landbase

3.1 Overview

This section describes the general methods and procedures used to create the final landbase files. Figure 3.1 shows the conceptual process for creating the three landbase datasets previously described (see section 1.3). The process of bringing the various data layers together is called a '*Multiunion*'; this section touches on this concept as well as the clean-up of the multiunioned layer and details as to how seismic lines are handled in the resultant landbases.

Figure 3.2 illustrates the steps of data processing and scripts used throughout. The scripts referenced in this figure are provided on the delivery media, and are also presented in Appendix V.

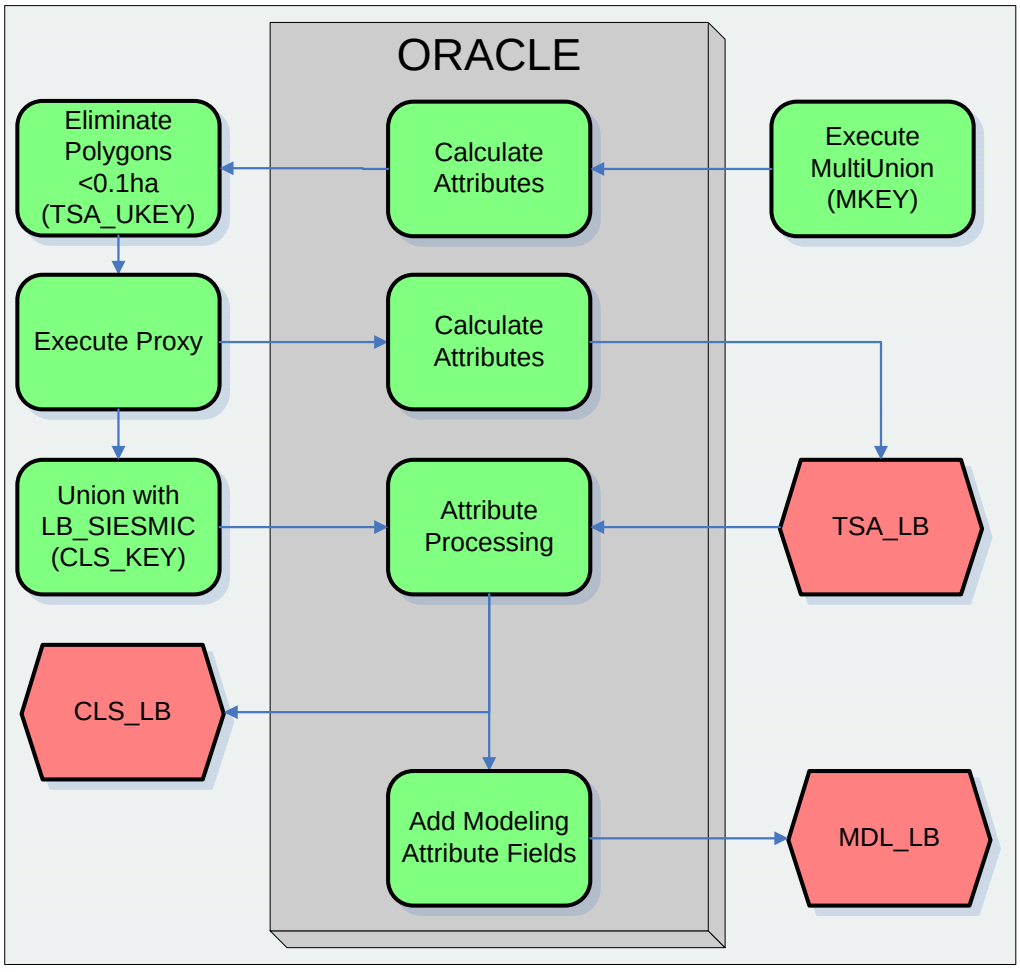


Figure 3.1. Overview flowchart of the landbase creation process.

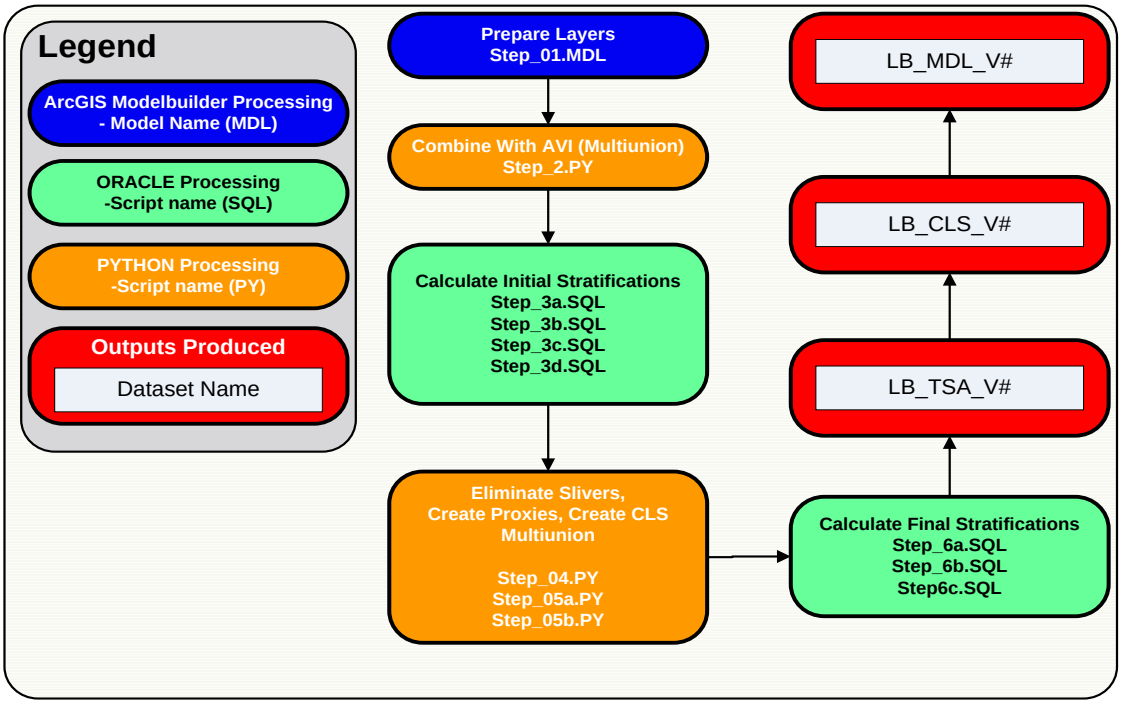


Figure 3.2 Map of data processing and scripts.

3.2 Multiunion

The underlying structure of each of the three landbases is the Alberta Vegetation Inventory (AVI). All other, non-proxy datasets (as mentioned in section 2) are unioned with the AVI which adds new linework and attributes, creating a multiunioned dataset. The multiunioned dataset is then processed within Oracle SQL to create temporary field values. Once these values have been processed, and the link of the table back to the spatial context has been made, polygon sliver elimination occurs. Table 2.1 lists the themes that are a part of the spatial multiunion as well as the themes that have been included as proxies.

3.3 Polygon Reduction

As noted earlier, the process of multiunioning spatial datasets from various sources will result in many sliver polygons that are artifacts of spatial processing. Typically these slivers do not identify any unique characteristic on the landbase and can, to a degree, be eliminated with no significant impact on subsequent analyses as viewed in Table 3.1.

For the purpose of landbase assessment, slivers were eliminated using the following rule set:

1. Any polygon < 0.01ha can be dissolved into any feature;
2. Polygons > 0.01ha < 0.1ha are subject to elimination;
3. Any boundary identifying a harvested cutblock (>1991 in age) cannot be eliminated; and
4. Any boundary between polygons with different landbase deletion code groups cannot be eliminated (Table 3.2).

Table 3.1. Pre-elimination deletion group areas versus resultant, eliminated areas.

Deletion Group	A14		A15		L1		L11		L2		L3	
	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)
ANTHRO	14,322	14,317	15,726	15,720	8,910	8,905	25,289	25,275	5,278	5,274	38,554	38,548
BLOCKS	13,514	13,513	16,890	16,889	27,262	27,261	51,315	51,313	23,101	23,101	22,966	22,963
FN	3,230	3,230	20,172	20,172	4,479	4,479	3,110	3,110	13,415	13,415	1	1
GroupDEL	692,551	691,577	760,043	759,477	230,011	229,233	639,944	638,607	208,384	207,658	441,146	440,106
ISO	0	984	0	587	0	788	0	1,366	0	732	0	1,053
LARP	195,909	195,909	3,727	3,727	19,048	19,048	213,644	213,644	0	0	1,690	1,690
MUN	22,412	22,412	9,078	9,078	0	0	128	128	0	0	1,125	1,125
NonFMA	60,722	60,721	167,573	167,573	27,144	27,143	9,015	9,014	19,676	19,675	3,628	3,628
PPA	206	206	36	36	8	8	68	68	0	0	1	1
SMA	0	0	265,985	265,987	0	0	0	0	0	0	0	0
WATER	174,689	174,685	178,403	178,388	42,165	42,160	105,264	105,253	29,176	29,174	79,472	79,468
	1,177,554	1,177,554	1,437,634	1,437,634	359,026	359,026	1,047,776	1,047,776	299,028	299,028	588,583	588,583

Table 3.1 Continued.

Deletion Group	L8		S11		S14		S18		S22		S7	
	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)	Pre-Elim (ha)	Post-Elim (ha)
ANTHRO	3,840	3,838	3,769	3,767	4,897	4,894	32,799	32,794	16,378	16,373	1,600	1,599
BLOCKS	4,320	4,320	7,132	7,130	6,551	6,550	27,198	27,196	7,372	7,372	8,596	8,596
FN	0	0	41,360	41,360	5,805	5,805	30,732	30,732	13,928	13,928	0	0
GroupDEL	94,850	94,643	242,589	242,210	294,148	293,693	391,203	390,458	636,356	635,464	85,800	85,551
ISO	0	209	0	389	0	465	0	761	0	911	0	253
LARP	0	0	0	0	0	0	0	0	0	0	0	0
MUN	0	0	0	0	0	0	957	957	0	0	0	0
NonFMA	1,039	1,039	2,311	2,310	12,526	12,525	42,434	42,434	84	84	15,607	15,607
PPA	0	0	0	0	0	0	0	0	0	0	1	1
SMA	0	0	0	0	0	0	0	0	0	0	0	0
WATER	22,788	22,787	35,393	35,387	40,444	40,439	85,624	85,616	128,517	128,503	15,779	15,778
	126,837	126,837	332,553	332,553	364,371	364,371	610,948	610,948	802,635	802,635	127,384	127,384

Table 3.2. Deletion groups used for sliver elimination.

Grouping Arguments	Group Code
F_YLD_SRC = ARIS-UP, ARIS-INT, ARIS-EXT, RSA	BLOCKS
F_DEL = ROAD, PIPE, ANTH, ANTHNON	ANTHRO
F_DEL = LAKE, RIVER, WETLAND, FLOOD, SWAN, WBUF, RVRBRK	WATER
F_DEL = BURN, NNV, NNF, AQUATIC, LT, BW, TPR, ADEN, NCOM-CON, NCOM-DEC, NCOM-CC, NFCC, NOARIS, NOID, ANTHVEG	GROUPDEL
F_DEL	*Other Values*

Note:

- The summary of strata totals may not match tables shown further in this document because this summary is not filtered by managed (active) or un-managed (passive) landbase.
- Areas in Table 3.1 do not always match between deletion groups due to the introduction of isolated stands (section 4.3.3.2), stands that fall within the Cowper Traditional Landuse Zone (section 2.3.30), seismic lines, rounding, and elimination rule 1 above. Total area differences, for each FMU, show that no landbase areas, on the whole, have been changed due to sliver elimination.
- F_DEL is a column in all provided landbases which contains the deletion category that is assigned to each polygon after consideration of deletion datasets and rules. Deletion types are explained in section 4.4.2.
- F_YLD_SRC definition can be found in section 4.4.1. *Other values* implies F_DEL values not listed in other rows.

3.4 Seismic Line Approach

Seismic lines, when combined with the landbase, created an increase of approximately 50% in the number of polygons across the Al-Pac FMU's. To reduce model memory and computational overhead, seismic lines are represented in the landbase through yield curve gross volume reductions. This is calculated by creating a weighted average of the seismic area by yield curve across all FMUs. The result can be observed in Table 3.3. This is only performed on the managed (active) landbase for stands in the natural condition.

The landbase intersected with the seismic features is called the Classified Landbase and is provided.

Table 3.3. Seismic yield curve scaling factor for all FMU's.

Yield Curve Number	Seismic Area (ha)	Total Polygon Area (ha)	Seismic Factor (%)
1	4,585	505,647	0.91
2	3,161	371,801	0.85
3	651	83,398	0.78
4	525	70,462	0.75
5	1,206	173,108	0.70
6	0	6	1.35
7	1,245	145,109	0.86
8	489	55,144	0.89
9	2,719	354,995	0.77
	14,581	1,759,669	0.83

SQL Code for Table 3.3:

```
select f_yc_num, sum(seis_area), sum(f_area),(sum(seis_area)/ (sum(f_area) + sum(seis_area)) )
Percentage from mdl_lb_v8 where f_yc_num < 10 and f_condition = 'MANAGED' group by
f_yc_num;
```

Note: The summed area of Table 3.3 does not match areas in later tables as only yield curve numbers 1-9 are considered here.

Note: Area remaining on curve 6 is due to discrepancies with provided information for RSI and AVI TPR assignments.

3.5 Administrative Boundary Alignment

There were multiple datasets representing essentially the same administrative type information, but in different ways; an example of this being the LARP boundaries on the East side of the Al-Pac FMA area. The LARP area is represented in the FMA boundary, PPA, and PNT input datasets in which there are alignment issues that occur when bringing these layers together. For an improved product, a preliminary processing step to address these alignments was undertaken. The steps taken were as follows:

1. Union LB_PNT (section 2.3.11) with LB_FMA (section 2.3.1);
2. Select where FMA_STATUS = 'FMA' AND PNT = 'PNT';
3. Calculate FMA_STATUS = NULL for the selected features, then remove selection;
4. Select where FMA_STATUS not in ('FMA', 'LARP', 'DFA+');
5. Eliminate selection into features in ('LARP', 'DFA+');
6. Dissolve by FMA_STATUS;
7. Delete where FMA_STATUS = NULL; and,
8. Union LB_PPA (section 2.3.14) with resulting file in step 7;
9. Select where FMA_STATUS = 'FMA' AND PPA_STAT = 'PPA';
10. Calculate FMA_STATUS = NULL for the selected features, then remove selection;
11. Select where FMA_STATUS not in ('FMA', 'LARP', 'DFA+');
12. Eliminate selection into features in ('LARP', 'DFA+');
13. Dissolve by FMA_STATUS;
14. Delete where FMA_STATUS = NULL; and,

The result of this step is a cleaned administrative boundary that is used in the multiunion. This layer does not represent the legal FMA boundary and replaces the LB_FMA, LB_PNT and LB_PPA datasets. The file produced is included in the delivery dataset (LB_ADMIN_BOUND) and contains the same fields and attributes that are a part of the LB_FMA datasets (see section 2.3.1). Fields from LB_PNT and LB_PPA are excluded from the landbase.

4 Development of the Netdown Landbase

4.1 Overview

This section describes how the AVI data and the combination of all the spatial overlays are used to classify and stratify the landbase for the purpose of determining the managed (active) landbase and the strata within the landbase that will contribute to the TSA.

This section is divided into parts that will allow the analyst to review the specific data and business rules that contribute to the landbase classification. A combination of table, flow chart and narrative are used to describe the process and data. The specific scripts and models used to perform these calculations are presented graphically in Figure 1.1 and Figure 3.2.

The order of flowcharts and other information in this section is very important in processing. Values that come first will be at the forefront when conflicts arise between values.

Spatial resolution of datasets can create results that are not intuitive in the coding world. Slivers and misalignments of datasets will result in the need to place caveats within the code to handle them (e.g. RSA blocks on top of AVI Rivers). The location as to where these caveats occur affects the end result, and instances of these caveats will be seen in provided figures and scripts.

The general procedure for developing the netdown database is outlined below:

1. Develop yield classes (section 4.2);
2. Apply exclusion rule sets (section 4.3) ;
3. Create final stratification fields (section 4.4); and,
4. Create final landbases (section 4.5).

All input fields in the sections to follow are sourced from the input datasets “important attributes” in section 2.3.

4.2 Develop Yield Classes

As discussed, the stratification of the landbase is dependant upon the data that goes in. As part of the multiunion; RSI, RSA, and Cutblock data is linked to the AVI. Order in which datasets are added to the stratification process affects end strata calls. For the Al-Pac landbase, AVI underlies all other information so that when other information does not exist, the AVI data provides the calls. RSI overwrites AVI information according to the RSI definition in section 2.3.18. Any post 1991 cutblock ARIS calls overwrite AVI and RSI data but RSA block information overwrites everything.

4.2.1 AVI Stratification

To produce the stratifications of the AVI, the fields shown below are calculated. From these fields, a final stratum call can be made on each polygon. The <sp> field represents tree species that are within the

landbase. The values are calculated independently for both layers of the AVI stand (overstory and understory):

- <sp>_ORD: overstory species order (ranking), where <sp> represents the various species.
- U<sp>_ORD: understory species order (ranking), where <sp> represents the various species.
- <sp>_PCT: overstory species percent (based on crown closure), where <sp> represents the various species.
- U<sp>_PCT: understory species percent (based on crown closure), where <sp> represents the various species.
- HARDPCT: total overstory deciduous component expressed as a proportion of 10.
- UHARDPCT: total understory deciduous component expressed as a proportion of 10.
- SOFTPCT: total overstory coniferous component expressed as a proportion of 10.
- USOFTPCT: total understory coniferous component expressed as a proportion of 10.
- LEAD_DEC: leading overstory deciduous species based on order of deciduous species (<sp>_ORD variables).
- ULEAD_DEC: leading understory deciduous species based on order of deciduous species (U<sp>_ORD variables).
- LEAD_CON: leading overstory coniferous species based on order of coniferous species (<sp>_ORD variables).
- ULEAD_CON: leading understory coniferous species based on order of coniferous species (U<sp>_ORD variables).
- C_CODE: BCG for the stand overstory (based on sum of <sp>PCT values).
- UC_CODE: BCG for the stand understory (based on sum of U<sp>PCT values).
- DRULE: the leading overstory deciduous assignment for the purpose of determining the GOA Strata (function of <sp>_ORD variables).
- UDRULE: the leading understory deciduous assignment for the purpose of determining the GOA Strata (function of U<sp>_ORD variables).
- CRULE: the leading overstory coniferous assignment for the purpose of determining the GOA Strata (function of C_CODE and <sp>_PCT variables).

- UCRULE: the leading understory coniferous assignment for the purpose of determining the GOA Strata (function of UC_CODE and U<sp>_PCT variables).

- B10_STRATA_SRD: the extended GOA planning strata code for the stand overstory (derived as a function of C_CODE, DRULE, CRULE, <sp>_ORD and <sp>_PCT variables).

- B10_USTRATA_SRD: the extended GOA planning strata code for the stand understory (derived as a function of UC_CODE, UDRULE, UCRULE, U<sp>_ORD and U<sp>_PCT variables).

All fields are described in Appendix III.

4.2.2 Defining Layer

Stands on the landbase have both overstory and understory characteristics. MWFP has identified a selection of AVI polygons for changing the 'story' that is used for defining variables (section 2.3.29). This section creates the fields that will be referenced in further sections for stratification purposes.

- AVI_STORY: This field identifies whether the AVI polygon is to be managed according to the overstory (1) or understory (2). Understory is utilized when an AVI polygon has been identified by MWFP as a 'switch stand'.

- FSP1: This field represents the leading species call of the AVI for the overstory (SP1) or understory (uSP1) according to AVI_STORY.

- FSP2: This field represents the second most leading species call of the AVI for the overstory (SP2) or understory (uSP2) according to AVI_STORY.

- FORIGIN: This field represents the origin date of the AVI polygon for the overstory (ORIGIN) or understory (uORIGIN) according to AVI_STORY.

- FTPR: This field represents the TPR of the AVI for the overstory (SP1) or understory (uSP1) according to AVI_STORY.

- FDENSITY: This field represents the density call of the AVI for the overstory (SP1) or understory (uSP1) according to AVI_STORY.

- FMOIST: This field represents the moisture call of the AVI for the overstory (SP1) or understory (uSP1) according to AVI_STORY.

- FB10_STRATA_SRD: This field represents the stratum call of the AVI for the overstory (SP1) or understory (uSP1) according to AVI_STORY.

4.2.3 ARIS and RSA Stratification

ARIS and RSA stratifications occur outside of Oracle processing. In both instances, a table is created by Froese Forestry Ltd./ The Excel Wiz Consulting and is loaded into the database. Both ARIS and RSA data tables are described in sections 2.3.8 and 2.3.6 and are joined to the landbase according to an opening number link as created in the multiunion process. Strata calls originating from ARIS are initially placed in a field named “A_STRATA” while calls originating from RSA are placed in a field named “R_STRATA”. This is to ensure that the source of the strata calls is maintained in the landbase.

The list of Category 1s from section 2.3.7 is linked to the ARIS data to create a temporary table. This table is joined to the multiunion (by poly_num) where the fields are updated to include Category 1 values.

All common fields between the datasets are amalgamated according to the hierarchy listed in section 2.3.7.4 (RSA-Category 1s-Completed cutblocks-Other). The fields CC_TYPE, CC_STATUS, OWNERSHIP, and OPEN_ID (OPEN_NUM) are populated from each of the sources where available.

Figure 4.1 details the general process of this section.

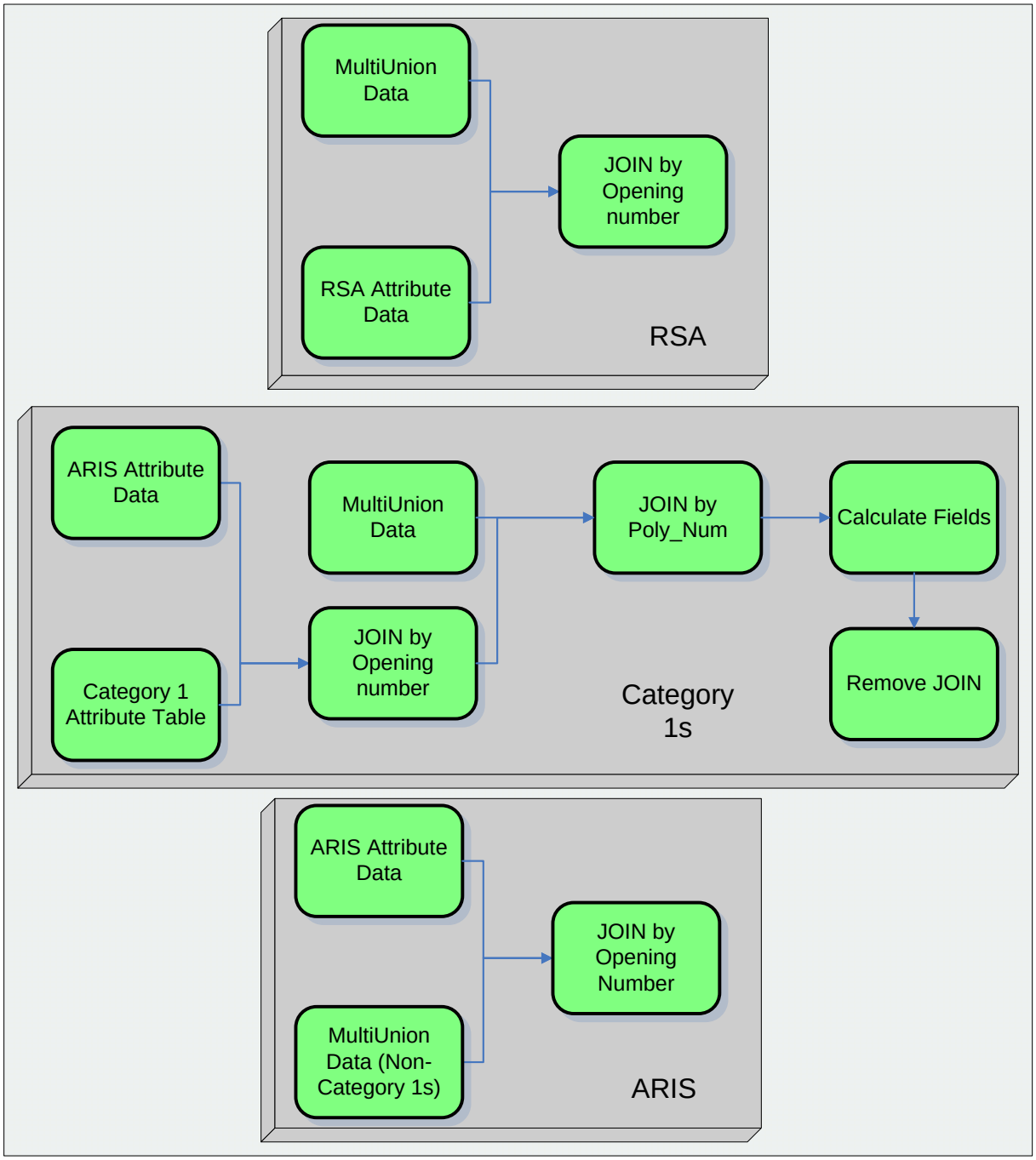


Figure 4.1. Method of joining ARIS and RSA tables to the multiunioned dataset.

4.2.4 Descriptive Data Fields

Key attributes are created for use throughout the general procedure within Oracle. The following fields are calculated and described in the sub-sections to follow:

- STRT_SRC: the source to which stratification originates (AVI, RSI, RSA, or ARIS);and,

- TREATMENT: identifies block stage (Completed or Planned).

4.2.4.1 *Strata Source*

The Al-Pac landbase has many sources from which polygons can get their yield stratifications. An identifier distinguishing where each polygon gets its data and subsequent stratum assignments will assist in the delineation of the landbase. The method, as to how stratification source was identified, is depicted in Figure 4.2. For field definitions, see section 4.2.3, 2.3.7, 2.3.8, and Table 4.1.

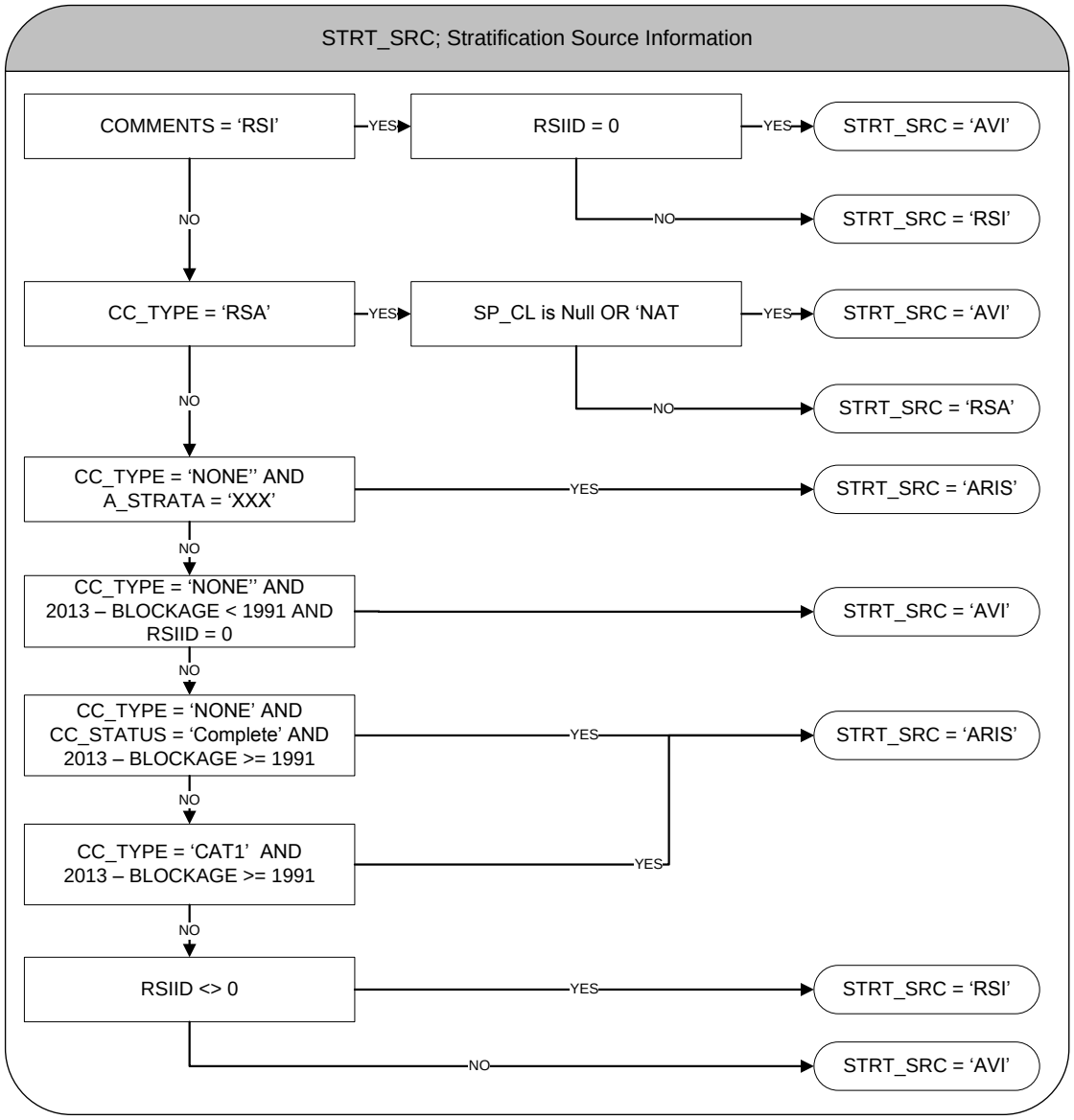


Figure 4.2. STRT_SRC - Flowchart depicting the yield stratification source for each polygon.

Table 4.1. STRT_SRC – Field definitions.

STRT_SRC	Description
RSA	Polygons identified as RSA blocks
ARIS	Polygons identified as ARIS blocks
RSI	Polygons identified as RSI blocks
AVI	Polygons that have no alternative source data

4.2.4.2 *Treatment*

Treatment is a stratification which identifies the stage of each polygon in the forest planning process. Polygons can either be cut (CUT), planned to be cut (PLN), or not cut (AVI). Method of delineation can be observed in Figure 4.3. Field definition can be observed in sections 2.3.7, 2.3.9, 4.2.4.1, and Table 4.2. The field CC_STATUS is the field created from the amalgamation of LB_HARV, Category 1, RSA, and POLY_IDS_FOR_CC_V3 data.

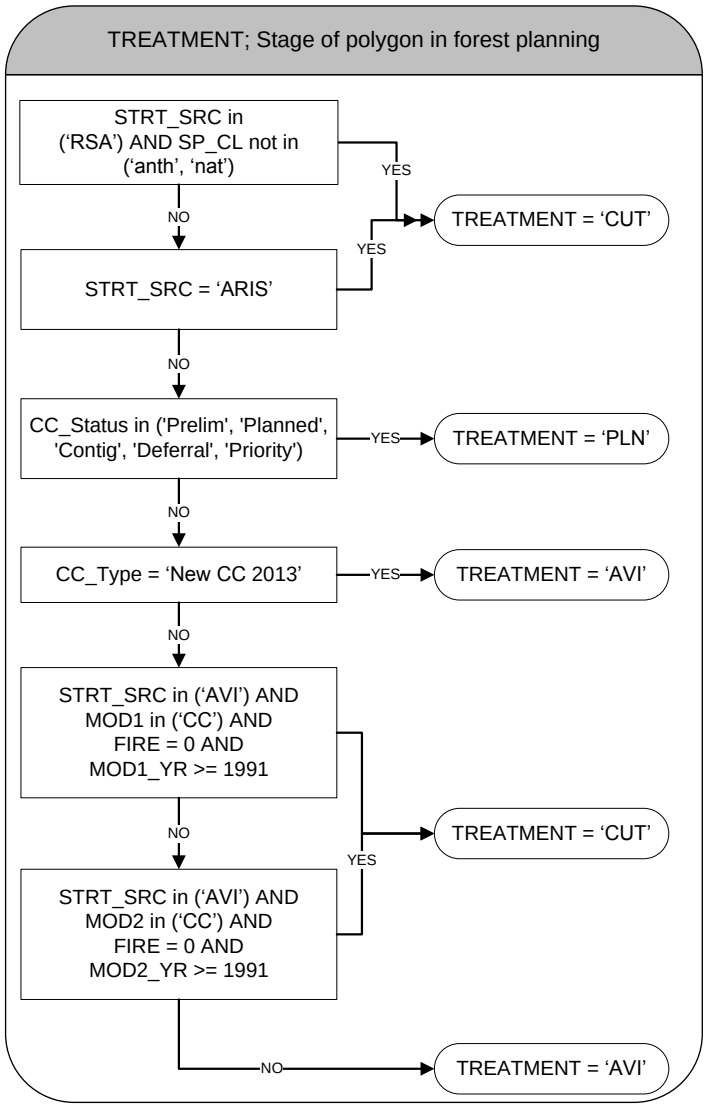


Figure 4.3. TREATMENT - Flowchart depicting the method of assigning treatment type.

Table 4.2. TREATMENT – Field definitions.

STRT_SRC	Description
CUT	Polygons identified as CUT
PLN	Polygons identified as PLANNED
AVI	Polygons that have no alternative designation

4.2.5 Classification of Strata and Initial Age

With AVI, RSI, ARIS, and RSA incorporated, an initial strata call and broad cover group and age can be determined.

4.2.5.1 *Strata Groups*

Strata groups are the combination of coniferous and deciduous components. A polygon can only fall into one strata group with precedence of call origin following, in order:

1. RSA;
2. ARIS;
3. RSI; and then,
4. AVI.

Figure 4.5 shows the methodology of assigning a broad cover group (BCG) to each polygon. Field definitions can be found in sections 4.2.3, 4.2.4.1, 2.3.8, 2.3.18, and Table 4.3.

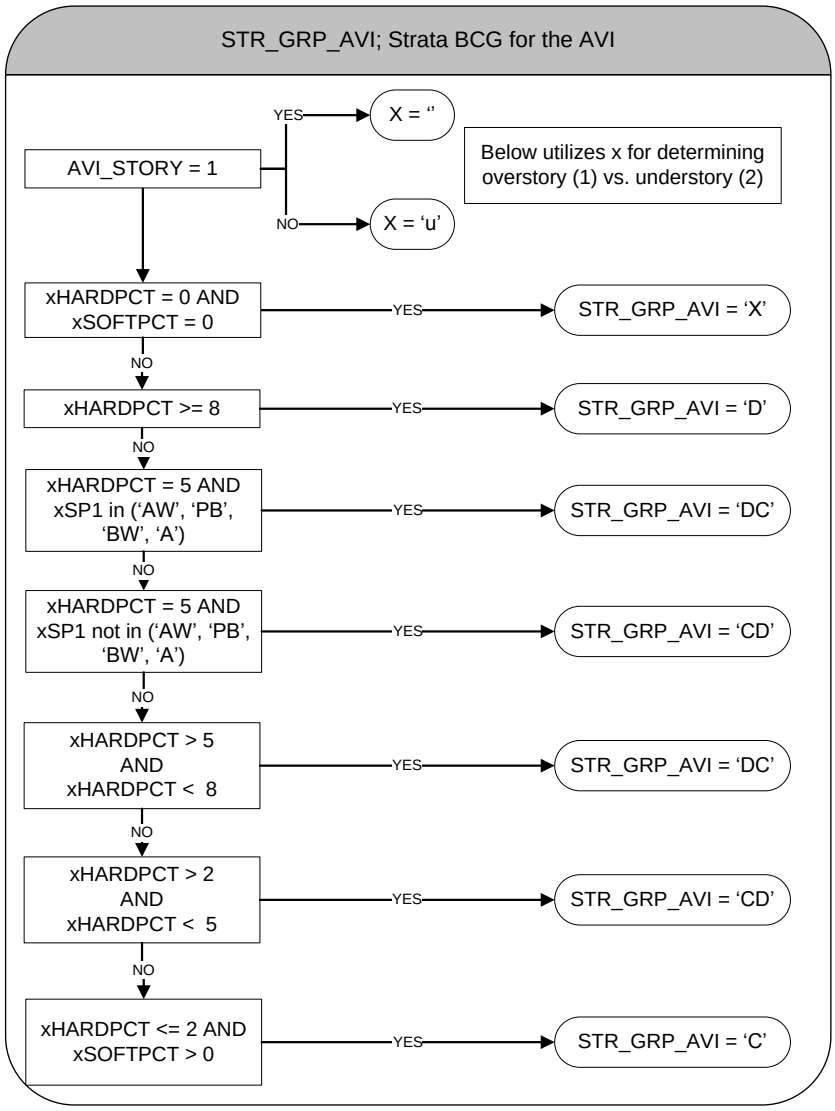


Figure 4.4. STR_GRP_AVI – Broad Cover Group determination for the AVI based on AVI_Story.

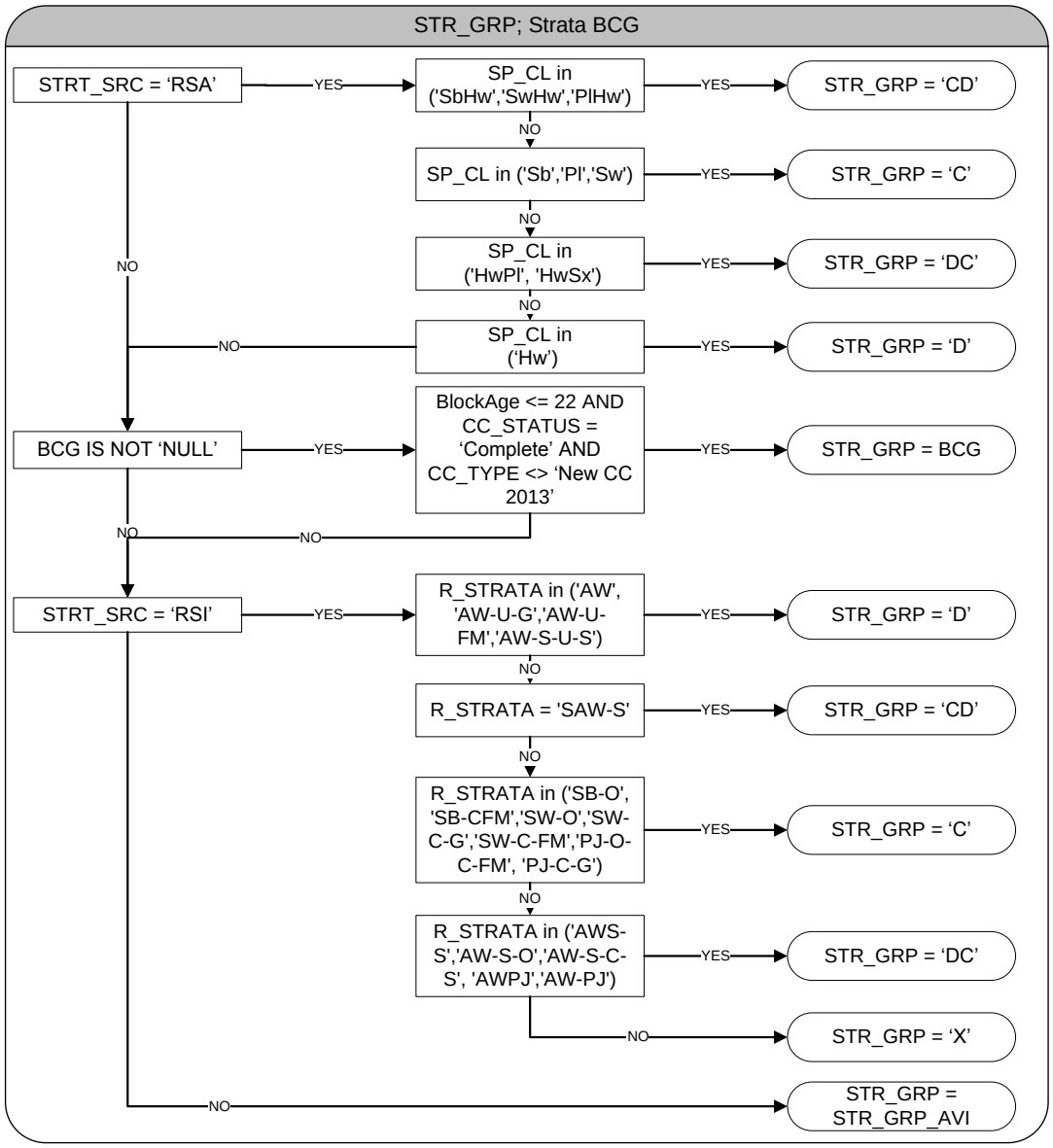


Figure 4.5. STR_GRP - Broad cover group assignments based on the various source input information.

Table 4.3. STR_GRP & STR_GRP_AVI – Field definitions.

STR_GRP	Description
D	Polygons identified as deciduous
DC	Polygons identified as having a deciduous-coniferous mix
CD	Polygons identified as having a coniferous-deciduous mix
C	Polygons identified as coniferous
X	Polygons with no BCG assigned

Note: BCG will be updated further along due to the introduction of operational segmentations, land use, fires, cutblocks and other disturbances.

4.2.5.2 *Yield Strata*

The stratum to which each polygon initially belongs to is assessed prior to any exclusion rules being determined. As is the case with STR_GRP, yield strata assignments are based upon the hierarchal order of RSA, ARIS, RSI, and AVI. Figure 4.6 through Figure 4.9 depicts the method utilized to determine the preliminary strata calls. Stands identified as switch stands (section 2.3.29) are placed on understory strata assignments.

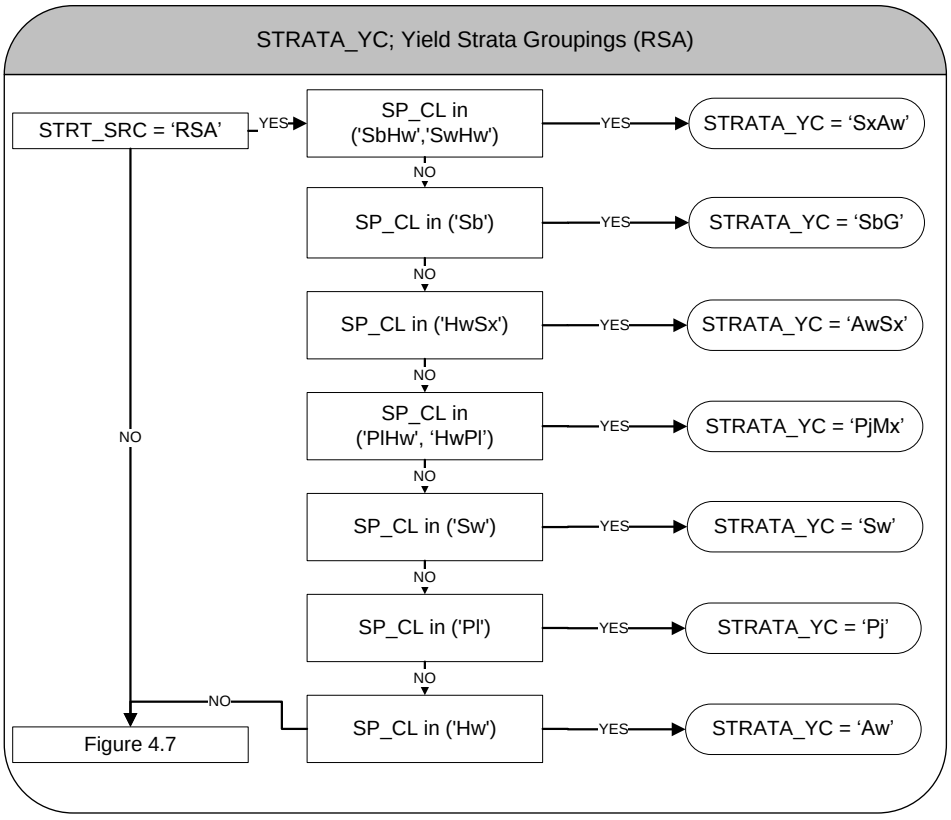


Figure 4.6. STRATA_YC - Yield strata grouping for RSA polygons.

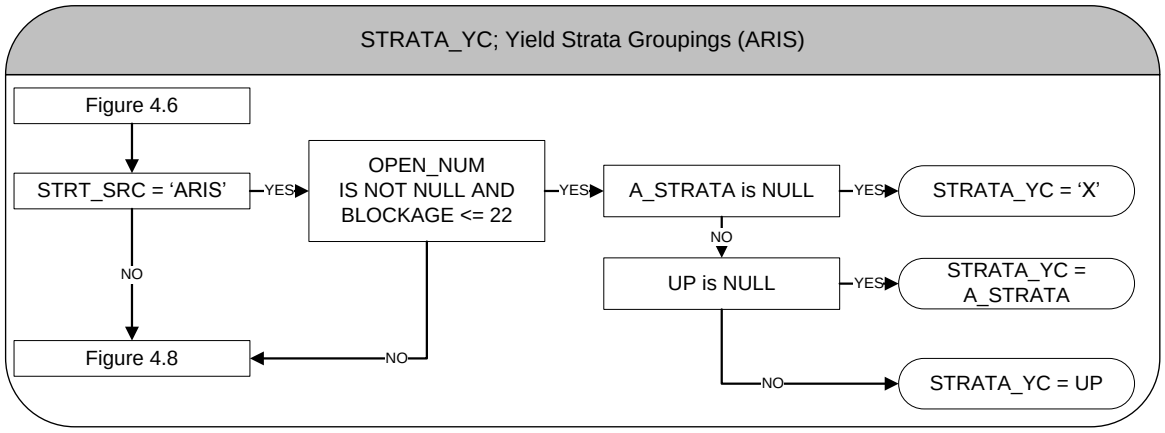


Figure 4.7. STRATA_YC - Yield strata grouping for ARIS polygons.

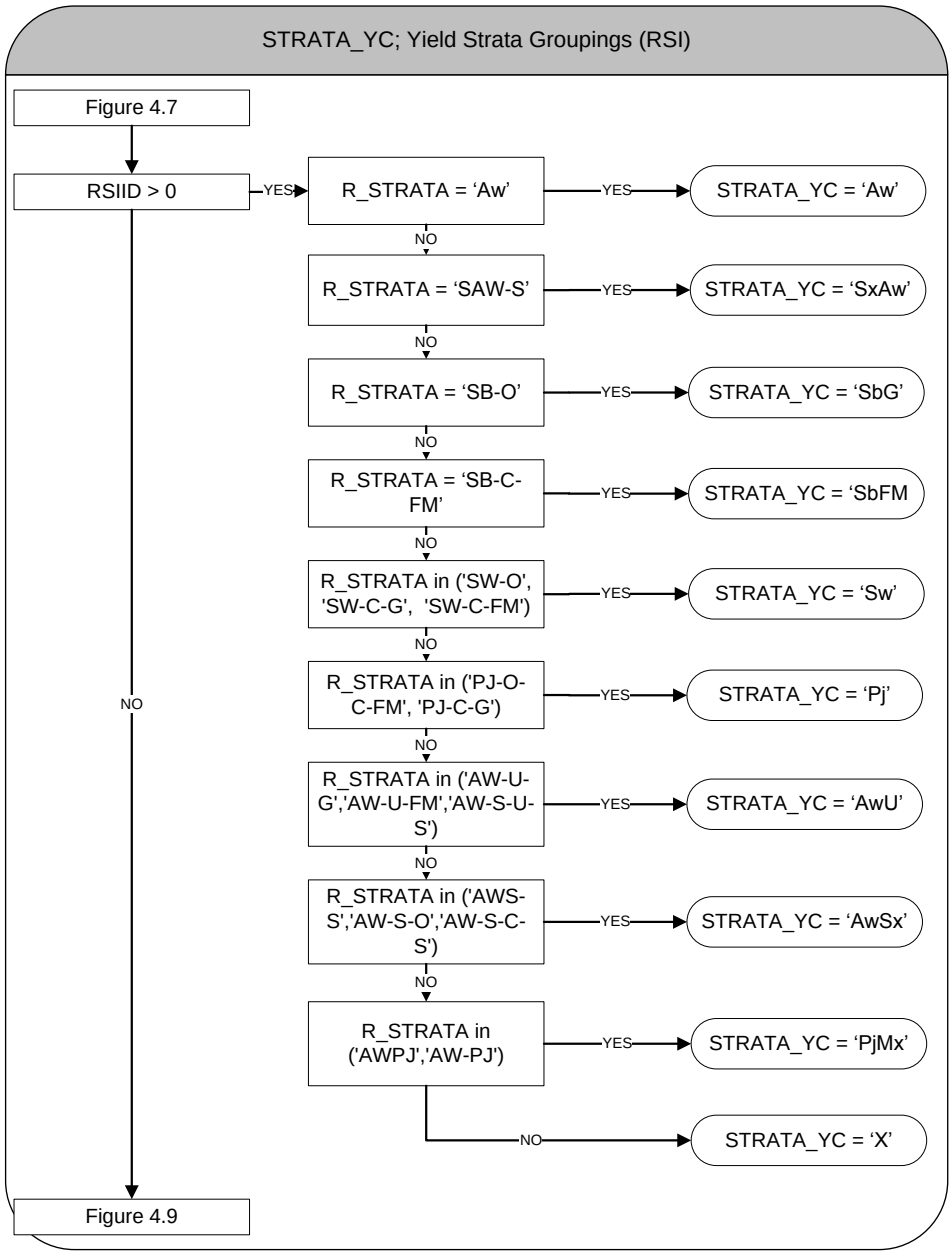


Figure 4.8. STRATA_YC - Yield strata grouping for RSI polygons.

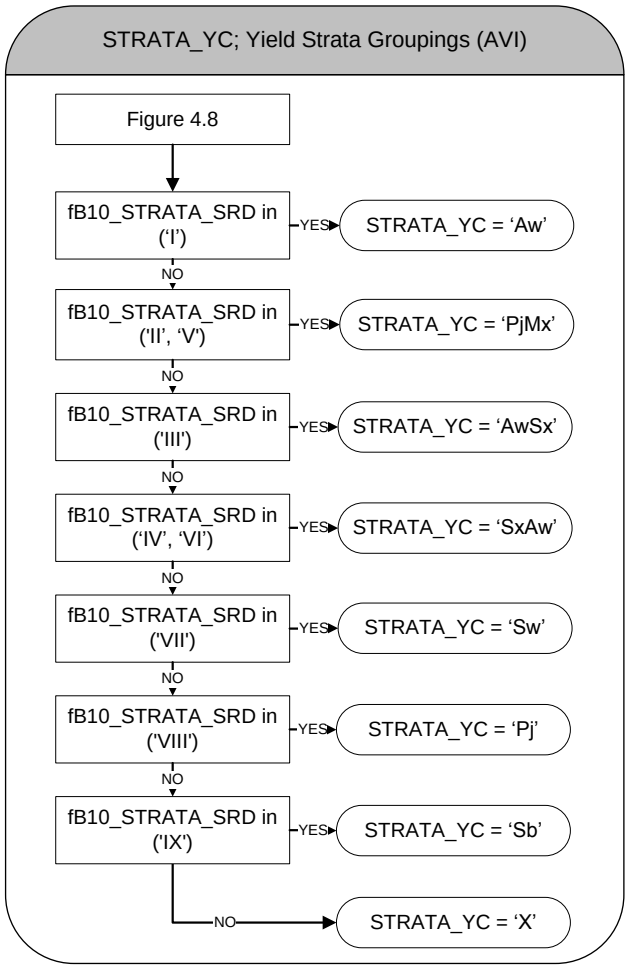


Figure 4.9. STRATA_YC - Yield strata grouping for AVI polygons.

NOTE: SP_CL is part of the RSA data from section2.3.6. OPEN_NUM, BLOCKAGE, and A_STRATA are part of the ARIS data table as described in section 2.3.8 and 4.2.3. R_SRATA is also sourced from section 4.2.3. fB10_STRATA_SRD is derived from AVI data as described in section 4.2.1 and 4.2.2.

4.2.5.3 *Stand Age*

Stand age is a function of stratification source and AVI story as calculated. Figure 4.10 depicts AGE determination. Field definitions can be found in section 4.2.2.

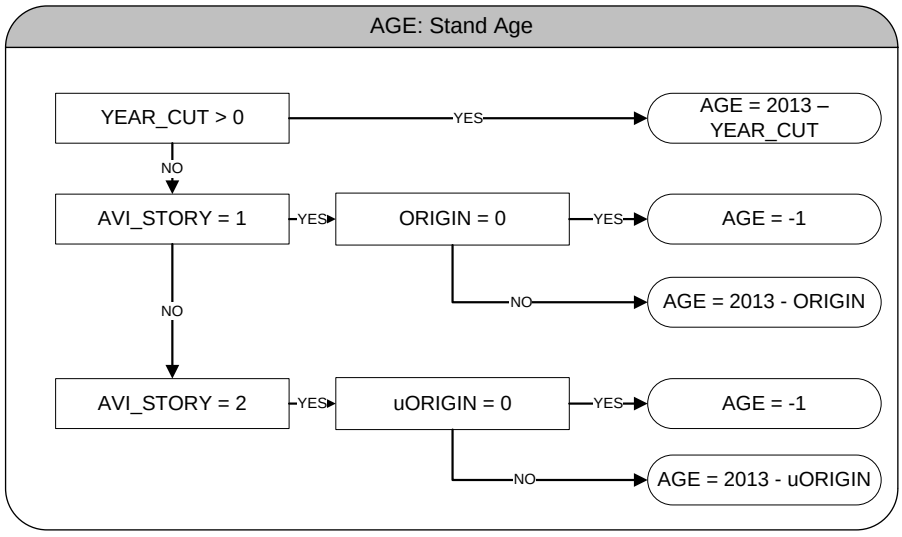


Figure 4.10. AGE – Stand Age.

4.3 Application of Exclusion Rule Sets

Exclusions are a part of any landbase. Exclusions can be sourced from the base AVI or from the data that has been multiunioned with the AVI. There can be forested and non-forested exclusions. Forested exclusions retain their forest strata call (F_YC = Forested) while non-forested exclusions lose it (F_YC = X). The exclusion types affect this consideration differently. The types can be sourced from the following, hierarchal restriction set:

1. Administrative;
2. Landscape; and,
3. Operational.

4.3.1 Administrative Restrictions

Administrative restrictions are sourced from strategic land management decisions to limit harvesting within certain areas. These areas generally contain vegetation but are removed from the timber harvesting landbase. This section focuses on how the netdown landbase handles this type of restriction.

4.3.1.1 *D_STATUS: Land Status*

Land status deletions are areas that are protected by Alberta disposition types PNTs (Protective Notations) and PPAs (Parks and Protected Areas), or are areas identified as Municipalities, Treaty Land Entitlements, historical sites, recreational leases, or are simply areas that fall outside of Al-Pac's FMA. Figure 4.11 indicates the program logic applied to the net landbase table to assign a value to D_STATUS.

F_YC is not affected by this deletion type.

Field definitions may be found in sections 2.3.1, 2.3.3, 2.3.4, 2.3.14, and Table 4.4.

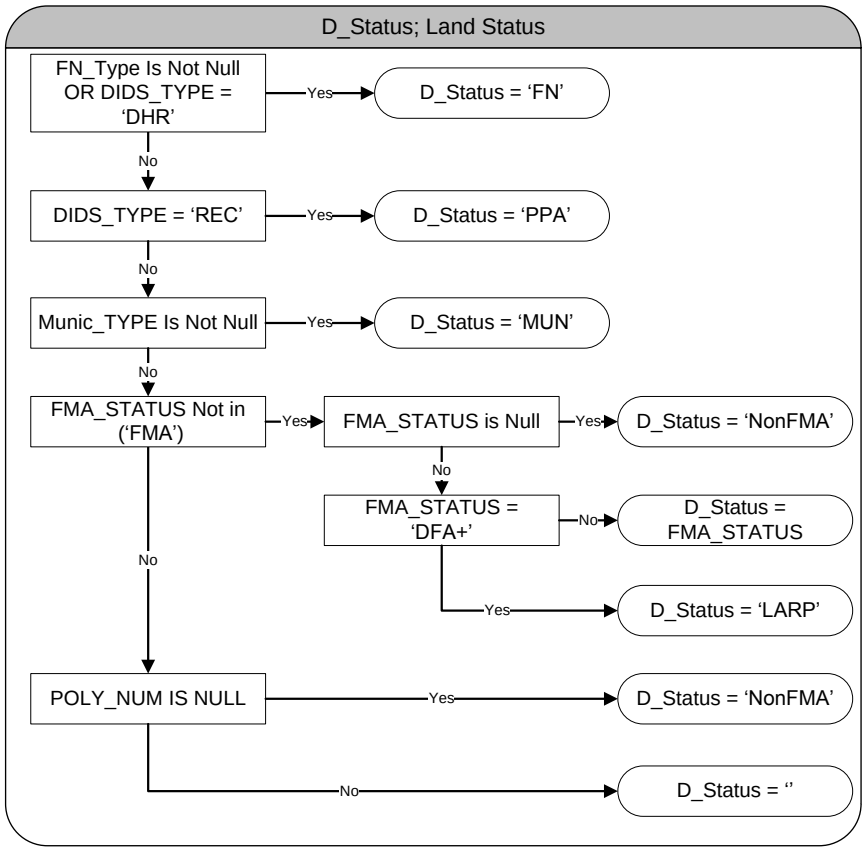


Figure 4.11. D_STATUS – Land status identification.

Table 4.4. D_STATUS – Field definitions.

D_STATUS	Description
LARP	Polygons inside the Lower Athabasca Regional Plan area; considered as DFA+
PPA	Polygons within parks and other protected or recreational areas; removed from the forest management landbase
FN	Polygons falling inside of defined treaty entitlements or part of historical sites; removed from the forest management landbase
MUN	Polygons within municipalities; removed from the forest management landbase
NONFMA	Polygons falling outside any one of the above classifications; removed from the forest management landbase

4.3.1.2 *D_SMA*

Surface Mineable Areas (SMAs) is a large swath of land to the north of Fort McMurray and is detailed in section 2.3.16. Figure 4.12 depicts the selection criteria for deletion.

F_YC is not affected by this deletion type.

Field definitions may be found in section 2.3.16 and Table 4.5. The field “MOS” has been turned to “SMA” to represent the new name for the area.

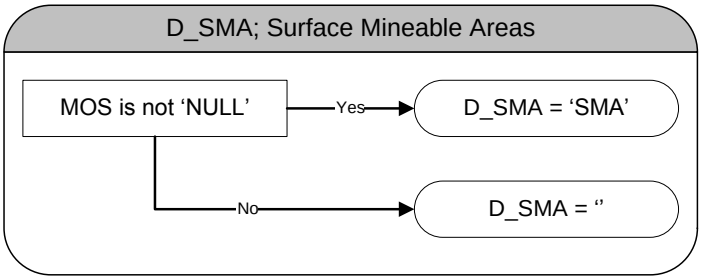


Figure 4.12. D_SMA – Surface Mineable Area deletion type.

Table 4.5. D_SMA – Field definitions.

D_SMA	Description
SMA	Polygons within the Surface Mineable Areas zone; removed from the forest management landbase
''	Polygons not within this zone

4.3.1.3 *D_PSP: Permanent Sample Plots*

The GOA and forest companies invest large amounts of resources in the creation, maintenance, and measurement of PSPs. While not a deletion (PSPs are to be a part of the active landbase as a deferral) this field flags them in the landbase. Figure 4.13 depicts how PSPs are delineated in the LB.

F_YC is not affected by this type.

Field definitions may be found in section 2.3.13 and Table 4.6.

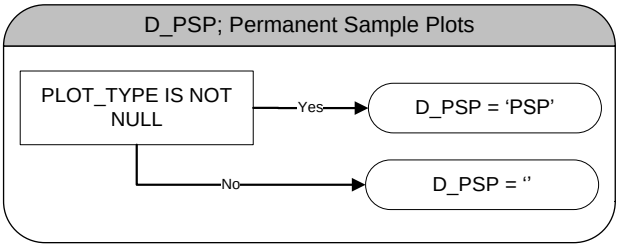


Figure 4.13. D_PSP – Permanent Sample Plot identification within the landbase.

Table 4.6. D_PSP – Field definitions.

D_PSP	Description
PSP	Polygons within Permanent Sample Plots or their buffers
''	Polygons not within this zone

4.3.1.4 *D_BUF: Water Feature Buffer Deletions*

Operating ground rules stipulate that water buffers will be removed from the operable landbase (see section 2.3.20).

For the protection of Trumpeter Swan breeding areas, lakes they are known to inhabit are buffered to limit disturbance (see section 2.3.25). The field "TS_BUFF" has been changed to "SWAN_BUFF" in the landbase.

Figure 4.14 depicts how feature buffers are handled in the landbase.

F_YC is not affected by this deletion type.

Field definitions may be found in sections 2.3.19, 2.3.20, 2.3.25, and Table 4.7.

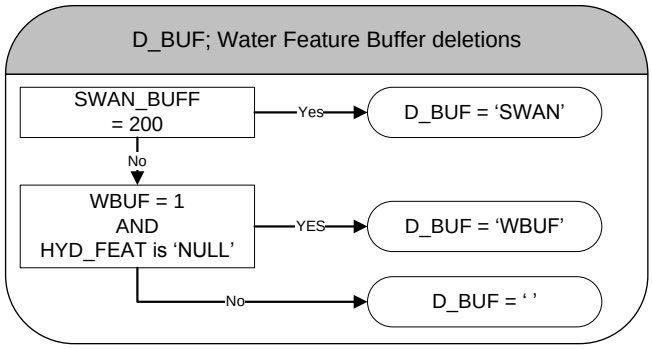


Figure 4.14. D_BUF - Water feature buffer deletion identification within the netdown landbase.

Table 4.7. D_BUF – Field definitions.

D_BUF	Description
SWAN	Polygons within defined Trumpeter Swan lake buffers; removed from forest management landbase
WBUF	Polygons within defined water feature buffers; removed from forest management landbase
''	Polygons not within these zones

4.3.1.5 *D_RIVBRK: River Break Area Deletions*

Deciduous landbase within the river breaks identified in section 2.3.27 are deletions and are identified here. Figure 4.15 depicts how feature buffers are handled in the landbase.

F_YC is not affected by this deletion type.

Field definitions may be found in section 2.3.27 and Table 4.8.

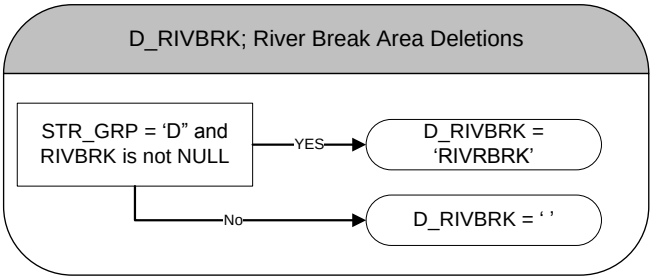


Figure 4.15. D_RIVBRK – River break area deletions.

Table 4.8. D_RIVBRK – Field definitions.

D_RIVBRK	Description
RIVBRK	Polygons within defined river breaks; removed from the forest management landbase when deciduous
''	Polygons not within this zone

4.3.2 Landscape Restrictions

Landscape restrictions are areas where the land condition is not conducive to timber harvesting. Typically, this restriction type is comprised of anthropogenic features and other landscape realities. This sub-section details how landscape restrictions are handled in the landbase.

4.3.2.1 *D_ANTHRO: Anthropogenic Deletion Types*

Anthropogenic features are sourced from the AVI and from the multiunion process. These features have no forest growing and reset any polygons identified as forest in the AVI to non-forested.

F_YC is affected by this deletion type.

Field definitions may be found in sections 2.3.11, 4.4.1 and Table 4.9.

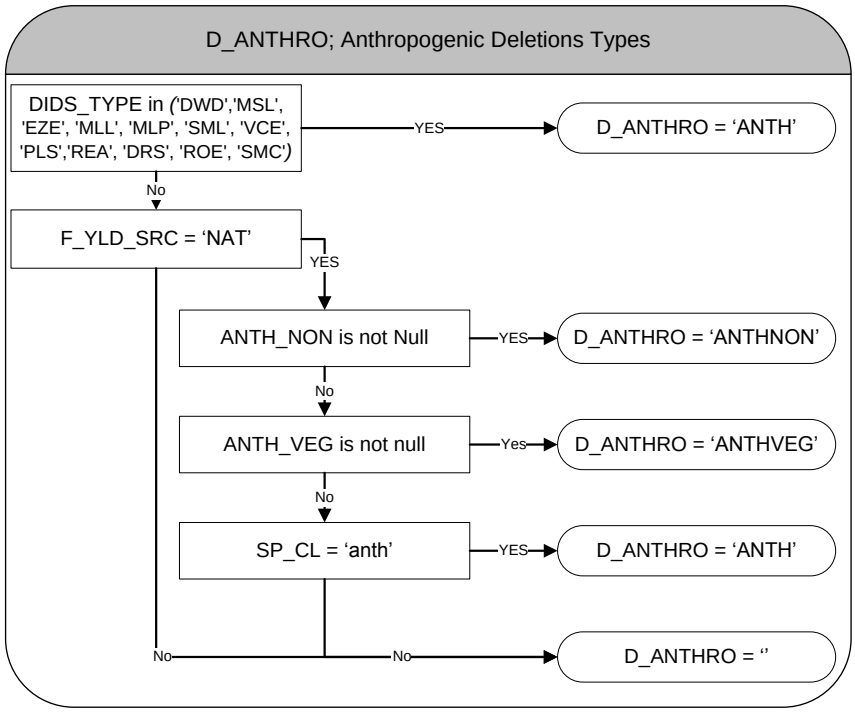


Figure 4.16. D_ANTHRO – Anthropogenic feature identification within the landbase.

Table 4.9. D_ANTHRO – Field definitions.

D_ANTHRO	Description
ANTH	Polygons defined as having anthropogenic disturbances originating from multiunion data; removed from forest management landbase
ANTHNON	Polygons defined as having un-vegetated anthropogenic disturbances originating from the AVI; removed from forest management landbase
ANTHVEG	Polygons defined as having vegetated anthropogenic disturbances originating from the AVI; removed from forest management landbase
''	Polygons outside of the above classifications

4.3.2.2 *D_ACCESS: Access Deletions*

Access deletions include roads, pipelines, and other trails that are used to access resources. Access deletions are sourced from both DIDs (see section 2.3.11), Capital roads (see section 2.3.12) and from AVI attributes ANTH_VEG and ANTH_NON. Figure 4.17 indicates the program logic applied to the net landbase.

F_YC is affected by this deletion type.

Field definitions may be found in section 2.3.11, 2.3.12, and Table 4.10.

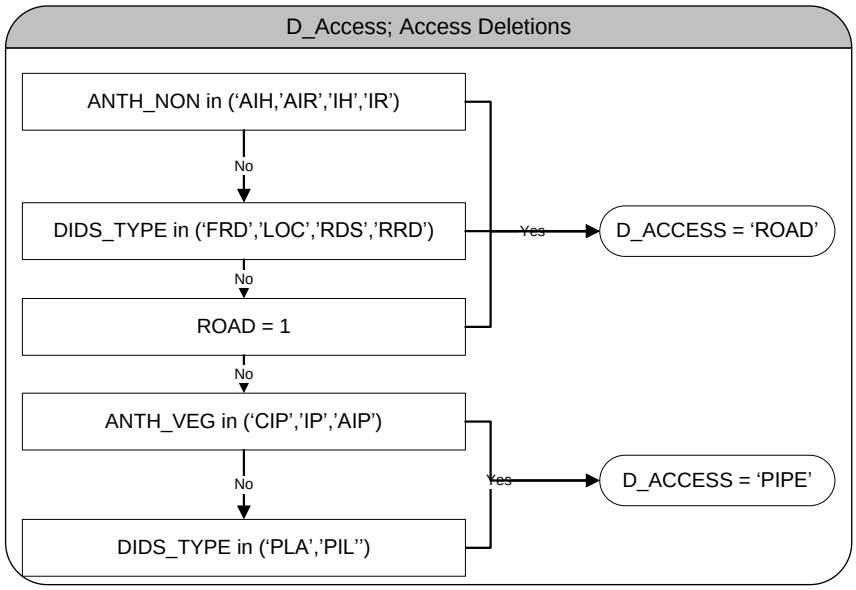


Figure 4.17. D_ACCESS – Access deletion identification.

Table 4.10. D_ACCESS – Field definitions.

D_ACCESS	Description
ROAD	Polygons defined as having a road; removed from the forest management landbase
PIPE	Polygons defined as having a pipeline; removed from the forest management landbase

4.3.2.3 *D_NATDIST: Natural Disturbance Deletions*

Natural disturbances deletions include forest fires and other naturally occurring phenomenons (e.g. windfall). Data is sourced from both the AVI (NAT_NON) and from the provincial fire records as described in section 2.3.9. Without detailed information for AVI updates in burned areas, any identified disturbed areas become deletions according to Figure 4.18. MWFP identified openings that were fire salvage and lacked reforestation liability. These openings are identified here as landbase deletions as no inventory update can be applied to them.

F_YC is affected by this deletion type.

Field definitions may be found in sections 2.3.9, 2.3.7, 4.4.1 and Table 4.11.

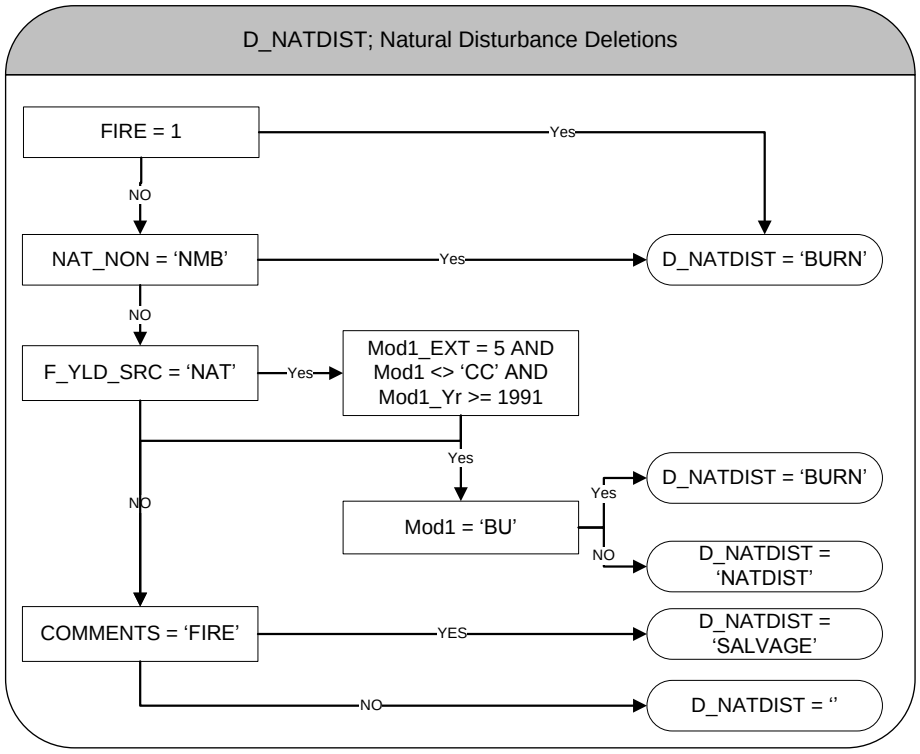


Figure 4.18. D_NATDIST – Natural disturbance deletions.

Table 4.11. D_NATDIST – Field definitions.

D_NATDIST	Description
BURN	Polygons defined as having been burnt; removed from forest management landbase
SALVAGE	Polygons identified as being a MWFP salvage block; removed from the forest management landbase
NATDIST	Other, MOD1 identified disturbances that are of MOD1_EXT = 5
''	Polygons outside of the above classifications

4.3.2.4 *D_NONFOR: Non-Forested Deletions*

Non-forested deletions include non-forested or non-vegetated areas such as water, anthropogenic (man-made) features, and naturally non-treed areas. There are two classes:

- NNF: Naturally non-forested areas are those identified by using the AVI non-forest-land codes;
- NNV: Naturally non-vegetated areas are those identified by using the AVI non-vegetated code;

Figure 4.19 shows the program logic applied to the net landbase table to identify non-forested areas.

F_YC is not affected by this deletion type.

Field definitions may be found in section 4.4.1 and Table 4.12.

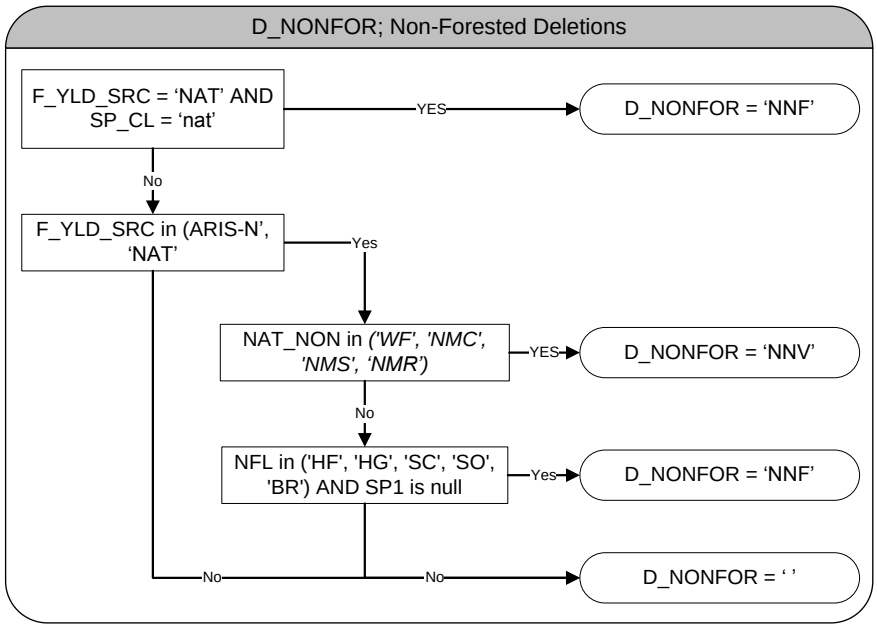


Figure 4.19. D_NONFOR – Non-forested deletion category.

Table 4.12. D_NONFOR – Field definitions.

D_NONFOR	Description
NNF	Polygons defined as being Naturally Non-Forested; removed from forest management landbase
NNV	Polygons defined as being Naturally Non-Vegetated; removed from forest management landbase
''	Polygons outside of the above classifications

4.3.2.5 *D_HYDRO: Hydrological Type Deletions*

Hydrological features identify hydrological deletions. Figure 4.20 indicates the program logic applied to the net landbase.

F_YC is affected by this deletion type.

Field definitions may be found in section 2.3.19 and Table 4.13.

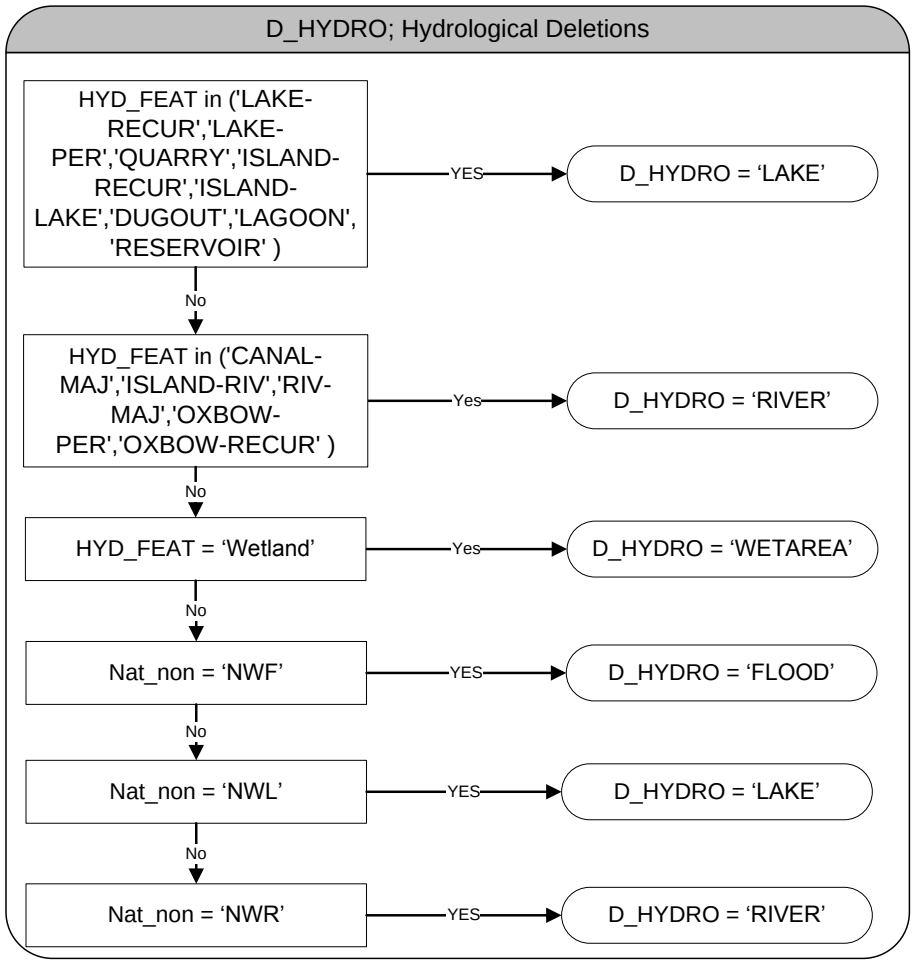


Figure 4.20. D_HYDRO – Hydrological deletion category.

Table 4.13. D_HYDRO – Field definitions.

D_HYDRO	Description
LAKE	Polygons defined as being a Lake; removed from forest management landbase
RIVER	Polygons defined as being a River; removed from forest management landbase
WETAREA	Polygons defined as being a Wet Area; removed from forest management landbase
FLOOD	Polygons defined as being Flooded; removed from forest management landbase

4.3.2.6 *D_MOIST: Soil Moisture Deletions*

Soil moisture limits the productivity and operability of the land. Soil moisture deletions account for this and are applied as observed in Figure 4.21.

F_YC is not affected by this deletion type.

Field definitions may be found in section 4.2.2 and Table 4.14.

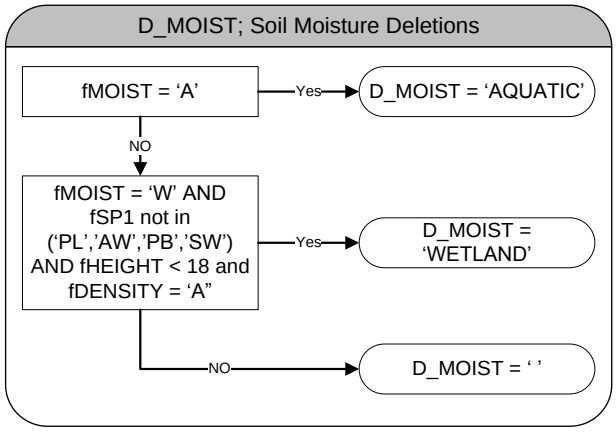


Figure 4.21. D_MOIST – Soil moisture deletion type.

Table 4.14. D_MOIST – Field definitions.

D_MOIST	Description
AQUATIC	Polygons defined as being Aquatic; removed from forest management landbase
WETLAND	Polygons defined as being a Wetland; removed from forest management landbase
''	Polygons outside of the above classifications

4.3.3 Operational Restrictions

Operational restrictions identify land areas that are, operationally, non-feasible. This identification can be species, situation, or locationally specific.

4.3.3.1 *D_TPR: Timber Productivity Deletions*

Determining Timber Productivity Rating (TPR) deletions is in partly based on the strata type definition. TPR deletions for all strata are made if the TPR is U (unproductive) or if the TPR satisfies Figure 4.22.

F_YC is not affected by this deletion type.

Field definitions may be found in sections 4.2.2, 4.2.5.2, 4.4.1, and Table 4.15.

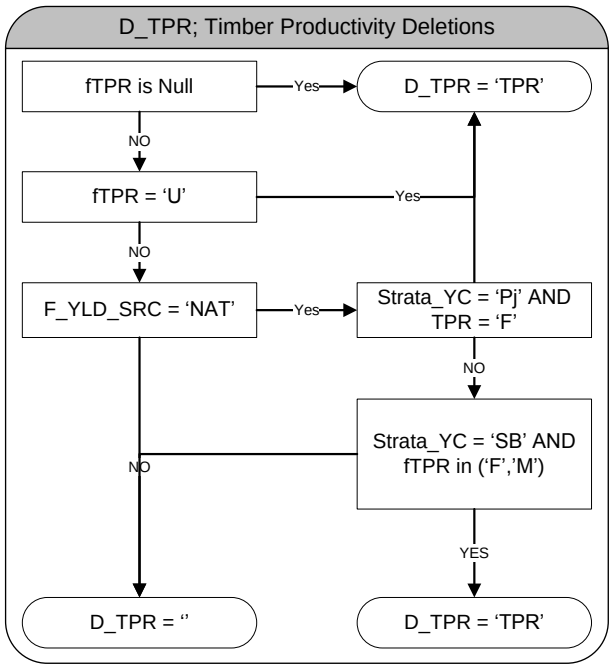


Figure 4.22. D_TPR – Timber productivity deletions.

Table 4.15. D_TPR – Field definitions.

D_TPR	Description
TPR	Polygons defined as having an un-merchantable Timber Productivity; removed from the forest management landbase
''	Polygons outside of the above classifications

4.3.3.2 *D_ISO: Isolated Polygon Deletion*

Isolated stands are polygons that are isolated in terms of accessibility or feasibility for harvest operations. There are 2 types of isolated stands identified within the landbase; (i) isolated stand deletions (ISOa or ISOb), and (ii) isolated stand deferrals (ISOc) (Figure 4.23).

There are two methods used to identify which type the isolated stand is:

A. A perimeter to area ratio (PA) function which identifies polygons that are artifacts from the multiunion process resulting from the intersection of harvest blocks. The PA relationship is compared to that of a circle of the same size (area); the smaller the value the larger the perimeter compared to the area.

B. A set of rules based on isolated stand size and their proximity to roads.

The first method (A) is applied as follows:

1. PA values of <300 with areas <=1ha, become an isolated stand deletion (see ISOa in Figure 4.24), otherwise they move to criteria 2;

2. Polygons that have PA values of <300 with areas <=2ha, become an isolated stand deferral (see ISOc in Figure 4.24), otherwise they move to criteria 3;

3. Polygons that have PA values of <500 with areas <=5ha, become an isolated stand deferral (see ISOc in Figure 4.24).

The second method (B) is applied as follows (

Table **4.16**):

1. Polygons are grouped with stands that are within 75m of other harvestable stands, where available. Any group or polygon that is <1 ha becomes an isolated stand deletion (see ISOb in Figure 4.24);

2. Grouped (or not grouped) polygons from criteria 1 that are between 1 and 2 ha and are within 500m of existing access (road, seismic) become an isolated stand deletion (see ISOb in Figure 4.24);

3. Grouped (or not grouped) polygons from criteria 2 that are grouped with other grouped (or not grouped) polygons within 1000m: if this group is < 5 ha then each individual grouped (or not grouped) polygon < 2ha becomes an isolated stand deletion (see ISOb in Figure 4.24);

If any of these conditions are not true, the polygon (or group of polygons) are considered operable and are left in the active (managed) landbase.

F_YC is not affected by this deletion type.

The final landbase attributes (F_*) are updated according to D_ISO values:

F_DEL = 'ISO' when D_ISO in ('ISOa', 'ISOb')

F_BLOCK = 'DEF' (deferral) when D_ISO = 'ISOc'

Table 4.16. The definition of isolated stand deletions (ISOb), method 1.

Criteria	Description
1	All stands < 1ha that cannot be grouped together with other harvestable stands within 75m to make a unit >= 1ha that follow criteria 2 and 3
2	All stands >= 1ha and < 2ha and within 500m of a road or seismic
3	All stands >= 1ha and < 2ha that cannot be grouped to other harvestable stands within 1000m to make a minimum unit of 5ha

Note: a harvestable stand (FOREST) is any polygon part of the active landbase as defined by STEP_03e in the landbase process (see Figure 1.1). Road features used in the analysis can be observed in sections 2.3.11 respectively.

Note: ISO rules subject to change.

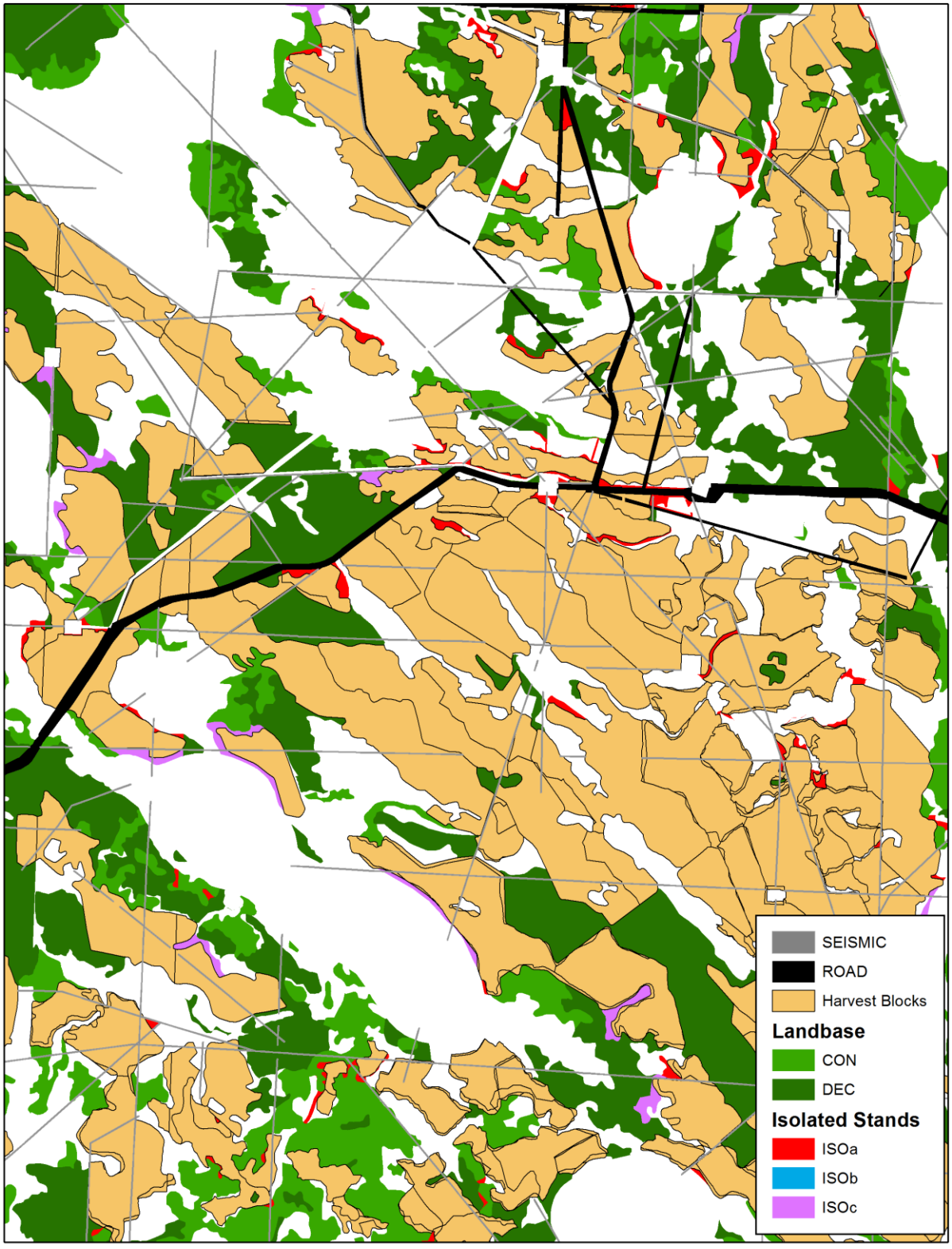


Figure 4.23. Isolated stand deletion type example with area of deletion.

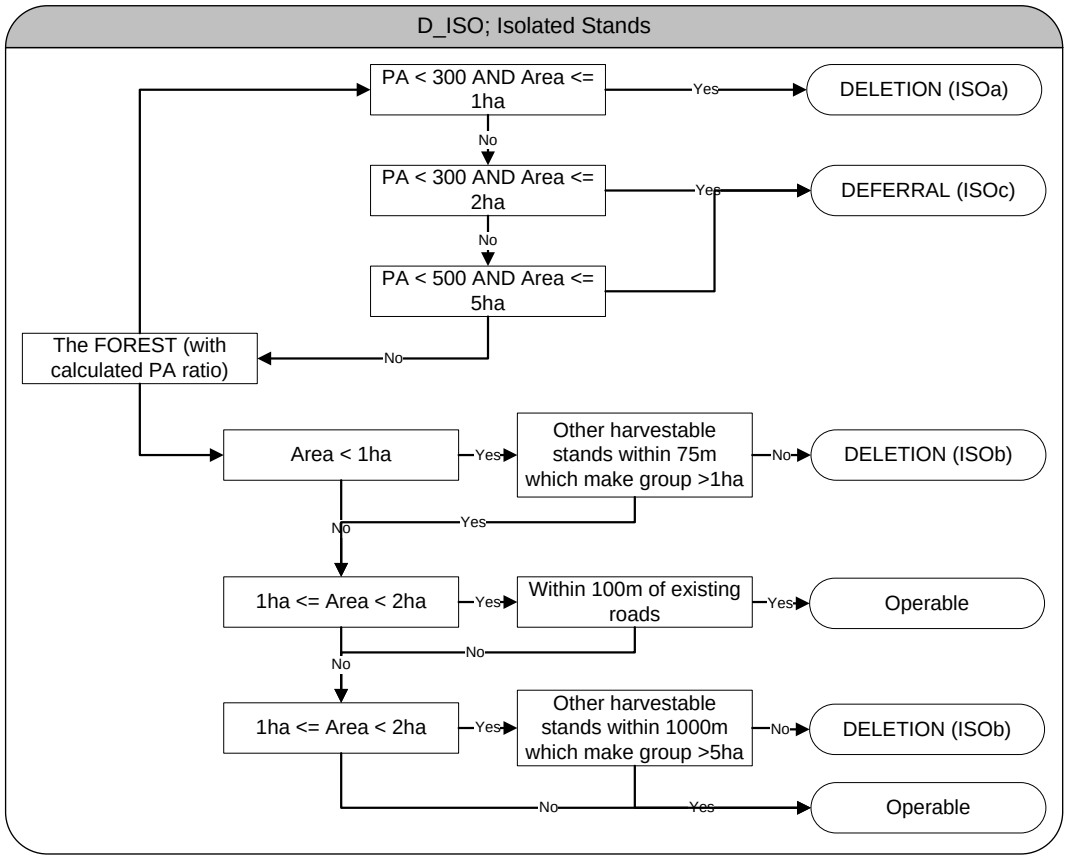


Figure 4.24. D_ISO – Program logic for the calculation of ISO stands.

Table 4.17. D_ISO – Field definitions.

D_ISO	Description
ISOa	Polygons defined as being an ISO type a
ISOb	Polygons defined as being an ISO type b
ISOc	Polygons defined as being an ISO type c
''	Polygons that are not an ISO deletion

4.3.3.3 *D_SLOPE: In-Operable Slope Deletions*

In areas identified as having steep slopes (see section 2.3.26), operability is limited and hence is deleted from the landbase according to Figure 4.25.

F_YC is not affected by this deletion type.

Field definitions may be found in section 2.3.26 and Table 4.18.

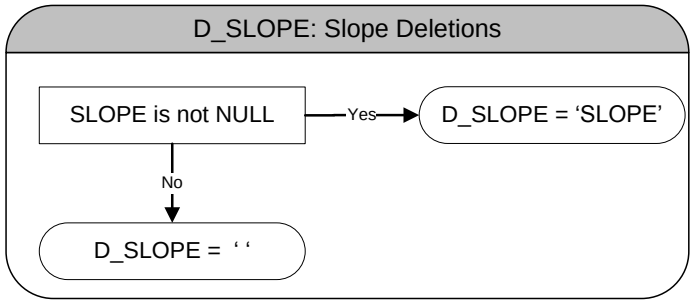


Figure 4.25. D_SLOPE – Slope deletions.

Table 4.18. D_SLOPE - Field definitions.

D_SLOPE	Description
SLOPE	Polygons defined as being inside of a delineated high slope area; removed from the forest management landbase when deciduous
''	Polygons outside of the above classifications

4.3.3.4 *D_SP: In-Operable Species Type Deletions*

Certain species types are not part of the species that can be processed and are hence eliminated from the operable landbase. The program logic applied can be observed in Figure 4.26.

F_YC is not affected by this deletion type.

Field definitions may be found in sections 4.2.2, 4.2.4.1, 4.2.4.2, and Table 4.19.

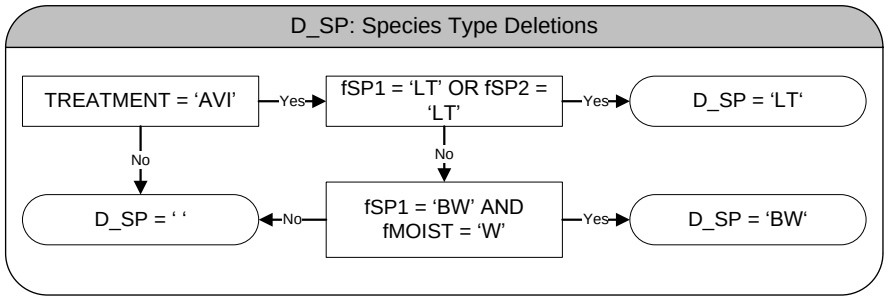


Figure 4.26. D_SP – Species type deletions.

Table 4.19. D_SP - Field definitions.

D_SP	Description
LT	Polygons defined as being un-merchantable due to Larch presence; removed from forest management landbase
BW	Polygons defined as being un-merchantable due to White Birch; removed from forest management landbase
''	Polygons outside of the above classifications

4.3.3.5 *D_IDENTA: 'A' Density Stand Deletions*

'A' density stands are operationally not feasible thus are here identified for exclusion from the operable landbase.

F_YC is not affected by this deletion type.

Field definitions may be found in section 4.2.4.1, 4.2.5.2, and Table 4.20.

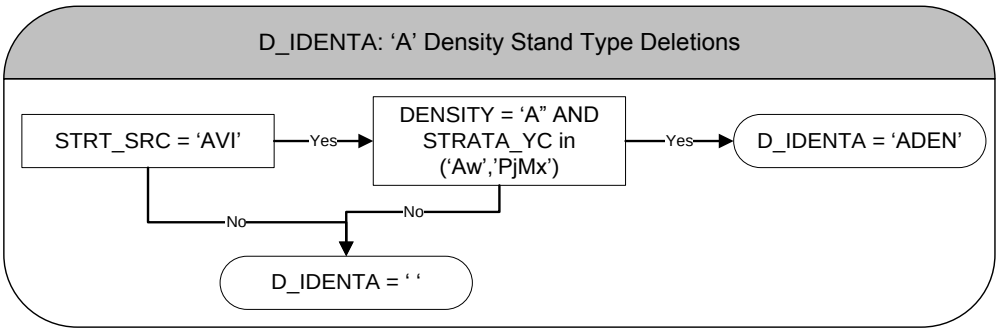


Figure 4.27. D_IDENTA – 'A' density stand deletions.

Table 4.20. D_IDENTA - Field definitions.

D_IDENTA	Description
ADEN	Polygons defined as having too low a crown closure to be merchantable; removed from the forest management landbase
''	Polygons outside of the above classifications

4.3.3.6 *D_NONCOMCON: Non-Commercial Coniferous Stand Deletions*

There exist coniferous stands that are operationally not feasible. These are identified here and are deleted from the operable landbase. Figure 4.28 identifies the program process.

F_YC is not affected by this deletion type.

Field definitions may be found in section 4.2.5.2 and Table 4.21.

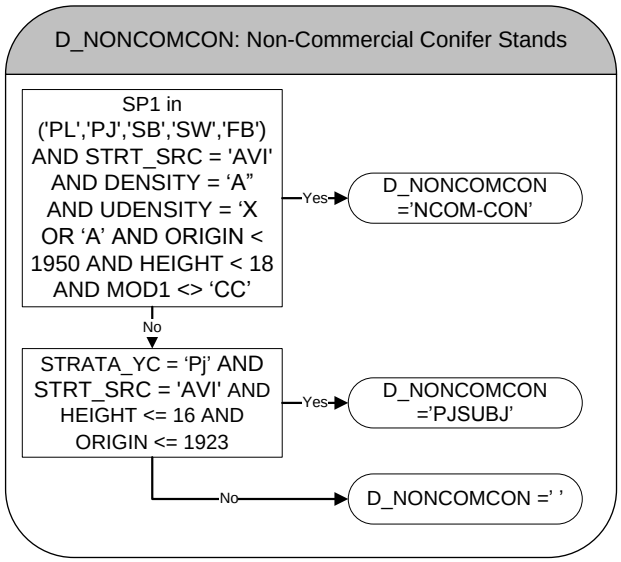


Figure 4.28. D_NONCOMCON – Coniferous non-commercial stand deletions.

Table 4.21. D_NONCOMCON - Field definitions.

D_NONCOMCON	Description
NCOM-CON	Polygons defined as being non-commercial due to coniferous stand conditions; removed from the forest management landbase
PJSUBJ	Polygons defined as being non-commercial due to Jack Pine stand conditions; removed from the forest management landbase
''	Polygons outside of the above classifications

4.3.3.7 *D_NONCOMDEC: Non-Commercial Deciduous Stand Deletions*

There exist deciduous stands that are operationally not feasible. These are identified here and are deleted from the operable landbase. Figure 4.29 identifies the program process.

F_YC is not affected by this deletion type.

Field definition may be observed in section 4.2.4.1 and Table 4.22.

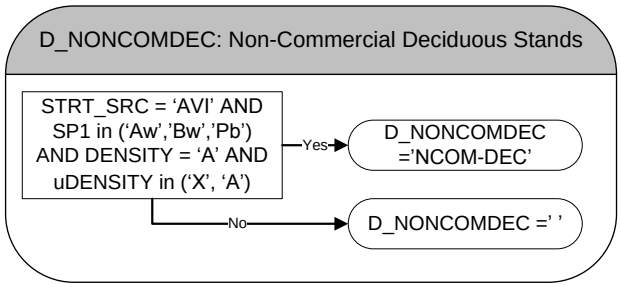


Figure 4.29. D_NONCOMDEC – Deciduous non-commercial stand deletions.

Table 4.22. D_NONCOMDEC - Field definitions.

D_NONCOMDEC	Description
NCOM-DEC	Polygons defined as being non-commercial due to deciduous stand conditions; removed from the forest management landbase
''	Polygons outside of the above classifications

4.3.3.8 *D_BLOCK: Operational and Harvest Deletions*

There are five main sources of deletions in this category:

1. NONRSA – Areas included in RSA block shapefiles that are not part of the RSA block. These areas are flagged as either being anthropogenic or un-harvested areas (nat);

2. NOID – A "No ID" call can be made in two separate instances. Through the process of finding cutblocks spatially (see section 4.2.4.2), some blocks had no opening number to match to ARIS records. As these areas have no ARIS data from which to establish a vegetation stratum, they are **deleted** from the landbase. MOD1 values of CC with no opening number are the second type of instance in this category.

3. NFCC – A non-forested clear cut is a call handed out in six instances:

    a. ARIS assignments required that blocks with a Performance Survey and a 'NSR' condition have their yield curves adjusted; the methodology employed here simply deletes them from the landbase;

    b. In some instances, ARIS interpretation did not lead to a usable product for application in the landbase process; there is a link in the company spatial records to ARIS, but it is unusable. These areas are therefore deleted.

    c. When the opening type of the cutblock is identified in ARIS as a type of WF, NH, FS, LC, MO, OD, PC, or SW the opening is deleted. These cutblocks are removed as the growth trajectories cannot be accurately defined.

d. MOD1 of CC identified a recent cutblock (post 91) where ARIS did not.

e. RSI identified NFCC areas.

f. When the owner of the cutblock is the GOA, LFS, or FRIAA.

4. NOARIS – This call is allocated when there is an opening number associated with a company spatial file but no ARIS link to that number. Without knowing its ARIS assigned values, the areas are deleted.

5. NCOM-CC - Within the current operational planning process, some areas have been manually flagged as “Deletions”. These could be areas that are misinterpreted in the AVI and reflect merchantable or operable conditions where none exist, or other areas of inoperability (see section 2.3.7).

The program logic (as detailed in Figure 4.30) contains instances for catching the above points but also to catch some polygons with some odd interactions. For example, MOD1 years of 1991 or greater for CC’s are present with a cutblock shapefile having an ARIS link stating that it is a PRE91 cutblock. This is a contradiction and required code to handle. MWFP provided information on openings that are considered RSI which have an ARIS opening number but no link to ARIS. These identified blocks were not assigned to a deletion as these were RSI blocks (pre-91; detailed in section 2.3.7).

F_YC is affected by this deletion type.

Field definitions may be found in sections 2.3.7, 2.3.8, 4.2.4, 4.2.5 and Table 4.23.

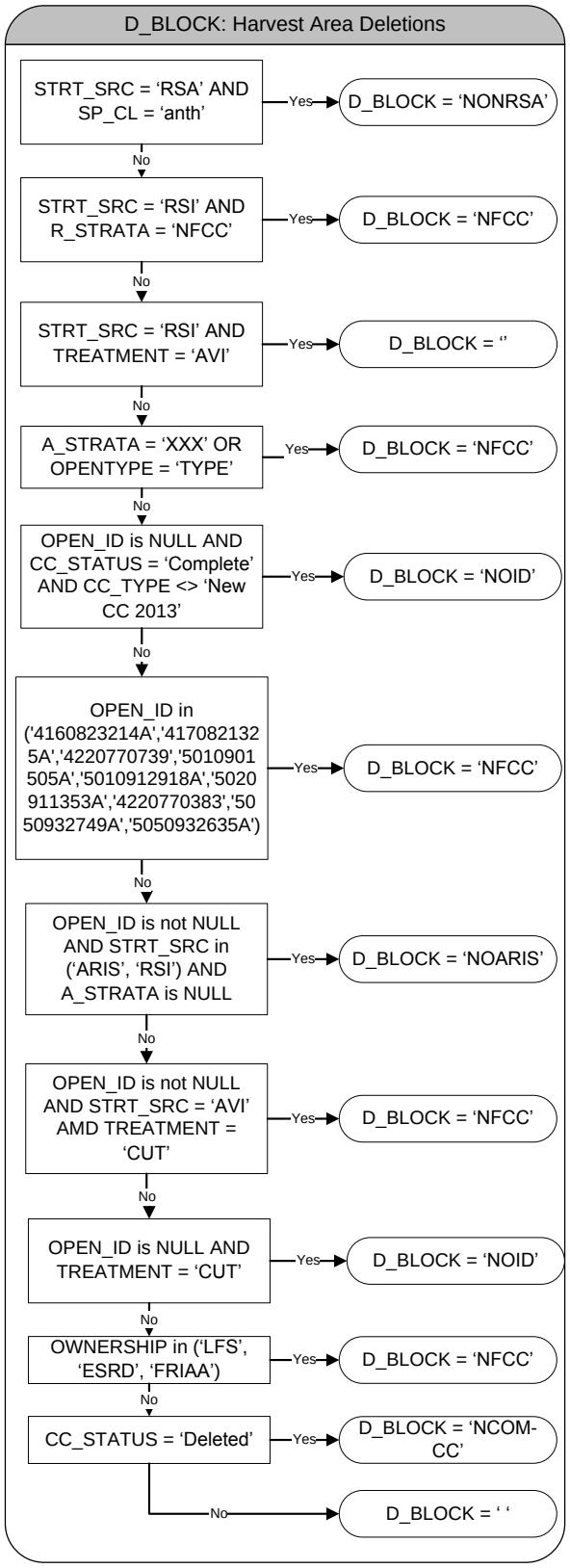


Figure 4.30. D_BLOCK – Block shapefile related deletions.

Table 4.23. D_BLOCK - Field value definitions.

D_Block	Description
NONRSA	RSA data contains anthropogenic features. This deletion type removes them.
NOID	Some polygons have been identified as cut but lack an opening number to link to strata information. This deletion code deletes these occurrences
NFCC	Some polygons have a link to ARIS but either A) no stratum was able to be assigned from the data, b) MOD1 of CC identified a recent cutblock (post 91) where ARIS did not, c) the performance survey yielded an NSR value, or d) RSI identified NFCC
NOARIS	There are instances where there are cutblocks that do not have a link to ARIS but require one to receive a stratum call
NCOM-CC	Companies have provided data outlining areas to which are not conducive to forest harvesting; this deletion code flags these for deletion

4.4 Final Classifications

Creating initial strata and exclusions attributes paves the way for the creation of attributes relevant for timber supply analysis and final landbase classifications. The following explores the programmatic methodology behind important fields for timber supply modeling and landbase classification.

4.4.1 F_YLD_SRC: Final Yield Source

The final call on where strata calls will originate is determined using the program logic in Figure 4.31. This designation is utilized in the D_ “deletion” and F_ “final” landbase codes. This designation, in turn, can affect F_YC.

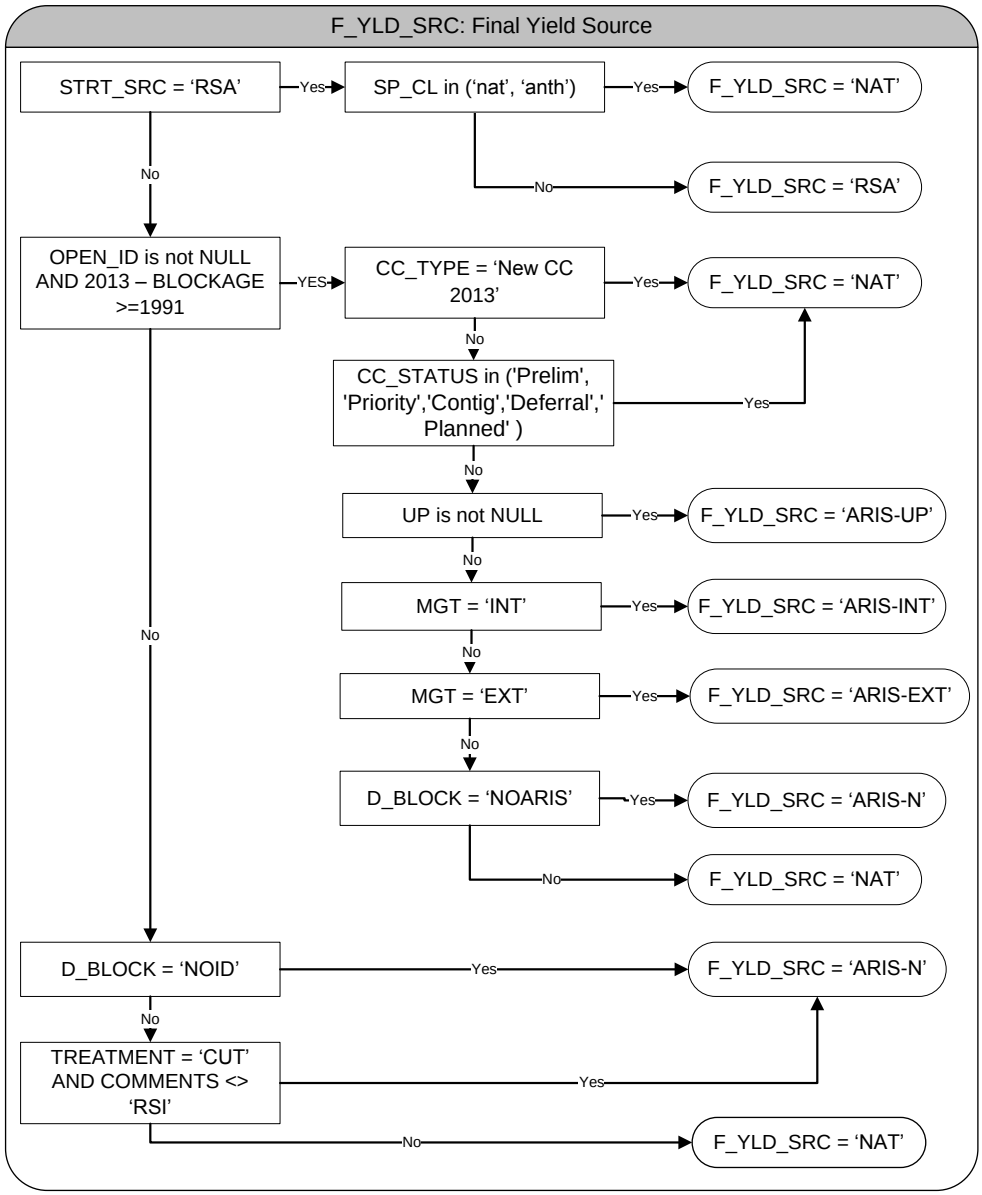


Figure 4.31. F_YLD_SRC – Final yield source.

Table 4.24. F_YLD_SRC - Field definitions.

F_YLD_SRC	Description
NAT	Polygons defined as being Natural, not having any harvest activities since 1991
RSA	Polygons defined as harvest blocks under the RSA protocol
ARIS-UP	Polygons defined as harvest blocks with an active ARIS link; Understory protection block
ARIS-INT	Polygons defined as harvest blocks with an active ARIS link; Intensively managed
ARIS-EXT	Polygons defined as harvest blocks with an active ARIS link; Extensively managed
ARIS-N	Polygons defined as harvest blocks with an in-active ARIS link; removed from forest management landbase

4.4.2 F_DEL: Landbase Deletion

F_DEL contains the amalgamation of all landbase deletion codes into one field. There exist multiple deletion type opportunities per polygon thus requiring the determination of an exclusion hierarchy for precedence. The exclusion hierarchy can be observed in Table 4.25.

F_DEL is calculated at two distinct points in program logic. F_DEL is preliminarily executed to assess the landscape for deletion groupings for sliver elimination (STEP_3e.sql; Appendix V). Once sliver elimination is processed, proxy datasets are linked to the remaining polygons. Isolated stands (see section 4.3.3.2) are calculated at this stage and are a deletion type thus needs accounting in the F_DEL code. F_DEL is run again (STEP_7c.sql, Appendix V), accounting for isolated stands in this iteration. The processing of F_DEL is the same in both the preliminary and secondary execution of the code.

Ordering of the hierarchy is by design to ensure certain deletion types are on the surface for mapping purposes. Please review the respective sub-sections for field definitions of F_DEL.

Table 4.25. F_DEL – Exclusion hierarchy.

Exclusion Hierarchy Rule (#)	Deletion Type	Level
1	When D_Status is present, D_Status	ADMIN
2	When D_SMA is present, D_SMA	ADMIN
3	When RSA is Present, No Deletion Call	
4	When D_ACCESS is present, D_ACCESS	LANDSCAPE
5	WHEN D_Anthro is present, D_ANTHRO	LANDSCAPE
6	When D_HYDRO is present, D_HYDRO	LANDSCAPE
7	When D_NATDIST is present, D_NATDIST	LANDSCAPE
8	When D_BUF is present, D_BUF	ADMIN
9	When D_RIVBRK is present, D_RIVBRK	ADMIN
10	When F_YLD_SRC is ARIS based, No Deletion Call	
11	When D_NONFOR is present, D_NONFOR	LANDSCAPE
12	When D_MOIST is present, D_MOIST	LANDSCAPE
13	When D_SP is present, D_SP	OPERATIONAL
14	When D_SLOPE is present, D_SLOPE	OPERATIONAL
15	When D_TPR is present, D_TPR	OPERATIONAL
16	When D_NONCOMCON is present, D_NONCOMCON	OPERATIONAL
17	When D_NONCOMDEC is present, D_NONCOMDEC	OPERATIONAL
18	When D_IDENTA is present, D_IDENTA	OPERATIONAL
19	When D_ISO is present, D_ISO	OPERATIONAL
20	When D_BLOCK is present, D_BLOCK	OPERATIONAL

4.4.3 F_YC: Final Yield Strata

The FMP yield strata represent the species grouping assigned to each polygon in the landbase. The species groups are based on the strata definitions in Table 4.26 and the initial strata calls made in section 4.2.5.2. The deletion categories (section 4.3) and strata definition source (section 4.2.4) affects the final call. The program logic for the final yield strata calls can be viewed in Figure 4.32.

Table 4.26. Al-Pac yield strata.

Yield Strata	GOA Strata	Overstory				Understory		
		Broad Cover	Crown Closure	Leading Conifer	TPR	Broad Cover	Crown Closure	Leading Conifer
Aw	I	D	B, C, D	Any	G,M,F	D / None	-	-
AwU	I	D	B, C, D	Any	G,M,F	C/DC/CD	A, B, C, D	Any
AwSx	III	DC	Any	Sw, Sb	G,M,F	Any	-	-
SxAw	IV, VI	CD	Any	Sw, Sb	G,M,F	Any	-	-
Sw	VII	CD	Any	Sw, Sb	G,M,F	Any	-	-
SbFM	IX	CD	Any	Sb	M,F	Any	-	-
SbG	IX	CD	Any	Sb	G	Any	-	-
PjMx	II, V	CD, DC	B, C, D	Pj	G,M,F	Any	-	-
Pj	VIII	C	Any	Pj	G,M	Any	-	-

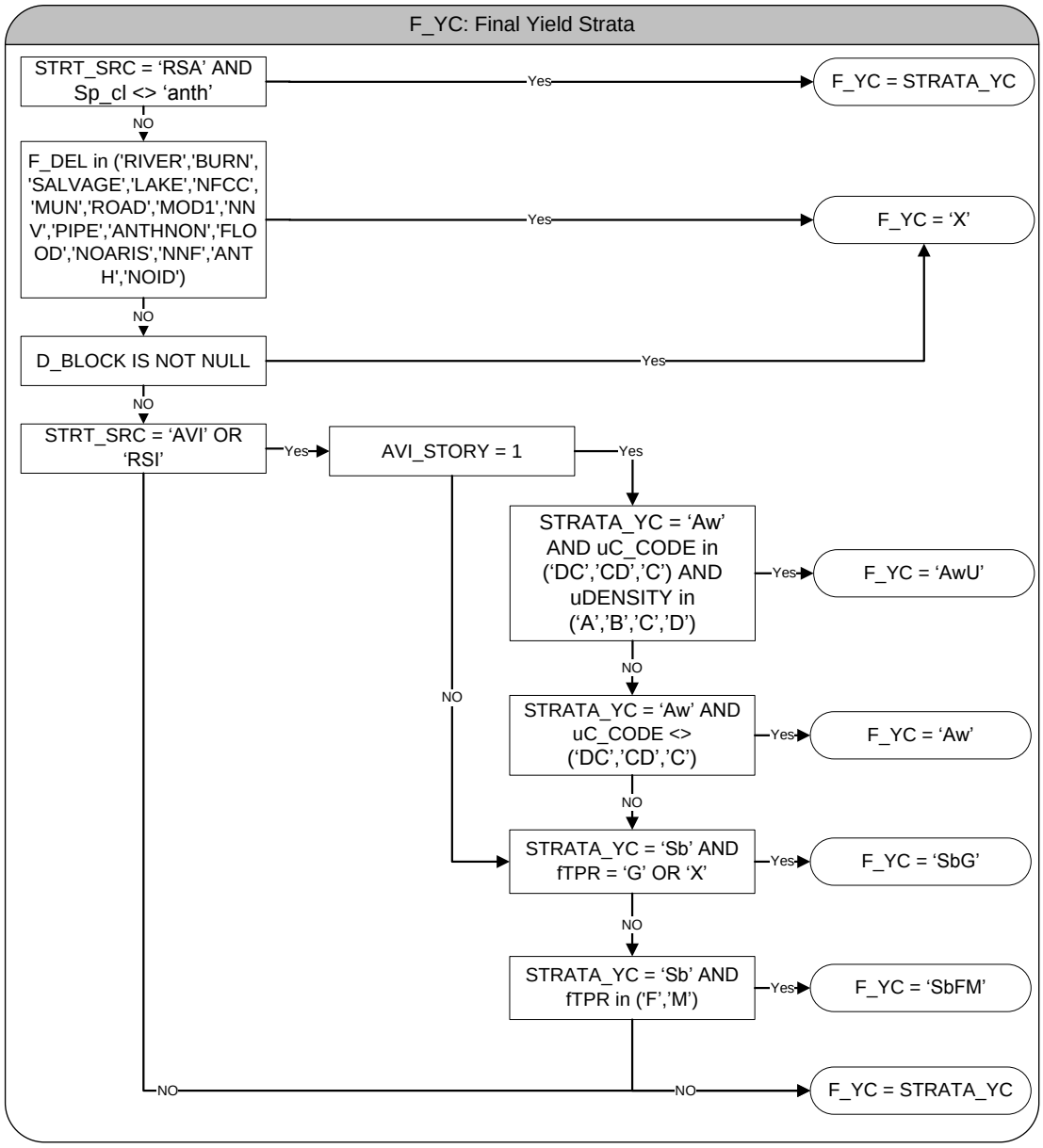


Figure 4.32. F_YC – Final yield strata call methodology for the Al-Pac landbase.

4.4.4 F_YC_NUM: Yield Curve Number

The yield strata do not match directly to created yield curves. Yield numbers are required, by polygon, in order to link the appropriate curves to the polygon. Documentation of the yield curve process can be found earlier in the FMP. Figure 4.33 depicts the assignments.

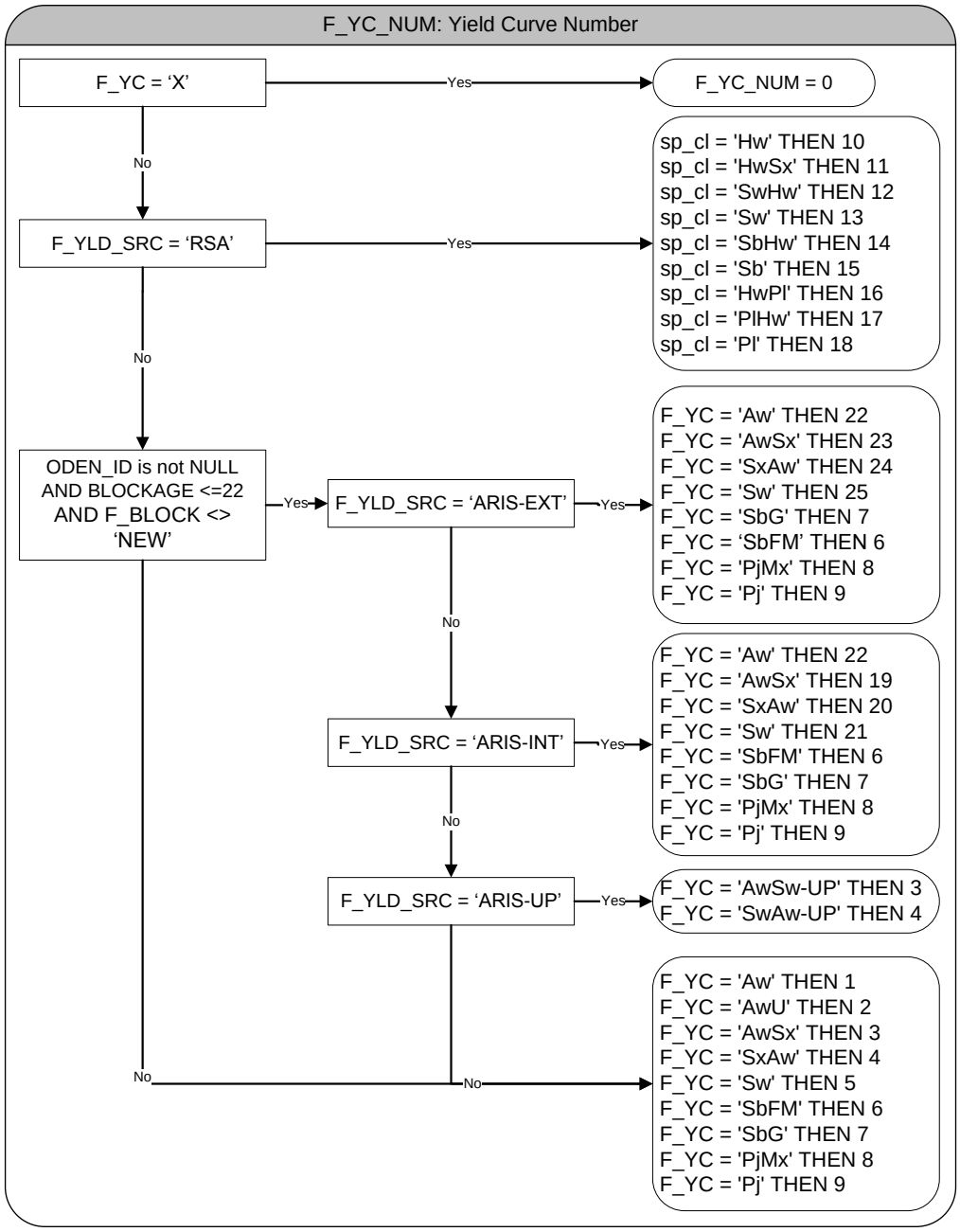


Figure 4.33. F_YC_NUM – Yield curve number assignment.

Table 4.27. F_YC_NUM – Field definitions.

Stand Type	F_YC_NUM	Description
Non-Forested	0	N/A
Natural	1	Aspen Leading
	2	Aspen Leading w/ Understory Protection
	3	Aspen Leading Spruce
	4	Spruce Leading Aspen
	5	White Spruce Leading
	6	Black Spruce Leading on a Fair or Medium Site
	7	Black Spruce Leading on a Good Site
	8	Jack Pine Mixedwood
	9	Jack Pine Leading
Post-Performance	10	Aspen Leading
	11	Aspen Leading Spruce
	12	White Spruce Leading Aspen
	13	White Spruce Leading
	14	Black Spruce Leading Aspen
	15	Black Spruce Leading on a Good Site
	16	Aspen Leading Pine
	17	Jack Pine Leading Aspen
	18	Jack Pine
Intensively Managed	22	Intensively Managed Aspen Leading
	19	Intensively Managed Aspen Leading Spruce
	20	Intensively Managed Spruce Leading Aspen
	21	Intensively Managed White Spruce Leading
	6	Intensively Managed Black Spruce Leading FM
	7	Intensively Managed Black Spruce Leading G
	8	Intensively Managed Jack Pine Mixedwood
	9	Intensively Managed Jack Pine Leading
Extensively Managed	22	Extensively Managed Aspen Leading
	23	Extensively Managed Aspen Leading Spruce
	24	Extensively Managed Spruce Leading Aspen
	25	Extensively Managed Jack Pine Leading
	7	Extensively Managed Black Spruce Leading G
	8	Extensively Managed Jack Pine Mixedwood
	9	Extensively Managed Jack Pine Leading
Understory Protection	26	Aspen Leading White Spruce Leading
	27	White Spruce Leading Aspen

4.4.5 F_BLOCK: Final Block Stage Assignment

This column identifies the block stage of identified harvest boundaries on the landbase and areas that are to be flagged for deferral. Blocks are either in the planning stage, harvested, or harvested in the interim time between landbase cut-off date (May 1st, 2013) and effective date (May 1st, 2015). Figure 4.34 details the program logic applied. This field is calculated as part of Step_7c.sql.

Field definitions may be found in sections 2.3.7, 4.2.4.2, 2.3.31, 2.3.30, 2.3.13, 4.3.3.2 and Table 4.28.

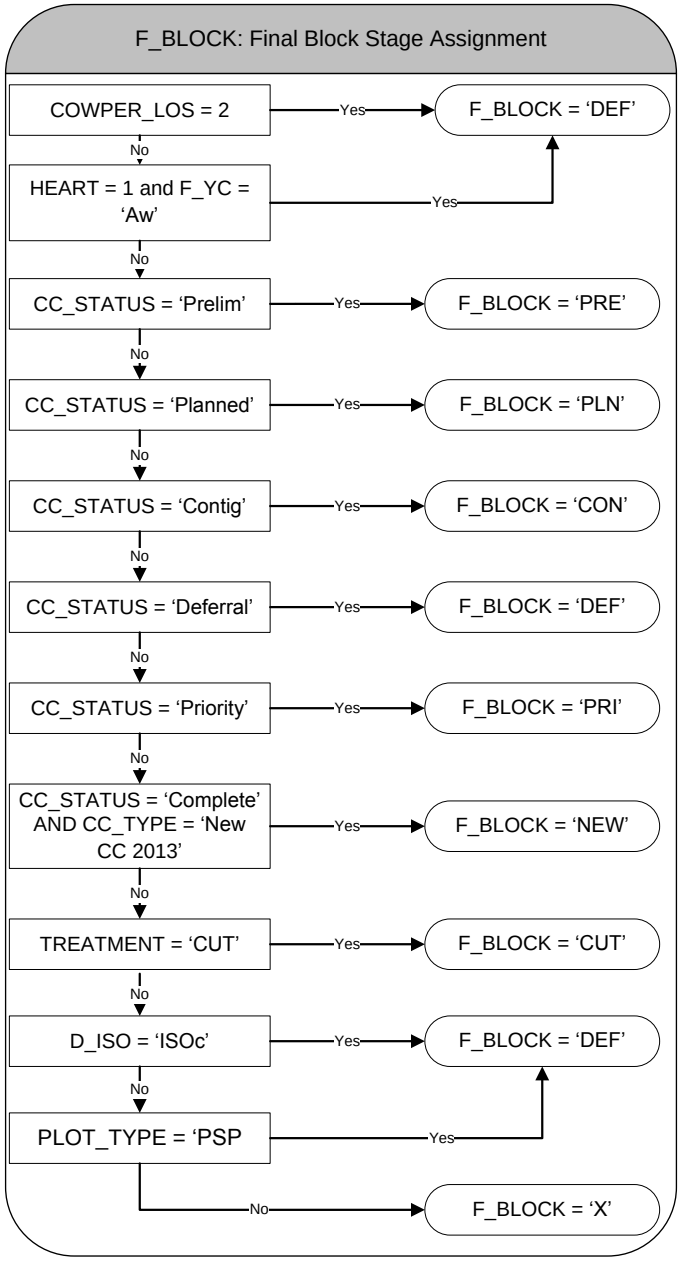


Figure 4.34. F_BLOCK – Final block stage assignment.

Table 4.28. F_BLOCK - Field definitions.

F_Block	Description
PRE	Polygon defined as a Preliminary block; to be harvested in period 1 or 2
PLN	Polygon defined as a Planned block; to be harvested in period 1 or 2
CON	Polygon defined as a Contingency block; to be harvested in period 1 through 4
DEF	Polygon defined as a Deferral block; to be harvested past period 4 if at all
PRI	Polygon defined as a Priority block; to be harvested in period 1
NEW	Polygon defined as a block completed in the intervening space between the reference year (2013) and effective date (2015); to be harvested immediately
CUT	Polygon defined as an existing Cutblock

4.4.6 F_ORIGIN: Final Stand Origin Assignment

This column identifies the year in which a polygon originated. Typically, the origin is an AVI call, but with the inclusion of new landbase features (e.g. cutblocks, DIDs), origin requires updating. Figure 4.35 depicts the program logic that is applied.

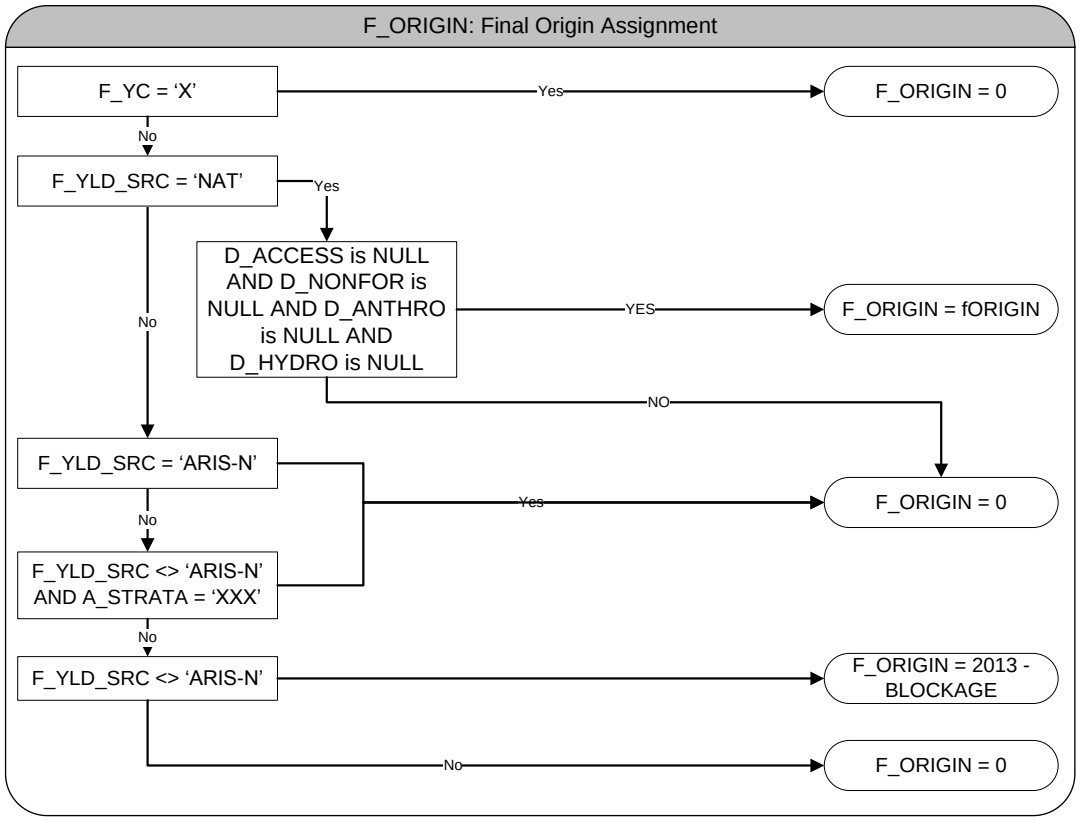


Figure 4.35. F_ORIGIN – Final origin year assignment.

4.4.7 F_LANDBASE: Final Landbase Assignment

This column identifies whether a given polygon is belonging to the Coniferous or Deciduous landbase. Figure 4.36 displays the program logic applied. Field definitions may be observed in Table 4.29. This step is processed as part of Step_7c.sql.

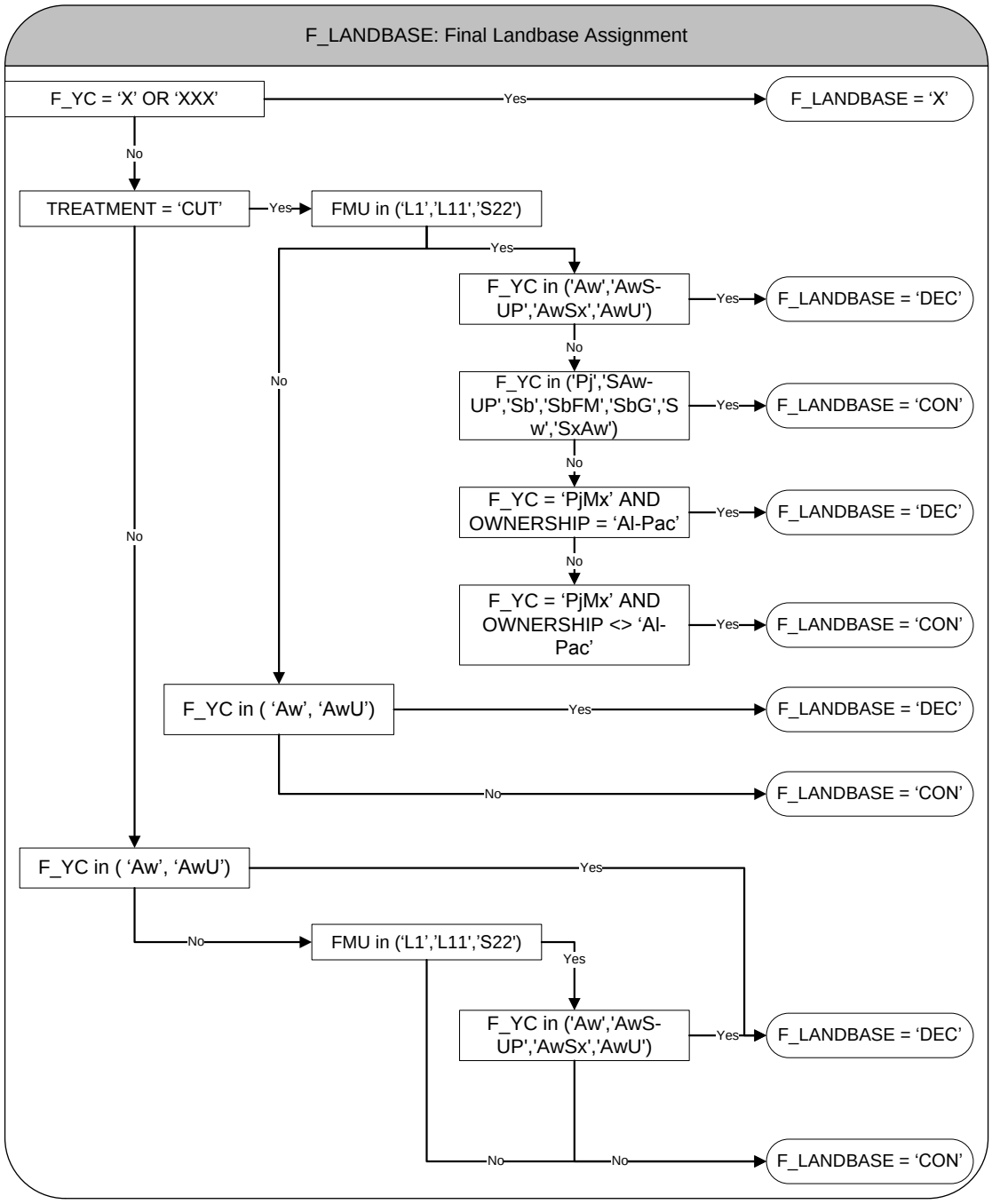


Figure 4.36. F_LANDBASE – Final landbase assignment.

Table 4.29. F_LANDBASE - Field definitions.

F_LANDBASE	Description
CON	Polygon defined as part of the Coniferous landbase
DEC	Polygon defined as part of the Deciduous landbase
X	Polygons outside of the above classifications

4.4.8 F_HGT: Stand Height

F_HGT represents the final crown closure class for a specific polygon. If the polygon is a natural, forested stand, it receives the value from its originating source; otherwise, F_ HGT is set as 'X' as observed in the program logic that is applied (Figure 4.37). No cutblocks or RSI polygons receive a height value.

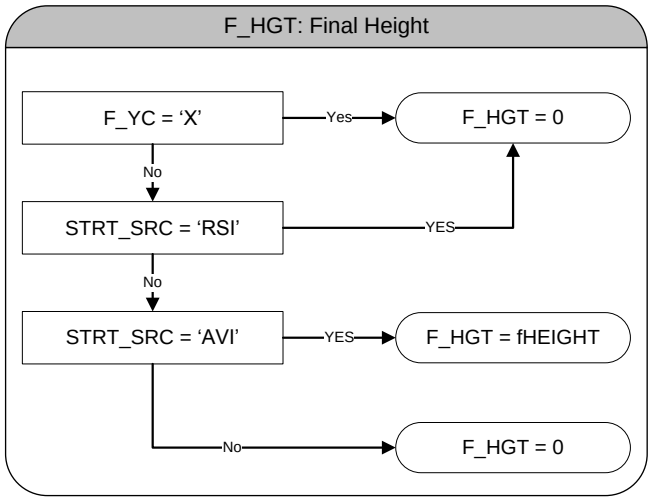


Figure 4.37. F_HGT - Final height.

4.4.9 F_AGE: Stand Age

Age is simply a function of F_ORIGIN and the data reference year, 2013. Values of -1 are set when there is no forest cover (Figure 4.38).

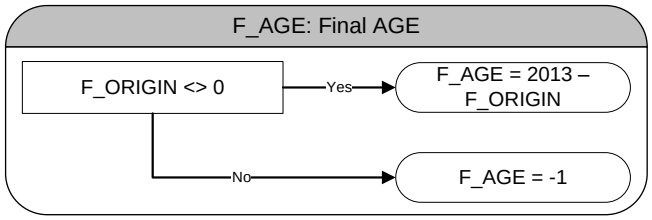


Figure 4.38. F_AGE – Final age.

4.4.10 F_TPR: Final TPR

F_TPR represents the final crown closure class for a specific polygon. If the polygon is a natural, forested stand, it receives the value from its originating source; otherwise, F_ TPR is set as 'X' as observed in the program logic that is applied (Figure 4.39). No cutblocks or RSI polygons receive a TPR value.

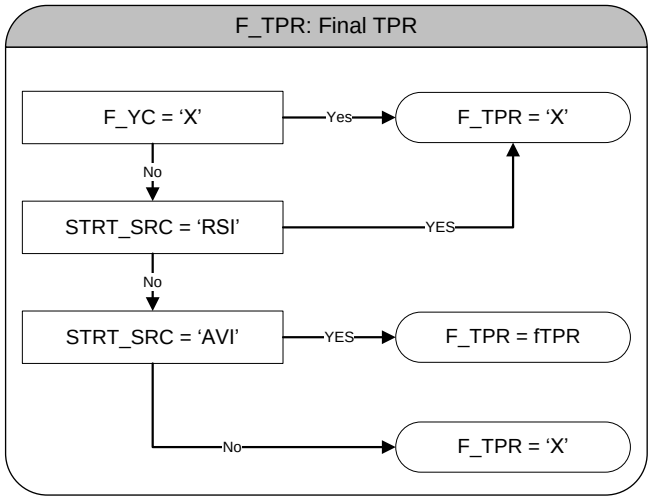


Figure 4.39. F_TPR – Final TPR.

4.4.11 F_DEN: Stand Density

F_DEN represents the final crown closure class for a specific polygon. If the polygon is a natural, forested stand, it receives the value from its originating source; otherwise, F_DEN is set as 'X' as observed in the program logic that is applied (Figure 4.40). No cutblocks or RSI polygons receive a density value.

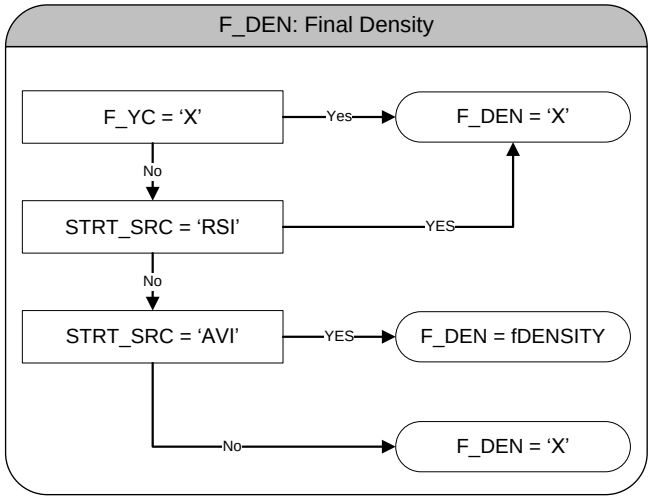


Figure 4.40. F_DEN – Final density.

4.4.12 F_STEMS: Enhanced AVI Stem Count

As part of the AVI dataset, there is enhanced inventory information. One such enhanced dataset is an estimate of stems per hectare of the understory. This data is carried forward to the landbase as depicted in Figure 4.41.

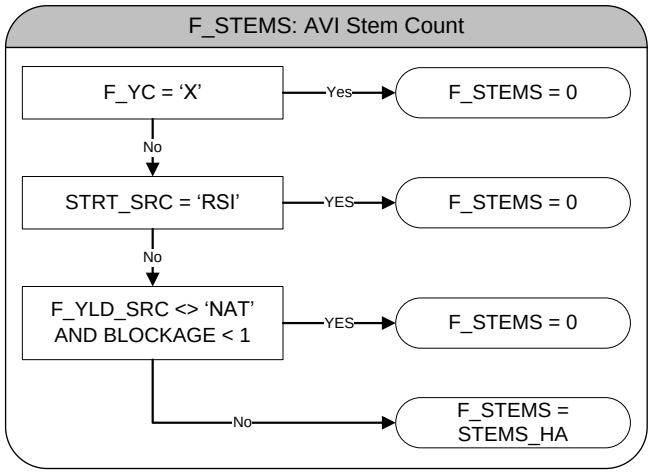


Figure 4.41. F_STEMS – Enhanced AVI stem counts.

4.4.13 F_STEM_ABV600: Areas of >600 Stems/Ha

Binary type identification (1, 0) of polygons containing more than 600 stems/ha; sourced from F_STEMS.

4.4.14 F_WILD: Wildlife Habitat Identifier

This column identifies all land area that contains zones designated to a habitat type as reviewed in sections 2.3.23, 2.3.24, and 2.3.25. Program logic, as applied, can be observed in Figure 4.42. Field definitions may be observed in Table 4.30.

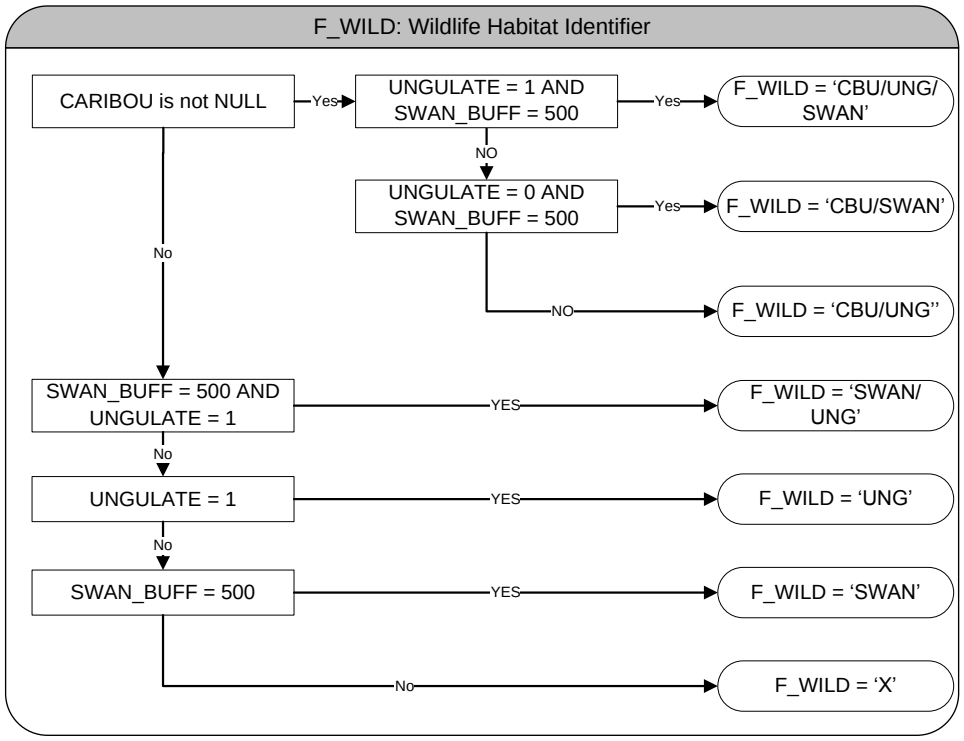


Figure 4.42. F_WILD – Wildlife habitat identification.

Table 4.30. F_WILD – Field definitions.

F_WILD	Description
CBU/UNG/SWAN	Polygon defined as being inside a Caribou, Ungulate, and Swan zone
CBU/UNG	Polygon defined as being inside a Caribou and Ungulate zone
CBU/SWAN	Polygon defined as being inside a Caribou and Swan zone
UNG/SWAN	Polygon defined as being inside a Ungulate and Swan zone
UNG	Polygon defined as being inside an Ungulate zone
CBU	Polygon defined as being inside a Caribou zone
SWAN	Polygon defined as being inside a Swan zone
X	Not in a defined wildlife zone

4.4.15 F_Condition: Managed and Un-Managed Landbase Identifier

Landbase condition, in terms of managed versus un-managed areas, is a function of F_DEL (section 4.4.2). Areas with a deletion code (F_DEL <> 'X') are considered part of the 'UN-MANAGED' (passive) landbase while F_DEL = 'X' identifies the 'MANAGED' (active) landbase. This is calculated once the final iteration of F_DEL is calculated in Step_7c.sql.

4.4.16 F_FMA: Areas Under Forest Management or Other Agreement

Al-Pac has been granted an FMA under which they may conduct harvest activities. There are other areas, that while not under FMA, have been provided to Al-Pac to utilize for non-timber objectives. This section details the identification of areas under FMA or under a non-timber value category. Areas under LARP and FMA are reviewed in section 2.3.1.

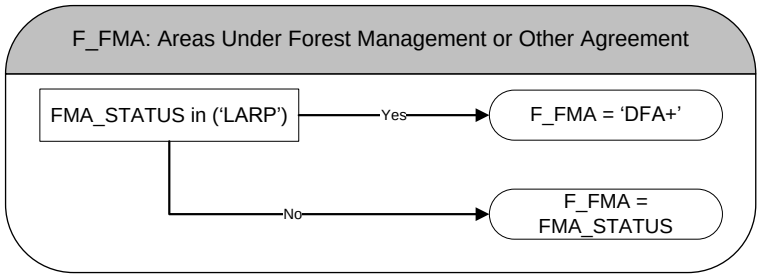


Figure 4.43. F_FMA – Final forest area definition.

Table 4.31. F_FMA – Field definitions.

F_FMA	Description
FMA	Area available for timber harvesting and non-timber values
DFA+	Area available only for non-timber values
X	Area not available for timber harvesting or non-timber values

4.5 Final Landbase Creation

Final landbase creation and area assignments for the different landbases change with the type of landbase in question.

4.5.1.1 *TSA Landbase*

The Timber Supply Analysis landbase is a result of linking the eliminated landbase to the proxy dataset by MKEY. A new field called TSA_UKEY is created as a unique identifier of this landbase. The TSA landbase contains all fields that were present in the pre-elimination landbase. The pre-elimination landbase contains all fields listed in sections 4.2, 4.3, and 4.4. The fields D_ISO (section 4.3.3.2), F_DEL (section 4.4.2), F_WILD (section 4.4.14), F_LANDBASE (section 4.4.7), F_BLOCK (section 4.4.5), and F_CONDITION (section 4.4.15) are updated in the TSA landbase to account for the addition of the proxy datasets. The field DEL_GRP is calculated to roll up F_DEL values for table summaries observed in the document.

The field F_AREA is simply the area of each polygon in the eliminated landbase.

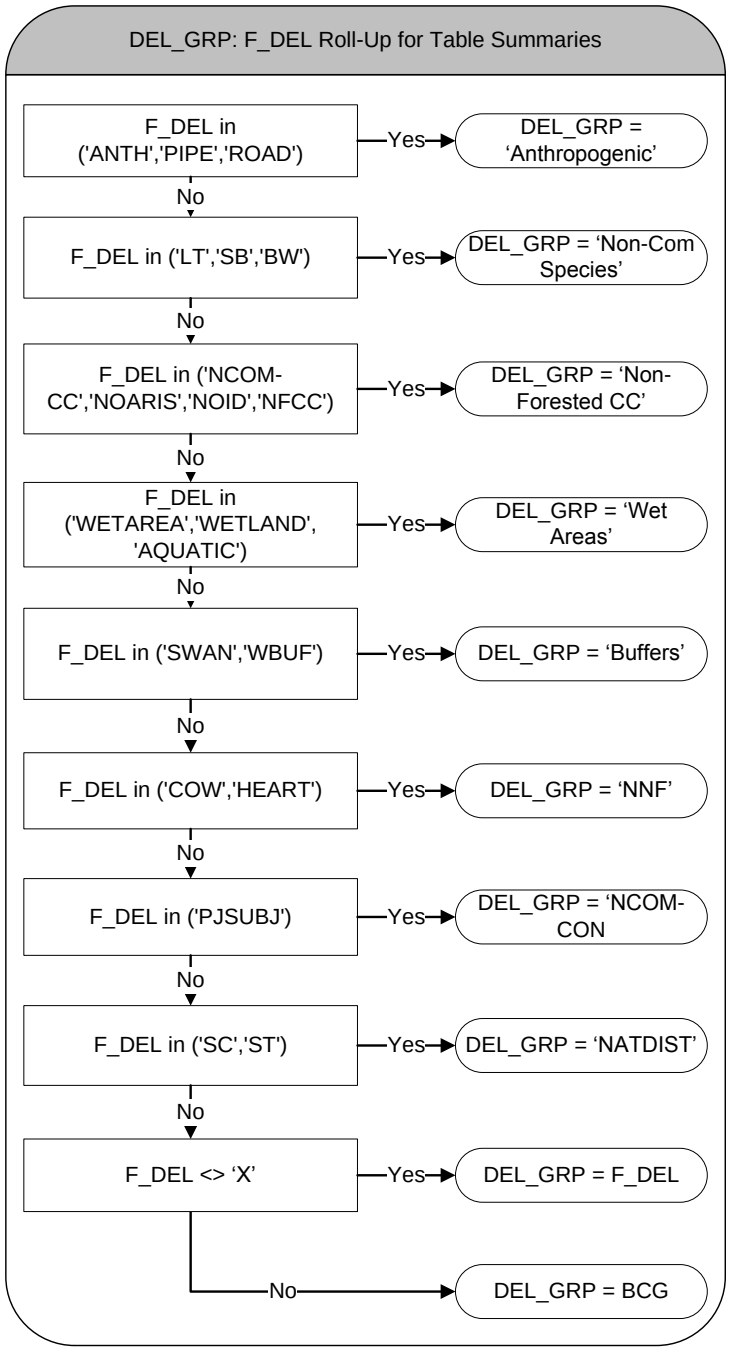


Figure 4.44. DEL_GRP – Deletion group for summarizing data in the landbase files.

4.5.1.2 *CLS Landbase*

The Classified landbase is the result of the unioning of the TSA landbase with the seismic line features as documented in section 2.3.15. This landbase contains the most linework and polygon features of all the landbases. In addition to the TSA landbase fields, the fields' SEISMIC (section 2.3.15), AREA_SEIS, and CLS_KEY are created as part of the union. CLS_KEY is a unique identifier of this landbase. AREA_SEIS is the area of each polygon and becomes F_AREA for this landbase. SEISMIC is a binary type identifier of

whether the polygon in question is, or is not, representing a seismic line feature on the landbase. SEISMIC values of 1 (present) are removed for areas to which the field TREATMENT = 'CUT' as cutblocks are regenerated as a whole, regardless of pre-harvest seismic feature presence (Figure 4.45). Fields in the CLS landbase required updating to reflect the introduction of seismic lines; Figure 4.46 identifies the fields that are changed and the values that reflect this addition.

Once all fields are calculated, AVI and processed AVI fields are added to the landbase to create the submission dataset (section 2.3.17, APPENDIX III).

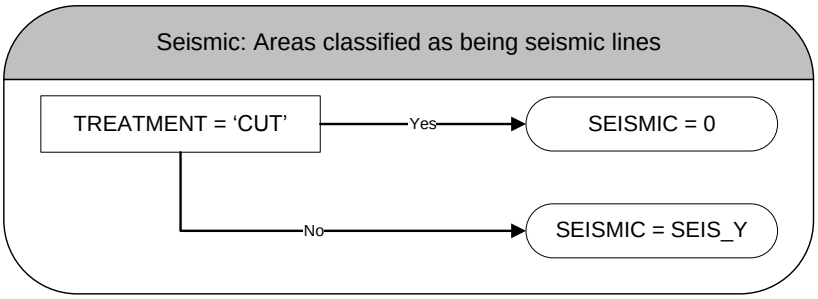


Figure 4.45. SEISMIC – Polygons classified as being seismic lines.

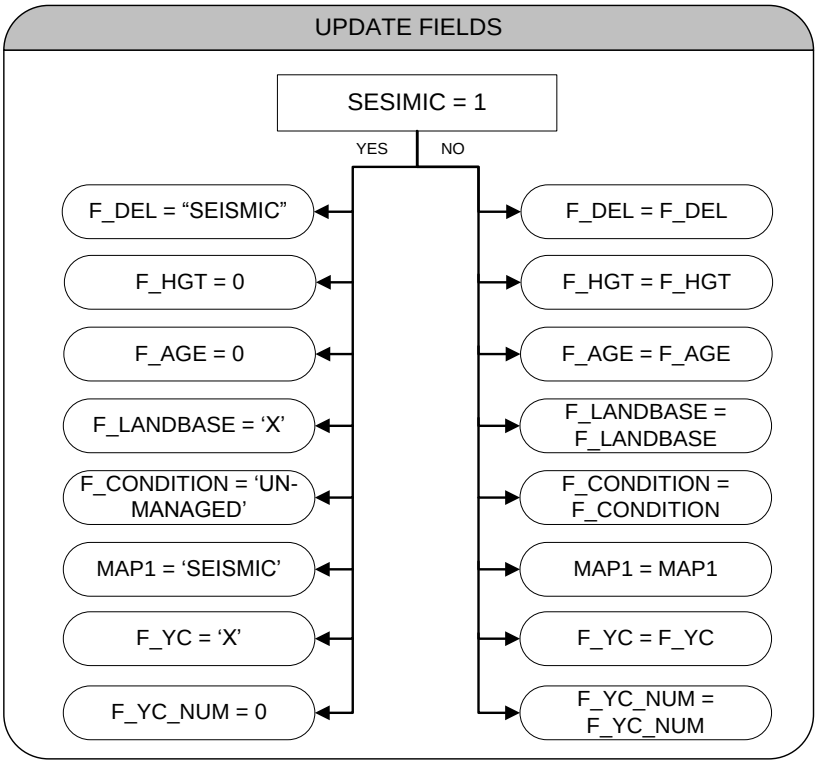


Figure 4.46. Fields in the CLS landbase that required updating due to seismic line addition.

4.5.1.3 *MDL Landbase*

The Modeling landbase is the landbase that is to be used in the timber supply analysis performed by Spatial Planning Systems. The MDL landbase has the same linework and polygon count as the TSA landbase but has 2 new columns added and only a selection of fields pertinent to SHS modeling from the TSA landbase. The F_AREA field is updated based on the polygon having seismic features contained within it, as identified through the CLS landbase.

The new columns include SEIS_AREA and ORIG_AREA. ORIG_AREA is simply the F_AREA field of the TSA landbase. SEIS_AREA is the sum of area, per polygon, that is considered a seismic feature (SEISMIC = 1 in the CLS landbase).

4.6 Landbase Update for TSA

As a result of A-I-P conditions and the subsequent timber supply analysis, additional datasets and information was gathered beyond that of the original net landbase submitted for A-I-P. Fires since data cut off (May 1st, 2015), additional PNTs, non-commercial site index rules, and some cut block changes were made to the modeling landbase submitted for A-I-P and require documentation on their inclusion in the final landbase for FMP submission.

4.6.1 Additional fires added to the Net Landbase for modeling

2015 fires:

Stands that were within the boundaries of 2015 fires were to be deferred from harvest for the first 20 years. No Landbase update was performed to capture these features as there was no net effect on managed landbase.

Horse River:

The Horse River occurred in May 2016, and only preliminary boundary identification was available for this assessment. All forested polygons covered by the fire boundary were updated in D_NATDIST to equal 'BURN'. These stands contributed in future to ecological values, but not wood supply. All polygons within the Horse River fire were set to UN-MANAGED landbase.

- Input: HorseRiver_utm12N.shp
- Name is submission file: HORSE_FIRE

4.6.2 Adjustments to SbFM NCOMSI status to align with 2007 subjective deletions

The Net Landbase assigned all SbFM (F_YC_NUM = 6) to F_CONDITION = 'UN_MANAGED'. SbFM stands in A14 and L3 that were not restricted by a non-commercial site index call or were otherwise a deletion were updated to be managed landbase. If stands were a non-commercial site index (NCOM-SI) then the

F_DEL code was changed to 'NCOM-SI', otherwise the F_DEL code was changed to 'X' and the F_CONDITION code was changed to 'MANAGED'.

This update resulted in the creation of a new deletion field named D_NONCOMSI_10 in the classified landbase. Non-commercial stands were assigned based on an age/height/species matrix (Table 4.32). These stands are deleted from the operable landbase (Figure 4.47). The landbase identifier of this deletion type is "NCOM-SI". F_YC is not affected by this deletion type. Field definition may be observed in Table 4.33.

Table 4.32. D_NONCOMSI- Non-commercial site index (NCOM-SI)

Height(m)	Species Age (>)			
	Aw, Bw, Pb	Pl	Sb	Sw, Fd, Fb
3	18	13	18	27
4	26	22	28	38
5	34	28	37	49
6	46	37	47	60
7	53	47	57	72
8	67	57	68	84
9	75	68	80	95
10	86	80	93	107
11	101	95	117	120
12	117	111	123	134
13	136	130	140	148
14	160	160	165	165
15	180	180	180	180

Table 4.33. D_NONCOMSI - Field definitions.

D_NONCOMSI	Description
NCOM-SI	Polygons defined as being non-commercial due to stand growth conditions; removed from the forest management landbase. Applies to only FMU 'A14' and 'L3' Black Spruce stands.
''	Polygons outside of the above classifications

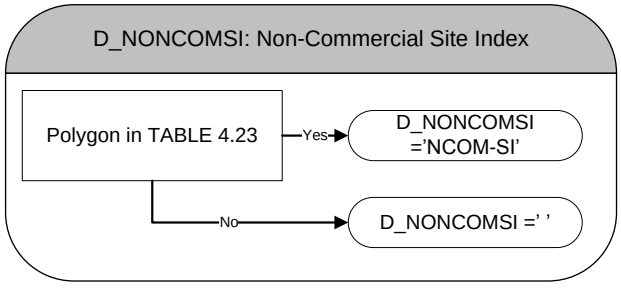


Figure 4.47. D_NONCOMSI – Non-commercial site index.

4.6.3 Millar Western Liability Blocks

Millar Western identified forest stands that were deleted because they were within the Richardson fire, but they had harvested and verified that they were productive. A list of openings was provided and D_NATDIST = 'BURN' was updated to 'X'. The list included:

- OPEN_ID in '4090980503', '4090981610', '4090982013', '4090982042', '4090980708A', '4090981612A' ,'4090981814A', '4090982105A', '4090982183A', '4090982211A', '4090982740A', '4090982743A'

4.6.4 Additional ARIS blocks

16 additional ARIS cutblocks in the NLB were reviewed and deemed that they should not be part of the active landbase. D_BLOCK was updated to reflect the NFCC nature of the following openings:

- OPEN_ID in ' 4180720825, 4180722013, 4180730516, 4180731803, 4190712399, 4190712446, 4190712685, 4190713565, 4190720129, 4190720280, 4190721233, 4190723636, 4200701714,4200701886,4210711903,4210733350'

4.6.5 Additional PNT selections

Government review of the NLB identified additional protective notations that were required. The government provided shapefiles included all PNTs. A manual process was carried out to locate only those PNTs that were not already included in the NLB. These PNTs were unioned with the NLB using ArcGIS, and the F_DEL attribute within these zones was set to 'NonFMA'.

- Input file: PNT_Apply.shp
- Name in submission file: PNT_APPLY

All spatial dataset utilized in the landbase update have been included with the landbase submission.

5 Landbase Summary

Following is a summary of the Al-Pac landbase according to the rule-sets applied in previous sections.

5.1 A-I-P Submission Results

Table 5.1 is a summary of the gross and net landbase, by FMU, for the classified landbase as submitted for A-I-P.

Table 5.2 and Table 5.3 shows the distribution of yield classes over the gross and net landbases, respectively, by FMU for the classified landbase (A-I-P). This is the FMP submission landbase.

Table 5.1. Summary of the classified Al-Pac Landbase (A-I-P).

Deletion Category	Forest Management Unit												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Total Landbase Area (ha)	1,177,554	1,437,634	359,026	1,047,776	299,028	588,583	126,837	332,553	364,371	610,948	802,635	127,384	7,274,328
Prohibits Timber Harvesting													
NonFMA	61,211	171,477	27,144	9,010	19,863	3,682	1,029	2,298	12,300	42,383	83	15,564	366,044
LARP	197,000	3,725	19,262	213,302	0	1,959	0	0	0	0	0	0	435,248
First Nations Reserve	3,221	20,081	4,444	3,081	14,836	1	0	40,995	5,740	30,636	13,883	0	136,918
Provincial Park	205	36	8	68	0	1	0	0	0	0	0	1	319
Municipal	22,538	9,043	0	127	0	1,121	0	0	0	952	0	0	33,781
Surface Mineable Area	0	269,268	0	0	0	0	0	0	0	0	0	0	269,268
SubTotal	284,175	473,630	50,857	225,588	34,699	6,764	1,029	43,293	18,039	73,970	13,967	15,565	1,241,577
Total Landbase Area Remaining (ha)	893,378	964,004	308,168	822,188	264,329	581,819	125,808	289,260	346,331	536,977	788,668	111,819	6,032,751
Disturbed													
Seismic	5,773	6,903	2,386	8,796	2,862	4,314	1,023	4,759	6,590	4,521	6,082	1,674	55,682
Anthropogenic	13,861	15,258	9,061	25,874	5,030	38,141	3,755	3,552	4,567	32,231	15,680	1,541	168,551
Anthropogenic Non-Vegetated	117	107	145	392	130	119	36	25	60	397	134	16	1,678
Anthropogenic Vegetated	565	214	223	1,127	275	486	124	180	244	283	323	133	4,177
Burned Areas	60,587	113,048	53,364	177,548	8,865	93,818	1,664	7,890	39,106	19,124	60,949	170	636,134
Other Natural Disturbance	0	0	0	118	27	0	0	0	0	4	0	2	152
SubTotal	80,903	135,530	65,180	213,855	17,188	136,877	6,603	16,405	50,566	56,559	83,168	3,537	866,373

Table 5.1 continued.

Deletion Category	Forest Management Unit												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Total Landbase Area Remaining (ha)	812,475	828,474	242,989	608,333	247,141	444,942	119,205	272,855	295,765	480,418	705,499	108,282	5,166,378
Aquatic													
Lake	8,491	13,734	20,281	18,004	3,527	7,634	4,169	10,632	7,505	28,217	19,479	6,676	148,349
River	715	2,620	295	2,204	746	3,834	730	147	1,265	564	1,955	840	15,916
Flooded Areas	1,153	2,417	619	1,482	676	538	116	1,166	768	2,572	1,901	109	13,517
River Break	7,765	1,849	0	0	3,859	8,355	1,635	0	0	0	0	1,298	24,762
Buffers	16,615	15,370	8,477	17,687	3,644	10,137	3,022	7,627	6,752	15,545	17,907	6,158	128,941
SubTotal	34,740	35,991	29,671	39,376	12,452	30,498	9,672	19,573	16,290	46,899	41,242	15,081	331,484
Total Landbase Area Remaining (ha)	777,735	792,483	213,317	568,957	234,689	414,444	109,533	253,282	279,475	433,519	664,257	93,201	4,834,893
In-Operable													
Wet Areas	163,341	159,063	20,801	82,646	23,956	66,971	17,599	22,549	30,209	52,370	104,387	8,002	751,894
Naturally Non-Forested	60,869	50,847	13,554	39,795	19,531	36,614	12,161	21,378	22,359	41,895	65,357	8,171	392,531
Naturally Non-Vegetated	27	35	0	0	9	166	4	0	2	0	1	0	244
Non-Commerical Species	70,131	78,065	31,913	55,030	35,329	34,309	15,153	10,252	7,357	36,510	34,753	9,382	418,183
Timber Productivity Rating	224,826	187,053	32,198	143,754	42,804	136,075	16,675	45,684	61,438	103,525	192,187	9,423	1,195,643
Non-Commerical Coniferous Stands	8,939	6,925	2,639	8,827	548	1,747	882	3,395	1,278	1,169	4,481	300	41,130
Non-Commerical Deciduous Stands	6,069	5,605	1,548	3,236	2,623	1,660	955	2,509	4,529	3,334	5,901	808	38,778
A Density Stand Deletions	7,079	14,044	2,743	3,502	1,934	1,271	701	2,596	5,037	6,096	6,425	1,304	52,731
Isoloated Stands	977	584	777	1,349	713	1,040	206	381	456	750	901	245	8,379
Non-Forested CC	3,596	4,041	4,053	8,252	3,371	2,405	1,779	822	421	4,563	1,902	1,096	36,301
SubTotal	545,855	506,263	110,224	346,391	130,820	282,258	66,115	109,566	133,086	250,210	416,296	38,729	2,935,814

Table 5.1 continued.

Deletion Category	Forest Management Unit												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Total Deletions (ha)	945,673	1,151,414	255,933	825,210	195,159	456,397	83,419	188,837	217,982	427,639	554,674	72,912	5,375,249
Total Landbase Area Remaining (ha)	**231,880**	**286,221**	**103,093**	**222,566**	**103,869**	**132,186**	**43,418**	**143,716**	**146,389**	**183,309**	**247,961**	**54,472**	**1,899,079**
Operable													
Deciduous	75,971	142,450	59,253	119,412	54,603	28,841	23,631	73,175	80,293	95,952	162,760	36,652	952,993
Deciduous / Coniferous	13,108	16,987	5,899	11,800	7,855	13,103	2,281	11,361	8,068	16,092	14,438	3,100	124,092
Coniferous / Deciduous	14,071	13,689	5,537	7,490	9,819	14,160	2,356	7,605	8,331	17,560	9,903	2,884	113,405
Coniferous	128,730	113,094	32,404	83,865	31,592	76,082	15,149	51,575	49,698	53,705	60,860	11,837	708,590
SubTotal	231,880	286,220	103,093	222,566	103,869	132,186	43,418	143,716	146,389	183,309	247,961	54,472	1,899,079

SQL Code: select fmu, del_grp , sum(f_area) from cls_lb_v8 group by fmu, del_grp order by 1, 2;

Table 5.2. Gross landbase yield class area summary (A-I-P).

Yeild Class	Forest Management Unit												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Aw	73,524	119,594	65,656	126,627	44,187	34,130	21,553	57,257	48,893	62,110	116,931	30,706	801,168
AwSw_UP	28	0	124	299	176	73	0	0	0	145	339	41	1,225
AwSx	18,586	22,493	6,384	11,071	8,469	14,122	2,405	8,904	6,785	16,271	13,598	3,220	132,308
AwU	81,016	138,095	6,965	25,860	28,724	11,359	6,246	28,986	44,805	52,499	67,963	13,367	505,884
Pj	109,582	117,534	27,554	107,626	10,715	29,387	7,670	36,916	33,694	13,682	49,729	5,828	549,917
PjMx	13,740	19,749	2,255	9,321	2,314	3,434	515	8,723	6,329	5,017	6,277	1,243	78,917
SbFM	524,655	501,875	92,767	358,467	96,516	226,407	44,751	81,880	91,210	186,056	318,064	24,024	2,546,673
SbG	43,704	57,613	6,462	40,912	14,849	17,776	8,579	16,233	6,594	21,719	14,810	5,755	255,005
Sw	49,274	52,800	10,453	15,936	16,560	41,103	5,121	13,857	20,503	27,129	21,399	4,542	278,677
SwAw_UP	14	0	73	15	98	46	0	0	0	275	13	71	604
SxAw	14,436	16,153	5,641	6,715	10,505	14,448	2,433	5,753	6,514	16,925	9,446	2,671	111,639
X	248,995	391,729	134,692	344,927	65,916	196,296	27,565	74,043	99,046	209,120	184,066	35,917	2,012,311
	1,177,554	1,437,634	359,026	1,047,776	299,028	588,583	126,837	332,553	364,371	610,948	802,635	127,384	7,274,328

Table 5.3. Net landbase yield class area summary (A-I-P).

Yeild Class	FMU												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Aw	30,414	59,859	54,120	100,116	31,231	20,929	18,305	49,446	42,537	47,994	104,144	25,178	584,274
AwSw_UP	28	0	124	299	176	73	0	0	0	145	339	41	1,225
AwSx	9,343	11,525	4,981	8,139	6,577	11,296	2,041	7,297	5,626	13,541	11,287	2,617	94,270
AwU	45,557	82,591	5,133	19,295	23,371	7,912	5,327	23,729	37,756	47,880	58,616	11,474	368,641
Pj	75,628	63,540	20,219	48,868	8,051	23,366	6,532	29,914	26,342	11,887	32,968	5,072	352,387
PjMx	9,684	10,450	1,616	5,611	1,905	2,969	320	7,091	4,995	4,431	4,720	1,024	54,817
SbFM	0	0	0	0	0	6	0	0	0	0	0	0	6
SbG	22,794	23,842	3,254	22,361	8,881	14,524	3,829	10,503	5,052	16,471	9,625	2,825	143,961
Sw	30,308	25,712	8,931	12,636	14,661	38,186	4,788	11,158	18,304	25,344	18,267	3,939	212,233
SwAw_UP	14	0	73	15	79	46	0	0	0	275	13	71	585
SxAw	8,110	8,701	4,642	5,226	8,937	12,879	2,277	4,577	5,778	15,341	7,983	2,231	86,681
	231,880	286,220	103,093	222,566	103,869	132,186	43,418	143,716	146,389	183,309	247,961	54,472	1,899,079

SQL Code: select fmu, f_yc, sum(f_area) Gross, sum(CASE WHEN f_DEL = 'X' THEN f_area ELSE 0 END) Net from cls_lb_v8 group by fmu, f_yc order by 1, 2;

5.2 FMP Submission Results

Table 5.4 and Table 5.5 shows the distribution of yield classes over the gross and net landbases, respectively, by FMU for the classified landbase submitted with the FMP.

The overall impact to the active landbase submitted with the FMP compared to the version submitted for A-I-P is a reduction of 128,872ha.

Table 5.4. Gross landbase yield class area summary (FMP submission).

Yeild Class	Forest Management Unit												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Aw	53,407	114,295	65,604	117,793	44,187	34,100	21,553	57,247	48,750	62,110	116,834	30,706	766,586
AwSw_UP	28	0	124	276	176	73	0	0	0	145	339	41	1,202
AwSx	14,409	20,142	6,380	10,270	8,423	14,087	2,405	8,904	6,785	16,271	13,597	3,220	124,892
AwU	55,011	128,258	6,941	22,917	28,724	11,359	6,246	28,942	44,759	52,499	67,903	13,367	466,923
Pj	62,674	112,097	27,523	104,694	10,715	29,302	7,670	36,895	33,667	13,682	49,554	5,828	494,302
PjMx	9,723	18,606	2,254	8,814	2,314	3,432	515	8,717	6,328	5,017	6,264	1,243	73,226
SbFM	415,559	462,662	92,535	344,919	96,516	226,055	44,751	81,773	91,072	186,056	317,782	24,024	2,383,704
SbG	31,919	53,025	6,443	37,086	14,849	17,758	8,579	16,233	6,593	21,719	14,810	5,755	234,769
Sw	39,512	46,925	10,426	14,237	16,530	41,088	5,085	13,857	20,489	27,129	21,399	4,542	261,221
SwAw_UP	0	0	73	9	98	46	0	0	0	275	13	71	584
SxAw	11,259	14,300	5,634	6,021	10,419	14,446	2,338	5,753	6,514	16,925	9,446	2,671	105,725
X	484,052	467,324	135,089	380,740	66,077	196,836	27,697	74,232	99,415	209,120	184,695	35,917	2,361,193
	1,177,554	1,437,634	359,026	1,047,776	299,028	588,583	126,837	332,553	364,371	610,948	802,635	127,384	7,274,328

Table 5.5. Net landbase yield class area summary (FMP submission).

Yeild Class	FMU												Total
	A14	A15	L1	L11	L2	L3	L8	S11	S14	S18	S22	S23	
Aw	18,281	56,009	53,283	92,001	31,231	20,749	18,125	49,193	42,440	47,164	104,092	24,709	557,278
AwSw_UP	28	0	124	276	176	73	0	0	0	135	339	41	1,193
AwSx	5,958	9,812	4,886	7,468	6,531	10,971	2,026	7,183	5,601	12,949	11,286	2,599	87,269
AwU	23,183	73,878	5,035	17,188	23,371	7,775	5,313	23,548	37,731	46,628	58,600	11,369	333,617
Pj	39,232	59,220	20,189	46,308	8,051	23,313	6,530	29,732	26,342	11,641	32,927	4,969	308,454
PjMx	6,378	9,886	1,608	5,177	1,905	2,950	320	7,066	4,995	4,392	4,720	1,009	50,405
SbFM	14,654	0	0	0	0	15,903	0	0	0	0	0	0	30,557
SbG	14,904	21,100	3,220	19,836	8,881	14,392	3,823	10,497	5,052	16,265	9,625	2,819	130,414
Sw	21,955	20,357	8,853	11,133	14,654	36,419	4,732	10,974	18,075	24,503	18,267	3,927	193,849
SwAw_UP	0	0	73	9	79	46	0	0	0	272	13	71	563
SxAw	4,878	6,737	4,389	4,376	8,544	12,205	2,142	4,282	5,549	13,917	7,440	2,151	76,609
	149,450	256,999	101,660	203,772	103,423	144,796	43,011	142,474	145,786	177,865	247,309	53,663	1,770,207

SQL Code: select fmu, f_yc, sum(f_area) Gross, sum(CASE WHEN f_DEL = 'X' THEN f_area ELSE 0 END) Net from cls_lb_v9 group by fmu, f_yc order by 1, 2;

5.3 Delivered Data

The TSA landbase submitted with the FMP contains 1,729,881 polygons; the CLS landbase, 3,284,037. The TSA and MDL landbases were not submitted as part of the net landbase component of the FMP submission; only the CLS landbase is submitted. The TSA landbase is submitted as part of the TSA submission.

The submission FMU datasets are grouped by landbase type and contain a DBF file that links to each landbase. Each landbase has a unique identifier as identified in Figure 5.1.

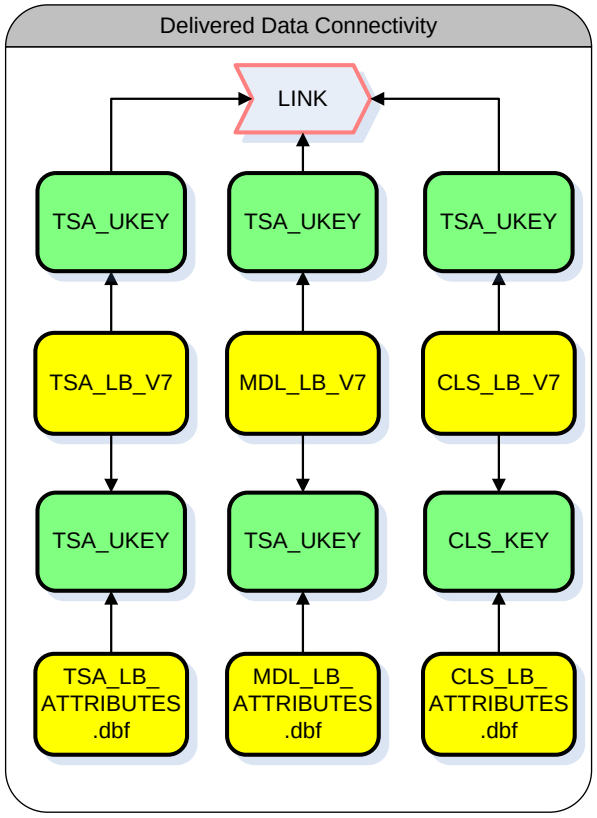


Figure 5.1. Delivered data connectivity to each other and the supplied attribute tables.

6 References

Alberta Environment and Sustainable Resource Development. 2014. Reforestation Standard of Alberta. Government of Alberta, Department of Environment and Sustainable Resource Development. Edmonton, AB. 264 p.

Froese Forestry Consulting Inc. 2014. Annex V: Yield Curve Development. Prepared for Alberta-Pacific Forest Industries Inc. Edmonton, AB.

Appendix I - Glossary

Glossary Term	Definition
Active landbase	Area that is available for forest management activities. That component of the physical landbase that is not deleted in the landbase netdown process. Consists of the combined coniferous and deciduous landbases. Also referred to as the timber harvesting landbase, net landbase and contributing landbase.
Alberta Regeneration Information System (ARIS)	A Provincial database of silviculture treatments applied to harvested lands. Updated annually by permit and license holders. Considered to be the defacto record of treatment history and block status.
Alberta Plywood Ltd (ALPLY)	A neighbouring FMA holder and license holder inside the Al-Pac FMA area.
ARC Macro Language (AML)	A third-generation (non-compiled) scripting language, propriety to ESRI. AML is a legacy language used commonly in early versions of the ESRI software. While primarily a legacy product, it is still used for developing processes that need to run unattended.
Alberta Vegetation Inventory (AVI)	The provincial standard for forest inventory information (classification and data storage).
AVI polygon	A polygon delineated based on aerial photography using Alberta Vegetation Inventory rules (AFLW 1991, Nesby 1997). For vegetated areas, areas must be sufficiently similar in terms of structure, moisture regime, crown closure, height, species composition and origin year to be considered a single unit or a polygon. Non-vegetated areas must have a similar non-vegetated classification.
Ed Bobocel Lumber Co Ltd. (BOBL)	A quota holder inside the Al-Pac FMA area.
Broad Cover Group (BCG)	A classification of forest types based on coniferous and deciduous components of the AVI species composition. The broad cover groups are coniferous (C), coniferous-leading mixedwood (CD), deciduous-leading mixedwood (DC) and deciduous (D).
Classified landbase	A spatial landbase and attribute classification generated as the second stage of the timber supply analysis process. Used to calculate the area and distribution of all features on the landscape, particularly to generate summaries of seismic detail and carry this into the modeling landbase.
Cutblock	A specified area that is either designated for harvest or has already been harvested.
Defining layer	Inventory layer used to assign strata. The defining layer may be the overstory or the understory.

Glossary Term	Definition
Deletions	All areas excluded from the active landbase and assigned a code identifying the reason for deletion.
Digitally Integrated Disposition System (DIDs)	A Provincial database and system of specific land use disposition types submitted for approval. The DIDs spatial data are managed and distributed by Alberta Public Lands.
Environmental Systems Research Institute (ESRI™)	The developer of the suite of geographic information system software products commonly known as ArcInfo, ArcMap, ArcView, Spatial Analyst and others.
Forecasting	See Timber Supply Analysis.
Forest management agreement (FMA)	Contract between the Province of Alberta and the FMA holder whereby the Province provides an area-based Crown timber supply. In return, the FMA holder commits to: Managing the timber resource on a perpetual sustained yield basis, taking into consideration a broad range of forest values in determining forest management practices; and meeting defined economic objectives, including capital investments and job creation, and seeking out new business opportunities that provide measurable economic benefits for both the Province and the FMA holder. The FMA gives the FMA holder the right to access Crown fibre. In return, the FMA holder commits to forest management responsibilities, which may change from time to time (Alberta SRD 2006).
Forest Resource Improvement Association of Alberta (FRIAA)	A program to continue sustaining and enhancing Alberta's forests.
Fully stocked	All potential growing space that is effectively occupied by merchantable tree species.
Input datasets	Datasets received for the purpose of completing the landbase netdown. Frequently require processing to convert or add attributes, assign/add projection information, or combine with other inputs that represent the same features.
Landbase polygon	A polygon within the (classified, TSA, or modeling) landbase derived during spatial processing to incorporate various spatial layers and attributes of interest.
Managed landbase	That portion of the net landbase which is considered "managed" in the respect that the land received a harvest treatment and subsequent silviculture treatments. Note that AVI stands classified with modifier = 'CC', where there is no identified cutblock boundary, no Opening Number, nor any records of reforestation are not considered 'managed'.

Glossary Term	Definition
Modeling landbase	A tabular and spatial landbase. Tabular data make the landbase suitable for both strategic and operational timber supply modeling. The spatial component is used for harvest scheduling.
Natural stand	Natural stands developed under natural (non-anthropogenic) disturbance regimes. Stand initiation was due to natural disturbances, such as fire, pest or pathogen outbreak, *etc*.
Northlands Forest Products (Northlands)	A quota holder inside the Al-Pac FMA area.
North American Datum (NAD)	A mathematical process of correcting geospatial locations relative to a fixed, known position.
Passive landbase	That part of the gross landbase that has a deletion and is excluded from the gross landbase.
Plot	Unit of area, within which variables of interest are assessed.
Polygon	A closed geometric entity used to spatially represent area features with associated attributes.
Regeneration lag	The period of time between harvest and establishment of the regenerated stand.
Regenerated Stand Inventory (RSI)	An AVI type investigation undertaken by MWFP to update information for older cutblock areas with silvicultural enhancements not observed in original AVI.
Sliver	Generally small polygons created in the spatial analysis due to overlapping features that do not have coincident boundaries. Typically these are artifacts of spatial processing and generally do not represent true differences in polygon differentiation with respect to landbase classification.
Species group	A single species code used to represent one or more AVI species. For example, the AW species group consists of AVI species A and Aw; and the LT species group consists of La, Lt and Lw.
Species type	There are two species types: deciduous and coniferous. Deciduous species include aspen, birch and poplar; species belonging to the coniferous type include fir, pine, larch and spruce.
Spruceland Lumber (SPML)	A quota holder inside the Al-Pac FMA area.
Stand	A community of trees sufficiently uniform in species, age, arrangement or condition as to be distinguishable as a group in the forest or other growth in the area. A stand may also be that polygon as defined in the AVI or Phase III inventory (Alberta SRD 2006).
Strata/Stratification	A classification scheme for defining polygons within the active landbase.

Glossary Term	Definition
Structured Query Language (SQL)	A formal computer language for querying relational database system tables. The language follows an ANSI compliant format and the core set of commands are part of a common language used across many database software programs.
St. Jean Lumber (STJEAN)	A quota holder inside the Al-Pac FMA area.
Submission datasets	Datasets submitted to GOA for approval.
Timber supply analysis (TSA)	Calculations/computer models with built-in assumptions regarding forest growth patterns, used to determine the annual allowable cut. Also calculates the spatial harvest sequence and other non-timber values (Alberta SRD 2006).
TSA landbase	A spatial landbase that carries all the information of the classified landbase, with the exception of the seismic line work.
Universal Transverse Mercator (UTM)	A method of projecting spherical shapes on a flat plane. Typically this projection is used when the features need to have good area representation and the extent of the dataset does not cover more than 1 predefined UTM zone (three degrees of longitude).
Unmanaged landbase	That portion of the net landbase which is considered to be on a "natural" yield projection. All un-harvested areas are considered 'un-managed'. In addition, note that AVI stands classified with modifier = 'CC', where there is no identified cutblock boundary, no Opening Number, nor any record of reforestation are considered 'unmanaged'.
Vanderwell Contractors (VAND)	A quota holder inside the Al-Pac FMA area.
Yield curve	Graphical representation of a predictive yield equation. One yield curve in fact consists of three curves: a conifer volume-age curve, a deciduous volume-age curve and a total volume-age curve.
Yield strata	A system of stratification applied to the forested landscape based upon FMU, and defining layer and/or understory layer attributes (broad cover group, crown closure class, leading conifer species). Yield strata form the basis for the development of yield curves; each yield stratum has one or more associated yield curves.

Appendix II – AVI Approval

Alberta Agriculture and Forestry

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Forest Management Branch
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Edmonton, Alberta T5K 2M4
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Telephone: 780-427-8474
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File: 06286-F01-04

August 4, 2016

Mr. Dave Cheyne, RPF
Management Forester
Alpac Forest Products Incorporated
P.O. Box 8000
Boyle, Alberta T0A 0M0

Dear Mr. Cheyne:

Subject: APPROVAL – ALBERTA VEGENTATION INVENTORY USE FOR AL-PAC 2017 FOREST MANAGEMENT PLAN

In follow-up to an email sent to you on July 14, 2016 from Beverly Wilson regarding the Aberta Vegetation Inventory (AVI) used in the classified landbase (CLB) submission.

The department accepts and approves the use of the June 2016 re-submission of the AVI data as part of the net landbase process. I want to thank you for your efforts in working with the department on the AVI discrepancy over the last few months. To assit in the development of future plans and to ensure that Al-Pac and the department are consistent with regards to the use of AVI, the department would like to meet with yourself to discuss the following:

- Softcopy AVI (SAVI) updates – submission schedule and quality control procedures;
- Development of Al-Pac new inventory (AVI-II) – timelines, update processes, and the departments expectation and requiremetns related to AVI-II final products.

To set-up a meeting date or if you have any questions, or require further information, please contact Janis Braze, Section Head, Forest Resource Management at 780-644-8234.

Yours truly,

Robert J. Popowich, RPF
Director, Forest Resource Management

cc: Wes Nimco, Forest Area Manager, Lac La Biche Forest Area
Daryl Price, Director, Forest Resource Analysis Section
Janis Braze, Section Head, Forest Resource Management Planning Section
Beverly Wilson, Senior Resource Analyst, Forest Resource Analysis Section

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Appendix III – Species Coding Detail

Species Order

(AW_ORD, BW_ORD, PB_ORD, FB_ORD, FD_ORD, LT_ORD, PL_ORD, SB_ORD, SW_ORD and UAW_ORD, UBW_ORD, UPB_ORD, UFB_ORD, UFD_ORD, ULT_ORD, UPL_ORD, USB_ORD, USW_ORD)

The order of species in the species composition code is important for stratification. An example of how species percents are used to calculate species order for aspen is in Table 6.1. This rule is applied for all species groups in both the overstory (fields *_ORD) and understory (fields U*_ORD).

Table 6.1. Example of species order assignment for under and overstory.

AW_ORD	Description	Selection Criteria
1	Species 1	SP1 = 'AW'
2	Species 2	SP2 = 'AW'
3	Species 3	SP3 = 'AW'
4	Species 4	SP4= 'AW'
5	Species 5	SP5 = 'AW'
9	No 'AW' present	

Species Percent

(AW_PCT, BW_PCT, PB_PCT, FB_PCT, FD_PCT, LT_PCT, PL_PCT, SB_PCT, SW_PCT and UAW_PCT, UBW_PCT, UPB_PCT, UFB_PCT, UFD_PCT, ULT_PCT, UPL_PCT, USB_PCT, USW_PCT)

AVI species percents were assigned to the appropriate species percent fields. AVI species percents are in 10% classes. An example of how species percents were calculated for aspen is in Table 6.2. This rule is applied for all species group codes and also for all species groups in both the overstory (fields *_PCT) and understory (fields U*_PCT).

Table 6.2. Example of species percent assignment.

AW_PCT	Description	Selection Criteria
SP1_PER	Species 1 percent class	*SP1* = 'AW'
SP2_PER	Species 2 percent class	*SP2* = 'AW'
SP3_PER	Species 3 percent class	*SP3* = 'AW'
SP4_PER	Species 4 percent class	*SP4* = 'AW'
SP5_PER	Species 5 percent class	*SP5* = 'AW'
'0'	No 'AW' present	

Species Type Percent

(HARDPCT, SOFTPCT, UHARDPCT, USOFTPCT)

The sum of species percents for deciduous and coniferous species were calculated using the following equations. Note that species type percent is calculated for each layer.

HARDPCT = AW_PCT + BW_PCT + PB_PCT

SOFTPCT = FB_PCT + FD_PCT + LT_PCT + PL_PCT + SB_PCT + SW_PCT

UHARDPCT = UAW_PCT + UBW_PCT + UPB_PCT

USOFTPCT = UFB_PCT + UFD_PCT + ULT_PCT + UPL_PCT + USB_PCT + USW_PCT

Leading Species

(LEAD_DEC, LEAD_CON, ULEAD_DEC, ULEAD_CON)

The leading deciduous species *(i.e.* the first listed deciduous species in the AVI species composition) was determined using species order (Table 6.3). The leading coniferous species was also determined (Table 6.4).

Table 6.3. Assignment of deciduous leading species.

LEAD_DEC	Description	Selection Criteria
'AW'	Aspen leading deciduous	*AW_ORD < BW_ORD and AW_ORD < PB_ORD*
'BW'	Birch leading deciduous	*BW_ORD < AW_ORD and BW_ORD < PB_ORD*
'PB'	Poplar leading deciduous	*PB_ORD < AW_ORD and PB_ORD < BW_ORD*
'NO'	No deciduous present	*HARDPCT = 0*

Table 6.4. Assignment of coniferous leading species.

LEAD_CON	Description	Selection Criteria
'FB'	True fir leading conifer	*FB_ORD < FD_ORD and FB_ORD < LT_ORD and FB_ORD < PL_ORD and FB_ORD < SB_ORD and FB_ORD < SW_ORD*
'FD'	Douglas fir leading conifer	*FD_ORD < FB_ORD and FD_ORD < LT_ORD and FD_ORD < PL_ORD and FD_ORD < SB_ORD and FD_ORD < SW_ORD*
'LT'	Larch leading conifer	*LT_ORD < FD_ORD and LT_ORD < FB_ORD and LT_ORD < PL_ORD and LT_ORD < SB_ORD and LT_ORD < SW_ORD*
'PL'	Pine leading conifer	*PL_ORD < FD_ORD and PL_ORD < LT_ORD and PL_ORD < FB_ORD and PL_ORD < SB_ORD and PL_ORD < SW_ORD*
'SB'	Black spruce leading conifer	*SB_ORD < FD_ORD and SB_ORD < LT_ORD and SB_ORD < PL_ORD and SB_ORD < FB_ORD and SB_ORD < SW_ORD*
'SW'	White spruce leading conifer	*SW_ORD < FD_ORD and SW_ORD < LT_ORD and SW_ORD < PL_ORD and SW_ORD < SB_ORD and SW_ORD < FB_ORD*
'NO'	No coniferous present	*SOFTPCT = 0*

Note that the leading *understory* deciduous (ULEAD_DEC) and *understory* coniferous (ULEAD_CON) species were also calculated using the appropriate values from the species based U*_ORD variables.

Broad Cover Group

(C_CODE, UC_CODE)

The BCG was assigned using the rules outlined in Table 6.5. Note that the BCG was calculated for the overstory (C_CODE) and the understory (UC_CODE) using the appropriate SOFTPCT/HARDPCT/SP1 or USOFTPCT/UHARDPCT/USP1 fields as necessary.

Table 6.5. BCG assignment.

C_CODE	Label	Description	Selection Criteria
D	Pure Deciduous	Deciduous >= 80%	*HARDPCT >= 8*
DC	Deciduous-Coniferous	Coniferous > 20% and Deciduous > 20%	*(HARDPCT > 2 and SOFTPCT > 2) or (HARDPCT = 5 and SP1 is ('AW','PB','BW'))*
CD	Conifer-Deciduous	Coniferous > 20% and Deciduous > 20%	*(HARDPCT > 2 and SOFTPCT > 2) or (SOFTPCT = 5 and SP1 is not ('AW','PB','BW'))*
C	Pure Coniferous	Coniferous >= 80%	*SOFTPCT >= 8*
NULL	No cover group	Not a forested type	*SOFTPCT = 0 and HARDPCT = 0*

Strata Decision Rules

(DRULE, CRULE, UDRULE, UCRULE)

Extended strata are defined in the Alberta Forest Management Planning Standard (Alberta Sustainable Resource Development 2006). To assign extended strata, the leading deciduous species and leading coniferous species were required. The leading deciduous species was the species with the lowest order. Note that the leading deciduous rule is calculated for both overstory (DRULE) and understory (UDRULE) layers of each stand. The rules for DRULE and UDRULE assignment are presented in Table 6.6.

Table 6.6. Assignment of leading deciduous strata decision rule.

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

Assignment of leading coniferous species was more complex, and based on relative percent composition by species. Note that the leading coniferous rule was calculated for both overstory (CRULE) and understory (UCRULE) layers of each stand. The rules for CRULE and UCRULE assignment are presented in Table 6.7.

Table 6.7. Assignment of leading coniferous strata decision rule.

CRULE	Description	Selection Criteria
'FB_LEAD'	True fir leading coniferous 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 coniferous 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*))

CRULE	Description	Selection Criteria
'FBFD_LEAD_MW'	True fir or Douglas fir leading coniferous 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*) >= *SW_PCT*))
'LT_LEAD'	Larch leading coniferous 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 coniferous 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*))
'PL_LEAD_MW'	Pine leading coniferous 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*))
'SB_LEAD'	Black spruce leading coniferous 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*))
'SBLT_LEAD_MW'	Black spruce or larch leading coniferous 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_PCT*))
'SW_LEAD'	White spruce leading coniferous 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*))

CRULE	Description	Selection Criteria
'SW_LEAD_MW'	White spruce leading coniferous 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*)))
'NO_C'	No coniferous present	*SOFTPCT* = 0

Extended Strata

(B10_STRATA_SRD, B10_USTRATA_SRD)

Based on the leading species, BCG and species composition, polygons were then assigned to an extended strata (see Table 6.8). Note that the extended SRD strata were calculated for both the overstory (B10_STRATA_SRD) and understory (B10_USTRATA_SRD) strata using the appropriate input variables representing the proper layer.

Table 6.8. Assignment of extended strata.

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'

STRATA_SRD	Description	Selection Criteria
'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

STRATA_SRD	Description	Selection Criteria
'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

Appendix IV – Data Dictionary

PLEASE SEE ATTACHED DRIVE

Appendix V – Processing Scripts

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