Weyerhaeuser

Pembina 2017-2026

Forest Management Plan

Chapter 1: Corporate Overview and Forest Management Approach

March 19, 2018

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1 Corporate Overview

1.1 Introduction

The Province of Alberta and Weyerhaeuser Company Limited signed Forest Management Agreement (FMA) # 0900046 (Annex I) on December 16th, 2009, with a commencement date of December 1st, 2009. The FMA gives Weyerhaeuser *"the right to establish, grow, harvest and remove timber thereon on a perpetual sustained yield basis"*.[1] Previous to this agreement, Weyerhaeuser operated two distinct FMAs, divided by the Pembina River: FMA #8500023 in Drayton Valley, and FMA#9700035 in Edson.

As part of the agreement, Weyerhaeuser is required to prepare a Forest Management Plan (FMP) that covers the Defined Forest Area (DFA) that is consistent with Forest Management Units (FMUs) E15, E2, W5, W6 and R12 to be submitted on or before April 1st, 2016. This requirement was extended to April 1, 2017 in the spring of 2016, with a second extension to December 1, 2017 occurring in the spring of 2017.

The Weyerhaeuser Edson facility commenced operations in October of 1983. Originally owned by Pelican Spruce Mill Ltd., the complex, which manufactures oriented strand board (OSB), was purchased by Weyerhaeuser in the fall of 1988. Annual production at the mill averages 415 million square feet (3/8 inch basis) of OSB. Wood volume deliveries are approximately 600,000 m^3 per annum. Approximately eighty percent of the delivered volume is trembling aspen, with the remainder being balsam poplar (16%), white birch (1%) and small-diameter lodgepole pine (3%).

In Drayton Valley, Pelican Spruce Mills Ltd. was awarded the original FMA Area in 1985 in exchange for a commitment to build and operate an OSB plant in Drayton Valley. The FMA Area was loosely based on the former O'Chiese Block of the Brazeau Timber Development Area. Wood requirements were met from the FMA Area, the purchase wood program and from Deciduous Timber Allocations outside the FMA Area. In 2007, due to declining export markets, Weyerhaeuser decided to permanently close the OSB facility.

In 1987, Pelican Spruce Mills purchased Coniferous Timber Quotas and built a dimensional lumber sawmill-planer complex with a capacity of approximately 157 million board feet of dimensional lumber. Much of the deciduous timber was in mixed stands with conifer timber, and the conifer timber supply in the region was still under-utilized. Conifer wood supply for the sawmill is currently being procured from the FMA, Coniferous Timber Quotas and private land sources.

The forest industry in the area is made up of many large wood producing facilities that rely on the flow of timber from the DFA. These facilities include pulp mills, sawmills, a medium-density fibreboard (MDF) plant, and post and pole operations. Table 1-1 lists the major facilities that utilize timber from the DFA. There are also many smaller facilities in relative proximity to the DFA. Many of these facilities access timber from the DFA through the Community Timber Permit Program, as well as from private land and industrial salvage. Some of these smaller operators have been in operation for several generations.

[1] Forest Management Agreement Order-In Council 257/97

Table 1-1. Major wood processing facilities accessing wood from the Weyerhaeuser DFA (m^3).

Wood Processing Company	Type of Facility	Mill Production				Estimated Average Annual Volume of Wood Produced from FMA		Mill Start-Up Date
		Metric Tonnes Pulp	MM FBM Lumber	MM SF 3/8" OSB	MM SF 3/4" MDF	Coniferous	Deciduous	
Alberta Newsprint Company	Pulp Mill	270,000				80,000		1990
Blue Ridge Lumber (1981) Inc.	Sawmill		420			35,000		1975
Ranger Board	MDF Plant				130			1986
Millar Western Forest Products Ltd.	Sawmill		330			12,000		2001
Millar Western Forest Products Ltd.	Pulp Mill	320,000						1988
Edson Forest Products (formerly Sundance Forest Industries)	Sawmill		200			43,500		1988
Tall Pine Timber Company Ltd.	Sawmill		7.5			30,000		1958
Weyerhaeuser Company Ltd	OSB Plant			370			350,000	1984
	Sawmill		220			900,000		1987

At the time of the last FMP approvals, the 2007 Mountain Pine Beetle (MPB) amendments, the forestry sector was in the worst recession on record beginning in 2006. Poor markets led to the permanent closure of the Drayton Valley OSB facility and resulted in reduced investment in Weyerhaeuser's other facilities in Alberta over this period. Consequently, the accelerated coniferous harvest levels from the 2007 MPB amendments remained under-utilized for a number of years. Following the recession Weyerhaeuser resumed investment in the Drayton Valley sawmill, investing tens of millions of dollars since 2008 resulting in increasing sawmill consumption as shown Table 1-2. Weyerhaeuser is now well positioned to make full use of the the volumes associated with the continued implementation of the Healthy Pine Strategy.

Table 1-2 Drayton Valley Sawmill annual demand

Year	Demand (m^3)
2008	700,000
2010	731,000
2012	770,000
2014	830,000
2016	920,000
2018	988,000

1.2 Company Philosophy

Weyerhaeuser prides itself in being a progressive company, responding to the needs and desires of a very large constituency. This constituency is comprised of its parent company, Weyerhaeuser Company Limited, based in Seattle, Washington, and its international shareholders, employees, suppliers and customers, as well as local Edson and Drayton Valley area residents.

Natural resources can also be defined as being constituents of Weyerhaeuser. Currently, all land where timber is harvested by Weyerhaeuser in the Province of Alberta is public land, held in trust for the betterment of the people of Alberta. These natural resources include air, soil, water, flora and fauna.

Weyerhaeuser's current vision statement is:

"Working together to be the world's premier timber, land and forest products company".

Associated with this vision is the Core Value, which reads:

"Our company vision is supported by four core values: safety, integrity, citizenship, and sustainability. Our values are not just words on a page — our people really do live them every day. As a company with more than 100 years under our belt, we've been at this a long time. Sustainability, quite simply, is the way we do business. But we understand it's not enough to say we are sustainable; we must be able to prove it to our stakeholders by setting the right goals and transparently reporting on our progress toward meeting them."

Mindful of these statements, Weyerhaeuser's Environmental Policy is:

"To be responsible stewards of the environment wherever we do business. We are committed to managing natural resources responsibly to create products that meet society's needs. We practice sustainable forestry, reduce pollution, conserve natural resources and energy, and continually improve our environmental performance."

Weyerhaeuser has a corporate sustainable forestry policy, which reads:

"It is a Weyerhaeuser policy to manage its forests for the sustainable production of wood and wood products that meet our customers' needs without compromising the ability of future generations to meet their needs. We are committed to independent certification of our forest practices and to meeting the principles and objectives of globally accepted forest certification standards. This policy applies to company-owned and managed lands worldwide"

Expectations are to:

- *Maintain healthy and productive forests and minimize losses caused by fire, insects, and disease.*
- *Reforest promptly after harvest by planting within the first available planting season, not to exceed twenty-four months, or by planned natural regeneration methods within five years or as provided in an applicable license.*
- *Harvest at sustainable rates over the long term.*
- *Minimize waste in our harvesting practices.*
- *Encourage the use of non-timber products and ecosystem services from the forest.*
- *Use forest practices and technology to retain organic matter and soil nutrients.*
- *Protect soil stability and long-term soil productivity by using equipment and practices appropriate to the soil, topography, and weather to minimize erosion and harmful soil disturbance.*

- *Protect water quality and water resources by practicing sound road construction and maintenance.*
- *Use best management practices (BMPs) and meet or exceed applicable laws to protect water quality, waterbodies, wetlands, and riparian areas.*
- *Employ reliable processes in using forest chemicals to meet our silvicultural and environmental objectives in compliance with applicable laws, BMPs, label directions, and certification standards.*
- *Provide a diversity of habitats for wildlife and contribute to conservation of biological diversity through practices and programs that address habitat diversity and conservation of plants and animals at multiple scales, in accordance with certification and other locally accepted standards.*
- *Protect threatened and endangered species and cooperate with government agencies to determine how our forestlands can contribute to their conservation.*
- *Consider aesthetic values by identifying sensitive areas and adapting our practices accordingly.*
- *Where safe and appropriate, provide the public with opportunities to recreate on our lands.*
- *Identify sites of special ecological, geological, cultural, and historical importance and manage them in a manner appropriate for their unique features."*

1.2.1 Environmental Management System (EMS)

Weyerhaeuser has established and implemented an Environment Management System (EMS) since 2002. The EMS outlines standards and procedures for its employees and contractors to achieve the requirements of the company's Environmental Core Policy. Weyerhaeuser's Pembina Timberlands employees are accountable for the company's environmental performance and compliance with environmental legal requirements. Timberlands functions, activities and tasks are guided by clearly defined guidelines and operational controls.

1.2.2 Certification

In 2002 the company developed a Sustainable Forest Management Plan (SFMP) reflecting public values, objectives, indicators and targets to CSA standard Z809-96. In 2005, the SFMP was reviewed and updated to the newer CSA standard Z809-02.

In 2009, the company became certified to the Sustainable Forestry Initiative (SFI) and ceased to support its CSA certification. SFI is an independent, non-profit, charitable organization with a science based, internationally recognized forest management and fiber sourcing developed specifically for North American Forests, and promoting the following key principles:

1. Practice sustainable Forestry
2. Forest productivity and Health
3. Protection of water resources
4. Protection of biological diversity
5. Aesthetics and recreation
6. Protection of special sites and species of concern
7. Responsible fiber sourcing practices in North America
8. Avoidance of controversial source including illegal logging in off-shore fiber sourcing
9. Legal compliance
10. Research
11. Training and education

12. Public involvement
13. Transparency
14. Continual improvement

1.3 Forest Management Approach

1.3.1 Scope of Planning

The scope of planning for the management of forest resources on the Pembina DFA is:

> **To plan for forest harvesting and renewal activities and their integration with other forest values until the next FMP.**

In concert with this scope is Weyerhaeuser's intent to plan for and practice sustainable forest management that strikes a balance between ecological, societal, and economic values. Identifying the desired balance of values and adopting an appropriate management strategy to deliver these values is the purpose of the management planning process.

1.3.2 Resource Analysis

The resource analysis component of developing the management plan has been an iterative process of applying alternative strategies in order to meet a set of objectives related to the values. Each successive iteration had adjustments made to either the objectives or the strategies, or both. Finally, a set of objectives, indicators, targets and strategies were selected that best met the intent of the values. Figure 1-1 demonstrates the relationship of the resource analysis process in the management planning process.

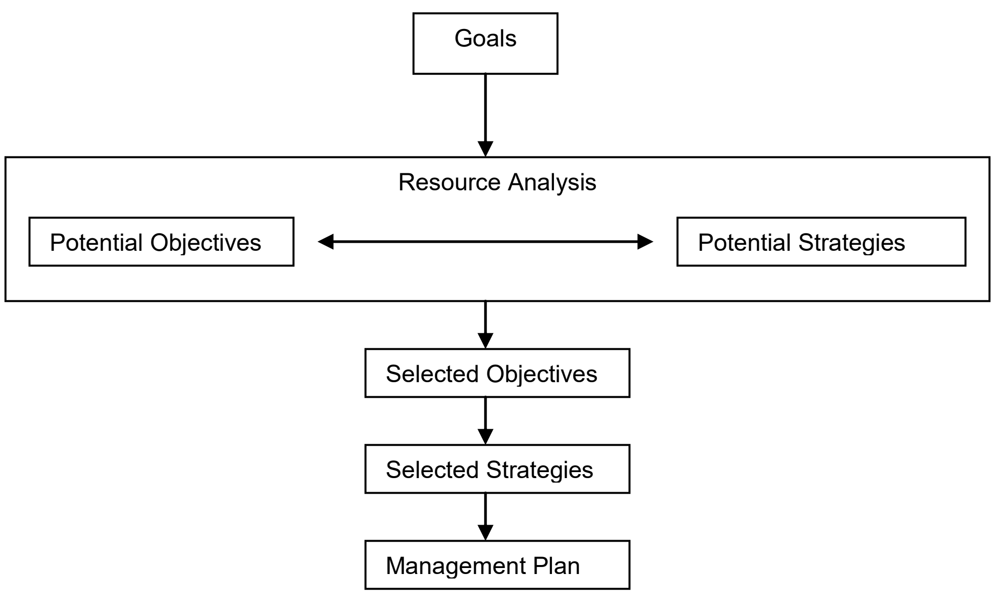


Figure 1-1. Management planning process.

1.3.3 Management Approach

1.3.3.1 Adaptive Management

Weyerhaeuser practices the principle of adaptive management (Figure 1-2). Adaptive management can be described as a learning approach to management that incorporates the experience gained from the results of previous actions and decisions. Our application of adaptive management has the following elements:

- objective driven - the management plan is a series of activities that result in meeting a set of desired forest conditions and benefits;
- strategic and operational links - the strategic plan provides relevant direction for operational plans;
- monitoring - key result variables are monitored to assess the accuracy of forecasts; and
- analysis and adjustment - plans are renewed based on the knowledge gained through analyzing the variance between forecast and actual responses.

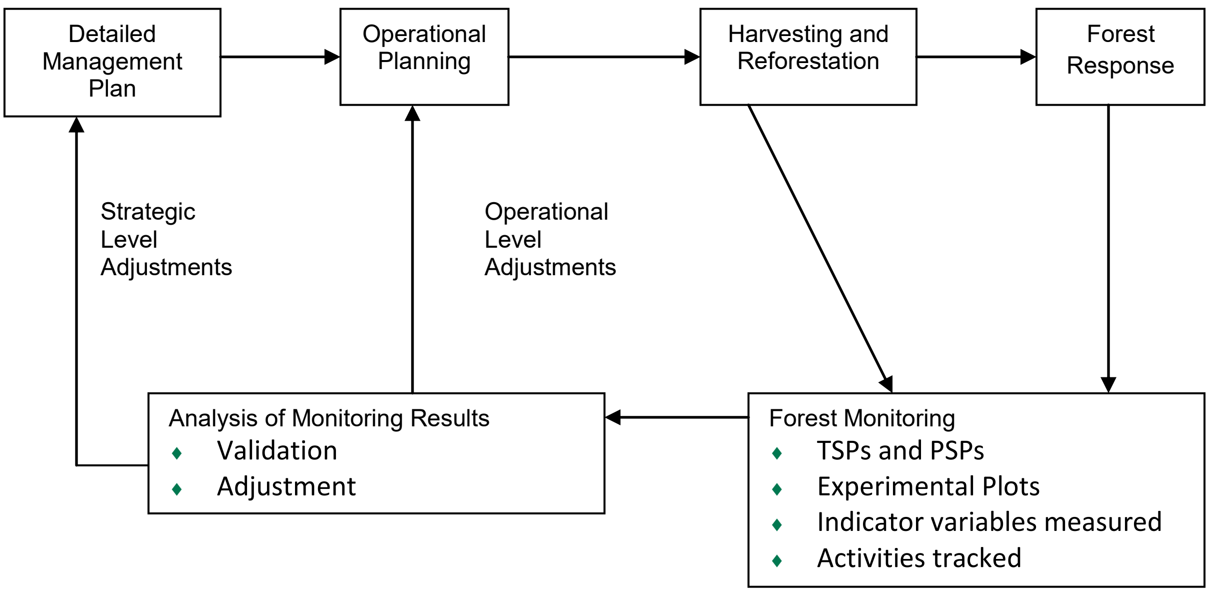
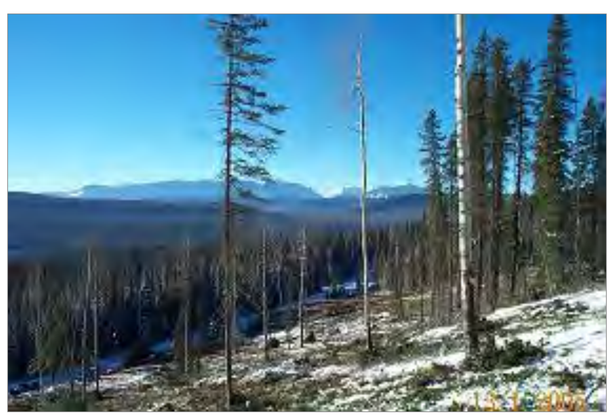


Figure 1-2. Adaptive forest management.

1.3.3.2 Ecologically Based Forest Management



Ecologically Based Forest Management: This plan is committed to addressing the conservation of biological diversity and the long term ecological sustainability of managed forest ecosystems. In order to achieve this goal, the plan will integrate ecologically-based forest science with changing economic and social expectations of the forest. The ecological science component of forest management plans will be addressed by the following three principles.

1. Maintain landscape diversity and stand structure within the range of natural variability.
2. Conserve habitat for threatened and endangered plant and wildlife species.
3. Allow for integration of societal needs and expectations.

Ecologically based forest management implies recognition of the complexity of forest ecosystems, and of the importance of preserving the functioning of natural ecological processes for the long term. It entails maintaining, through sound forest management practices, the inherent natural structural and vegetational diversity of forest landscapes, and the complex set of ecological relationships that determine the abundance and distribution of plant and animal communities. Ultimately, ecologically based forest management means utilizing a coarse-filter approach at the landscape and stand-level combined with a fine-filter (species-specific) approach to achieve a balanced perspective for analysis.

Coarse Filter Approach

In managing for future forest landscapes, the plan will first identify broad DFA resource objectives. Timber harvesting and silvicultural practices will then be implemented at the stand level, depending on site-specific topography, soil and micro-environmental conditions.

The Ecological Land Classification of Alberta provides a stratification of forest landscapes based on climate, topography, soil and parent material. At a regional level, Natural Subregions are characterized by distinct regional climates. Within each Subregion, Ecodistricts refer to areas with similar relief, geomorphology and genesis of parent material. Ecodistricts provide ecologically based Compartments, where specific landscape objectives could, if necessary, be identified and spatial harvest sequencing could be impacted.

With a decrease in size of disturbance and in the range of variability, such as occurs in traditional harvesting operations with many small cutblocks of similar size and shape, there is an increase in the amount of edge and decline in interior forest habitat. In contrast, stand replacing disturbances can affect very small to very large areas and create complex heterogeneous vegetational mosaics. In addition, gap-type disturbance and successional processes create multi-ages and mixed-species forest stands. For this reason, the plan will use a range of cutblock sizes and shapes, and adopt silvicultural practices that are more consistent with the ecological processes. This plan will strive to maintain large extent of forest stands in later seral stages to address the need of interior habitat species. Similarly, attempts will be also made to maintain forest connections at the stand level (single trees, patches, etc.) and at the landscape level to facilitate the dispersal of organisms and the maintenance of well-distributed populations.

Forest harvesting and natural stand-replacing or gap-type disturbances differ in the amount of biomass left on site. Differently from forest harvesting, even the most intense fires leave most of the above ground biomass in the form of snags, individual green-trees, or clumps of live trees skipped over by the fire. This structure provides micro-habitat opportunities to a range of species that will differ depending on site-specific conditions and on the age of the regenerating forest. In order to approximate snag densities present immediately following a stand replacing disturbance, the plan will endeavour to maintain, within safety and operational constraints and silvicultural considerations, snags on the harvest site. Live trees (*see* green tree retention) will be retained where needed so to contribute to future snag abundance, and eventually coarse down woody material.

The retention of trees in large clumps or patches within cutblocks is an attempt to emulate stand-replacing events and provide small refugia for biota that might be otherwise impacted by harvesting. In addition, clumps and patches within a cutblock may contribute to maintain connectivity between habitat patches as they can facilitate the dispersal of various plants and wildlife species. Clumps and patches in a cutblock may include riparian habitats, inoperable sites, mesic ecosites, as well as merchantable trees, and can contribute to the older age class distributions.

The retention of green trees and snags at the harvest site will have a bearing on the success of maintaining coarse down woody debris. However, it will be still necessary to leave woody debris at the harvest site. Consequently, attempts will be made to retain all unmerchantable downed logs not directly related to the roads and landings associated with the processing of timber. In addition, the retention of some harvest generated woody debris piles, subject to forest protection regulations, will occur to provide habitat opportunities for small mammals and furbearers.

Fine Filter Approach

The ecological approach to forest management (coarse filter) may not be sufficient to address habitat requirement of species that are either rare, endangered or threatened, or are of special societal value. For this reason, the plan has attempted to identify these species on the DFA, and address their habitat requirements (fine filter). More specifically, the plan has:

- Identified and inventoried provincially and nationally rare, endangered and threatened plants and wildlife species that occur or are thought to occur on the DFA;
- Assessed the habitat requirements of selected species and integrate them into timber harvest planning; and
- Attempted to maintained habitat conditions required by species of special management concern.

1.4 Forest Management Goals

Ecological, societal and economic values can be represented in the management planning process by a series of goals, as described below.

Goal 1: Ensure that Weyerhaeuser's Edson and Drayton Valley facilities remain globally competitive with respect to fiber supply from the DFA area while recognizing that other facilities share similar desires.

The intent of Goal #1 is to:

- Recognize the values of jobs, economic distribution, and supply of wood,
- Provide an acceptable return to Weyerhaeuser's shareholders,
- Provide an economic return to Alberta,
- Maintain Weyerhaeuser's economic viability in order to contribute to the local economy,
- Maintain access to and security of the timber resource,
- Provide for low cost, good value timber, and
- Recognize the rights and needs of other timber operators.

Goal 2: Maintain forest diversity at the stand and landscape level in terms of structure, composition and function.

The intent of Goal #2 is to:

- Recognize the values of: biological diversity, wildlife and habitat, older seral forests, protected areas, ecosystem integrity, trees, and vegetation,
- Conserve habitat for rare and endangered species,
- Maintain habitat for all plants and animals,
- Improve knowledge of ecological processes and the responses of fish and wildlife to forest management activities, and
- Maintain biodiversity and old seral forests across the landscape.

Goal 3: Maintain the productive capacity of the forest ecosystem.

The intent of Goal #3 is to:

- Recognize the value of soil productivity,
- Maintain soil productivity, and
- Maintain nutrient cycling processes.

Goal 4: Maintain the process and function of watersheds.

The intent of Goal #4 is to:

- Recognize the values of: water quality, fisheries, water quantity, healthy watersheds, and functional riparian areas,
- Maintain the structure and function of riparian areas, and
- Maintain within the natural range of water quantity and quality.

Goal 5: Improve public acceptability of forest management activities.

The intent of Goal #5 is to:

- Recognize the values of: education and public information
- Obtain input and advice from stakeholders, including the general public, on forest management activities,
- Communicate with the public to improve understanding about the forest and forest management activities,
- Demonstrate commitment to and progress towards improving skills in forest management and knowledge of ecosystem process,
- Recognize and align practices with social values, and
- Manage in a socially acceptable manner.

Goal 6: Improve Relationships with First Nation and Métis Communities

The intent of Goal #6 is to:

- Respect First Nation Treaty rights
- Recognize First Nation and Métis' cultural and historical values
- Effectively consult with each community
- Protect known sites identified through the consultation process,
- Work proactively towards improving knowledge of forest management activities with the sharing of GIS information with the individual consultation offices, and
- Undertaking information sharing sessions at the community level.

Goal 7: Integrate forest management activities with the needs of other resource users.

The intent of Goal #7 is to:

- Recognize the values of: multiple use, aesthetics, recreation, tourism, safe enjoyment of forest, camping and related activities, access,
- Cooperate on access issues related to forest management activities,
- Work cooperatively with other resource users,
- Minimize impacts on potential recreational and tourism opportunities, and
- Cooperate with all land neighbors.

Goal 8: Protect unique archeological and ecological sites.

The intent of Goal #8 is to:

- Recognize the value of protection of unique sites, and
- Protect or conserve significant ecological and archeological sites as they are identified.

Goal 9: Increase the sustainable harvest level of deciduous and coniferous timber.

The intent of Goal #9 is to:

- Recognize the value of an effective reforestation programs,
- Improve timber utilization,
- Improve forest yield,
- Decrease loss of timber from natural causes, and
- Maintain or increase the area of forested land that is dedicated to timber production.

1.5 References

ESRD 2006. Alberta Forest Management Planning Standard. Version 4.1, April 2006. Alberta Sustainable Resource Development, Public Lands and Forest Division, Forest Management Branch. 112 pages.

Weyerhaeuser 2005. Sustained Yield Unit R12 Detailed Forest Management Plan 2000-2015. December 2005. Weyerhaeuser Company Ltd. Drayton Valley, Alberta.

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Weyerhaeuser

Pembina 2017-2026

Forest Management Plan

Chapter 2: FMP Development

March 19, 2018

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2 FMP Development

2.1 Plan Development Process

The Terms of Reference (ToR, Annex 2) was developed to provide a framework that details the process for development of this Forest Management Plan (FMP or Plan) for the Weyerhaeuser Pembina Forest Management Agreement Area (FMA or the Area) and associated non-FMA areas within Forest Management Units (FMUs) E15, E2, W5, W6 and R12 (amalgamated as FMU R15 for the FMP) in accordance with the *Alberta Forest Management Planning Standard V4.1 – April 2006*[1]. The combined FMA/non-FMA areas are defined as the Defined Forest Area (DFA) for the purposes of this Plan. In addition to Alberta Agriculture and Forestry (AAF) requirements, Weyerhaeuser's own policy influenced the development of the FMP which include Weyerhaeuser's Environmental Core Policy, Sustainable Forestry Policy, and Weyerhaeuser's commitment to certification under the Sustainable Forestry Initiative. The ToR was intended to ensure a timely submission of the FMP. The ToR, approved on August 8, 2014, with revisions approved on November 9, 2015 and April 6, 2017, can be found in Annex II.

2.2 Plan Development Team

The Plan Development Team (PDT) was formed to resolve the technical details of the FMP. The Team was made up of individuals from Weyerhaeuser and AAF, with the core team shown below in Table 2-1.

Table 2-1. Plan Development Team members.

Team Member	Organization	Designation
Paul Scott	Weyerhaeuser - Pembina	Lead, Forest Management Coordinator
Kerri MacKay - Second	Weyerhaeuser - Pembina	Strategic Informatics Forester
Ian Kwantes	Weyerhaeuser - Pembina	Operational Planning Coordinator
Liana Luard	AAF - Edmonton	Lead, Forest Planning and Performance Monitoring
Stephen Mills	AAF - Edson Forest Area	Area Forester
Darcy Evanochko	AAF - Rocky Mountain House Forest Area	Area Forester
Trisha Stubbings	AAF - Rocky Mountain House Forest Area	Area Forester
Dave Hobson	AEP - Upper Athabasca Region	Regional Wildlife Biologist
Mike Blackburn	AEP - Upper Athabasca Region	Fisheries Biologist
Paulette Penton	AEP - Upper Athabasca Region	Fisheries Biologist

Table 2-2 below summarizes the meetings held by the PDT, along with the main topics discussed at the meeting. Each meeting also included reports of ongoing First Nations and Métis consultation, Public Involvement, and interaction with the other Timber Operators.

1

http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/formain15749/$FILE/ForestManagementPlanningStandard-2006.pdf

Table 2-2. Meetings held with the Plan Development Team since the start of the process.

Meeting Number	Date	Primary Topics of Discussion
2014 Meetings		
2014-01	April 3	Terms of Reference for PDT, Cull, ARIS validation
2014-02	July 15	Critical Items List, FMU amalgamation
2014-03	September 9	VOITs table
2014-04	September 30	VOITs table
2014-05	October 29	VOITs table, TSA and LB issue documents
2014-06	December 2	TSA, LB and G&Y issue documents
2015 Meetings		
2015-01	February 25	FMU amalgamation, ARIS validation, Issue documents
2015-02	March 19	FMU amalgamation, ARIS validation, Issue documents
2015-03	June 4	AVI, single landbase, FMU amalgamation
2015-04	August 9	VOITs, Fisheries map
2015-05	November 18	VOITs, Issue documents
2016 Meetings		
2016-01	January 14	VOITs, issue documents, Patchworks validation
2016-02	March 17	Silviculture Strategies Table (SST), Wildlife models, Net Land Base (NLB) determination, Yield Curves (YCs)
2016-03	May 20	Issue documents
2016-04	September 22	SST, Issue documents, ARIS reconciliation
2016-05	December 13	Issue documents, Non-timber assessments
2017 Meetings		
2017-01	January 17	FMP text, NLB, YC and ARIS response from AAF
2017-02	February 14	Athabasca Rainbow Trout, Bull Trout modelling
2017-03	April 11	AIP conditions to NLB and Ycs, non-timber assessments
2017-04	May 11	Non-timber assessments, AAC
2017-05	June 15	Non-timber assessments, AAC, Quota Holder review of SHSV1
2017-06	July 27	Non-timber assessments, AAC
2017-07	September 14	Non-timber assessments, AAC, Quota Holder review of SHSV2 and sign-off of final SHS

The PDT reached agreement-in-principle (AIP) on many issue documents. Tracking of the issue documents presented to the PDT is shown in Table 2-3 and can be found in the appendices of their associated Annexes VI, VII, VIII, and IX.

Table 2-3. List of Issue Documents agreed to during the development of the FMP.

Number	Name	Appendix Number	AIP Date
	Annex VI : Net Landbase		
LB-001	Conversion of the Patchworks SHS Validated Polygons (Scenario P10005) to the new AVI	VIII	NA
LB-002	Seismic Line width	IX	2-Dec-14
LB-005	RSA/AVI Update Process	X	14-Jan-16
LB-007	Hydrography Buffer Sources	XI	25-Feb-15
LB-008	Road Buffer Identification	XII	25-Feb-15
LB-009	Combine Watersheds	XIII	25-Feb-15
LB-010	Process to Reconcile New 2012 AVI to Current ARIS Records	XIV	04-Jun-15
LB-013	Seral Stage and Ecological Unit Definitions	XV	19-Mar-15
LB-014	Reconciliation of the Original DFA Boundary (FMUs E2, E15, R12, W5, W6) and the new R15 FMU Boundary	XVI	14-Jan-16
LB-015	Determination of Absolute or Proxy Status for Layers used in the Landbase Netdown Process	XVII	14-Jan-16
LB-017	Landbase Assignments for Protective Notations (PNTs)	XVIII	13-Dec-16
LB-021	NSR Performance Surveyed Blocks	XIX	13-Dec-16
	Annex VII : Yield Curve Development		
GY-001	Application of scale cull to YC's – Scale Cull	X	4-May-15
GY-002	Yield curve adjustment methodology	XI	4-May-15
GY-004	Estimated Stand Decline in Deciduous Stands	XII	20-May-16
GY-005	Application of the Results of the Regenerated Stand Productivity Study in FMP Yield Curve Development	XIII	23-Jan-15
GY-006	RSA linework – resolution of overlaps/slivers	XIV	25-Feb-15
GY-010	Managed Stand Yield Curve Development	XV	18-Nov-15
GY-010a	Natural Stand Yield Curve Development	XVI	20-May-16
GY-011	RSA Survey Information in Hw Stands	XVII	22-Sept-16
	Annex VIII: Growth and Yield Program		
GY-012	Post-RSA Growth and Yield Monitoring Plot Installations	VI	26-July-17
	Annex IX : Timber Supply Analysis		
TSA-001	FMU Amalgamation - Quota allocations	I	11-May-17
TSA-002	Weyerhaeuser Non-FMA AACs	II	14-Sept-17
TSA-004	Combined Landbases (Edson FMUs)	III	NA
TSA-005	Addressing Seismic Lines in the TSA Process	IV	18-Nov-15
TSA-006	MPB – Prioritizing Pine Stands	V	11-May-17
TSA-009	Songbird Habitat Modelling: Time Zero Results and TSA Integration	VI	NA[1]
TSA-010	Barred Owl Habitat: TSA Predictive Modelling	VII	NA[1]
TSA-011	Grizzly Bear Habitat: TSA Predictive Modelling	VIII	NA[1]

TSA-012	Songbird Habitat Modelling: Incorporating Hard Linear (HLIN) Features into the Modelling Landbase	IX	11-May-17
TSA-013	Marten Habitat Modelling: Time Zero Results and TSA Integration	X	NA[1]
TSA-014	Watershed Assessment (ECA): Integrating ECA into the Spatial TSA Modelling	XI	15-Jun-17

[1]All documents with AIP Dates of "NA" did not require AIP as part of the planning process

Interim submissions to AAF were tracked in the PDT Document and Approval Tracking Sheet that can be found in Appendix 2-1. Action items identified during PDT meetings were recorded utilizing the PDT tracking sheet (see Appendix 2-2).

2.3 Milestones

The process for the Plan development was complex and required a detailed, coordinated schedule to ensure that timelines were met. Table 2-4 provides a summary of the milestones and associated submission, agreement-in-principle (AIP) or approval dates for the major components of the FMP. As stated previously, the Terms of Reference outlines a progressive review of all plan components through to final submission and approval of the entire plan.

Table 2-4. Sequence of events during the development for the FMP.

Forest Management Plan Milestone	Approval/AIP Date	Approval Authority up to date of sumbmission
Terms of Reference - revised	April 6, 2017	Senior Manager, Forest Resource Management
Issues and Plan Direction	September 23, 2014	Executive Director, Forest Management Branch
Public Involvement Plan - revised	January 23, 2017	Forest Area Manager, Edson Forest Area
First Nations Consultation Plan - revised	March 24, 2016	Forest Area Manager, Edson Forest Area
New AVI 2.1	March 7, 2016	Executive Director, Forest Management Branch
Landbase Determination - AIP	March 28, 2017	Senior Manager, Forest Resource Management
Yield Curve Development - AIP	March 28, 2017	Senior Manager, Forest Resource Management
Growth and Yield Monitoring Program	Submitted November 28, 2017	Senior Manager, Forest Resource Management
Timber Supply Forecasting	Submitted November 28, 2017	Senior Manager, Forest Resource Management
Spatial harvest sequence	October 31, 2017	Sign-off from PDT and Timber Operators
Forest Conditions Assessments - AIP	September 14, 2017	PDT
Performance Monitoring – VOITs	September 14, 2017	PDT
Final Plan Submission	Submitted November 28, 2017	Executive Director, Forest Management Branch

2.4 Forest Management Issues

The Forest Management Planning process can generate issues that have the potential to impede progress without clear direction. Knowing this, Weyerhaeuser and AAF generated a list of important issues that might derail the timely submission and approval of this plan. These issues, with the associated AAF management direction, approved on September 23, 2014, are as follows:

1. ***Mountain Pine Beetle Prevention (Pine) Strategy:*** Maintain current Prevention (Pine) Strategy while considering non-timber values – The conifer AAC approved in the 2007 MPB addendums is being continued for the full 20-years forecasted in the previous plans. Other non-timber values

assessed during development of the Timber Supply included Grizzly Bear, Barred Owl, Songbirds, east-slopes cold water fish species (Grayling, Athabasca Rainbow Trout, and Bull Trout) and water flow.

2. ***Coniferous Post Surge AAC levels:*** Develop feasible options for the mid-term supply and long-term sustainability – The post-surge conifer AAC will be 90% of the pre-surge AAC. Age-class limitations between years 60 and 90 limit available options. For more information see sections 6.1 and 6.6.4 in Chapter 6.
3. ***Unused volume:*** If unused volume is anticipated in the current quadrant it must be modeled, represent the profile and be spatially available. Unused volume requests are separate from the FMP process and must be approved by the Executive Director, Forest Management Branch – conifer surge AAC above the baseline AAC will be made up of two components: estimated under-production to May 1, 2017 (or over-production if the case) by operator, with the remainder of the surge AAC being distributed equally among the operators based on their percent allocations, except for fixed-volume allocations.
4. ***Healthy Deciduous Strategy:*** Propose options and opportunities to increase utilization of the deciduous resource, while considering non-timber values – limits to deciduous utilizations will continue for the foreseeable future. Interest for the species for other purposes (i.e. biofuel, bioenergy) have been investigated, but are limited due to the lack of government incentives.
5. ***Single Landbase:*** Work with the PDT and Quota Holders to ensure everyone is fully informed and in agreement regarding moving to a single landbase. All Quota Holders must sign off on a single landbase, prior to moving forward with the Timber Supply Analysis – Issue document TSA-004 Combined Landbase for the Edson FMU's (Appendix III, Annex IX) – AAF provided direction on this issue. It is their position that this is a decision Weyerhaeuser will have to make with input from the affected Quota Holders. Weyerhaeuser's decision, therefore, is to combine the currently divided landbases into single landbases using scenario #2 (issue document TSA-004) to establish the baseline AAC's for each of the old Edson FMA FMU's (E15, E2, W5 and W6 (R12 is currently a single landbase)), utilizing the new AVI, new yield curves and new net land bases. Alternative scenarios will be discussed as part of the timber supply analysis process leading to the Preferred Forest Management Scenario (PFMS).
6. ***Forest Management Unit Amalgamation:*** Work with the PDT and Quota Holders to ensure everyone is fully informed and in agreement regarding moving to a single FMU. Quota Holder sign off is required prior to submitting a request to the department. Approval by the Executive Director, Forest Management Branch is required prior to moving to a single FMU – Approved July 22, 2015 by Robert Popowich, Senior Manager, Forest Resource Management Section, AAF.

2.5 Public Consultation

2.5.1 Public Consultation Plan

The Public Involvement Plan (PIP) provided a framework to solicit stakeholder and general public input into the development of this FMP for the Weyerhaeuser DFA. All input was shared with the PDT. The PIP has shown that Weyerhaeuser has engaged stakeholders appropriately in its development of this FMP, tracked all responses accordingly, and has attempted to address all issues in the Plan itself.

There are a number of stakeholder groups that may be impacted by forest management plan implications on the DFA. These stakeholder groups were separated into four categories: Primary, Secondary, the General Public, and timber operators. Additionally, there were other public input processes (i.e. Land Use Framework) occurring concurrently with this process that might impact some of this Plan's indicators and targets moving forward. Each of these groups was approached differently to offer opportunities for input into the Plan. Weyerhaeuser made the commitment to meet with any other stakeholder group or individual not identified initially if they expressed a desire to meet.

The PIP was approved on October 27, 2014, with amendments approved on January 23, 2017. The approved PIP's and the approval letters can be found in Annex III Public Involvement.

2.5.2 Consultation Outcomes

2.5.2.1 Primary Stakeholders: Stakeholder Advisory Group

In the spring of 2016, Weyerhaeuser (the company) established a Stakeholder Advisory Group (SAG). The intent of the SAG for the company was to solicit advice and direction on forest management issues, with the focus being issues brought forward from the SAG. The group was comprised of a number of knowledgeable people who represented defined stakeholder interests. The interests represented by the group included: Off-highway vehicles (OHV) (Brazeau ATV club, representing ATV'ers and snowmobilers), grazing, petroleum resources (Alberta Energy Regulator, representing oil and gas operators), trapping, hunting, fishing, and municipal government.

The SAG had a total of 6 members, as well as representatives from Weyerhaeuser and AAF that acted as resources to the Group. Weyerhaeuser believed that the representatives from Alberta Energy Regulator properly represented the interest of the Oil and Gas Industry.

Weyerhaeuser decided to have only one representative for the ATV and Snowmobile clubs. Snowmobile clubs are normally set up to manage localized trail systems that are normally registered with GOA, which is uniquely different from ATV clubs, which deal with general use on the DFA, and travel exclusively on non-designated trail systems or linear disturbances at a much larger scale than snowmobiles do. As well, ATV users also tend to be snowmobile users, so potential issues were determined to be similar in nature, with the exception of season of use. As snowmobile clubs use designated trail systems, their input into forestry activities will normally occur at the operational stage as Forest Harvest Plans (FHPs) are developed.

A total of 7 meetings were held. The primary meeting introduced the company to the SAG, and familiarized the SAG with the intent of the process. One field trip was taken to show some on the ground examples of forest management activities. The final SAG report was reviewed at the seventh meeting (see Annex III).

Table 2-5 summarizes the meetings held with the SAG.

Table 2-5. Summary of Stakeholder Advisory Group meetings with associated topics.

Meeting Number	Meeting Date	Meeting Topics
1	July 2, 2016	Introductions; review of forest management, forestry legislation, forest tenure
2	August 24, 2016	Water in forestry
3	Sept. 14, 2016	Cumulative effects

Meeting Number	Meeting Date	Meeting Topics
4	Oct. 12, 2016	Field and Helicopter tour of operations
5	Nov. 16, 2016	Wildlife habitat and protection/conservation; Net Land Base review
6	Dec. 15, 2017	Review of presentations and recommendations
7	July 13, 2017	Review of draft report, draft SHS, discussion of VOITs table, and acknowledgements

A series of newsletters were developed and sent out to many stakeholders. This included grazing operators and trapline owners, First Nations, Municipalities, SAG members, both Weyerhaeuser manufacturing facilities and AAF.

2.5.2.2 Secondary Stakeholders

Secondary stakeholders are those that may be indirectly impacted by forest management activities. These include the municipal entities of:

- Edson
- Drayton Valley
- Rocky Mountain House
- Yellowhead County
- Clearwater County
- Brazeau County

Table 2-6 lists the meetings held with municipal governments. Appendix 2-5 includes the information presented at these meetings.

Table 2-6. Summary of Meetings held with Municipal Governments.

Meeting Date	Municipal Government
Nov. 24, 2016	Town of Drayton Valley
Dec. 13, 2016	Clearwater County
Dec. 20, 2016	Brazeau County
Jan. 10, 2017	Town of Edson
Feb. 21, 2017	Yellowhead County

*Clearwater County included a representative of Rocky Mountain House.

Skadi Wilderness Adventures was contacted directly about the first open house. No contact information regarding the Rose Creek Recreation Trail Association could be located.

There were no issues brought forward at these meetings that had not been previously addressed in the FMP.

2.5.2.3 General Public

The General Public would include any group or individual not currently listed as being either a primary or secondary stakeholder, First Nation or Métis member, or Timber Quota Holder, and may be indirectly impacted by the Plan.

A series of two open houses were held in Edson, Drayton Valley and Rocky Mountain House during Plan development (Table 2-7). Primary and secondary stakeholders were sent a trifold notification of the open houses. Copies of the open house advertisements and mailouts can be found in Annex III Public Involvement.

Table 2-7. Summary of Open Houses held.

Open House Date	Location	Attendees	Information shared	Interest
Nov. 22, 2016	Edson	3	Landscape assessment (LA), draft VOITs, Wildlife information, maps of selected LA themes	None recorded
Nov. 23, 2016	Rocky Mountain House	9	Landscape assessment (LA), draft VOITs, Wildlife information, maps of selected LA themes	3 requests for maps
Nov. 23, 2016	Drayton Valley	6	Landscape assessment (LA), draft VOITs, Wildlife information, maps of selected LA themes	Hog fuel from DV sawmill; R12 CTPP volumes, integration between WY and the CTP program, carryforward of unused volumes, mill residuals, mill tour
Oct. 24, 2017	Edson	8	VOITS Table, 20-year SHS maps, non-timber assessment maps and information, Landscape Assessment, EMS information	Impacts to Wildlife, SHS maps for W5 Beaver Meadows
Oct. 25, 2017	Rocky Mountain House	12	VOITS Table, 20-year SHS maps, non-timber assessment maps and information, Landscape Assessment, EMS information	Debris disposal, OHV access, operational maps
Oct. 26, 2017	Drayton Valley	11	VOITS Table, 20-year SHS maps, non-timber assessment maps and information, Landscape Assessment, EMS information	Operational maps, access to the FMP site hosted by Forcorp

No specific issues were identified in any of the open house sessions that would directly affect the development of the FMP. There were some questions that were operation in nature, but had no bearing on the FMP.

2.5.2.3.1 Social Media Engagement

The primary goal of the using social media platforms during the FMP development process was to reach members of the general public that may not rely on traditional print media for information. Differing demographics utilize different platforms to stay current and informed and over recent years these platforms have become an increasingly relevant way to acquire information. In an attempt to increase public engagement during this process, a Facebook page was created that is being administered by Kerri MacKay. The goal of the creating this page was to relay information pertaining to the development of the FMP by posting publications and notices of events regarding FMP development to solicit feedback.

To increase the size of the network having access to these posts research was conducted to identify other Facebook pages which engage users in localities in and around the Weyerhaeuser Pembina DFA. Three pages were identified and utilized to increase attention and encourage engagement. An informal query of open house attendees demonstrated that they had seen these posts. Social media was not used as a replacement to traditional print advertising, but more as a complimentary platform to reach those that do not receive or made use of traditional media.

Social media analytics provided the following data regarding outreach:

Total reach of all posts (combined from the Pembina Timberlands page and external sharing):

Drayton Valley Community Watch: ~1,500 views
Edson AB Community Watch: ~6,000 views
Rocky Mountain House AB Swap and Buy: ~19,000 views

Figure 2-1 and Figure 2-2 provide examples of the community engagement conducted through social media.

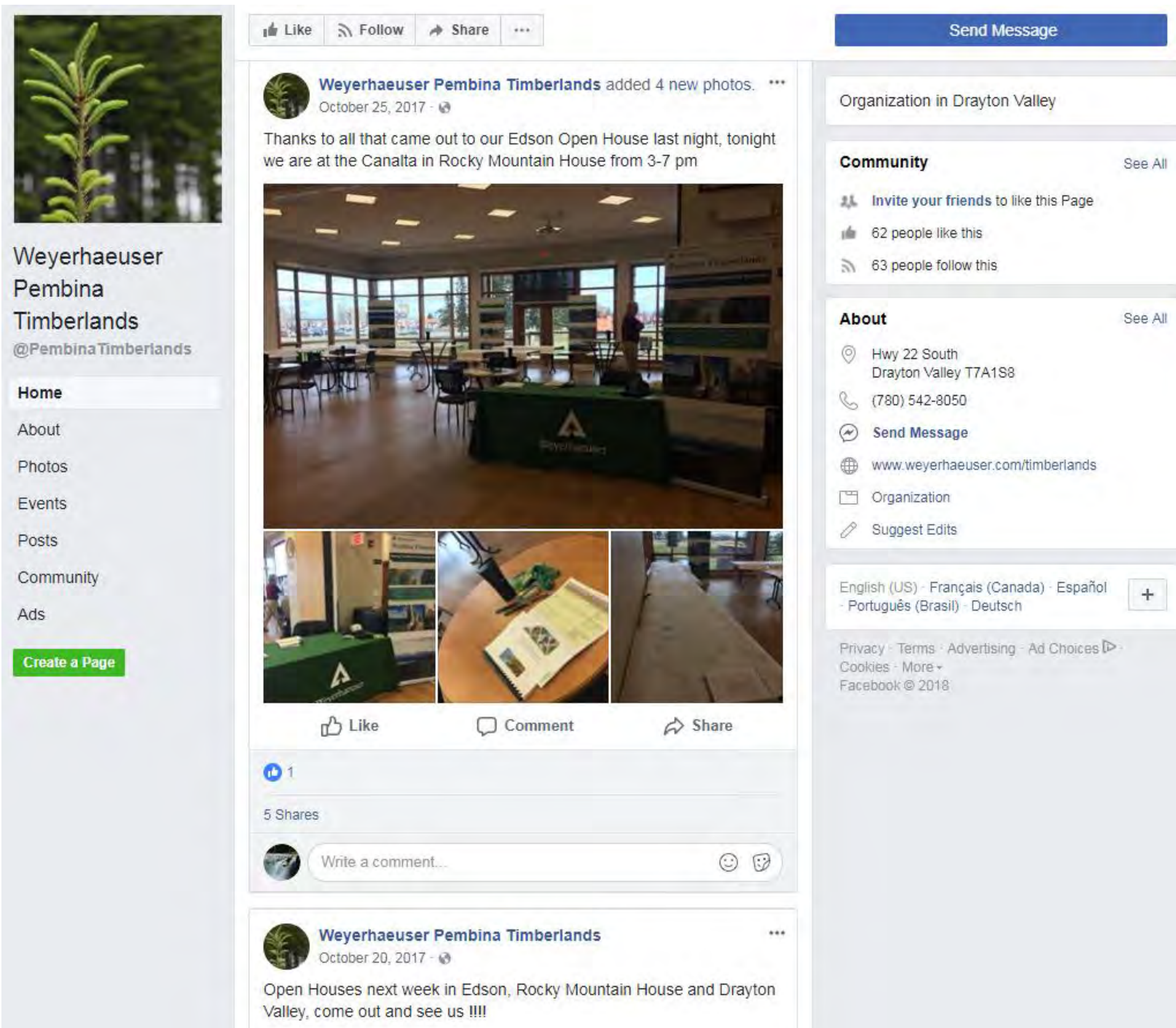

Figure 2-1. Screen shot of the Weyerhaeuser Pembina Timberlands Facebook page including an invitation and thank you regarding the Edson open house and evidence of the page engagement.

Posts	Reach	Clicks/Actions	Published
Thanks to all that came out to our Edson Open House last night, tonight we are at	3.7K	136	Oct 25, 2017 at 1:41pm
Open Houses next week in Edson, Rocky Mountain House and Drayton Valley,	6.1K	191	Oct 20, 2017 at 4:09pm
Newsletter three available now, should you want to recieve in hard copy please	93	9	Sep 5, 2017 at 1:59pm
Newsletter three available now, should you want in hard copy please contact us	3.5K	70	Aug 15, 2017 at 12:00pm
Please see the second edition of our newsletter, again we encourage anyone	2.1K	60	Jul 18, 2017 at 10:23am
Please see the first edition of our newsletter below. We are utilizing this	36	6	Jun 19, 2017 at 2:48pm
Here we are all set up in Edson at the Best Western High Road Inn we are here	8	0	Nov 22, 2016 at 4:09pm
Weyerhaeuser Pembina Timberlands added an event.	0	1	Nov 14, 2016 at 4:20pm
Come out to our open houses at the locations and times listed below	589	41	Nov 14, 2016 at 3:57pm
Welcome to to our page. Please ask questions, request info or just enjoy our	6	0	Nov 14, 2016 at 3:50pm
Weyerhaeuser Pembina Timberlands updated their cover photo.	1	4	Jun 14, 2016 at 1:08pm
Weyerhaeuser Pembina Timberlands updated their profile picture.	0	2	Jun 14, 2016 at 1:00pm

Figure 2-2. Example of social media engagement conducted through Facebook.

2.5.2.4 Public Involvement: Expectations versus Reality

The Public Involvement Plan (PIP) was submitted by Weyerhaeuser in the fall of 2014, with approval by Alberta Agriculture and Forestry (AAF) that same month. One revision of the PIP was completed in March of 2016, with approval by AAF received in January of 2017. Documents in support of the Public Consultation process can be found in Annex III.

It was always the intent of Weyerhaeuser to make the PIP process effective, efficient and meaningful. One guiding principle was to make material available to the public as it was ready, and not before. This eventually led to a limit in the amount of time which important information could be shared with the public.

Taking this into consideration, with the approaching submission of a primary component of the FMP, *i.e.* the Landbase Determination, the Stakeholder Advisory Group (SAG) was established.

The SAG was given the opportunity to focus attention on a list of issues developed by them. This list drove the process to a greater degree than those identified by Weyerhaeuser in the PIP (see final SAG report for details). The opportunity to capture minutes was discussed but the group was ok to track action items from the previous meeting (See Annex III: Public Involvement). The PIP was not adjusted to reflect this direction however.

Draft chapters (including VOITs), maps (including the SHS), and public involvement documents (open house notices, etc.) were provided on a website set up for Weyerhaeuser by FORCORP specifically to disseminate FMP information to as many individuals or organizations as possible. The SAG was also given the opportunity to review the entire draft submission of the FMP at the last meeting, but no members indicated the desire to do so at the final SAG meeting. Notes were recorded about the discussions that occurred during the meeting, but not in the context that they were 'minutes' of the meeting. These notes were used to identify outstanding items to reviewed at follow-up meetings.

Weyerhaeuser sent out three newsletters to Primary (Trappers, Grazing Operators, SAG members), Secondary (Municipalities) and other (Quota Holders) stakeholders and First Nations/Métis consultation coordinators in the summer of 2017. Presentations were also given to municipal governments.

The initial open houses in November of 2016 were poorly advertised, resulting in a total of 17 individuals attending. In the fall of 2017, increased effort was put in to advertise further ahead of the scheduled events, with invitations also going out to primary and secondary stakeholders well in advance of the scheduled dates. A total of 32 individuals attended the second series of open houses.

All responses received have been reviewed and summarized in section 2.5.2. Any concerns identified at the open houses or presentations to Secondary Stakeholders (municipalities only) were recorded in the Silvacom Consultation Tracker (see report in Annex III: Public Involvement).

All comments received during the PIP process were shared with the Plan Development Team through a series of updates.

2.5.2.5 Timber Operators

Timber operators who owned Quota's, as well as AAF representatives that managed Community Timber Permit Programs (CTPP), were invited to a total of six technical sessions between 2014 and 2017. These included representatives of the following:

- Alberta Newsprint Company
- Blue Ridge Lumber
- BRISCO Wood Products
- Dale Hansen Ltd.
- EDFOR Cooperatives
- Millar Western Ltd.
- Tall Pine Timber Company
- CTPP Edson – FMU E2
- CTPP Cold Creek – FMU's W5 & W6
- CTPP Lodgepole – FMU R12

The technical sessions were held to explain complex issues and receive feedback from timber operators. Feedback received was incorporated into the plan. Presentations focused on issues that affected the determination of the Annual Allowable Cut (AAC), with emphasis on the Net Landbase Determination, Yield Curve Development, Timber Supply Analysis (TSA), and the Spatial Harvest Sequence (SHS) development (Table 2-8).

These same organizations were represented at the Operating Ground Rules Sessions held in 2017.

Table 2-8. Summary of information shared with Quota Holders.

Date	Document or information Shared
2014	
April 4, July 8 and July 21, 2014	Drafts Terms of Reference
April 30/June 18, 2014	Patchworks validation process
June 17 and July 23, 2014	Utilization Standards
Sept. 15, 2014	Technical Session #1 held
Sept. 16, 2014	Approved Terms of Reference
Sept. 16, 2014	Approved First Nations Consultation Plan
Sept. 17, 2014	PPT presentation from Technical Session #1
Sept. 22, 2014	Notes from Technical Session #1
Sept. 26, 2014	Issue Document LB-002: Seismic line width
Sept. 29, 2014	Approved Issue summary from AAF
Oct. 20, 2014	Issue Document LB-004: Combined Landbases
Dec. 16, 2014	AIP on scale cull from AAF
Dec. 23, 214	Revised Issue Document LB-004: Combined Landbases
2015	
Mar. 11, 2015	Issue Document GY-006 RSA linework overlap
Mar. 11, 2015	Revised Issue Document LB-002: Seismic line width
Mar. 11, 2015	Issue Document LB-007: Streams layer
Mar. 11, 2015	Issue Document LB-008: Roads layer
Mar. 11, 2015	Issue Document LB-009: Combined watersheds
Mar. 11, 2015	Issue Document LB-013: Seral Stage and Ecological Definitions
Mar. 11, 2015	Issue Document TSA-002 Non-FMA AACs
Mar. 24, 2015	Utilization Matrix
Mar. 24, 2015	Issue Document LB-001 Conversion of Patchworks to new AVI
May 5, 2015	Issue Document GY-001 Cull
May 5, 2015	Issue Document GY-001 Cull AIP from AAF
May 5, 2015	Issue Document GY-002 Utilization Standards
May 5, 2015	Issue Document GY-002 Utilization Standards AIP by AAF
August 26, 2015	Issue Documents GY-001 Cull; GY-002 Yield Curve Development; GY-005 RSP; GY-006 RSA Linework; LB-001 Patchworks conversion; LB-002 Seismic line width; LB-005 RSA Linework overlap; LB-007 Streams; LB-008 Roads; LB-009 Watersheds; LB-010 AVI/RSA; LB-013 Seral Stage, ecological units; TSA-001 FMU Amalgamation; TSA-002 Non-FMA AAC; TSA-004 Combined Landbases; TSA-005 Addressing seismic lines
Sept. 9, 2015	Technical Session #2 held
Sept. 17, 2015	Notes and PPT presentation from Technical Session #1
Nov. 9, 2015	Approved Revised Terms of Reference
Nov. 23, 2015	GY-010 Managed Stand Yield Curve development AIP by AAF; LB-005 Addressing Seismic Lines AIP

Date	Document or information Shared
2016	
Jan. 4, 2016	VOITs table
Jan. 13, 2016	Technical Session #3 held
Jan. 14, 2016	AIP Issue Documents: LB-005 RSA linework, LB-014 FMU Boundary Reconciliation; LB-015 Land base layers by assignment or proxy
Feb. 25, 2016	ARIS reconciliation information
April 26, 2016	Technical Session #4 held
May 3, 2016	Notes and documents from Technical Session #4: LB-018 Landbase Rules; TSA-003 TSA Parameters; NLB Summary
May 16, 2016	VOITs Table, GY-010a - Yield Curves for Natural Stands; GY-004 Methodology for implementing stand decline in Yield Curves
June 27, 2016	Silviculture Strategies Table (SST)
July 6, 2016	Revised SST
July 12, 2016	Revised SST
Aug. 23, 2016	AAF comments to SST
Sept. 7, 2016	Draft Yield Curve document
Sept. 8, 2016	Draft Chapter 3 - Landbase Assessment
Sept. 9, 2016	Draft Net Landbase Determination document
Sept. 15, 2015	Technical Session #5 held
Sept. 19, 2016	Notes from Technical Session #5
Sept. 28, 2016	Production tables to date for determination of under/over production to start of TSA model
Sept. 29, 2016	PPT from Technical Session #5
Oct. 4, 2016	ARIS reconciliation sign-off
Oct. 28, 2016	Link sent to walk through items: NLB, YC and ARIS reconciliation
2017	
Jan. 5, 2017	OGR Template
Jan. 27, 2017	OGR Session #1
March 21, 207	Unused Volume Table
March 31, 2017	OGR Session #2
April 3, 2017	AIP on NLB and YC documents from AAF
April 12, 2017	Review of PL-02 and PL-10 shapes for confirmation
April 27, 2017	OGR Session #3
May 3, 2017	NLB and YC approval letters from AAF
May 4, 2017	Technical Session #6 held
May 9, 2017	Notes and documents from Tech Session #6
May 17, 2017	Issue documents: TSA-006 Prioritizing Pine Stands; TSA-012 Songbirds and incorporating HLIN; LB-017 Landbase assignments for Protective Notations, LB 0-021 NSR Performance Survey Blocks; GY-011 RSA Survey work for HW
May 24, 2017	SHSV1 Review
June 1, 2017	OGR Session #4

Date	Document or information Shared
July 18, 2017	SHSV2 Review
Sept. 1, 2017	FMP Newsletters No's 1,2 and 3
Sept. 25, 2017	Seedlot tables; SHS sign-offs
Oct. 4, 2017	ARIS reconciliation sign-offs
Nov. 1, 2017	Draft FMP comments
Nov. 3, 2017	Input into the FMP sign-off

A more detailed listing of Table 2-8 can be found in Appendix 2-3, while a summary of outstanding items from the timber operators meetings can be found in Appendix 2-4.

The following issues were provided in an email from Ian Daisley of ANC on November 23, 2017:

- *Section 7.10.3.1 makes reference to retention patches being laid out at the FHP stage. I would like to see this reference removed as what is important is results not how you do it and we feel that we can meet the retention targets by identifying them at the harvest stage*.
- *As said before I believe the 4% retention is more than is necessary and prefer that it remain at the current 3% (for W6)*.
- *We had talked about this before but we would have liked to have seen a dissolving of the "current spheres of interest" so that ANC would be able to cut closer to Whitecourt within the W6 compartment. The magnitude of these concerns is difficult to assess but it would be interesting to see the piece size and haul distance metrics compared between those operators with historical allocations within W6 so we could ensure ourselves that we are not being penalized*.

2.6 First Nation and Métis Settlement Consultation

2.6.1 First Nation Consultation Process

The Government of Alberta (GOA) released its First Nations Consultation Guidelines on Land Management and Resource Development (the Guidelines) in September 2007, with a further revision of the Guidelines occurring on July 28, 2014. The Guidelines outline procedures to carry out the GOA's recognized duty to consult with First Nations regarding land management and resource development policies, legislation and regulatory decisions. They also allow for GOA to delegate aspects of that consultation to industry. Furthermore, the Guidelines provide direction to industry regarding its role in the consultation process with respect to specific forest management plans, including the annual General Development Plan and the Forest Management Plan (FMP).

As such, Weyerhaeuser Pembina Timberlands (the Company) developed a First Nations Consultation Plan (FNCP) that articulated the way the Company would carry out the prescribed procedural aspects of consultation required by GOA with specific First Nations. This process was driven by the revised guidelines, and the Company believes this plan met the consultation requirements necessary to secure approval of its FMP. The original FNCP was approved on August 25, 2014, with revisions occurring on March 24, 2016 and August 9, 2017. The approved plans can be found in Annex IV Consultation.

The following First Nations were consulted during the development of the FMP, as defined in the AAF pre-consultation assessment dated March 25, 2014:

- Alexander First Nation
- Alexis Nakota Sioux Nation
- O'Chiese First Nation
- Paul First Nation
- Stoney Bearspaw First Nation
- Stoney Chiniki First Nation
- Stoney Wesley First Nation
- Sunchild First Nation

Figure 2-3 shows where these First Nations communities reside in relation to the DFA.

First Nations were consulted at 4 different times during the development of the Forest Management Plan. These components included:

- Forest Management Plan Initiation – September 2015
- VOITS Table – May 2016
- Spatial Harvest Sequence - July 2017
- Draft Forest Management Plan – November 2017

Records of Consultation (ROC) Logs were used to record all communication with the First Nations. This included letters, emails, phone calls and meetings specific to each component of the FMP.

Concerns and Response (CR) Tables were also maintained for each First Nation. The CR Tables recorded specific concerns raised during the process, with Weyerhaeuser's response to each concern.

Weyerhaeuser also committed to report quarterly to AAF the results of the consultation effort undertaken. In response to the report, AAF provided a detailed assessment of the effort undertaken by Weyerhaeuser to consult effectively with the First Nation communities. Table 2-9 Summarizes this reporting process with AAF.

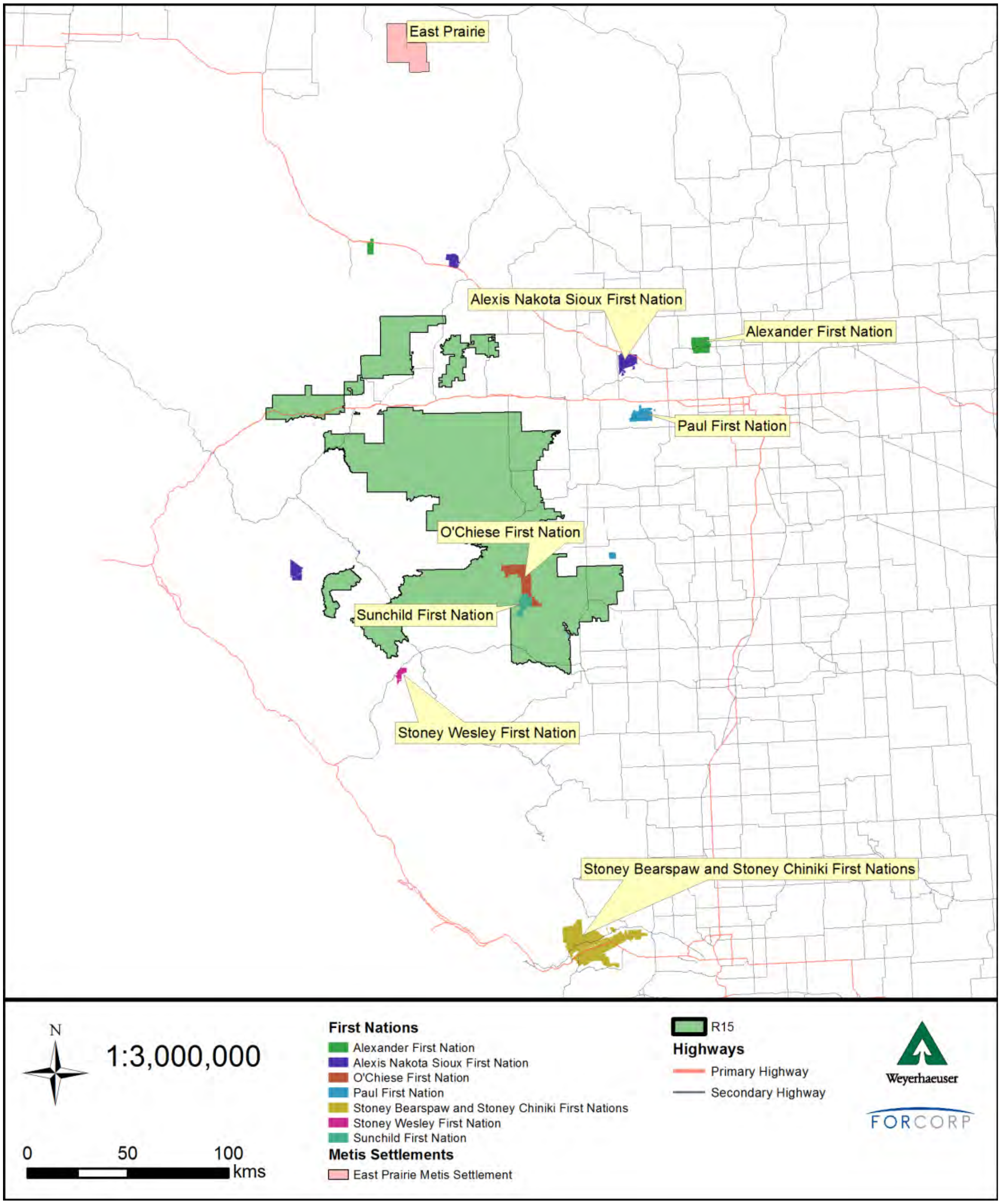

Figure 2-3. Map of FMA with associated FN communities shown.

Table 2-9. Summary of First Nation documents submitted to AAF.

Documents Submitted	Date Submitted to AAF	Response Date from AAF	Comments
FN Consultation Plan	March 17, 2014	April 8, 2014	Need to amend plan
FN Consultation Plan	April 9, 2014	May 12, 2014	Edits to Plan required
FN Consultation Plan	June 9, 2014	July 14, 2014	Concerns to be addressed
FN Consultation Plan	July 18, 2014	August 25, 2014	Plan approved
Revised FN and Métis Consultation Plan	March 24, 2016	March 24, 2016	Revised Plan approved
FN Quarterly report #1 to AAF	March 25, 2016	June 23, 2016	interim Adequacy Assessment
FN Quarterly report #2 to AAF	July 14, 2016	August 3, 2016	interim Adequacy Assessment
FN Quarterly report #3 to AAF	Sept. 13, 2016	Oct. 6, 2016	interim Adequacy Assessment
FN Quarterly report #4 to AAF	January 3, 2017	March 7, 2017	interim Adequacy Assessment
FN Quarterly report #5 to AAF	April 19, 2017		No comments received
FN Quarterly report #6 to AAF	July 18, 2017	August 9, 2017	interim Adequacy Assessment
Revised FN and Métis Consultation Plan	August 9, 2017		No comments received
FN/Métis Quarterly report #7 to AAF	October 1, 2017		No comments received
FN/Métis Final Report #8 to AAF	November 7, 2017		

2.6.2 Métis Settlement Consultation Process

The GOA released its Consultation with Métis Settlements on Land and Natural Resource Management was approved on March 14, 2016. The Guidelines outline procedures to carry out the GOA's recognized duty to consult with Métis Settlements regarding land management and resource development policies, legislation and regulatory decisions. They also allow for GOA to delegate aspects of that consultation to industry. Furthermore, the Guidelines provide direction to industry regarding its role in the consultation process with respect to specific forest management plans, including the annual General Development Plan and the Forest Management Plan (FMP).

On August 3, 2017, AAF advised Weyerhaeuser to begin consulting the East Prairie Métis Settlement (location shown in Figure 2-3) on the Forest Management Plan, as well as revise the First Nations Consultation Plan to include Métis. A copy of the letter can be found in Annex IV Consultation.

The consultation process for East Prairie Métis Settlement (EPMS) commenced in mid-August 2017, and included all information previously consulted with the First Nation communities. These components included:

- Forest Management Plan Initiation – August 2017
- VOITS Table – August 2017
- Spatial Harvest Sequence – August 2017

- Draft Forest Management Plan – November 2017

Concerns and Response (CR) Tables were also maintained for the Settlement. The CR Tables recorded specific concerns raised during the process, with Weyerhaeuser's response to each concern.

Weyerhaeuser also committed to report quarterly to AAF the results of the consultation effort undertaken. In response to the report, AAF provided a detailed assessment of the effort undertaken by Weyerhaeuser to consult effectively with the East Prairie Métis Settlement.

2.6.3 Consultation Summary

The final First Nation and Métis Consultation Report was submitted to AAF on November 7, 2017. The draft version of the Forest Management Plan was submitted for consultation to all First Nations and the East Prairie Métis Settlement on November 1, 2017. Electronic versions were made available, and hard copies were also mailed out or were delivered to each consultation office.

To date, the FMP has incorporated input through different considerations:

- Two VOITs have been created to address impact on either gathering sites or cultural sites resulting from harvest activities
- One VOIT has been created to report on economic participation on the DFA
- A commitment has been made to the Stoney First Nation Bighorn Community to hold two pipe/prayer ceremonies annually, once in the late spring to represent company activities during non-frozen (summer/fall) periods, and once for areas that would be harvested during winter, or frozen, conditions.

2.7 References

AAF 2006. Alberta Forest Management Planning Standard. Version 4.1, April 2006. Alberta Agriculture and Forestry, Public Lands and Forest Division, Forest Management Branch. 112 pages.

Appendix 2-1: Document Submission and Approval Tracking Sheet

Weyerhaeuser Pembina 2016 FMP Document Submission and Approval Tracking Sheet **Updated February 28, 2018**

Document Submitted	Submitted To	Date Submited	Date Resubmitted	Date Agreement Reached (AIP)	Comments
GY001 -Combined Field and Scale Cull Application Process	Liana Luard	November 4, 2013	March 25, 2015	May 5, 2015	Agreement-In-Principle by Rob Popowich was provided for Mill Scale Cull Percentage (Dec 10, 2014) and Field Cull Percentage (May 4, 2015) but not Issue Document GY001.
Terms of Reference	Liana Luard	17-Mar-14	18-Jul-14	August 8, 2014	Approved by Rob Popowich
FMU amalgamation	Darren Tapp	March 10, 2014	Oct. 20, 2014	July 22, 2015	Agreement-In-Principle - Rob Popowich Liana to develop table and map
Public Involvement Process	Dave Hugelschaffer	3/17/2014; 07/25/2014	6-Oct-14	Oct. 27, 2014	Approved by Dave Hugelschaffer
First Nations Involvment Process	Dave Hugelschaffer	9-Jun-14	18-Jul-14	August 25, 2014	Approved by Dave Hugleschaffer
CTL Process	Darren Tapp	March 18, 2014		Approved	Approved by Darren Tapp
AVI Submission 1 - 8 twps	Liana Luard	23-Jan-14	NA	April 11, 2014	Approved for use in FMP by DT
AVI Submission 2 - 8 twps	Liana Luard	28-Feb-14	NA	April 11, 2014	Approved for use in FMP by DT
AVI Submission 3 - 6 twps	Liana Luard	16-Apr-14	NA	July 18, 2014	Approved for use in FMP by DT
AVI Submission 4 - 8 twps	Liana Luard	28-Jul-14	NA	November 19, 2014	Approved for use in FMP by DT
AVI Submission 5 - 16 twps	Liana Luard	24-Sep-14	NA	December 10, 2014	Approved for use in FMP by DT
AVI Submission 6 - 16 twps	Liana Luard	December 17, 2014	NA	February 9, 2015	Approved for use in FMP by DT
AVI Submission 7	Liana Luard	February 19, 2015	June 29th	September 22, 2015	Informed that twp 55-13 failed at 71.1%; meeting set up between WY, ESRD and Silvacom to discuss outages on June 18th; twp 55-13 resubmitted on June 29th; to be approved with Submission 10, along with the remainder of submission 7 townships not previously approved.
Test township - C. Lomerse	Liana Luard	March 18, 2015	na	June 5, 2015	Informed early June from Liana that test township acceptable
AVI Submission 8	Liana Luard	March 26, 2015	na	September 17, 2015	Approved for use in FMP by DT
AVI Submission 9	Liana Luard	June 29, 2015	na	September 17, 2015	Approved for use in FMP by DT
AVI Submission 10	Liana Luard	September 23, 2015	na	November 16, 2015	Approved for use in FMP by DT
Processor Production Study (GY001)	Liana Luard	21-Jul-14	NA	January 23, 2015	Results to be used in yield curves were granted Agreement-in-Principle on May 4, 2015 by Rob Popowich
GY002 - Yield Adjustment Process	Liana Luard	August 13, 2014	April 1, 2015	May 5, 2015	Agreement-In-Principle - Rob Popowich
Fourth Order Watershed Shapes	Liana Luard	22-Sep-14	NA	January 13, 2015	ESRD watershed shape file received by WY
FMP Issues List	Liana Luard	25-Aug	NA	September 24, 2014	Approved by Darren Tapp
GY-005 - RSP Project	Liana Luard	10/7/2014	31/12/2014	January 23, 2015	Agreement-in-Principle by Rob Popowich
TSA 002 Non-FMA AAC	Liana Luard	Oct. 29, 2014	January 8, 2015	February 25, 2015	PDT Agreement

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TSA 004 - Combined landbase	Liana Luard	Oct. 29, 2014	December 22, 2014	June 4, 2015	Review QH comments with PDT; ESRD will not give approval for this; It will be Weyerhaeusers decision, with Agreement-In-Principle (AIP) from the PDT, to move forward based on feedback from Quota Holders; Liana to provide direction in writing by next PDT meeting (April 28th). **EDFOR discussed this topic at their April Directors meeting. On April 10th, Paul discussed the results with Dave Cobb; proposal rejected by Directors; Paul requested Dave to send email outlining concerns of Directors; nothing received as of May 5th. EDFOR representatives Dave Cobb, John Nyssen, Chad Dickson and Ron Pollach met to review this issue. EDFOR discussed this with Popowich on May 21st as well. Greg Greidanus to review this with EDFOR presentation on June 17th; ESRD will remain silent on this issue (will not offer an opinion, therefore PDT as a whole cannot approve the document). June 4, 2015 - Prov provided direcftion to Weyerhaeuser to make the decision independantly to pursue or not and propse in DFMP**
LB 002 - Seismic line width	Liana Luard	Oct. 29, 2014		December 2, 2014	PDT Agreement
LB 007 Hydrology buffer sources	Liana Luard	Oct. 29, 2014		February 25,2015	PDT Agreement
LB 008 - Road buffer identification	Liana Luard	Oct. 29, 2014		February 25,2015	PDT Agreement
LB - 009 Combined Watersheds	Liana Luard	January 26, 2015		February 25,2015	PDT Agreement
GY 006 - RSA linework overlaps and slivers	Liana Luard	Oct. 29, 2014		February 25,2015	PDT Agreement
LB-013 Seral Stage and Ecological Unit Definition	Liana Luard	March 19, 2015		March 19, 2015	PDT Agreement
Revised AVI proposal	Liana Luard	February 18, 2015	May 5, 2015	June 3, 2015	AIP Rob Popowich
TSA-005 Addressing Seismic lines in the TSA	Liana Luard	October 6, 2015	na	November 18, 2015	PDT Agreement
GY-010 Managed stand yield curve development	Liana Luard	October 6, 2015	na	November 18, 2015	PDT Agreement
Revised TofR	Liana Luard	November 1, 2015	na	November 9, 2015	Approved by Darren Tapp
Revised PIP	Dave Hugelschaffer	November 1, 2015	March 11, 2016	January 23. 2017	Approved by Kevin Vander Haeghe
Revised FN Consultation Plan	Dave Hugelschaffer	November 1, 2015	na	March 24, 2016	**Approved by Kevin Vander Haeghe**
List and shape file ARIS #s in AVI but not in extracts	Liana Luard	Nov. 2, 2015	na	May 1, 2016	Results supply to Weyerhaeuser
List of ARIS#s in Extract but not in AVI	Liana Luard	Nov. 3, 2015	na	May 1, 2016	Results supply to Weyerhaeuser
List and shape file of CC with no known ARIS opening number	Liana Luard	Nov. 5, 2015	na	May 1, 2016	Results supply to Weyerhaeuser
Request made for a new complete ARIS extract with single files for each treatment type	Liana Luard	Nov. 17, 2015	na	November 24, 2015	completed Nov 24, 2015
GY_010a issue document: Natural Stand Yield Curves	Liana Luard	January 28, 2016	March 29, 2016	20-May-16	AIP by PDT May 20, 2016
LB-005 ARIS/AVI update process	Liana Luard	Dec. 2, 2015	na	January 14, 2016	Review at PDT Jan 14, 2016
AVI final submission	Liana Luard	Dec. 3, 2015	na	January 14, 2016	**Approved by Darren Tapp**
LB-015 Proxy's versus absolute boundaries	Liana Luard	Dec. 4, 2015	na	January 14, 2016	Review at PDT Jan 14, 2016

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Document Submitted	***Submitted To***	***Date Submited***	***Date Resubmitted***	***Date Agreement Reached (AIP)***	***Comments***
LB-014 R15 Boundary Reconciliation	Liana Luard	Dec. 4, 2015	na	January 14, 2016	Review at PDT Jan 14, 2016
Region I SW genetic gain	Liana Luard	Feb. 23, 2016	na	16-Mar-16	**AIP by Erica Samis**
GY-004 Methodology for Implementing stand decline to YC	Liana Luard	May 3, 2016		20-May-16	AIP by PDT May 20, 2016
Request to survey unknown blocks to keep in active landbase	Liana Luard	May 10, 2016	na	6-Jul-16	**AIP by Rob Pobowich with direction on number of plots**
Chapter 3 of FMP - Landscape Assessment	Liana Luard	September 8, 2016	na	Dec, 2016	PDT to give AIP upon review and acceptance, GOA please send comments to Paul S
Reponse to Rob Popowich regarding June 30, 2016 letter outlining concerns of Public Involvement Process	Liana Luard	September 8, 2016	na	September 8, 2016	should precipitate approval of the outstanding review of the Public Involvement Plan - see line 37 above; no formal response back from RP.
Net Land Base Determination	Liana Luard	October 26, 2016	February 27, 2017	28-Mar-17	AIP by Rob Popowich
Yield Curve Development	Liana Luard	October 26, 2016	AIP expected from AAF by December 8th	28-Mar-17	AIP by Rob Popowich
ARIS reconciliation	Liana Luard	October 26, 2016	November 3, 2017	Outstanding	Latest verion with WY comments provided to Liana and Cassandra
SST	Liana Luard	October 26, 2016	AIP expected from AAF by December 8th	28-Mar-17	AIP by Rob Popowich
FMA conifer carryover request to Darren Tapp	Liana Luard	January 18, 2017	NA	13-Apr-17	Received by Bob Winship
Request for submission extension	Darren Tapp	March 9, 2017	NA	21-Mar-17	Approved by Darren Tapp
Revised Terms of Reference resulting from extension approval	Liana Luard	March 24, 2017	April 5, 2017	6-Apr-17	AIP by Rob Popowich

Appendix 2-2: Plan Development Team Outstanding Item Tracking Sheet

2017 Pembina FMP Outstanding Item Tracking Log

Core PDT Members: Paul Scott, Kerri Mackay, Liana Luard, Stephen Mills (alt - Darcy Evanochko/Trisha Stubbings), Dave Hobson (alt - Anne Hubbs)

PDT Advisers: Bob Winship, Wendy Crosina, Darren Aitkins, Greg Greidanus, Cosmin Tansanu, Ted Gooding, Andrew Johnson, Bob Christiansen, Paulette Penton (ESRD Fisheries issues), Kelsey Gibos (ESRD Fire)

Categories: TofR, Voits, AVI, NLB, TSA, YC, Public, SST

Updated: October 24, 2017 | Completed action item

Date	In Attendance	Tracking Number	Topic Category	Action Item or Decision Made	Assigned To	Expected completion date	Date Completed	Comments
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-01	TofR	Edits to document made this date to the March 17,2014 draft	Paul	4-Jul-14	July 18, 2014	Complete - final edits ok; submit to Popowich for approval
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-02	NLB	Need FireSmart Community Zones - shape files	Liana	15-Jul-14	July 15, 2014	Complete - Sent to Paul and Kerri by email this date
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-03	AVI	Need to identify disturbance code for Firesmart clearings to use in AVI being done by Silvacom	Liana	15-Apr-14	April 25, 2014	Complete - Supplied by Liana
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-04	Tof R	Send list for Table 7	Stephen	15-Apr-14	April 4, 2014	Complete - Sent by Stephen, updated by Liana
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-05	FMU amalgamation	Review Jan. 9th email from Tim Boult	Paul	1-May-14	April 10, 2014	Complete - Additional information sent out to Quota holders on April 14th.
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-06	FMU letter to Darren Tapp	Response from ESRD to be sent to Bob;July 15th note that Bob Winship will meet with Darren Tapp upon completion of new package	Paul	July 18th	July 18, 2014	Completed - Paul to send out another request to those quota holders who have not repsonded to date re previous email on April 14th; send emails from EDFOR, TPTL, ANC, BRL and MWI to Liana
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-07	TSA	Single landbase signoff for embedded operators to be determined by ESRD	Liana	1-May-14	July 15, 2014	Completed - this will be part of the issues list, and will be introduced at the first meeting session with all Quota Holders
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-08	TofR	Critical issues list formalized	Liana	July 18th	July 15, 2014	Completed - Reviewed at July 15th PDT meeting;
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-09	TofR	Quota Holder review section 6.2 needs more clarity	Paul	4-Apr-14	April 4, 2014	Completed - Updated in June 2nd version
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-10	Cull Proposal - GY001 Discussion Paper Nov 1, 2013	Gyula to revise proposal to reflect scale, field, and CTL cull procedures	Liana/Paul		December 10, 2014	Approved by Rob Popowich
April 3, 2014	Paul, Liana, Kerri, Stephen	2014-11	CTL	Send comments to Paul	Liana	Oct. 29th	November 27, 2014	Completed - Comments use to clarify process; revised version submitted May 12, 2014 to Liana; ESRD reviewing provincial direction; AOP direction still needs to be approved; Approved for AOP on Nov. 28, 2014
July 15, 2014	Paul, Liana, Kerri, Stephen, Dave	2014-12	Reconciliation (carry forward) process	send reconciliation process to all PDT members	Liana	July 18th	July 23, 2014	Completed - Clarifies how ESRD manages carryforward each quadrant
July 15, 2014	Paul, Liana, Kerri, Stephen, Dave	2014-13	Issues list	Send out issues list for WY to fill out their concerns	Liana	July 18th	August 19, 2014	Completed - WY edits to sent back to Liana for her review;
July 15, 2014	Paul, Liana, Kerri, Stephen, Dave	2014-14	G&Y	Liana to talk to Darren Aitkin re June 6th meeting at WY office re second bullet in re under point 4	Liana	July 18th	September 9, 2014	Drop - Edits to me made to June 6th document to provide more clarity.
Sept. 9, 2014	Paul, Liana, Kerri, Stephen, Dave	2014-15	VOITS	Send visual retention guide to all PDT members	Paul	Sept. 19th	October 24, 2014	Completed - Paul to email guide to PDT members
Sept. 9, 2014	Paul, Liana, Kerri, Stephen, Dave	2014-16	VOITS	Species of interest list	Liana	1-Aug-15	August 19, 2015	List presented at August 19th PDT meeting.
Sept. 30, 2014	Paul, Liana, Kerri, Stephen, Dave	2014-17	VOITS	Review of VOITS table; all edits made in VOITs document	Paul	Sept. 30th	September 30, 2014	Completed
October 29, 2014	Paul, Liana, Kerri, Stephen	2014-18	Issues Documents TSA002 TSA004 LB002 LB007 LB008 LB009	ESRD to review and provide feedback to issues documents for acceptance at next (December) PDT	Liana, Stephen	14-Nov-14	December 2, 2014	Completed - See Tracking sheet
October 29, 2014	Paul, Liana, Kerri, Stephen	2014-19	Fourth Order Watersheds	Request the completion and delivery of the new watershed layer for Pembina FMA; request to go in by Liana on December 3rd	Liana		January 13, 2015	Received from ESRD in lieu of WY fourth order watersheds
October 29, 2014	Paul, Liana, Kerri, Stephen	2014-20	Amalgamated Scale and field Cull Proposal	Document resubmitted to ESRD on March 24, 2015	Paul	March 24, 2015	May 4, 2015	Agreement-In-Principle by Rob Popwich
October 29, 2014	Paul, Liana, Kerri, Stephen	2014-21	ECA Thresholds/Draft Recommendation	Liana to determine the thresholds for ECA to be used in the upcoming plan	Liana		February 5, 2015	Received from ESRD
December 2, 2014	Paul, Liana, Kerri, Stephen, Darcy	no issues identified					December 2, 2014	
February 25, 2015	Paul, Liana, Kerri, Stephen, Dave, Dave Hugelschaffer	2015-01	AVI	Update AVI project description to reflect strategy to interpret west country area having no 2012 imagery	Paul	May 5, 2015	June 3, 2015	Agreement-In-Principle by Rob Popwich
February 25, 2015	Paul, Liana, Kerri, Stephen, Dave, Dave Hugelschaffer	2015-02	ARIS reconciliation	Need TPRS review for all WY dispositions so that WY ARIS can be updated to reflect missing pre-WY operated blocks	Liana	July 2, 2015	June 26, 2015	27 dispositions to be transferred to WEY ARIS for future ARIS extraction. Provide to SOL upon extraction; Paul discussed with Liana on May 5th; spread sheet received from Casandra under review by Liana.
February 25, 2015	Paul, Liana, Kerri, Stephen, Dave, Dave Hugelschaffer	2015-03	ARIS reconciliation	Set up meeting between ESRD and WY to review ARIS reconciiation process	Liana	March 13, 2015	March 18, 2015	Meeting is scheduled March 25, 2015
February 25, 2015	Paul, Liana, Kerri, Stephen, Dave, Dave Hugelschaffer	2015-04	VOITS	Set up conference call with Marty Oburne to reveiw Voits 18 and 19 re establishment and performance survey targets and acceptable variance	Liana	March 13, 2015	March 18, 2015	Done on March 18, 2015

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Categories: TofR, Voits, AVI, NLB, TSA, YC, Public, SST

Updated: October 24, 2017

Completed action item

Date	In Attendance	Tracking Number	Topic Category	Action Item or Decision Made	Assigned To	Expected completion date	Date Completed	Comments
February 25, 2015	Paul, Liana, Kerri, Stephen, Dave, Dave Hugelschaffer	2015-04	VOITS	Liana to review again with John Stadt; WY ok to stay as proposed	Liana	March 19, 2015	March 18, 2015	Issue document based on the VOIT 1 (LB13)
March 19, 2015	Paul, Liana, Kerri, Stephen, Dave, Paulette, Darcy	2015-05	VOITS	Liana to review Voits hi-lited with 'Blue' with John Stadt prior to PDT meeting on April 28th	Liana	October 1, 2015	May 20, 2016	John Stadt putting together wording for biodiversity voits
March 19, 2015	Paul, Liana, Kerri, Stephen, Dave, Paulette, Darcy	2015-06	PDT	ESRD to review Dave Hobson Lead to cover his 6 month absence starting April 1st	Liana	April 28, 2015	March 18, 2015	Anne Hubbs
June 4, 2015	Paul, Liana, Kerri, Stephen, Darcy (on phone)	2015-07	TSA 004 combined LB	Liana to review with Rob Popowich	Liana	19-Aug-15	August 19, 2015	Liana to review with Popowich regarding PDT agreement in Principle on this item. Greg Greidanus to have a presentatiin for EDFOR on June 17th. GOA recommends that Weyerhaeuser must make it's own decision to move ahead. GOA will not provide direction to this issue document.
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-08	LB 10	Paul to send current document to PDT	Paul	August 20, 2015	August 20, 2015	Document sent to PDT
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-09	RSA - TSA005	Paul to confirm RSA protocol for seismic in survey blocks	Paul	August 20, 2015	October 6, 2015	Confirmed with Kandis Dickhaut and service provider that plot landing on seismic lines are not moved
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-10	TSA005	Andrew to update TSA-005 issue document to reflect endorsed process of dealing with seismic in both mature and juvenille stands	Andrew	September 7, 2015	October 6, 2015	done
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-11	Terms of Reference, PIP, FNCP	Update Terms of Reference, Public Involvement Plan, and First Nations Consultation Plan to reflect accurate dates of intent of the processes	Paul	October 7, 2015	November 1, 2015	done
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-12	VOIT 14	Update the reporting section to reflect the fine filter species information provided	Paul	September 15, 2015	November 1, 2015	done; review on November 18th PDT
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-13	Fine Filter Species	Paulette to provide Power point presentation given at meeting pertaining to Fisheries Management to PDT members	Paulette	September 1, 2015	November 10, 2015	PPT sent to PDT members
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-14	Genetics VOIT 15	Paul to review email from Liana providing direction for VOIT 15	Paul	August 20, 2015	August 20, 2015	Completed and included in Voits table sent to PDT August 20th
August 19, 2015	Paul, Liana, Stephen, Kerri, Paulette, Anne	2015-15	All docs	Review to replace references to AESRD to GOA	Paul	September 1, 2015	August 20, 2015	Completed and included in Voits table sent to PDT August 20th
Nov 18,2015	Paul, Bob, Kerri, Liana, Dave, Dave	2015-16	VOITS	Update public involvement plan to reflect post FMP public involvement planning, adjust VOIT 34 to reflect changes	Paul, Kerri	January 15, 2016	January 12, 2016	
Nov 18,2015	Paul, Bob, Kerri, Liana, Dave, Dave	2015-17	PIP	Request variance from current approved sequencing, quantify in writing intent and rationale	Paul, Kerri	January 1, 2016	January 1, 2016	Dropped
November 18, 2015	Paul, Bob, Kerri, Liana, Dave	2015-18	Landbase	LB-005 to be resubmitted to Liana	Paul	December 1, 2015	December 2, 2016	
November 18, 2015	Paul, Bob, Kerri, Liana, Dave	2015-19	VOIT 14	Presentation to understand the Warbler habitat descriptions and targets	Dave Hobson	January 14,2016	January 14, 2016	
March 17, 2016	Paul, Bob, Kerri, Liana, Dave	2016-01	ARIS reconciliation	Send out ARIS reconciliation document dated March 3 to PDT	Paul	March 17, 2016	March 17, 2016	Send by email during PDT meeting
March 17, 2016	Paul, Bob, Kerri, Liana, Dave	2016-02	LB17	Send our LB 17 to PDT	Paul	March 17, 2016	March 17, 2016	Send by email during PDT meeting
March 17, 2016	Paul, Bob, Kerri, Liana, Dave	2016-03	VOITs	set up meeting with PDT and Wendy and John Stadt to discuss wildlife modelling and NRV in more detail	Liana	late April	May 20, 2016	
May 20, 2016	Paul, Bob, Kerri, Liana, Dave, Darcy, Trisha	2016-04	FFS	Dave to review Songbird reporting requirements	Dave	Next PDT	September 22, 2016	Strix report sent by Paul Scott in early May. Model will be run, results will be reported, reactions to the results will be reviewed keeping in mind the population distributions on the FMA.
May 20, 2016	Paul, Bob, Kerri, Liana, Dave, Darcy, Trisha	2016-05	GY11 - RSA Survey Information in Hw Stands	Liana to send Cosmin GY011 for review and comments	Liana	May 24th	September 22, 2016	comments as of September 20 - PS - Incorporated into draft YC document as enhanced M91 curves. Reviewed and PDT AIP
Sept. 22, 2016	Paul, Bob, Kerri, Liana, Dave, Darcy, Trisha	2016-06	LB017 -Landbase Assignments for Protective Notations (PNTs)	Liana to send to Stephen for final sign off on PNT inclusion in net landbase	Liana	Next PDT	November 25, 2016	Agreement-In-Principle by Paul and Stephen - Nov 21st 2016 version.
Sept. 22, 2016	Paul, Bob, Kerri, Liana, Dave, Darcy, Trisha	2016-07	TSA006 - MPB - Prioritizing Pine Stands	Liana to send out R factor ranking and compartment Rish analysis as made available to her	Liana	ASAP	September 24, 2016	Sent by Liana to Paul

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PDT Advisers: Bob Winship, Wendy Crosina, Darren Aitkins, Greg Greidanus, Cosmin Tansanu, Ted Gooding, Andrew Johnson, Bob Christiansen, Paulette Penton (ESRD Fisheries issues), Kelsey Gibos (ESRD Fire)

Categories: TofR, Voits, AVI, NLB, TSA, YC, Public, SST

Updated: October 24, 2017 — Completed action item

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Sept. 22, 2016	Paul, Bob, Kerri, Liana, Dave, Darcy, Trisha	2016-08	TSA007 - Structure Retention Strategy	Paul to update based on second iteration from GoA	Paul	Next PDT	April 11, 2017	Will incorporate in implementation section of the FMP
Sept. 22, 2016	Paul, Kerri, Liana, Dave, Trisha	2016-09	LB-017 PNTs	Stephen to review table of In's and Outs in issue document for confirmation prior to next PDT	Stephen	Next PDT	November 25, 2016	Agreement-In-Principle by Paul and Stephen - Nov 21st 2016 version.
Sept. 22, 2016	Paul, Kerri, Liana, Dave, Trisha	2016-10	LB-021 - NSR Performance Surveyed blocks	Liana to review with Greg and Cosmin	Liana	ASAP	September 30, 2016	Recommendation given by Cosmin; need AIP by PDT
Sept. 22, 2016	Paul, Kerri, Liana, Dave, Trisha	2016-11	ARIS reconciliation	List of unknown blocks from ARIS given to; 12 blocks in NLB but not in ARIS, and another 9 blocks in NLB WY committed to survey and send info to AAF to enter into ARIS	Stephen/ Trisha	ASAP	September 26, 2016	Provided by Stephen and Trisha
Sept. 22, 2016	Paul, Kerri, Liana, Dave, Trisha	2016-12	ARIS reconciliation	reviewed ARIS reconciliation spreadsheet with Cassandra and Andrew; no apparent issues; all operators to sign off on	Paul	Next PDT	26-Oct-16	All completed and signed off
Sept. 22, 2016	Paul, Kerri, Liana, Dave, Trisha	2016-13	SST	Revise Transistion line to reflect this affects both passive (slivers of pure SB) and activer LB(SB with PL)	Paul	ASAP	26-Oct-16	Sent to Liana and included in package submitted on October 26, 2016 walkthrough
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri	2016-14	wildlife	Dave Hobson to send link to PDT for moose and ungulate population surveys	Dave	ASAP	December 14, 2016	link for wildlife sent to PDT members
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri	2016-15	Public Input Update	Kerri to update public consultation document to reflect social media efforts	Kerri	Complete	January 20, 2017	ASAP, to send to Stephen/PDT no later than Jan20, 2017
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri	2016-16	Extension Letter	Paul to consider providing a fomal letter of extension to GOA based on plan preparation trajectory, date to be proposed once landbase and yields are approved	Paul	Early January	March 9, 2017	Extension approved on March 21 by Darren Tapp
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri	2016-17	MPB Ranking	Liana to talk to Forest Health about the inclusion of age 0 stands being ranked and targeted.	Liana	ASAP	April 11, 2017	Andrew to filter out R1 or R2 stands that have no pine content for targeting purposes
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian	2016-18	TSA Parameters-MPB Surge Period	Liana to confirm length of surge period based on previous FMP approved duration. Company request is to go from 17-20 and not greater than 20.	Liana	ASAP	January 17, 2017	Liana indicated no greater than 20 years from 2007
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian	2016-19	Wildlife models	Dan to get model time zero snapshots to Dave Hobson to prepare for review with Anne Hubbs	Dan	ASAP	December 29, 2016	Owl, grizzly bear, songbird and marten
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian	2016-20	Wildlife models	Dave, Wendy and Anne to review wildlife model outputs and prepare feedback for PDT scheduled for Feb. 14, 2017	Paul	1-Feb-17	February 17, 2017	Drop two song birds from analysis - Canada Warbler and Bay-breasted Warbler due to lack of significance on the DFA
13-Dec-16	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian, Trisha	2016-21	Allocation Tables	Liana to provide direction on percentages to be applied to AAC Allocation table	Paul	Apr-17	April 12, 2017	Review quota numbers to ensure correct.
17-Jan-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian, Trisha	2017-01	Variance Tracking	Liana to clarify the status of the Stewardship Reporting DRAFT document which contains the direction for the SHS variance tracking , is it consistent with what Darren Fearon is representing in the OGR's ?	Liana	ASAP	June 15, 2017	Chapter 5 VOIT draft includes direction as provided in DRAFT Stewardship Reporting Framework. Confirm alignment . Directive complete - with policy group. Interpretive bulletin available online.
17-Jan-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian, Trisha	2017-02	Variance Tracking	Paul to send DRAFT Stewardship Reporting Framework to PDT	Paul	ASAP	14-Feb-17	Chapter 5: VOITS draft sent to PDT early in January for comments by February 14th
17-Jan-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian, Trisha	2017-03	VOITS	Liana to work with Dave Hobson to refine VOIT 14 reporting and bring to PDT	Liana, Dave	11-May-17	May 11, 2017	Voit 14 edited by Paul and sent to PDT on April 13th
17-Jan-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian, Trisha	2017-04	Fish Models	Mike to arrange for Jessica Reilly to attend the Feb 14, 2017 PDT to present model available for Bull Trout , as well as approach to Grayling on Pembina River, Athabasca Rainbow north of the Pembina	Mike, Liana	14-Feb-17	14-Feb-17	
17-Jan-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian, Trisha	2017-05	VOIT and Public Involvement Plan	Stephen to meet with Kevin Vander Haeghe on Monday to review VOIT 34 direction. Stephen to report out to PDT Feb 14, 2017	Stephen	14-Feb-17	23-Jan-17	
17-Jan-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan, Greg, Ian, Trisha	2017-06	Carryover request letter	Paul to send letter of request for FMA carryover to Liana	Liana	18-Jan-17	January 18, 2016	Letter dated Jan. 10, 2017
14-Feb-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan,Ian, Mike, Trisha	2017-07	ECA Watershed Layer	Liana to send ECA watershed layer to Jessica	Liana	14-Feb-17	14-Feb-17	
14-Feb-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan,Ian, Mike, Trisha	2017-07	Roads Layer	Liana to check with Greg regarding roads layer to use for Cold Fish modeling	Liana	17-Feb-17	1-Apr-17	no modelling done
14-Feb-17	Paul, Liana,Dave, Stephen, Andrew, Kerri, Dan,Ian, Mike, Trisha	2017-07	Cold Water Fish Presentation	Paul to send presentation with mitigation strategies to Wendy / PDT	Paul	17-Feb-17	17-Feb-17	File on hand so no need to send

2017 Pembina FMP Outstanding Item Tracking Log

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PDT Advisers: Bob Winship, Wendy Crosina, Darren Aitkins, Greg Greidanus, Cosmin Tansanu, Ted Gooding, Andrew Johnson, Bob Christiansen, Paulette Penton (ESRD Fisheries issues), Kelsey Gibos (ESRD Fire)

Categories: TofR, Voits, AVI, NLB, TSA, YC, Public, SST

Updated: October 24, 2017 | Completed action item

Date	In Attendance	Tracking Number	Topic Category	Action Item or Decision Made	Assigned To	Expected completion date	Date Completed	Comments
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave	2017-04	Cold Water Fish Presentation	Liana to provide direction on use of the Bull Trout model	Liana	11-May-17	11-May-17	At the May 11, 2017 PDT it was decided to do the following: as the bull trout model was not complete, it will not be affect the PFMS SHS development; if available by June 15, 2017, Forcorp will assess the model against the current PFMS SHS; otherwise GoA can run the model based on the submitted PFMS SHS.
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave	2017-05	TSA	Liana to provide document describing "back to natural scenarios" and as described by Greg G	Liana	13-Apr-17	14-Apr-17	Sent by Liana to Paul
			TSA	Liana to provide document describing forecasting SOP as described by Greg G	Liana	13-Apr-17	26-May-16	Sent by Liana to Paul
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave	2017-06	Songbird Model	Weyerhaeuser to investigate impact of the hard linear layer and how it has been derived. Formulate a proposal to adequately represent the impact of hard linear on the SHS blocking	Andrew/Dan	30-Apr-17	12-Apr-17	sent to Liana
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave	2017-07	ECA	Liana to provide direction on reporting timelines for ECA	Liana	18-Apr-17	12-Dec-16	Sent by Liana to Paul
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave, Dan	2017-08	NTA - Barred Owl	Liana to provide guidance document on how the results are assessed	Liana	18-Apr-17	18-Apr-17	Sent by Liana to Paul
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave, Dan	2017-09	NTA - Barred Owl	Dan to generate Barred Owl snapshot results for additional periods (30 years and 40 years)	Dan/Paul	4-May-17	May 11, 2017	Show to PDT; issues appear to arise between years 30- and 40
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave, Dan	2017-10	Grizzly Bear	Dave to review Issue doc with Anne and Gord Stenhouse and provide recommendation on reporting resolution.	Dave Hobson	30-Apr-17	May 11, 2017	VOIT to use DFA primary/secondary zones
11-Apr-17	Paul, Liana, Kerri, Ian, Andrew, Greg, Dave, Dan	2017-11	Chapter 4	Andrew to describe using both discussion and metrics, the success of the previous FMP MPB strategies. Forecast to Actual.	Andrew	1-Sep-17	27-Jul-17	Numbers provide by Dan and Andrew and will be incorporated in chapter 4 of the FMP for period up to May 1, 2017
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-12	FN Consultation	GOA looking for response to Ochiese FN proposed VOITS from Weyerhaeuser.	Paul/Bob	15-Jun-17	June 15, 2017	Updated LOG and CRT tables and letter sent May 31, 2017 to O'Chiese for review and comment re: proposed voits.No response recieved to CRT
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-13	FN Consultation	Stephen to provide clarification on version of SHS to be referred to the FN for review.	Stephen	24-May-17	June 15, 2017	Paul suggested to use SHS V1 that operational planners are reviewing. Letter pending from Kevin Vander Haeghe.
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-14	Public Consultation	Paul and Kerri to review final SAG session contents and review opportunities against plan to ensure committments are made	Paul/Kerri	May 24th	June 15, 2017	WY to discuss this internally how we want to proceed with this. At this stage we may be willing to have a final session to review the draft SHS, VOITs and draft FMP. Draft report sent to SAG members on May 16, 2017 for comments. No comments received to date from SAG members
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-15	Public Consultation	Paul and Kerri to comfirm efforts to meet with Municipality of RMH	Paul/Kerri	May 24th	June 15, 2017	Clearwater County was given a presentation on Dec. 20, 2016, which included a member of RMH Council. No request has be received from RMH for a presentation.
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-16	Public Consultation	Paul and Kerri to confirm list of those that received invitations and mailouts to open house.	Paul/Kerri	May 24th	15-May-17	Email to Stephen and Bert copies of 'emials sent' for the November Open houses; list incuded Grazing and Timber Operators, AAF staff, FN Consultation Offices, FMA timber operators, Sundre Forest Products, Rocky Mountain House, Yellowhead County, Skadi Wilderness, company contractors, Pembina Synergy Group
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-17	Public Consultation	Paul to compile details of consultation efforts to date	Paul	May 24th	15-May-17	Sent presentation and notes to Stephen and Bert re:municipal councils and other stakeholder groups.
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-18	Non Timber - cold water fish	GOA to provide Bull Trout Model no later than **June 15, 2017** to test against PFMS with no resulting impact on SHS. If not recieved by June 15, 2017 no modelling to occur by WY prime contactors	Mike	15-Jun-17	June 15, 2017	If model received after June 15, 2017 GOA may take opportunity to run the model on PFMS without resulting effect to the SHS. However mitigation reccommendations may be provided to be evaluated operationally. No model available as of June 15, 2017
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-19	Wildfire Threat Assessment	Liana to forward once edited and complete	Liana	15-May-17	19-May-17	Document received " Weyerhaeuser Pembina FireSmart Management 2017"
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-20	TSA_002 Non-FMA Allocations	Liana to get Greg to clarify method of determining Non-FMA AAC Quota Allocation	Liana	14-Sep-17	27-Jul-17	Need clarity under section 3 Resolutions on how to apply volumes for the WY DTA and CTQ that represents the 20 year cut versus the 200 year average; 200 year average if theoretical number, whereas this impacts WY and no other operator, but other operators access volume (are scheduldded in the SHS) from non-FMA areas; AAF internal meeting to discuss set for July 14th, 2017; Greg indicated clear direction given in issue document.
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-21	Barred Owl	Andrew to remove Sw from patch creation for barred owl	Andrew	May 24th	15-May-17	Edits made to Patchworks model
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-22	Barred Owl	Dave to obtain recommendations used in MWI plan from Fauve Blanchard to inform approach for this plan	Dave	May 24th	15-May-17	Paul emailed Appendix 7-5 from MW draft FMP to PDT on May 15th, 2017
11-May-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-23	ECA	Liana to provide comments from GOA on ECA Issue document TSA_014	Liana	May 24th	11-May-17	TSA 014 edited as per document provided May 11, 2017

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PDT Advisers: Bob Winship, Wendy Crosina, Darren Aitkins, Greg Greidanus, Cosmin Tansanu, Ted Gooding, Andrew Johnson, Bob Christiansen, Paulette Penton (ESRD Fisheries issues), Kelsey Gibos (ESRD Fire)

Categories: TofR, Voits, AVI, NLB, TSA, YC, Public, SST

Updated: October 24, 2017

Completed action item

Date	In Attendance	Tracking Number	Topic Category	Action Item or Decision Made	Assigned To	Expected completion date	Date Completed	Comments
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-24	FN Consultation	Paul to check date of last log submission for the O'Chiese and ensure that up to date, reflecting consultation efforts to date and is consistent with AAF quarterly report.	Paul	Jun-23	20-Jun-17	Log was updated on May 31, 2017
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-25	Public Consultation	Kerri to compile the list of recipients for the first edition of the mailouts	Kerri	23-Jun-17	15-Aug-17	Done
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-26	Public Consultation	Kerri to email newsletter to PDT members	Kerri	16-Jun-17	25-Jul-17	Emailed newsletters 1 & 2 with PDT docs.
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-27	ARIS reconciliation	Follow up with Paul on ARIS audit results from Cassandra post meeting June 22, 2017	Liana	30-Jun-17	26-Jun-17	Liana emailed Paul list with comments from Cassandra; Paul Replied to comments on July 10; raddition comments received on July 20, with response back to Liana on July 24th
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-28	Wildfire Threat Assessment	Liana to get edit to document to reflect inclusion of the RMH area	Liana	23-Jun-17	21-Jun-17	Updated version sent to Paul
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-29	DTA Non FMA	Liana to get clarification on the ability to spatially allocate non FMA AAC to FMA and observe a 15 year deferral on R15 Grazing areas south of the Pembina River.	Liana	14-Sep-17	September 14, 2017	Not identified as an issue at todays meeting
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-30	SHS Review	Ian to send new date for finalisation of v1 of SHS review.	Ian	16-Jun-17	16-Jun-17	Ian will follow-up with a phone call on June 19th
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-31	Barred Owl	Dave to review barred owl results with Mike Russel.	Dave	23-Jun-17	27-Jul-17	Discussed at meeting.
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-32	VOITs	Paul to add O'chiese VOITs to end of VOITs table	Paul	23-Jun-17	20-Jun-17	Three voits added to table
15-Jun-17	Paul, Ian, Kerri, Dan, Andrew,Bert, Liana, Michael, Dave, Stephen	2017-33	VOITs	Wording for fish VOIT #14	Mike / Liana	14-Sep-17	September 14, 2017	Voit wording updated and accepted
27-Jul-17	Paul, Ian, Dan, Andrew,Trisha, Dave, Stephen	2017-34	VOITs	QH seed supply info in chapter 5?	Liana	31-Aug-17	31-Aug-17	Liana to confirm if QH seed information required in the reforestation section in chapter 7 also has to reside in chapter 5 Stewardship reporting
27-Jul-17	Paul, Ian, Dan, Andrew,Trisha, Dave, Stephen	2017-35	FN Consultation	Alberta to render decision on East Prairie Metis consultation requirements.	Stephen	31-Aug-17	3-Aug-17	Paul sent out related information to EPMS on August 9, 2017
14-Sep-17	Paul, Kerri, Liana, Ian, Dan, Andrew, Stephen	2017-36	Seed Supply	Trisha to comunicate request for seed supply from TPTL and DHL	Trisha	22-Sep-17	22-Sep-17	Received from TPTL
14-Sep-17	Paul, Kerri, Liana, Ian, Dan, Andrew, Stephen	2017-37	Fish Models	Mike to define the watershed groupings to be used in the combined watersheds compilation (Bull Trout, Grayling, Athabasca)	Mike	2-Oct-17	October 5, 2017	
14-Sep-17	Paul, Kerri, Liana, Ian, Dan, Andrew, Stephen	2017-38	Fish Models	Mike to provide Paul paragraph describing mitigation strategies to be inserted into Chapter 7 (Check non timber assessment document)	Mike	2-Oct-17	September 29, 2017	Used non-timber assessement document
14-Sep-17	Paul, Kerri, Liana, Ian, Dan, Andrew, Stephen	2017-39	VOIT 25	Liana to check working version of VOITS for wording in VOIT 25	Liana	Sept. 26, 2017	September 26, 2017	
14-Sep-17	Paul, Kerri, Liana, Ian, Dan, Andrew, Stephen	2017-40	SHS Variance	Liana to deliver excel spredsheet to be used to track SHS variance and drive stewardship reporting on compartment variance.	Liana	15-Sep-17	15-Sep-17	
14-Sep-17	Paul, Kerri, Liana, Ian, Dan, Andrew, Stephen	2017-41	SHS Variance	Liana to seek clarification on variance tracking by comparment vs. By compartment by strata.	Liana	2-Oct-17	September 22, 2017	
14-Sep-17	Paul, Kerri, Liana, Ian, Dan, Andrew, Stephen	2017-42	FHP Transition	Liana to talk to Rob re. Direction for FHP approval direction during the transition period of new plan from existing	Liana	15-Sep-17	15-Sep-17	Will be effective year of approval

Appendix 2-3: Quota Holder Document Review Tracking Sheet

Updated November 24, 2017

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
Terms of Reference (ToR) V1	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Greg Branton, Jerry Baker, Mark Cookson, Dale Hansen	4/4/2014	14 days	Ian Daisley - In intro, plan should be acceptable to QH	Plan talks about timely submission of the DFMP that is acceptable to Weyerhaeuer. Text was left as is.	email records from QH to draft version
				Bob Mason - concerned about make-up of PDT; would like to see at least one QH on the PDT	Beefed up Quota Holder section 6.2 in revised ToR	
				Mark Cookson - acceptable	No issues identified	
				Dave Cobb, Dave Chaluk, Dale Hansen, Jerry Baker	No responses received within alloted time	
First Review of Patchworks validation process	Krista Woods, Tracy Courser, Ian Daisley,	4/30/2016	NA	No comments recorded	No issues identified	see below
Second Review of Patchworks validation process for those who missed first review	Bob Mason, Jerry Baker, Dave Cobb	6/18/2014	NA	No comments received	No issues identified	Presentation and minutes email record of June 25, 2014
ARIS request (AAF)	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway	7/4/2014	End of July - forward to Elisha Cahoon at Silvacom and Andrew Johnson at Forcorp	Bob Mason (Tim McCready)	ARIS received July 22	could not locate email record
				Ian Daisley (Garry Mitchell)	ARIS received Aug. 8	
				Dave Challuk	No response	
				Dave Cobb	No response	
				Jerry Baker	ARIS received July 22	
				Shane Sadoway	ARIS received July 8	
				FRIAA and CTPP	ARIS received June 10	
Terms of Reference (ToR) - V3	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Greg Branton, Jerry Baker, Mark Cookson, Dale Hansen	7/8/2014	by July 15	Bob Mason	No Response	Email record
				Ian Daisley	July 9th - no concerns	
				Dave Challuk	No Response	
				Dave Cobb	No Response	
				Dale Hansen (mailed out)	No Response	
				Jerry Baker	No Response	
				Shane Sadoway	No Response	
Utilization Request	Bob Mason, Ian Daisley, Shane Sadoway (Mark Cookson)	6/17/2014	No specific date	Bob Mason	15/10/15; CTL and TL	email records
				Ian Daisley	15/10/15; 50% CTL	
				Mark Cookson	15/11/15	
ToR - final Version	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Greg Branton, Jerry Baker, Mark Cookson, Dale Hansen	7/21/2014	25-Jul	Bob Mason	No response	could not locate email record
				Ian Daisley	No response	
				Dave Challuk	No response	
				Dave Cobb	No response	
				Dale Hansen (mailed)	No response	
				Jerry Baker	No response	
				Shane Sadoway	No response	
Utilization Request Revised	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Greg Branton, Jerry Baker, Mark Cookson, Dale Hansen	7/23/2014	1-Aug	Bob Mason	July 31 - 15/10; CTL and TL	email records
				Ian Daisley	July 28, no concerns	
				Dave Challuk	No Response	
				Dave Cobb	July 23, no concerns	
				Dale Hansen (mailed)	No Response	
				Jerry Baker	No Response	
				Shane Sadoway	No Response	
Scheduled meeting at Forcorp on September 15th, 2014	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Greg Branton, Jerry Baker, Mark Cookson, Dale Hansen	August 6. 2014; resent August 25th	NA	Bob Mason	Attended	Email records
				Ian Daisley	Attended	
				Dave Challuk	Did not Attend	
				Dave Cobb	Attended	
				Dale Hansen	Did not Attend	
				Jerry Baker	Did not Attend	

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
				Shane Sadoway	Attended	
ARIS second request	Dave Cobb, Dave Chaluk, Dale Hansen	8/13/2014	ASAP	Dave Cobb	Sept.2, 2014	Email Record
				Dave Challuk	Sept. 29, 2014	
				Dale Hansen	No Repsonse	
Approved TofR sent out	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Mark Cookson, Dale Hansen	9/16/2014	NA	NA	NA	Email record
Approved FN sent out	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Mark Cookson, Dale Hansen	9/16/2014	NA	NA	NA	Email record
September 15, 2014 technical session#1 with Quota Holders	Bob Mason, Shane Sadoway, Ian Daisley, rebecca Heemeryck, Ken Anderson, Tracey Courser, Dave Cobb,	9/15/2014	NA	NA	NA	See minutes
Power Point Presentation from Sept. 15 at Forcorp	***Quota Holder TSA Group*** : Bob Mason, Ken Anderson, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Tracy Courser, Dale Hansen ***ESRD TSA group*** : Liana Luard, Greg Greidanus, Stephen Mills, Darcy Evanochko, Rebecca Heemeryck	9/17/2014	NA	NA	NA	Email record
Notes from Sept. 15th Forcorp meeting	***Quota Holder TSA Group/ ESRD TSA group***	9/22/2014	NA	NA	NA	Email Record
LB-002 - Siemic line resolution	***Quota Holder TSA Group/ ESRD TSA group***	9/26/2014	NA	NA	NA	Email record
Approved Issues Summary from AAF	***Quota Holder TSA Group/ ESRD TSA group***	9/29/2014	NA	NA	NA	Email record
TSA-004 Combined Landbase	Dave Chaluk, Dave Cobb, Bob Mason, Shane Sadoway, Ian Daisley	10/20/2014	by Nov. 3	ANC - Oct. 24	Hesitant to support proposal, and offer two options; 1) run both models to see the impact to the conifer cut, or 2) maximize conifer cut as a goal in combined landbase.	Email records
				EDFOR - Nov. 3	Will review proposal at Nov. 12th EDFOR directors meeting	
				BRL - Nov. 3	Wy to address the following: 1) Comparison of conifer aac between two approaches; 2) Sequencing will be consistent with section 3 and be validated thru the SHS process, and 3)spheres-of-interest will be maintained unless otherwise agreed to	
				MWI	Dec. 16 reply; no issues with proposal	
				ETL	no reply	

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
AIP on scale cull from AAF	Dave Chaluk, Dave Cobb, Bob Mason, Shane Sadoway, Ian Daisley	Dec. 16, 2014	NA	NA	Approval-In-Principle to use in Yield curve development	Email record
TSA-004 Combined Landbase revised Dec. 22	Dave Chaluk, Dave Cobb, Bob Mason, Shane Sadoway, Ian Daisley	Dec. 23, 2014	by Jan. 15, 2015	ANC - Dec. 23, 2014; if Weyerhaeuser willing to maximize conifer (Scenario 3) then they are ok with proposal	Ok with Run 3 that maximizes conifer at expense of deciduous	Email records
				BRL	Ok with the revised proposal	
				EDFOR	Will seek 3rd party review with the Board of Directors. Dave Cobb reviewed with Ken Anderson MWI. Issue to be reviewed at Edfor Board Meeting first part of April	
				Brisco	Prefer to maximize confer AAC - see March 27 email	
				MWI	no reply	
				ETP	no reply	
ARIS Extract request	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	3/11/2015		Bob Mason	16-Mar	Email records
				Ian Daisley	12-Mar-15	
				Brett Salmon	13-Mar-15	
				Dave Cobb	outstanding	
				Jerry Baker	12-Mar-15	
				Shane Sadoway	13-Mar-15	
				Dale Hansen	outstanding	
GY-006 RSA Linework overlap	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	3/11/2015	by April 17, 2015	Bob Mason	No Comments received	Email records
				Ian Daisley	No Comments received	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
LB-002 Seismic Line Width	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	3/11/2015	by April 17, 2015	Bob Mason	No Comments received	Email records
				Ian Daisley	No Comments received	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
LB-007 Streams Layer	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	3/11/2015	by April 17, 2015	Bob Mason	No Comments received	Email records
				Ian Daisley	No Comments received	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
LB-008 Roads Layer	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	3/11/2015	by April 17, 2015	Bob Mason	No Comments received	Email records
				Ian Daisley	No Comments received	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
LB-009 Combine Watersheds	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 30, Brett Salmon	3/11/2015	by April 17, 2015	Bob Mason	No Comments received	Email records
				Ian Daisley	No Comments received	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
LB-013 Seral Stage and Ecological Unit Definitions	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31,	3/11/2015	by April 17, 2015	Bob Mason	no reply	Email records
				Ian Daisley	no reply	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
	Brett Salmon			Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
TSA-002 Non-FMA AACs	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	3/11/2015	by April 17, 2015	Bob Mason	No Comments received	Email records
				Ian Daisley	March 23; clarified impact on QHs, comments sent to all	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
Utilization Matrix	Brett Salmon, Dale Hansen - resent March 31	3/24/2015	by April 17, 2015	Brett Salmon	15/11/15 utilization standard	Email record
				Dale Hansen	No Comments received	
LB-001 Conversion of Patchworks to new AVI	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	3/24/2015		Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	March 27th email - no concerns	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
GY001 - Cull	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	5/5/2015	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
GY001 - Agreement-In-Principle ESRD	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	5/5/2015	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
GY002 - Utilization Standards	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	5/5/2015	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
GY002 - Agreement-In-Principle ESRD	Bob Mason, Ian Daisley, Dave Chaluk, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen -resent March 31, Brett Salmon	5/5/2015	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Jerry Baker	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
Cut block shapes for those block harvested between May 1 2012 and April 30, 2015	Bob Mason, Ian Daisley, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen, Brett Salmon	6/24/2015	by July 15	Bob Mason	Received	Email records
				Ian Daisley	Received	
				Brett Salmon	no new harvest	
				Dave Cobb	Received	
				Jerry Baker	Received	
				Shane Sadoway	Received	
				Krista Woods - CTP	Received	
				Rebecca Heemeryck - CTP	Received	
				Dale Hansen	no new harvest	
Sept. 9, 2015 agenda and documents to review GY-001 Cull; Gy-002 YC ; GY-005 - RSP; GY-006 RSA linework; LB-001 Patchworks Conversion; LB-002 Seismic Line width LB-005 RSA linework; LB-007 Streams; LB-008 Roads LB-009 Watersheds; LB-010 AVI/RSA LB-013 Seral/Ecological TSA-001 FMU amalgamation TSA-002 Non-fma aac TSA-004 Combined landbases TSA-005 Addressing seismic lines	Bob Mason, Ian Daisley, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen, Brett Salmon, Tracy Corser	8/26/2015	NA	No comments received	NA	Email records

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
September 9, 2015 Technical session #2 with Quota Holders	Ken Anderson, Tracy Courser, Dave Cobb	9/9/2015	NA	NA	NA	See minutes
Sept. 9, 2015 minutes and PPT	Bob Mason, Ian Daisley, Dave Cobb, Jerry Baker, Shane Sadoway, Dale Hansen, Brett Salmon, Tracy Corser	9/17/2015	NA	No comments received	NA	Email record
Approved Revision of ToR	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon, Tracy Corser	11/9/2015	NA	No comments received	NA	Email record
Request for planned block shape files post May 1, 2015	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon, Tracy Corser	11/17/2015	ASAP	Bob Mason	Received from Ken Andersen	Email record
				Ian Daisley	supplied November 23	
				Brett Salmon	get from Ian Kwantes	
				Dave Cobb	Paul used Silacom planned layer	
				Paul King	Get from Bill Taylor	
				Shane Sadoway	supplied on November 18th	
				Krista Woods - CTP	suppllied on November 18th	
				Rebecca Heemeryck - CTP	Supplied from Ian Kwantes	
				Dale Hansen	no planned blocks to incorporate	
PDT documents with Agreement In Principle GY-010 Managed stand YC LB-005 Addressing Seismic lines	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon, Tracy Corser	11/23/2015	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
January 13, 2016 technical session #3 with Quota Holders	Bob Mason, Paul King, James Norman, Ken Anderson, Tracy Courser, Dave Cobb, Dale Hansen, Cynthia Lebrecque,	1/13/2016	NA	NA	Na	See minutes
VOITs table: Review of accepted voits as of Nov. 18th, with the exception of the following: 2, 3,14 and 34; review at technical session on Jannuary 13th at Forcorp.	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon, Tracy Corser	1/4/2016	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	Email received January 15, 2016 from James Norman "Value – 1.1.2 Local/stand scale biodiversity - ANC would prefer a mixed approach to retention that recognizes the residual differences between conifer and deciduous dominated stands after a fire. ANC is operating in Pl dominated stands during a surge to reduce MPB susceptibility and long term AAC implications, increasing the retention requirement on these stands now seems counter-productive."	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
				Dale Hansen	No Comments received	
Documents sent after AIP by PDT on January 13th; LB 005, LB 014; LB 015	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	Jan. 14, 2016	NA		No Comments received	Kerri to confirm - Paul in Austrailia
ARIS to AVI reconciliation spreadsheet and shapefiles for blocks exceeding tolerance limits of .5/5%	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon, Tracy Corser	2/25/2016		Bob Mason/Ken Andersen	Reviewed on March 17; two blocks to be reviewed by Tim to confirm; all other acceptable	Email records
				Ian Daisley	Meet with ANC on March 22 to review entire list	
				Brett Salmon	Reviewed with Brett on Phone on March 14; all AIP	
				Dave Cobb	Review on March 9th at EDFOR office; shape files and scanned maps sent to Forcorp on all outstanding blocks with issues	
				Paul King	Review on March 3rd in DV, more to do; second meeting on March 23 to review outstanding issues	
				Byron Gronberg, Pete Gommerud	Reviewed with Peter Gommerud on March 8th; scanned maps of blocks sent to Forcorp to edit	
				Steve Mills and Darcy Evanochko	Reviewed lists and maps supplied by Stephen and Darcy at the march 17 PDT meeting; follow-up required to finalize list.	
				Shane Sadoway	Review at Blue Ridge on March 7th; scanned maps sent to Forcorp for edits	
				Dale Hansen	AIP on March 10th all blocks	
April 26 Technical sesssion#4 with Quota Holders	Bob Mason, Shane Sadoway, Ian Daisley,	4/26/2016	NA	NA	NA	See minutes
Minutes and associated documents from Technical session held April 26, 2016: Minutes, LB-018, NLB summary, TSA-003	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	5/3/2016	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
VOITS, GY_010a, GY_004	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	24-May-16	NA	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
SST	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	27-Jun-16	15-Jul-16	Bob Mason	OK - Tim McCready	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	OK	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
SST - edits to columns 3 and 4	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	6-Jul-16	15-Jul-16	Bob Mason	OK - Tim McCready	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	Additons to PL and PL mixed wood establishment tactic for direct seeding; addition of site prep for D strata as well as LFN; increase upper range of mixedwood seedlings to 1600/ha.	
				Dale Hansen	No Comments received	
SST - updated with comments from Shane Sadoway	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett	12-Jul-16	25-Jul-16	Bob Mason	OK - Tim McCready	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	**Documentation**
	Salmon			Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
SST comment received from Marty O'Byrne et al	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	Aug. 23, 2016	NA	Bob Mason	Reviewed at Sept. 15 session	Email Record
				Ian Daisley	Reviewed at Sept. 15 session	
				Brett Salmon	No Comments received	
				Dave Cobb	Reviewed at Sept. 15 session	
				Paul King	Reviewed at Sept. 15 session	
				Shane Sadoway	Reviewed at Sept. 15 session	
				Dale Hansen	Reviewed at Sept. 15 session	
Draft Yield Curve document	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	Sept. 7, 2016	Sept. 28, 2016	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
Chpt. 3 - Landscape Assessment	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	Sept. 8, 2016	NA	Bob Mason	PDT to review and agree	Email record
				Ian Daisley	PDT to review and agree	
				Brett Salmon	PDT to review and agree	
				Dave Cobb	PDT to review and agree	
				Paul King	PDT to review and agree	
				Shane Sadoway	PDT to review and agree	
				Dale Hansen	PDT to review and agree	
NLB draft document	Bob Mason, Ian Daisley, Dave Cobb, Paul King, Shane Sadoway, Dale Hansen, Brett Salmon	Sept. 9, 2016	Sept. 30, 2016	Bob Mason	No Comments received	Email record
				Ian Daisley	No Comments received	
				Brett Salmon	No Comments received	
				Dave Cobb	No Comments received	
				Paul King	No Comments received	
				Shane Sadoway	No Comments received	
				Dale Hansen	No Comments received	
September 15 technical session #5 to review draft NLB, YC, SST and ARIS reconciliation with Quota Holders	Bob Mason, Ken Anderson, Tracy Courser, Ian Daisley, Paul King, Dave Cobb, Dale Hansen, Rebecca Heemeryck, Dana Williams,	15-Sep-16	NA	Need to forward seed polygons to Quota Holders to review	Send out shape files on Septermber 29th	Minutes from meeting
Minutes from Technical session #5 held September 15, 2016	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Ken Anderson, Paul King, Shane Sadoway, Tracey Courser.	9/19/2016	NA	NA	NA	Email record
Under-production table for TSA	Ian Daisley, Shane Sadoway, Bob Mason, Dave Cobb, Paul King, Dale Hansen	9/28/2016	12/1/2016	Ian Daisley	Oct. 5 - 3000 underproduction	Email record
				Shane Sadoway	Sept. 30 - 2 x AAC	
				Bob Mason	supplied on November 24th by Ken Anderson; both quota to be filled this year	
				Brett Salmon	Oct. 25 - no under or over production	
				Dave Cobb	Dec. 12, 2016	
				Dale Hansen	No reply	
				Paul King	Received by phone on November 10th	
Power Point Presentation from Sept. 15 at Forcorp - Yield Curves and Net land base	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Ken Anderson, Paul King, Shane Sadoway, Tracey Courser.	9/29/2016	NA	NA	NA	Email record
SHS seed polygons from validation of Patchworks P10005	Ian Daisley	9/28/2016	11/1/2016; extended to Nov. 30th	James Norman - shape files returned on October 14th, 2016	Shape file forwarded to Forcorp	Email record
SHS seed polygons from validation of Patchworks P10005	Paul King	9/29/2016	11/1/2016; extended to Nov. 30th	Paul King	Paul worked with Bill Tayor in DV office	Email record
SHS seed polygons from validation of Patchworks P10005	Dave Cobb	9/29/2016	11/1/2016; extended to Nov. 30th	Dave Cobb	Competed on Nov. 23; files sent to Forcorp	Email record
SHS seed polygons from validation of Patchworks P10005	Bob Mason	NA	11/1/2016; extended to Nov. 30th	Bob Mason	Ian working with Cynthia L to complete task	Email record
SHS seed polygons from validation of Patchworks P10005	Shane Sadoway	9/29/2016	11/1/2016; extended to Nov. 30th	Shane Sadoway	Task completed by Nov. 24; files sent to Forcorp	Email record

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
SHS seed polygons from validation of Patchworks P10005	Krista Woods	NA	11/1/2016; extended to Nov. 30th	Dana Williams	Dana worked with Ian Kwantes in Edson WY office on 3D computer	Email record
ARIS reconciliation sign-off	Garry Mitchell	Oct. 4, 2016		Oct. 13, 2016 - signed	Signed copy sent to Popowich	Email records
	Tim McCready	Oct. 4, 2016		Oct. 12, 2016 - signed	Signed copy sent to Popowich	
	Shane Sadoway	Oct. 4, 2016		Oct. 17, 2016 - signed	Signed copy sent to Popowich	
	Karalee Brennan	Oct. 4, 2016		Oct. 12, 2016 - signed	Signed copy sent to Popowich	
	Dave Cobb	Oct. 4, 2016		Oct. 20, 2016 - signed	Signed copy sent to Popowich	
	Dale Hansen	Oct. 4, 2016		Oct. 21, 2016 - signed	Signed copy sent to Popowich	
	Brett Salmon	Oct. 4, 2016		Oct. 17, 2016 - signed	Signed copy sent to Popowich	
	Paul King	Oct. 4, 2016		Oct. 17, 2016 - signed	Signed copy sent to Popowich	
	Stephen Mills	Oct. 4, 2016		Oct. 21, 2016 - signed	Signed copy sent to Popowich	
	Trisha Stubbings/Darcy Evanochko	Oct. 4, 2016		Oct. 13, 2016 - signed	Signed copy sent to Popowich	
	Clyde Corser	Oct. 4, 2016		No signed agreement	one block in passive landbase	
	Paul Scott	Oct. 4, 2016		Oct. 25, 2016 - signed	Signed copy sent to Popowich	
	Diane Renaud	4-Oct-16		Nov. 28, 2016 - signed	Signed copy sent to Popowich	
	Tanya Norman	4-Oct-16		Nov. 30, 2016 - signed	Signed copy sent to Popowich	
	Byron Crundberg	Oct. 4, 2016		Oct. 18, 2016 - signed	Signed copy sent to Popowich	
Link sent to download NLB/ YC drafts from AAF walk through on October 26th	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Paul King, Shane Sadoway	Oct. 28, 2016	NA	NA	NA	email record
Meeting requested by EDFOR to clarify issues about Single land base and sequencing	Dave Cobb, John Nyssen, Chad Dickson	Dec. 20, 2016	NA	NA	3 questions possed to WY and answers provided prior to meeting via email reviewed at the meeting	email record
Meeting Notice for starting OGR review	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Shelby Jorgensen, Shane Sadoway	Dec. 23, 2016	NA	NA	NA	email record
Meeting Notice for FMP Tech. session on Feb. 9, 2017	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Shelby Jorgensen, Shane Sadoway	Dec. 23, 2016	NA	NA	NA	email record
Copy of OGR Template received from Darren Fearon	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Shelby Jorgensen, Shane Sadoway	Jan. 5, 2017	NA	NA	NA	email record
FMP update	Shelby Jorgensen, Liane Nicol (representing Tall Pine Timber)	Jan. 9, 2017	NA	NA	NA	email record
OGR Development Session#1 - Edson High Road Inn	Bob Mason, Ken Anderson, Ian Daisley, Dave Cobb; Not in attendance: Shane Sadoway, Dale Hansen, Brett Salmon, Shelby Jorgensen	27-Jan-17	NA	NA	NA	Darren Fearon copy of draft OGRs
Carry Forward Table review	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Shelby Jorgensen, Shane Sadoway	21-Mar-17	31-Mar-17	NA	NA	email record
OGR Development Session#2 - Edson High Road Inn	Bob Mason, Ken Anderson, Ian Daisley, Dave Cobb, Shane Sadoway, Brett Salmon; Not in attendance: Dale Hansen, Shelby Jorgensen	31-Mar-17	NA	NA	NA	Darren Fearon copy of draft OGRs
AIP of NLBV5 and associated document	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Shelby Jorgensen, Shane Sadoway	3-Apr-17	NA	NA	NA	email record
AIP of YC and associated document	Bob Mason, Brett Salmon, Dale Hansen, Dave Cobb, Ian Daisley, Shelby Jorgensen, Shane Sadoway	3-Apr-17	NA	NA	NA	email record

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
Review of PL02/PL10 shapes	Bob Mason, Brett Salmon, Dave Cobb, James Norman for Ian Daisley, Bob Baker, Shane Sadoway, Becky Hamerlik, Dana Williams	12-Apr-17	ASAP		James Norman - April 11, shp files	email record
					Dave Cobb - April 12, excel file	
					Ken Anderson - April 18, shp files	
					Shane Sadoway - April 12, shp files	
					Brett Salmon - April 13, ok acknowl.	
					Bob Baker	
Meeting date for Technical Session at Forestry Corp on May 4, 2017	Bob Mason, Brett Salmon, Dave Cobb, James Norman for Ian Daisley, Bob Baker, Shane Sadoway, Becky Hamerlik, Dana Williams	6-Apr-17	NA	NA	NA	email record
Carry forward request to AAF	Bob Baker	19-Apr-17	15-May-17		Is expected to do	email record
	Ian Daisley		1-May-17		Yes	
	Dale Hansen		1-May-17		Will do at some point	
Send NLB5 and YC document and associated AIP letters from AAF	Bob Mason, Brett Salmon, Dave Cobb, Ian Daisley, Bob Baker, Shane Sadoway, Dave Cobb, Dale Hansen	3-May-17	NA	NA	NA	email record
FMP Technical Session	Bob Mason, Dave Cobb, Ian Daisley, Shane Sadoway, Dave Cobb; not present: Bob Baker, Dale Hansen, Brett Salmon	4-May-17	NA	NA	NA	Meeting
Technical Session Presentation and notes from May 4, 2017	Bob Mason, Brett Salmon, Dave Cobb, Ian Daisley, Bob Baker, Shane Sadoway, Dave Cobb, Dale Hansen	9-May-17	NA	NA	NA	email record
Issue documents sent out include:TSA006, TSA012, LB017,LB021, GY011	Bob Mason, Dave Cobb, Ian Daisley, Shane Sadoway, Dave Cobb; not present: Bob Baker, Dale Hansen, Brett Salmon	17-May-17	NA	NA	NA	Meeting
SHSV1 review inititation	Bob Mason (Cyntia Lebreque), Brett Salmon, Dave Cobb, Ian Daisley (James Norman), Bob Baker, Shane Sadoway, Dave Cobb, Dale Hansen	24-May-17	3 weeks to June 14, 2017	NA	Forcorp tool will capture suggested changes to the SHS	email record
Seed Inventory request	Ian Daisley	6-Jun-17		seedlot information supplied	NA	Email records
	Bob Mason	6-Jun-17		seedlot information supplied	NA	
	Shane Sadoway	6-Jun-17		seedlot information supplied	NA	
	Peter Gommerud	6-Jun-17		seedlot information supplied	NA	
	Dave Cobb	6-Jun-17		seedlot information supplied	NA	
	Bob Baker	6-Jun-17		seedlot information supplied	NA	
	Dale Hansen	6-Jun-17		seedlot information supplied	NA	
	Brett Salmon	6-Jun-17		seedlot information supplied	NA	
SHSV2 review inititation	Bob Mason (Cyntia Lebreque), Brett Salmon, Dave Cobb, Ian Daisley (James Norman), Bob Baker, Shane Sadoway, Dave Cobb, Dale Hansen	18-Jul-17	3 weeks to August 09, 2017	NA	Forcorp tool will capture suggested changes to the SHS	email record
SHSV2 review reminder	Bob Mason (Cyntia Lebreque), Brett Salmon, Dave Cobb, Ian Daisley (James Norman), Bob Baker, Shane Sadoway, Dave Cobb, Dale Hansen	4-Aug-17	deadline of August 09, 2017	Edits completed on schedule using the on-line tool; exception is Bob Baker for TPTL	Forcorp tool will capture suggested changes to the SHS	email record
SHSV2 review extension	Perm Sieusahai for Tall Pine Timber (Bob Baker)	18-Aug-17	deadline of August 18, 2017	Edits completed on August 18th in on-line tool	Forcorp tool will capture suggested changes to the SHS	email record
ARIS reconciliation of blocks outside of acceptable variance	Peter Gommerud/Byron	21-Aug-17	ASAP			email record
	Tim Mcready			Tim Mcready	AIP on blocks - August 21	
	Dave Cobb			Dave Cobb	Two shapes requested by Dave from silvacom	
	Shane Sadoway			Shane Sadoway	AIP on blocks - August 23	

Document Reviewed	Submitted To/In attendance	Date Sent Out or Requested	Review Period	Comments/Replys Received From:	How issues were addressed	***Documentation***
FMP Newsletters	Bob Mason, Brett Salmon, Dave Cobb, Ian Daisley, Bob Baker, Shane Sadoway, Dave Cobb, Dale Hansen	Sept. 1, 2017	NA	NA	NA	email record
Seedlot Tables 7-5	Garry Mitchell, Ian Daisley	Sept. 25, 2017	25-Sep	will seek varinace when needed		email record
	Shane Sadoway		Setp 25	OK		
	Dave Cobb		27-Sep	OK		
	Tim McCready,Bob Mason, Ken Anderson					
	Dale Hansen					
	Brett Salmon					
	Byron Grundberg		26-Sep	OK		
	Perm Sieusahai/Bob Baker					
Final SHS for Signoff	Ian Daisley/James Norman	Sept. 25, 2017; reminder sent October 10, 2017; reminder sent Oct. 31		sign-off dated Oct. 23, 2017		email record
	Shane Sadoway			Sign-off dated Oct. 25, 2017		
	Dave Cobb			Sign-off dated Oct. 31, 2017		
	Bob Mason, Ken Anderson			Sign-off dated Oct. 31, 2017		
	Dale Hansen			Sign-off dated Oct. 27, 2017		
	Brett Salmon			Sign-off dated Oct. 31, 2017		
	Stephen Mills			Sign-off dated Oct. 25, 2017		
	Trisha Stubbings			Sign-off dated Oct. 25, 2017		
	Perm Sieusahai/Bob Baker		3 weeks	Sign-off dated Oct. 24, 2017		
ARIS reconciliation signoff	Garry Mitchell	Oct. 4, 2017; reminder sent out on Oct. 20th to those operators still outstanding; resent to MW, EDFOR and FRIAA on Oct. 31	ASAP	Signoff received on Oct. 6, 2017		email record
	Tim McCready			Signoff received on Oct. 23, 2017		
	Shane Sadoway			Signoff received on Oct. 13, 2017		
	Byron Grundberg			Signoff received on Oct. 31, 2017		
	Dave Cobb			Signoff received on Oct. 31, 2017		
	Perm Sieusahai/ Bob Baker			Signoff received on Oct. 27, 2017		
	Dale Hansen					
	Brett Salmon			Signoff received on Oct. 19, 2017		
	Karalee Brenneis SFPI			Signoff received on Oct. 6, 2017		
	Tanya Norman/Diane Renauld			Signoff received on Oct. 10, 2017		
	Stephen Mills			Signoff received on Nov. 3, 2017		
	Trisha Stubbings			Signoff received on Oct. 26, 2017		
Draft FMP	Ian Daisley	Nov. 1, 2017				email record
	Bob Mason					
	Shane Sadoway					
	Brett Salmon					
	Dave Cobb					
	Perm Sieusahai/ Bob Baker					
	Dale Hansen		Nov. 24			
AIP on FMP Input	Ian Daisley	Nov. 3, 2017	ASAP			email record
	Bob Mason			Letter received Nov. 23		
	Shane Sadoway					
	Brett Salmon					
	Dave Cobb					
	Perm Sieusahai/ Bob Baker					
	Dale Hansen			Letter received Nov. 2 - need to get a signed copy		

Appendix 2-4: Quota Holder Tracking Sheet

Quota Holder Members: Ian Daisley (ANC), Bob Mason(MW), Ken Anderson(MW), Shane Sadoway(BRL), Tracy Corser(BRL), Dave Cobb(EDFOR), Dave Chaluk(ETP), Jerry Baker(TPTL), Dale Hansen(DHL)

CTPP Coordinators - Rebecca Deemeryck (DV), Krista Woods(ED)

ESRD Participants - Liana Luard, Greg Greidanus, Stephen Mills, Darcy Evanochko, Cosmin Tansanu, Darren Aitkin

Weyerhaeuser Participants - Paul Scott, Kerri Mackay

Service Providers: Ted Gooding, Andrew Johnson, Bob Christiansen, Saman Orou, Gyula Guylas

Categories: Yield Curves Development (YC), Land base determination (LB), Timber Supply Analysis (TSA), VOITs,

Date and Topics	***In Attendance***	***Tracking Number***	***Topic Category***	***Action Item or Decision Made***	***Date Completed***
Meeting #1: Sept. 15, 2014 ; Presentation to timber operators of current status of FMP planning	Paul Scott, Kerri Mackay, Ian Kwantes, Gyula Guylas, Ted Gooding, Andrew Johnson, Ian Daisley, Bob Mason, Ken Anderson, Shane Sadoway, Tracy Corser, Dave Cobb, Liana Luard, Greg Greidanus, Stephen Mills, Darcy Evancohko, Rebecca Heemeryck **Not Present: Jerry Baker, Dave Chaluk, Dale Hansen, Cosmin Tansanu**	QH-01	GY	**Yield Curve Baseline utilization for conifer of 15/11/15/366 CTL** - no issues	Sept. 15
		QH-02	GY	**Cull - scale, field** - no issues with numbers provided	Sept. 15
		QH-03	GY	**RSA data** - Millar Western and ANC to check if any RSA data available; Kerri to see if Tall Pine has any data, Paul to check with Dave Chaluk	9-Nov-15
		QH-04	LB	**Provincial hydro layer** to be used with no adjustments - ESRD OK	Sept. 15
		QH-05	LB	**Watershed layer** - Paul to send to Liana to review.	Sept. 16
		QH-06	LB	**Siesmic Line width** - 8 meters in natural stands	Sept. 15
		QH-07	LB	**Single landbase** - no issues brought forward at this time	Sept. 15
Meeting #2:Sept. 09, 2015 ; Presentation to timber operators of current status of FMP planning	Paul Scott, Kerri Mackay, Gyula Guylas, Andrew Johnson, Ken Anderson, Tracy Corser, Dave Cobb, Greg Greidanus, **Not Present: Jerry Baker, Dale Hansen, Bob Mason, Ian Daisley, Stephen Mills, Rebecca Heemeryck, Ted Gooding, Krista Woods, Brett Salmon,Liana Luard, Darcy Evanochko, Cosmin Tansanu**		No issues brought forward; see notes provided by Andrew Johnson G:\PLANNING\2016 DFMP\12.0 Presentations\ September 9_2015\ QHMeeting_notes_Sept9_20150914.pdf		

Meeting #3: Janyary 13, 2016 Presentations on; timelines, Public and First Nations process, AVI, ARIS reconciliation, NLB, YC, Genetic Gain, TSA, Voits, Shared documents	Paul Scott, Kerri Mackay, Gyula Guylas, Andrew Johnson, Dan Jensen, Ted Gooding, Bob Mason, Paul King, Dale Hansen, James Norman, Ken Andersen, Tracy Corser, Dave Cobb, Cynthia Lebrecque, Ian Kwantes, Bill Taylor, Greg Greidanus, Cosmin Tansanu, Liana Luard, Stephen Mills, Darcy Evanochko, Cosmin Tansanu **Not Present: Shane Sadoway, Ian Daisley, Rebecca Heemeryck, Krista Woods, Brett Salmon,**	QH-08		ANC and BRL were not in agreement to the Structure retention percent represented in VOIT #10 - AAF aware of this G:\PLANNING\2016 DFMP\12.0 Presentations\ January 13_2016\ QHMeeting_notes _Jan13_20160119.pdf		
Meeting #4: April 26th, 2016: presentation of status of Yield curve development, net land base determination, wildlife models, ARIS reconciliation, structure retention, SST	Paul Scott, Kerri Mackay, Gyula Guylas, Andrew Johnson, Dan Jensen, Ted Gooding, Bob Mason, Shane Sadoway, Ian Daisley, Greg Greidanus, Cosmin Tansanu, Liana Luard, Stephen Mills, Ian Kwantes, Deb Weber **Not Present: Tracy Corser, Dave Cobb, Paul King, Dale Hansen, Rebecca Heemeryck, Krista Woods, Brett Salmon, Darcy Evanochko**	QH-09	LB	Dan to see how much area is made up of transistional small permanents as part of the buffer deletions layer; Weyerhaeuser to make decision on whether in or out of the NLB G:\PLANNING\2016 DFMP\12.0 Presentations\April 26_2016\ QHMeeting_notes_Apr26_ 20160429_final.pdf	April 27th	
Meeting #5: September 15th, 2016: presentation of draft Yield curve document, draft net land base doucument, review of ARIS reconciliation summary to date, Silviculture Strategy Table review	Paul Scott, Kerri Mackay, Gyula Guylas, Andrew Johnson, Dan Jensen, Ted Gooding, Bob Mason, Ian Daisley, Dana Williams, Greg Greidanus, Liana Luard, Stephen Mills, Tracy Courser, Dave Cobb, Paul King, Dale Hansen, Rebecca Heemerrck, Ken Anderson **Not Present: Krista Woods, Brett Salmon, Shane Sadoway, Cosmin Tansanu**	QH-10		See action items from previous meeting. G:\PLANNING\2016 DFMP\12.0 Presentations\ September 15, 2016\ QHMeeting_notes _Sep15_20160919.pdf		
		QH-11	RSA	Discussion on risk of using RSA results; indicated that process defined by AAF, and numbers are generally compareable to others throughout the Province	15-Sep-16	
		QH-12	SHS	Quota holders need to review the seed polygons identified in the P10005 validation process - Forcorp to send out a shape file to each operator those blocks they reviewed and said either yes or no to	Only TPTL outstandins as of Dec. 13, 2016	

Additional Supporting information						
Meeting date	Attachments					
Sept. 15		G:\PLANNING\2016 DFMP\Presentation		G:\PLANNING\2016 DFMP\Presentation		

Appendix 2-5: Secondary Stakeholder Meeting Presentation

Weyerhaeuser Pembina Timberlands

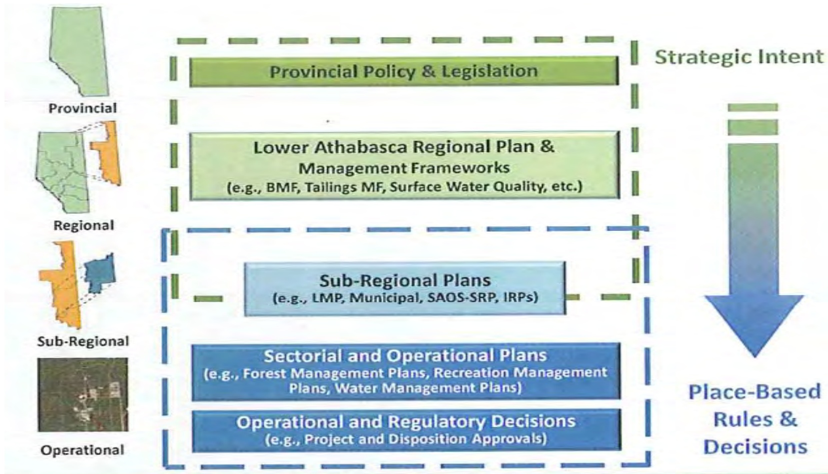
Alberta's Green Area

- 35.1 million ha
- Shared management responsibility.
  - Land Manager (Environment and parks)
  - Forest Manager (Agriculture and Forestry)

2

Alberta Land Use Framework

Planning Hierarchy



Weyerhaeuser Pembina Timberlands

Land Use Framework - Regional Plans

- Main strategy under the Land-use Framework Policy
- Define economic, environmental, and social outcomes for a region in relation to land-use
- Align provincial policies related to land/ environment at a regional level
- Environmental Frameworks for each Region (Air, Surface Water, Groundwater, Biodiversity)
- *Addresses cumulative effects, and binds Government to act to thresholds*

4

Weyerhaeuser Pembina Timberlands

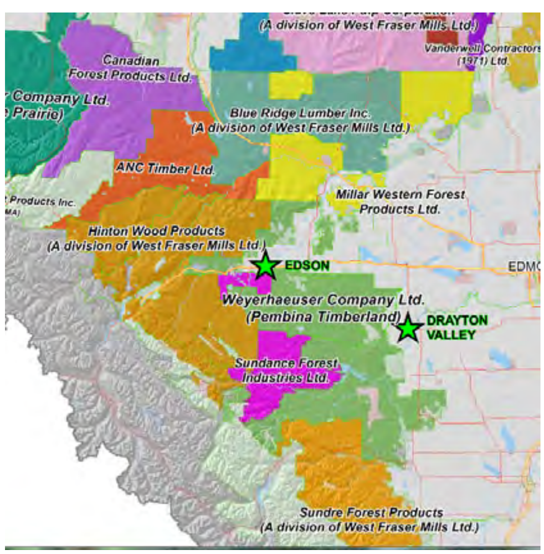
Forest Tenure

<u>**Forest Management Agreement:**</u>

- **Area based, surface rights agreement between Government and Weyerhaeuser (Order-In-Council)**
- **Rights to establish, grow and harvest forests**
- **20 Year renewable agreement subject to terms and conditions**
- **Minimize impacts of forest management on other resource values and users**
- **Forecasts future development of the forest over 200+ years**
- **Indigenous communities, stakeholder and public engagement**

5

Forest Management Agreement (FMA) Areas



6

Weyerhaeuser Pembina Timberlands

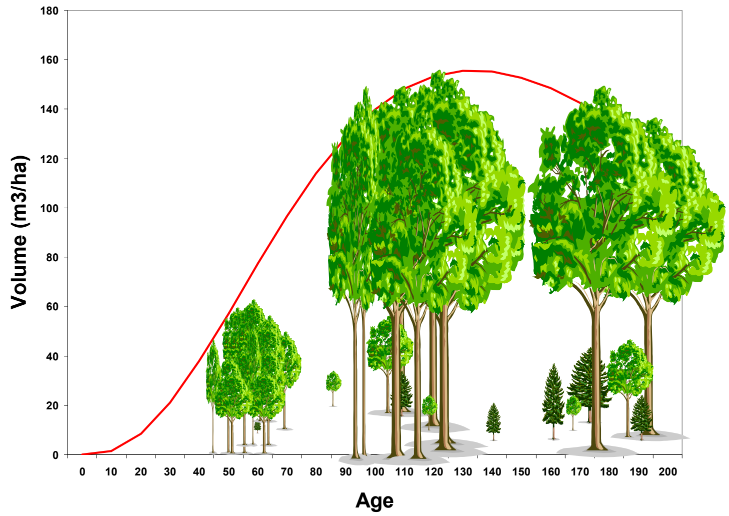
Forest Management Plan:

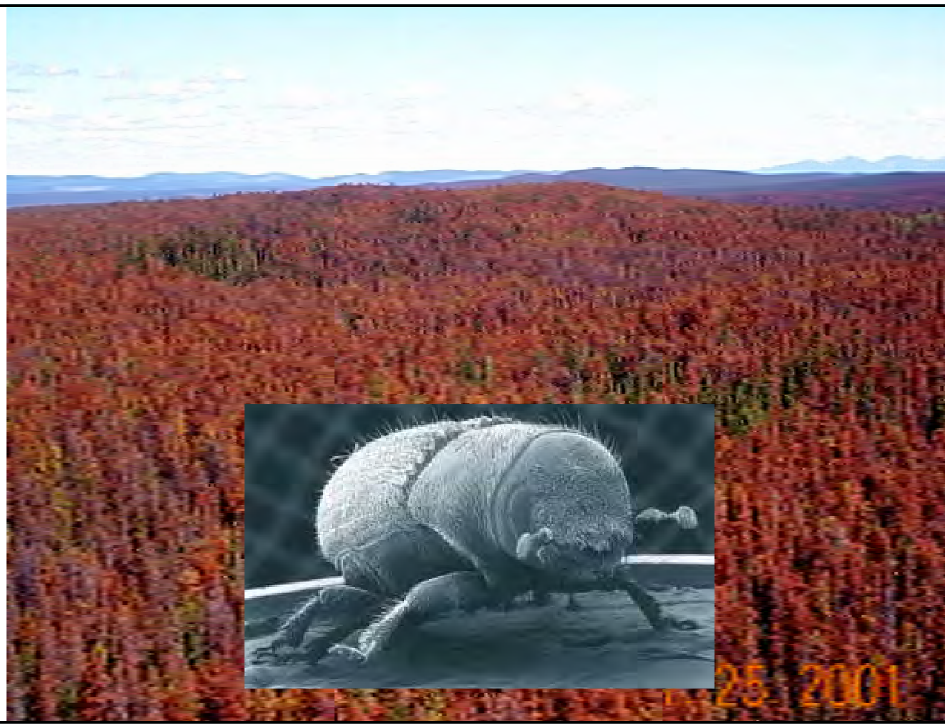
- Long term management of forest vegetation and minimizes impacts of forestry operations on other values and users
- Establishes sustainable forest management, including long term sustained timber yields, based on Government of Alberta standards and international environmental certifications
- Forecasts future forest development at 200 years
- ***Sets sustainable timber harvest levels*** subject to Government approvals, and 20 year sequencing of where timber harvesting will occur
- Revised every 10 years

7

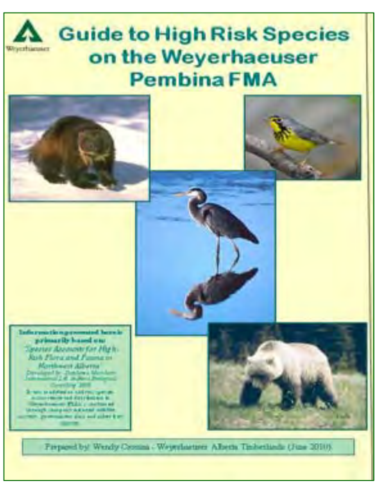
Yield

Stand Level

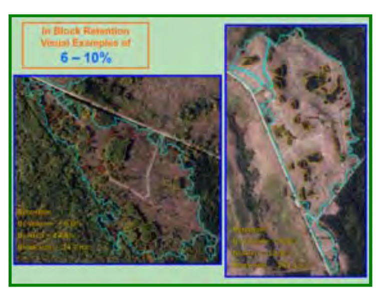




Weyerhaeuser Pembina Timberlands



Wildlife Conservation & Protection



12

Weyerhaeuser Pembina Timberlands

Integrated Land Management

13

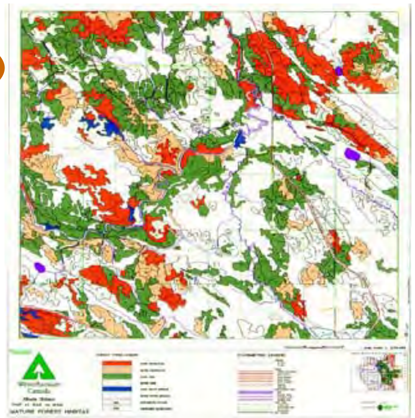
Reforestation

- ✓ All harvested areas are reforested to regulated standards
- ✓ We reforest to the same forest types that are there today
- ✓ Reforestation is monitored for up to 15 years to ensure success
- ✓ We plant over 4 million seedlings annually

Harvest Design - Criteria

Wildlife

Aesthetics



Watershed

Logistics

Ecological

Timber

Reforestation

Getting input & involvement from stakeholders, public and Indigenous communities

Key Issues Overview

From the perspective of those seeing what others do in the forest:

Cause	Effect
Logging	➢ Change from old forest to young/new forest ➢ Change forest over the landscape ➢ Is it reforested, is it sustainable? ➢ Wood fibre “waste”
Roads, pipelines, wells, etc.	➢ Removes forest cover / soil, fragments habitat ➢ Brings people (hunting, disturbance) ➢ Crosses watercourses / watersources
Motorized recreational vehicle use	➢ Brings people (hunting, disturbance) ➢ Crosses watercourses / watersources
Herbicide	➢ Enviro hazard
Grazing	➢ Forest cover change ➢ Domestic animals ➢ Brings people

Key Issues Overview

From the perspective of regulators:

Legislation / Regulation / Policy	Focus
Traditional Use by Aboriginal Peoples	➢ Fishing, hunting, trapping, special uses
Public Lands, Forests, Minerals, PNG, Water, Fish & Wildlife	➢ Use of Crown land (commercial & recreational) ➢ Use & conservation of natural resources ➢ Renewable, sustainable forest resource ➢ Forest protection (fire)
Environmental protection	➢ Soil ➢ Water, watersheds ➢ Pollution, contamination, hazardous waste
Endangered, threatened species	➢ Adequate habitat ➢ Protection from people ➢ Terrestrial & aquatic
Migratory birds	➢ Nest protection
Historical resources	➢ Protection (temporary & permanent)

Key Issues Overview

From the perspective of resource managers, scientists:

Topic	Focus
Biodiversity	➢ How do you measure it? ➢ How do you influence / manage for it? ➢ Habitat – fragmentation, patch size, age/type of forest
Conservation, natural range of variability	➢ What can be "managed" vs. what needs to be protected? How much is enough? ➢ What's "natural"? How do we compare?
Watersheds	➢ What impacts do disturbances have? ➢ How much is reasonable? ➢ What are the best protection requirements?
Cumulative effects	➢ What are the effects of human developments? ➢ How much is too much? ➢ ***How do we manage for multiple users impacts?***
Climate change	➢ What's going to change, how do we adapt?

Weyerhaeuser Pembina Timberlands

Forest Management:

- **What further information would you like to know?**
- **What concerns, issues or questions do you have that can be addressed in forest management?**
- **Would you like to be kept informed over time, and if so, how?**

20

Environmental Management Frameworks – Regional Approach to Cumulative Effects

Indicators, Thresholds

- Indicators are chosen (e.g. NO_2, Phosphorous)
- Triggers and limits (thresholds) are set for each indicator

Monitoring and Modeling

- Monitor and assess actual ambient conditions relative to triggers and limits

Management Response and Reporting

- Exceeding triggers or limits requires a response
- Results reported

Pembina 2017-2026

Forest Management Plan

Chapter 3: Landscape Assessment

March 19, 2018

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3 Landscape Assessment

3.1 Introduction

In December 2009, Weyerhaeuser's Edson and Drayton Valley Forest Management Agreement (FMA) areas were amalgamated into a single FMA, the Weyerhaeuser Pembina Timberland FMA. The new FMA encompassed Forest Management Units (FMU) E2, E15, W5, W6 and R12. For the 2016 Forest Management Plan (FMP), FMUs E2, E15, W5, W6 and R12 have also been amalgamated into a new single FMU, R15. While this amalgamation is awaiting final approval by Alberta Agriculture and Forestry (AAF), the FMP assumes a single FMU. The Defined Forest Area (DFA) covered in this FMP consists entirely of the new amalgamated FMU.

Much of the information presented in this chapter was derived from information presented in Weyerhaeuser's previous FMPs, new Alberta Vegetation Inventory (AVI), and data obtained from AAF. This chapter is laid out in a similar format to the 2012 Regional Forest Landscape Assessment Reports and is provided as background to help guide FMP development. Due to the age and scale of the data, it may not align with data presented elsewhere within the FMP.

The source of data for each topic is referenced with the use of end notes. The full data list is presented in Appendix 3-1 with appropriate references included in each section. All data source references are identified by the format (1) where '1' represents the reference in a numerical sequence, listed in Appendix 3-1. All initialisms used in the report are defined in the glossary of the FMP. Maps included herein reflect a broad representation of each metric, and are not intended for operational use.

Some area estimates may not agree with other published information within this report. The presentation of area estimates to the nearest hectare may result in the tabulated sums of some tables to appear to not total correctly; however, this is simply due to rounding.

3.2 Administrative Boundaries

3.2.1 Forest Management Agreement and Defined Forest Area

The Weyerhaeuser Pembina Defined Forest Area (DFA) is located in west central Alberta, covering 1,067,415 hectares and including both Forest Management Agreement (FMA) and non-FMA areas (1). Non-FMA areas (those excluded from the legal boundaries of the FMA) account for 11% of the DFA (Table 3-1) and contain:

1. **First Nations Reserves** (Sunchild and O'Chiese)
2. **Provincial Parks** (Sundance, Obed Lake, and Crimson Lake)
3. **Provincial Recreation Areas** (Fickle Lake, Brazeau Reservoir, Brazeau River, Brown Creek, Chambers Creek, Hornbeck Creek, Minnow Lake, Wolf Lake, Nojack, and Wapiabi)
4. **Natural Areas** (O'Chiese and Aurora)
5. **Provincial Grazing Reserves** (Sang Lake and Pembina)
6. Lands that are covered by **Grazing Leases**. Weyerhaeuser manages these areas for their deciduous timber through Deciduous Timber Allocations (DTAs) and for their coniferous timber through Coniferous Timber Quotas (CTQs).

FMA and non-FMA areas are visible in Figure 3-1.

Table 3-1. Defined forest area (DFA) and forest management agreement (FMA) area.

DFA	Administrative Boundary	Area (ha)	% of DFA
FMA	FMA	955,220	89
	Subtotal	***955,220***	***89***
Non-FMA	First Nations Reserves	19,065	2
	Provincial Parks	8,170	1
	Provincial Recreation Areas	6,134	1
	Natural Areas	1,284	0
	Provincial Grazing Reserves	18,301	2
	Grazing Leases	30,728	3
	Other	28,513	3
	Subtotal	***112,195***	***11***
Total		**1,067,415**	**100**

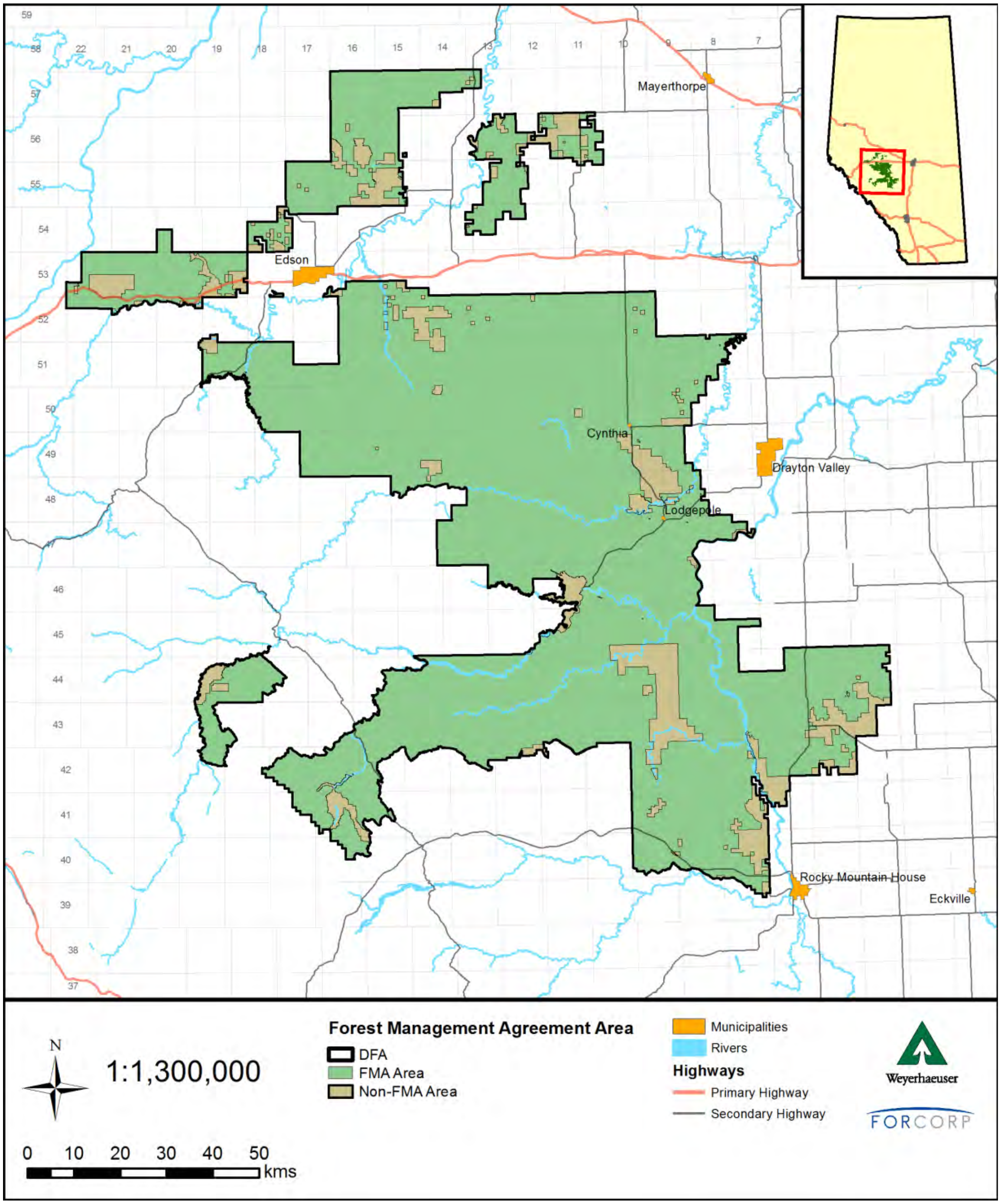


Figure 3-1. FMA and non-FMA areas of the DFA.

3.2.2 Surrounding Forest Management Agreement Areas

The DFA is bordered on three sides by four different FMAs (1) (Figure 3-2). To the north, Millar Western Forest Products Ltd. produces pulp and dimension lumber at its facilities in Whitecourt. To the west, Hinton Forest Products produces pulp and dimension lumber in Hinton, and Edson Forest Products (formerly Sundance Forest Industries) manufactures both lumber and value-added products in Edson. Finally, to the south, Sundre Forest Products produces dimensional lumber in Sundre and laminated veneer lumber in Strachen. The eastern side of the DFA is adjacent to Alberta's White Area (Section 3.2.7) and shares borders with agricultural land and municipal developments.

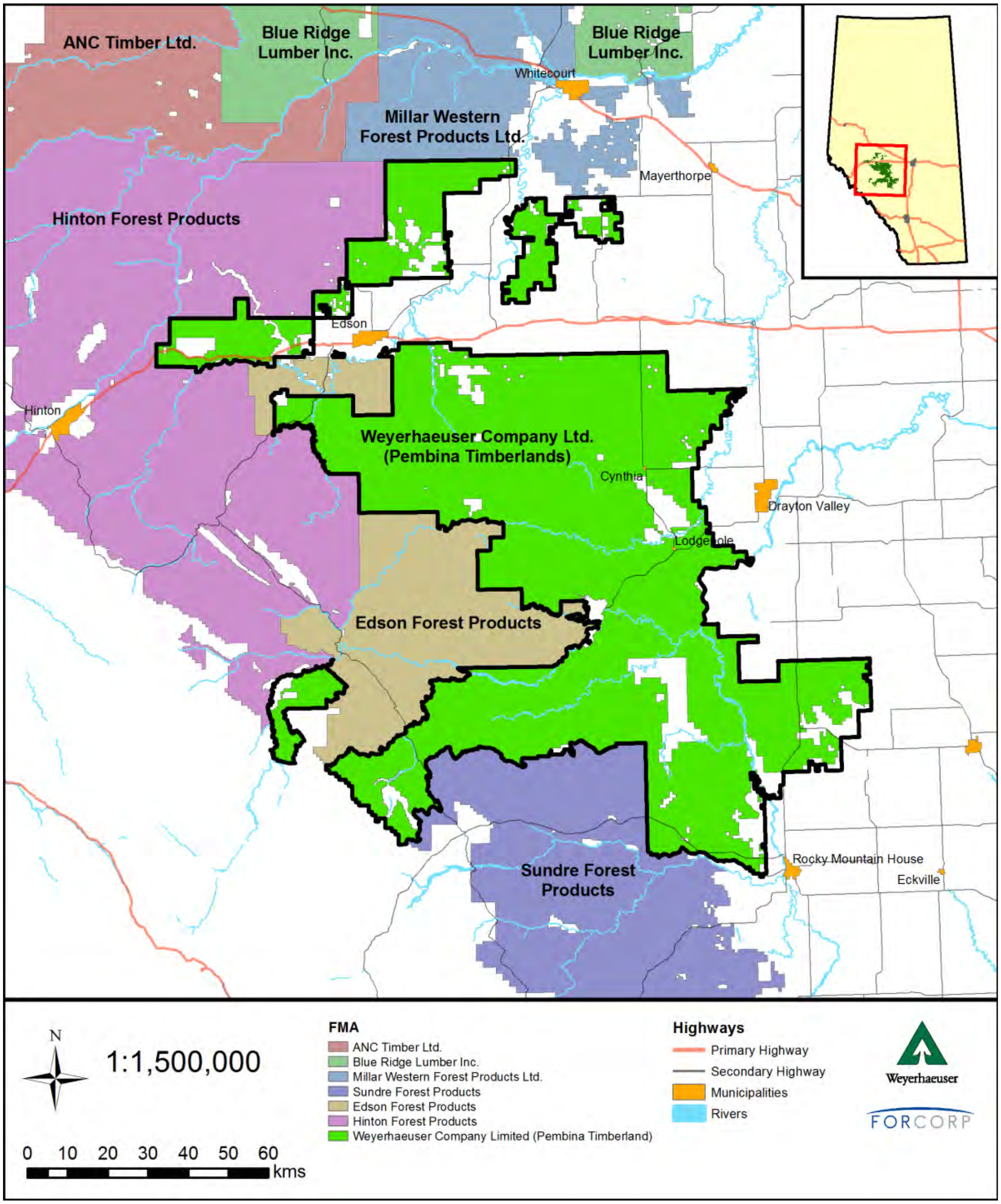


Figure 3-2. Forest management agreement areas surrounding the DFA.

3.2.3 Forest Management Units

The Weyerhaeuser DFA contains only one Forest Management Unit (2), R15 (Figure 3-3):

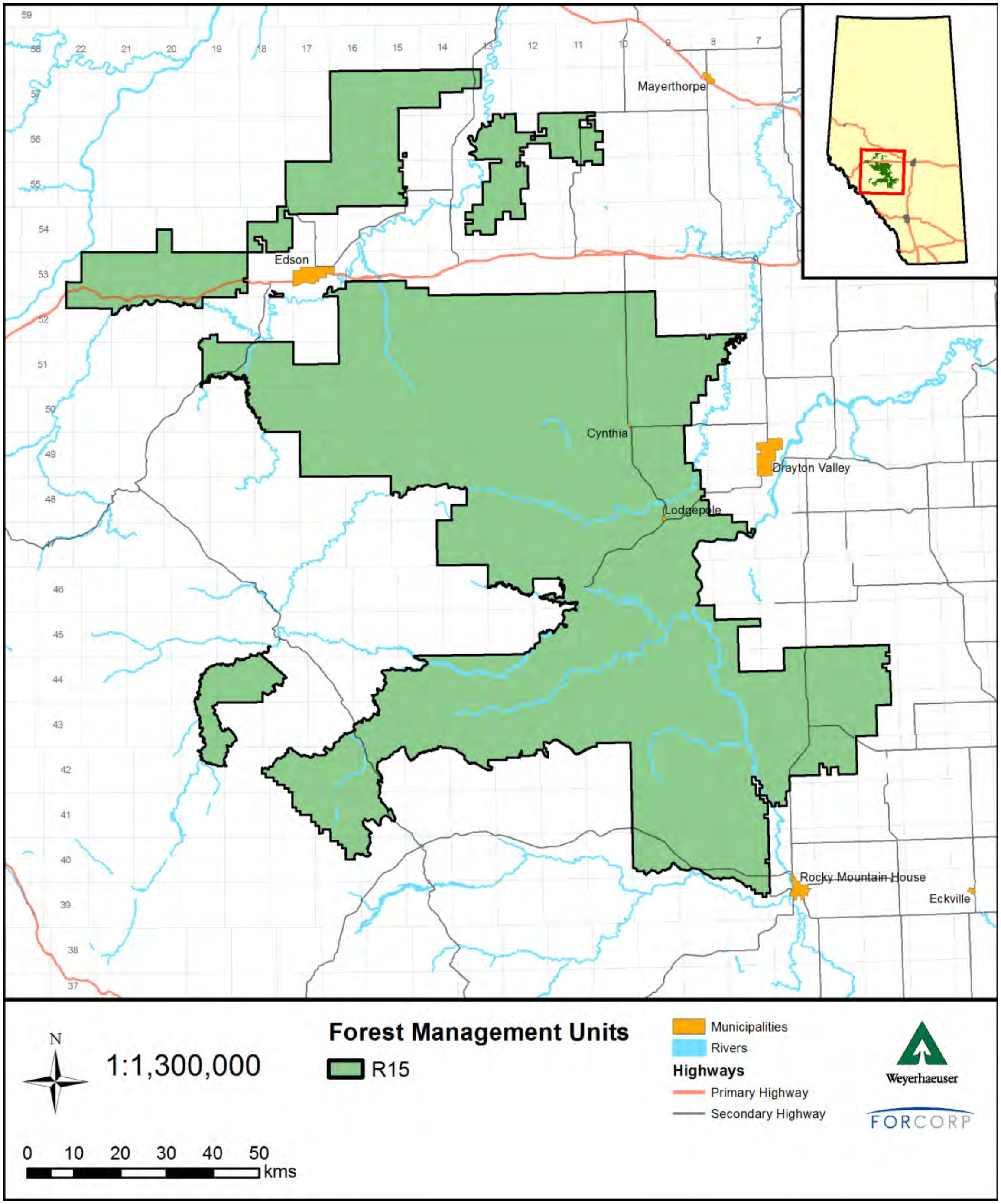


Figure 3-3. Forest management units within the DFA.

3.2.4 Volume Supply Areas

R15 is an amalgamation of previous FMU boundaries, on which Volume Supply Areas (VSA) are based (2) (Figure 3-4):

- VSA 1 is consistent with former FMU E2, and covers an area north of the Yellowhead Highway. It is generally west and north of Edson.
- VSA 2 is consistent with former FMU W5, located in three components: to the northeast of Edson, south of Niton Junction, and adjacent to the Pembina Grazing Reserve.
- VSA 3 is consistent with former FMUs E15 and W6, and is generally located south of the Yellowhead Highway and north of the Pembina River
- VSA 4 is consistent with former FMU R12, and covers an area south of the Pembina River and north of Highway 11. It is the largest VSA (Table 3-2).

Along the Yellowhead Highway, the White Area roughly separates VSAs 1 and 2 from VSAs 3 and 4. Two FMUs exist within this area (E01 and W01). These White Area FMUs integrate land that is privately owned with land that is owned by the Crown. The primary use for Crown land within the White Area is cattle grazing, with timber production being secondary. E01 and W01 do not currently have annual allowable cuts assigned. Timber production is generally confined to smaller own-use permits issued by AAF, or to larger permits sold through an auction process.

Table 3-2. Volume supply areas.

VSA	Area (ha)	% of DFA
1	121,327	11
2	68,802	6
3	346,365	32
4	530,921	50
Total	**1,067,415**	**100**

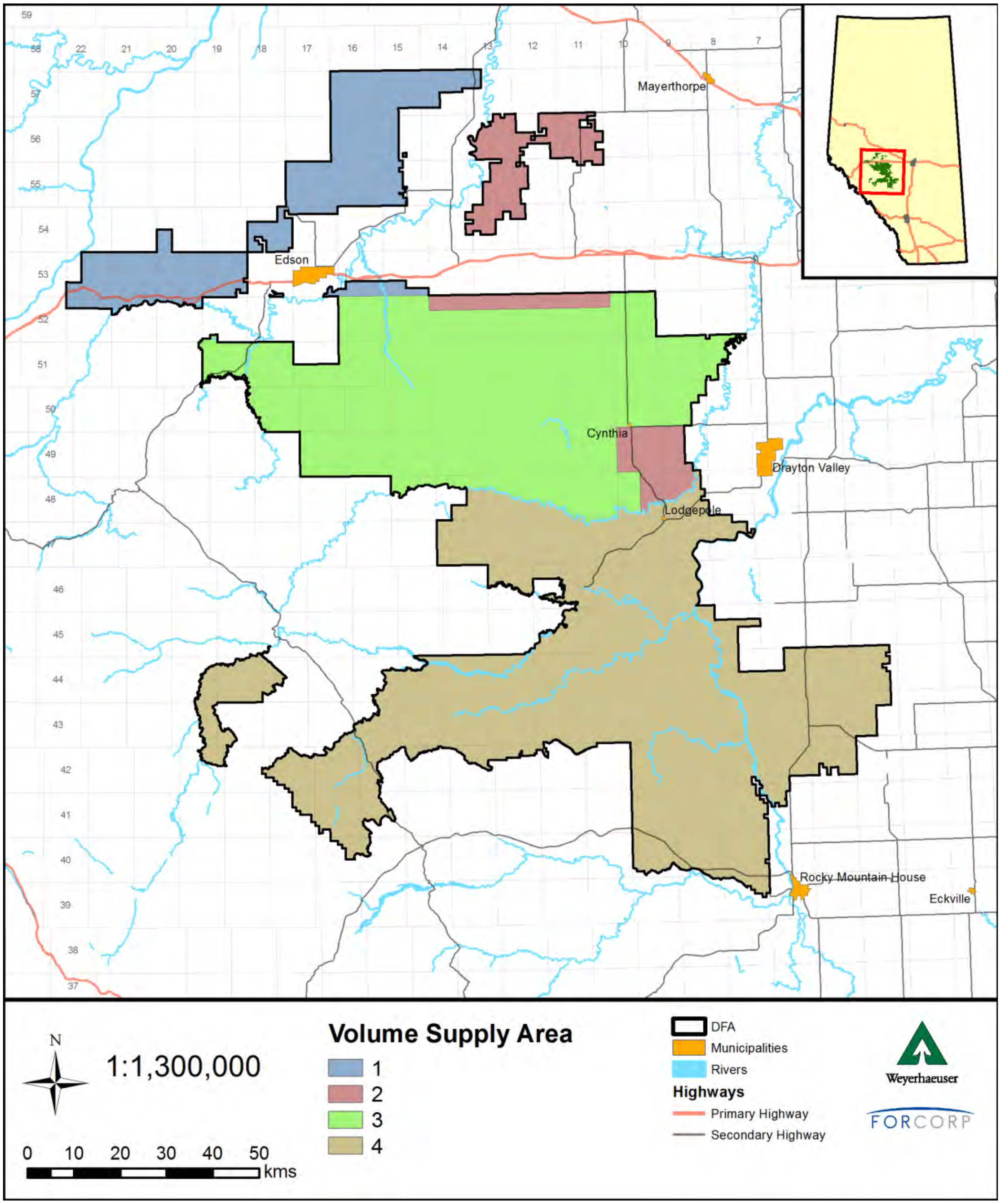


Figure 3-4. Volume supply areas of the DFA.

3.2.5 Compartments

The DFA is separated into 10 compartments (3) (Figure 3-5 and Table 3-3). The compartments divide the DFA into smaller units which provide a link between the strategic level FMP and operational implementation, for example, Spatial Harvest Sequence (SHS) variance analysis is completed at the compartment level.

Table 3-3. Compartments.

Compartment	Area (ha)	% of DFA
Baptiste	77,459	7
Beaver Meadows	34,278	3
Brazeau	109,476	10
Edson	115,485	11
Macmillan	190,536	18
Medicine Lake	86,035	8
Nordegg	68,540	6
South Canal	123,406	12
West Country	66,005	6
Wolf Lake	196,195	18
Total	**1,067,415**	**100**

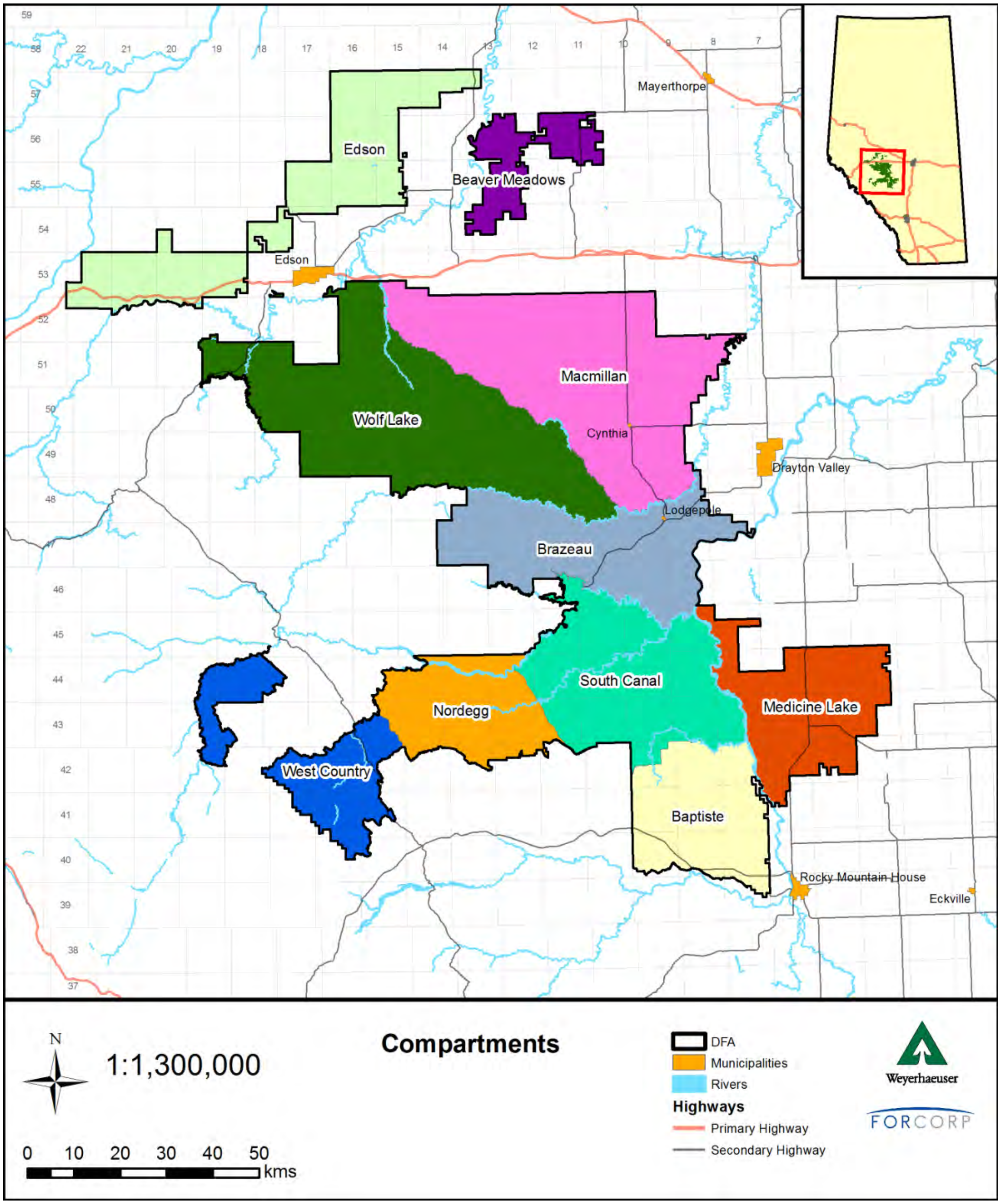


Figure 3-5. Compartments within the DFA.

3.2.6 Land-Use Regions

Alberta's Land-Use Framework (LUF) identifies seven regions, of which the DFA overlaps two: the Upper Athabasca and the North Saskatchewan (Alberta, 2008) (4). The Upper Athabasca is the fourth largest of the seven regions and covers the north-western half of the DFA. The North Saskatchewan is the third largest region and covers the south-eastern half of the DFA. These regions have significant industrial and recreational activities throughout. Table 3-4 and Figure 3-6 provide additional details for the regions.

Table 3-4. Land-use regions.

Land-Use Region	Total Region Area in Alberta (ha)	Area of Region Within the DFA (ha)	% of Region in the DFA	% of DFA
Upper Athabasca	8,298,097	533,356	6	50
North Saskatchewan	8,578,706	534,059	6	50
Total	**16,876,803**	**1,067,415**	**6**	**100**

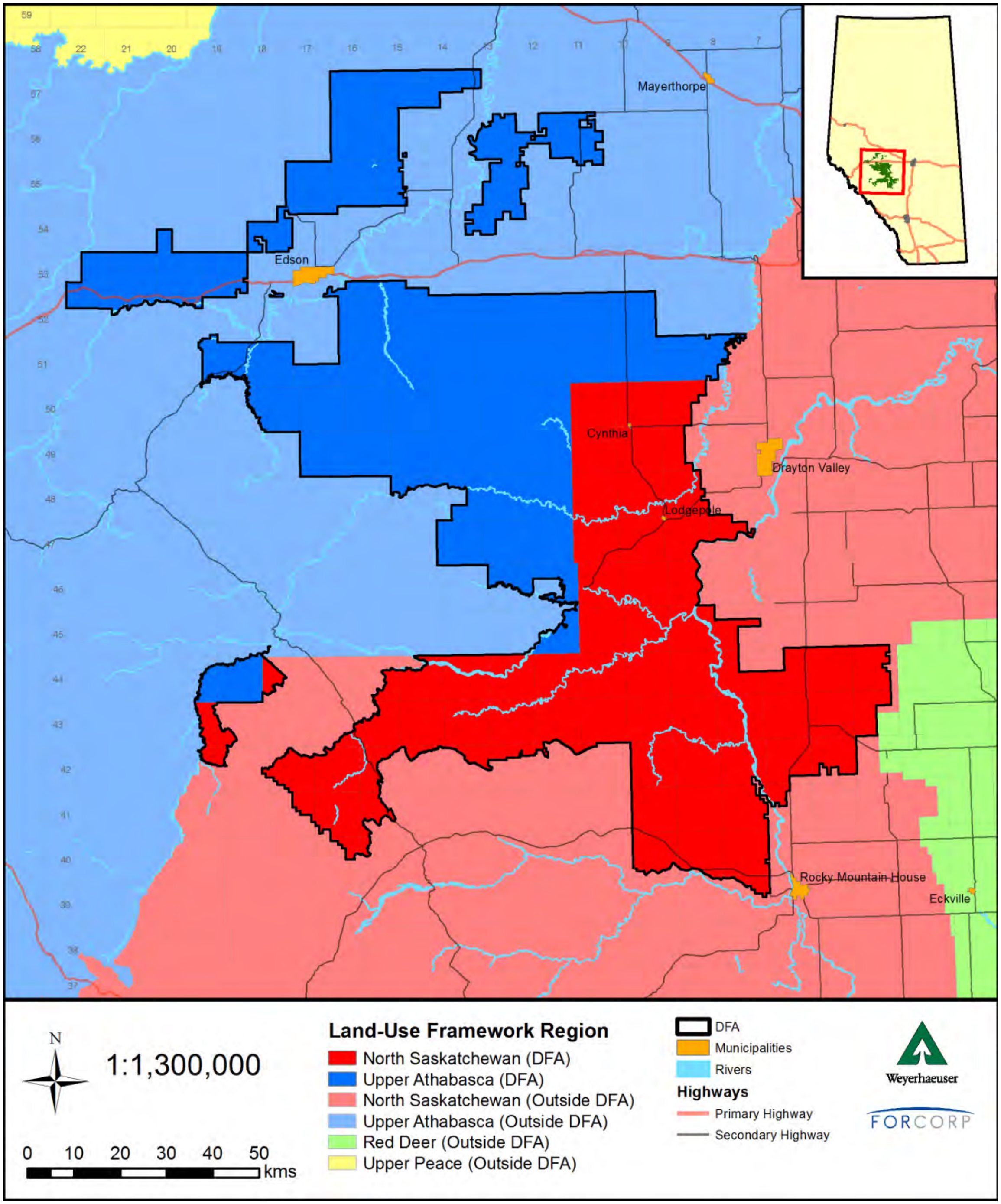


Figure 3-6. Alberta land-use framework regions within and around the DFA.

3.2.7 Green and White Areas

The Green and White Areas of Alberta (5) are zones created in 1948 for the purposes of land use decision making. The white area is primarily private land, often related to agricultural use. The green area is referred to as crown land, and is managed for natural resource development, recreation and conservation. Federal lands are excluded from these two areas; including national parks, military areas, etc. The DFA is exclusively located in the green area (Figure 3-7).

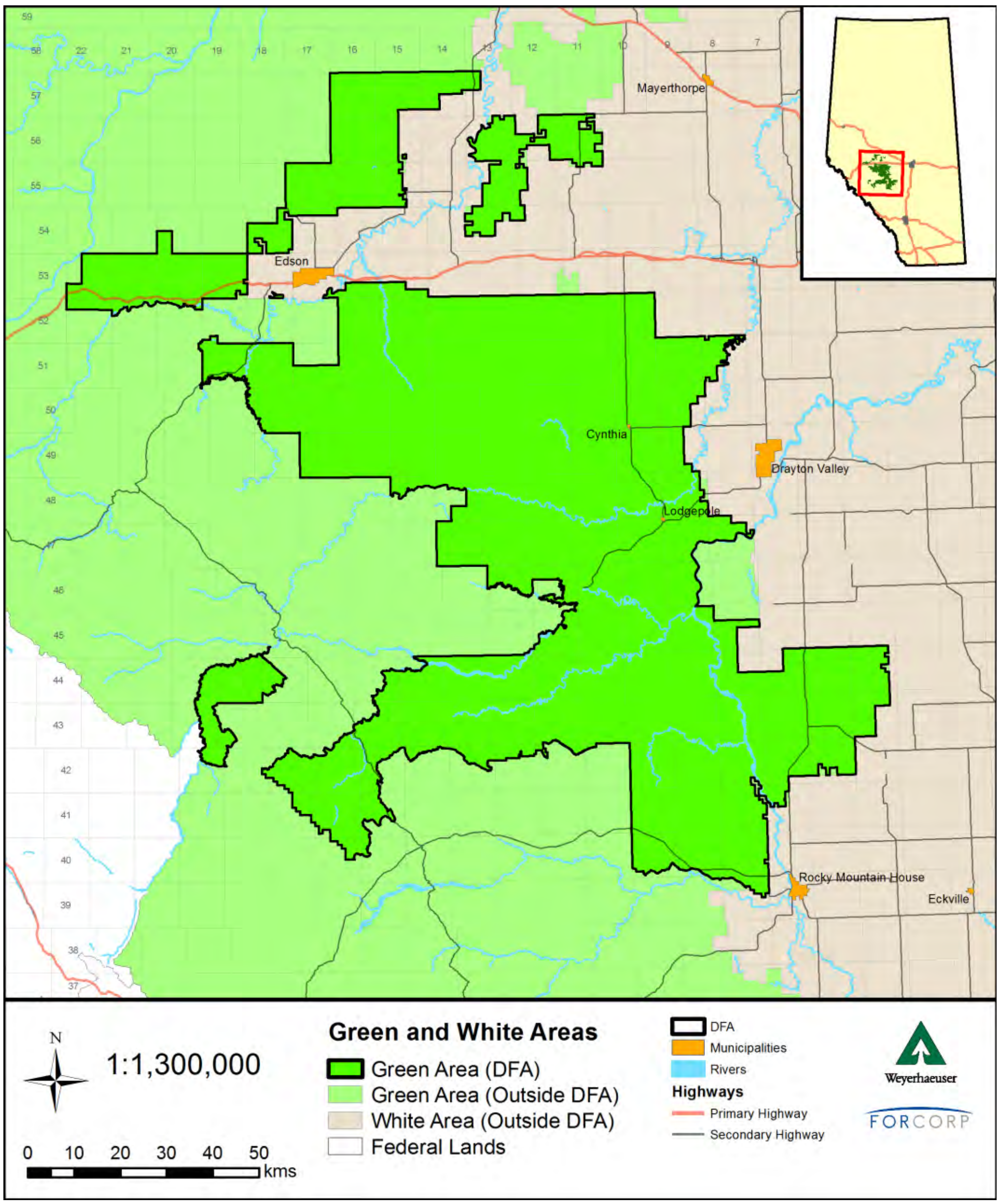


Figure 3-7. Green and white areas.

3.2.8 Natural Subregions

The DFA contains six of Alberta's natural subregions (Natural Regions Committee 2006) (6). The lower foothills subregion makes up 85.5% of the DFA, and together with the upper foothills, central mixedwood, and subalpine subregions 99.8% of the DFA is covered. The remaining two subregions, the dry mixedwood and the alpine, make up only 0.1% of the DFA each (Table 3-5) and (Figure 3-8).

Lower Foothills

The Lower Foothills natural subregion is characterized by deciduous forests and deciduous-dominated mixedwood forests, with coniferous forests 650 to 1625 meters Above-Sea-Level (ASL). It represents a transition from the aspen and white spruce dominated boreal mixedwood forest to the lodgepole pine dominated forests of the Upper Foothills natural subregion. The Lower Foothills is the predominant natural subregion in the DFA, accounting for approximately 86% of the area.

Upper Foothills

The Upper Foothills natural subregion occurs at elevations above the Lower Foothills, and generally in the western portion of the DFA. The elevation ranges from 950 to 1750 meters ASL. Whereas the Lower Foothills is characterized by deciduous and deciduous-dominated mixedwood forests, the Upper Foothills is dominated by coniferous forests containing mainly lodgepole pine. The mixing of white spruce and Engelmann spruce in coniferous forest stands has also been observed in the Upper Foothills, but in general, there is a lack of aspen. The Upper Foothills accounts for approximately 7% of the DFA.

Subalpine

The Subalpine natural subregion occurs above the Upper Foothills, at elevation ranges of 1,150 to 2,000 meters (ASL). Lodgepole pine is the dominant species. The presence of Engelmann spruce instead of white spruce in successionally mature stands, along with subalpine fir, is another indication of the Subalpine. Found in the southwest corner of the DFA, the Subalpine accounts for approximately 2% of the area.

Alpine

The Alpine natural subregion occurs above the Subalpine, at elevations higher than 2,000 meters ASL. There is no dominant forest cover in this region. The Alpine natural subregion just barely overlaps the southwestern border of the DFA, and accounts for less than 1% of its area.

Central Mixedwood

The Central Mixedwood natural subregion occurs below the Lower Foothills, at elevations of 200-1,050 meters ASL. Forest stands vary from aspen deciduous to aspen-dominated mixedwoods, to white spruce and jack pine on upland terrain. The Central Mixedwood covers 5% of the DFA, located on its eastern side.

Dry Mixedwood

The Dry Mixedwood natural subregion occurs below the Lower Foothills at elevations between 225 and 1,225 meters ASL. Vegetation cover is similar to the Central Mixedwood but with less coniferous. The Dry Mixedwood is largely covered by aspen stands with understoreys dominated by rose, beaked hazelnut, tall forbs and marsh reed grass. This region overlaps a small piece of the southeastern corner of the DFA, accounting for less than 1% of its area overall.

Table 3-5. Natural subregions within the DFA.

Natural Subregion	Area (ha)	% of DFA
Alpine	798	0.1
Subalpine	25,379	2.4
Lower Foothills	912,968	85.5
Upper Foothills	73,877	6.9
Central Mixedwood	53,454	5.0
Dry Mixedwood	939	0.1
Total	**1,067,415**	**100.0**

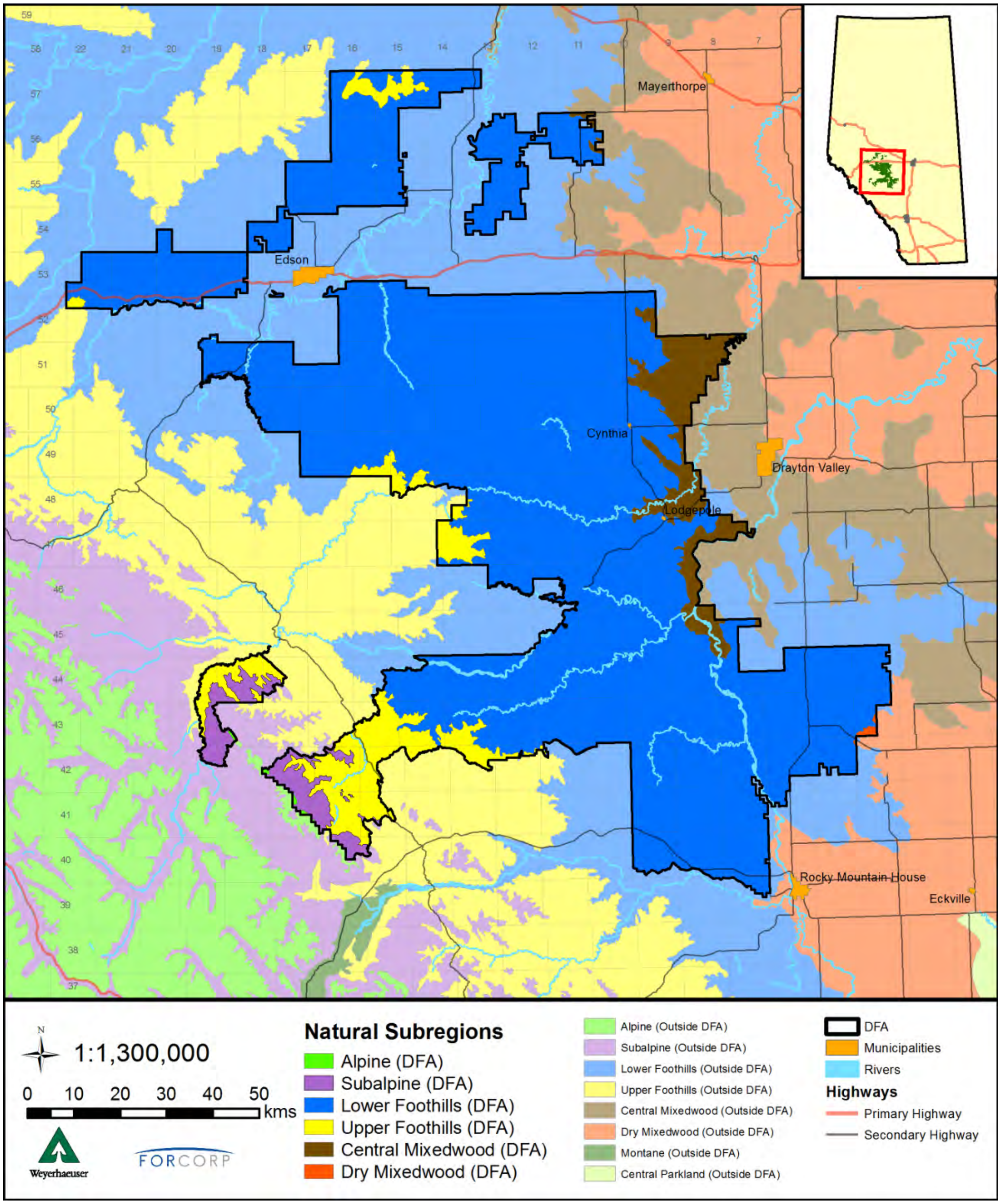


Figure 3-8. Natural subregions within the DFA.

3.2.9 Municipal Districts

The DFA covers portions of four provincial counties: Yellowhead, Woodlands, Brazeau and Clearwater (Figure 3-9) (7). For each, Table 3-6 shows the area of the portion within the DFA.

Table 3-6. Municipal districts.

County	Area within DFA (ha)	% of DFA
Brazeau	161,222	15
Clearwater	372,871	35
Woodlands	11,203	1
Yellowhead	522,119	49
Total	**1,067,415**	**100**

Table 3-7 presents the population for each county in its entirety (Alberta, 2015a). There are only three populated centres within the DFA, Lodgepole, Marlboro, and Cynthia. Lodgepole had a population of 125 in the 2011 federal census, Marlboro had a population of 80, and Cynthia was not surveyed (Statistics Canada, 2012a and 2012b). Nearby towns include the larger centres of Edson, Drayton Valley, and Rocky Mountain House and smaller centres of Mayerthorpe and Eckville (Table 3-8). Figure 3-10 illustrates the other small populated centres near the DFA.

Table 3-7. Population of municipal locations within or overlapping the DFA.

Municipal Classification	Name	Population[1]
County	Brazeau	7,201
	Clearwater	12,278
	Woodlands	4,612
	Yellowhead	10,469
County Subtotal		*34,560*
Unincorporated Place	Cynthia	100[2]
	Lodgepole	125
	Marlboro	80
Unincorporated Place Total		*305*
Grand Total		**34,865**

[1] Woodlands County population figures are current as of May 2014, all other population figures are current as of May 2011

[2] Estimated

Table 3-8. Population of towns surrounding the DFA.

Town	Population[1]
Edson	8,646
Drayton Valley	7,049
Rocky Mountain House	7,220
Mayerthorpe	1,398
Eckville	1,125
Total	**25,438**

[1] Rocky Mountain House population figure is current as of 2015, Edson as of 2012, all others as of 2011

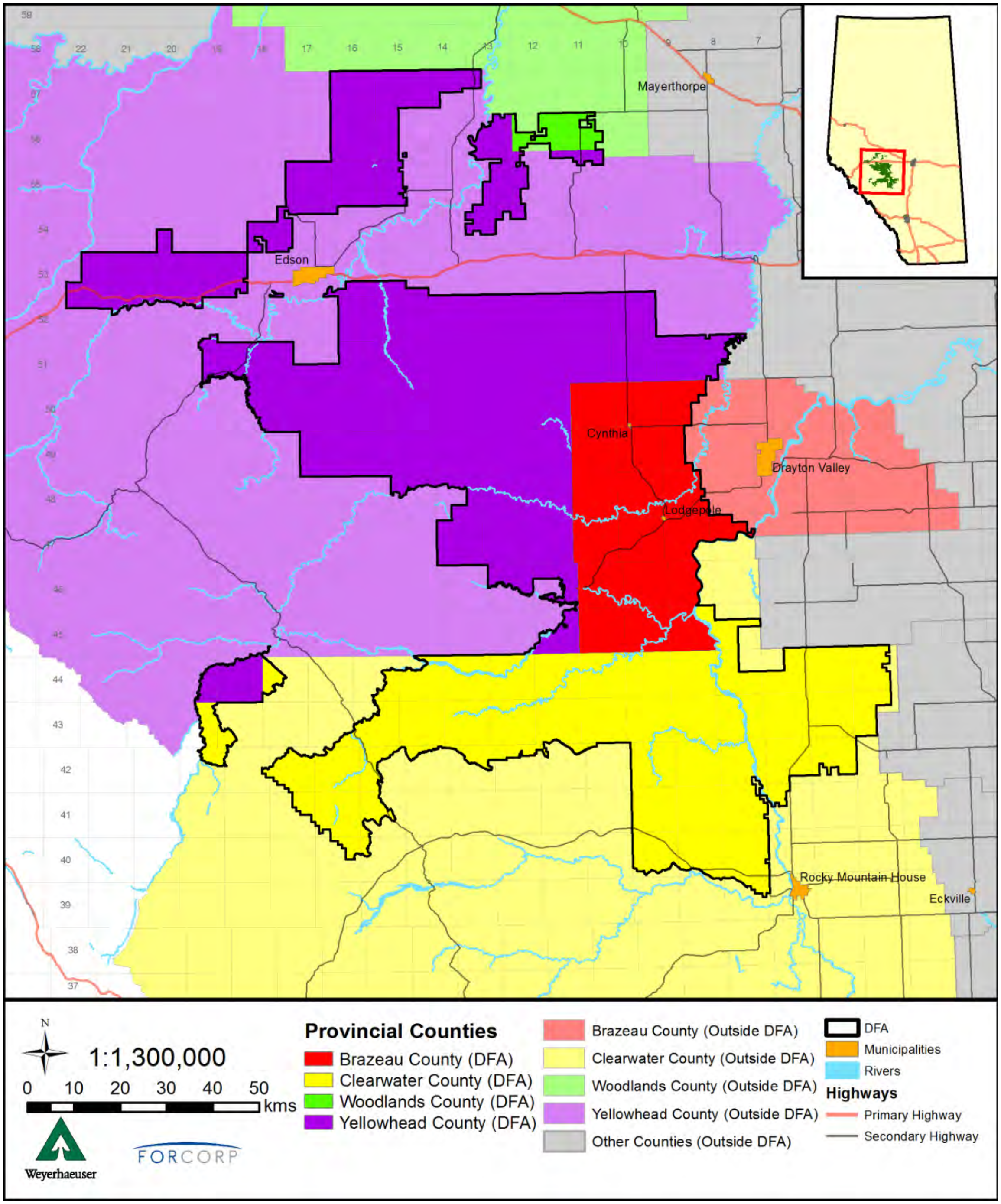


Figure 3-9. Provincial counties within the DFA.

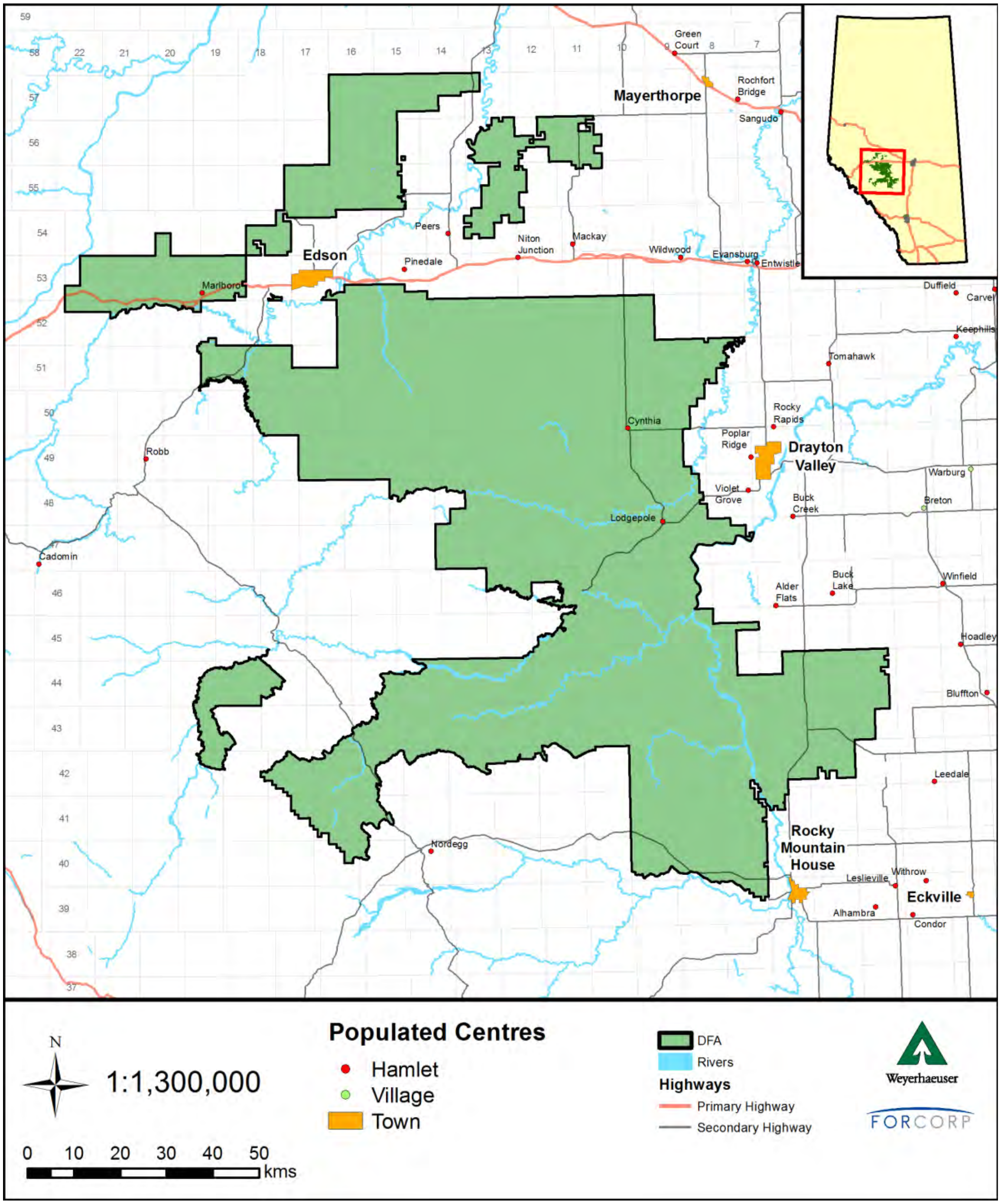


Figure 3-10. Populated centres within and surrounding the DFA.

3.2.10 Federal Government Lands

There are no federal government lands within the DFA. The closest federal land is Jasper National Park, which borders the DFA to the west of the West Country compartment (Figure 3-11) (7).

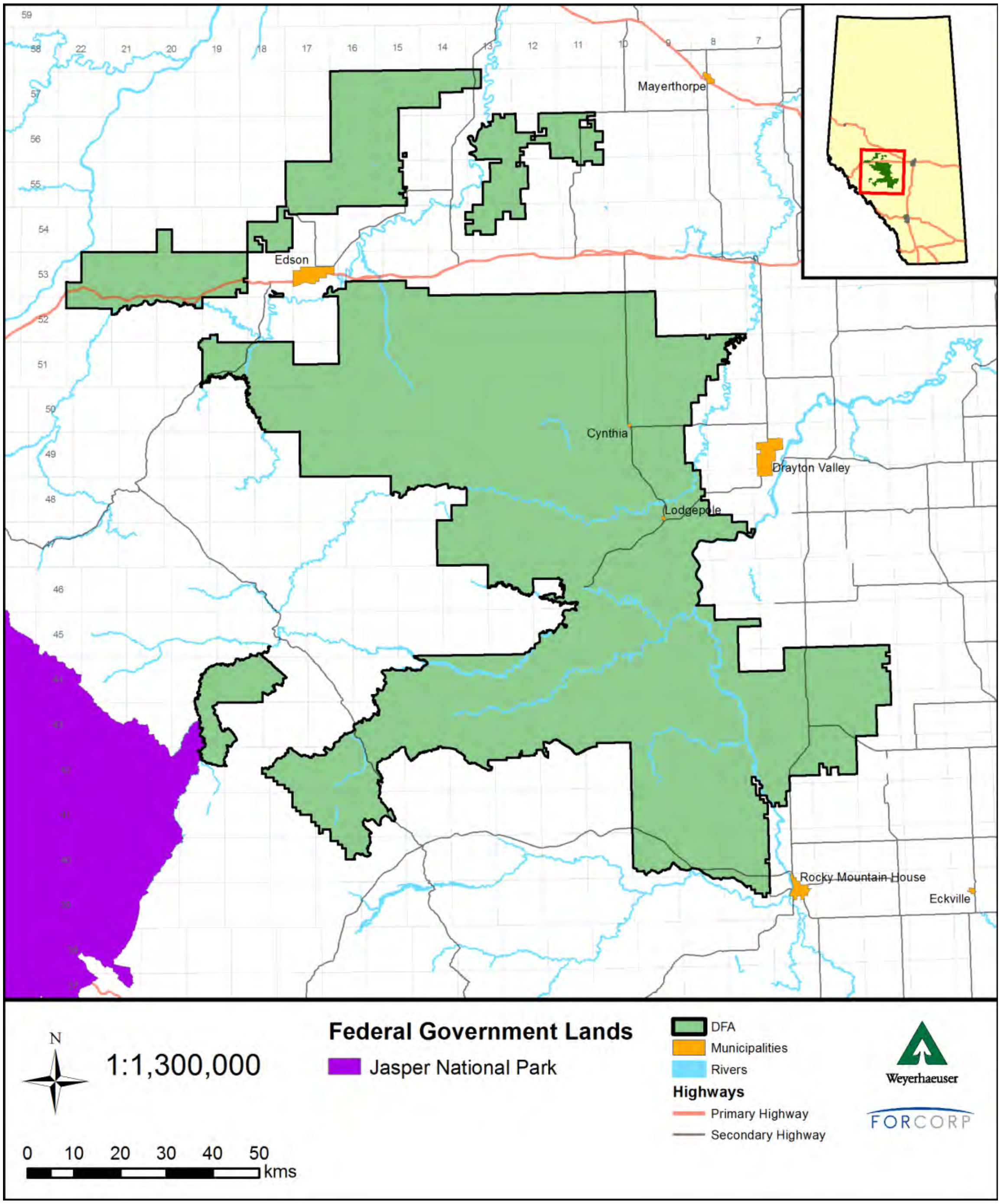


Figure 3-11. Federal government lands adjacent to the DFA.

3.2.11 First Nations Reserves and Métis Settlements

There are two First Nations reserves within the boundary of the DFA, the O'Chiese First Nation and the Sunchild First Nation (Table 3-9), with a combined on-reserve population of 1,192 (Table 3-10) (Alberta, 2015a). Six other First Nations also have treaty rights across all or parts of the DFA: the Alexander First Nation, the Alexis Nakota Sioux Nation, the Paul First Nation, the Stoney Bearspaw Nation, the Stoney Chiniki Nation, and the Stoney Wesley Nation (Figure 3-12) (9). One Métis settlement has traditional land use areas within and near the DFA (East Prairie Métis Settlement).

Table 3-9. Area of First Nations reserves within the DFA.

First Nation	Reserve Area (ha)	% of DFA
O'Chiese	13,853	1.3
Sunchild	5,212	0.5
Total	**19,065**	**1.8**

Table 3-10. Population of First Nations reserves within the DFA (current as of August 15, 2015).

First Nation	On Reserve and Crown Land	Off Reserve	Total
O'Chiese	332	391	723
Sunchild	860	421	1,281
Total	**1,192**	**812**	**2,004**

Alexander First Nation

The Alexander First Nation is located near the town of Morinville and has three treaty areas (134, 134A, and 134B) in the Sturgeon and Lac St. Anne counties (northeast of the extent of Figure 3-12). The Alexander First Nation are of Cree heritage. The Alexander First Nation is a signatory to Treaty 6.

Alexis Nakota Sioux Nation

The Alexis Nakota Sioux Nation originated when the Assiniboine group detached themselves from the rest of the Siouan family. In the 1960s, research among the Alexis people determined that the band is comprised largely of remnants of the Wood or Swampy Ground Assiniboine described in various pre-reserve accounts of observers in the Edmonton area. The current reserves are located roughly in the center of the pre-reserve territory, which stretched possibly as far north as Lac La Biche and west into the Jasper National Park. In the north, the three bands which came under Treaty Six all chose reserves in their traditional hunting areas. Alexis' band, with 42 families, took a reserve (133) on the shores of Lac St. Anne. Further Treaty Areas were established in 1995 in Cardinal River (Treaty Area 234 - Figure 3-12), Whitecourt (Treaty Area 232) and Elk River (Treaty Area 233 - Figure 3-12).

Sioux is an abbreviation of Nadouessioux, a French version of the name Nadowe-is-iw given to them by the Chippewa. The name signifies snake or adder, and is a metaphor for enemy.

Originally, hunting, trapping, fishing, and gathering in the parkland along the North Saskatchewan River formed the basis of the Alexis Nakota Sioux economic system. The Alexis Nakota Sioux First Nation is a signatory to Treaty 6.

O'Chiese First Nation

The O'Chiese are of Saulteaux and Cree ancestry, and migrated from an area on the north shore of Lake Superior. They travelled westward as they trapped for the North West Company in the 18th and 19th centuries. In the 1880's one group amongst several moved through the Rocky Mountain House area into the headwaters of the North Saskatchewan River. They were joined by members of the Cree who had originated from the Cypress Hills under the leadership of Chief Louis Sunchild. In 1950, a group of approximately 15 families from the O'Chiese First Nation band became signatures to Treaty 6. The O'Chiese First Nation had land designated as Treaty Areas 203 (Figure 3-12) and 203a in the proximity of Rocky Mountain House. The O'Chiese First Nation is a signatory to Treaty 6.

Paul First Nation

The original Stoney people of the Paul First Nation travelled over large portions of Western Canada and the United States. They were active in the fur trade with the Hudson Bay Company. At the end of the 19th century the band negotiated Treaty Areas 133A and 133B adjacent to Lake Wabamun, east of Edmonton, and Treaty Area 133C near Buck Lake (Figure 3-12). The Paul First Nation is a signatory to Treaty 6.

Sunchild First Nation

The people of the Sunchild First Nation have origins with other Chippewa people. They migrated from the Black Hills in Montana at the end of the 19th century due to conflict with the American government. Members of the group, who had stayed for some time in the Cypress Hills, eventually moved to the Rocky Mountain House area under the leadership of Chief Louis Sunchild. The Sunchild First Nation had land designated as Treaty Area 202, located in the proximity of Rocky Mountain House (Figure 3-12). The Sunchild First Nation is a signatory to Treaty 6.

Stoney Nation (Bearspaw, Chiniki, and Wesley)

Stoney First Nation is located in Big Horn country and controls Treaty Area 144A (Figure 3-12). Two additional treaty areas, 144B and 144C, are located in southern Alberta. The Stoney are descendants of the Sioux nations that once covered large parts of western America. The Stoney Bearspaw, Chiniki and Wesley First Nations are signatories to Treaty 7.

East Prairie Métis Settlement

East Prairie became a Métis Settlement in 1939, following the formation of the Métis Association of Alberta and the creation of settlements across the province. The first council member was Charlie Bellerose, one of the only settlers living in the area at East Prairie's inception, and the first supervisor was Peter Tompkins. The settlement grew throughout the decades as more settlers arrived and roads, bridges, and permanent housing were built (Federation of Métis Settlements, 1979).

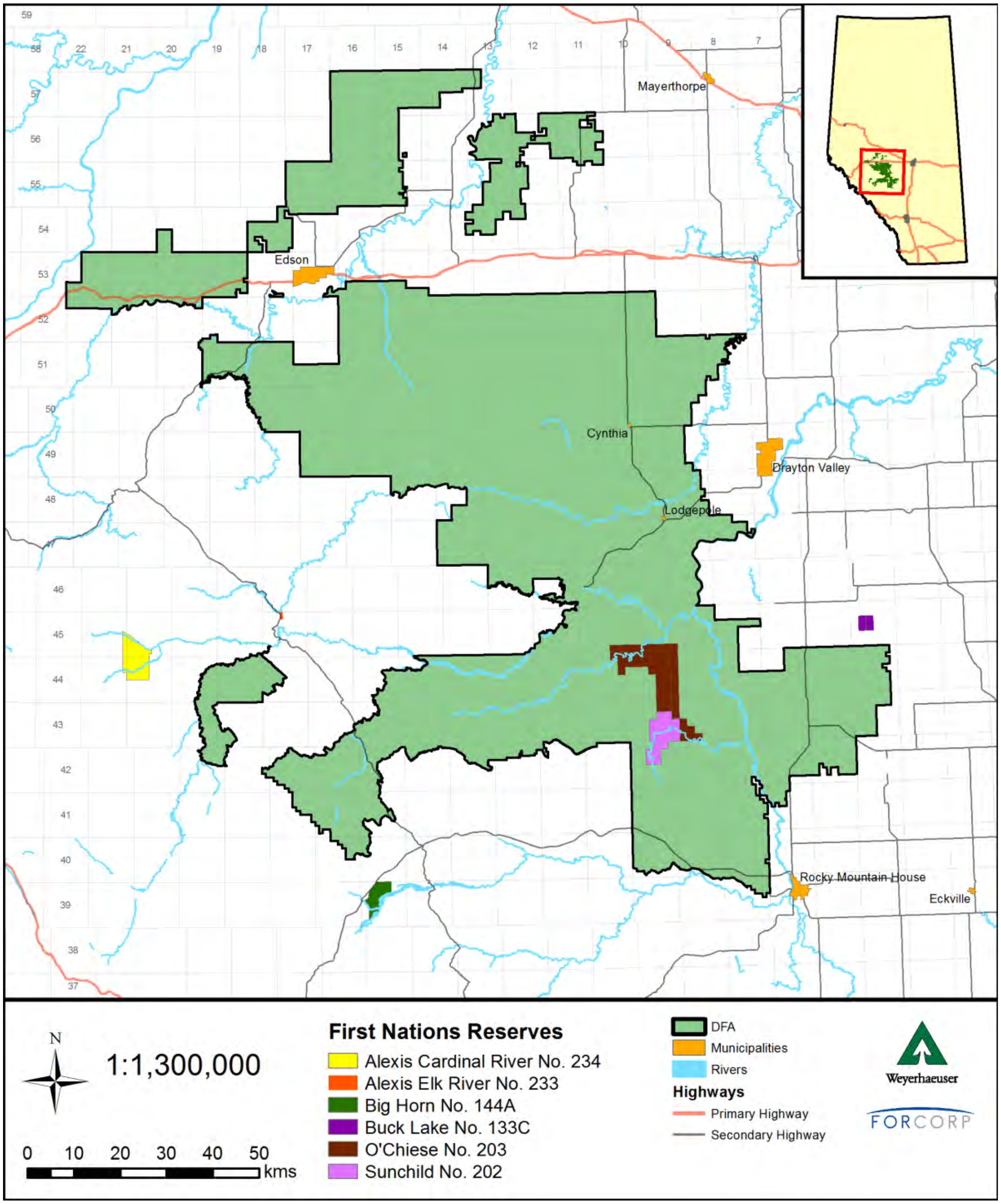


Figure 3-12. First Nations reserves within and near the DFA.

3.2.12 Protected Areas and Parks

There are seven types of protected areas and parks within and bordering the DFA (10, 13) (Figure 3-13). In total, protected areas and parks make up less than 2% of the DFA, with the largest contributors being Provincial Parks and Provincial Recreation Areas (Table 3-11).

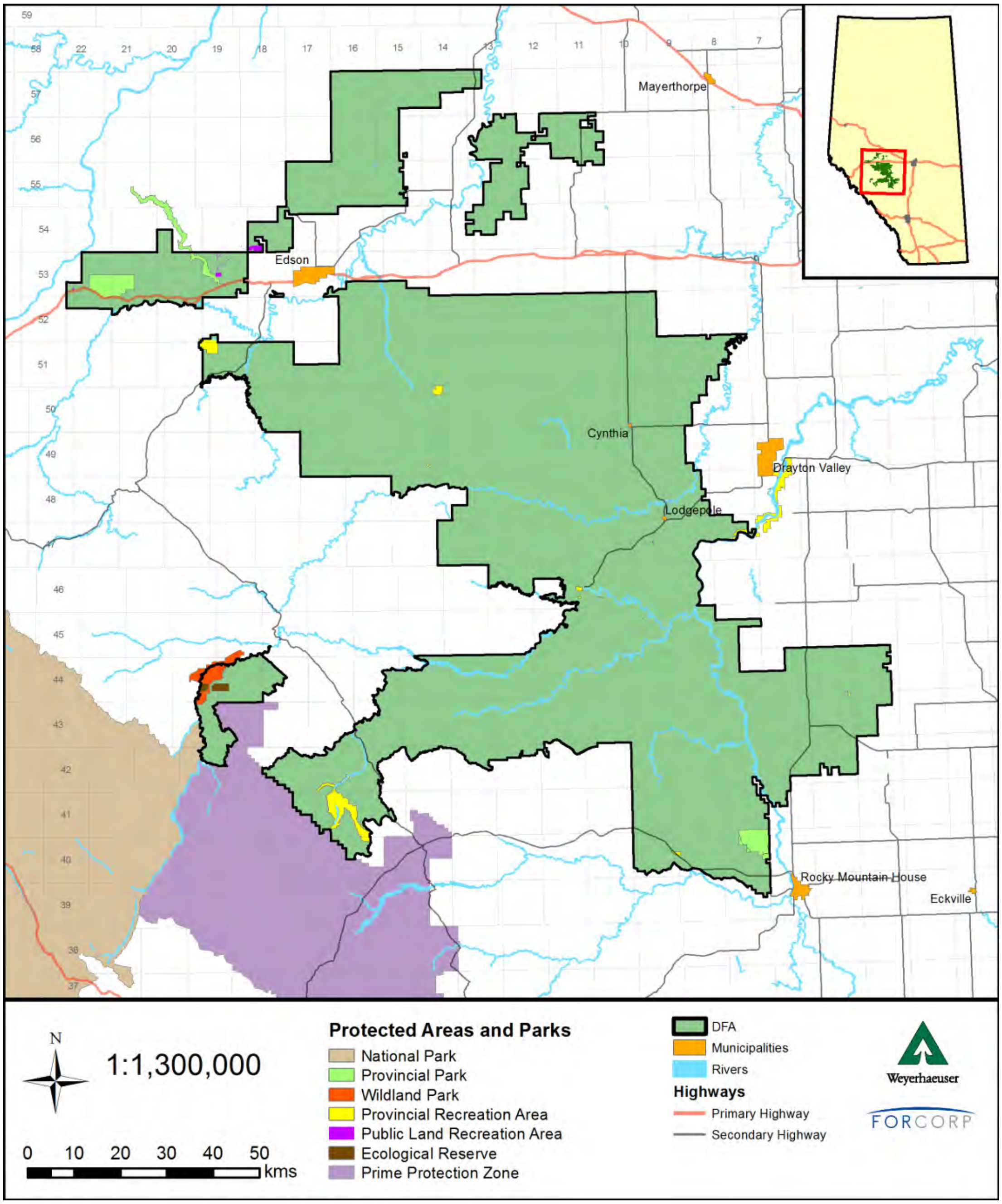


Figure 3-13. Protected areas and parks within and bordering the DFA.

Table 3-11. Area of protected areas and parks within the DFA.

Protected Area or Park Type	Area within DFA (ha)	% of DFA
Provincial Parks	8,170	0.8
Wildland Parks	2,569	0.2
Provincial Recreation Areas	6,134	0.6
Public Land Recreation Areas	561	0.1
Ecological Reserves	845	0.1
Total	**18,279**	**1.7**

The various types protected area and parks are defined (Canada, 2015) (Alberta, 2015b) (Alberta, 1984) (Alberta, 2012a) and described in the following sections.

3.2.12.1 National Parks

National parks are a country-wide system of representative natural areas of Canadian significance. By law, they are protected for public understanding, appreciation and enjoyment, while being maintained in an unimpaired state for future generations.

There are no national parks within the DFA. Jasper National Park borders the DFA to the west of the West Country compartment.

3.2.12.2 Provincial Parks

A Provincial park represents areas which preserve natural heritage. They support outdoor recreation, heritage tourism, and natural heritage appreciation activities that depend upon, and are compatible with, environmental protection where natural, historical and cultural landscapes and features are protected under the Provincial Parks Act in Alberta.

Provincial parks within the DFA include Obed Lake, Sundance, and Crimson Lake.

3.2.12.3 Wildland Parks

Wildland parks exist to preserve and protect natural heritage and provide opportunities for backcountry recreation. Wildland parks are typically large, undeveloped natural landscapes that retain their primeval character. Trails and primitive backcountry campsites are provided in some wildland parks to minimize visitor impacts. Some wildland parks provide considerable opportunities for eco-tourism and adventure activities such as back packing, backcountry camping, wildlife viewing, mountain climbing and trail riding. Access and use of wilderness and wildland parks is not as restrictive as in wilderness areas.

The only wildland park that overlaps the DFA is Brazeau Canyon. This park preserves a portion of the valley of the Brazeau River where it leaves Jasper National Park west of Rocky Mountain House. Uplands north of the deeply incised valley include small kames, eskers and lakes. South of the river a diversity of mineral and organic wetlands with tufa deposits and marl pools are preserved. The wildland has high plant community diversity and rare plants have been noted (Alberta, 2015c).

3.2.12.4 Provincial Recreation Areas

Provincial recreation areas are managed with outdoor recreation as the primary objective. They often provide access to lakes, rivers, reservoirs, and adjacent Crown land. Some areas are intensively developed while others remain largely undeveloped.

Provincial recreation areas within the DFA include Hornbeck Creek, Nojack, Wolf Lake, Fickle Lake, Minnow Lake, Brazeau Reservoir, Elk River, Wapiabi, Chambers Creek, Weald, Blue Rapids, Medicine Lake, and Blackstone.

3.2.12.5 Public Land Recreation Areas

A public land recreation area is an area of recreation land designated under the authority of Section 179 of the Public Lands Administration Regulation under the Public Lands Act.

Public land recreation areas within the DFA include Little Sundance Creek Snowmobiling, Eccles Pond Day Use, Jackknife Springs Day Use, Blackstone Viewpoint Forest Recreation Area, Blackstone Gap, and Hornbeck Cross Country Skiing.

3.2.12.6 Ecological Reserves

Ecological reserves preserve and protect natural heritage in an undisturbed state for scientific research and education. They contain representative, rare and fragile landscapes, plants, animals and geological features. Their primary intent is strict preservation of natural ecosystems, habitats and features and associated biodiversity. Public access to ecological reserves is by foot only, and although roads and other facilities do not normally exist, they are often open to the public for low-impact activities such as photography and wildlife viewing.

The Marshybank Ecological Reserve (11) was created through the Coal Branch Sub-Regional Integrated Resource Plan and established in July 1987 by Order-in-Council, and is "split into two portions by a half mile strip of land that provides for future access to other resources." (Alberta, 1990). The reserve is located entirely within the DFA. This 845-hectare ecologically significant and protected area will be been excluded from the eligible landbase for the DFA. The western portion of the Reserve was excluded from the eligible landbase in the previous FMP, with the understanding that the smaller eastern portion would eventually be returned to the eligible landbase.

3.2.12.7 Prime Protection Zones

Prime Protection Zones are defined in the Alberta Policy for Resource Management of the Eastern Slopes (revised in 1984), with the intent to preserve environmentally sensitive terrain and valuable ecological and aesthetic resources. Regional objectives that are considered compatible with the intent of this zone include watershed, fisheries and wildlife management, and extensive recreational activities such as hunting, fishing, trapping, trail use (non-motorized), primitive camping, and scientific study. Timber harvesting is not considered a compatible activity. The Eastern Slopes Policy does, however, recognize the need to consider, under strict operating guidelines, essential management programs which may include activities such as wildlife habitat improvement, fire control, and timber sanitation cutting to protect merchantable timber in other zones.

Prime protection zones that border the Weyerhaeuser DFA (Figure 3-13) are defined in the Coal Branch (Alberta, 1990) and Nordegg-Red Deer River (Alberta, 1986) Sub-Regional Integrated Resource Plans.

3.2.12.8 Natural Areas

A natural area represents natural and near-natural landscapes of regional and local importance for nature-based recreation and heritage appreciation. Natural areas are typically quite small; however, larger sites can be included. Most natural areas have no facilities and in those that do, facilities are minimal and consist mainly of parking areas and trails.

The Rocky - North Saskatchewan Sub-Regional Integrated Resource Plan identified an ecologically significant area immediately west of the O'Chiese First Nations Reserve (12) (Figure 3-14). The area is representative of the forested upland terrain of the eastern foothills and has now been defined and placed under an Order in Council as the O'Chiese Natural Area (Twp 44 Rge 10 W5M). Weyerhaeuser has agreed to act as volunteer steward for the area. The Company's duties will be to observe, record, and report any activities within the Natural Area and to assist AAF in management and promotion.

The Aurora Natural Area was designated under the Wilderness Areas, Ecological Reserves, Natural Areas, and Heritage Rangelands Act. The site protects a steep north-facing escarpment that contains Cordilleran species such as devil's club, mountain ash and red elderberry. The area also contains white spruce-lodgepole pine forest, poplar stands, shrublands, and mesic and dry meadows.

In total, the natural areas account for only 0.12% of the DFA (Table 3-12).

Table 3-12. Natural areas within the DFA.

Natural Area Name	Area (ha)	% of DFA
O'Chiese	376	0.035
Aurora	908	0.085
Total	**1,284**	**0.120**

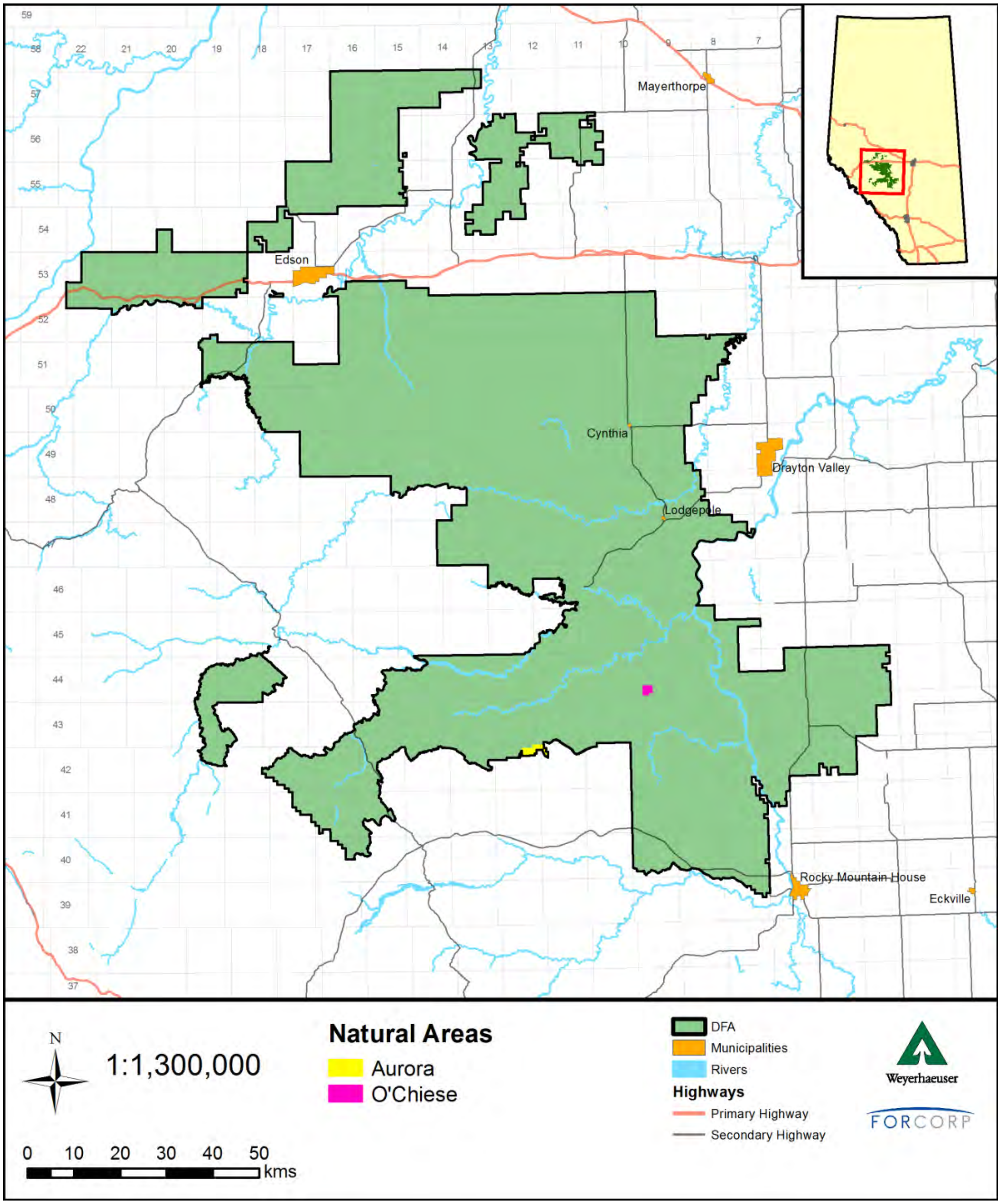


Figure 3-14. Natural areas within the DFA.

3.2.13 Wildfire Management Areas

Wildfire Management Areas (WMAs) are used by AAF to define forest protection responsibilities (14). The DFA is split evenly between the Edson and Rocky Mountain House WMAs (Table 3-13) and bordered to the north by the Whitecourt WMA (Figure 3-15). Federally-administered land (Jasper National Park to the west) and the White Area (see Section 3.2.7) to the east are not part of Alberta's Forest Protection Area, and do not have WMAs.

Table 3-13. Wildfire management areas.

WMA Name	Area (ha)	% of DFA
Edson	536,492	50.3
Rocky Mountain House	530,923	49.7
Total	**1,067,415**	**100.0**

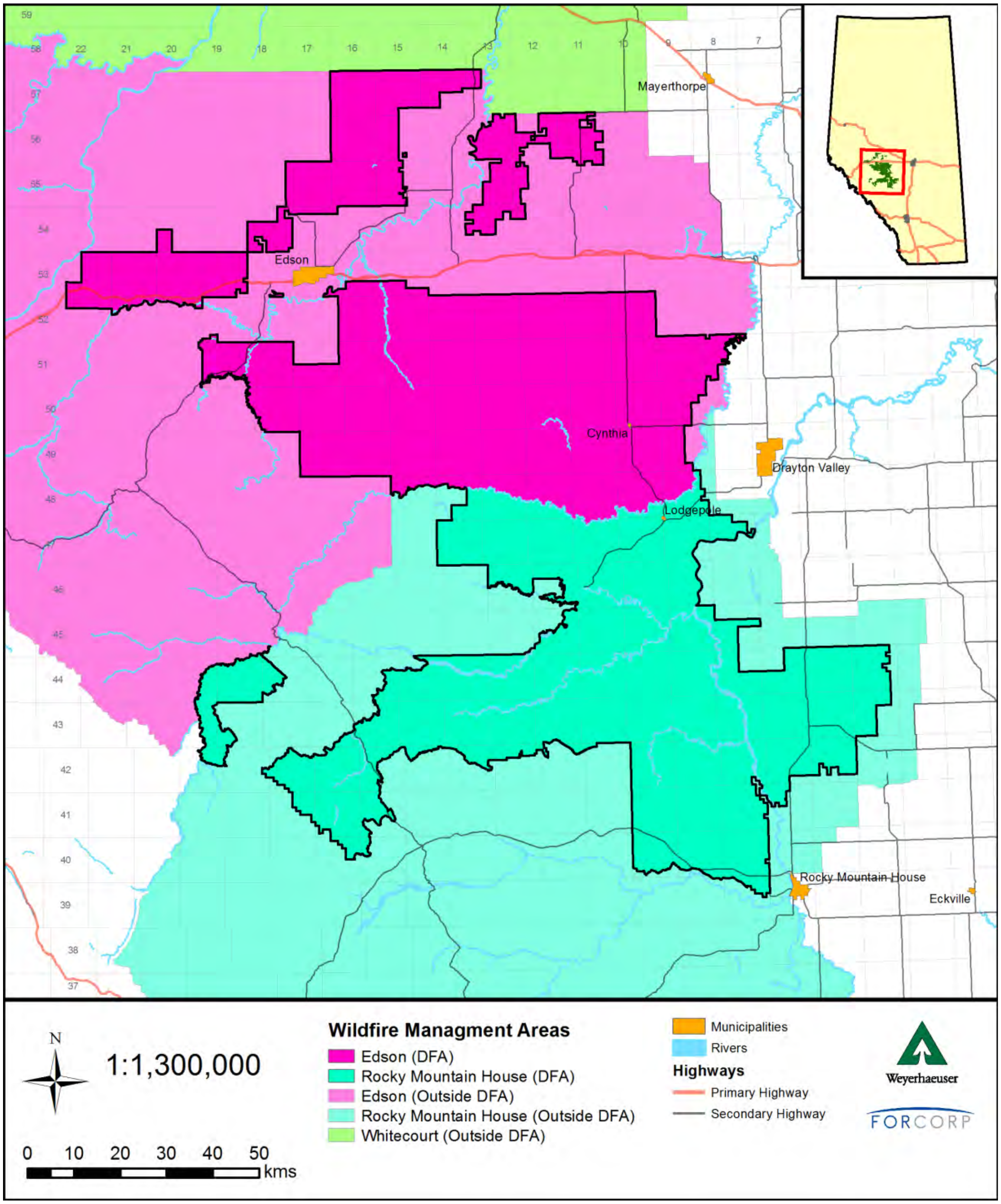


Figure 3-15. Wildfire management areas.

3.3 Physical Conditions

3.3.1 Topography

The DFA lies within the Interior Plains Physiographic Region, situated just east of the Western Cordillera Region. The Interior Plains is further divided into the Alberta Plains Division and the Alberta Plateau Benchlands Division (Figure 3-16).

The Alberta Plains Division is generally found below 900 metres of elevation, with bedrock surface comprised of very gently tilted Mesozoic and Tertiary strata. It is overlaid with varying thickness of glacial deposits, including ground moraine, lacustrine deposits and dunes.

The Alberta Plateau Benchland Division is generally found between 900 - 1300 metres of elevation, with some hills approaching the 1500 metre level. It is underlaid by very gently dipping Cretaceous and Tertiary strata.

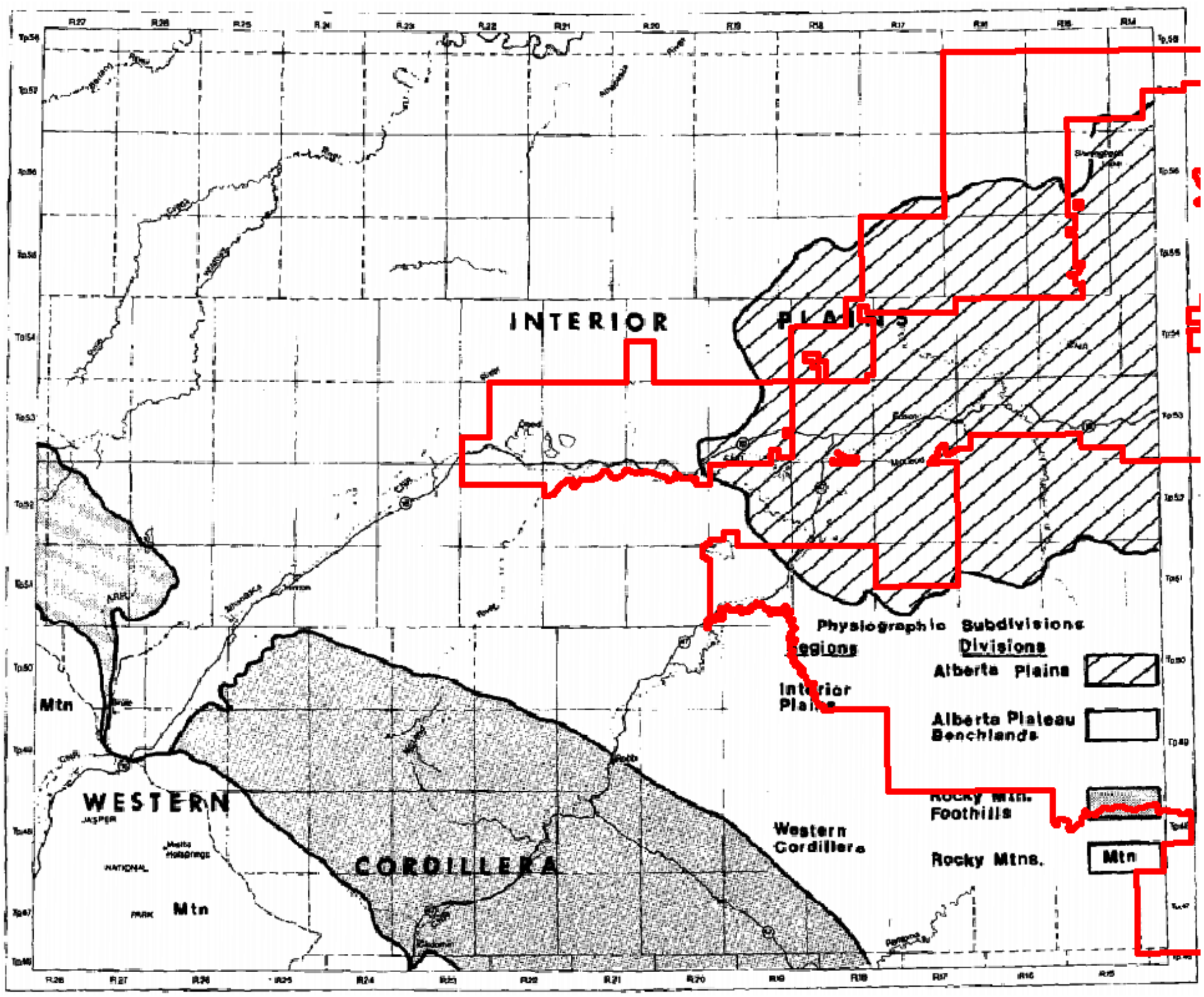


Figure 3-16. Physiographic Regions of West-Central Alberta (Alberta Institute of Pedology, 1972). Red outline represents the DFA boundary.

The topography for the western portion of the DFA within the Subalpine natural subregion and for some of the Upper Foothills natural subregion (see Section 3.2.8 for information on natural subregions) is characterized by a pattern of medium to high relief, steeply inclined bedrock ridges, and inter-ridge valleys. The area within the eastern portion of the Upper Foothills natural subregion and western portion of the Lower Foothills is characterized by strongly rolling ridges interspersed with lowland areas. The eastern portion of the DFA within the Lower Foothills natural subregion is made up of rolling topography. Of particular note in the eastern portion is the area in the vicinity of Medicine Lake, which is characterized by poorly drained, hummocky moraine deposits. Such deposits are a relic of previous glacial activity on the DFA. Figure 3-17 illustrates the distribution of glacial landforms (such as drumlinoids, eolian forms, eskers, crevasse fillings) across the DFA (17).

The DFA follows the general landscape of the foothills natural region with a transition to the rocky mountain region in the southwest (Figure 3-18) (18). The lowest point of elevation is 766 metres above sea level, on the northern edge of the Beaver Meadows compartment. The western edge of the West Country compartment has the highest point of elevation, at 2,621 metres above sea level.

The slope of the DFA is fairly uniform, with almost 99% of it being 30% or less (Table 3-14). Slope and aspect are important elements of topography for natural resource management, as they influence forest development. However, slope is also an important factor for defining machine operability as well as potential for erosion. Four classes of slope percent were calculated in Table 3-14 based on generally accepted thresholds of operability. Almost the entire DFA is operable (30% slope or less) with the majority of steeper areas being located in the West Country compartment as it transitions to more mountainous ground, or throughout the rest of the DFA in river valleys.

Table 3-14. Slope percent classes and corresponding areas within the DFA.

Slope Percent Class	Area (ha)	% of DFA
0 - 30%	1,055,264	98.9
31 - 45%	8,348	0.8
46 - 60%	2,030	0.2
60%+	1,121	0.1
Total	**1,066,762[1]**	**100.0**

[1]Calculated using pixels so may not round to exact FMU area due to raster analysis.

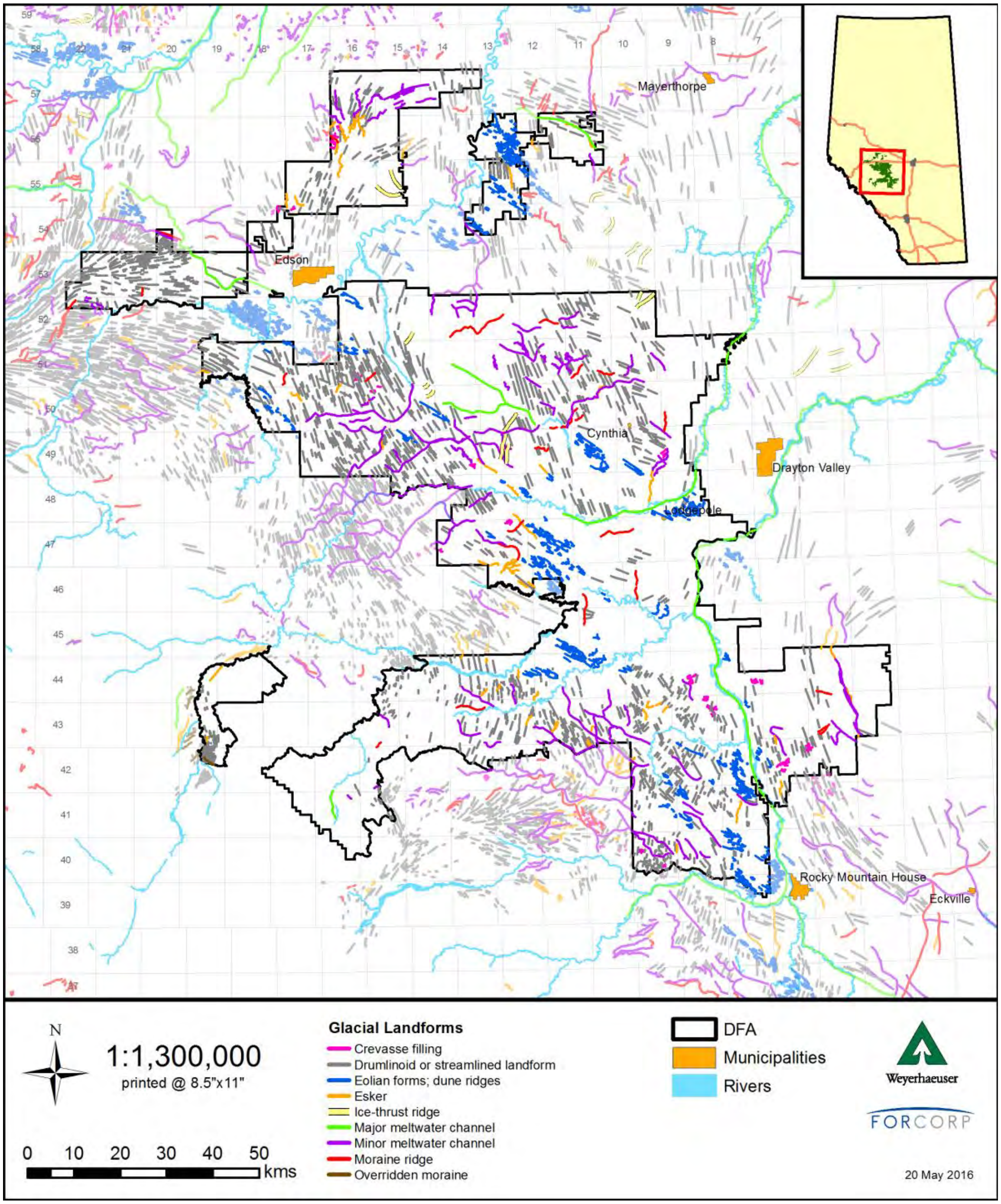


Figure 3-17. Glacial landforms within and around the DFA.

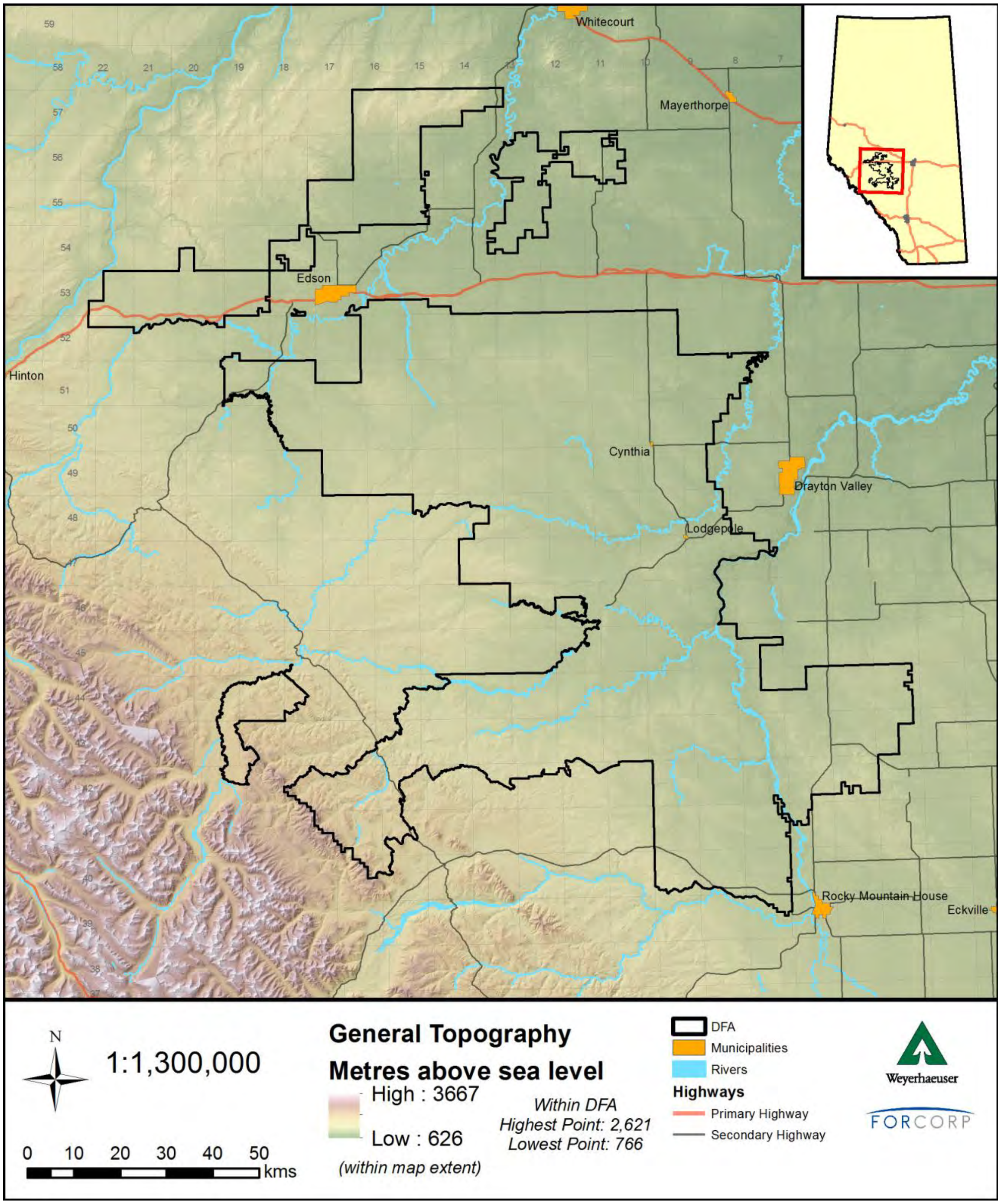


Figure 3-18. General topography within and around the DFA.

3.3.2 Soils and Landforms

The bedrock of the DFA is of the Paskapoo Formation from the Palaeocene age (60-65 million years old). It consists of weakly consolidated beds of sandstone and siltstone with interbedded strata of shale, coal, and chert conglomerate.

The entire area was once covered by glaciers. These glaciers originated from either the east as Continental glaciers or from the west as Cordillera glaciers. The principal deposits from these glaciers included till, lacustrine sediment, and glaciofluvial sediment. Scattered about the area, pre-glacial gravels and post-glacial deposits that include alluvial, aeolian, colluvial, and organic material can also be found.

The types of soils found in the area are a direct result of different soil forming processes. These processes modify the parent material via the interaction of climate, biological activity, relief, drainage, and time. The predominant soils of the area are orthic gray luvisols and brunisolic gray luvisols (19). The luvisols are identified by the migration of clay downwards through the soil to form a distinct layer of enriched clay material. There are also some brunisols and organic soils throughout the DFA (Figure 3-19), although they only amount to 8% of the area (Table 3-16). Table 3-15 describes in further detail some of the main characteristics of the soil orders on the DFA. Soil and soil texture are greatly influenced by ecosite (Section 3.4.3).

Table 3-15. Soil order descriptions (University of Saskatchewan, 2016).

Soil Type	Description
Brunisol	Brunisolic soils have sufficient development and tend to have a brownish coloured B horizon. These soils tend to form under forests giving them this colour, but can exist in a wide range of environments including the Boreal forest, mixed forest, shrubs, grass, and heath and tundra. They are typically well to imperfectly drained.
Luvisol	Luvisolic soils are generally light coloured and are usually well to imperfectly drained. They are located in areas under forest vegetation where the climate is subhumid to humid and mild to very cold . They are well developed and have sandy loam to clay parent materials.
Organic	Organic soils are mainly composed of organic materials and are saturated with water for prolonged periods. They consist of mainly mosses, sedges, or other hydrophytic vegetation. They occur in areas of poorly and very poorly drained depressions.

Table 3-16. Soil orders within the DFA.

Order Name	Group Name	Subgroup Name	Area (ha)	Area (%)
Brunisol	Eutric Brunisol	Eluviated Eutric Brunisol	28,015	3
		Subtotal	***28,015***	***3***
Luvisol	Gray Luvisol	Brunisolic Gray Luvisol	282,289	26
		Dark Gray Luvisol	9	0
		Gleyed Gray Luvisol	30,242	3
		Orthic Gray Luvisol	531,233	50
		Podzolic Gray Luvisol	144,548	14
		Subtotal	***988,321***	***93***
Organic	Mesisol	Typic Mesisol	51,079	5
		Subtotal	***51,079***	***5***
Total			**1,067,415**	**100**

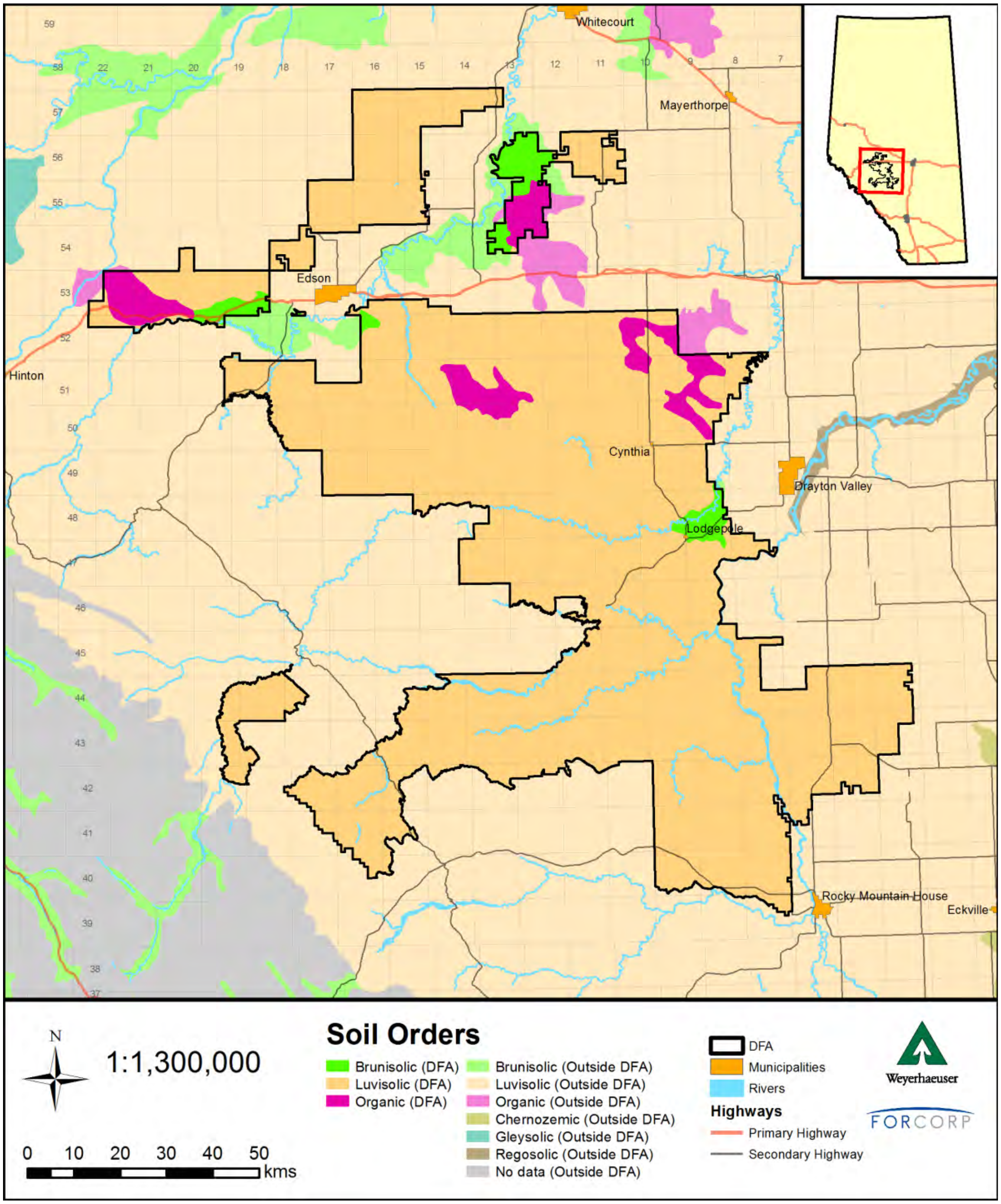


Figure 3-19. Soil orders within and around the DFA.

3.3.3 Hydrography

3.3.3.1 Water basins

Rivers that drain the DFA are part of two major water basins, the Athabasca and the North Saskatchewan (Figure 3-20) (20). The Athabasca waters drain into the Arctic Ocean via the Mackenzie River, while the North Saskatchewan drains into Lake Winnipeg. A small section (2%) of the DFA falls within the South Saskatchewan basin in the southeast (Table 3-17). Water basins form the basis for Alberta's Land-Use Framework Regions (Section 3.2.6). Within Alberta, there are seven major water basins and seven land-use framework regions.

Table 3-17. Major water basins within the DFA.

Basin Name	Entire Basin Area (ha)	Portion of Basin in DFA		Portion of DFA Occupied by Basin (%)
		Area (ha)	(%)	
Athabasca	14,434,561	599,907	4	56
North Saskatchewan	9,272,059	446,098	5	42
South Saskatchewan	11,672,109	20,447	0	2
Total	**35,378,729**	**1,066,452**	**3**	**100**

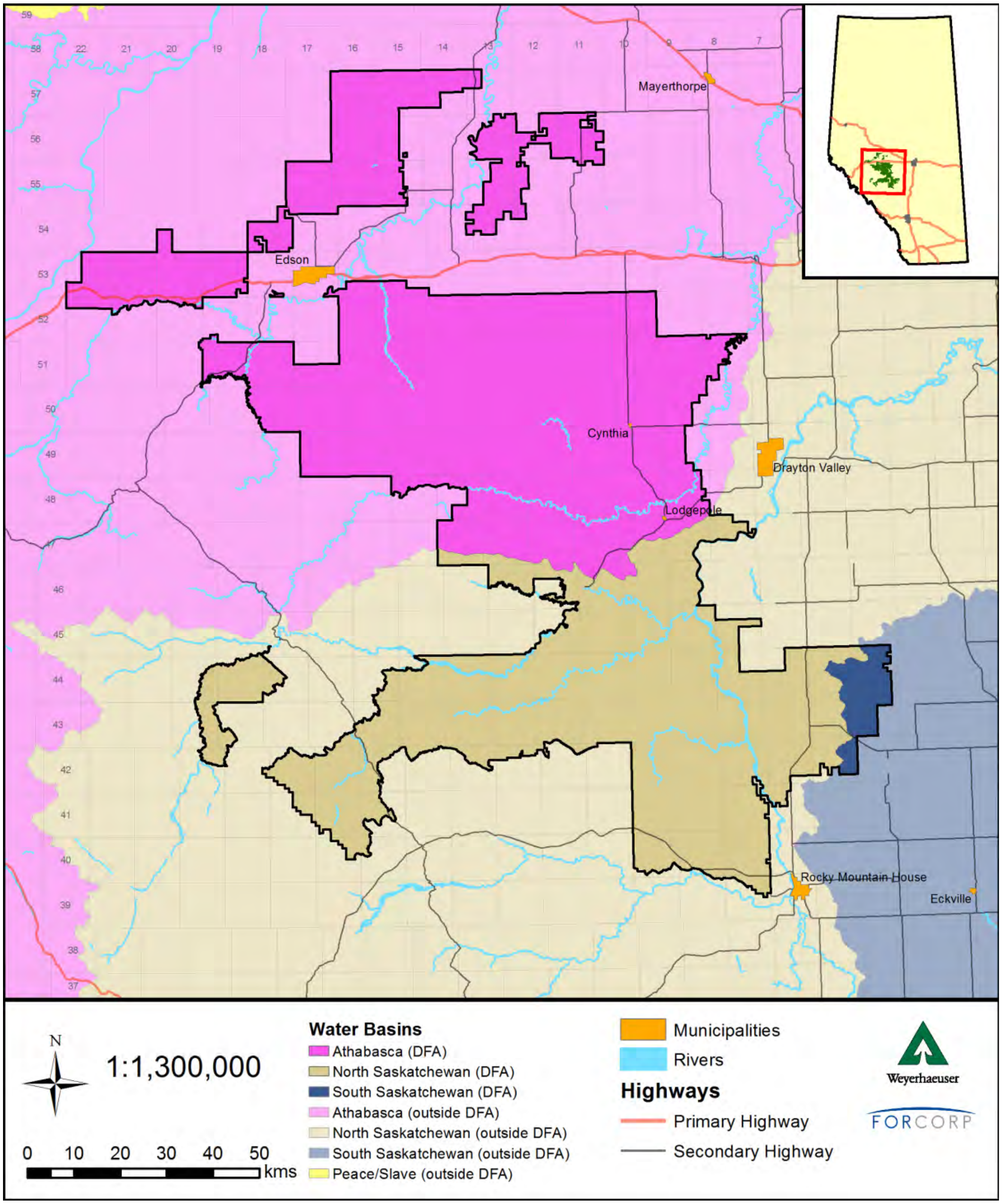


Figure 3-20. Major water basins within and around the DFA.

3.3.3.2 Watersheds

Watershed units were delineated in 2015 by AAF (21) (Figure 3-21). Names were assigned based firstly on the predominant stream, and secondly on features of local or historical significance. The completed coverage transcends the DFA boundaries and as a result, some watersheds are only partially within the DFA. Table 3-18 lists the amount of each watershed that is within and outside the DFA.

Table 3-18. Watersheds within the DFA.

WatShdCode	Watershed Name (Fourth Order)	Full Watershed Area (ha)	Watershed Area Within DFA (ha)	Area of Watershed Within DFA (%)
1	Groat	13,247	3,752	28
2	Cairn	15,578	2,018	13
3	Mcleod	17,839	2,946	17
4	Oldman	14,939	5,527	37
5	Shining bank	19,469	6,638	34
6	Paddle	15,414	1,496	10
7	Trout	26,296	19,780	75
8	Hardluck	15,695	9,003	57
9	Graham	9,443	4,873	52
10	South Mcleod	13,331	2,513	19
11	East Poison	34,204	3,747	11
12	Whitefish	21,913	8,810	40
13	Middle Poison	6,454	5,487	85
14	Deer	13,757	5,775	42
15	Bear	13,890	9,855	71
16	East Bear	7,581	324	4
17	West Poison	6,496	3,875	60
18	South Bear	3,088	7	0
19	Edson	37,509	2,975	8
20	Fairless	8,042	972	12
21	Lower Carrot	11,503	1,473	13
22	Prarie	15,083	2,209	15
23	Mason	11,188	1,501	13
24	North Athabasca	4,634	164	4
25	Sundance East	24,444	11,416	47
26	Obed	13,119	11,306	86
27	Sundance West	87,943	17,705	20
28	Athabasca	58,254	1,587	3
29	West Moose	8,016	225	3
30	Lower Moose	6,274	2,457	39
31	Niton	11,435	161	1
32	Hoke	2,415	140	6
33	East Lobstick	6,293	762	12
34	Lower Sang	13,991	10,032	72
35	West Lobstick	13,811	4,386	32
36	Granada	37,648	16,257	43
37	West Carrot	9,241	7,183	78
38	Nojack	13,516	13,371	99
39	East Carrot	7,505	7,487	100
40	Marsh	8,664	1,287	15
41	Upper Moose	13,762	10,065	73
42	Bigoray	27,636	16,171	59
43	East Fickle	1,838	978	53
44	West Fickle	14,852	2,584	17
45	Chip	14,035	14,035	100
46	Peco	2,010	1,978	98
47	Upper Sang	8,894	8,894	100
48	Minnow	15,446	15,446	100
49	Embarras	7,160	2,139	30

WatShdCode	Watershed Name (Fourth Order)	Full Watershed Area (ha)	Watershed Area Within DFA (ha)	Area of Watershed Within DFA (%)
50	Upper North Rat	10,123	10,123	100
51	West Eta	5,158	5,158	100
52	Macmillan	5,310	5,309	100
53	East Eta	13,417	13,417	100
54	Rodney	4,156	4,156	100
55	Bruce	8,343	8,343	100
56	Kathy	15,360	1,998	13
57	Swartz	24,282	16,419	68
58	Erith	6,252	2,973	48
59	Svedberg	11,625	11,625	100
60	Sinkhole	7,632	7,115	93
61	North Corser	11,600	66	1
62	Lower North Rat	6,691	6,691	100
63	Varty	2,493	2,493	100
64	Tom	1,147	1,147	100
65	Corser	4,644	605	13
66	Coyote	26,175	24,217	93
67	Dzida	5,029	5,029	100
68	Cynthia	14,652	3,574	24
69	Paddy	22,877	22,877	100
70	Keyera	13,909	13,901	100
71	Half Moon	19,920	19,868	100
72	Raven	16,442	9,463	58
73	South Rat	17,467	17,467	100
74	East Zeta	6,245	6,245	100
75	West Zeta	13,019	13,019	100
76	Hanlan	13,362	64	0
77	Upper Pembina	33,770	12,986	38
78	Middle Pembina	2,934	2,934	100
79	Lower Pembina	15,374	14,004	91
80	Jerry	3,058	3,058	100
81	Rehn	5,645	5,645	100
82	Dismal	27,826	17,793	64
83	Rockyview	13,748	1,159	8
84	Baker	3,940	3,940	100
85	Tall Pine	15,812	15,812	100
86	Reservoir	5,859	5,859	100
87	Sand	28,596	17,892	63
88	South Elk Fringe	6,726	0	0
89	South Elk	16,445	4,525	28
90	North Elk	13,459	10,536	78
91	Lower Sask-atchewan	8,858	8,858	100
92	Brazeau	17,885	17,885	100
93	Lower Wolf	14,069	882	6
94	Upper Sask-atchewan	3,120	3,120	100
95	Negraiff	10,090	5,870	58
96	West Negraiff	2,874	1	0
97	Mink	11,294	1,772	16
98	Horseshoe	9,165	2,288	25
99	Garden	5,249	2,322	44
100	Broken Arm	10,697	3,497	33
101	East Nordegg	5,797	5,797	100
102	Nordegg	33,360	33,360	100
103	West Lower Blackstone	9,429	229	2
104	Marshy-bank Fringe	18,210	4	0
105	Lower Blackstone	22,181	19,228	87
106	North Marshy-bank	15,266	10,620	70
107	Wilson	5,916	5,787	98
108	North Open	10,369	10,367	100
109	Middle Wolf	11,895	4,508	38
110	Marshy-bank Fringe2	11,113	0	0
111	North Sask-atchewan	32,937	32,082	97
112	Middle Blackstone	6,542	1,989	30
113	Upper Brown	24,866	2,462	10
114	East Rundell	9,529	9,516	100
115	Sundre	9,312	556	6
116	Owl	4,995	4,995	100
117	North Rapid	1,943	1,943	100
118	Middle Marshy-bank	5,002	2,685	54

WatShdCode	Watershed Name (Fourth Order)	Full Watershed Area (ha)	Watershed Area Within DFA (ha)	Area of Watershed Within DFA (%)
119	Middle Open	5,307	3,704	70
120	North O'Chiese	7,329	7,329	100
121	North Brewster	8,160	8,160	100
122	Upper Wolf	18,457	18,429	100
123	Marshy-bank Fringe 3	5,056	0	0
124	Stephens	14,390	14,379	100
125	Upper Blackstone	1,391	455	33
126	Chiefs	9,040	8,398	93
127	O'chiese	11,850	11,850	100
128	Wawa	9,655	9,581	99
129	Grey Owl	5,128	4,350	85
130	North Colt	2,674	2,180	82
131	Rapid	9,437	5,566	59
132	South Marshy-bank	10,789	5,185	48
133	South Open	8,842	3,591	41
134	Lobstick	6,246	4,829	77
135	Brewster	17,030	6,860	40
136	West Chungo	18,836	42	0
137	Sutherland	11,430	1,194	10
138	Sunchild	4,668	4,481	96
139	Stephens Fringe	12,697	4	0
140	Little Grey Owl	21,394	58	0
141	Hansen	7,233	6,857	95
142	Welch	7,571	816	11
143	South Lobstick	5,184	187	4
144	Chungo	27,377	11,663	43
145	Big Beaver	8,706	6,552	75
146	Baptiste	11,601	11,601	100
147	East Baptiste	9,328	8,220	88
148	West Baptiste	4,930	4,930	100
149	Lower Chambers	1,408	1,408	100
150	Lookout	6,257	6,040	97
151	Penti	5,100	4,114	81
152	Lower Wapiabi	1,443	1,443	100
153	West Chambers	13,749	1,959	14
154	South Baptiste	6,265	6,265	100
155	South Lookout	28,573	35	0
156	Noname	9,473	8,588	91
157	Upper Wapiabi	17,789	3,744	21
158	Sturrock	5,800	5,548	96
159	East Chambers	6,526	6,468	99
160	East Sturrock	10,904	65	1
161	Upper Chambers	15,848	11,313	71
162	Crimson	8,342	302	4
163	Rocky	8,048	6,823	85
164	Upper Chambers Fringe	3,612	1	0
165	Highway	14,140	582	4
166	House	6,127	5,054	82
167	Plateau	7,493	306	4
	Total	**2,095,912**	**1,067,413**	**51**

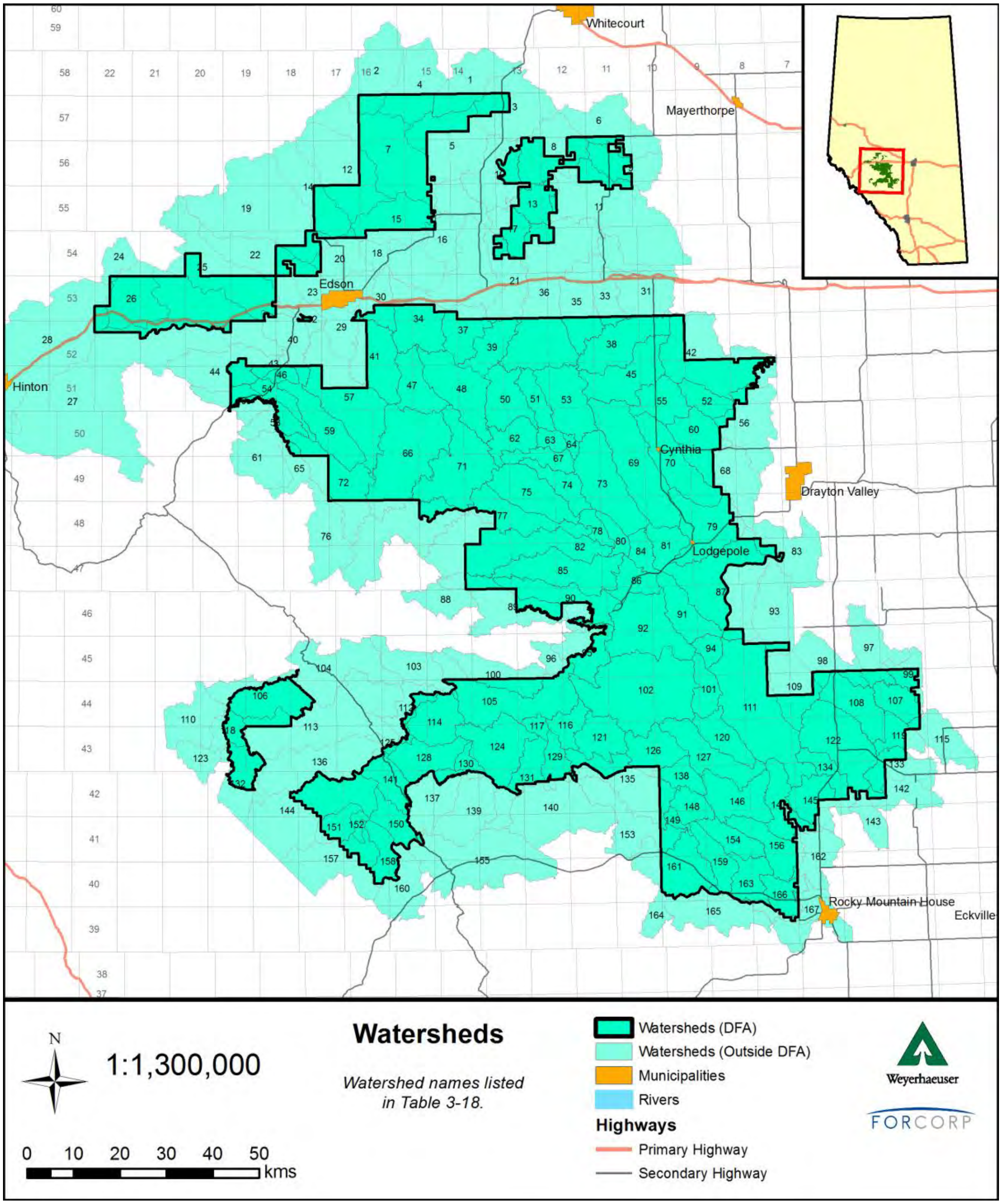


Figure 3-21. Watersheds within the DFA.

3.3.3.3 Rivers, Streams, and Waterbodies

The DFA's water features (22) are displayed in Figure 3-22. Table 3-19 lists the ten rivers and streams with the greatest length within the DFA. There are also a number of lakes scattered throughout the area (Table 3-19 lists the ten lakes with the largest area within the DFA). The Brazeau Reservoir highlights a number of man-made water features throughout the DFA (Table 3-20 and Table 3-21 delineate the area and length of features throughout the DFA by class). The Forest Management Agreement identifies PNT800942 (24), surrounding the Brazeau Reservoir, for possible future expansion and water resource development (Figure 3-23).

Table 3-19. Significant water features within the DFA.

Lake Name	Area (ha)[1]	River Name	Length (km)[1]
Obed Lake	483	Wolf Creek	152
Fickle Lake	382	Brazeau River	143
Wolf Lake	238	Nordegg River	131
Crimson Lake	231	Pembina River	97
Minnow Lake	209	Bigoray River	91
Sinkhole Lake	192	Rat Creek	91
Sucker Lake	164	Baptiste River	75
Bear Lake	152	Paddy Creek	64
Sang Lake	140	North Saskatchewan River	60
Medicine Lake	127	Dismal Creek	54

[1] Area of lakes and length of rivers refer only to the portion within the DFA.

Table 3-20. Waterbody classification within the DFA.

Waterbody Class	Area (ha)
Man-made Features	5,774
Lake (Permanent)	7,797
Lake (Reccuring)	2,420
Major River	5,463
Oxbow (Permanent)	206
Oxbow (Reccuring)	96
Island (Lake)	86
Island (River)	662
Total	**22,504**

Table 3-21. River/stream classification within the DFA.

River/Stream Class	Length (km)
Major River (Primary)	534
Major River (Secondary)	64
Stream (Permanent)	1,630
Stream (Recurring)	2,323
Stream (Indefinite)	3,996
Oxbow (Permanent)	9
Oxbow (Recurring)	23
Man-made Features	29
Arbitrary Flow (Manual)	17
Arbitrary Flow (DEM)	23
Total	**8,648**

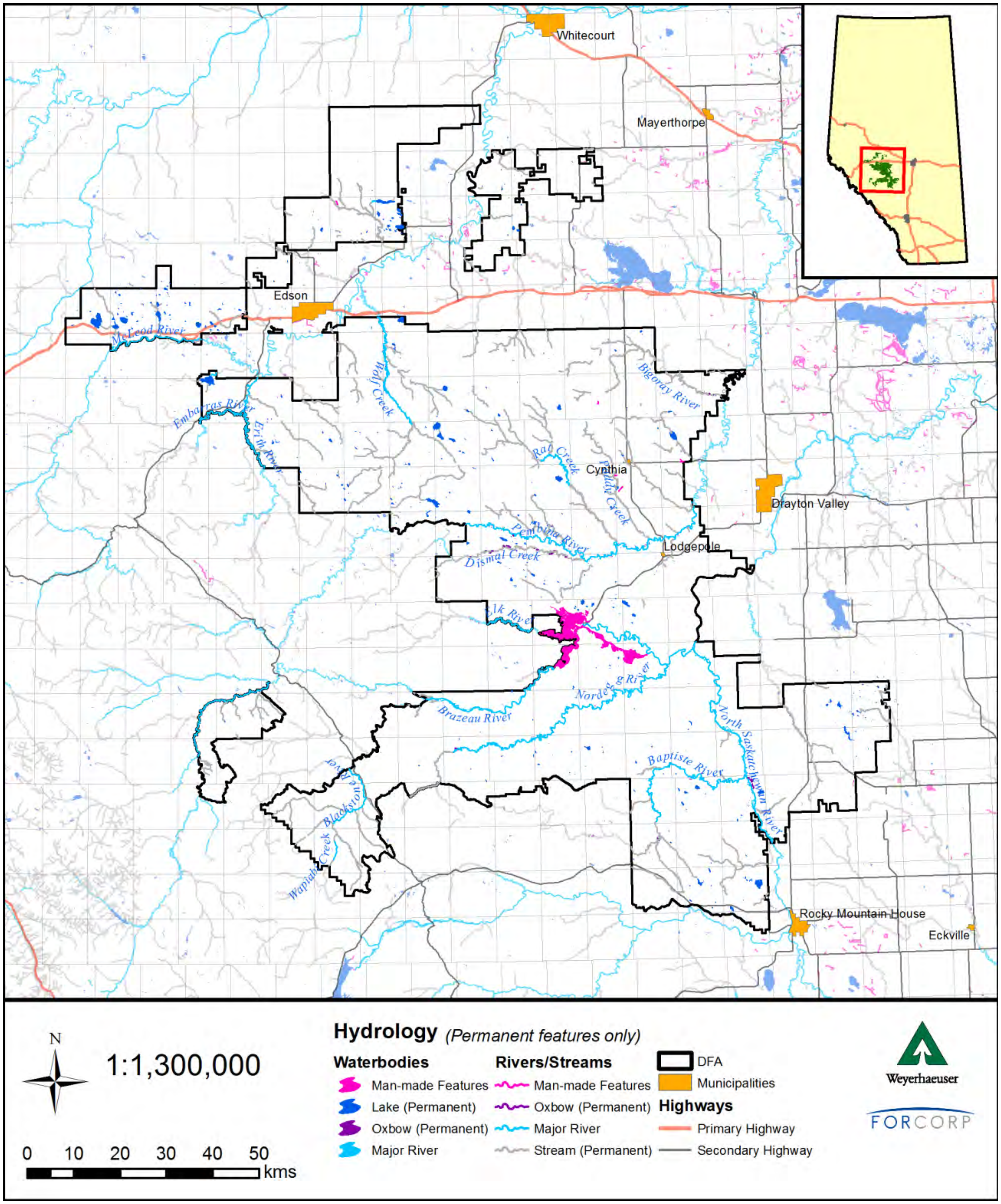


Figure 3-22. Permanent waterbodies and rivers within the DFA.

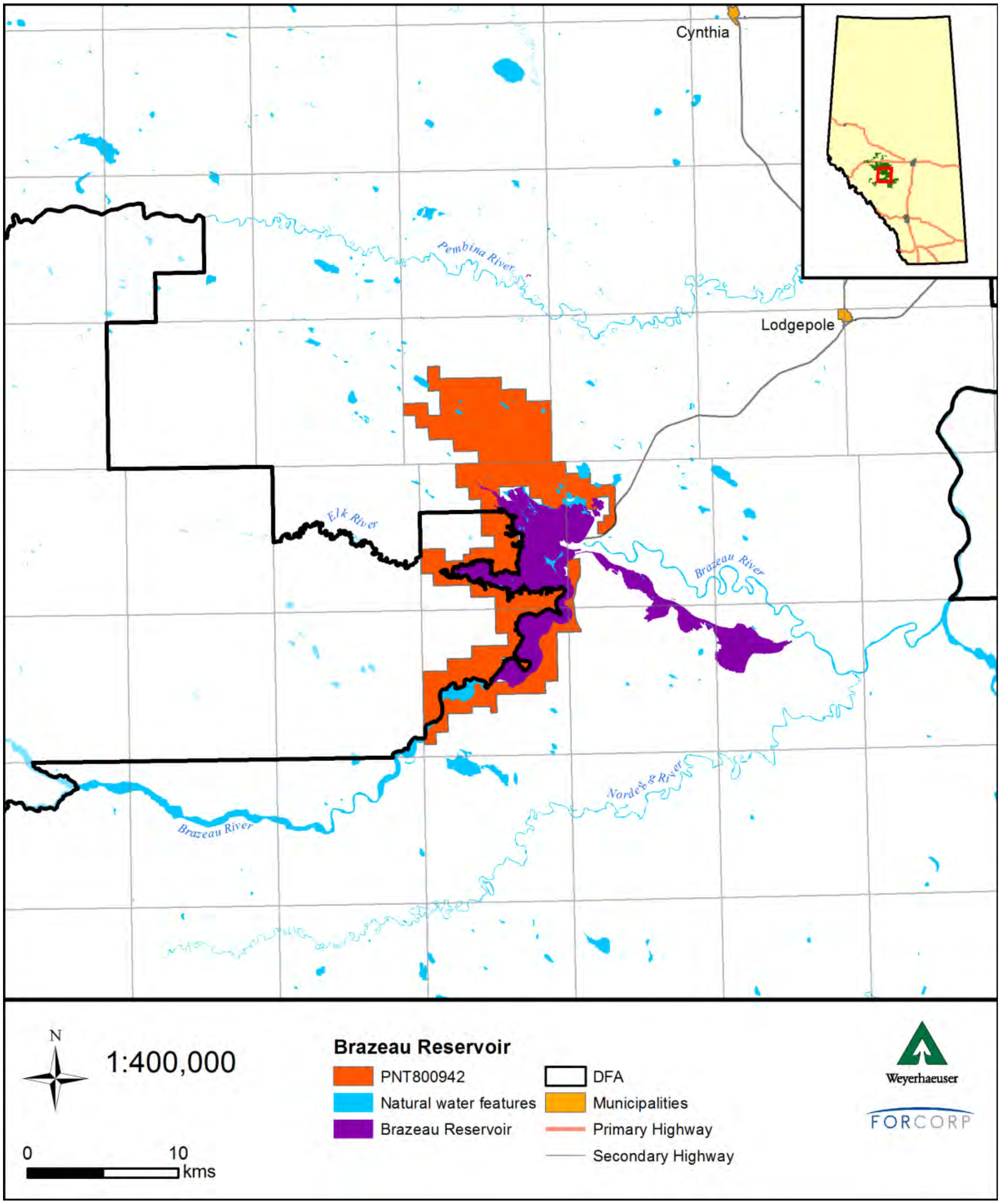


Figure 3-23. Brazeau reservoir and PNT800942.

3.3.3.4 Wetlands

Wetlands are areas typically identified as bogs, fens or marshes and having little or no tree cover. The AVI program (25) identifies wetlands by assigning a moisture regime of 'aquatic' and identifying the type of vegetation cover, which is typically herbaceous grass or forbs (Alberta, 2005). The DFA contains approximately 700 hectares of wetlands (Table 3-22). The vast majority of these areas are classified as herbaceous forb (95%), with 3% falling under herbaceous grassland and 2% under closed shrub. The distribution of wetlands across the DFA is fairly even, with a greater concentration in the northwest compartments and an absence in the southwest as the DFA transitions from foothills to subalpine (Figure 3-24).

Table 3-22. Summary of wetlands within the DFA.

Wetland Classification	Area (ha)	Area (%)
Herbaceous - Grassland	23	3
Herbaceous - Forbs	683	95
Closed Shrub	12	2
Total	**718**	**100**

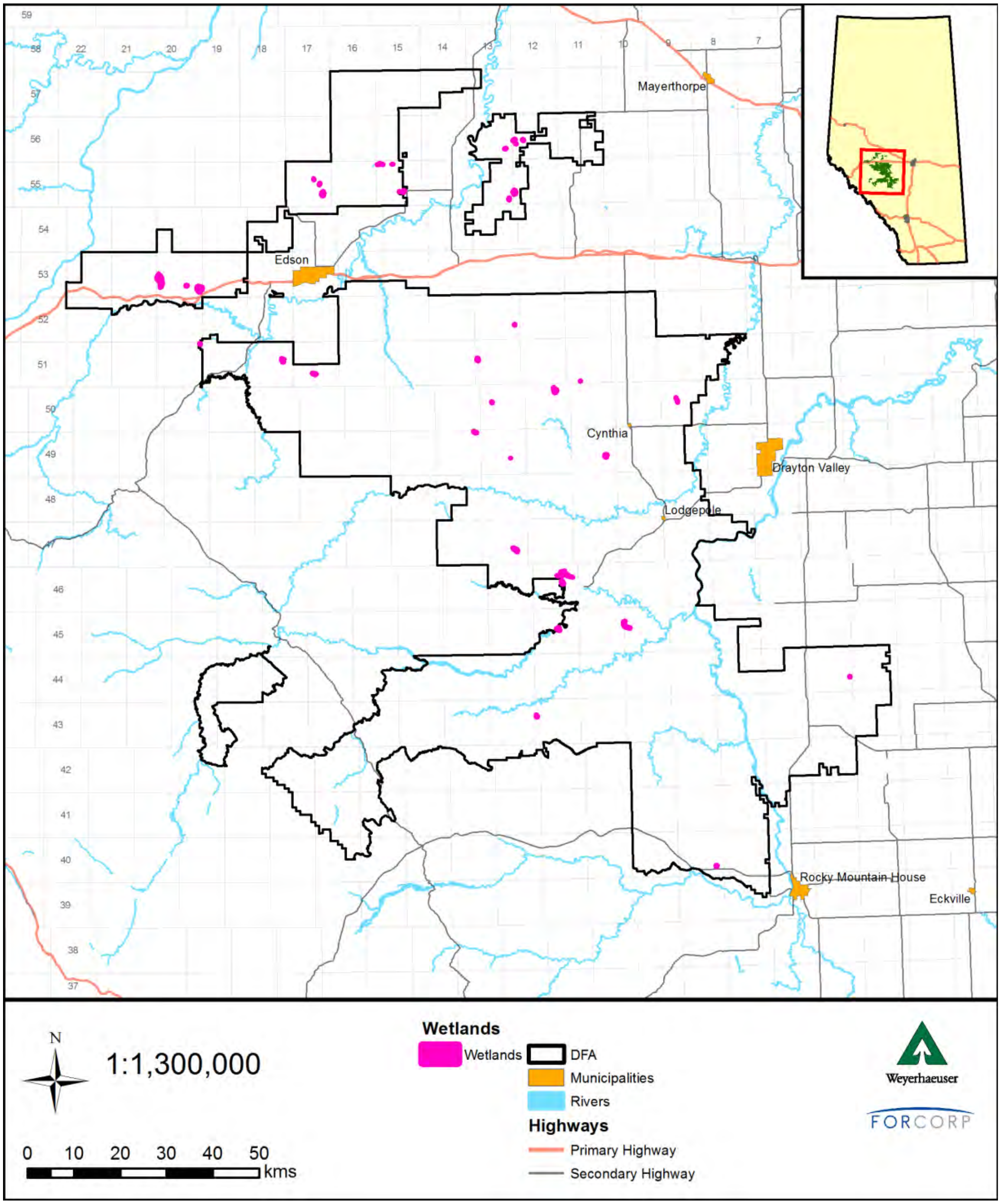


Figure 3-24. Wetlands within the DFA.

3.3.4 Climate

The DFA is considered to be of a sub-humid continental climate, with long cold winters followed by moderately mild summers. The mean annual precipitation is roughly 550-600 millimetres, of which approximately 75% falls in the summer months as rain. There are approximately 76 frost-free days. The western and northern portions of the DFA are generally cooler in the summer months and warmer in the winter months than the eastern and southern portions. This is a result of the generally higher elevations in the west and north, and the effect of winter Chinooks that pass through the region. Figure 3-25 displays the daily mean January and July temperature and mean annual maximum daily precipitation across the DFA (23).

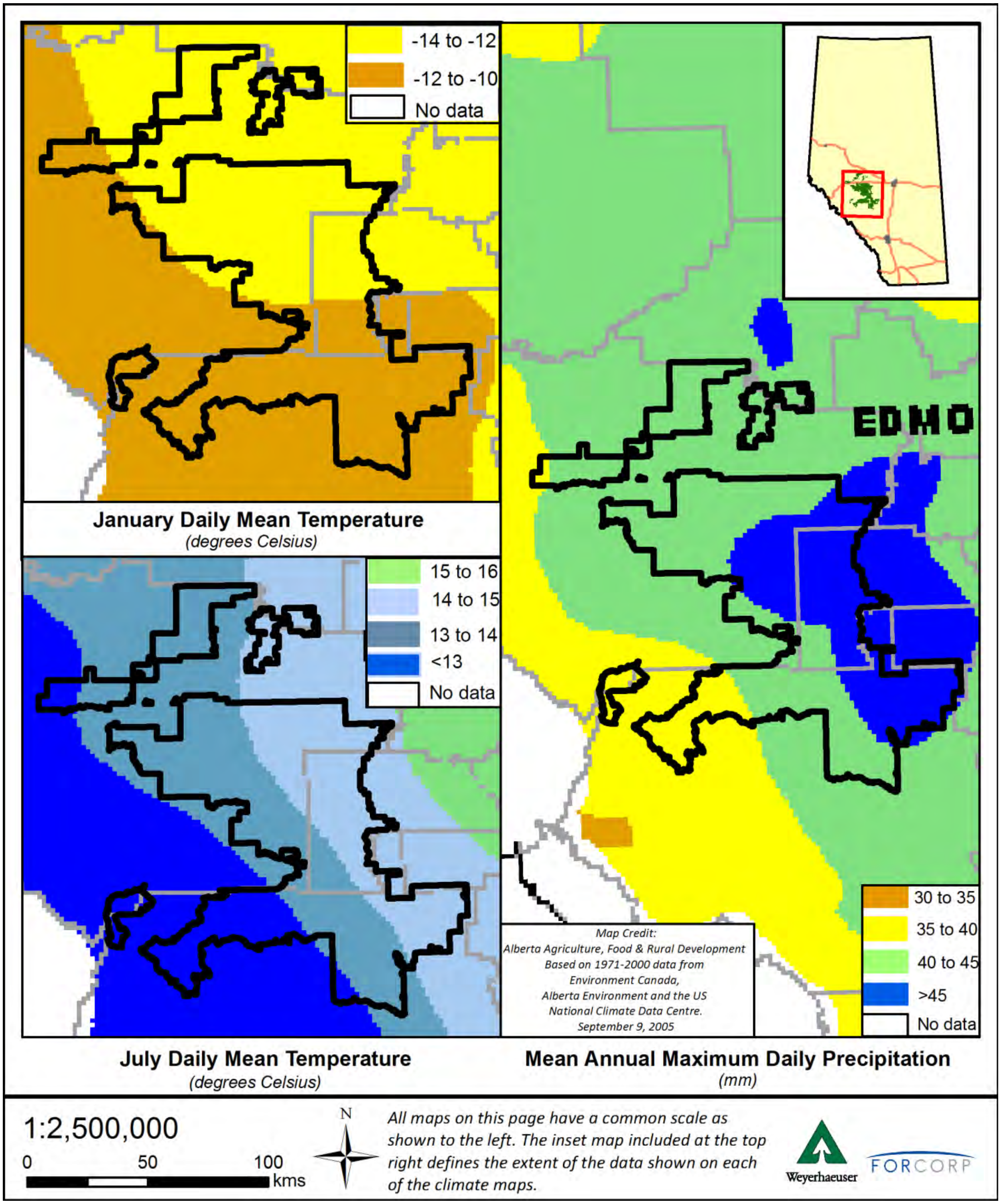


Figure 3-25. Mean temperatures and annual precipitation on a provincial scale.

3.4 Forest Landscape Pattern and Structure

In the previous FMP, Alberta Vegetation Inventory (AVI) imagery from the mid-1990's was used to delineate the forest characteristics in this section (Weyerhaeuser, 2004 and 2005). New AVI imagery was flown for much of the DFA in 2012 (25). Where gaps existed in the new imagery, a combination of previous AVI or older imagery was used to fill in the missing information. The total DFA area under the old AVI is less than under the new AVI as grazing leases and some non-forested areas were not interpreted in the old AVI.

In the tables and figures of this section, "non-forested" refers to the summation of area within the DFA not covered by AVI interpretation, and area within the DFA interpreted to not have any forest cover.

3.4.1 Forest Species

Table 3-23 and Figure 3-26 compare summaries of commercial forest species on the DFA between the old and new AVI. In this assessment, the selected species was the leading overstorey tree species as identified in the forest inventory. Figure 3-27 illustrates the differences in species coverage between the old and new AVI. In both AVI datasets, aspen and lodgepole pine are the most prevalent species, followed by black and white spruce. Lodgepole pine covered the most area in the old AVI (25%), but is equalled by trembling aspen in the new AVI at 23%.

Table 3-23. Leading tree species within the DFA (old and new AVI).

	Old AVI		New AVI		Percentage Change in
Leading Species	Area (ha)	Area (%)	Area (ha)	Area (%)	Area from Old to New AVI
Trembling Aspen (Aw)	238,937	23	247,848	23	4
Lodgepole Pine (Pl)	254,914	25	245,706	23	-4
Black Spruce (Sb)	182,599	18	153,049	14	-16
White Spruce (Sw)	105,631	10	126,689	12	20
Tamarack (Lt)	83,516	8	109,659	10	31
Balsam Poplar (Pb)	30,653	3	24,860	2	-19
White Birch (Bw)	6,712	1	6,454	1	-4
Engelmann Spruce (Se)	12	0	1,844	0	15,721
Balsam Fir (Fb)	182	0	578	0	218
Alpine Fir (Fa)	-	-	57	0	-
Non-Forested	128,990	12	150,669	14	17
Total	**1,032,146**	**100**	**1,067,415**	**100**	**3**

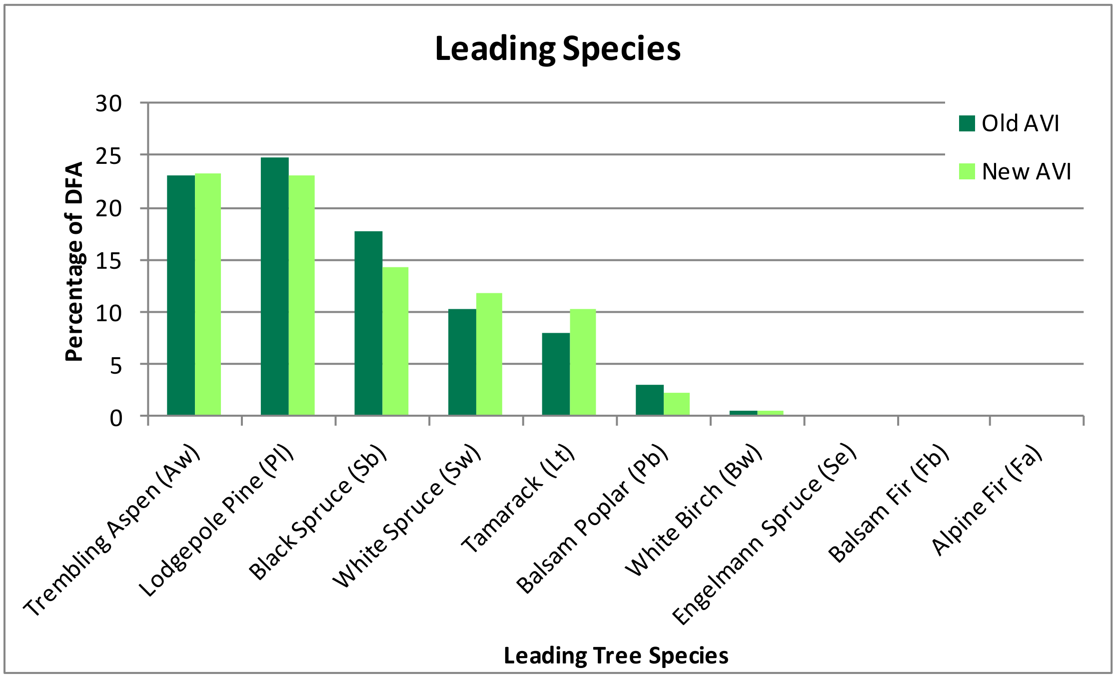


Figure 3-26. Leading tree species within the DFA (old and new AVI).

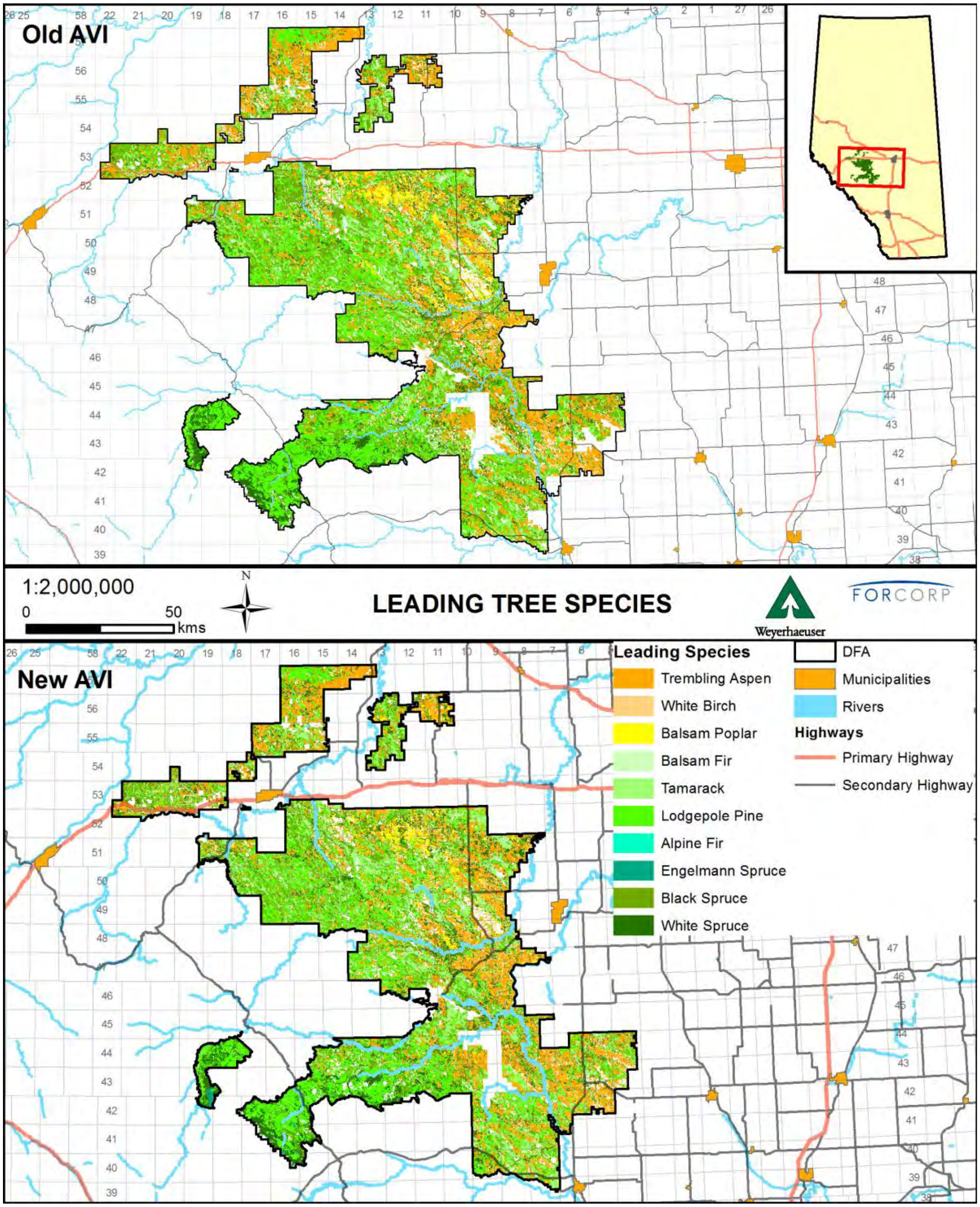


Figure 3-27. Comparison of leading tree species on the DFA from old AVI to new AVI.

3.4.2 Forest Cover Types

Forest cover types (strata) are delineated based on the following predominance of coniferous and/or deciduous in a given stand:

- Aw - stands with at least 80% deciduous,
- AwPl - stands with between 50 and 70% deciduous and with Pl being the leading coniferous species,
- AwSw - stands with between 50 and 70% deciduous and with Sw being the leading coniferous species,
- SwAw – stands with between 50 and 70% coniferous with the leading species being Sw,
- PlAw - stands with between 50 and 70% coniferous with the leading species being Pl,
- SbAw - stands with between 50 and 70% coniferous with the leading species being Sb,
- Sw - stands with at least 80% coniferous and the leading species is Sw,
- Pl - stands with at least 80% coniferous and the leading species is Pl,
- Sb - stands with at least 80% coniferous and the leading species is Sb.

Based on the species distribution between the old and new AVI, the strata would not be expected to change between interpretations. In the new AVI, Sb, Pl, and Aw stands are the most common (Table 3-24 and Figure 3-28). Figure 3-29 illustrates the distribution of forest cover types in the new AVI. Pl and Sw are more common in the western (subalpine and upper foothills) portion of the DFA, with Aw and Sb covering much of the eastern side (lower foothills and central mixedwood). Forest cover type can also be described more broadly in terms of broad cover group (BCG) or ecological unit, with mixedwoods grouped together into deciduous- or coniferous-leading. As shown in Table 3-24, BCG and ecological unit are similar with ecological units providing a more detailed breakdown for pure coniferous cover types. Figure 3-30 illustrates the distribution of ecological units across the DFA.

Table 3-24. Forest cover types within the DFA (old and new AVI).

Strata	BCG	Ecological Unit	Old AVI		New AVI		Percentage Change in Area from Old to New AVI
			Area (ha)	Proportion of Forested Area (%)	Area (ha)	Proportion of Forested Area (%)	
Aw	D	DX	217,235	24	215,003	23	-1
AwPl	DC	DC	25,794	3	21,050	2	-18
AwSw	DC		31,648	4	38,245	4	21
SwAw	CD	CD	25,671	3	28,092	3	9
PlAw	CD		28,127	3	22,633	2	-20
SbAw	CD		1,576	0	2,087	0	32
Sw	C	SW	80,551	9	110,779	12	38
Pl	C	PL	227,821	25	241,399	26	6
Sb	C	CX	264,732	29	259,614	28	-2
Total			**903,155**	**100**	**938,901**	**100**	**4**

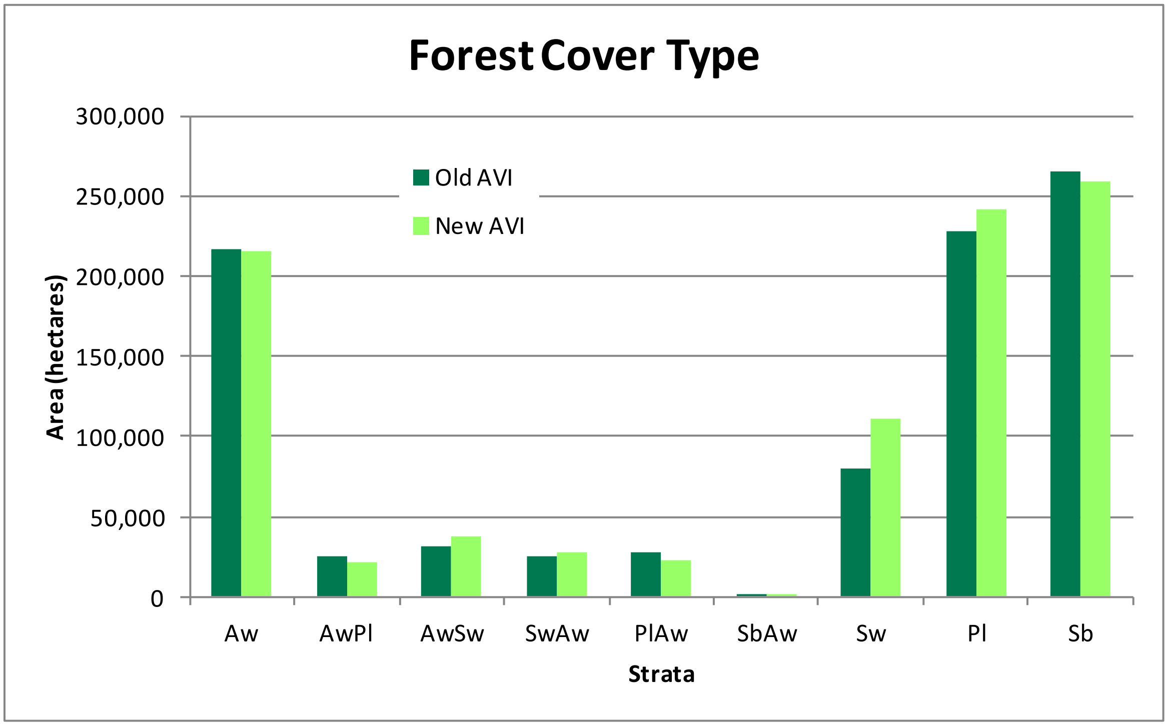


Figure 3-28. Forest cover types within the DFA (old and new AVI).

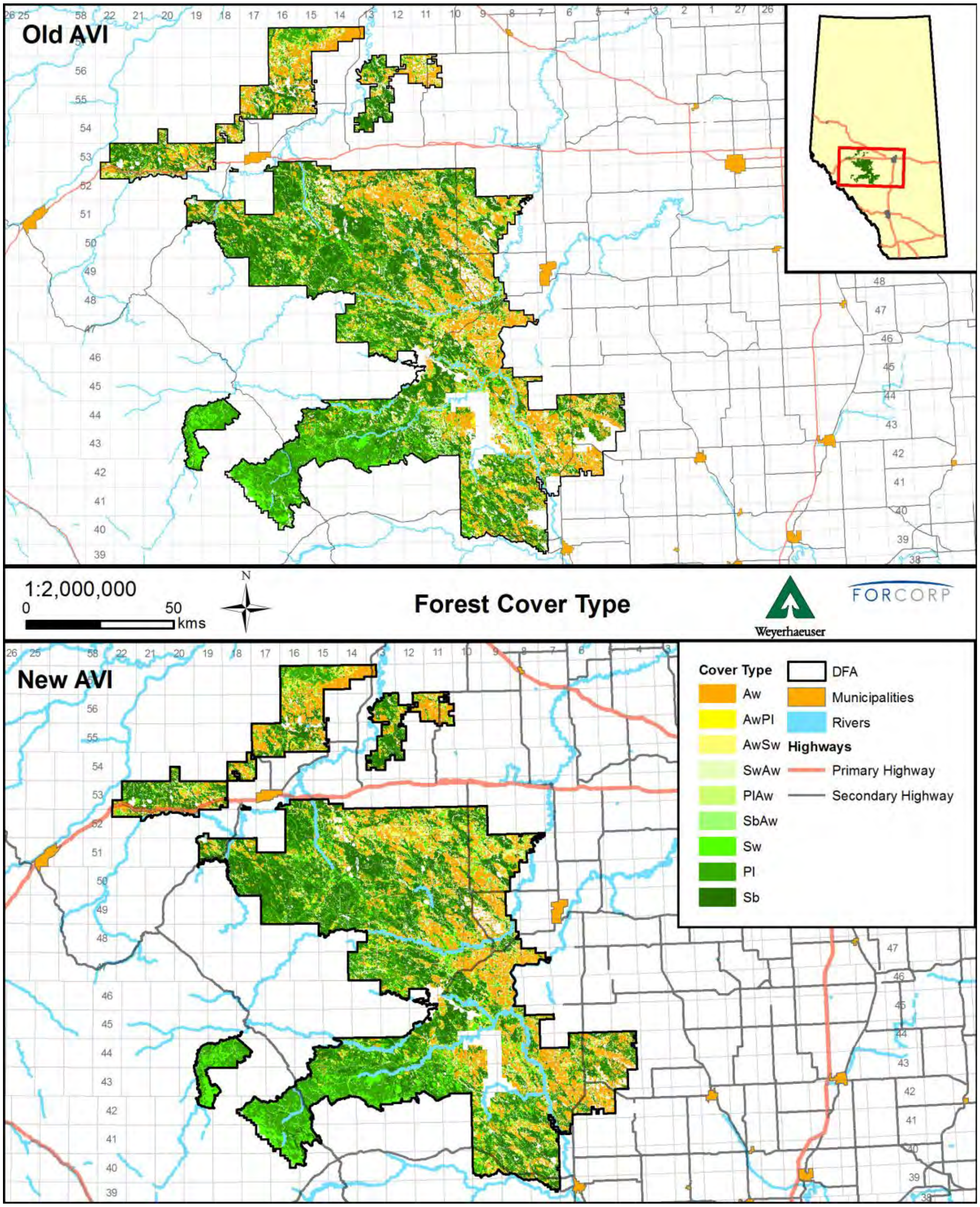


Figure 3-29. Comparison of forest cover types on the DFA from old AVI to new AVI.

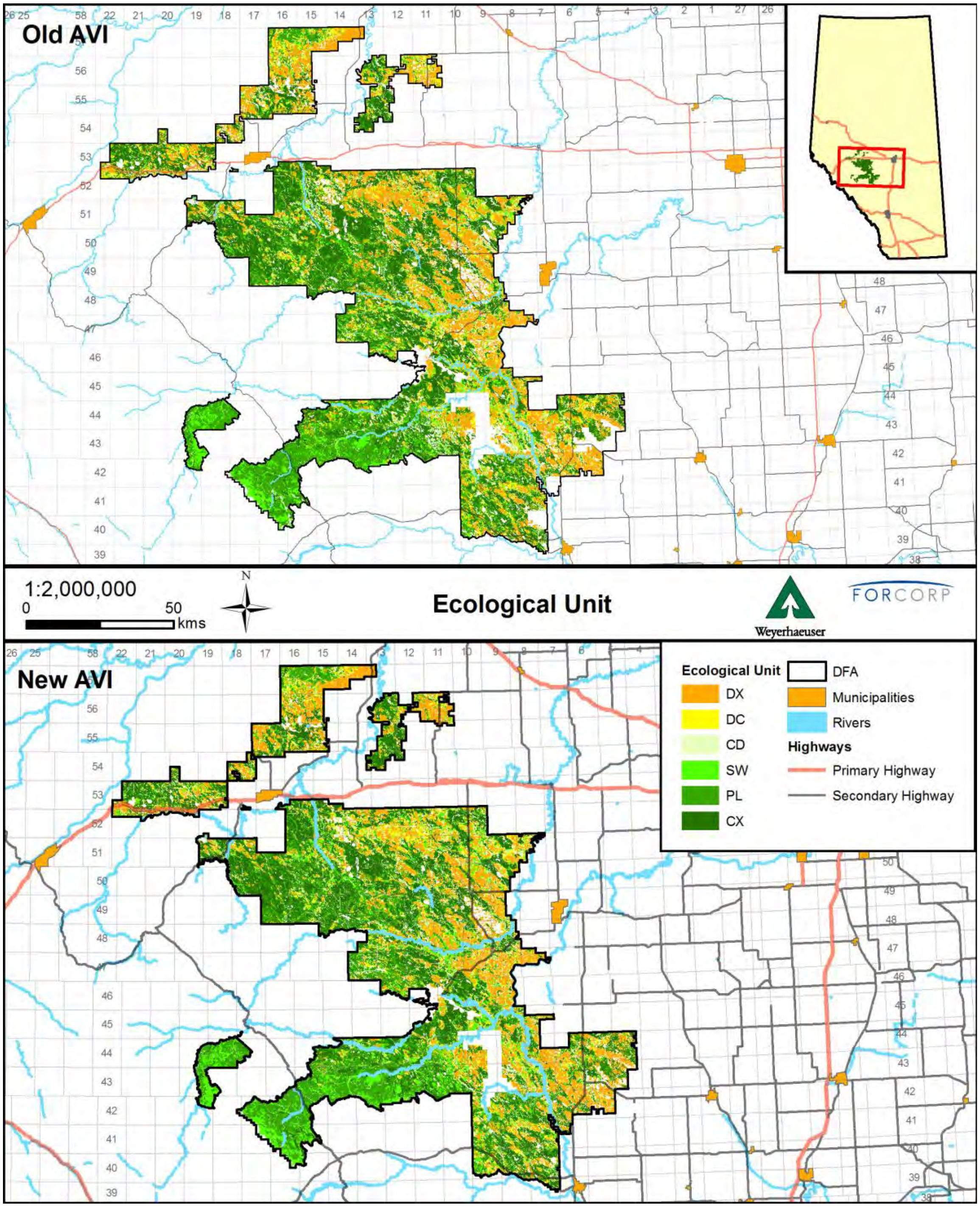


Figure 3-30. Comparison of ecological units on the DFA from old AVI to new AVI.

3.4.3 Ecosite

Ecosite classification (26) for the DFA was completed post-AVI by GreenLink Forestry Inc. in 2016. The ecosite map (Figure 3-32) is based on algorithms designed specifically for the AVI of the DFA. The primary fields are Mapcode, Ecosite, and Ecosite-phase, based on the Field Guide to Ecosites of West-Central Alberta (Beckingham, Carns, and Archibald, 1996). Mapcode (Figure 3-31) is a natural subregion-independent ecosite label that is consistent and facilitates ecological communication across natural subregions, since ecosite labels change across them. The ecosite map is based on algorithms that assign edaphic conditions to AVI based on interpreted moisture-regime, tree species, non-forest vegetation, crown closure, and site index. Algorithms are assigned specifically to Mapcodes only. Ecosite is assigned based on Mapcodes and natural subregions. Ecosite-phase is assigned based on ecosite, tree species, and lower vegetation proportions interpreted for the AVI data (GreenLink, 2016).

The most common ecosite on the DFA is Mesic/Medium (low-brush cranberry and rhododendron-mesic), covering 38% of its area (Table 3-25). The management implications for these ecosites include:

- Good timber productivity,
- Harvest operations possible during drier periods of summer, and
- Vegetation competition in reforestation that is moderate to high.

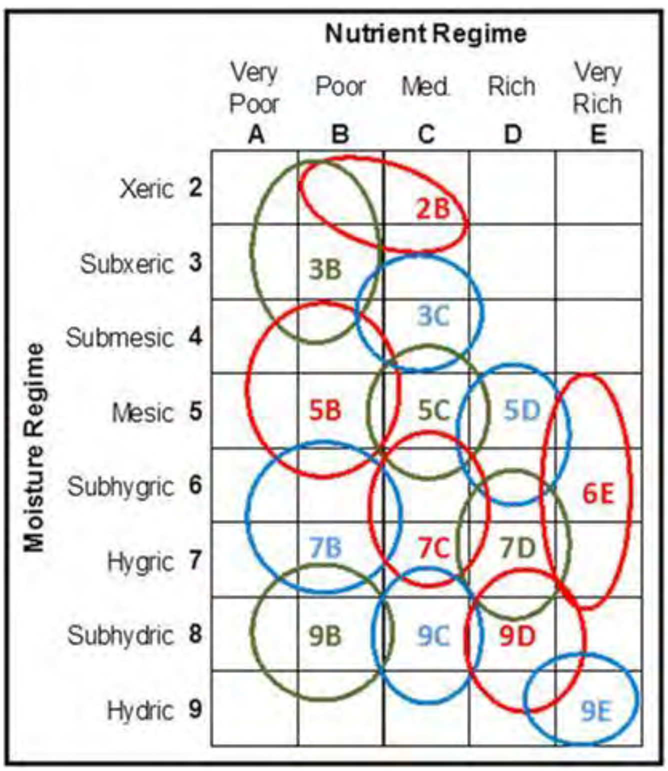


Figure 3-31. Generalized edatopic position of each mapcode. Different colour circles are for contrast only (Greenlink, 2016).

Table 3-25. Ecosite classification within the DFA.

Ecosite Class	Mapcode	Area (ha)	% of DFA
Xeric/Poor	2B, 3B	28	0
Subxeric/Poor	2B, 3B, 3C	123	0
Subxeric/Medium	2B, 3C	15	0
Submesic/Medium	3C, 5B, 5C	10,122	1
Mesic/Poor	5B, 5C, 7B	55,002	5
Mesic/Medium	5B, 5C, 5D, 7C	393,469	38
Subhygric/Poor	5B, 5C, 7B, 7C	36,760	4
Subhygric/Medium	5C, 5D, 7B, 7C, 7D	1,638	0
Subhygric/Rich	5C, 5D, 6E, 7C, 7D	166,765	16
Subhygric/Very Rich	5D, 6E, 7D	6,395	1
Hygric/Medium	7B, 7C, 7D, 9C	56,572	5
Hygric/Rich	6E, 7C, 7D, 9D	15,590	2
Subhydric/Very Poor	9B	2,171	0
Subhydric/Poor	9B, 9C	87,671	8
Subhydric/Medium	9B, 9C, 9D	51,603	5
Subhydric/Rich	7D, 9C, 9D, 9E	68,895	7
Hydric/Rich	9D, 9E	579	0
Anthropogenic or Naturally Non-Vegetated	-	78,040	8
Total	**-**	**1,031,439**	**100**

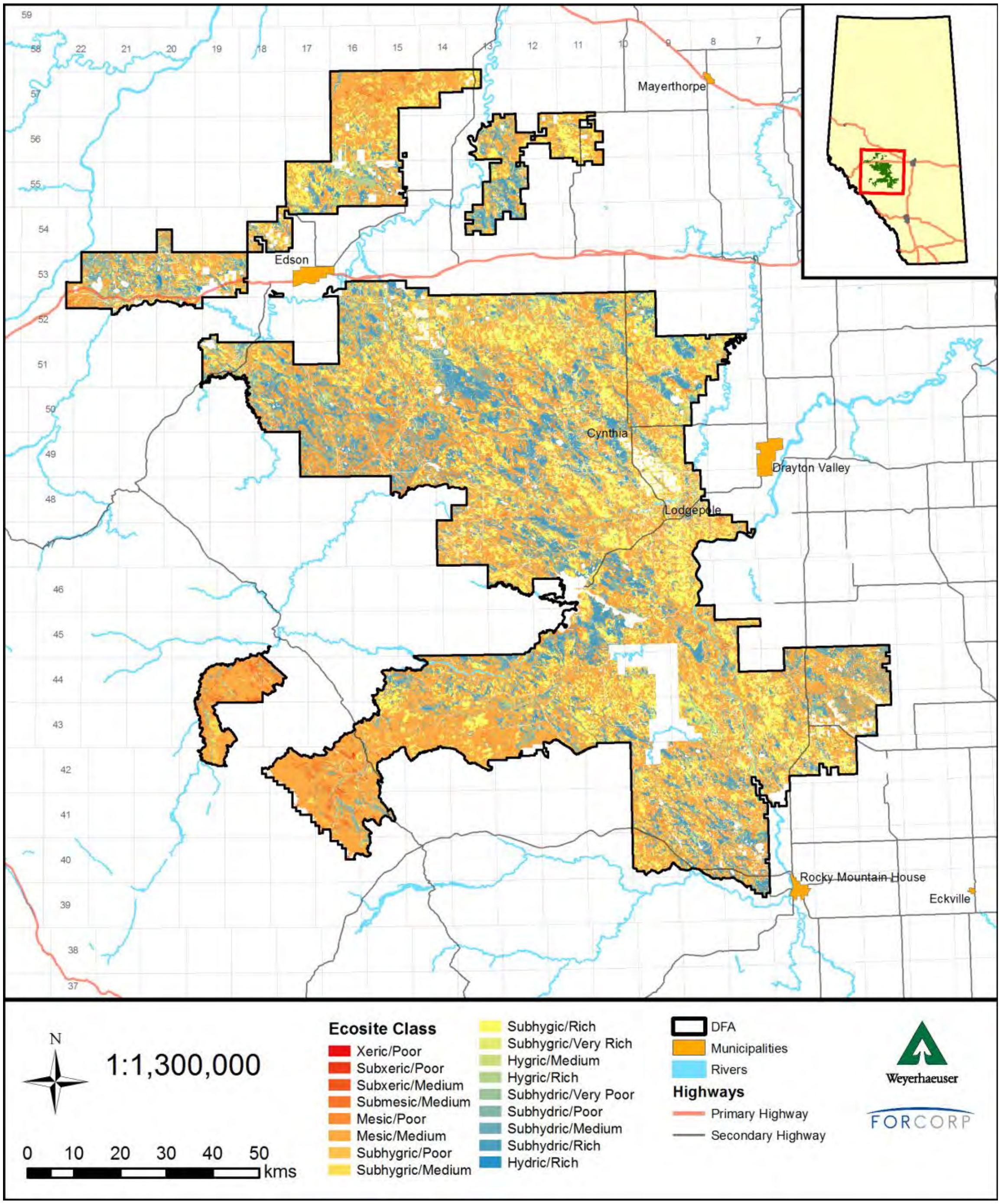


Figure 3-32. Ecosite classification within the DFA.

3.4.4 Forest Age Classes

The old and new AVI provide snapshots of the DFA's forest age class distribution at the time of their capture (c.1995 and 2012, respectively) (Figure 3-34). Making a comparison of the snapshots highlights both the succession of ageing forest stands and the implementation of sustainable harvesting (Figure 3-33).

The current age of stands within the DFA varies from 0 to 362 years. As shown for the new AVI in Table 3-26, 65% of the forest appears to have been established in the years between 1880 and 1950 (60-140 year old age classes).

The average weighted age of the forest has increased from 88 years based on the old AVI to 93 years for the new AVI.

Table 3-26. Age Class Distribution across the DFA (old and new AVI)

Years of Age	Old AVI		New AVI		Percentage Change in Area from Old to New AVI
	Area (ha)	Proportion of DFA (%)	Area (ha)	Proportion of DFA (%)	
1-20	15,853	2	48,172	5	204
21-40	20,933	2	47,828	4	128
41-60	119,657	12	40,414	4	-66
61-80	156,739	15	127,952	12	-18
81-100	188,932	18	140,710	13	-26
101-120	292,947	28	187,686	18	-36
121-140	77,424	8	238,863	22	209
141-160	18,909	2	60,020	6	217
161-180	4,180	0	12,814	1	207
181-200	1,600	0	3,993	0	150
>200	6,890	1	8,293	1	20
Non-Forested	128,081	12	150,669	14	18
Total	**1,032,146**	**100**	**1,067,415**	**100**	**3**

The current forest age class distribution across the DFA is the result of an effective fire suppression program over the last 50 years. It is not an ecologically-sustainable age class distribution as it does not reflect the natural processes controlling plant association development in this region. The amount of forest stands greater than 100 years old in the Lower and Upper Foothills and in the Subalpine seems to be well beyond the natural range of variation that is expected to occur in these fire-driven ecosystems (Andison, 1998).

The forests in the Lower Foothills natural subregion are a mosaic of aspen and poplar stands interspersed with white spruce and lodgepole pine. Further to the west, in the Upper Foothills and Subalpine natural subregions, forests are dominated by extensive stands of conifers - lodgepole pine, Engelmann/white spruce or, at higher elevation or in wetter areas, fir. In the Lower and Upper Foothills subregions, large expanses of black spruce and tamarack forests are common in less drained areas. Further to the east, the Central Mixedwood contains mostly stands where aspen, white spruce and jack pine predominate, interspersed with wet, bogs and fens. The Dry Mixedwood subregion is similar to the Central but with less coniferous, meaning that most of its stands are aspen dominated. Due to these differences in topography and climatic conditions, the six natural subregions have historically experienced distinct disturbance regimes (Andison, 1997). In the Lower Foothills, forests burned frequently (fire cycle approximately 50-75 years), but fires were rarely very large. In this region, forest stands rarely survived much beyond 120 years. Further to the west in the Upper Foothills, the forest burned less frequently (fire cycles approximately 60-90 years). In general, fires were more catastrophic, covering large areas that included stands of varying age. In the Subalpine and Alpine, fires were not common but were very catastrophic, extending over large areas (White, 1985). In these subregions, forests older than 200 years are common (Rogeau, 1996) and consist of stands that survived the latest fire. Fires to the east in the Central and Dry Mixedwood were even more frequent than the Lower Foothills, however, on average were smaller in size.

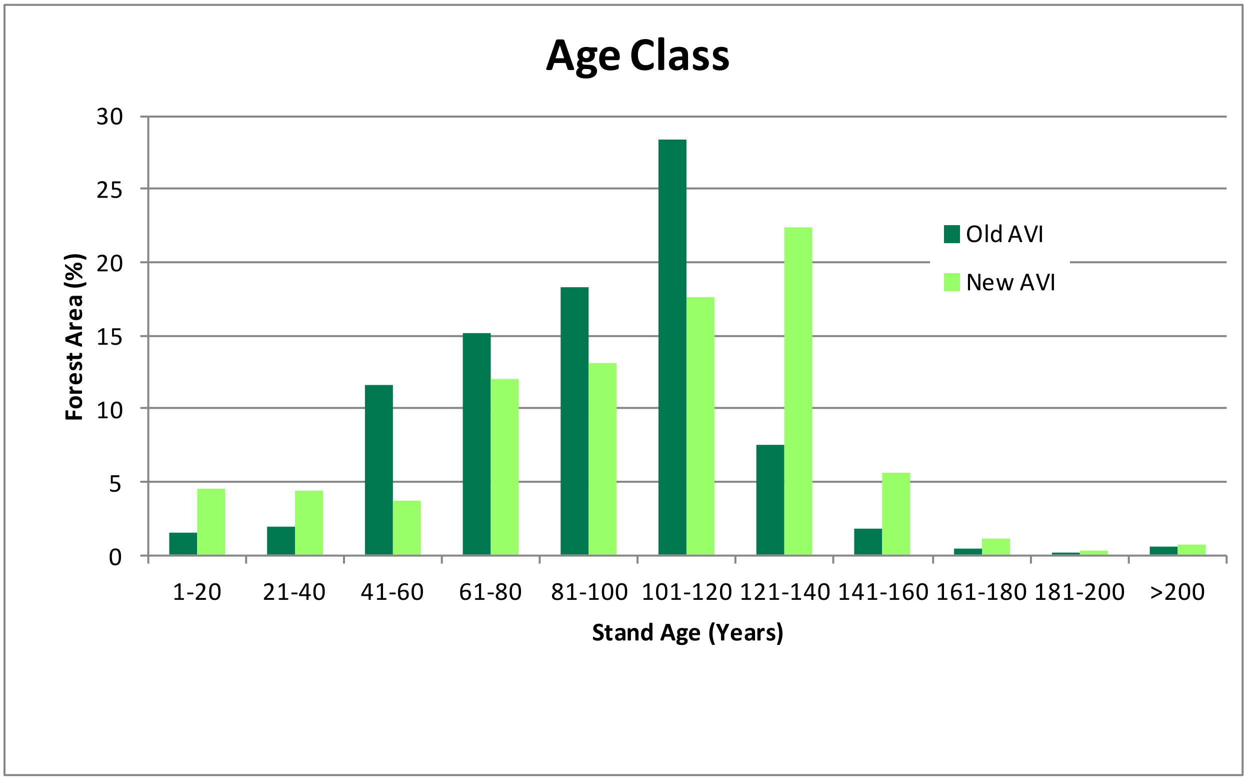


Figure 3-33. Age class distribution across the DFA (old and new AVI).

The different disturbance regimes among the natural subregions are evident in their specific age class distribution (Figure 3-35). The Central Mixedwood, Dry Mixedwood, and Lower Foothills natural subregions show a younger age class distribution than the Upper Foothills, Subalpine, and Alpine natural subregions. Forest stands older than 140 years represent 53% of the landscape in the Subalpine, 14% in the Upper Foothills, and 11% in the Alpine, and only 6% in Lower Foothills, 3% in the Central Mixedwood, and 0% in the Dry Mixedwood natural subregions.

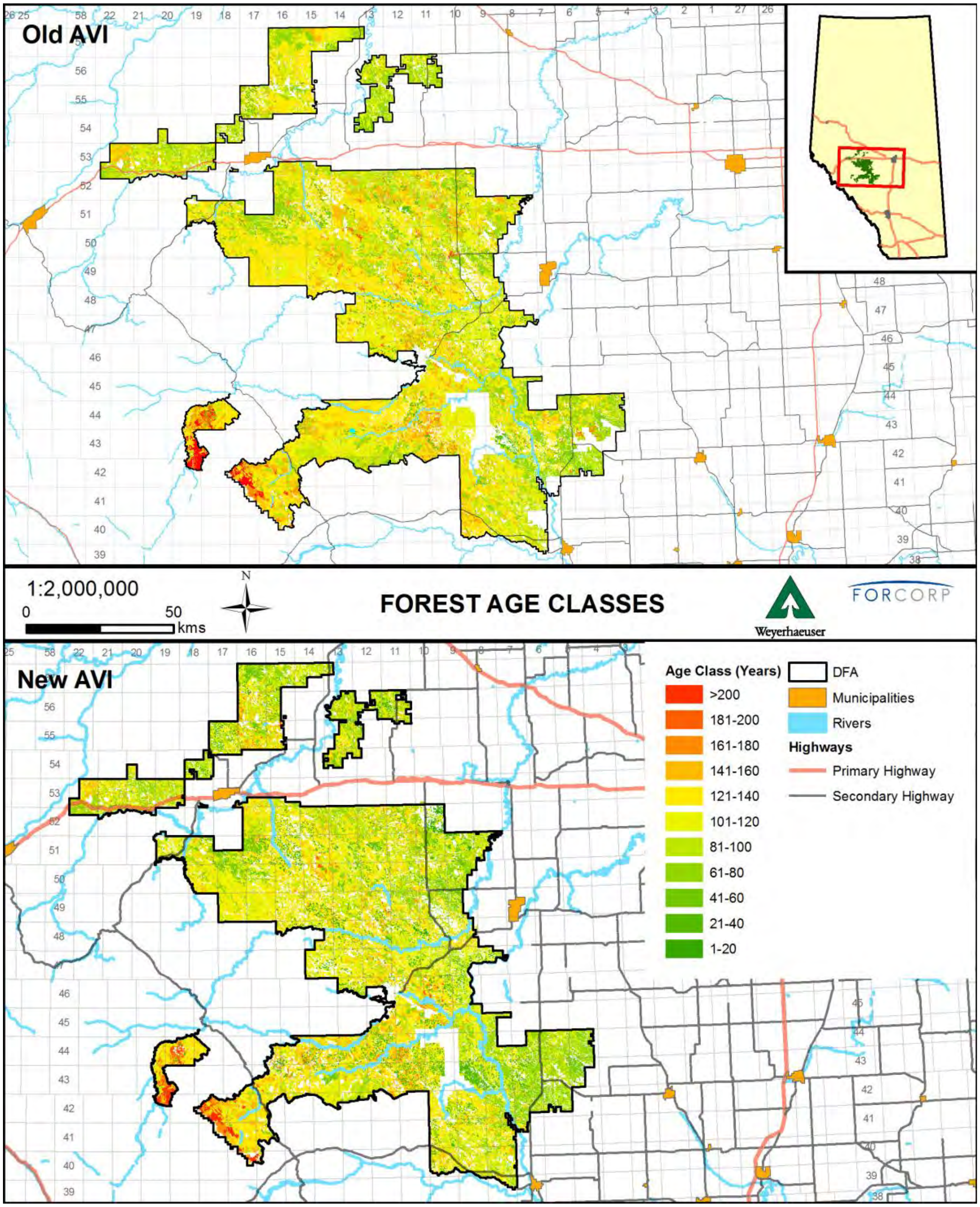


Figure 3-34. Comparison of age class distribution on the DFA from old AVI to new AVI.

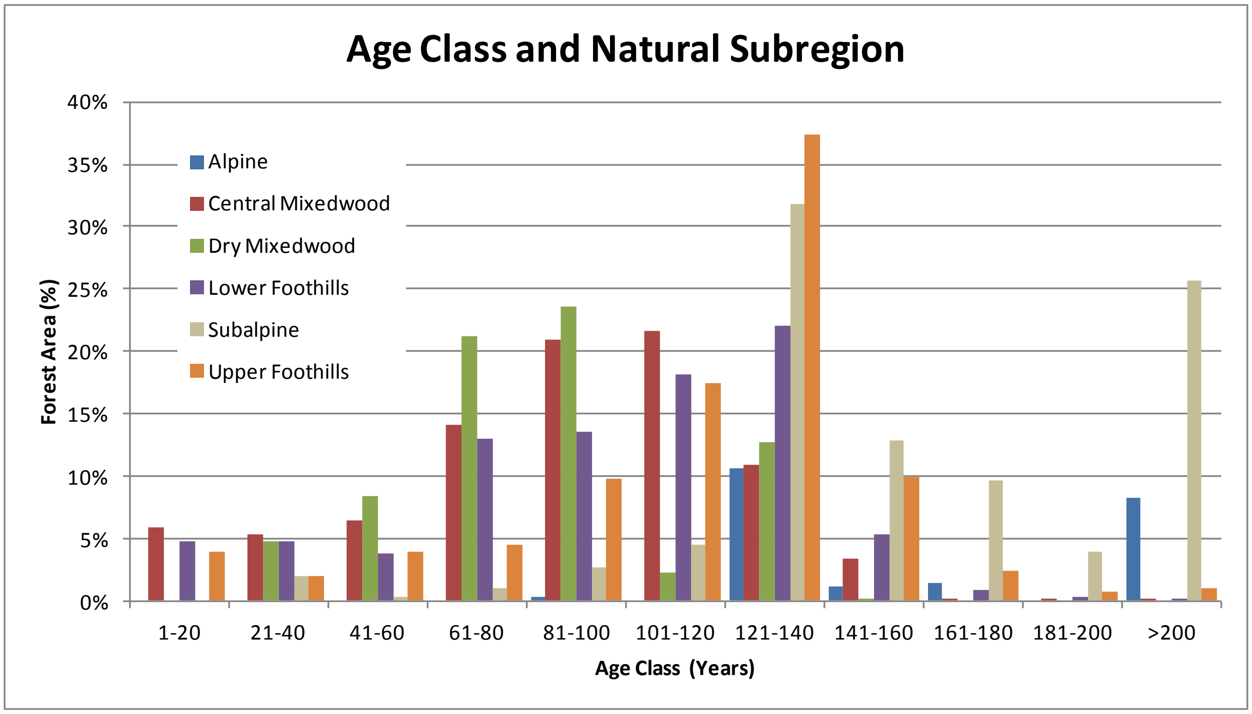


Figure 3-35. Age class distribution across the DFA as a percentage of each natural subregion (new AVI).

The amount of older forests in the Subalpine natural subregion suggests the occurrence of four major fire events in 1760, 1840, 1860 and 1890. The extent of the Subalpine region affected by these fires ranged from 26% in 1890 to 6% in 1840. It should be noted that the percentage of area affected by older fire events might be underestimated by the current age class distribution because more recent events may have affected areas previously burned. Low severity or smaller fire events may have also occurred in 1720 and in 1790-1800, but to date have not been detected.

A fire event in the Subalpine would most likely travel long distances and also affect the Upper and Lower Foothills subregions. However, in these regions, and particularly in the Lower Foothills, there is little evidence of fire having occurred in the 1700s and 1800s because more recent fires have erased their footprint. The presence of remnant older stands in the Upper Foothills from 1760, 1840 and 1860 provides supporting evidence to suggest those major fire events did affect the Subalpine natural subregion.

The last major fire event occurred in 1890-1900. That fire affected 27% of the Subalpine natural subregion, at least 42% of the Upper Foothills and 27% of the Lower Foothills natural subregion. The fire in the 1890-1900 decade may have extended over a larger area in the Lower Foothills, but a shorter fire cycle in this natural subregion and smaller, more recent fires may have erased some of its footprint.

The amount of area younger than 40-50 years of age in the Upper Foothills and Subalpine natural subregions may be of concern. In such fire-driven ecosystems, it suggests limited habitat availability for wildlife species that depend on early seral stages (Lyon et al., 2000).

3.4.5 Seral Stages

Seral stages are delineated differently based on whether the stand is predominately coniferous or deciduous. For stands where total coniferous is equal to or exceeds 50% and the leading species is coniferous, the seral stages are as follows:

- Regenerating - defined as stands between disturbance date and 30 years old representing the period from disturbance to initial crown closure
- Young - defined as stands between 31 and 80 years old; in other words when the stands first start to reach merchantability
- Mature – defined as stands between 81 and 140 years old
- Old Forest – defined as stands 141 years and older

For stands where total deciduous is equal to or exceeds 50% and the leading species is deciduous, the seral stages are as follows:

- Regenerating - defined as stands between disturbance and 20 years old representing the period from disturbance to initial crown closure
- Young - defined as stands between 21 and 70 years old; in other words when the stands first start to reach merchantability
- Mature – defined as stands between 71 and 120 years old
- Old Forest – defined as stands 121 and older

The most common seral stage on the DFA is mature coniferous (39%), followed by mature deciduous (14%). Together, this mature stage covers over half of the DFA (Table 3-27).

Table 3-27. Seral stages within the DFA for (old and new AVI).

Seral Stage	Old AVI		New AVI		Percentage Change in Area from Old to New AVI
	Area (ha)	Proportion of DFA (%)	Area (ha)	Proportion of DFA (%)	
Coniferous-Regenerating	4,541	0	43,404	4	856
Coniferous-Young	178,218	17	109,253	10	-39
Coniferous-Mature	414,598	40	413,985	39	0
Coniferous-Old Forest	31,122	3	80,579	8	159
Deciduous-Regenerating	11,854	1	20,491	2	73
Deciduous-Young	97,527	9	54,466	5	-44
Deciduous-Mature	154,542	15	153,625	14	-1
Deciduous-Old Forest	10,756	1	40,941	4	281
Non-Forested	128,990	12	150,669	14	17
Total	**1,032,146**	**100**	**1,067,415**	**100**	**3**

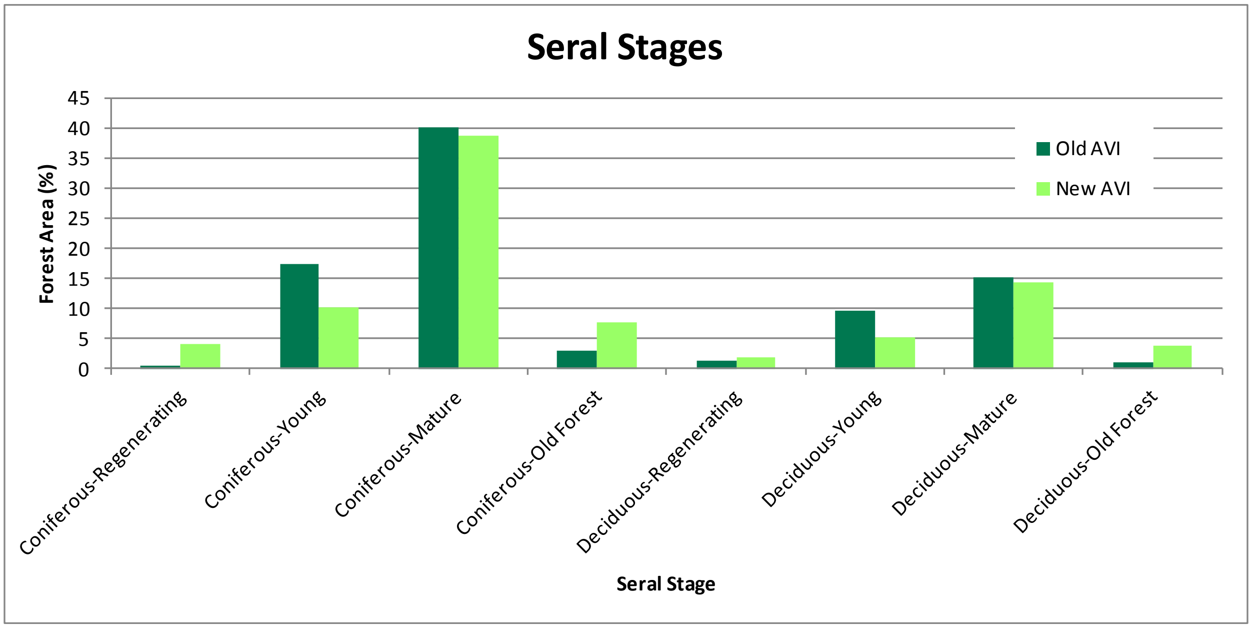


Figure 3-36. Seral stages within the DFA (old and new AVI).

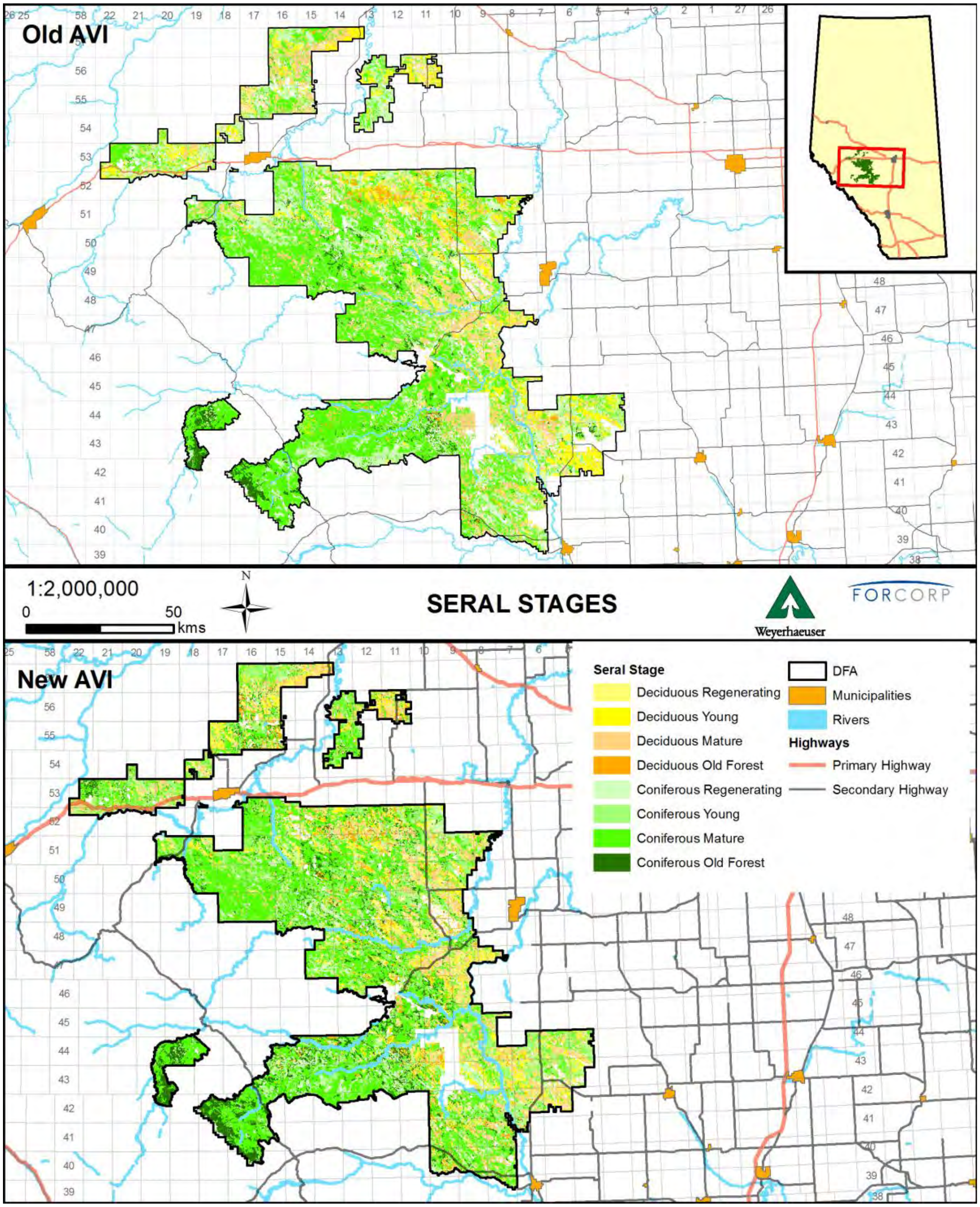


Figure 3-37. Comparison of seral stages on the DFA from old AVI to new AVI.

3.4.6 Forest Patches

In northern forests, fire plays an important function in determining the variety of vegetation patterns observed on the landscape. The type, duration, severity, and size of fire determine post-fire vegetation composition and succession (Johnson, 1992). However, fires and fire regimes differ greatly across and within geographical regions, and are influenced by a number of factors including climate, weather, vegetation composition, stand age, topography and others (Rogeau 1996).

The distribution of age classes across a landscape, and hence the amount of late seral stages, will vary depending on the length of time since the last fire disturbance and the fire cycle of the region[1].

Based on the fire regime of a region, the relative contribution of stands of different ages on a landscape is believed to follow a theoretical negative exponential curve where the age-class distribution is represented by a high percentage of young age classes, an exponentially declining percentage of older age classes and a relatively small percentage of very old stands (Johnson and Gutsell 1994).

However, while on a theoretical level the age-class distribution may approach a negative exponential distribution reflecting a long-term average, at any one time the relative amount of various age classes may vary significantly. As suggested by Andison (1997, 1998) in his research in the foothills of Alberta, the historical range of variation in age-class distribution is wide and there is not a "natural" age-class distribution representative of a landscape. Andison has showed in simulations that, for instance, in the Upper Foothills Natural Subregion the percentage of young (0-40 year old) stands may represent with equal probability 0 to 70% of a landscape, while older forest stands (140-200 year old) could represent anywhere from 0 to 15%. Despite the wide range of probability of representation by individual age classes, older forest classes had a smaller range of representation in any simulated age-class distribution than younger stands, indicating the lower likelihood of older stands occurring on fire-driven landscapes.

In Alberta, fire regimes differ among natural subregions depending on climate, tree species dominance, and even historical lightning strikes (Andison 2000). Natural subregions with cooler, wetter climates and less lightning activity have longer fire cycles (Table 3-28).

Table 3-28. Overview of characteristics of the lower and upper foothills in the foothills model forest and the subalpine of Jasper National Park (Weyerhaeuser, 2005).

Characteristic	Lower Foothills	Upper Foothills	Subalpine
Fire Cycle (years)	65-75	80-90	130-190
% Area in Patches > 2,000 ha	33	76	66
Lightning hits/1,000 ha	58	48	11
Growing Degree Days	1,121	880	903
Rain/year (mm)	403	370	328
Snow/year (cm)	144	233	162

The differences in lightning strikes, growing-degree days and amount of rain and snow among the natural subregions are rough indications of the increased risk of ignition, fire growth, length of fire

[1] Fire cycle is defined as “the number of years required to burn over an area equal to the entire area of interest” (Merrill and Alexander 1987, Johnson and Gutsell 1994.)

season, and forest flammability. In this context, the Lower Foothills would appear to have a high ignition probability, since this subregion has the most lightning strikes and the highest number of growing degree days. This suggests that the Lower Foothills subregion burns fairly often, but in relatively small patches. This can be explained by the much greater lightning activity, which is known to produce more fire starts; however, higher levels of precipitation reduce the chances of any single fire becoming very large. The size of fires is also influenced by the nature of the vegetation dominant in the Lower Foothills. Deciduous forests, which are common there, tend to limit the spread of fires due to their high moisture content in the summer. In the Upper Foothills and Subalpine, fire activity tends to be more intense due to a combination of historical ignition probabilities, topography, vegetation, and fire weather indicators.

3.4.6.1 Regenerating Forest Patches

Regenerating forest patches (Figure 3-38) are contiguous areas greater than 0.1 hectares classified in the "regenerating" seral stage (see Section 3.4.5) and not split by any linear feature greater than 8 metres wide. Table 3-29 details the number and area of these patches by size class. The current AVI shows over double the area of regenerating patches than that of the old AVI, but with only three quarters the number of patches. This increase in large patches can be partially attributed to the implementation of the Healthy Pine Strategy, as large mature pine stands have been targeted for harvest. This initiative to slow the spread of mountain pine beetle has resulted in more large, regenerating stands across the DFA.

Table 3-29. Young seral stage patch size within the DFA (old and new AVI).

Patch Size Class	Old AVI			New AVI			Percentage Change in Average Patch Size from Old to New AVI
	Number of Patches	Area (ha)	Average Patch Size (ha)	Number of Patches	Area (ha)	Average Patch Size (ha)	
< 20 hectares	11,867	37,448	3	7,337	42,988	6	86
20 - 99 hectares	385	11,763	31	1,516	57,944	38	25
100 - 249 hectares	2	262	131	96	14,512	151	15
250+ hectares	8	2,826	353	24	8,811	367	4
Total	**12,262**	**52,299**	**4**	**8,973**	**124,256**	**14**	**225**

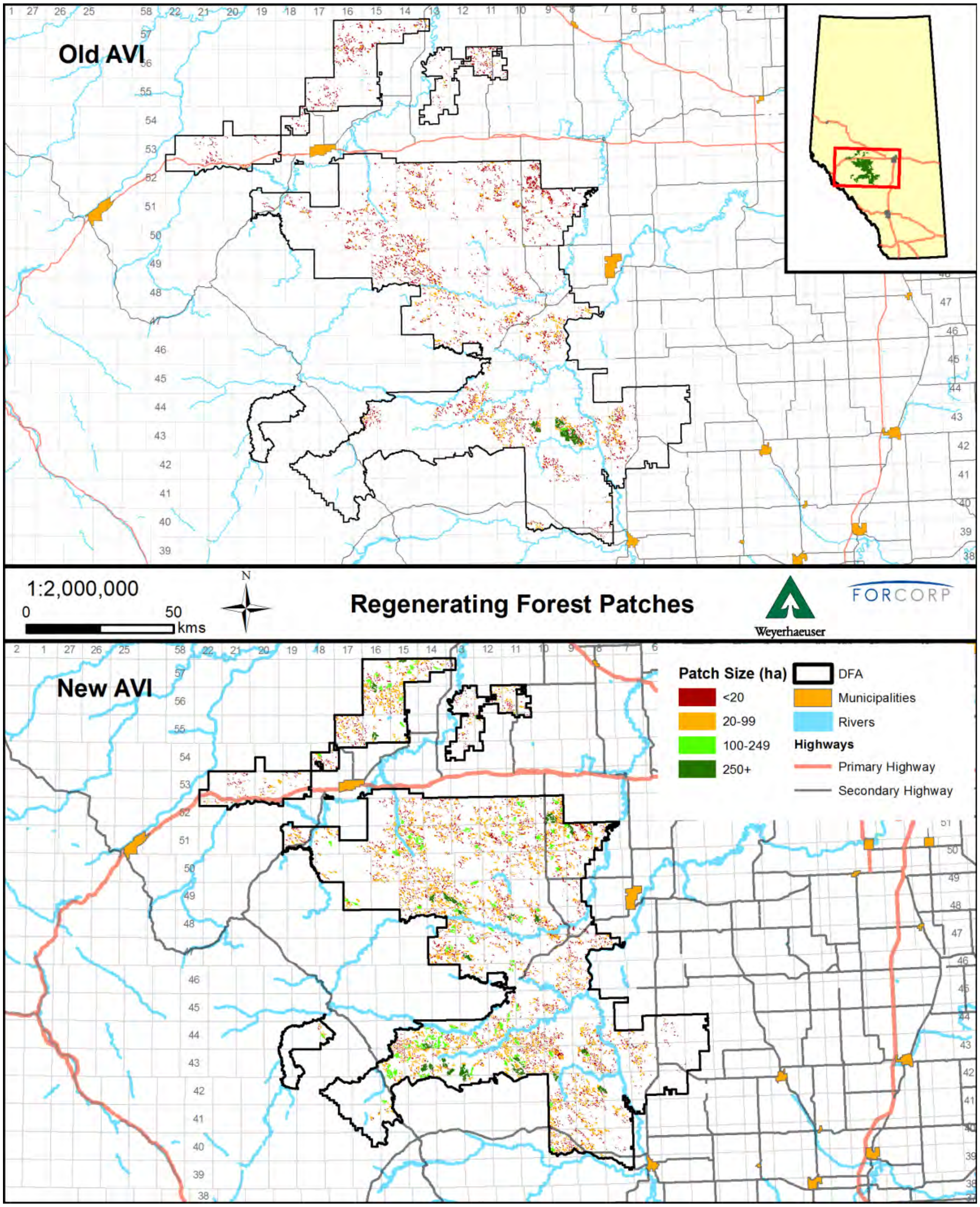


Figure 3-38. Comparison of young seral stage patch size on the DFA from old AVI to new AVI.

3.4.6.2 Old Interior Forest

Old interior forest (OIF) patches are defined as any patch greater than 120 ha that is composed of forested stands greater than 120 years old, using a 15m adjacency distance. OIF patches include all strata within both active and passive forested areas of the landbase.

Table 3-30 shows the total OIF area on the landbase broken down by ecological unit (see section 3.4.2).

Table 3-30. Old interior forest area by ecological unit

Ecological	Area	
Unit	Ha	%
DX	24,354	9%
DC	10,557	4%
CD	10,467	4%
PL	93,170	34%
SW	41,924	15%
CX	91,161	34%
Total	**271,633**	**100%**

Figure 3-39 shows the distribution of old interior forest patches across the DFA.

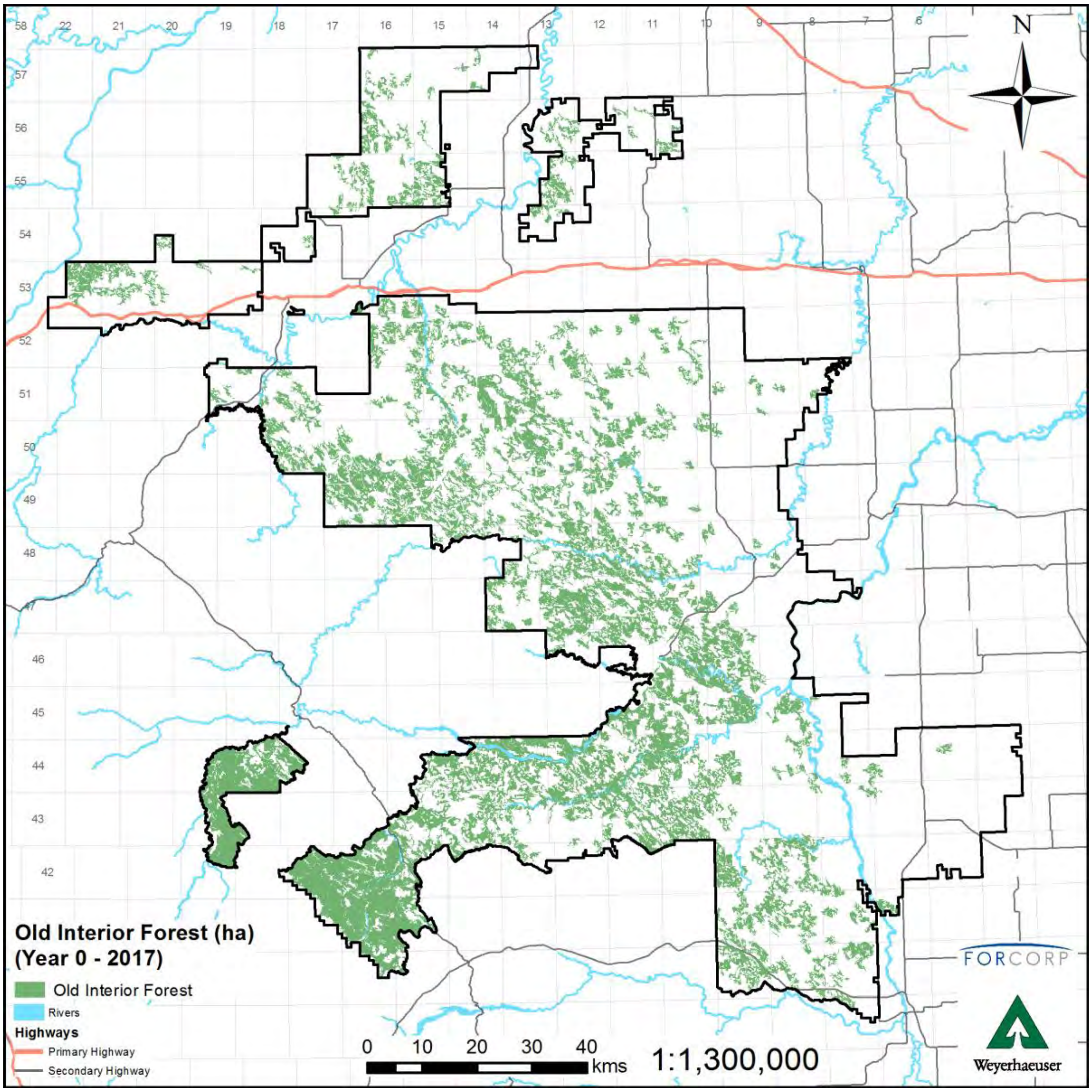


Figure 3-39. Old interior forest patches within the DFA

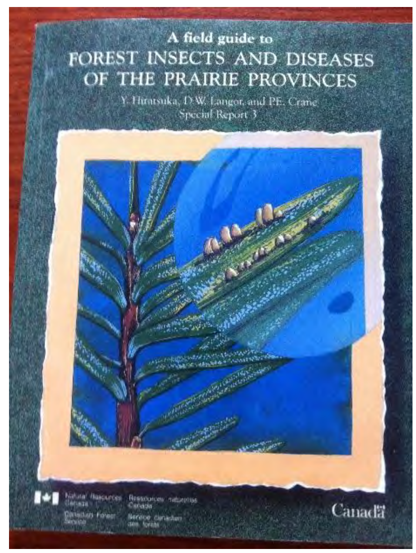
3.5 Forest Landscape Disturbance and Succession

3.5.1 Inherent Disturbance Regime

There are many natural disturbance regimes that impact the landscape at any time, including fire, insect, disease, flooding, wind and weather events (hail, early and late season snowfalls). Human-caused, or anthropogenic, events, such as logging, thinning, drainage, reforestation effort and success, access and settlements, and the development of the energy industry will also impact how forests develop.

3.5.2 Insects and Diseases

The disturbance factors detailed in sections 3.5.2.1, 3.5.2.2, 3.5.2.3, 3.5.2.4, and 3.5.2.5 occur naturally throughout the DFA and have not caused significant timber losses (mortality) within the past 25 years. Mountain Pine Beetle (*Dendroctonus ponderosae*) represents the greatest threat, following an unprecedented in-flight of beetles into Alberta from British Columbia in 2006 and again in 2009.



3.5.2.1 **Mountain Pine Beetle**

The primary threat to Alberta forests at this time is the Mountain Pine Beetle (MPB), which invaded the DFA around 2006 and 2009 from the northwest with in-flights from British Columbia (Figure 3-40) (28). The area south of the Pembina River is currently less infested with the beetle, while the area to the north of the river has infestations resulting in mortality of small groups of trees. AAF has aggressively controlled MPB to date on the DFA, but populations continue to progress from the north and west of the DFA, and remain a threat.

Stand Susceptibility Index (SSI) is the physical characteristics of a stand that determine its MPB habitat suitability, without considering the climate or location of the particular stand. For example, a stand may have a high SSI but be located in an area (e.g. higher elevation) that would give it no real capacity to produce new beetle populations. Within the DFA, 34% of the stands have been assigned an SSI value (Table 3-31 and Figure 3-41) (28).

The DFA falls into AAF's Upper Athabasca Region (South District) for MPB control. In 2016, AAF has treatment plans for an estimated 2,719 control trees on 985 sites (Alberta, 2015d).

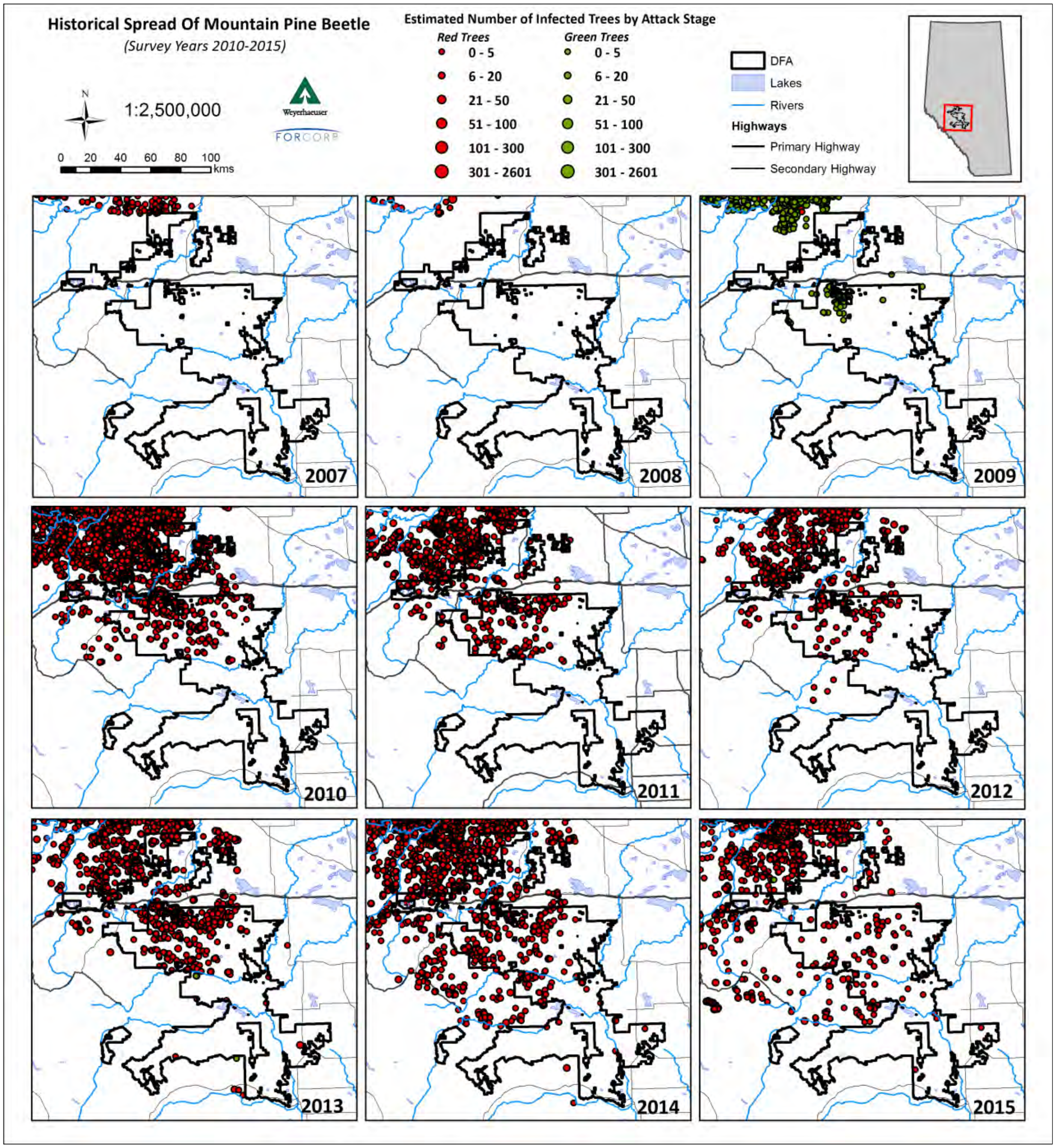


Figure 3-40. Historical spread of mountain pine beetle in the DFA.

Table 3-31. Stand Susceptibility Index within the DFA.

SSI Category	Area (ha)	Proportion of DFA (%)
1-20	103,403	10
21-40	109,284	10
41-60	129,222	12
>60	22,957	2
Total	**364,866**	**34**

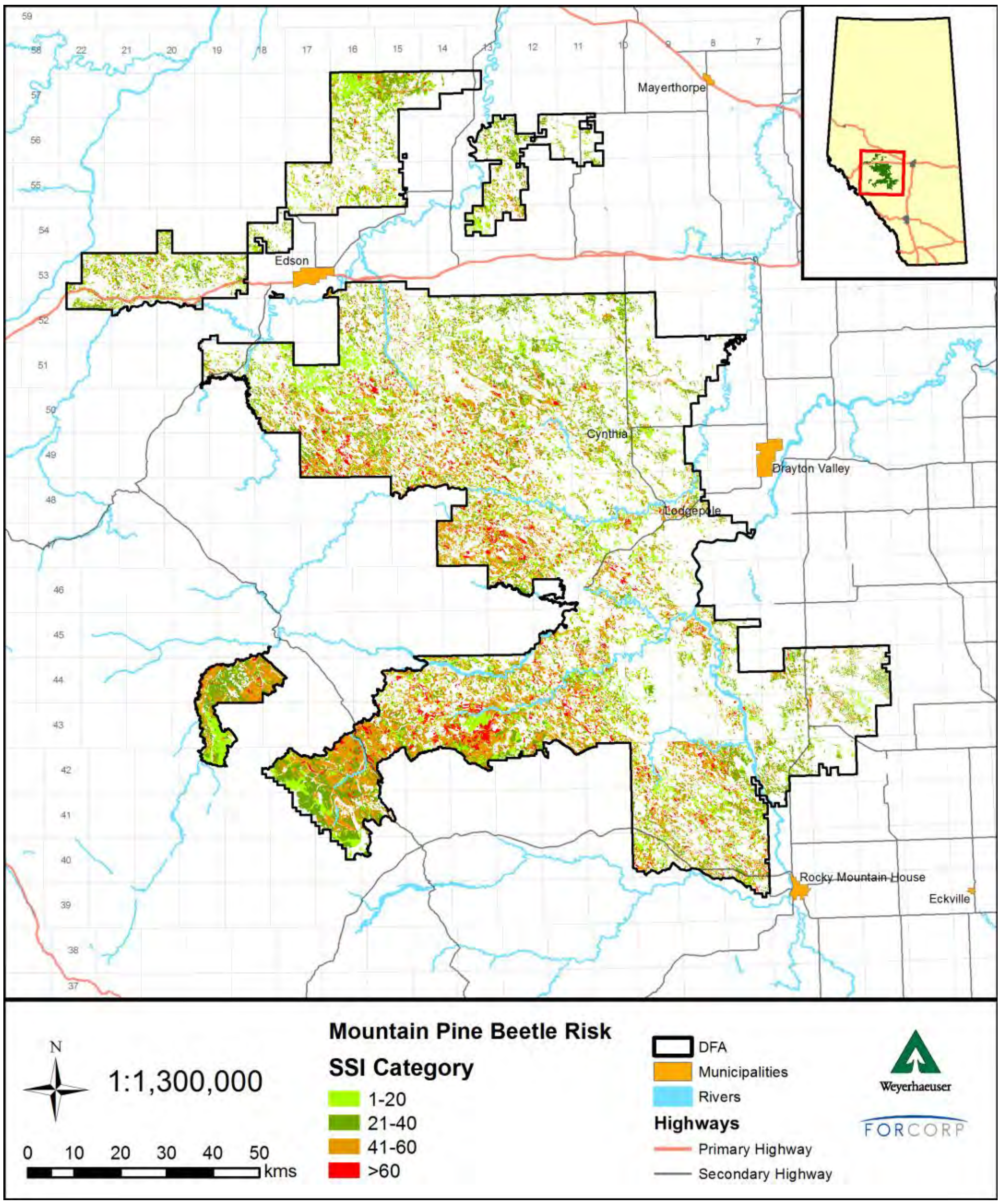


Figure 3-41. Stand Susceptibility Index for mountain pine beetle across the DFA.

3.5.2.2 Spruce Budworm

Spruce budworm (*Choristoneura fumiferana*) is the most important defoliator pest of spruce-fir forests in North America. Based on AAF historical survey data, however, there has been no detection of spruce budworm within the DFA (30).

3.5.2.3 Spruce Beetle

The most recent AAF surveys for Spruce Beetle (*Dendroctonus rufipennis*) occurred in 2015 and returned low to moderate infestations across approximately 1,400 ha in the southern portion of the DFA. Most of the infestations were located in river valleys and creek bottoms (Alberta, 2015d).

3.5.2.4 Hardwood Defoliators

Moderate to severe defoliation of aspen from Forest Tent Caterpillar (*Malacosoma disstria)* was experienced during the mid-1980s, with a repeat in the mid-2000’s, the impact of which is expected to be reductions in growth during those periods. Available AAF survey data for 2008-2015 (Figure 3-42) (31) shows minimal impact from Forest Tent Caterpillar, Large Aspen Tortrix (*Choristoneura conflictana*), and Bruce Spanworm (*Operophtera bruceata*) with a light to moderate impact from Aspen Two Leaf Tier (*Enargia decolor*).

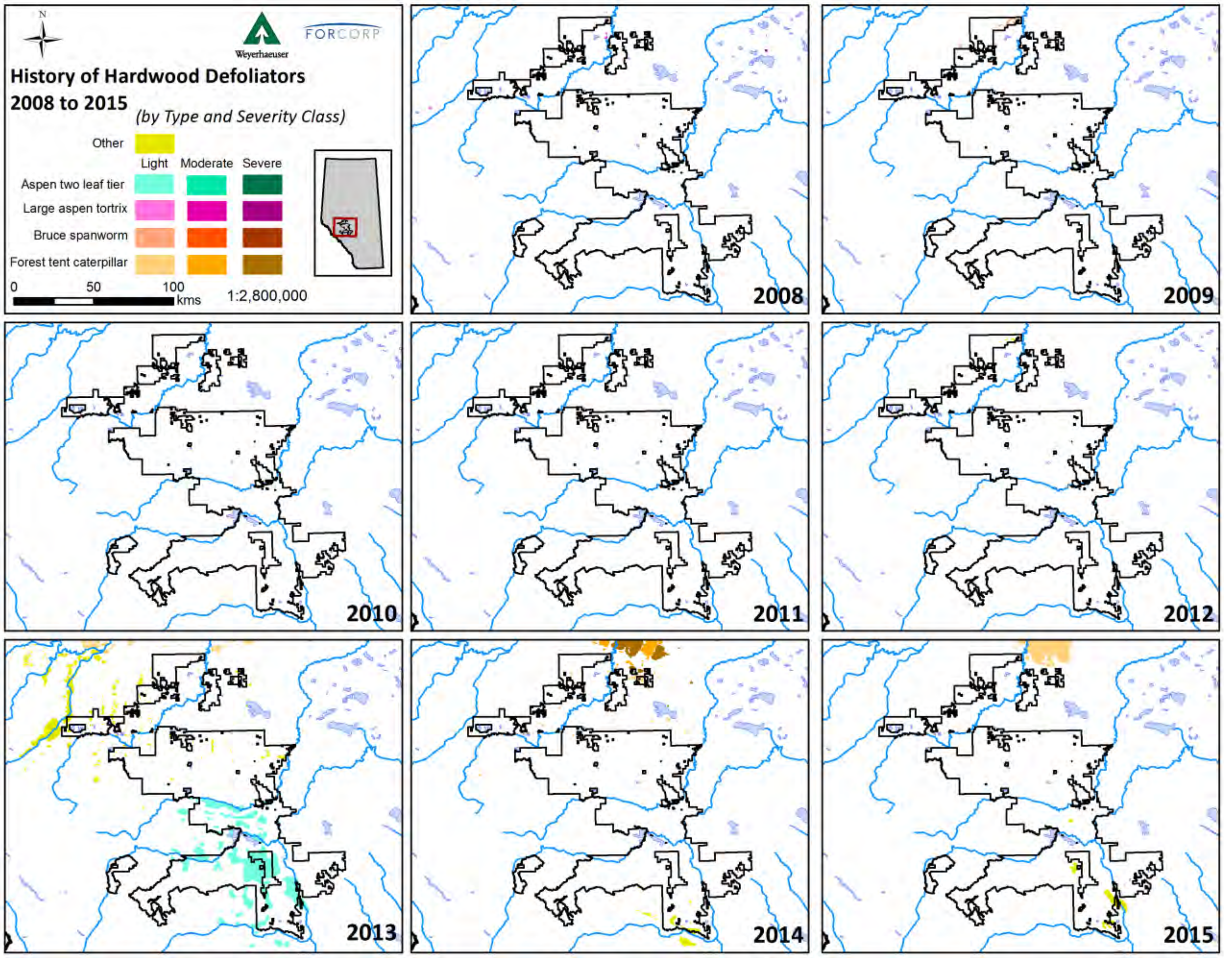


Figure 3-42. History of hardwood defoliation outbreaks (2008-2015) within the DFA.

3.5.2.5 Other Forest Health Agents

Table 3-32, Table 3-33, Table 3-34, and Table 3-35 list the known insects and diseases that are present on the DFA and their impact on tree growth. The deciduous resource, which is generally mature to over-mature, is under the greatest threat as it is susceptible to stem decay. The impact of stem decay increases with the age of the tree. Aspen twig blight (*Venturia macularis*) and balsam twig blight (*Venturia populina)* are cause for concern in immature forests. These pathogens cause a loss of growth, although the exact extent of damage is unknown. The regenerating stands are also susceptible to shepherd's crook and ungulate browse. Weather related disturbances are also becoming more prevalent across the landscape. Hail and extreme wind events cause the majority of the damage to standing timber, however, early winter and late spring snowfalls can cause substantial damage through stem breakage (Figure 3-43)(32).

Table 3-32. Mature and immature stand pests of trembling aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) (Weyerhaeuser, 2005).

Damage Agent	Damage
Bruce spanworm (*Operophtera bruceta*)	There is typically a loss of radial increment during an outbreak, but no mortality directly attributable to the insect.
Forest tent caterpillar (*Malacosoma disstria)*	Two or more years of moderate to severe defoliation cause severe reduction in radial growth and considerable branch and twig mortality. Little mortality attributable to the defoliation of the tree.
Large Aspen tortix *(Choristoneura conflictana)*	Defoliation causes a reduction in the radial increment of the tree, but outbreaks seldom last long enough to cause any appreciable tree mortality.
Poplar borer *(Saperda calcarata)*	Trees are not usually killed by poplar borer attack, even when riddled with tunnels, but weakened stems are liable to break during windstorms and the wood is almost useless for lumber or other purposes.
Aspen leaf-roller *(Pseudexentera oregonana)*	Little damage is done to trees.
Hypoxolon canker *(Hypoxylon mammatum)*	Disease is considered to be more secondary in nature, usually occurring in trees already under stress. Trees with infections on the lower main stem usually die, due to weakening of the main stem.
Armillaria root rot *(A. ostoyae)*	Small-infected trees are usually killed quickly; large trees may have reduced growth but keep growing for a long time despite the presence of the fungus. This disease kills trees already weakened by other environmental factors.
Venturia leaf and shoot blight *(Venturia macularis)*	When most of the tender shoots of young trees are attacked, the trees are disfigured and growth is severely affected.
False tinder conk *(Phellinus tremulae)*	Damage to deciduous trees includes weakening of the stem due to reduction in structural integrity of the stem.

Table 3-33. Mature and immature stand pests of lodgepole pine (*Pinus contorta*) (Weyerhaeuser, 2005).

Damage Agent	Damage
Mountain Pine Beetle (*Dendroctonus ponderosae*)	Beetles attacking trees will either fully or partially kill a tree, dependant upon full or partial girdling of the cambium layer. Trees successfully attacked are killed outright. Sapwood turns blue due to the introduction of a fungus.
Western Gall Rust *(Endocronartium harknessii)*	Main stem galls often kill young trees. Trees with main stem galls tend to be deformed and easy to break at the gall.
Northern Pitch Twig Moth *(Petrova albicapitana)*	The feeding of the moth causes injury to the stem and can cause breakage or stem deformities.
Root collar weevil *(Hylobius sp.)*	Feeding kills young trees and is one of the most significant entry courts for root rot and other disease organisms on older trees.
Pine needle cast *(Lophodermella concolor, Davisomycella ampla, Elytroderma deformans)*	This disease has not been proven to significantly affect the health of large trees, although extensive defoliation can affect the growth and shape of the trees.
Atropellis canker *(Atropellis piniphila)*	Heavy resin flow results in a debarking problem that can increase costs of processing. Discoloration of wood caused by the disease degrades lumber, and stem deformities also degrade the worth of the tree for sawmills.
Pine needle rust *(Coleosporium asterum)*	Generally, the disease does not cause significant damage, but repeated heavy infections year after year could significantly reduce the growth of small trees.
Armillaria root rot *(A.ostoyae)*	Small infected trees are usually killed quickly; large trees may have reduced growth but keep growing for a long time despite the presence of the fungus. This disease kills trees already weakened by other environmental factors.

Table 3-34. Mature and immature stand pests of white spruce (*Picea glauca*) (Weyerhaeuser, 2005).

Damage Agent	Damage
Spruce budworm *(Choristoneura fumiferana)*	Short periods of defoliation cause a marked reduction in radial increment; prolonged outbreaks cause severe branch and, ultimately, tree mortality.
Spruce beetle *(Dendroctonus rufipennis)*	Damage occurs from beetles attacking and killing standing timber, especially if large numbers of beetles are present following fires, windstorms, or logging operations. A blue-stain fungus is also transmitted
Root collar weevil *(Hylobius sp.)*	Feeding kills young trees and is one of the most significant entry courts for root rot and other disease organisms on older trees.
Spruce needle rust *(Chrysomyxa sp.)* and Yellow witches' broom *(Chrysomyxa arctostaphli)*	Infection can lead to where almost all of the current year's growth is dropped off prematurely. Heavy infections seldom occur in successive years. No significant damage.
Armillaria root rot *(A. ostoyae)*	Small infected trees are usually killed quickly; large trees may have reduced growth but keep growing for a long time despite the presence of the fungus. This disease kills trees already weakened by other environmental factors.

Table 3-35. Mature and immature stand pests of tamarack (*Larix laricina*) (Natural Resources Canada, 2015).

Damage Agent	Damage
Larch beetle *(Dendroctonus simplex)*	During severe attacks, the numerous galleries excavated under the bark can disrupt sap flow, eventually causing the tree to become desiccated and die within the year.

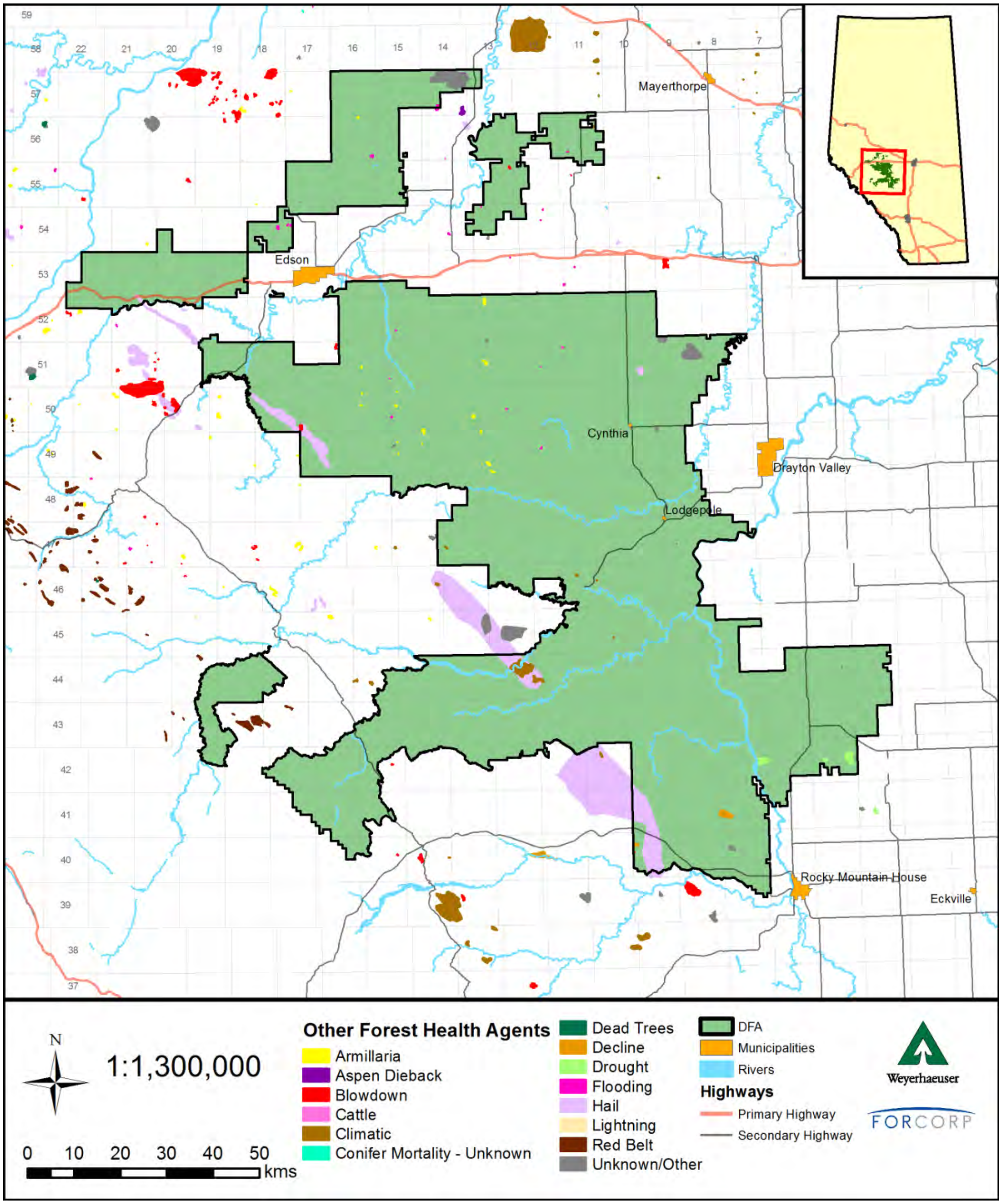


Figure 3-43. History of other forest health agents within and near the DFA (2010-2015).

3.5.3 Invasive Exotic Species

Alberta groups invasive weed species in two categories: Prohibited Noxious and Noxious. Prohibited noxious weeds are those that are not normally found in Alberta, or are localized, and are to be eradicated when found. Noxious weeds are generally widespread throughout Alberta and when found are to be contained through a variety of control measures. Control measures may include, but are not limited to, hand picking of individuals, herbicide treatment, or mowing.

There are a number of noxious weed species that are widespread throughout the DFA, most notably along municipal and industrial road right-of-ways. Table 3-36 identifies the most common noxious weeds found on the DFA. No prohibited noxious weeds are known to exist.

Table 3-36. Common noxious weeds found on the DFA.

Common name	Scientific name
Canada Thistle	*Cirsium arvense*
Scentless Chamomile	*Tripleurospermum perforatum*
Common Tansy	*Tanacetum vulgare*
Perennial Sow Thistle	*Sonchus arvensis*
Tall Buttercup	*Ranunculus acris*
Oxeye Daisy	*Leucanthemum vulgare*
Common Toadflax	*Linaria vulgaris*

Common Toadflax

3.5.4 Forest Succession Trajectories

Current forest structure in Alberta has been heavily influenced by either natural or anthropogenic processes. Human-caused influences have come to the forefront most predominately since the middle of the 20th century (1940's) with the establishment of wildfire protection practices and the industrialization of forested areas through oil and gas development and intensive forest management.

Most forest stand types, with the exception of those within protection areas (i.e. parks, natural areas and passive management areas) will transition to either the same or a different forest stand type based on anthropogenic processes, depending on whether they are regenerating as a result of logging or clearings for industrial (infrastructure) use. Areas impacted by harvesting will, for the most part, be replaced with similar stand types based on the current provincial reforestation policy or approved strategies within Forest Management Plans. Areas cleared as a result of industrial activity will normally never return to a true forest structure of mature trees, but will stay in an early successional stage of either grass, herb, or shrub that tends to protect industrial infrastructure (i.e. powerlines, pipelines, road right-of-ways).

True succession will only occur in areas of passive management (not scheduled for active forest management or industrial development) that has not been impacted, or where the successional clock has been reset by stand replacing natural disturbance (i.e. wildfire, windthrow, etc). Forest succession is the composition of vegetation communities, on a site, over time. Many conditions impact stand succession: seed availability, soil physical structure and nutrient status, ungulate herbivory, granivory, insect pests, fungal pathogens, light availability, rooting space, and seedbed quality (Kenkel et al., 1997). Forest succession, once started, can therefore take many paths. The largest influence on forest succession is the type of forest at the stand initiation stage.

3.5.5 Wildfire History

3.5.5.1 Fire Statistics

The recorded history of wildfire on the DFA is short in comparison to the history of wildfire that has actually occurred across the landscape. The province has been collecting wildfire history data since the 1930s (33). Table 3-37 summarizes the history of all wildfires that have overlapped the DFA since 1930, regardless of origin (lightning or human-caused). Of the 148 wildfires that have touched the DFA since 1930, 55% of the area burned has been within the DFA boundaries. Over this time, approximately 15% of the DFA has burned, with the largest in-DFA fire being over 24,000 hectares. The average wildfire size in the DFA, however, is only 961 hectares, with median decade wildfire sizes being even smaller. In the past two decades, the number of fires have increased but with less area burned (Figure 3-44). This smaller average fire size is a reflection of more effective suppression activities. Figure 3-45 illustrates the wildfire history of the DFA. AAF's 2017 analysis of the DFA's wildfire landscape and management priorities can be found in Appendix 3-.Appendix 3-

Table 3-37. History of wildfires that have overlapped the DFA, starting in 1930.

Fire Period (by decade)	Number of Wildfires	Total Wildfire Area (ha)	Within the DFA					
			Wildfire Area in DFA (ha)	Average Wildfire Size (ha)	Median Wildfire Size (ha)	Maximum Wildfire Size (ha)	Wildfire in DFA (%)	DFA Area Burned (%)
1930-1939	1	733	5	5	5	5	1	0.0
1940-1949	50	169,430	107,631	2,153	719	24,453	64	10.1
1950-1959	21	76,861	21,945	998	128	12,890	29	2.1
1960-1969	12	21,013	9,107	759	211	2,704	43	0.9
1970-1979	5	1,719	1,688	338	199	846	98	0.2
1980-1989	4	8,452	8,452	2,113	581	7,275	100	0.8
1990-1999	4	12,471	8,552	2,138	139	8,239	69	0.8
2000-2009	27	2,018	2,009	69	4	1,420	100	0.2
2010-2014	24	2,100	2,100	81	4	583	100	0.2
Total	**148**	**294,796**	**161,488**	**961**	**139**	**24,453**	**55**	**15.1**

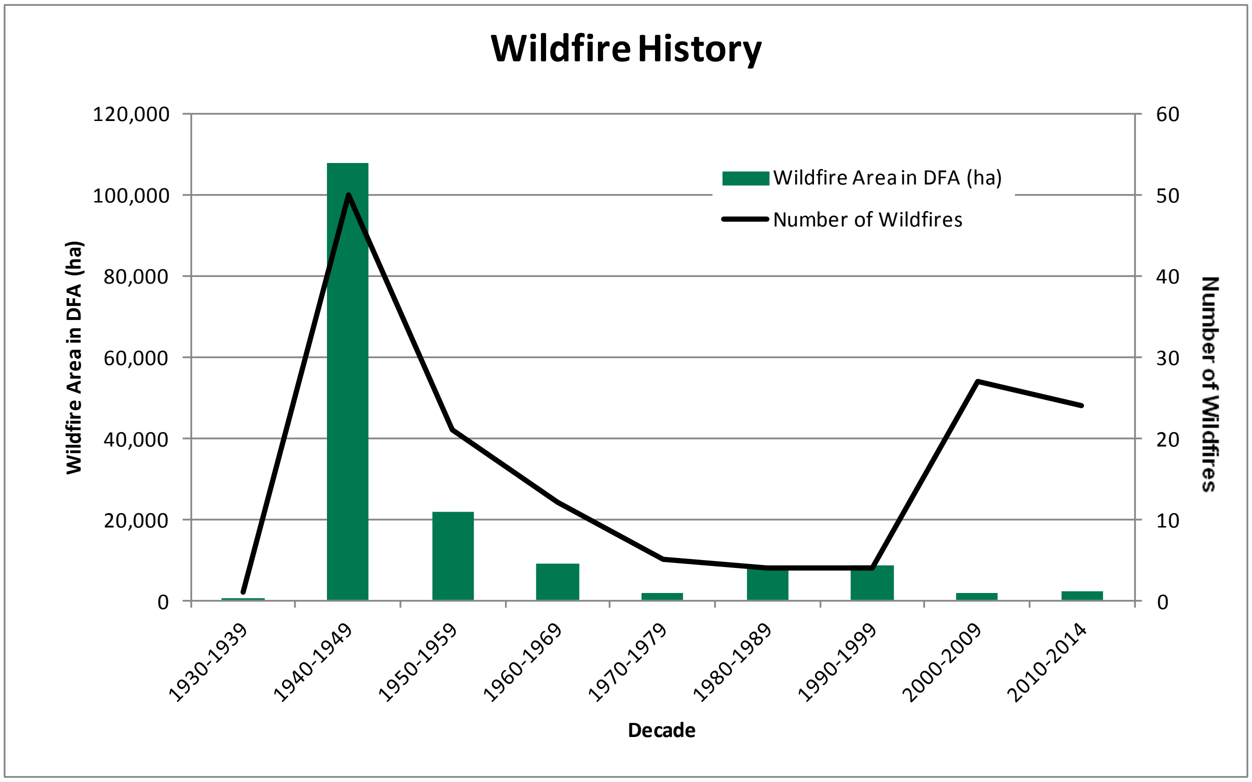


Figure 3-44. Wildfire size and frequency within the DFA since 1930.

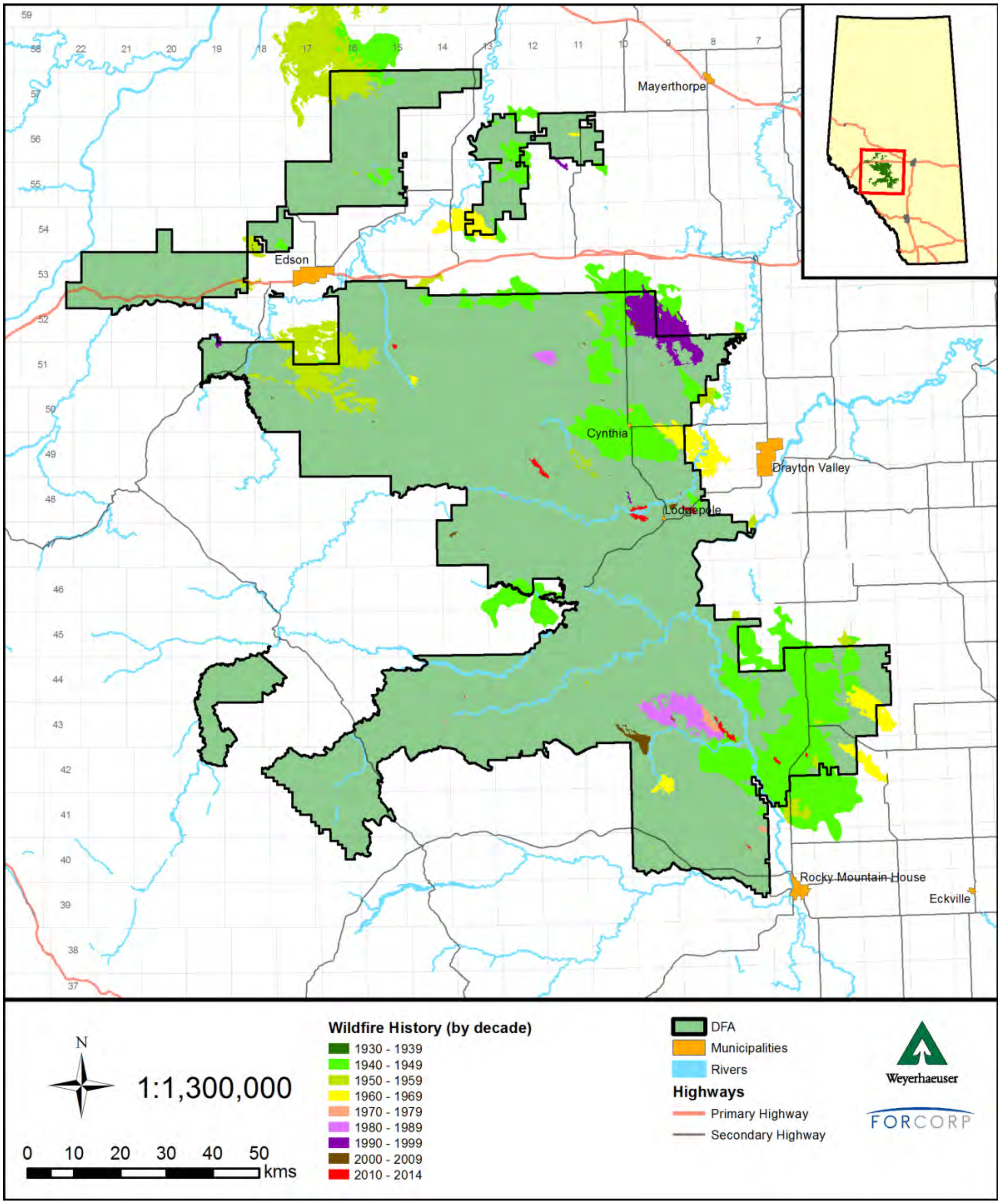


Figure 3-45. Wildfire history by decade across the DFA.

3.5.5.2 Forest Fuel Types

The Canadian Forest Fire Behaviour Prediction (FBP) System is used to categorize the forest into different fuel types (Figure 3-46). The Weyerhaeuser DFA is dominated by mainly coniferous fuels in the west (represented by C-3 Mature Pine and C-2 Boreal Spruce) in the Upper Foothills and Subalpine NSRs. The Central Mixedwood NSR is represented mostly by an aspen component (D-1/D-2 Aspen) but with pockets of white spruce/aspen mixed wood stands (M-1/M-2 Boreal Mixedwood) (Alberta, 2017).

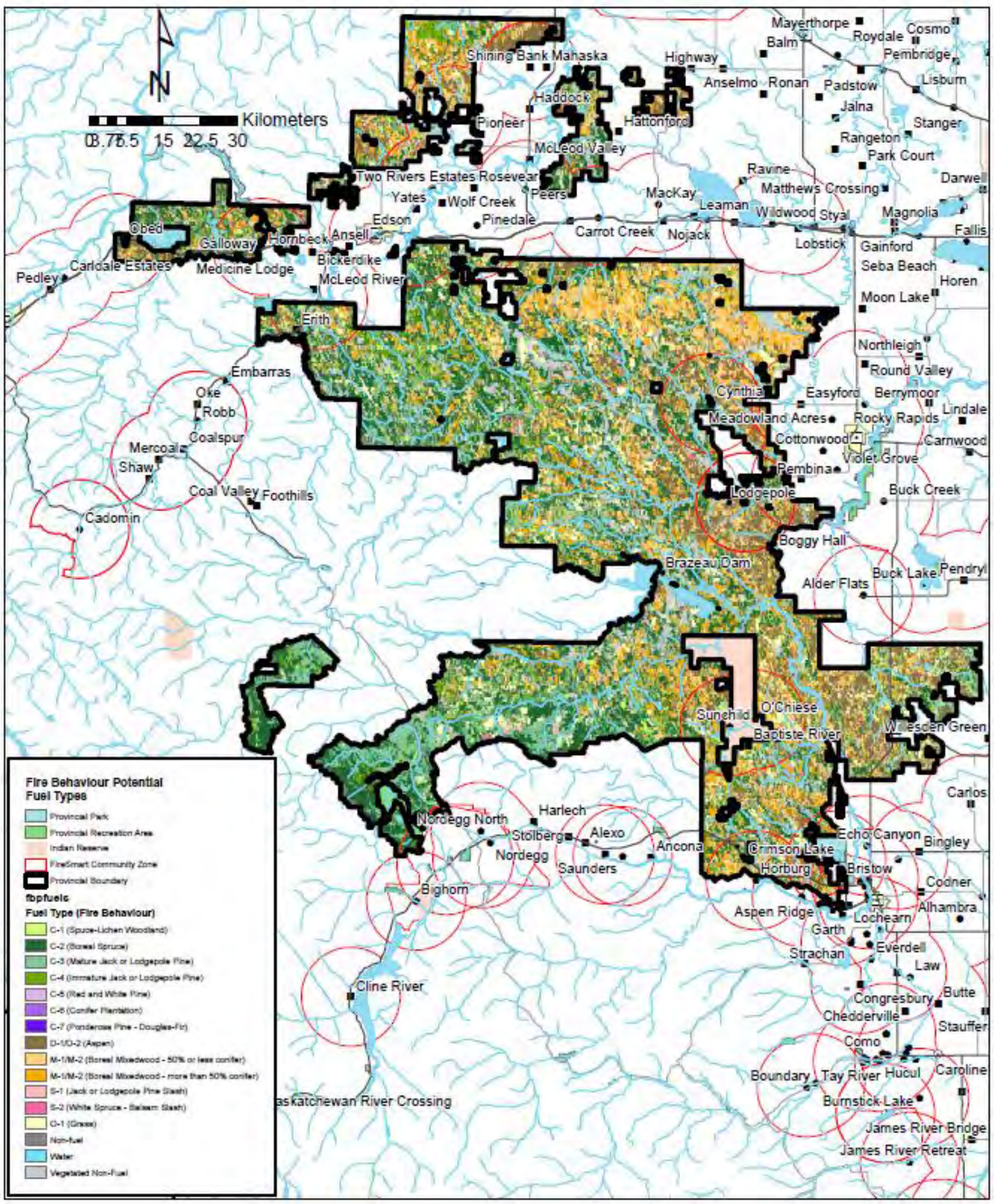


Figure 3-46. Canadian Forest Fire Danger Rating System's Fire Behaviour Prediction System fuel types across the DFA (Alberta, 2017).

3.5.5.3 Fire Behaviour Potential

The majority of wildfires within the Weyerhaeuser DFA occur in the spring. The following three figures depict the fire behaviour potential for the DFA for spring, summer and fall (Figure 3-47, Figure 3-48, and Figure 3-49). There is a distinct decrease in fire behaviour potential with the onset of green-up and transition into summer. However, an elevated risk remains in the conifer-dominated fuel types throughout the summer and fall in the western portions of the DFA (Alberta, 2017).

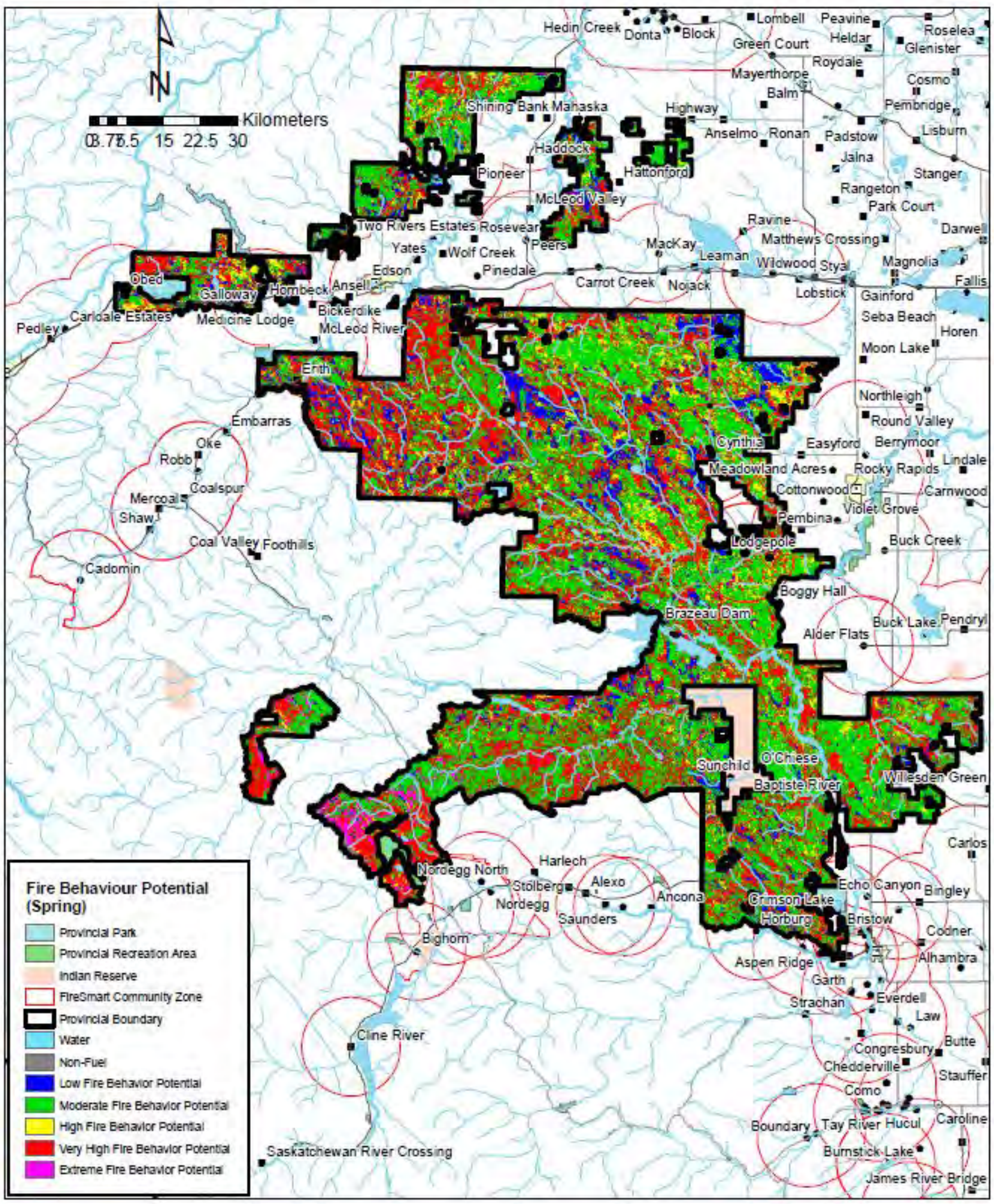


Figure 3-47. Modelled fire behaviour potential for the DFA in the spring (Alberta, 2017).

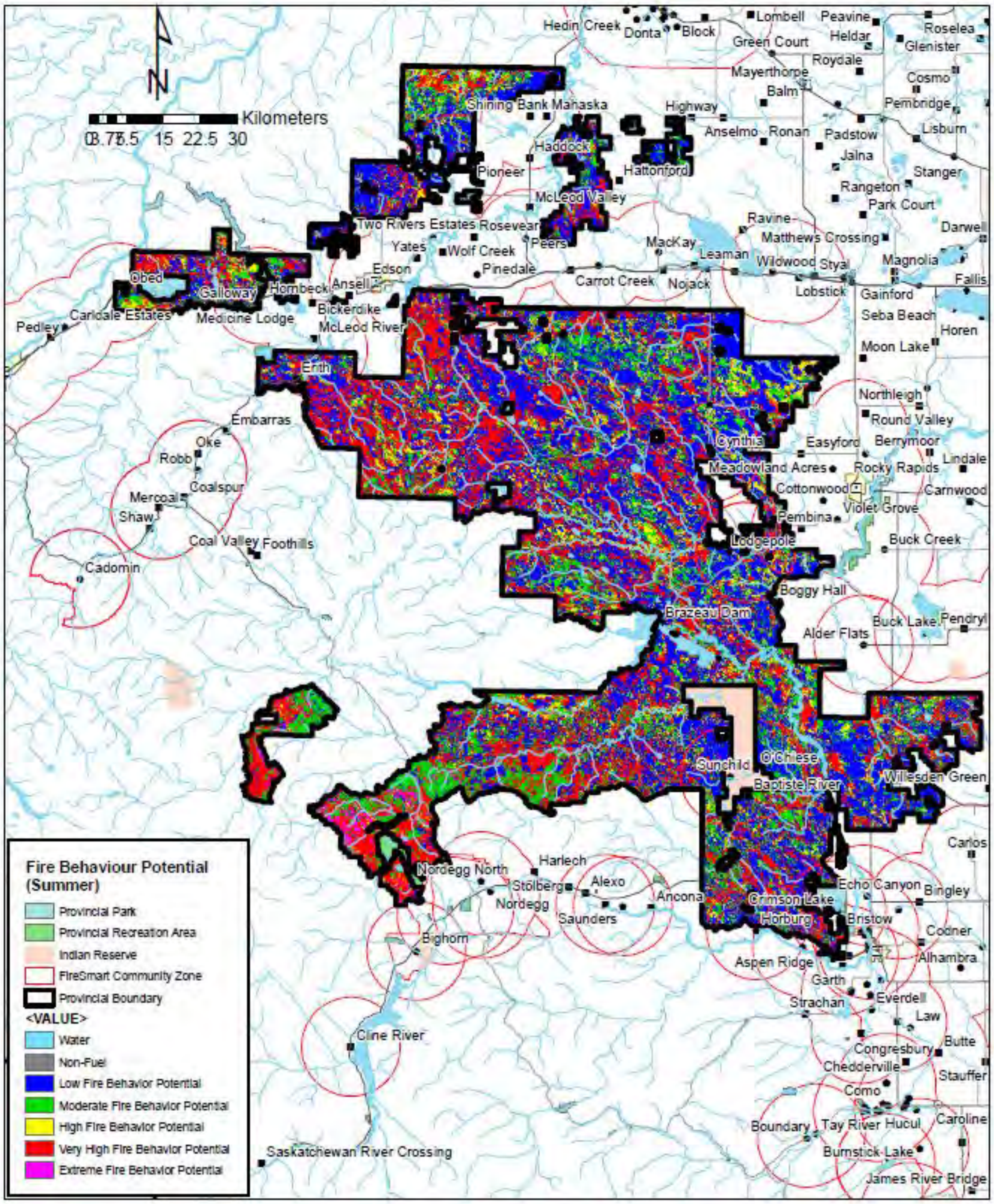


Figure 3-48. Modelled fire behaviour potential for the DFA in the summer (Alberta, 2017).

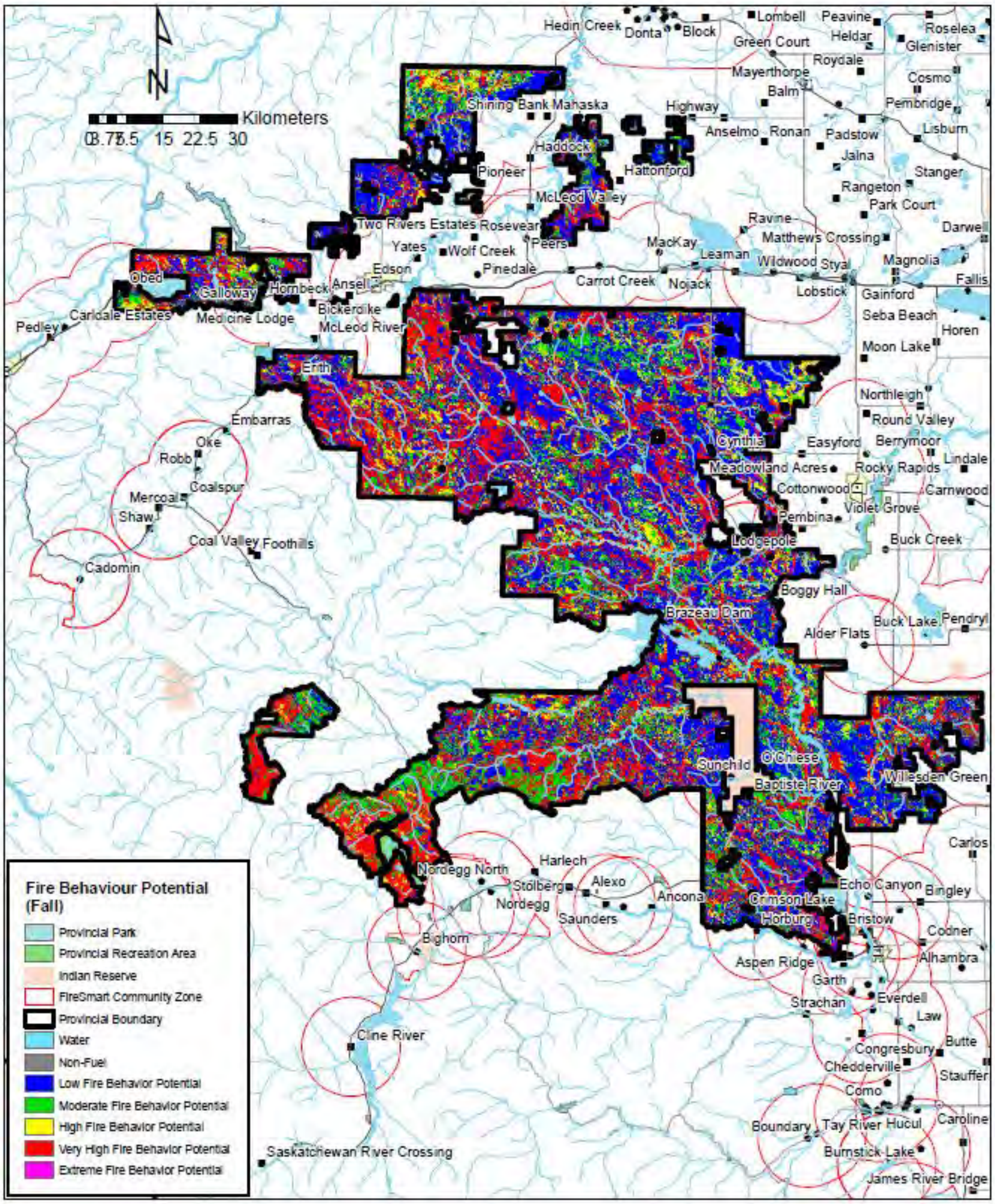


Figure 3-49. Modelled fire behaviour potential for the DFA in the fall (Alberta, 2017).

3.5.6 Timber Harvesting

Logging and saw milling operations began in the DFA as early as 1900. Much of this early activity was restricted to forested areas that were easily accessible along major watercourses. These same watercourses were also used as the main transportation method for getting logs to the sawmill. The last river run on the North Saskatchewan occurred in 1926.

In the 1960s, the boom in oil exploration and subsequent development meant many of the previously inaccessible areas became accessible to the forest industry. This decade also saw the introduction of a timber quota system that provided long-term security of timber supply as well as legal responsibility for prompt reforestation of cut over areas.

Figure 3-50, Figure 3-51, and Table 3- 38 show the change in harvest across each decade (represented by the area identified in the Alberta Regeneration Information System (ARIS) as having unique opening numbers) (34). To date, the 1990's have had the most cutblocks while the 2000's have had the greatest harvest area.

Table 3- 38. Historical harvesting activity within the DFA.

Year of Harvest	Total Harvest Area		Number of Harvest Areas		Average Cutblock Size
	(ha)	(%)	Count	(%)	(ha)
<1970	1,837	1	197	2	9
1970-1979	5,172	3	432	5	12
1980-1989	26,404	17	1,337	16	20
1990-1999	46,229	30	3,095	36	15
2000-2009	51,302	33	2,461	29	21
2010-2014	24,526	16	964	11	25
Total	**155,469**	**100**	**8,486**	**100**	**18**

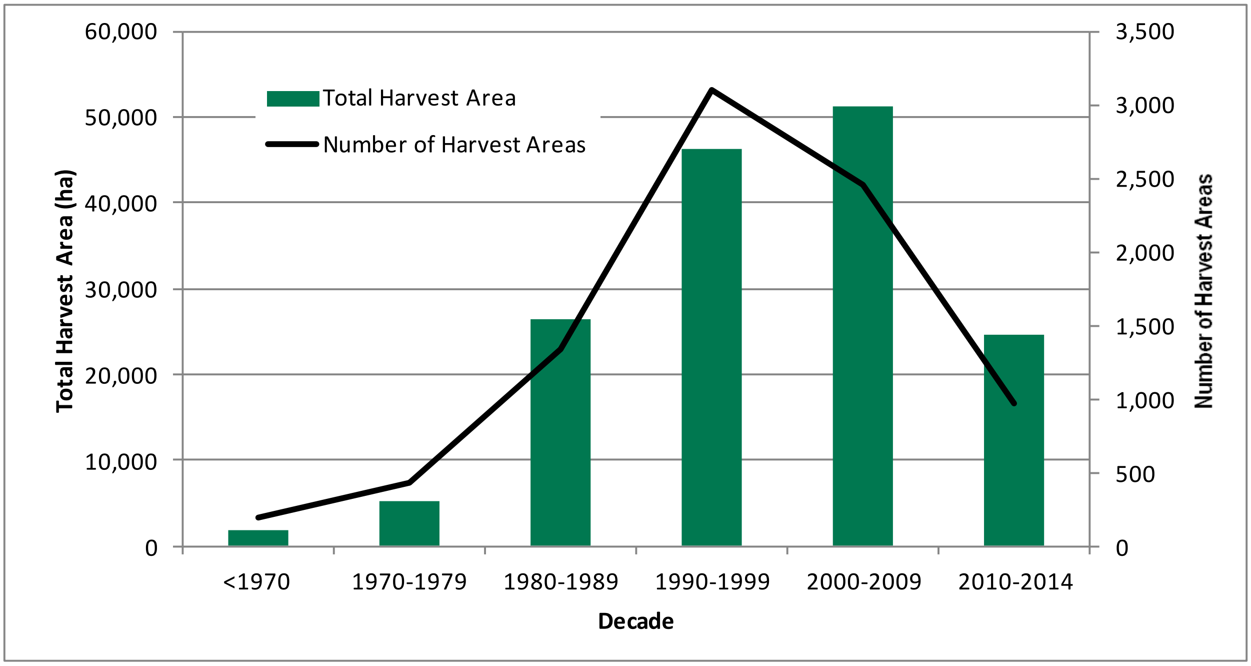


Figure 3-50. Total harvest area and number of harvest areas by decade.

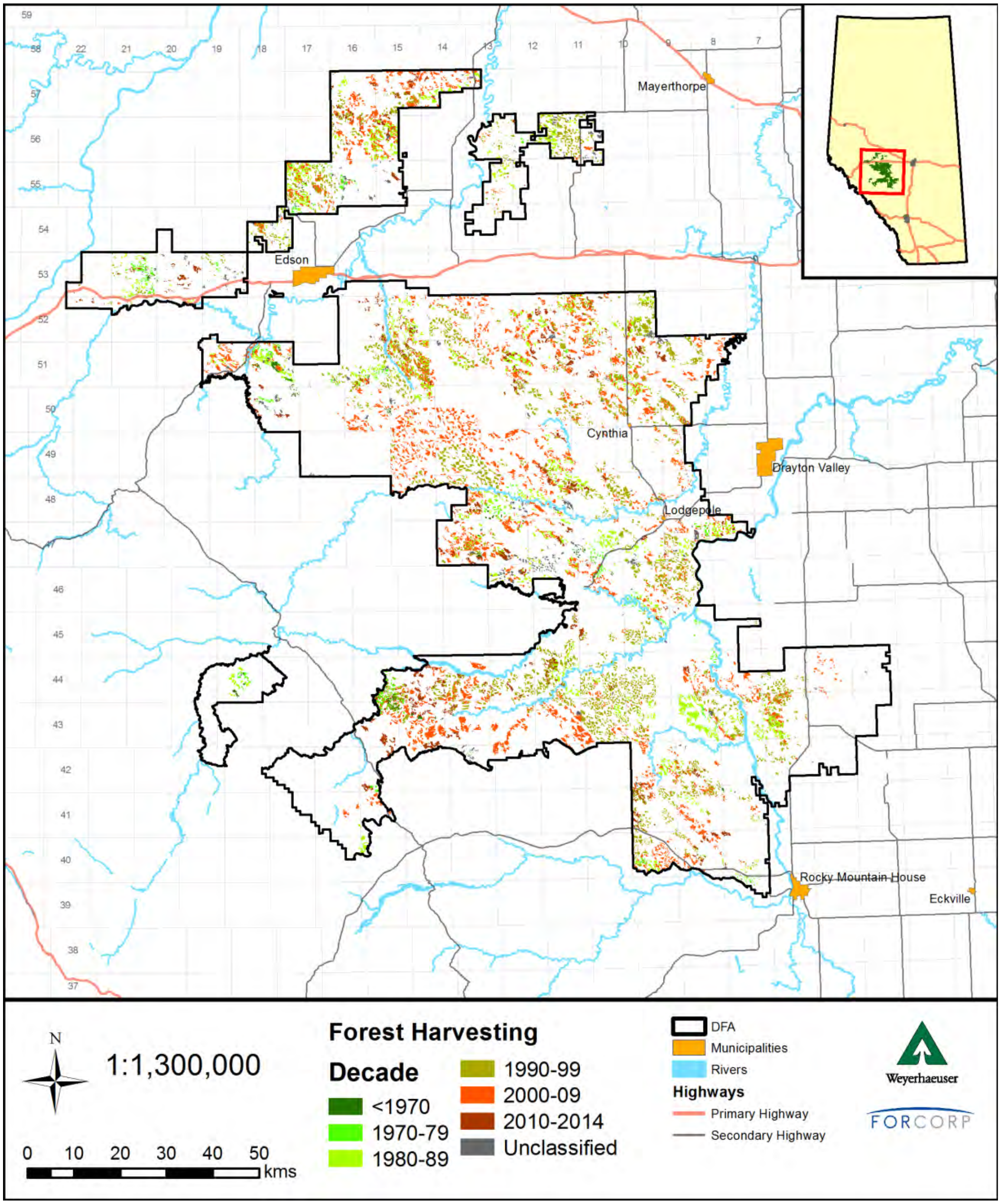


Figure 3-51. Harvesting within the DFA by decade.

3.5.7 Forest Industry Access

Most of the access available to the forest industry in the DFA is in the form of municipal (Provincial and County) and other industrial roads in place already (35). With the exception of the West Country, very little other permanent road development is anticipated. Major highways that traverse the DFA include: Highways 16 (Yellowhead), 22 (Rocky Mountain House), 753 (Cynthia), 620 (Lodgepole), 748 (Bear Lake), and 32 (Peers). Table 3-39 lists the road length in the DFA by class, with unimproved roads being the greatest. Weyerhaeuser also holds 512.5 km of active and inactive roads under Department License of Occupation (DLO) (Table 3-40) with the longest being the Svedberg Road (36.2 km). Figure 3-52 illustrates the roads within and near the DFA, becoming denser moving east towards the White Area (see Section 3.2.7). Roads to the southwest of the DFA are underrepresented as information for Jasper National Park was not available.

Table 3-39. Roads within the DFA by classification.

Road Type	Road Classification	Total Length (km)	Density on the DFA (km/km^2)
Paved	Highway (divided)	82	0.008
	Highway (undivided)	294	0.028
	Subtotal	***376***	***0.035***
All-Weather Road	Gravel Road	2,696	0.253
	Subtotal	***2,696***	***0.253***
Seasonal	Road (unimproved)	5,189	0.486
	Trail (vehicle access)	540	0.051
	Winter Road	7	0.001
	Road (unclassified)	63	0.006
	Subtotal	***5,799***	***0.543***
Total		**8,871**	**0.831**

Table 3-40. Weyerhaeuser-owned roads within the DFA.

Compartment	Road Name	Length (km)
Baptiste	Chambers Creek East	4.8
	Chambers Creek West	8.0
	Grace Creek	4.7
	Baptiste North	3.4
	Baptiste Road	4.3
	Muskeg Road to Sunchild	0.5
Beaver Meadow	Westman Trail	3.5
	Krista Trail	0.9
Brazeau	5-11-47-11-SE	0.8
	Sand Creek South	5.3
	Sand Creek North	2.2
Edson	Tomcat Road	5.3
	Old Man Creek Road	6.1
	Old Man Creek Road - Section 2	2.8
	Rolly Hills Road	1.1
	Russel Hakes EZE 952-233-373	0.4
	Deer Hill - Detour	4.0
	Deer Hill Road	11.5
	Ladd Road	2.3
	Ladd Road-0 spur North	2.2
	Ladd Road-0 spur South	0.8
	Ladd Road-1.15 spur	1.8
	Grande Prairie Trail	3.7
	DTP	4.3
	Whitefish Road	11.3
	Whitefish Road - 6.7 spur	2.7
	Whitefish Road - 8.3 spur	1.0
	Prison Road - 2.4 spur	0.3
	Prison Road - Obed	4.2
	Whiteside Road	3.2
	Whiteside Road 2	-
	Kathleen Lake Road	2.0
	Cricks Creek Road	11.8
	Watson Bypass	-
Macmillan	South Carrot Road - Talisman Section	6.4
	Carrot Tower Road	2.3
	South Carrot Road	15.5
	Sink Hole Lake Road	5.1
	Triumvirite Road	11.3
	Paddy Creek Road	4.3
	Easy Ford Road	20.6
Medicine Lake	Rose Creek	14.3
Nordegg	NRR - 34 spur	2.9
	NRR - 40 spur	8.6
	NRR - 40 - 1 spur	2.6
	NRR - Gravel Pit Extension	3.1
	Nordegg River Road (km 40-49)	9.0
	NRR - Wawa Creek Road (Sec II)	4.6
	NRR - Wawa West Road	10.3
	NRR - Old Alignment 41km	4.1
	Nordegg River Road (km 49-53)	4.2
	NRR - Wawa Creek Road (Sec I)	3.0
	NRR - Loose Moose	3.8
	NRR - Old Alignment 51km	3.0
	Nordegg River Road (km 13-28)	15.0
	Nordegg River Road (km 28-40)	11.7
	NRR - 36 spur	5.5
	NRR - 38 spur	5.0
	NRR - 28 spur	7.1
	NRR-42 Spur	3.4
	NRR - 44 spur	3.0
	S. Sabre	-
	NRR - Camp 15 Road (East)	3.2
	NRR - Camp 15 Road (West)	6.3
	NRR - Gravel Pit	0.6
	NRR – Gravel Pit Extension	3.1
	Yorkshire	1.0
	Rapid Creek West	20.5
	Rapid Creek East	12.3
	Sylvester Road	8.2
South Canal	Nordegg River Road (km 0-6)	5.6
	Nordegg River Road (km 6-13)	7.7
	Doc's Road	4.3
	Boundary Road	13.7
	Boundary Spur	2.9
West Country	Donsan Creek Road	5.1
	Unknown	1.2
	Access to Marshy Bank LMU	5.8

Table 3-40. Weyerhaeuser-owned roads within the DFA continued.

Compartment	Road Name	Length (km)
Wolf Lake	Big Rock Road - West Section	0.8
	Coulee Road	2.7
	A&V Road	2.0
	Svedberg Road	36.2
	Coyote Creek Extension	3.0
	Wolf Lake Storage Area	0.2
	Keg Road	1.5
	Branch Pole Road North	0.9
	Branch Pole Road South	1.9
	Branch Pole Road West	1.0
	Sang Lake Road	4.2
	Coyote Creek Road	9.5
	Mile 13 Road	4.0
	Moose Creek Road - Cody Section	6.0
	Moose Creek Road	11.0
	Moose Creek Road - South (North Section)	4.0
	Moose Creek Road - East	6.2
	Moose Creek Road- South	7.8
Total		**515.2**

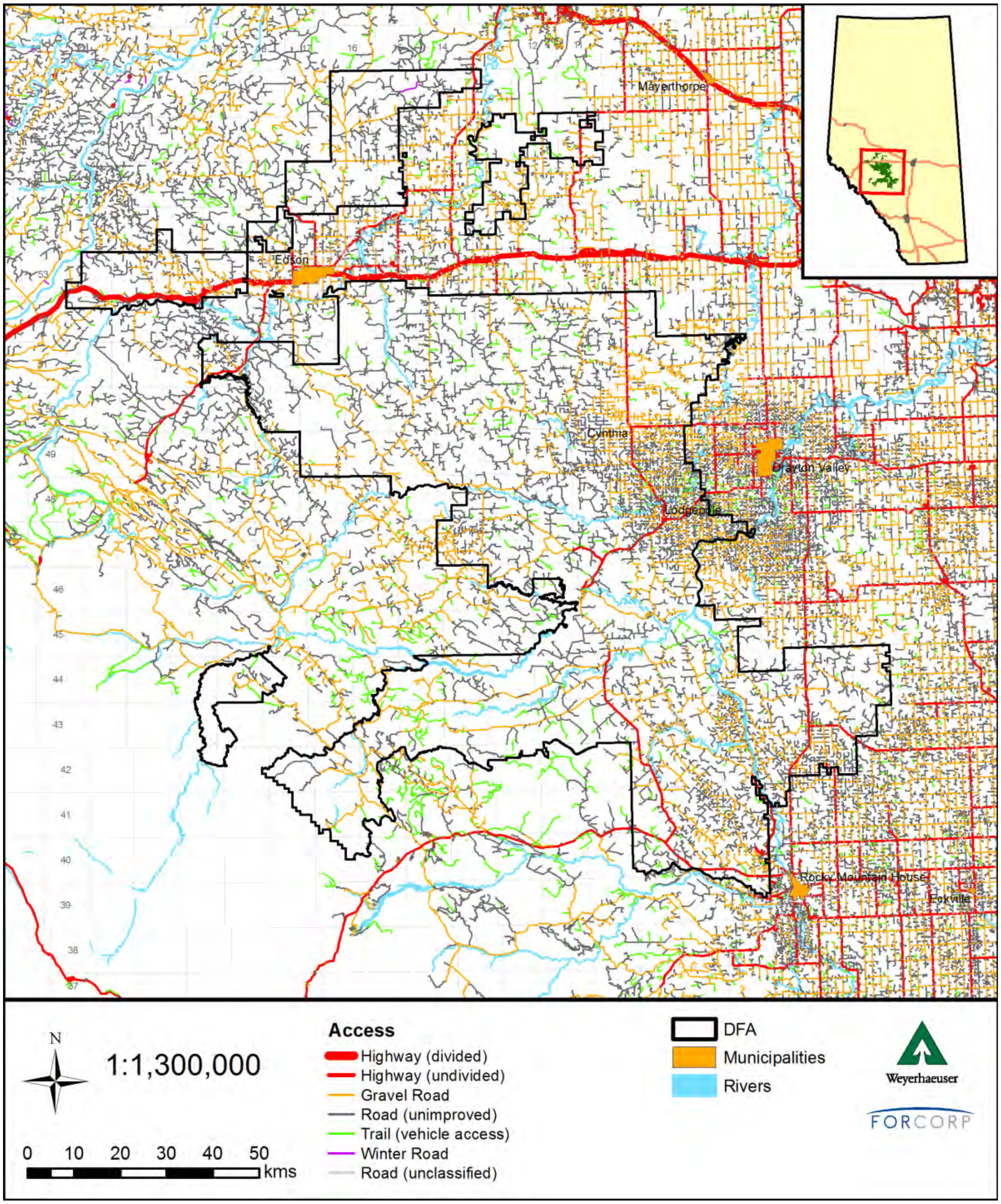


Figure 3-52. Roads within and around the DFA by road class.

3.5.8 Industrial Development

The DFA contains many other types of non-road industrial development (36), one of the most prominent being oil and gas. Development is intensive in some portions of the DFA and can have a significant impact on forest management, as well as contributing to the cumulative impact on other resources. Continuing development for oil and gas resources is expected.

The Wolf Lake compartment between Edson and Drayton Valley (Figure 3-53) is the most developed (by number and area of industrial dispositions) (Table 3-42). These dispositions are separated in to types, the most common of which (across the entire DFA) are pipeline agreements and mineral surface leases (Table 3-41).

Table 3-41. Non-road industrial development by disposition type across the DFA.

Disposition Type	Code	Number of Dispositions	Area (ha)	Percent of All Dispositions (by number)	Percent of All Dispositions (by area)	Percent of DFA
Miscellaneous Lease	DML, MLL, PML	63	649	1.3	6.8	0.06
Pipeline Installation Lease	DPI, PIL	516	61	10.5	0.6	0.01
Pipeline Agreement	DPL, PLA	2,121	3,579	43.3	37.3	0.34
Disposition Reservation	DRS	12	253	0.2	2.6	0.02
Easement	EZE	400	547	8.2	5.7	0.05
Mineral Surface Lease	MSL	1,671	3,319	34.2	34.6	0.31
License of Occupation	PLC	5	3	0.1	0.0	0.00
Public Land Sales	PLS	2	114	0.0	1.2	0.01
Provisional Roadway	RDS	18	52	0.4	0.5	0.00
Recreation Lease	REC	2	170	0.0	1.8	0.02
Surface Mineral License	SMC	34	55	0.7	0.6	0.01
Surface Mineral Exploration	SME	14	462	0.3	4.8	0.04
Surface Material Lease	SML	35	340	0.7	3.5	0.03
Total		**4,893**	**9,604**	**100.0**	**100.0**	**0.90**

Table 3-42. Industrial development by compartment.

Compartment	Number of Dispositions	Area (ha)	Percent of All Dispositions (by number)	Percent of All Dispositions (by area)	Percent of DFA
Baptiste	366	1,029	7.5	10.7	0.10
Beaver Meadows	19	17	0.4	0.2	0.00
Brazeau	653	1,339	13.3	13.9	0.13
Edson	434	651	8.9	6.8	0.06
Macmillan	874	1,387	17.9	14.4	0.13
Medicine Lake	372	875	7.6	9.1	0.08
Nordegg	53	146	1.1	1.5	0.01
South Canal	812	1,871	16.6	19.5	0.18
West Country	16	34	0.3	0.4	0.00
Wolf Lake	1,294	2,256	26.4	23.5	0.21
Total	**4,893**	**9,604**	**100.0**	**100.0**	**0.90**

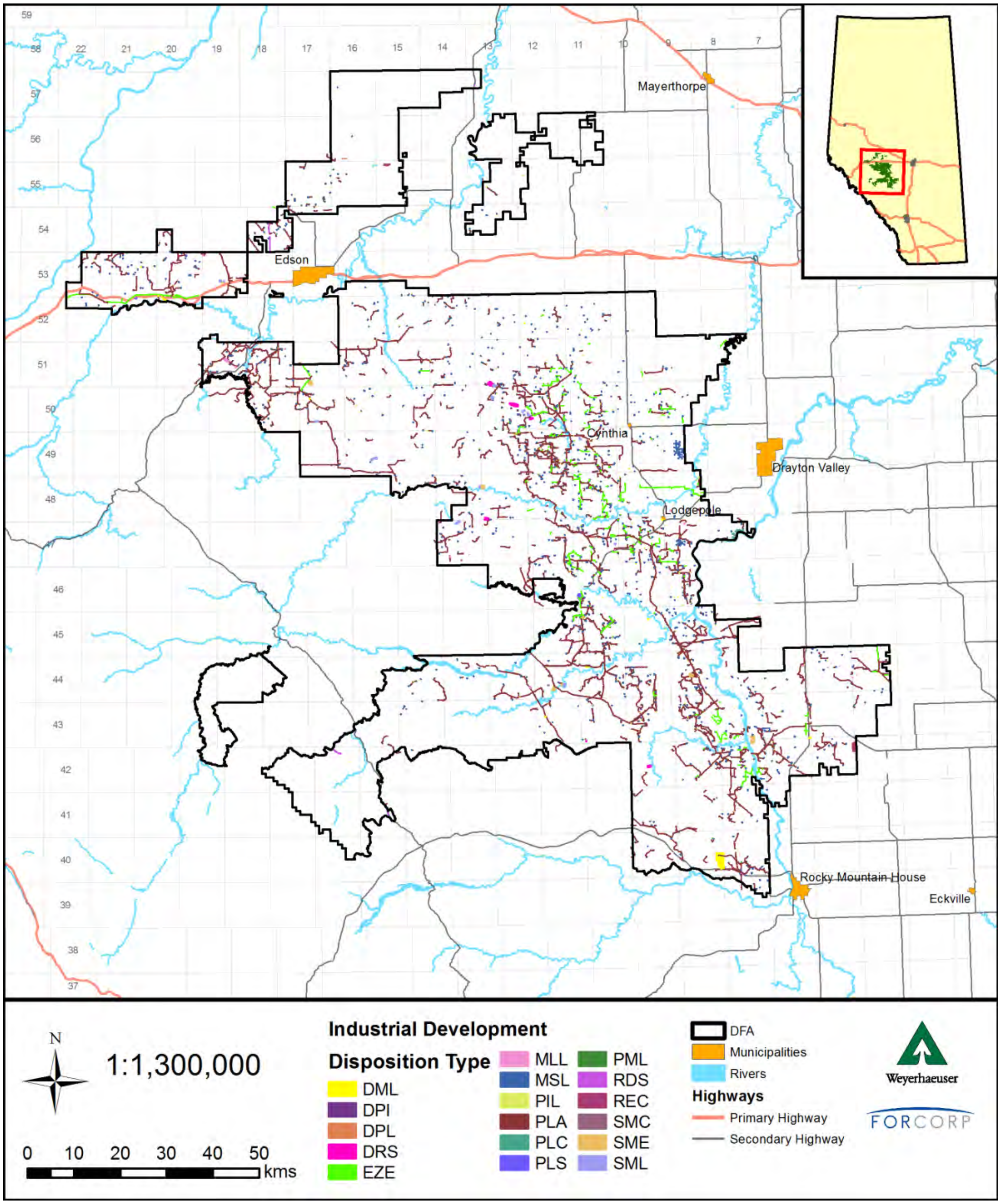


Figure 3-53. Industrial development within the DFA by disposition type.

3.5.9 Monitoring Sites

3.5.9.1 Permanent Sample Plots

Weyerhaeuser has had an active Growth and Yield monitoring program since 1999, and to date a total of 421 natural stand Permanent Sample Plots (PSPs) and 90 regenerating Permanent Sample Plots (Growth and Yield Monitoring Plots (GYMPs)) have been established across the DFA. Both types of plots have at least two measurements; the original establishment measurement and at least one additional re-measurement.

All plots are registered as Industrial Sample Plots with AAF. However, even though assumed to be protected, several of the PSPs have been disturbed over the years, either through logging or industrial activity, or MPB control efforts. A summary of these plots are described further in the Yield Curve Development section of the FMP.

AAF also has a number of natural stand PSPs on the DFA. There are a total of 77 natural stand PSPs. These plots are re-measured on an irregular schedule.

Figure 3-54 illustrates the distribution of sampling plots within the DFA (38, 39).

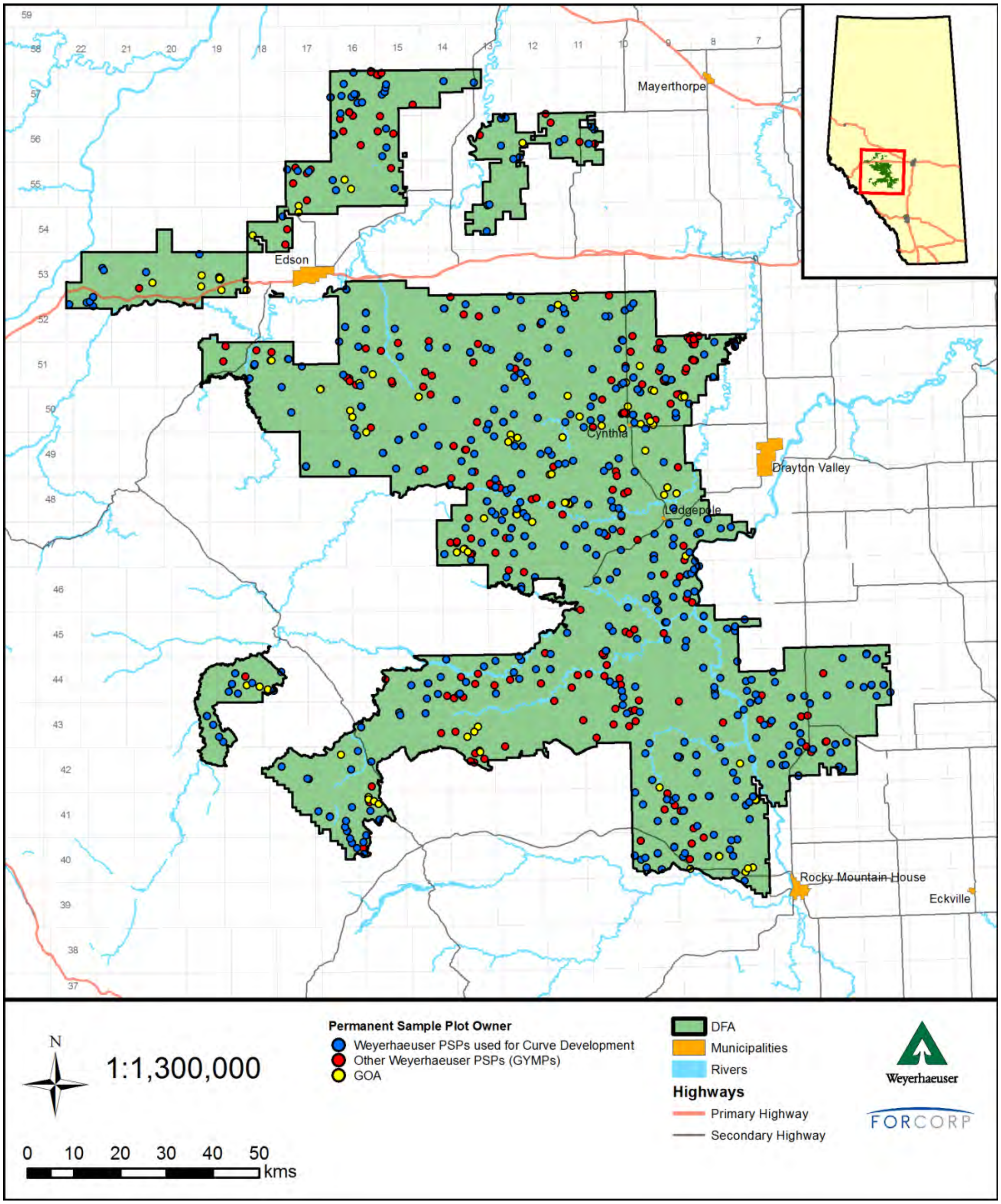


Figure 3-54. Permanent sample plots within the DFA.

3.5.9.2 Alberta Biodiversity Monitoring Institute

The Alberta Biodiversity Monitoring Institute (ABMI) has established 19 monitoring plots on the DFA (40) (Figure 3-55). The institute conducts monitoring of more than 2,000 species and habitats across the province to support decision making about diversity within Alberta. The network of plots is based on a 20km x 20km provincial grid that follows the protocol for the Canadian National Forest Inventory (NFI, 2016) (41).

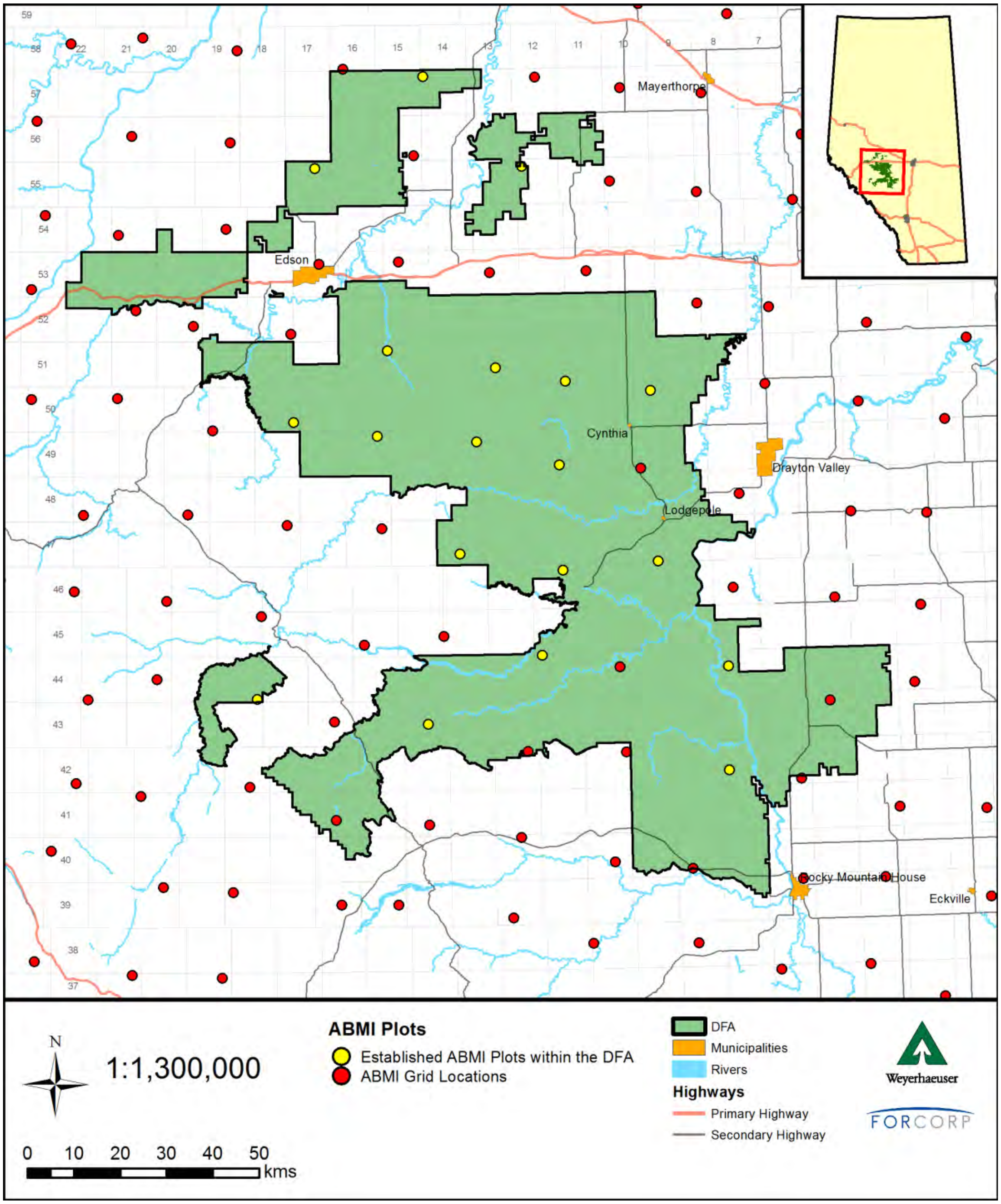


Figure 3-55. ABMI plots within the DFA.

3.6 Land Use

3.6.1 Aboriginal

Traditional use of the forest by the First Nation and Métis communities having Aboriginal and Treaty Rights that must be protected, covers a wide variety of uses, which include some of the following:

- Use of historic trails, travel or access routes;
- Development of campsites for a variety of purposes, such as hunting, fishing, trapping, ceremonies, cultural events, gathering, etc.;
- Hunting and fishing for subsistence and cultural or ceremonial events;
- Ceremonial, cultural or subsistence access to gathering sites in the forest for berries, plants (trees and shrubs), animal or animal parts, etc.;
- Visitation to grave sites or sites of historical, cultural or ceremonial significance.

Prayer Tree

3.6.2 Timber

The impact of the forest sector on the economic well-being of the province of Alberta as a whole, and to the DFA in particular, is well documented. According to the Alberta Forest Products Association, approximately two billion dollars is spent every year on salaries, construction, contracting expenses, research and development, and woodlands operations across the province. In Alberta, approximately 48,000 jobs are tied to the forest industry. The forest industry generates more than $12 billion in revenue, and is a major economic contributor in about 50 towns and cities across the province, with 12 communities considered forest-dependent.

The forest industry that relies upon timber from the DFA is made up of a few large facilities and many smaller operators. There are in excess of 50 small facilities in relatively close proximity to the DFA (Mills, 2015). Many of these facilities access timber from the DFA through the Community Timber Program, as well as from private land and industrial salvage. Some of these smaller operators have been in business for several generations.

There are many wood processing facilities that rely on the flow of timber from the DFA, including two pulp mills, five sawmills, one oriented strand board plant, one MDF plant, and several post and pole operations (Table 3-43).

Table 3-43. Major wood processing facilities accessing wood from the Weyerhaeuser DFA (m^3)

Wood Processing Company	Type of Facility	Mill Production				Estimated Volume of Wood Produced from FMA		Mill Start-Up Date
		Metric Tonnes Pulp	MM FBM Lumber	MM SF 3/8" OSB	MM SF 3/4" MDF	Coniferous	Deciduous	
Alberta Newsprint Company	Pulp Mill	270,000				80,000		1990
Blue Ridge Lumber (1981) Inc.	Sawmill		420			35,000		1975
Ranger Board	MDF Plant				130			1986
Millar Western Forest Products Ltd.	Sawmill		330			12,000		2001
Millar Western Forest Products Ltd.	Pulp Mill	320,000						1988
Edson Forest Products (formerly Sundance Forest Industries)	Sawmill		200			43,500		1988
Tall Pine Timber Company Ltd.	Sawmill		7.5			30,000		1958
Weyerhaeuser Company Ltd	OSB Plant			370			350,000	1984
	Sawmill		220			900,000		1987

3.6.3 Registered Trappers

There are a total of 114 Registered Fur Management Areas (RFMAs) overlapping the DFA (42), covering 97% of its area (Figure 3-56). The activity upon individual RFMAs varies dramatically, with some areas being trapped regularly, while others have only sporadic trapping pressure applied. The type of fur pursued annually also varies, with the main harvested species being marten, mink, fox, wolf, lynx, fisher, otter, and beaver.

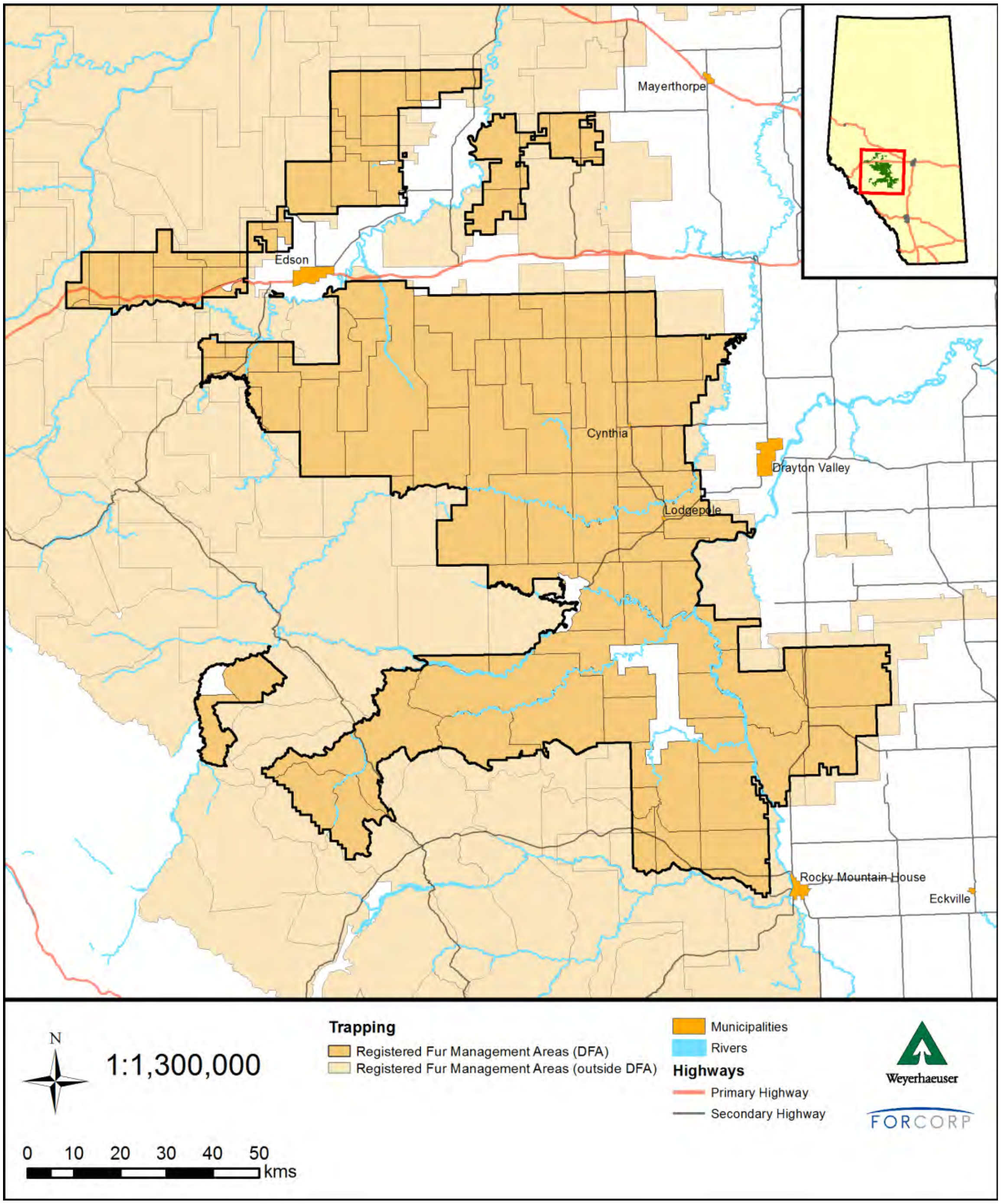


Figure 3-56. Registered fur management areas within the DFA.

3.6.4 Grazing

3.6.4.1 Grazing Dispositions

The grazing community mainly utilizes the DFA in areas of close proximity to populated centres with good, all-weather access (Figure 3-57). The disposition types include grazing permits, licenses, and leases, and provincial grazing reserves (43). Permits are based on one-year tenures, while grazing licenses and grazing leases are based on tenures of from 10 to 20 years. All dispositions are renewable.

Grazing dispositions are required by many operators who rely on provincial lands to supplement the feeding of their cattle or horses during the summer months. Table 3-44 defines the extent of grazing dispositions within the DFA .

Table 3-44. Grazing dispositions within the DFA.

Disposition Type	Area (ha)	% of Total Grazing Area	% of DFA
Forest Grazing License (FGL)	13,717	21	1.3
Grazing Lease (GRL)	30,728	47	2.9
Grazing Permit (GRP)	2,319	4	0.2
Provincial Grazing Reserve (GRR)	18,301	28	1.7
Total	**65,065**	**100**	**6.1**

3.6.4.2 Rocky Mountain Forest Reserve

The Rocky Mountain Forest Reserve (44) (Figure 3-58) was established for the conservation of forests and other vegetation and the maintenance of conditions favourable to optimal water supply (Alberta, 2004). The reserve is divided into 91 allotments (although they are not all actively grazed) and range management plans have been developed for each (number of Animal Unit Months, timing, integration with other users). Forest harvesting is not affected. The reserve covers 15% of the DFA (Table 3-45).

Table 3-45. Rocky Mountain Forest Reserve.

Total Area (ha)	Area within DFA (ha)	Portion of Reserve in DFA (%)	Portion of DFA Occupied by Reserve (%)
2,320,368	160,504	7	15

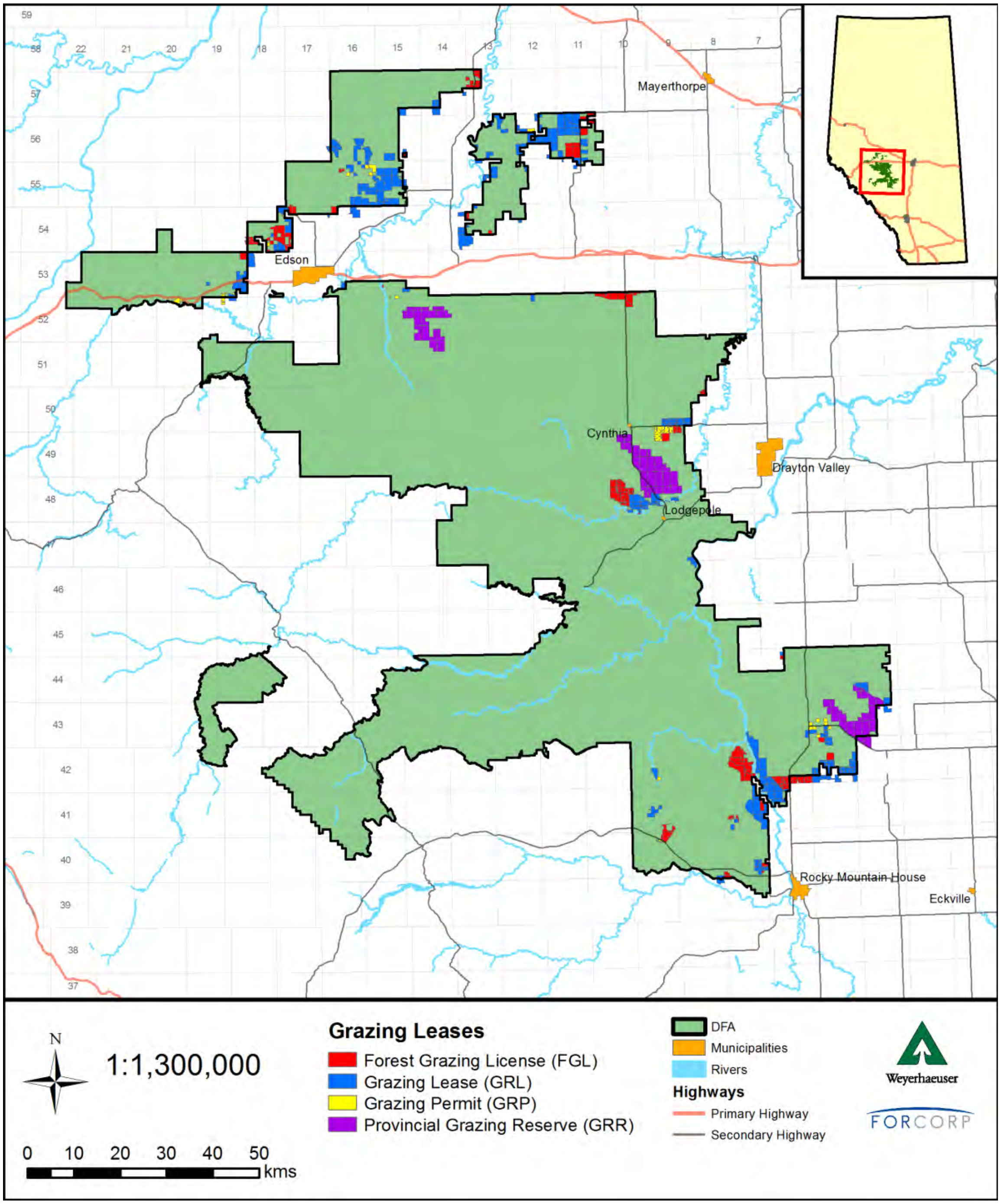


Figure 3-57. Grazing leases within the DFA.

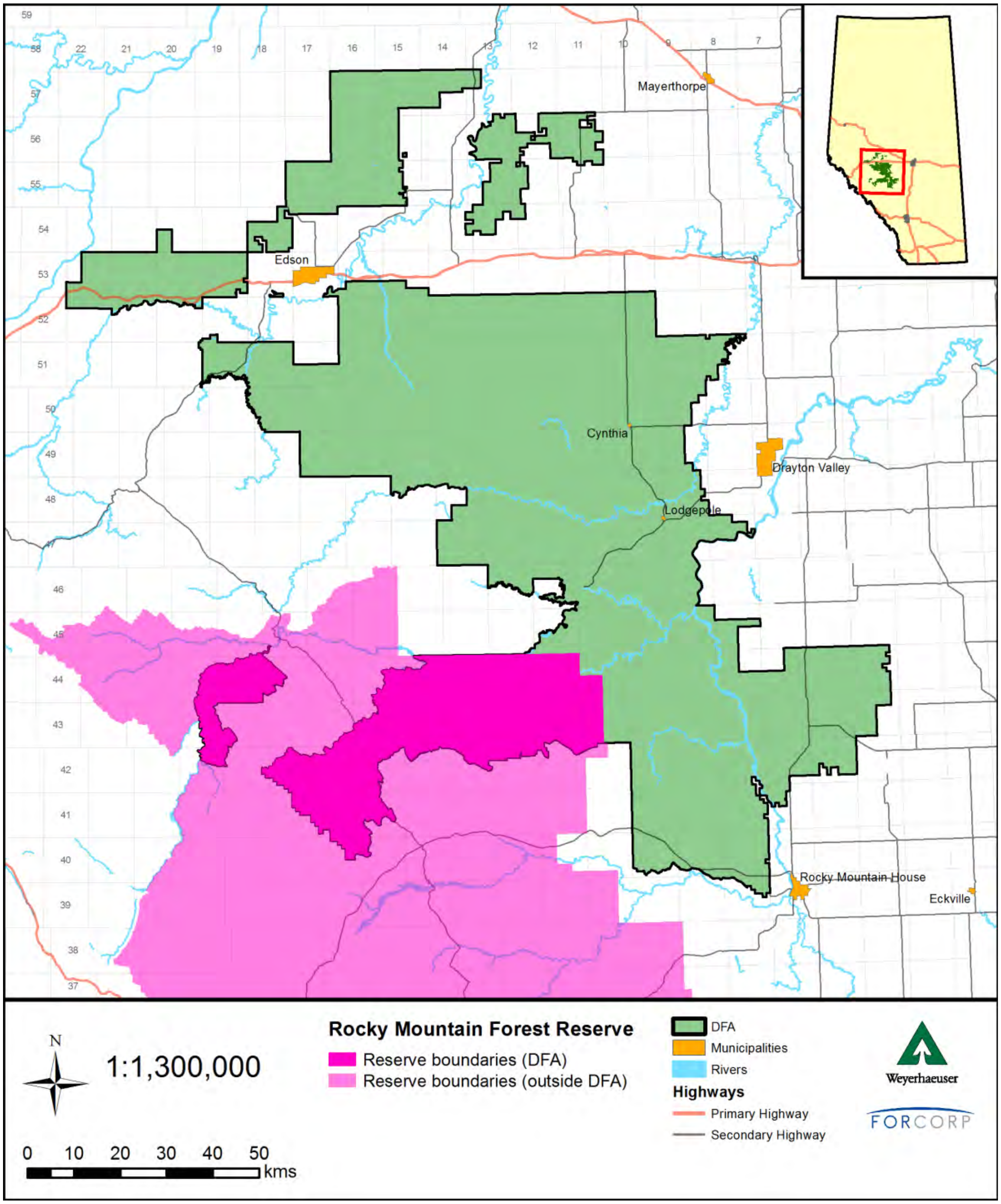


Figure 3-58. Rocky Mountain Forest Reserve.

3.6.5 Recreation

3.6.5.1 Camping

The DFA supports a number of recreational camping areas (Figure 3-59) (45). North of the Pembina river, these include Obed Lake, Wolf Lake, and Fickle Lake, which are administered by Alberta Community Development, and Bear Lake, Shining Bank Lake, and Long Lake, which are administered by Yellowhead County. South of the Pembina river, these include Brazeau Reservoir Recreation Area, Brazeau Reservoir Group Camp, West Canal Camp, and the East Canal Group Camp. Camping also occurs at Crimson Lake Provincial Park, the Blackstone Recreation Area, and at the Blackstone Lookout Recreation Area. Remote camping in non-designated sites is also prevalent throughout the DFA, especially along major rivers that are accessible by all-weather roads.

3.6.5.2 Day Use Areas

There are a number of day use areas scattered along the Yellowhead Highway. These are generally used for quick stops to prepare meals and for short rests. The day use areas include Miller Lake, Hornbeck and Nojack. There are a number of day use areas along the Forestry Trunk road between Highway 11 and Pembina Forks.

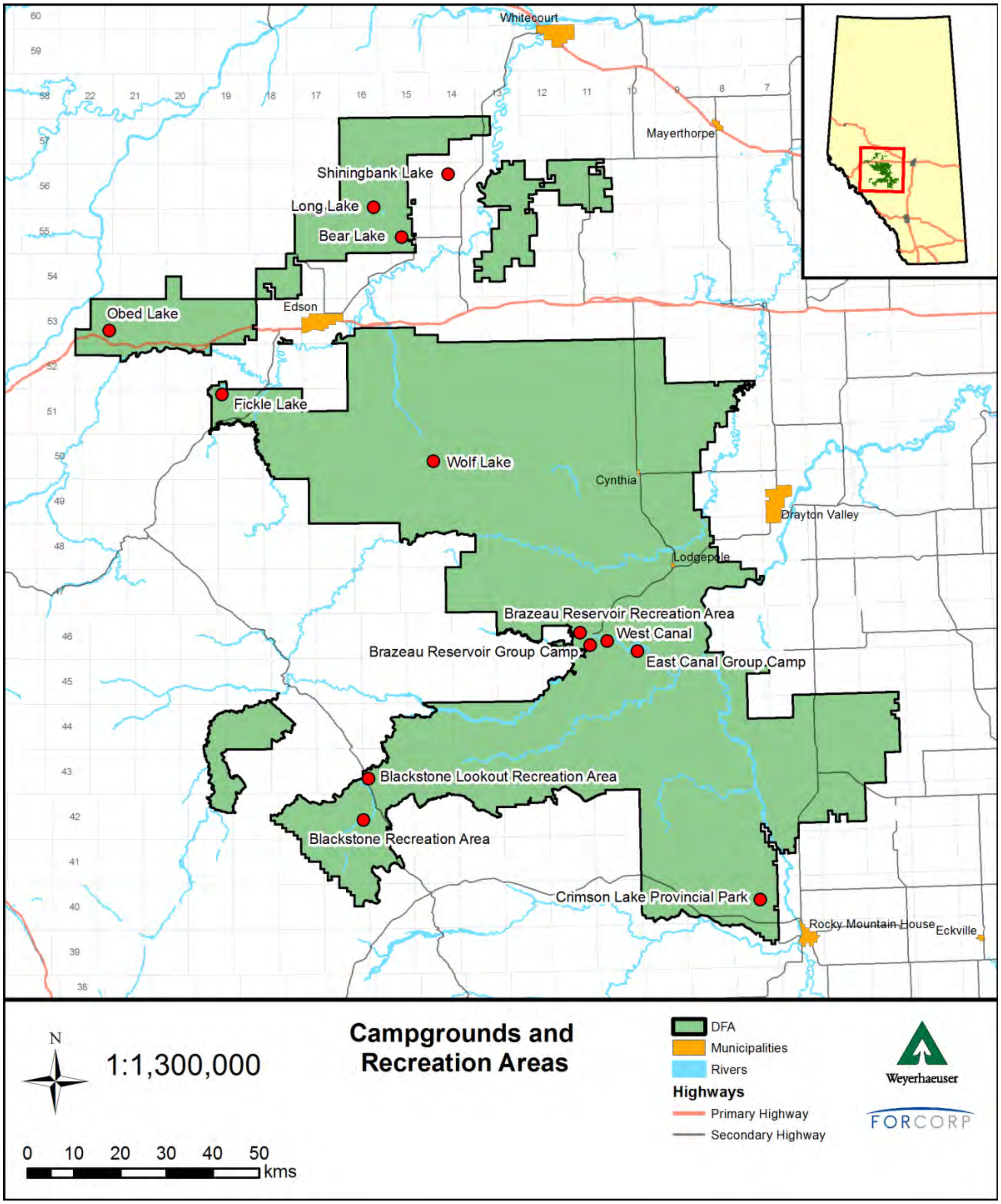


Figure 3-59. Campgrounds and recreation areas within and near the DFA.

3.6.6 Tourism

Integrated Resource Plans (IRPs), the M.D. Brazeau report on the Brazeau Reservoir Region Tourism and Recreation Potential, and Provincial base maps are the sources of information on which Weyerhaeuser has relied to identify recreation areas. There are no major recreation plans or developments other than those identified in the IRPs.

A synopsis of the IRP recreational resources assessment as it pertains to forest management is as follows:

- Overall recreational use and potential is moderate to low due to relatively poorer access and because areas outside the DFA are in greater demand. It should be noted that the Brazeau Road from Lodgepole to the Brazeau Reservoir has been upgraded since the IRP was done.
- Areas with high recreational use and potential include the Brazeau Reservoir, Medicine Lake, North Saskatchewan River, staging areas at the Blackstone and Wapiabi gaps, the Forestry Trunk Road, the Change road and Highway 11 corridor for water based activities, camping facilities and scenic resources.
- A designated vehicle route pilot project for recreational vehicles was proposed for the Brazeau-Pembina Sub-Region but has not been carried out.
- Public Lands and Forests Division have prepared a self-guided vehicle tour of the forest area southwest of Drayton Valley – the Brazeau Natural Resources Tour.

North of the Pembina River, a number of recreational activities and facilities have been established to capture some portion of this large economic potential. Some of the facilities include the East of Edson RV Park, Aspenhill Country Lodge, Silver Summit and the Hornbeck Cross-country Ski Trails.

Also active on the DFA are local ATV and snowmobile clubs. Some of these groups have well defined trails that are registered with AAF and are under disposition.

3.6.7 Guiding and Outfitting

The DFA is a popular area for fishing and hunting. In 2015, an estimated 288 moose and 443 elk were harvested within the 13 Wildlife Management Units (see Section 3.6.10.10.3) that overlap the DFA. Estimated hunter success averaged 24% for moose and 5% for elk (Alberta, 2016a, 2016b).

There are a number of organizations or businesses that operate upon or in the vicinity of the DFA, including:

- Brazeau ATV Club
- Centre for Outdoor Education
- Cheechako Survival Training
- Frontier Lodge
- Hostelling International – Northern Alberta
- Husky Wilderness Adventures (dog sled tours)
- Ice Haven Expeditions (dog sled tours)
- Rock and Water Adventure
- South of 60 Wilderness Associated Adventurers

As per the most recent Survey of Recreational Fishing in Canada, an estimated 4,107,207 angler-days occurred in Alberta in 2010 and over $5 million was spent on fishing packages. For packages including outfitters, over half of the money invested was in the Eastern Slopes Fish Management Zone (Zwickel, 2012). 97% of the DFA resides in the Eastern Slopes Zone, and the DFA covers 8% of the total zone area (Table 3-49).

Three of the 14 most popular rivers for fishing in Alberta (the Athabasca, McLeod, and Pembina) are within or adjacent to the DFA. Between 2016 and 2021, however, the Upper Pembina watershed (all flowing waters from the headwaters of the Pembina River downstream to Sec. Rd. 753 at Lodgepole) will be closed to all fishing activities. This recovery rest period is being used to recover the Arctic Grayling population (Alberta, 2016d).

3.6.8 Historical and Cultural Resources

The DFA was generally settled by non-aboriginal people at the beginning of the twentieth century. A second influx of settlers occurred in the 1930s, as people escaped the harshness of the dry prairie and came further west to re-establish themselves.

A great deal of the forest was exploited to produce railway ties for the two major railroads passing through the area at the turn of the century. As demand for ties diminished, small sawmills were set up to produce lumber for local use as well as for export.

Archaeological and historical features are protected through the Historical Resources Act of Alberta. Archaeological resources are defined in the Act as, "a work of humans that is primarily of value for its prehistoric, historic, cultural or scientific significance and is or was buried or partially buried in land in Alberta or submerged beneath the surface of any watercourse or permanent body of water in Alberta". A historic resource is defined in the Act as "any work of nature or of humans that is primarily of value for its paleontological, archaeological, prehistoric, cultural, natural, scientific or aesthetic interest" (Alberta, 2016c).

Alberta Culture and Tourism maintains a provincial GIS database that records known sites of different significance. The listing of historical resources identifies lands that contain or may contain historic or cultural resources, including archaeological and paleontological sites, Aboriginal traditional use sites of a historic nature, and historic structures. Each parcel of land is assigned a Historic Resource Value (HRV) ranging from 1 to 5, reflecting their importance.

- HRV 1: includes lands designated as Provincial Historic Resources under the Alberta Historical Resources Act, and my identify World Heritage Sites;
- HRV 2: designated as a Municipal or Registered Historic Resource;
- HRV 3: contains a significant historical resource that will likely require avoidance;
- HRV 4: contains a historic resource that may require avoidance; and
- HRV 5: believed to contain a historic resource

The DFA contains all levels of HRVs except level 2 (Figure 3-60) (27). There is one area each of level 1 and 3 significance along the Baptiste River; a Provincial Historic Resource managed by the Métis Nation of Alberta Association (see Section 3.2.11). Level 4's are scattered around the DFA, and level 5's generally follow the major river valleys. Table 3-46 shows the HRVs by category (note that the percentages are proportions of the total area covered by HRVs within the DFA). The largest percentage of HRVs are palaeontological (39%), closely followed by archaeological (37%), and cultural (23%).

Table 3-46. Historic Resource Values (HRV) within the DFA.

Category	HRV 1		HRV 3		HRV 4		HRV 5		Total	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Archaeological	151	0	285	0	2,471	3	27,034	34	29,941	37
Cultural	-	-	-	-	18,489	23	-	-	18,489	23
Historic Period	-	-	-	-	66	0	-	-	66	0
Palaeontological	-	-	-	-	332	0	31,316	39	31,648	39
Total	**151**	**0**	**285**	**0**	**21,358**	**27**	**58,350**	**73**	**80,144**	**100**

Historical artefacts not captured in AAF's database are occasionally discovered by Weyerhaeuser and other stakeholders. Examples of these artefacts include both intact and remnant trappers' cabins (although intact are rare). When discovered, artefact locations are recorded and buffered during the operational harvest planning stage.

Intact Trapper Cabin

Remnant Trapper Cabin

3.6.8.1 Historical Resources Predictive Model

Weyerhaeuser employs a Historical Resources Predictive Model to comply with the Historical Resources Act (Golder Associates, 2002a). To create the model, all known pre-contact historical archaeological sites on the DFA were identified and described. These known sites were used to calibrate the GIS predictive model to gain a level of confidence for applicability. The end result was a terrain based model (eg. degree of slope, proximity to flowing water) "to predict the location of pre-contact archaeological sites" (Golder Associates, 2002b). The model predicts the likelihood of resources being present by delineating areas as high, moderate, and low potential. The model was re-calibrated at the end of three years based on three years of field surveys.

Management responses for identified areas vary :

- High potential: avoidance or referral to a historical resource consultant (archaeologist) who will review the site's pre-activity during frost-free and snow-free conditions using aerial photography to direct the appropriate field inspections.
- Moderate potential: avoidance; or referral to historical resource consultant for post-activity review during frost-free, snow-free conditions.
- Low potential: no management response required.

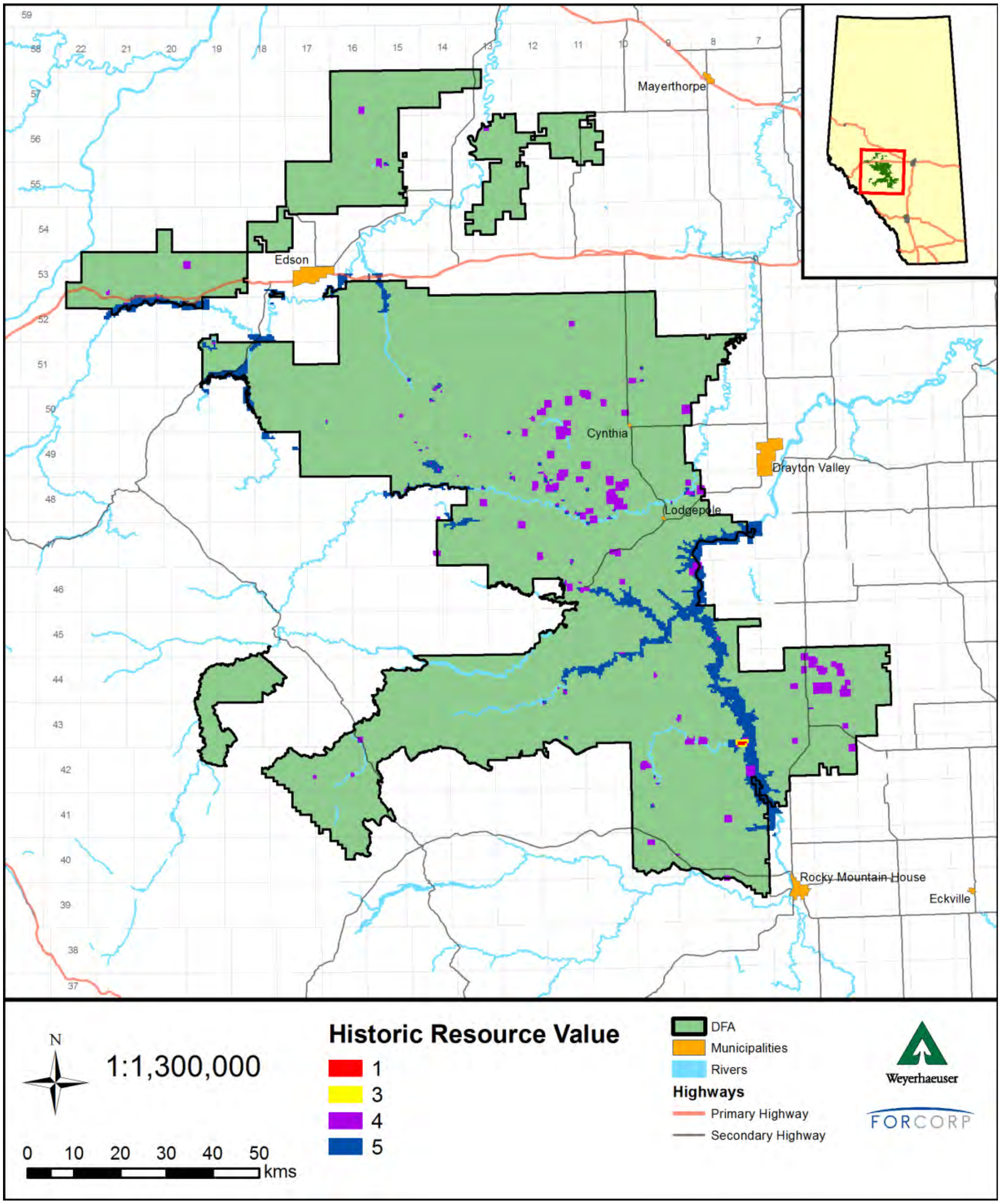


Figure 3-60. Historic Resource Values within the DFA.

3.6.9 Visual Resources

The DFA is very diverse, with areas of flat muskeg interspersed with rolling terrain covered with lodgepole pine, trembling aspen and white spruce. Cultivated land can also be found throughout the landscape, but is more generally found along the major and secondary paved highways.

The traffic on the Yellowhead highway is steady throughout the year. In the winter, traffic is heading into the mountains in pursuit of wintertime recreational activities, namely skiing, snowboarding, and snowmobiling. During the summer months, recreational vehicles tend to be the main mode of transport on the highway.

Visual landscape modeling has been used in previous harvest designs where terrain is quite variable. Modifications to harvest designs are very site specific and localized.

3.6.10 Fish and Wildlife Resources

The DFA is known for its abundant wildlife resources and its value for hunting, as well as for non-consumptive forms of outdoor recreation, such as camping and hiking. Hunting by First Nations in the area is also a significant activity. The diverse environment supports a wide range of forest types from pure aspen stands to mixedwood and pure coniferous stands as well as muskeg and riparian areas. This diversity also supports a wide variety of wildlife and plant species. The North Saskatchewan, Brazeau, Blackstone, and Wapiabi river valleys are an important feature for many species.

Weyerhaeuser undertakes extensive field research to provide baseline data on mammals, birds, amphibian, reptile and freshwater fish species (Appendix 3-2) that is used as a benchmark for future monitoring. Some of the data is needed at the stand level of the ecologically-based forest management approach to assess relationships between species and stand structure. Other data provides fine-filter inventory information that helps Weyerhaeuser plan its forest management to deal with threatened wildlife species as well as species of recreational value.

3.6.10.1 Avifauna

Bird surveys have been conducted tri-annually since 1994. Over 200 different bird species have been recorded (Weyerhaeuser, 2015), reflecting the size and diversity of bird populations in the DFA. Winter bird counts were completed to determine the number of bird species present and their relative abundance, and to assess species-specific relationships with stand structure and composition. These counts along transects were complemented by nocturnal counts using playbacks of owl vocalizations along predetermined vehicular routes. Breeding bird surveys (neotropical birds) were done with the objective of identifying species-stand structure associations.

<u>Songbirds</u>

The six most abundant songbird species found in the DFA are:

1. Yellow-rumped Warbler
2. Swainson's Thrush
3. Ruby-Crowned Kinglet
4. Chipping Sparrow
5. Red-breasted Nuthatch
6. White-throated Sparrow

Yellow-rumped Warbler

There is no habitat association common amongst all the songbirds. The Yellow-rumped Warbler breeds in coniferous forests but prefers open, mature stands that have dead standing trees throughout, and will occasionally nest in stands of black spruce or areas of muskeg. The Chipping Sparrow is found in mixedwood and coniferous stands, occupying openings and edges of woodlands, and in open deciduous forests. The Ruby-crowed Kinglet breeds primarily in coniferous and mixedwood forests, but can also be found in black spruce and tamarack stands.

Ruby-crowned Kinglet

Woodpeckers

Woodpeckers are birds that are specifically adapted to chisel through bark and wood, and are considered key species within a habitat. Their presence can serve as an indicator of the overall health of the ecosystem. A total of seven species of woodpecker are known to occur on the DFA: Black-backed Woodpecker, Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Three-toed Woodpecker, and Yellow-bellied Sapsucker.

Pileated Woodpecker

The Downy Woodpecker and the Northern Flicker are sighted the most often. Both the Black-backed and Pileated Woodpecker are classified as "sensitive" by the provincial ranking system.

Species Associated with Older Forests

There are a number of bird species that prefer late seral forest conditions. Those identified on the DFA included the Red-breasted Nuthatch, Yellow-rumped Warbler, Pine Siskin, Gray Jay, Golden-crowned Kinglet, Ruby-crowned Kinglet, Three-toed Woodpecker, Black-throated-Green Warbler, White-winged Crossbill, Brown Creeper, Rose-breasted Grosbeak, Pileated Woodpecker and Winter Wren.

Pine Siskin

Owls and Raptors

Nine species of owl are believed to occur in the DFA. These included the Northern Saw-whet, Great Gray, Boreal, Barred, Great-horned, Northern Pygmy, Long-eared, Short-eared, and Northern Hawk Owl.

Other raptors are also known to exist on the DFA. These included the Red-tailed Hawk, Rough-legged Hawk, Bald Eagle, Golden Eagle, Merlin, Northern Harrier, American Kestrel, Northern Goshawk and Osprey.

Waterfowl

Several bird species in the DFA require water as an essential part of their habitat, including the Barrows Goldeneye, Trumpeter Swan, Sandhill Crane and Great Blue Heron.

The Great Blue Heron and the Sandhill Crane have fairly specific habitat requirements. The Great Blue Heron is found in and about open, shallow water, including lake edges, streams, rivers, ponds,

Sandhill Crane

sloughs and marshes. They nest near the shoreline or on islands surrounded by water. Herons are colonial birds that return each year to the same breeding grounds, and prefer to nest high in aspen, black poplar or white spruce trees. Their populations are under pressure and consideration is given to protecting their habitat from human disturbance. The Sandhill Crane also requires large marshes, bogs, and sloughs for successful breeding. They often feed in open areas adjacent to wetland, such as meadows or older harvested areas. This species returns to the same breeding ground each year, and requires secluded and undisturbed sites for nesting. Both the Great Blue Heron and the Sandhill Crane are on classified as "sensitive" by the provincial ranking system.

Great Blue Heron

Trumpeter Swans are a migratory bird, and the few sightings in the DFA may be attributed to birds on route to their summer nesting grounds or on their way south for the winter. Although these birds are not generally found in the DFA, their occasional presence is important. There are a small number of lakes known to have been used for nesting purposes in the past that are given expanded buffers in the net landbase.

Trumpeter Swan

The Barrows Goldeneye is a waterfowl species that is unique to the Rocky Mountain/Foothills natural regions. They are commonly found throughout the DFA, occupying ponds, sloughs and small lakes.

Barrows Goldeneye

3.6.10.2 Mammals

Furbearers

Eleven species of commercial furbearers occur in the DFA. Winter track counts are used to assess their relative abundance and distribution. Based on previous surveys, Snowshoe hare and red squirrel are the most abundant. Snowshoe hare is usually found in old pine stands and mature and immature mixedwood stands. Red squirrels are associated with mature pine and immature mixedwood stands. Furbearer surveys were discontinued after 2003.

Red Squirrel

Snowshoe Hare

Fisher were uncommon in the surveys, and were first recorded in only two stand types: old and mature mixedwood stands. In later surveys, they were significantly more abundant than expected in mid-seral coniferous stands. Marten are relatively common and are associated with mature pine stands and old mixedwood stands.

Marten

Fisher

Weasels were the most common small carnivorous furbearer. They are generally associated with cutover/upland burns. Short tailed weasels were more abundant than expected in the early seral stages and in areas with limited overhead cover. Trapline data indicates that beaver, muskrat, fox, and otter occur in varying numbers throughout the DFA as well.

Fox

3.6.10.3 Large Carnivores

Grizzly bears are found in the western and southern portions of the DFA. Over the last number of years, the Foothills Model Forest (Hinton, AB) has been coordinating a multi-stakeholder research project on the grizzly bear population to determine long-term strategies for its conservation. The project has produced habitat maps for grizzly bears on portions of the DFA.

Grizzly Bear

Past surveys have identified several other large carnivore tracks. The most frequent large carnivore track count recorded was the Lynx, generally associated with immature pine and spruce stands. Coyotes were the next most frequent large carnivore, and were generally associated with mature mixedwood and immature coniferous sites. Black bears are also known to occur frequently within the DFA, and wolf tracks were found within a variety of forest types. Cougar was the least frequently found large carnivore track.

Lynx

3.6.10.4 Small Mammals

Very little is known about small mammals on the DFA. No known natural bat hibernacula exist within the DFA, and the only bat species in the DFA with a confirmed sighting is the little brown bat. Research in ongoing to learn more about the small mammals in the region.

Little Brown Bat

3.6.10.5 Ungulates

Populations of elk, moose, mule deer and white-tailed deer exist across the DFA. They provide substantial hunting revenues throughout Alberta, as well as the communities within and proximal to the DFA.

Table 3-47 presents estimated ungulate population numbers for the Wildlife Management Units (WMUs, see Section 3.6.10.10.3) that overlap the DFA (Alberta, 2016e). White-tailed deer are the most numerous ungulate, and WMU 348 (Chip Lake, in the northeast of the DFA) has the greatest total ungulate population. In all the WMUs that overlap the DFA, there are estimated to be over 31,000 ungulates.

Table 3-47. 2016 Ungulate population estimates within the WMUs that overlap the DFA.

WMU	Moose	Elk	Mule Deer	White-Tailed Deer	Total
328	200	250	300	1,200	1,950
330	170	50	50	300	570
332	900	200	300	2,100	3,500
337	670	150	350	1,500	2,670
338	456	300	200	1,300	2,256
339	347	490	250	1,000	2,087
340	366	250	200	450	1,266
342	147	185	100	250	682
346	2,744	550	300	2,500	6,094
348	3,241	450	1,290	4,500	9,481
430	20	30	50	200	300
434	20	20	50	100	190
436	35	30	30	75	170
Total	**9,316**	**2,955**	**3,470**	**15,475**	**31,216**

Both moose and elk are strongly associated with early seral stage forest, particularly deciduous and mixed wood stands, and riparian areas within river valleys. Given protection from unregulated harvest, populations should increase as older forest stand areas are harvested and regenerate.

Moose

Moose populations are affected by wood tick infestations and high density of access roads within the DFA. As a result, current moose hunting seasons are restrictive and based on permits only. The highest concentrations of moose are in the eastern two thirds of the DFA, where deciduous forests and muskegs are common.

Elk

Elk herds in the DFA have increased steadily, with the highest density of elk in the DFA found along the farmland/forest edge. In an attempt to limit population growth, particularly in farmland areas, a permit-based harvest of cows has been in place since 1994.

3.6.10.6 Herpetofauna

Herpetofauna are widely distributed across the DFA. The species believed to be present include the western toad, wood frog and the boreal chorus frog. Weyerhaeuser has supported University of Alberta research within the DFA to better understand the herpetofauna present.

3.6.10.7 Fisheries

The DFA supports a number of diverse sport fish species. Several of the sport fish are coldwater species-of-concern: Arctic Grayling, Mountain Whitefish, Bull Trout, and Athabasca strain Rainbow Trout. Other less threatened sport fishing species include Brook Trout, Brown Trout, Goldeye, Burbot, Northern Pike, Walleye, Yellow Perch and Lake Whitefish.

Non-sport fish also inhabit drainages within the DFA. These include the Long-nosed Dace, Pearl Dace, Finescale Dace, Northern Redbelly Dace, Emerald Shiner, Lake Chub, Fathead Minnow, Trout, Perch, Longnose Sucker, White Sucker, Slimy Sculpin, Spoonhead Sculpin, and Brook Stickleback.

The most widely distributed sport fish species found in lakes in the DFA are the Northern Pike, with lesser amounts of Walleye, Yellow Perch, Burbot and Lake Whitefish.

Arctic Grayling

In general, fisheries production in the streams and rivers in the DFA is limited by cool, less productive water, and a relatively short growing season. Sport and non-sport fish species are found in habitat ranging from large rivers to small tributary streams. Many waterbodies of all sizes are important for spawning and rearing, with larger rivers additionally vital to migration and overwintering. Recreational angling is popular at lakes, rivers and streams located in the DFA. Most of the recreational fishing pressure on the flowing waterbodies occurs on the larger rivers and streams. Access to streams and lakes in the DFA is very good, due to the presence of many roads and cutlines.

Brook trout, Brown Trout, Burbot, Northern Pike and Mountain Whitefish are sport fish species known to use the Baptiste River drainage in the southeast corner of the DFA. A number of large Brook Trout populations are present in this area. Brown Trout, Northern Pike, Mountain Whitefish, Goldeye, Walleye and Lake Sturgeon are all known within the North Saskatchewan and the lower Brazeau River drainages (near its confluence). Data collected through the Co-operative Fisheries Inventory Program (CFIP), suggests that the lower sections of many small tributaries to both rivers are utilized by Mountain Whitefish and Brown Trout for spawning and rearing purposes. The extent to which the mainstem North Saskatchewan is used by Lake Sturgeon within the DFA is unknown.

The upper section of the Blackstone River and the Wapiabi River drainages support Mountain Whitefish, Bull Trout, Brook Trout and Cutthroat Trout populations. Data collected through CFIP suggests that Bull and Brook Trout are using the tributaries to the Blackstone and Wapiabi Rivers as well as the mainstem rivers. However, within Weyerhaeuser's DFA, Cutthroat Trout and Mountain Whitefish seem limited to the mainstems. Bull Trout and Mountain Whitefish are common in the headwater reaches of the Brazeau River.

The Brazeau Reservoir and Power Canal provide an important sport fishery area for Northern Pike, Bull Trout, Brown Trout, Burbot and Mountain Whitefish. In addition, a number of ponds and small lakes have been stocked with rainbow trout to enhance recreational fishing opportunities within the DFA.

The Pembina River supports populations of sport fish such as Northern Pike, Arctic Grayling, Burbot, Mountain Whitefish and Walleye. Arctic Grayling are a species of Special Concern in Alberta (Table 3-48) and the population in the Upper Pembina River watershed is at high risk of being lost completely. Dismal Creek, a tributary to the Pembina, supports what is likely Alberta's southernmost Arctic Grayling population. Data collection through the CFIP Program has revealed that Arctic Grayling are specifically using a number of tributaries to Dismal Creek for spawning purposes. For this reason, the Upper Pembina watershed (all flowing waters from the headwaters of the Pembina River downstream to Sec. Rd. 753 at Lodgepole) will undergo a rest recovery period and be closed to all fishing activities between 2016 and 2021 (Alberta, 2016d). Given that the current watershed conditions are not adequate to maintain a sustainable Arctic Grayling population, additional efforts are required to facilitate recovery. Further protection from all activities (fishing, recreation, industry) within the Upper Pembina watershed

(Figure 3-61) is necessary to ensure the maintenance of essential biological and ecological processes that are required for recovery of the fishery.

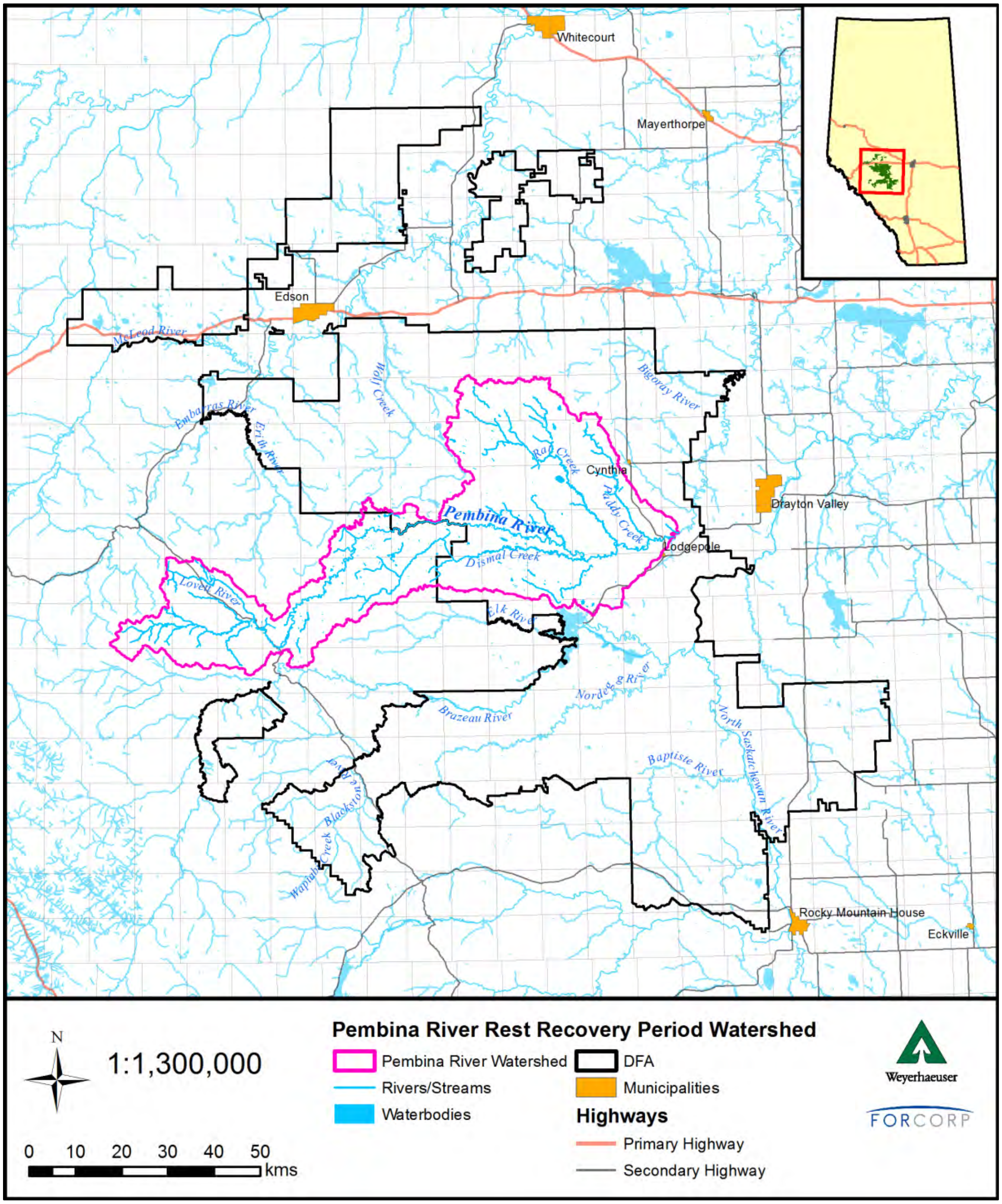


Figure 3-61. Upper Pembina watershed fishing closure.

3.6.10.8 East Slopes Cold Water Fish

Sensitive cold water fish species of concern in the DFA include the Athabasca Rainbow Trout, Bull Trout and Arctic Grayling. AAF is in the process of developing models to determine the impact of disturbances on the habitat quality of these species. These tools were unavailable for this FMP. In the absence on these models, Equivalent Clearcut Area was used as a measure of fish habitat disturbance for groups of watersheds representing the above mentioned species. The watershed groupings and numbers are visible in Figure 3-62. Watershed names are the same as those in Table 3-18.

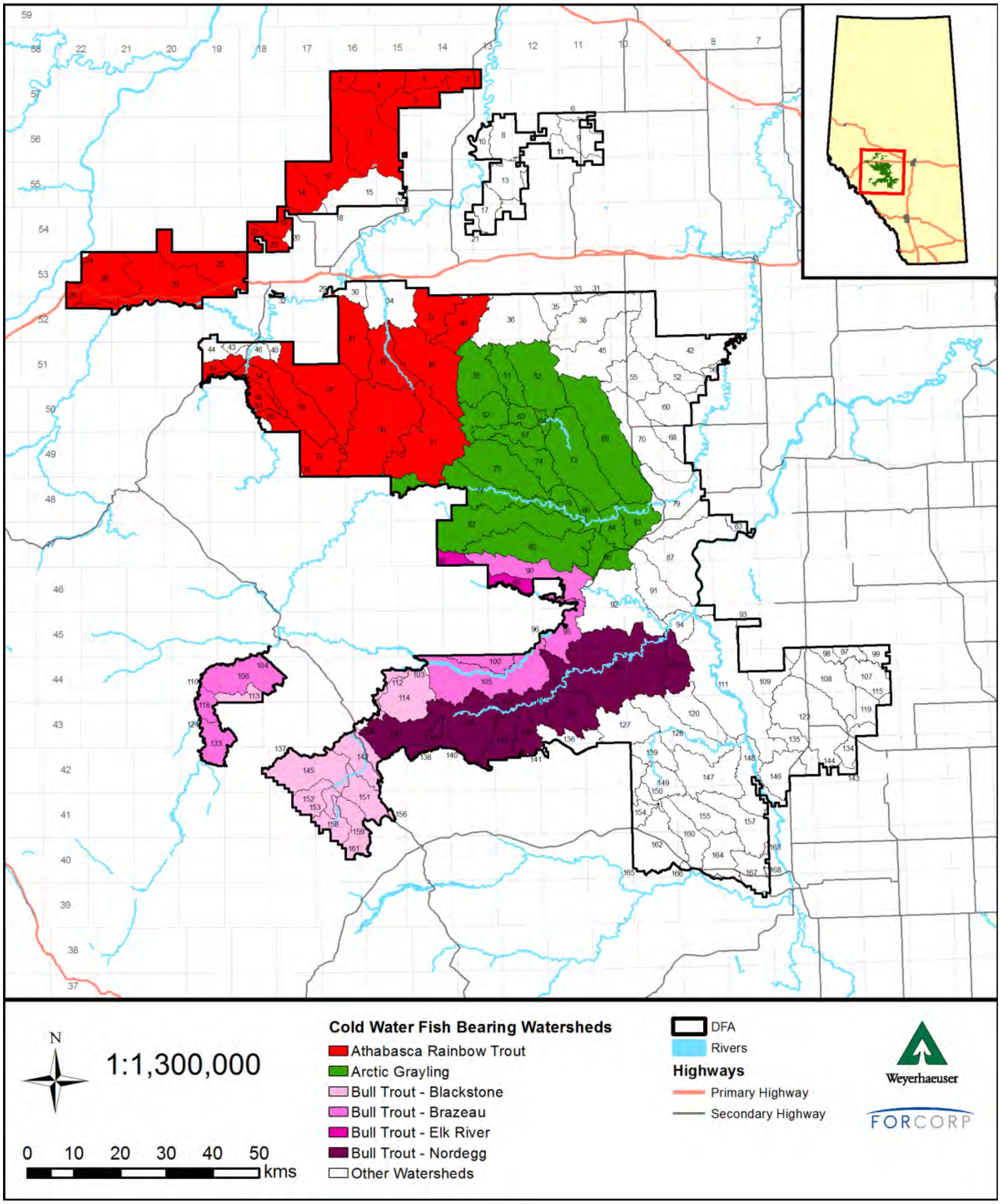


Figure 3-62. Cold water fish watersheds.

3.6.10.9 Species of Special Concern

All species in Alberta with a status of "endangered", "threatened, or "special concern" are listed by AAF (Alberta, 2014b). Of these species, Table 3-48 contains those that are confirmed to occur within the DFA by Weyerhaeuser sponsored research and monitoring programs, likely to occur based on literature reviews and habitat associations (Weyerhaeuser, 2015), and possible to occur based on general range maps (Alberta, 2014c).

Table 3-48. Species of special concern for the DFA.

Species Classification	Confirmed inside DFA	Likely inside DFA	Possibly inside DFA	Total
Endangered			Porsild's bryum (*Bryum porsildii*) Limber pine (*Pinus flexilis*) Whitebark Pine (*Pinus albicaulis*)	**3**
Threatened	Peregrine falcon (*Falco peregrines*) Westslope cutthroat trout (*Oncorhynchus clarkia lewisi*) Grizzly bear (*Ursus arctos*) Bull trout (*Salvelinus confluentus*) Athabasca rainbow trout (*Oncorhynchus mykiss*) Western grebe (*Aechmophorus occidentalis*)	Northern leopard frog (*Rana pipiens*) Lake sturgeon (*Acipenser fulvescens*) Pygmy whitefish (*Prosopium coulteri*)		**9**
Special Concern	Black-throated green warbler (*Dendroica virens*) Harlequin duck (*Histrionicus histrionicus*) White-winged scoter (*Melanitta fusca*) Barred owl (*Strix varia*) Arctic grayling (*Thymallus arcticus*) Trumpeter Swan (*Cygnus buccinator*)	Sprague's pipit (*Anthus spragueii*) Long-toed salamander (*Ambystoma macrodactylum*) Loggerhead shrike (*Lanius ludovicianus*) Prairie falcon (*Falco mexicanus*)		**10**
Total	**12**	**7**	**3**	**22**

3.6.10.10 Management Zones

3.6.10.10.1 Fish Management Zones

There are three Fish Management Zones (15) in Alberta used to determine fisheries health, regulate sport and commercial fishing, and determine fish stocking. Fish Management Zones are further subdivided into Fish Watershed Units which are based on specific river basins. Sport fishing regulations apply at the Watershed Unit level, or in some cases regulations are site specific to locations (lakes, streams) within a Watershed Unit.

The DFA is largely within the Eastern Slopes Fish Management Zone, with northern and eastern pieces reaching the Northern Boreal and Parkland Prairie zones (Figure 3-63 and Table 3-49). The portion of the Eastern Slopes zone that the DFA covers is further divided into Watershed Units ES2 (Red Deer and North Saskatchewan Rivers) and ES3 (Athabasca and Pembina Rivers).

Table 3-49. Fish Management Zones of Alberta.

Zone Name	Entire Zone Area (ha)	Portion of Zone in DFA		Portion of DFA
		Area (ha)	(%)	Occupied by Zone (%)
Eastern Slopes	12,271,620	1,038,381	8.46	97.3
Northern Boreal	33,014,617	6,359	0.02	0.6
Parkland Prairie	15,580,895	22,675	0.15	2.1
Total	**60,867,132**	**1,067,415**	**8.63**	**100.0**

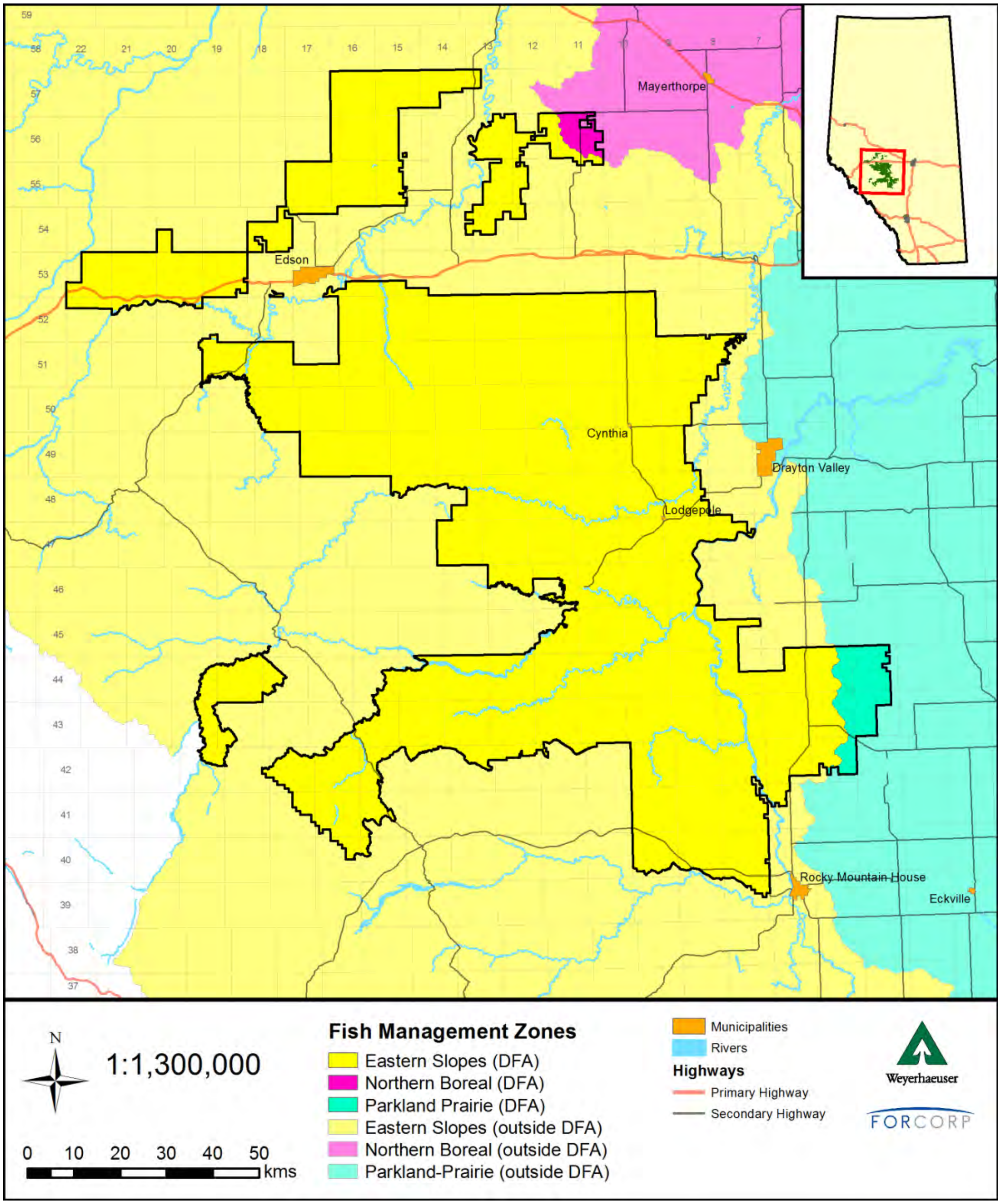


Figure 3-63. Fish Management Zones.

3.6.10.10.2 Hydrologic Unit Code 8 Watersheds

The Hydrologic Unit Code (HUC) watersheds of Alberta (37) represent a collection of four nested hierarchically structured drainage basin feature classes (Alberta, 2016f) and are used to meet fisheries management objectives. Fish sustainability indices (FSI's) are developed for selected cold water fish species based on the HUCs. Figure 3-64 shows the watersheds that overlap the DFA at the HUC 8 (finest) level. The Upper Pembina River watershed occupies the greatest area within the DFA at 19% (Table 3-50).

Table 3-50. HUC 8 watersheds overlapping the DFA.

HUC 8 Watershed Number	Name	Entire Watershed Area (ha)	Portion of Watershed in DFA Area (ha)	Portion of Watershed in DFA (%)	Portion of DFA Occupied (%)
1	Athabasca River Above Whitecourt	289,275	7,351	3	1
2	Paddle River	246,653	6,374	3	1
3	Trout Creek	62,695	38,539	61	4
4	Edson River	73,363	11,428	16	1
5	Lower Mcleod River	257,966	80,136	31	8
6	Upper Athabasca And Oldman Creek	238,254	12,297	5	1
7	Upper Mcleod River	306,285	36,052	12	3
8	Lobstick River	164,230	25,598	16	2
9	Lower Pembina River	211,941	2,633	1	0
10	Wolf Creek- Athabasca	83,415	78,010	94	7
11	Embarras River	185,816	33,866	18	3
12	Rat Creek	61,861	61,861	100	6
13	Upper Pembina River	352,565	205,086	58	19
14	North Saskatchewan Above Wabamun	231,433	27,545	12	3
15	Elk River	49,677	4,467	9	0
16	Brazeau Canal	21,935	21,935	100	2
17	Bucklake Creek	125,574	1,756	1	0
18	Brazeau River	311,958	59,020	19	6
19	Medicine River	277,310	20,852	8	2
20	Nordegg River	117,666	89,470	76	8
21	Wolf Creek- North Saskatchewan	66,788	36,888	55	3
22	North Saskatchewan Below Abraham	300,110	74,942	25	7
23	Blackstone River	140,211	54,116	39	5
24	Baptiste River	135,398	77,195	57	7
Total		**4,312,377**	**1,067,415**	**25**	**100**

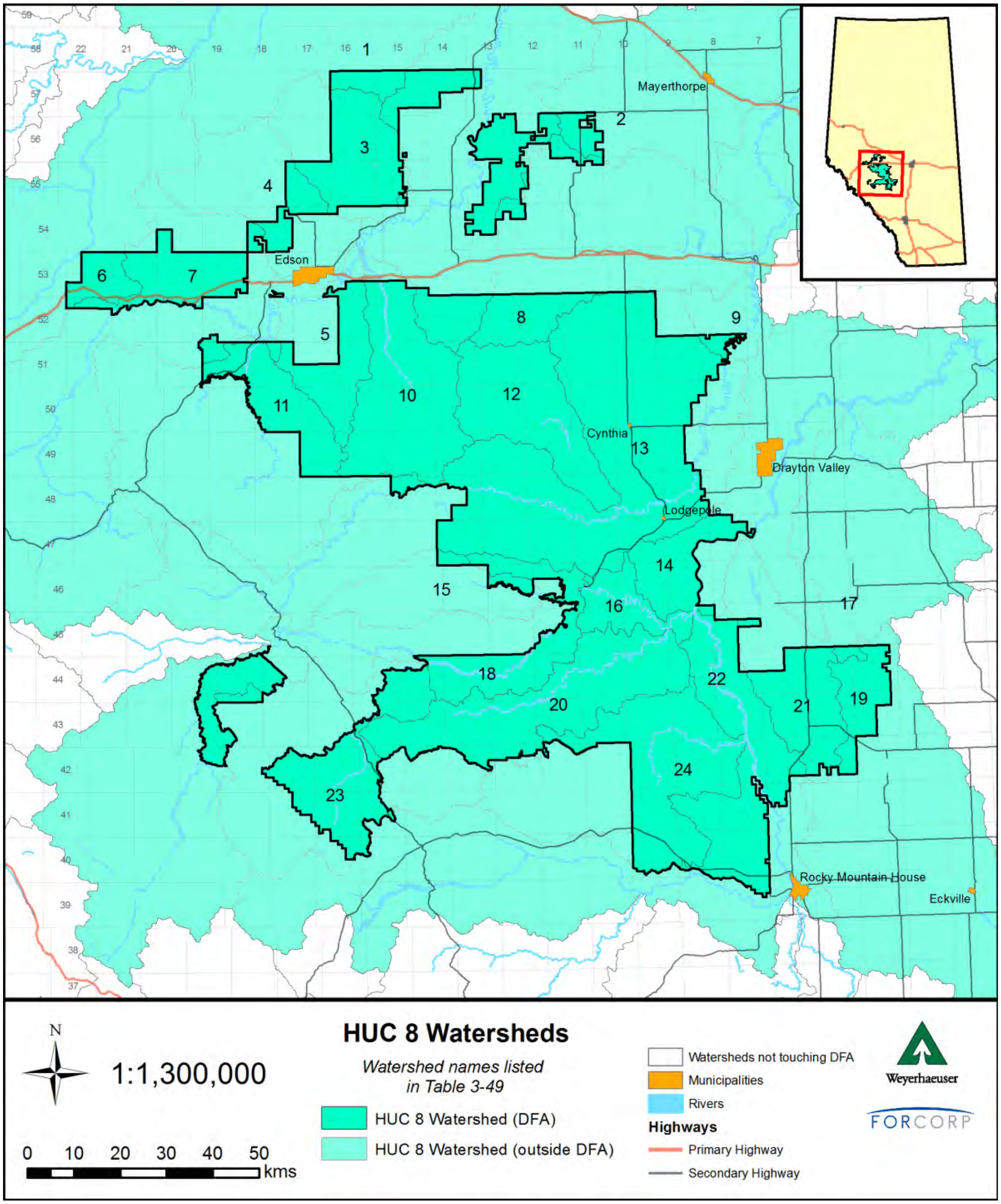


Figure 3-64. HUC 8 watersheds overlapping the DFA.

3.6.10.10.3 *Wildlife Management Units*

The Province of Alberta is divided into a series of Wildlife Management Units (WMU) (16). Wildlife within the boundaries of each WMU is managed by the Ministry of Environment and Parks (AEP) according to the regulations established in Alberta's *Wildlife Act*. There are 13 WMUs that overlap the DFA (Table 3-51 and Figure 3-65).

Table 3-51. Wildlife management units within the DFA.

Unit Name	Entire Unit Area (ha)	Portion of Unit in DFA		Portion of DFA
		Area (ha)	(%)	Occupied by Zone (%)
Alder Flats	287,423	46,189	16	4
Bighorn	81,429	3	0	0
Bigoray	202,841	103,645	51	10
Blackstone	145,849	58,516	40	5
Cardinal	61,051	189	0	0
Carrot Creek	254,646	221,016	87	21
Chip Lake	299,010	34,278	11	3
Elk River	210,882	75,808	36	7
McLeod River	150,314	15,721	10	1
O'Chiese	217,098	175,561	81	16
Schunda	287,059	128,924	45	12
Shiningbank	521,629	106,498	20	10
Wolf River	258,376	101,064	39	9
Total	**2,977,607**	**1,067,412**	**36**	**100**

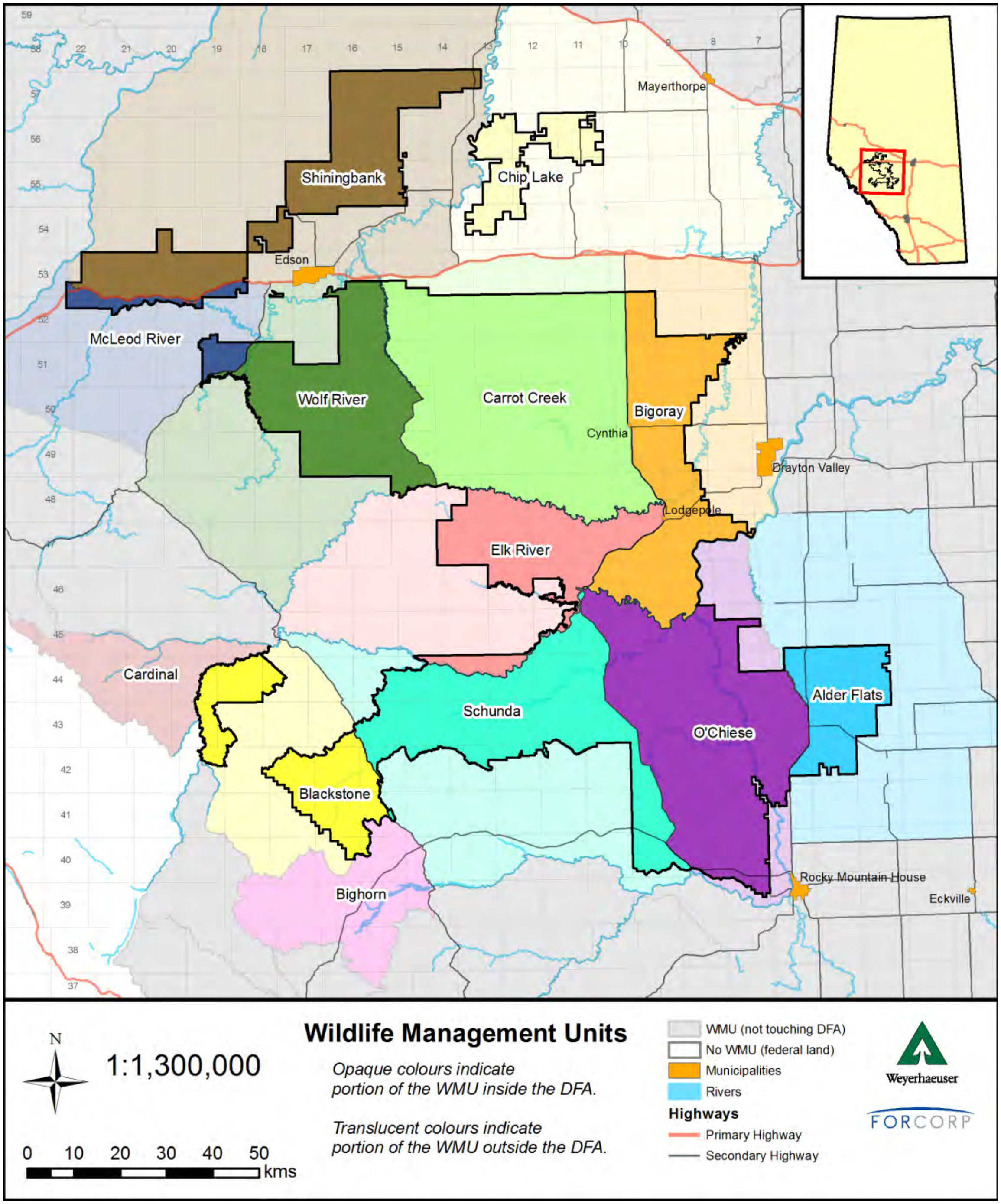


Figure 3-65. Wildlife management units within and around the DFA.

3.6.10.10.4 Wildlife Sensitivity Zones

Wildlife sensitivity zones (Table 3-52) are derived from aerial surveys, historical information, movements of collared animals and specific habitat type requirements. They are used by industrial operators and government departments in operational decision making on Crown land. In addition, these zones provide everyone with the best information currently available on the extent of wildlife sensitivities in Alberta (Alberta, 2015e).

The list of species is not exhaustive for the DFA, but identifies species that AAF has listed as a concern related to the development of industrial activities. A Landscape Analysis Tool (LAT) has been developed to incorporate the Wildlife Sensitivity zones when planning industrial activity. Reporting from the LAT allows for informed decisions, risk mitigation and adherence to standards (Alberta, 2014a).

Table 3-52. Wildlife sensitivity zones within the DFA.

Wildlife Species	Wildlife Sensitivity Zone within Alberta (ha)	Portion of Sensitivity Zone in DFA (ha)	Portion of Sensitivity Zone in DFA (%)	Portion of DFA occupied by Sensitivity Zone (%)
Grizzly Bear (*Ursus arctos horribilis*)				
Core Habitat	3,727,420	112,151	3%	11%
Secondary Habitat	4,680,902	70,747	2%	7%
Trumpeter Swan (*Cygnus buccinator*)	174,829	1,953	1%	0%
Colonial Nesting Bird:				
Great Blue Heron (*Ardea herodias*)	31,408	635	2%	0%
Sharp-Tailed Grouse (*Pedioecetes phasianellus*)	127,186	11	0%	0%
Total	**8,741,745**	**185,497**	**8%**	**17%**

Grizzly bear (*Ursus arctos horribilis*) is a threatened species in Alberta. Grizzly bear sensitivity zones (46) (Figure 3-66) have been established to reduce sources of human-caused mortality, reduce human-bear conflicts, avoid development within key habitats and seasons, and avoid development of grizzly bear attractants (Alberta, 2013a). Best management practices and approval for industrial users have been developed to meet these goals. Grizzly bear zones are delineated into core habitat (areas of high habitat value and low mortality risk) and secondary habitat (areas of good habitat, reflecting the broader range of grizzly bears) (Alberta, 2013b).

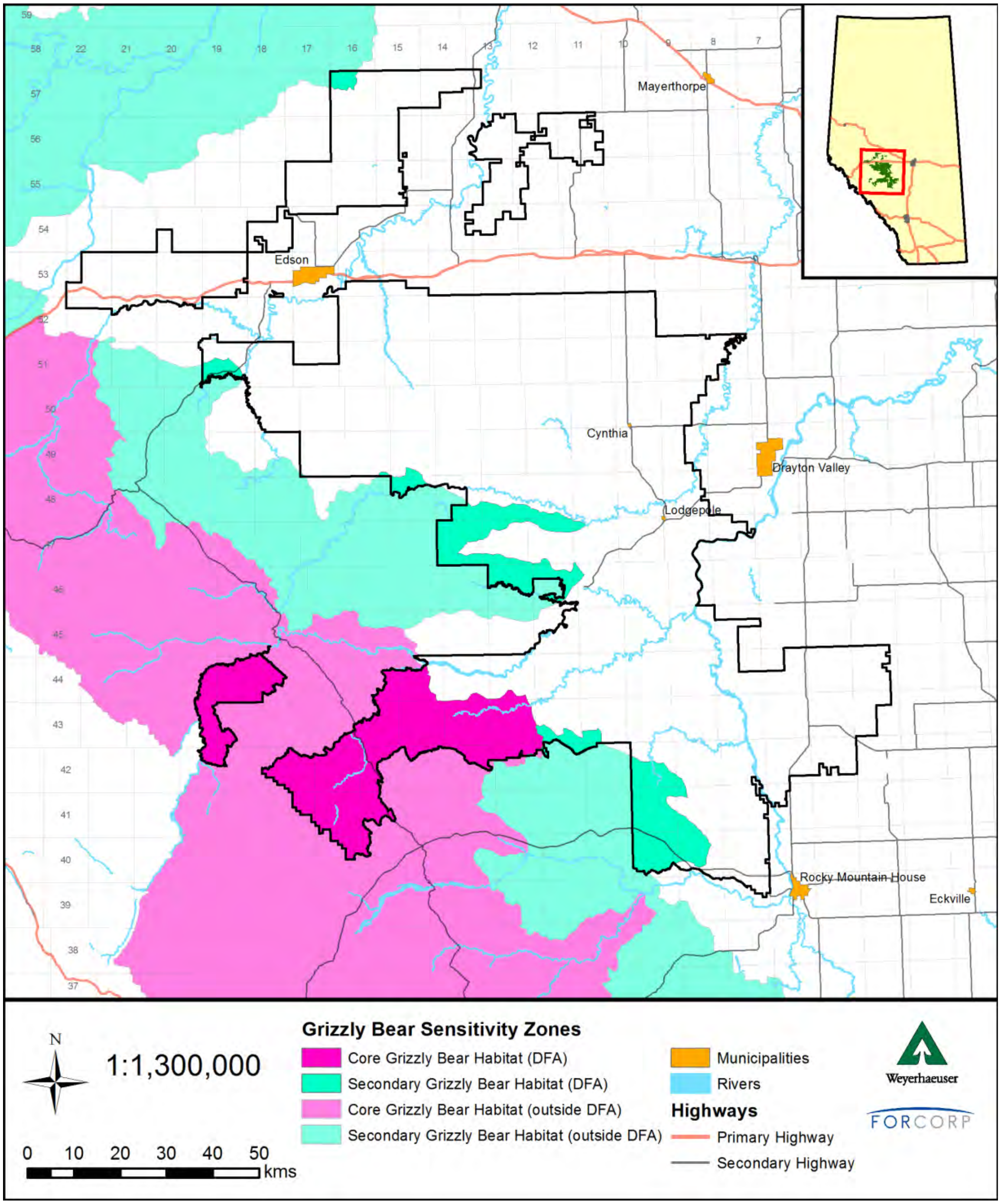


Figure 3-66. Grizzly bear sensitivity zones.

There are several avian species that require special consideration in forest management planning, including colonial nesting bird colonies (47), sharp-tailed grouse leks (48), and trumpeter swan waterbodies (49). The DFA includes all three types of birds, although there is only one sharp-tailed grouse lek touching the northern border (Figure 3-67).

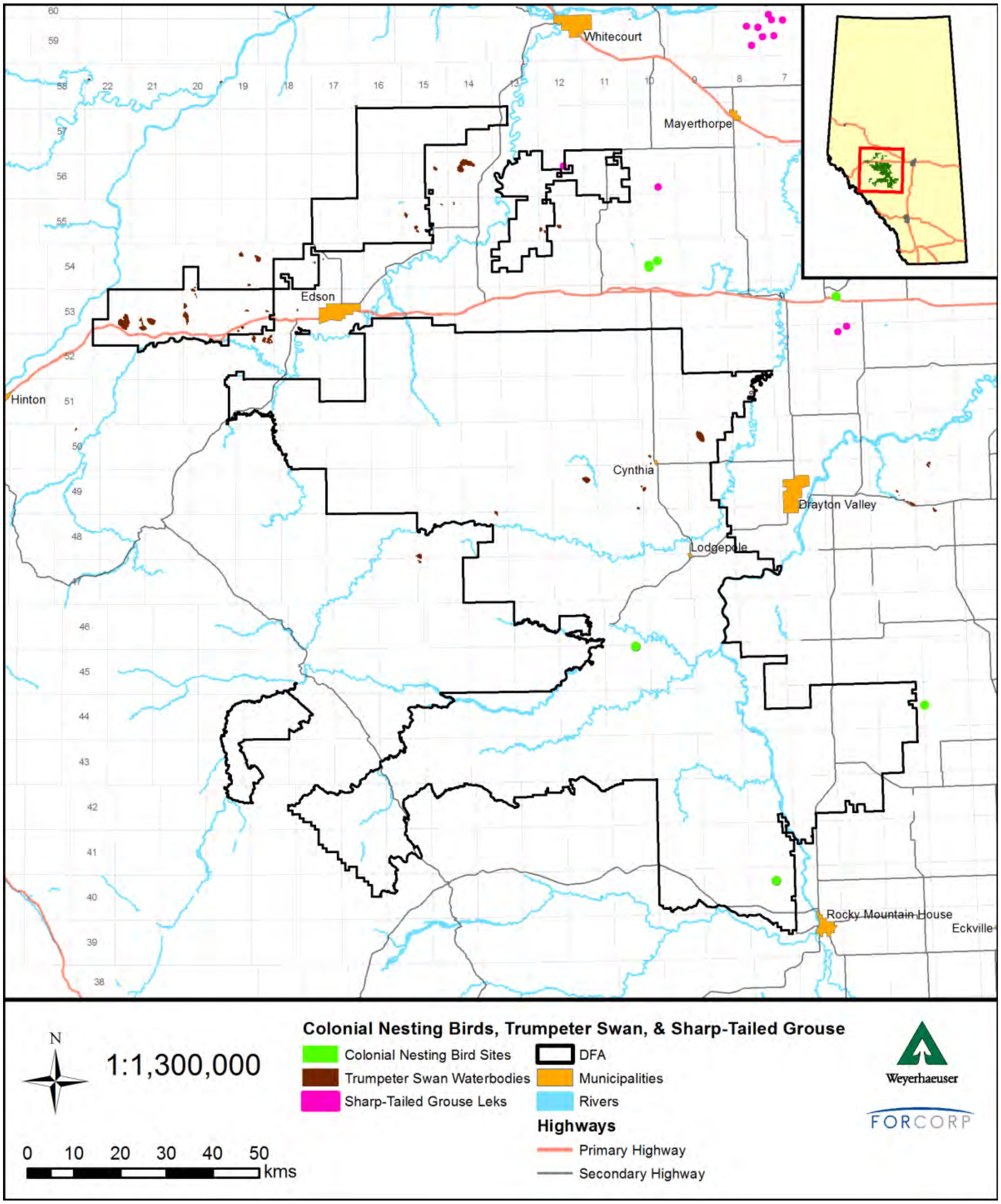


Figure 3-67. Colonial nesting bird sites, trumpeter swan waterbodies, and sharp-tailed grouse leks.

3.6.10.11 Sensitive Wildlife Sites

Aside from established wildlife sensitivity zones, Weyerhaeuser also has access to specific wildlife site locations (bear dens, snake hibernaculums, mineral licks, and other burrows, dens, and nests). Weyerhaeuser protects and buffers sensitive wildlife sites at the operational level when designing block and road layout, in accordance with the Alberta *Wildlife Act*.

3.6.10.12 Rare Plants

The Alberta Conservation Information Management System (ACIMS) maintains a spatial database of species and ecological communities that are considered rare or of conservation concern, including plants (Alberta, 2015f). ACIMS does not provide spatial data for plants separately. The element occurrences within the database are divided into sensitive (generalized location provided by township) and non-sensitive (more exact location provided) (50) (51). Figure 3-68 illustrates the non-sensitive element occurrences within the DFA (the closest sensitive townships are to the west of the DFA). The rare plants within the DFA in Figure 3-68 include:

Anemone quinquefolia (wood anemone)
Anomobryum filiforme (moss)
Botrychium campestre (field grape fern)
Bryum arcticum (moss)
Bryum purpurascens (moss)
Campylium radicale (Campuylium moss)
Collema subflaccidum (tree jelly lichen)
Conocephalum salebrosum (cat-tongue liverwort)
Cystopteris montana (mountain bladder fern)
Dicranella crispa (curl-leaved fork moss)
Dicranum tauricum (broken-leaf moss)
Gymnocarpium disjunctum (western oak fern)
Hypocenomyce anthracophila (small clam lichen)
Lactuca biennis (tall blue lettuce)
Leptogium tenuissimum (Lilliput jellyskin lichen)
Leptogium teretiusculum (jellyskin lichen)
Luzula acuminate (wood-rush)
Moerckia hibernica (liverwort)
Najas flexilis (slender naiad)
Oxytropis campestris var. *davisii* (northern locoweed)
Pellia endiviifolia (liverwort)
Phaeophyscia kairamoi (shadow lichen)
Physconia perisidiosa (crescent frost lichen)
Pinus albicaulis (whitebark pine)
Primula egaliksensis (Greenland primrose)

Ramalina obtusata (hooded ramalina)
Ramalina sinensis (fan ramalina)
Rhodobryum ontariense (Ontario Rhodobryum moss)
Rinodina exigua (spoke pepper-spore lichen)
Rorippa curvipes (blunt-leaved watercress)
Salix reticulata ssp. *reticulata* (net-veined willow)
Seligeria campylopoda (moss)
Seligeria donniana (Donian beardless moss)
Splachnum rubrum (red collar moss)
Tayloria splachnoides (splachnoid cyrtodon moss)

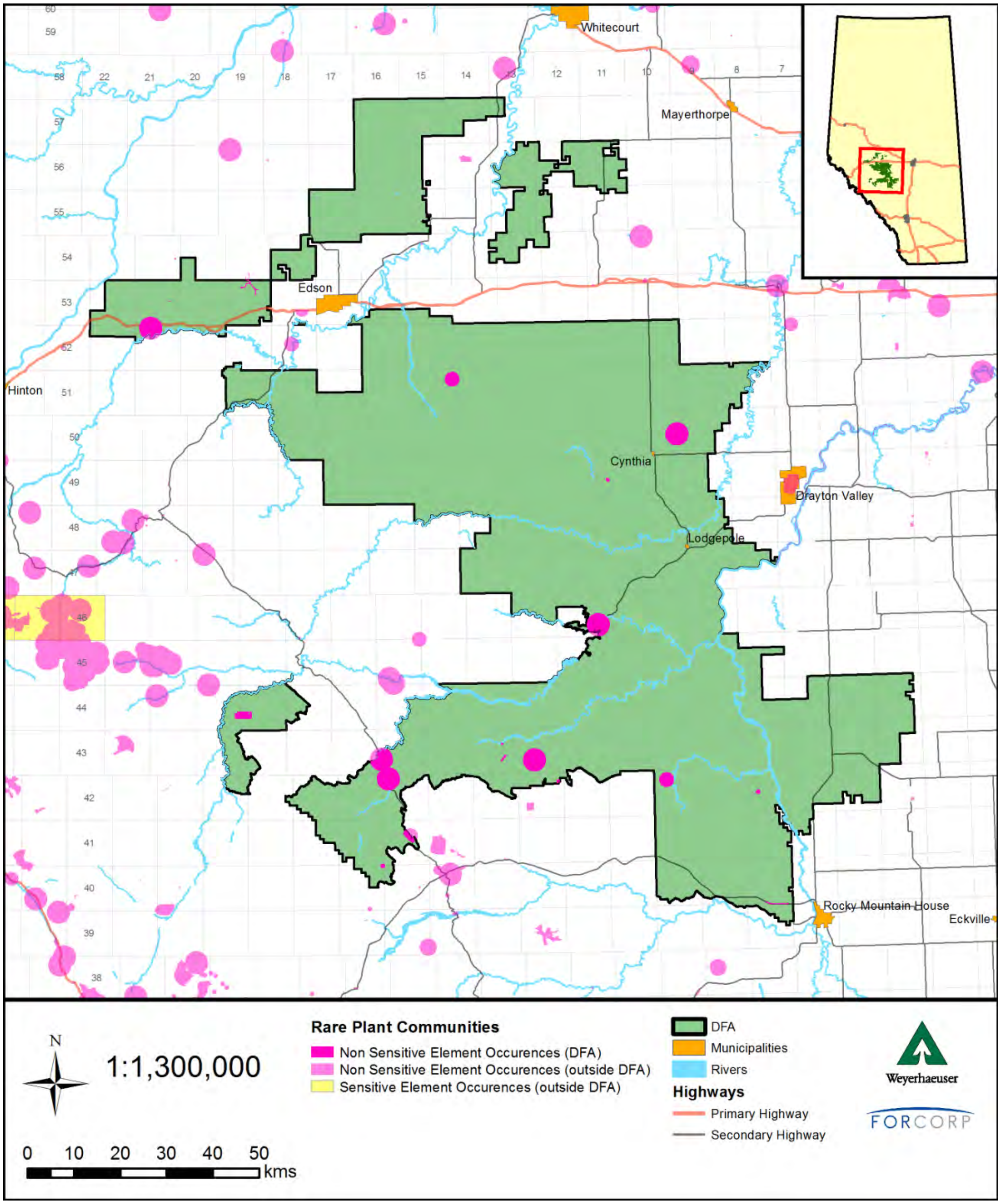


Figure 3-68. ACIMS rare plant communities within and near the DFA.

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Appendix 3-1 – Data Sources

This appendix contains data sources used for the creation of summary tables, maps, and other figures. Throughout the text, sources are referenced in numerical order.

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Appendix 3-2 – Wildlife Species Present on Weyerhaeuser's FMA

This list identifies species that are confirmed to occur in the Pembina Forest Management Agreement Area (FMA) by Weyerhaeuser sponsored research and monitoring programs (shaded), as well as species that are likely to occur within the FMA, based on literature reviews, habitat associations and Alberta Fish and Wildlife sources. Weyerhaeuser programs have documented the presence of 349 species: 62 mammal, 240 bird, 7 amphibian, 2 reptile, and 38 freshwater fish species.

Species Status

In 1996, most provincial, territorial and federal government Ministers responsible for wildlife signed the Accord for the Protection of Species at Risk in Canada. The Accord commits signatories to preventing species in Canada from becoming extinct as a consequence of human activity. It requires that all provincial and territorial signatories have a general status evaluation system that is similar and comparable.

Provincial

The general status evaluation process used in Alberta provides an initial assessment of wild species as to whether they are "At Risk" of extinction, "May Be At Risk" of extinction, are "Sensitive" to human activities or natural events, or are considered "Secure". Species classified as "At Risk" are subject to an Endangered or Threatened designation by the Alberta endangered species scientific committee.

National

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild Canadian species, subspecies and separate populations suspected of being at risk. Species determined to be at risk are categorized as "Extinct" (a species that no longer exists), "Extirpated" (no longer existing in the wild in Canada), "Endangered" (species facing imminent extirpation or extinction in Canada), "Threatened" (species likely to become endangered if limiting factors not reversed), or "Special Concern" categories (species sensitive to human activities).

Common Name	Scientific Name	COSEWIC	AB Status Rank (2004 or most current date)	Legal Designation (Either provincial or national)
MAMMALS				
Badger	*Taxidea taxus*		Sensitive	
Beaver[2,5,6,12]	*Castor canadensis*		Secure	
Big Brown Bat[11]	*Eptesicus fuscus*		Secure	
Bighorn Sheep[2]	*Ovis canadensis*		Secure	
Black Bear[2]	*Ursus americanus*	Not at risk	Secure	
Bushy Tailed Woodrat[6]	*Neotoma cinerea*		Secure	
Canada Lynx[5,7,8]	*Lynx canadensis*	Not at risk	Sensitive	
Columbian Ground Squirrel	*Spermophilus columbianus*		Secure	
Cougar[2,7,8]	*Felis concolor*		Sensitive	
Coyote[5,6,7,8]	*Canis latrans*		Secure	
Deer Mouse[6]	*Peromyscus maniculatus*		Secure	
Dusky Shrew[6]	*Sorex monticulus*		Secure	
Elk (Wapiti)[2,6,7]	*Cervus elaphus*		Secure	
Fisher[5,7,8]	*Martes pennanti*		Sensitive	
Golden-mantled Ground Squirrel[2]	*Spermophilus lateralis*		Secure	
Grizzly Bear[2]	*Ursus arctos*		At Risk	**AB Wildlife Act**
Heather Vole[6]	*Phenacomys intermedius*		Secure	
Hoary Bat[11]	*Lasiurus cinereus*		Sensitive	
Hoary Marmot[2]	*Marmota caligata*		Secure	
Least Chipmunk[2]	*Tamias minimus*		Secure	
Least Weasel[8]	*Mustela nivalis*		Secure	
Little Brown Bat[11]	*Myotis lucifugus*	Endangered	Secure	**Endangered (Federal SARA)**
Long-eared Bat[11]	*Myotis evotis*		Secure	
Long-legged Bat[11]	*Myotis volans*		Secure	
Long-tailed Vole[6]	*Microtus longicaudus*		Secure	
Long-tailed Weasel[8]	*Mustela frenata*	Not at risk	May be at risk	
Marten[5,6,7,8]	*Martes americana*		Secure	
Masked Shrew[6]	*Sorex cinerus*		Secure	
Meadow Jumping Mouse	*Zapus hudsonius*		Secure	
Meadow Vole[6]	*Microtus pennsylvanicus*		Secure	
Mink[2,5]	*Mustela vison*		Secure	
Moose[2,6,7]	*Alces alces*		Secure	
Mule Deer[2,6,7]	*Odocoileus hemionus*		Secure	
Muskrat[5]	*Ondatra zibethicus*		Secure	
Northern Bog Lemming	*Synaptomys borealis*		Secure	
Northern Flying Squirrel[6]	*Glaucomys sabrinus*		Secure	
Northern Long-eared Bat[11]	*Myotis septentrionalis*	Endangered	May be at risk	**Endangered (Federal SARA)**

Common Name	Scientific Name	COSEWIC	AB Status Rank (2004 or most current date)	Legal Designation (Either provincial or national)
Northern Pocket Gopher[6]	*Thomomys talpoides*		Secure	
Pika[2]	*Ochotona princeps*		Secure	
Porcupine	*Erithizon dorsatum*		Secure	
Pygmy Shrew[6]	*Sorex hoyi*		Secure	
Raccoon	*Procyon lotor*		Secure	
Red Fox[5,7,8]	*Vulpes vulpes*		Secure	
Red Squirrel[2,6,7,8]	*Tamiasciurus hudsonicus*		Secure	
Richardson Ground Squirrel[6]	*Spermophilus richardsonii*		Secure	
River Otter[5]	*Lutra canadensis*		Secure	
Shrew	*Sorex spp*			
Short-tailed Weasel (Ermine)[5,7,8]	*Mustela erminea*		Secure	
Silver-haired Bat[11]	*Lascionycteris noctivagans*		Sensitive	
Snowshoe Hare[2,6,7,8]	*Lepus americanus*		Secure	
Southern Red-backed Vole[6]	*Clethrionomys gapperi*		Secure	
Striped Skunk	*Mephitus mephitus*		Secure	
Thirteen-lined Ground Squirrel[2]	*Spermophilus tridecemlineatus*		Undetermined	
Vole	*Clethrionomys spp.*			
Water Shrew[6]	*Sorex palustris*		Secure	
Water Vole	*Microtus richardsoni*		Sensitive	
Western Jumping Mouse[6]	*Zapus princeps*		Secure	
White-tailed Deer[2,6,7]	*Odocoileus virginianus*		Secure	
Wolf[2,5,6,7,8]	*Canis lupus*	Not at risk	Secure	
Wolverine[5,7]	*Gulo gulo*	**Endangered**	May Be At Risk	**Endangered (Federal SARA)**
Woodchuck[2]	*Marmota monax*		Secure	
Yellow-pine Chipmunk[6]	*Tamias amoenus*		Secure	
BIRDS				
Alder Flycatcher[1,2,3,4,6]	*Empidonax alnorum*		Secure	
American Avocet	*Recurvirostra americana*		Secure	
American Bittern[2]	*Botaurus lentiginosus*		Sensitive	
American Coot[4]	*Fulica americana*	Not at risk	Secure	
American Crow[1,2,3,6,10]	*Corvus brachyrhynchos*		Secure	
American Dipper[2,3]	*Cinclus mexicanus*		Secure	
American Goldfinch[4,6]	*Carduelis tristis*		Secure	
American Green-winged Teal[2]	*Anas crecca*		Sensitive	
American Kestrel[2,3,6]	*Falco sparverius*		Secure	
American (Water) Pipet[2]	*Anthus rubescens*		Secure	

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American Redstart[1,2,3,4]	*Setophaga ruticulla*		Secure	
American Robin[1,2,3,4,6]	*Turdus migratorius*		Secure	
American Tree Sparrow[6]	*Spizella arborea*		Secure	
American Wigeon[3,6]	*Anas americana*		Secure	
Bald Eagle[3,910]	*Haliaeetus leucocephalus*	Not at risk	Sensitive	
Baltimore (Northern) Oriole[*4]	*Icterus galbula*		Sensitive	
Bank Swallow[6]	*Riparia riparia*		Sensitive	
Barn Swallow[1,2,3,6]	*Hirundo rustica*		Secure	
Barred Owl[9,10]	*Strix varia*		Sensitive	
Barrow's Goldeneye[2]	*Bucephala islandica*		Special Concern	**Special Concern (Federal SARA)**
Bay-breasted Warbler[4]	*Dendroica castanea*		Sensitive	
Belted Kingfisher[1,2,6]	*Ceryle alcyon*		Secure	
Black and White Warbler[4]	*Mniotilta varia*		Secure	
Black Tern[3,6]	*Chlidonias niger*	Not at risk	Sensitive	
Black-backed Woodpecker[1,6]	*Picoides arcticus*		Sensitive	
Black-bellied Plover[6]	*Pluvialis squatarola*		Secure	
Black-billed Cuckoo	*Coccyzus erythropthalmus*		Undetermined	
Black-billed Magpie[6]	*Pica hudsonia*		Secure	
Blackburnian Warbler	*Dendroica fusca*		Sensitive	
Black-capped Chickadee[1,2,3,4,6,10]	*Poecile atricapilla*		Secure	
Blackpoll Warbler[3,4]	*Dendroica striata*		Secure	
Black-throated Blue Warbler	*Dendroica caerulescens*		Accidental/vagrant	
Black-throated Green Warbler[1,3,4]	*Dendroica virens*	**Special Concern**	Sensitive	**Special Concern (Federal SARA)**
Blue Grouse	*Dendragapus obscurus*		Secure	
Blue Jay[3,4]	*Cyanocitta cristata*		Secure	
Blue-headed (Solitary) Vireo[1,3,4,6]	*Vireo solitarius*		Secure	
Blue-winged Teal[3,6]	*Anas discors*		Secure	
Bohemian Waxwing[1]	*Bombycilla garrulus*		Secure	
Bonaparte's Gull[6]	*Larus philidelphia*		Secure	
Boreal Chickadee[1,2,3,4,6,10]	*Poecile hudsonica*		Secure	
Boreal Owl[3,9,10]	*Aegolius funereus*	Not at risk	Secure	
Brambling	*Fringilla montifringilla*		Accidental/vagrant	
Brewer's Blackbird[2,3]	*Euphagus cyanocephalus*		Secure	
Brewer's Sparrow[2]	*Spizella breweri*		Sensitive	
Broad-winged Hawk[3,6]	*Buteo platypterus*		Sensitive	
Brown Creeper[2,3,4,6]	*Certhia americana*		Sensitive	

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Brown-headed Cowbird[1,2,3,4,6]	*Molothrus ater*		Secure	
Bufflehead[1,2,3,6]	*Bucephala albeola*		Secure	
Bullock's (Northern) Oriole[*6]	*Icterus bullockii*		Undetermined	
California Gull[6]	*Larus californicus*		Secure	
Canada Goose[1,2,3,6,10]	*Branta canadensis*		Secure	
Canada Warbler[6]	*Wilsonia canadensis*		Threatened	**Threatened (Federal SARA)**
Canvasback[4]	*Aythya valisneria*		Secure	
Cape May Warbler[1,4,6]	*Dendroica tigrina*		Sensitive	
Caspian Tern	*Sterna caspia*	Not at risk	Sensitive	
Cedar Waxwing[1,2,3,4,6]	*Bombycilla cedrorum*		Secure	
Chipping Sparrow[1,2,3,4,6]	*Spizella passerina*		Secure	
Cinnamon Teal[6]	*anas cynoptera*		Secure	
Clark's Nutcracker[2]	*Nucifraga columbiana*		Sensitive	
Clay-coloured Sparrow[1,2,3,4,6]	*Spizella pallida*		Secure	
Cliff Swallow[2,3,6]	*Petrochelidon pyrrhonota*		Secure	
Common Goldeneye[1,2,3,6]	*Bucephala clangula*		Secure	
Common Grackle[6]	*Quiscalus quiscula*		Secure	
Common Loon[1,2,3,4,6]	*Gavia immer*	Not at risk	Secure	
Common Merganser[2,3]	*Mergus merganser*		Secure	
Common Nighthawk[1,6]	*Chordeiles minor*	Threatened	Sensitive	**Threatened (Federal SARA)**
Common Raven[1,2,3,4,6,10]	*Corvus corax*		Secure	
Common Redpoll[10]	*Carduelis flammea*		Secure	
Common Snipe[1,2,3,4,6]	*Gallinago gallinago*		Secure	
Common Tern[4]	*Sterna hirundo*	Not at risk	Secure	
Common Yellowthroat[1,2,3,4,6]	*Geothlypis trichas*		Secure	
Connecticut Warbler[1,2,3,4,6]	*Oporornis agilis*		Secure	
Cooper's Hawk[6]	*Accipiter cooperii*	Not at risk	Secure	
Cordilleran Flycatcher[2,3]	*Empidonax difficilis*		Undetermined	
Dark-eyed Junco[1,2,3,4,6]	*Junco hyemalis*		Secure	
Double-crested Cormorant[3]	*Phalacrocorax auritus*	Not at risk	Secure	
Downy Woodpecker[1,3]	*Picoides pubescens*		Secure	
Dusky Flycatcher[4]	*Empidonax oberholseri*		Secure	
Eared Grebe[3]	*Podiceps nigricollis*		Secure	
Eastern Kingbird[1,3,6]	*Tyrannus tyrannus*		Secure	
Eastern Phoebe[2,3,4,6]	*Sayornis phoebe*		Sensitive	
European Starling[6]	*Sturnus vulgaris*		Exotic/alien	
Evening Grosbeak[1,3,4,6]	*Coccothraustes vespertinus*		Secure	
Forster's Tern[4]	*Sterna forsteri*		Sensitive	
Fox Sparrow[2]	*Passerella iliaca*		Secure	
Franklin's Gull[6]	*Larus pipixcan*		Secure	

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Gadwall[3]	*Anas strepera*		Secure	
Golden Eagle[6]	*Aquila chrysaetos*	Not at risk	Sensitive	
Golden-crowned Kinglet[1,2,3,4,6]	*Regulus satrapa*		Secure	
Golden-crowned Sparrow[2]	*Zonotrichia altricapilla*		Secure	
Gray Catbird	*Dumetella carolinensis*		Secure	
Gray Jay[1,2,3,4,6,10]	*Perisoreus canadensis*		Secure	
Gray Partridge	*Perdix perdix*		Exotic/alien	
Gray-crowned Rosy Finch	*Leucosticte tephrocotis*		Secure	
Great Blue Heron[1,3,6]	*Ardea herodias*		Sensitive	
Great Gray Owl[1,2,4,9,10]	*Strix nebulosa*	Not at risk	Sensitive	
Great Horned Owl[2,6,9,10]	*Bubo virginianus*		Secure	
Greater Scaup[2]	*Aythya marila*		Secure	
Greater Yellowlegs[2,3,6]	*Tringa melanoleuca*		Secure	
Gyrfalcon	*Falco rusticolus*	Not at risk	Secure	
Hairy Woodpecker[1,3,4]	*Picoides villosus*		Secure	
Hammond's Flycatcher[2]	*Empidonax hammondii*		Secure	
Harlequin Duck[2,3]	*Histrionicus histrionicus*		Sensitive	
Harris' Sparrow	*Zonotrichia querula*		Secure	
Hermit Thrush[1,2,3,4,6]	*Catharus guttatus*		Secure	
Herring Gull[4]	*Larus argentatus*		Secure	
Hoary Redpoll[6]	*Carduelis hornemanni*		Secure	
Hooded Merganser[3,6]	*Lophodytes cucullatus*		Secure	
Horned Grebe[6]	*Podiceps auritus*		Sensitive	
Horned Lark[2]	*Eremophila alpestris*		Secure	
House Sparrow[3]	*Passer domesticus*		Exotic/alien	
House Wren[1,6]	*Troglodytes aedon*		Secure	
Killdeer[1,3,6]	*Charadrius vociferus*		Secure	
Lapland Longspur	*Calcarius lapponicus*		Secure	
Lazoli Bunting	*Passerina amoena*		Secure	
Le Conte's Sparrow[1,2,3,6]	*Ammodramus leconteii*		Secure	
Least Flycatcher[1,2,3,4,6]	*Empidonax minimus*		Sensitive	
Least Sandpiper[6]	*Calidris minutilla*		Secure	
Lesser Scaup[2,3,6]	*Aythya affinis*		Sensitive	
Lesser Yellowlegs[1,4,6]	*Tringa flavipes*		Secure	
Lincoln's Sparrow[1,2,3,4,6]	*Melospiza lincolnii*		Secure	
Loggerhead Shrike	*Lanius ludovicianus*	Threatened	Sensitive	Threatened (Federal Species at Risk Act)
Long-billed Dowitcher[6]	*Limnodromus*		Secure	
Long-eared Owl[9]	*Asio otus*		Secure	
Long-tailed Duck	*Clangula hyemalis*		Secure	
Magnolia Warbler [1,2,3,4,6]	*Dendroica magnolia*		Secure	
Mallard[1,2,3,6,10]	*Anas platyrhynchos*		Secure	

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Marbled Godwit	*Limosa fedoa*		Secure	
Marsh Wren	*Cistothorus palustris*		Secure	
Merlin[4]	*Falco columbarius*	Not at risk	Secure	
Mountain Bluebird[2,3]	*Sialia currucoides*		Secure	
Mountain Chickadee[3]	*Poecile gambeli*		Secure	
Mourning Dove[6]	*Zenaida macroura*		Secure	
Mourning Warbler[1,4,6]	*Oporornis philadelphia*		Secure	
Nelson's Sharp-tailed Sparrow[3]	*Ammodramus nelsoni*		Secure	
Northern Flicker[1,2,3,4,6,10]	*Colaptes auratus*		Secure	
Northern Goshawk [1,2,3,6,9]	*Accipiter gentilis*	Not at risk	Sensitive	
Northern Harrier[1,3,9]	*Circus cyaneus*	Not at risk	Sensitive	
Northern Hawk Owl[10]	*Surnia ulula*	Not at risk	Secure	
Northern Mockingbird	*Mimus polyglottos*		Secure	
Northern Pintail[2]	*Anas acuta*		Sensitive	
Northern Pygmy Owl [2,9,10]	*Glaucidium gnoma*		Sensitive	
Northern Rough-winged Swallow[6]	*Stelgidopteryx serripennis*		Secure	
Northern Saw-whet Owl[2,9,10]	*Aegolius acadicus*		Secure	
Northern Shoveler[2]	*Anas clypeata*		Secure	
Northern Shrike[10]	*Lanius excubitor*		Secure	
Northern Waterthrush[3,4,6]	*Seiurus noveboracensis*		Secure	
Olive-sided Flycatcher[1,2,3,4,6]	*Contopus cooperi*	Threatened	May be at Risk	Threatened (Federal Species at Risk Act)
Orange-crowned Warbler[1,2,3,4,6]	*Vermivora celata*		Secure	
Osprey[2,3]	*Pandion haliaetus*		Sensitive	
Ovenbird[1,3,4,6]	*Seiurus aurocapillus*		Secure	
Palm Warbler[1]	*Dendroica palmarum*		Secure	
Pectoral Sandpiper[6]	*Calidris melanotos*		Secure	
Peregrine Falcon[2]	*Falco peregrinus*	Threatened	Special Concern	Threatened (Federal Species at Risk Act, AB Wildlife Act)
Philadelphia Vireo[1,3]	*Vireo philadelphicus*		Secure	
Pied-billed Grebe[3,4]	*Podilymbus podiceps*		Sensitive	
Pileated Woodpecker[1,2,3,4,6]	*Dryocopus pileatus*		Sensitive	
Pine Grosbeak[2,3,4]	*Pinicola enucleator*		Secure	
Pine Siskin[1,2,3,4,6]	*Carduelis pinus*		Secure	
Prairie Falcon	*Falco mexicanus*	Not at risk	Sensitive	

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Purple Finch[1,3,4,6]	*Carpodacus purpureus*		Secure	
Purple Martin[4]	*Progne subis*		Sensitive	
Red Crossbill[1,2,3]	*Loxia curvirostra*		Secure	
Red-breasted Merganser[6]	*Mergus serrator*		Secure	
Red-breasted Nuthatch[1,2,3,4,6,10]	*Sitta canadensis*		Secure	
Red-eyed Vireo[1,3,4,6]	*Vireo olivaceus*		Secure	
Redhead[3]	*Aythya americana*		Secure	
Red-necked Grebe[3,6]	*Podiceps grisegna*	Not at risk	Secure	
Red-necked Phalarope[6]	*Phalaropus lobatus*		Secure	
Red-tailed Hawk[1,2,3,6,9,10]	*Buteo jamaicensis*	Not at risk	Secure	
Red-winged Blackbird[1,2,3,4,6]	*Agelaius phoeniceus*		Secure	
Ring-billed Gull[6]	*Larus delawarensis*		Secure	
Ring-necked Duck [1,2,3,6]	*Aythya collaris*		Secure	
Ring-necked Pheasant	*Phasianus colchicus*		Exotic/alien	
Rock Dove (Rock Pigeon)[3]	*Columba livia*		Exotic/alien	
Rock Wren[2]	*Salpinctes obsoletus*		Secure	
Rose-breasted Grosbeak[1,3,4,6]	*Pheucticus ludovicianus*		Secure	
Rough-legged Hawk[9]	*Buteo lagopus*		Secure	
Ruby-crowned Kinglet[1,2,3,4,6]	*Regulus calendula*		Secure	
Ruby-throated Hummingbird[2]	*Archilochus colubris*		Secure	
Ruddy Duck[4]	*Oxyura jamaicensis*		Secure	
Ruffed Grouse[1,2,3,4,6]	*Bonasa umbellus*		Secure	
Rufous Hummingbird[3]	*Selasphorus rufus*		Secure	
Rusty Blackbird[6]	*Euphagus carolinus*	Special	Sensitive	Special Concern (Federal SARA)
Sandhill Crane[1,3,6]	*Grus canadensis*		Sensitive	
Savannah Sparrow[2,3,4]	*Passerculus*	Special	Secure	
Say's Pheobe[4]	*Sayornis saya*		Secure	
Sedge Wren	*Cistothorus platensis*	Not at risk	Sensitive	
Semipalmated Sandpiper[6]	*Calidris pusilla*		Secure	
Sharp-shinned Hawk[2,3,6]	*Accipiter striatus*	Not at risk	Secure	
Sharp-tailed Grouse[3]	*Tympanuchus*		Sensitive	
Short Eared Owl[2]	*Asio flammeus*	Special concern	May be at Risk	
Short-billed Dowitcher	*Limnodromus griseus*		Undetermined	
Snow Bunting[6]	*Plectrophenax nivalis*		Secure	

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Snowy Owl	*Bubo scandiaca*	Not at risk	Secure	
Solitary Sandpiper[1,2,3,6]	*Tringa solitaria*		Secure	
Song Sparrow[2,3,6]	*Melospiza melodia*		Secure	
Sora[6]	*Porzana carolina*		Sensitive	
Sprague's Pipit	*Anthus spragueii*	Threatened	Sensitive	Threatened (Federal Species at Risk Act)
Spotted Sandpiper[1,2,3,4,6]	*Actitus macularia*		Secure	
Spruce Grouse[1,2,3,4,6]	*Falcipennis canadensis*		Secure	
Steller's Jay[3]	*Cyanocitta stelleri*		Secure	
Stilt Sandpiper[6]	*Calidris himantopus*		Secure	
Surf Scoter[4]	*Melanitta perspicillata*		Secure	
Swainson's Hawk[3]	*Buteo swainsoni*		Sensitive	
Swainson's Thrush[1,2,3,4,6]	*Catharus ustulatus*		Secure	
Swamp Sparrow[1,2,6]	*Melospiza georgiana*		Secure	
Tennessee Warbler[1,2,3,4,6]	*Vermivora peregrina*		Secure	
Three-toed Woodpecker[1,2,3,4,6]	*Picoides tridactylus*		Secure	
Townsend's Solitaire[2,4]	*Myadestes townsendi*		Secure	
Townsend's Warbler[3]	*Dendroica townsendi*		Secure	
Tree Swallow[1,2,3,6]	*Tachycineta bicolor*		Secure	
Trumpeter Swan[2]	*Cygnus buccinator*	Not at risk	At risk	Threatened (AB Wildlife Act)
Tundra Swan[3]	*Cygnus columbianus*		Secure	
Upland Sandpiper	*Bartramia longicauda*		Sensitive	
Varied Thrush[1,2,3,4,6]	*Ixoreus naevius*		Secure	
Veery[2]	*Catharus fuscescens*		Secure	
Vesper Sparrow[4]	*Pooecetes gramineus*		Secure	
Violet-green Swallow[6]	*Tachycineta thalassina*		Secure	
Warbling Vireo[1,2,3,4,6]	*Vireo gilvus*		Secure	
Western Grebe[3,6]	*Aechmophorus*		Sensitive	
Western Meadowlark[6]	*Sturnella neglecta*		Secure	
Western Palm Warbler	*Setophaga palmarum*		Secure	
Western Tanager[1,2,3,4,6]	*Piranga ludoviciana*		Sensitive	
Western Wood-peewee[1,2,3,6]	*Contopus sordidulus*		Sensitive	
White-breasted Nuthatch[3,4]	*Sitta carolinensis*		Secure	
White-crowned Sparrow[2,3]	*Zonotrichia leucophrys*		Secure	
White-tailed Ptarmigan[2]	*Lagopus leucurus*		Secure	

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White-throated Sparrow[1,2,3,4,6]	*Zonotrichia albicollis*		Secure	
White-winged Crossbill[1,2,3,4,6,10]	*Loxia leucoptera*		Secure	
White-winged Scoter[6]	*Melanitta fusca*		Sensitive	
Willow Flycatcher[2]	*Empidonax trailii*		Secure	
Willow Ptarmigan	*Lagopus lagopus*		Secure	
Wilson's Phalarope[6]	*Phalaropus tricolor*		Secure	
Wilson's Warbler[2,3,4]	*Wilsonia pusilla*		Secure	
Winter Wren[1,2,3,4,6]	*Troglodytes troglodytes*		Secure	
Wood Duck	*Aix sponsa*		Secure	
Yellow Warbler[1,3,4]	*Dendroica petechia*		Secure	
Yellow-bellied Flycatcher[1,2]	*Empidonax flaviventris*		Undetermined	
Yellow-bellied Sapsucker[1,3,4,6]	*Sphyrapicus varius*		Secure	
Yellow-headed Blackbird[6]	*Xanthocephalus xanthocephalus*		Secure	
Yellow Rail	*Coturnicops noveboracensis*	Special concern	Undetermined	Special Concern (Federal SARA)
Yellow-rumped Warbler[1,2,3,4,6]	*Dendroica coronata*		Secure	
FRESHWATER FISH				
Arctic Grayling[13,15,16]	*Thymallus arcticus*		Sensitive	
Athabasca Rainbow Trout	*Oncorhynchus mykiss*	Endangered	Threatened	Threatened (Federal SARA) and Threatened (AB Wildlife Act)
Brassy Minnow	*Hybognathus hankinsoni*		Undetermined	
Brook Stickleback[13,15,16,17]	*Culaea inconstans*		Secure	
Brook Trout[13,14,15,17]	*Salvelinus fontinalis*		Exotic/alien	
Brown Trout[15,17]	*Salmo trutta*		Exotic/alien	
Bull Trout[13,14,15,16]	*Salvelinus confluentus*		Threatened	Threatened (AB Wildlife Act)
Burbot[13,14,15,16,17]	*Lota lota*		Secure	
Cisco	*Coregonus artedi*		Secure	
Cutthroat Trout[14]	*Oncorhynchus clarki*		Secure	
Westslope Cutthroat Trout	*Oncorhynchus clarkii lewisi*		Secure	Threatened (Federal Species at Risk Act)
Emerald Shiner[13]	*Notropis atherinoides*		Secure	
Fathead Minnow[15]	*Pimephalus promelas*		Secure	
Finescale Dace[17]	*Phoxinus neogaeus*		Undetermined	

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Fathead Chub	*Platygobio gracilis*		Secure	
Goldeye	*Hiodon alosoides*		Secure	
Iowa Darter[15,16]	*Etheostaoma exile*		Secure	
Lake Chub[13,15,16]	*Couesius plumbeus*		Secure	
Lake Sturgeon	*Acipenser fulvescens*		Threatened	Threatened (AB Wildlife Act)
Lake Whitefish	*Coregonus clupeaformus*		Secure	
Longnose Dace[13,15,16,17]	*Rhinichthys cataractae*		Secure	
Longnose Sucker[13,14,15,16,17]	*Catostumus catostumus*		Secure	
Mountain Sucker[15]	*Catostumus platyrynchus*	Not at risk	Secure	
Mountain Whitefish[13,14,15,16,17]	*Prosopium williamsoni*		Secure	
Northern Pike[13,16,17]	*Esox lucius*		Secure	
Northern Redbelly Dace	*Phoxinus eos*		Sensitive	
Pearl Dace[13,15,16]	*Margariscus margarita*		Undetermined	
Pygmy Whitefish	*Prosopium coulteri*		May be at risk	
Quillback	*Carpiodes cyprinus*		Undetermined	
Sauger	*Stizostedion canadense*		Sensitive	
Shorthead Redhorse	*Moxostoma macrolepidotum*		Secure	
Slimy Sculpin	*Cottus cognatus*		Secure	
Spoonhead Sculpin[13,16,17]	*Cottus ricei*	Not at risk	May be at risk	
Spottail Shiner	*Notropis hudsonius*		Secure	
Trout Perch[13,16,17]	*Percopsis*		Secure	
Walleye	*Stizostedion vitreum*		Secure	
White Sucker[13,15,16,17]	*Catostumus commersoni*		Secure	
Yellow Perch	*Perca flavescens*		Secure	
AMPHIBIANS				
Canadian Toad[12]	*Bufo hemiophrys*	Not at risk	May be at risk	
Boreal Chorus Frog[6,12]	*Pseudacris maculata*		Secure	
Long-toed Salamander[12]	*Ambystoma*		Sensitive	
Northern Leopard Frog[5]	*Rana pipiens*	Special concern	At risk	Threatened (AB Wildlife Act); Special Concern (Federal Species at Risk Act)
Western (Boreal) Toad[6,12]	*Bufo boreas*	Special concern	Sensitive	Special Concern (Federal Species at Risk Act)
Wood Frog[6,12]	*Rana sylvatica*		Secure	
Columbia Spotted Frog[5,12]	*Rana luteiventris*	Not at risk	Sensitive	

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REPTILES				
Wandering Garter Snake[5]	*Thamnophis elegens*		Sensitive	
Red Side Garter Snake[5,6]	*Thamnophis sirtalis*		Sensitive	

* In 1983, the Baltimore and Bullock's Oriole were classified as the same species and renamed the Northern Oriole (*Icterus galbula*) by the American Ornithologists' Union (Semenchuk 1992). It is uncertain whether this designation has changed.

References:

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Appendix 3-3 – Alberta FireSmart Management

Weyerhaeuser Pembina
FireSmart Management 2017

Completed by: Alberta Agriculture and Forestry, Forestry Division, Wildfire Management Branch

Weyerhaeuser Pembina - FireSmart Management 2017

Introduction

Wildfire is the dominant natural disturbance agent on this landscape, responsible for a significant part of landscape and site level diversity.

The aim of wildfire management is to balance the ecological role of fire while protecting human life, communities, watersheds and sensitive soils, natural resources, and infrastructure. The intent of the Alberta FireSmart program is to integrate fire, forest management, land management and community protection planning through a broad risk and resource management approach.

The goal of FireSmart in the forest management planning process is to create a landscape in which catastrophic fire is minimized. This is accomplished through a combination of:

- Reducing the fire behaviour potential,
- Reducing the exposure of values at risk to wildfire,
- Targeting timber harvest to locations with problematic forest fuel types,
- The consideration of species conversion, reduced stand stocking densities and reduced coarse woody debris retention in locations harvested near communities, and
- Ensuring linkages to other Fire Smart strategies—such as Community Wildfire Mitigation Strategies.

By incorporating areas identified as high risk into spatial harvest sequencing in addition to adhering to recommendations made through the Wildfire Risk Management Planning process of the overlapping Forest Areas—a reduction in fire behaviour potential will occur both at the FMA level and at the community level.

Landscape –Natural Subregions

The Weyerhaeuser Pembina FMA is comprised of four Natural Subregions (NSR) (Figure 1). These include the Lower Foothills, the Upper Foothills, the Subalpine and the Central Mixedwood.

The Lower Foothills NSR covers the majority of the FMA with a smaller area of Upper Foothills and Subalpine NSR. Wildfire within the four Natural Subregions is characterized by the following attributes from a Fire Regime Analyses (Alberta Wildfire Regime Analysis- Tymstra, Wang, and Rogeau, 2005). These attributes are of the Natural Subregions from a broad provincial perspective.

Lower Foothills

- Fire cycle: 475 years (Alberta Wildfire Regime Analysis – 2005).
- Human caused spring fires common.
- Lightning fires occur predominately in the Summer months.
- Frequent, medium sized wildfires.

Upper Foothills

- Fire cycle: 627 years (Alberta Wildfire Regime Analysis – 2005).
- Experiences more lightning-caused wildfires than the Lower Foothills NSR.
- Frequent, medium-sized wildfires and infrequent, large wildfires.

Subalpine

- Fire cycle: 4,542 years (Alberta Wildfire Regime Analysis- 2005).
- Lightning causes slightly more wildfires than humans.
- Peak season is late summer or fall (peak is August).
- Infrequent, small wildfires and very infrequent large, high-intensity wildfires.

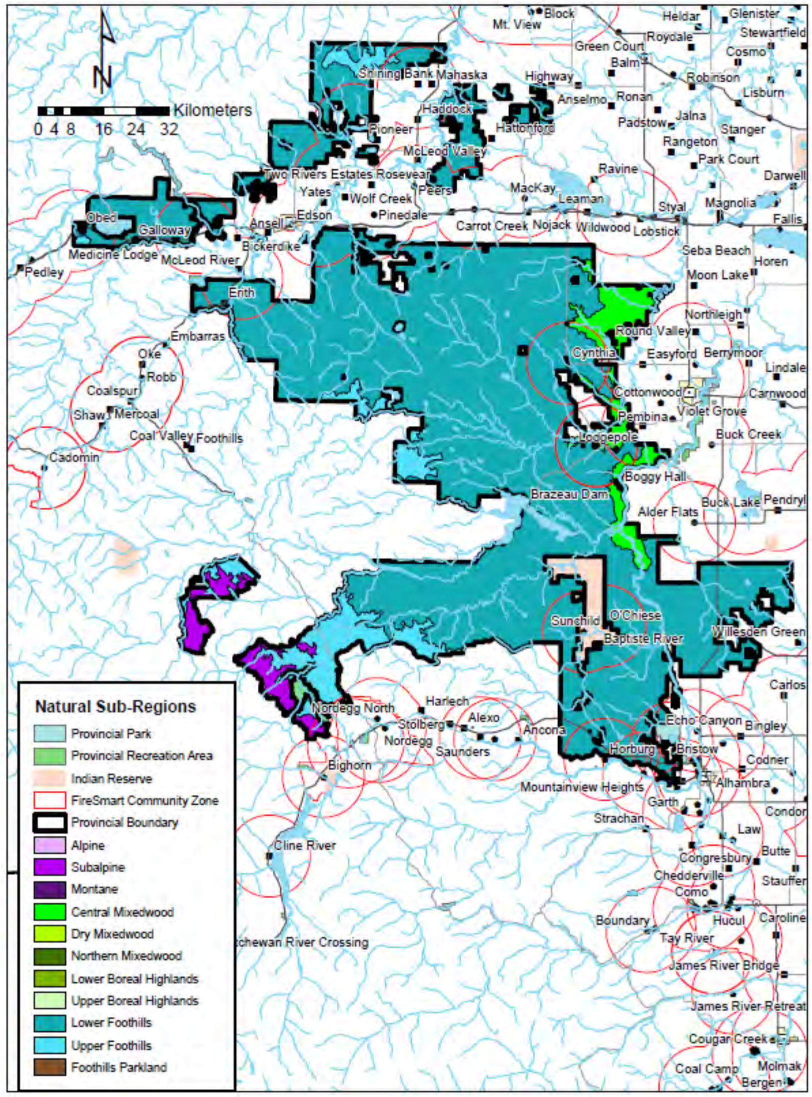

Figure 1. Natural sub-regions represented by the Weyerhaeuser Pembina FMA.

Central Mixedwood

- Fire cycle: 226 years (Alberta Wildfire Regime Analysis – 2005).
- Human caused spring fires common.
- Lightning caused fires occur predominately in the summer months.
- May is a critical month because Aspen mixed wood stand do not reach green-up until late May.
- Areas with infrequent, large wildfires, and areas with frequent small wildfires.

Historical Wildfires

Based on the fire cycles for the natural subregions and the area burned in the Weyerhaeuser Pembina FMA, a 25-year assessment (Figure 2) shows that the majority of the area burned was in the Lower Foothills Natural Subregion. The most significant fire years were 1998, 2002, 2011 and 2015. Over

12,470 hectares of forested vegetation was impacted during 1998. The years of 2002, 2011 and 2015 had between 800 and 1420 hectares of forested vegetation impacted by fire per year.

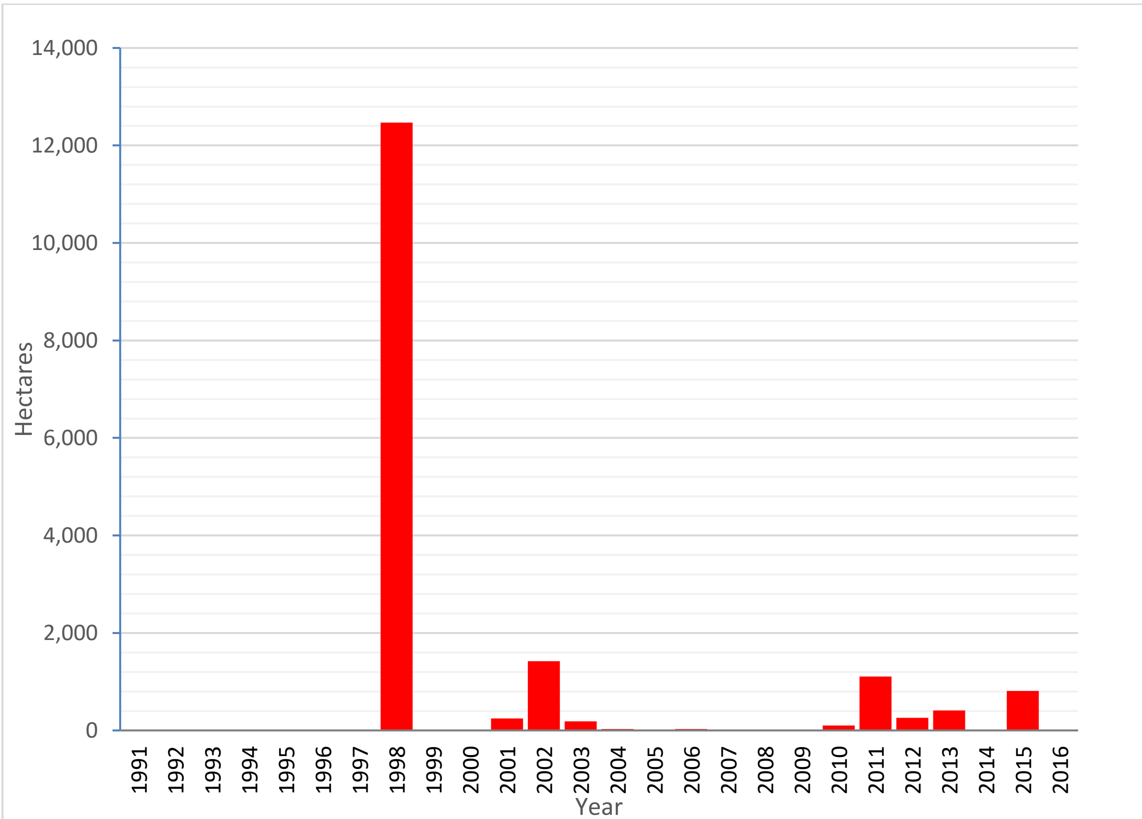

Figure 2. Historical Wildfires in the Weyerhaeuser Pembina FMA 1991-2016.

As illustrated in Figure 3, many of the historical wildfires on the Weyerhaeuser Pembina FMA occurred adjacent to communities and within the boundaries or adjacent to the boundaries of later established FireSmart Community Zones. It is therefore important to reduce flammable forest vegetation near communities to reduce the potential for wildfire to impact important values (human life, communities, critical infrastructure).

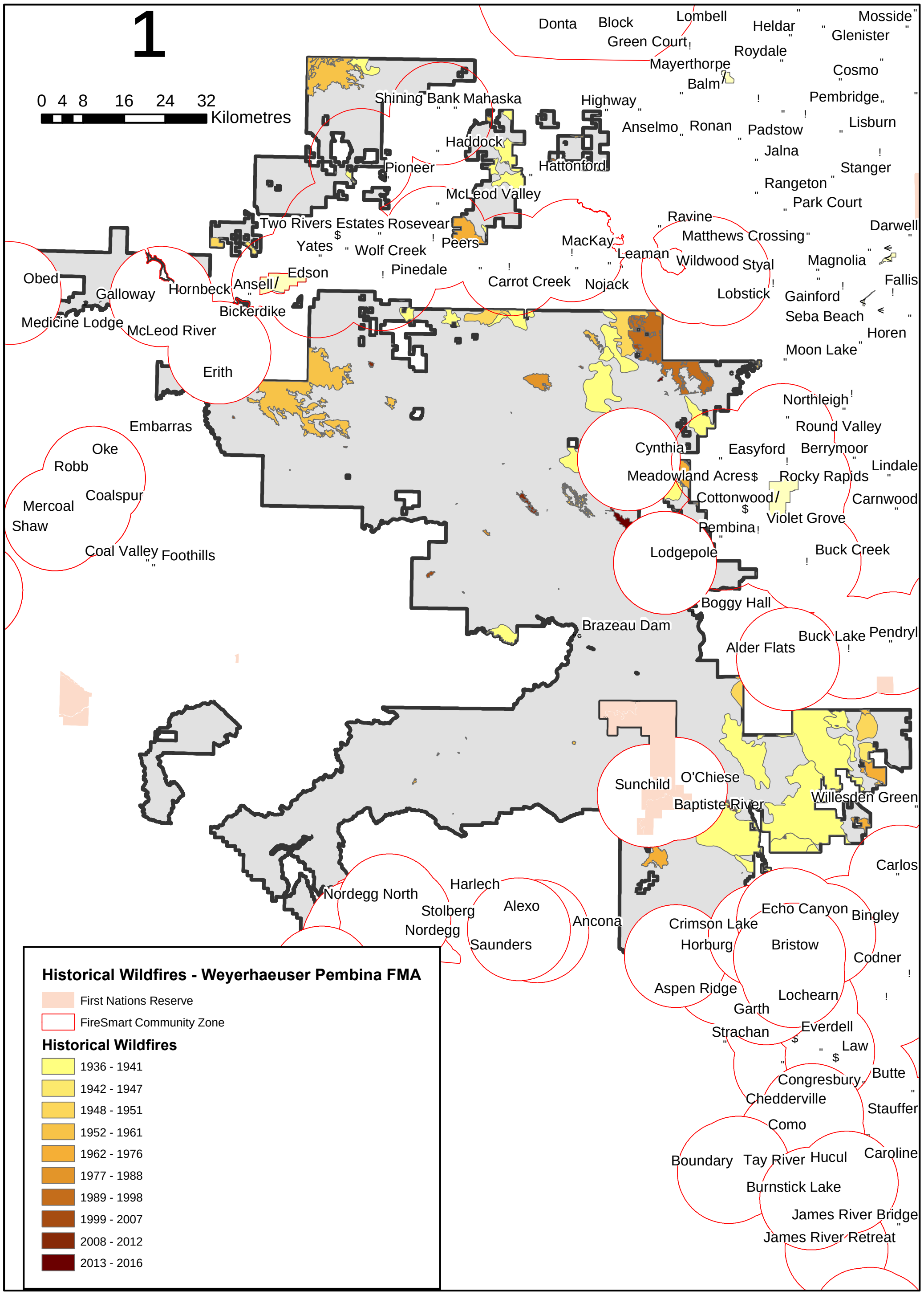

Figure 3. Historic wildfires from 1931-2016 for Weyerhaeuser Pembina FMA.

Forest Fuel Types

The Canadian Forest Fire Behaviour Prediction (FBP) System is used to categorize the forest into different fuel types (Figure). The Weyerhaeuser FMA is dominated by mainly coniferous fuels in the west (represented by C-3 Mature Pine and C-2 Boreal Spruce) in the Upper Foothills and Subalpine NSRs. The Central Mixedwood NSR is represented mostly by an aspen component (D-1/D-2 Aspen) but with pockets of white spruce/aspen mixed wood stands (M-1/M-2 Boreal Mixedwood).

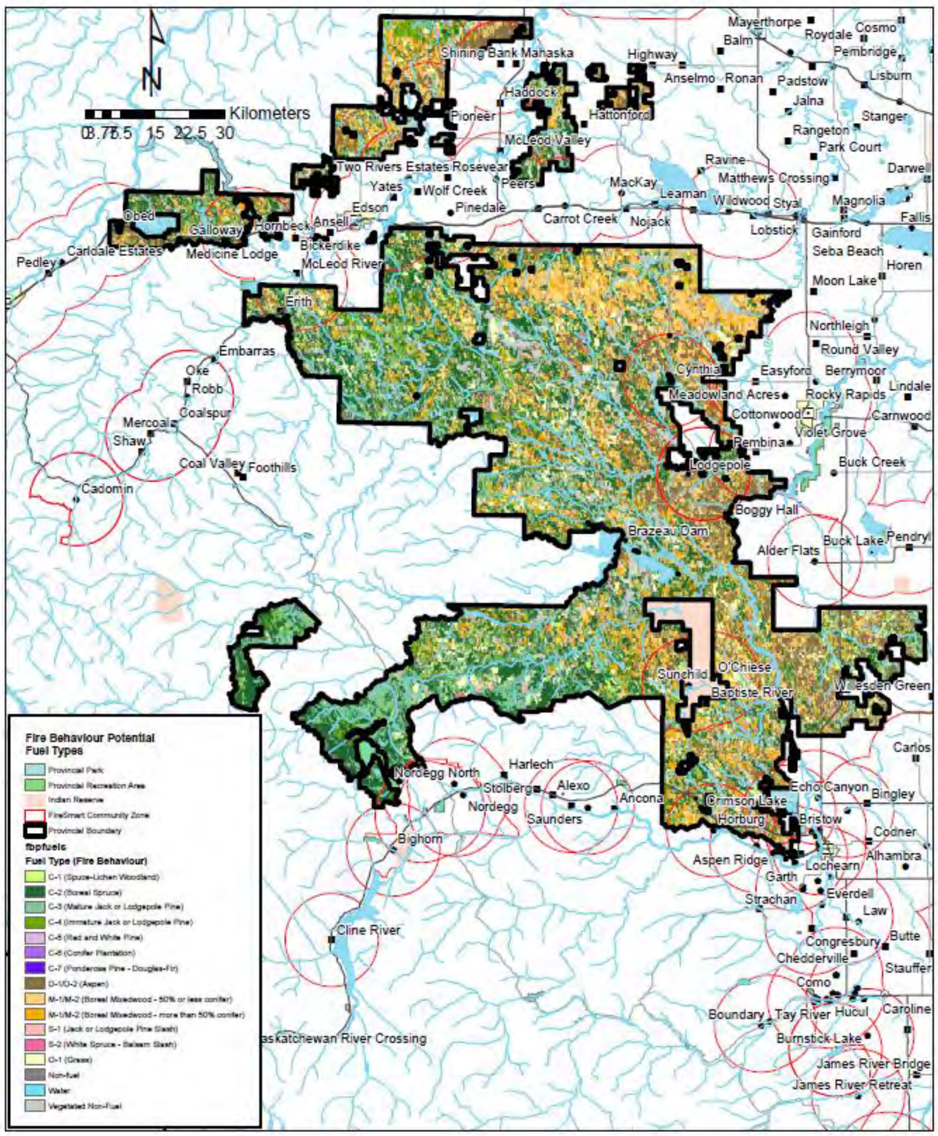

Figure 4. The Weyerhaeuser Pembina FMA as represented by the Canadian Forest Fire Danger Rating System's Fire Behaviour Prediction System fuel types.

Fire Behaviour Potential

The majority of wildfires within the Weyerhaeuser Pembina FMA occur in the spring. The following three figures depict the fire behaviour potential for the FMA for spring, summer and fall (Figures 5, 6 and 7.). There is a distinct decrease in fire behaviour potential with the onset of green-up and transition into summer. However, an elevated risk remains in the conifer-dominated fuel types throughout the summer and fall in the western portions of the FMA.

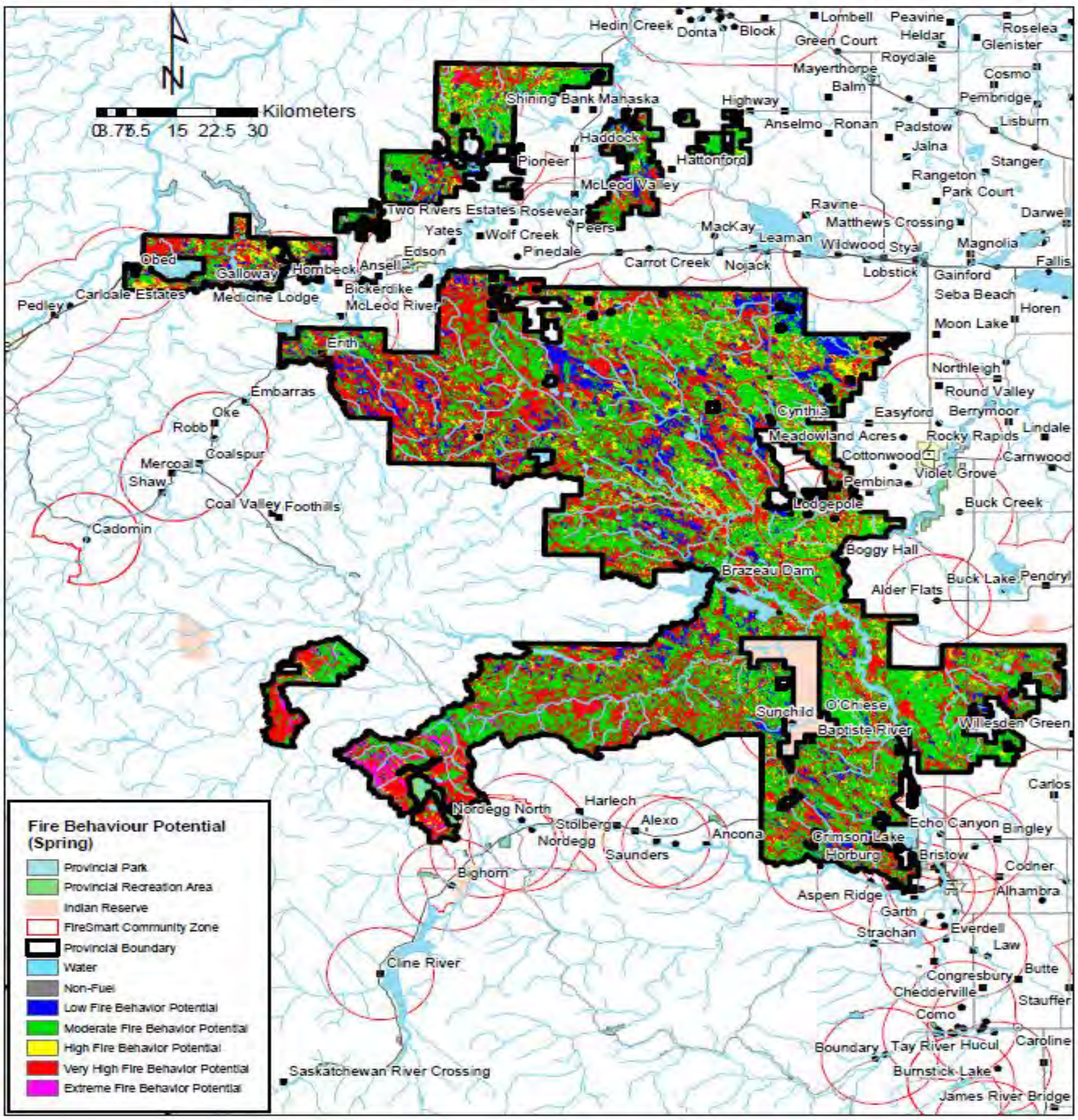

Figure 5. Modelled fire behaviour potential for the Weyerhaeuser Pembina FMA in the spring.

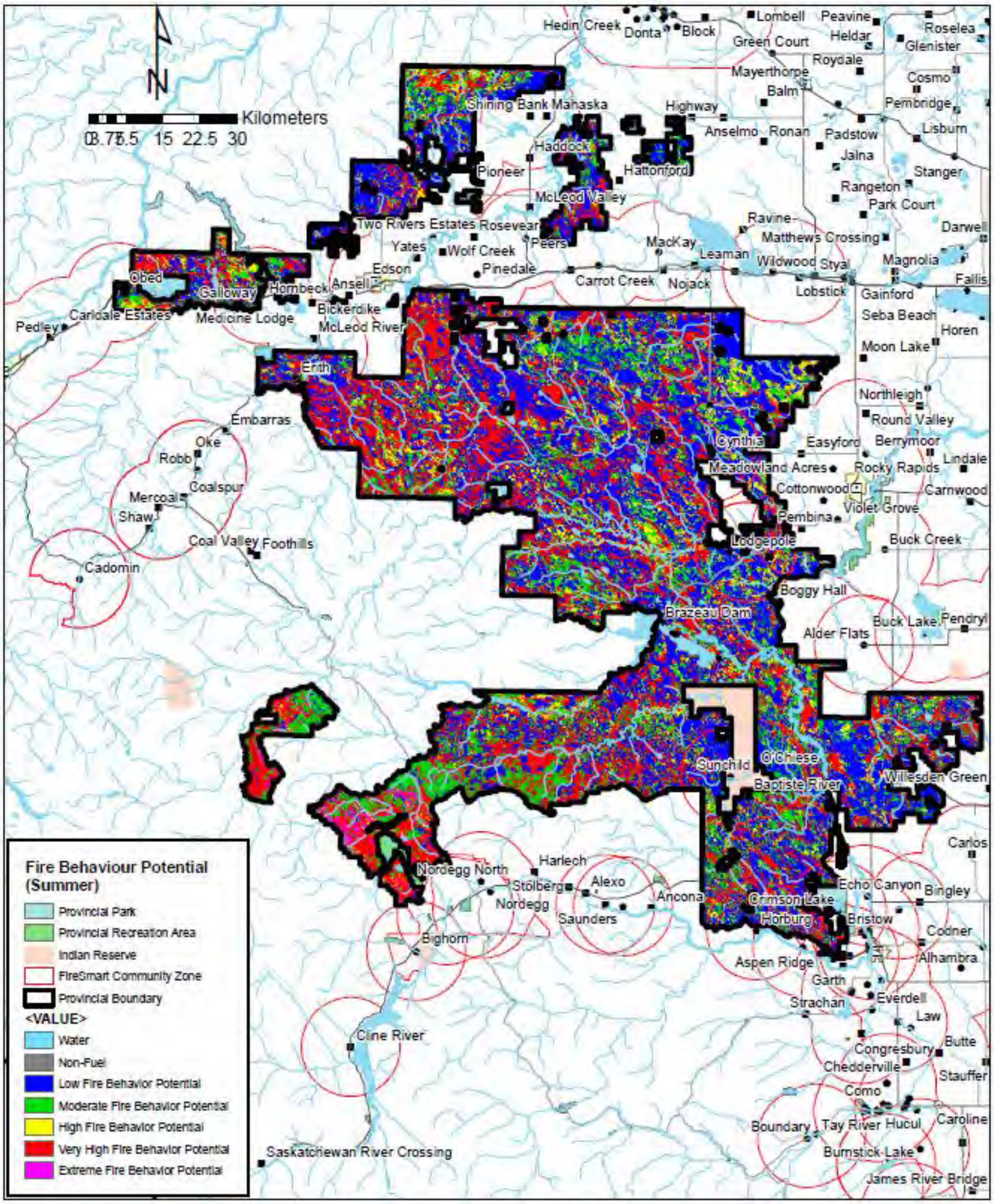

Figure 6. Modelled fire behaviour potential for the Weyerhaeuser Pembina FMA in summer.

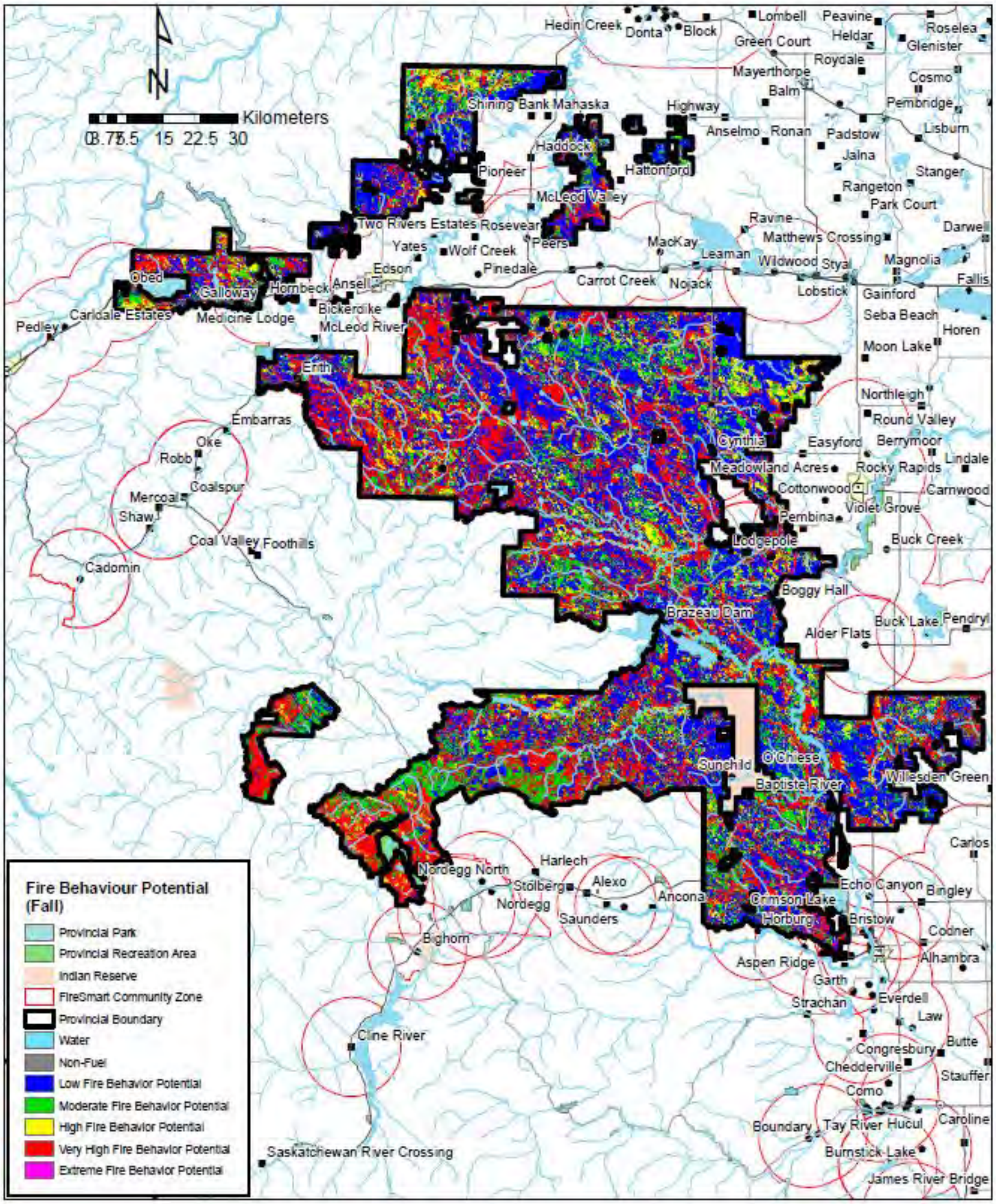

Figure 7. Modelled fire behaviour potential for the Weyerhaeuser Pembina FMA in the fall.

Recommendations

- Areas with continuous coniferous fuel types are susceptible to large wildfires, especially in the absence of large wildfires historically. Where possible, harvesting should be designed to reduce the continuity of these coniferous fuel types with a priority being in proximity to communities.
- While the focus has historically been on the reduction of fuel types with conifer overstory (FBP fuel types C-2 and C-3), it is important to note that mixedwood forest types are also highly susceptible to wildfire particularly those with a heavy conifer understory and should be considered in reducing wildfire risk to communities. This particular fuel type (M-2) was responsible for the majority of wildfire spread during the Fort McMurray wildfire event in May of 2016.
- Harvest should align with community protection objectives and harvest sequencing should occur early within the SHS.
- Work with Wildfire Management Staff to identify priority areas within the contributing landbase and explore opportunities to mitigate high risk black spruce stands in the non-contributing landbase.
- A commitment must be made to implement recommendations from the Edson Forest Area Wildfire Risk Management Plan (to be completed by March 2018) and the Rocky Wildfire Management Plan (to be completed by Spring 2018). This plan identifies cumulative risk on the landscape as an accumulation of fire likelihood and impact to a suite of identified social and landscape level values.

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Weyerhaeuser

Pembina 2017-2026

Forest Management Plan

Chapter 4: Previous FMPs

March 19, 2018

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4 Previous FMPs

4.1 Introduction

4.1.1 Drayton Valley FMA#8500023/42

The Weyerhaeuser Drayton Valley FMA had its origins in what was called the Brazeau Timber Development Area (TDA). In 1980, the Province requested proposals for forest industry development for the forest resource generally located between Rocky Mountain House and Drayton Valley. The TDA was divided into two major "Blocks" known as the O'Chiese Block (primarily deciduous timber) and the Nordegg Block (primarily coniferous timber). Public hearings were held on the proposals in 1982 but no forest industry development occurred right away.

Pelican Mills Ltd. was awarded the original FMA Area in 1985 in exchange for a commitment to build and operate an oriented strand-board (OSB) plant in Drayton Valley. The OSB facility operated for 22 years in Drayton Valley, however it ceased operations in 2007, and was closed permanently that year. The FMA Area was loosely based on the former O'Chiese Block of the Brazeau TDA. Wood requirements were met from the FMA Area, the purchase wood program and from Deciduous Timber Allocations outside the FMA Area.

The FMA was renewed in 2005 as FMA #0500042. In 2009, the Drayton Valley Weyerhaeuser FMA was combined with the Edson Weyerhaeuser FMA to form a new Weyerhaeuser FMA #0900046.

4.1.2 Edson FMA#9700035

The Province of Alberta and Weyerhaeuser Company Limited signed Forest Management Agreement (FMA) # 9700035 on June 11th, 1997, with a commencement date of July 1st, 1997. Previous to this agreement, Weyerhaeuser operated in the Edson area under the quota tenure system.

As part of the agreement, Weyerhaeuser was required to prepare a Preliminary Forest Management Plan (PFMP). The PFMP provided direction for harvesting and reforestation activities on the FMA for an interim period until a Detailed Forest Management Plan (DFMP) was approved and implemented.

4.2 Description of Previous FMPs

4.2.1 FMA#8500023

1987
A Preliminary Forest Management Plan was submitted in February 1987 and subsequently was approved by the Province in October, 1987. Mill production began in March 1987 and timber harvesting operations in the same year.

Pelican Mills purchased Coniferous Timber Quotas and built a dimensional lumber sawmill-planer complex. It was a logical progression for the company as much of the deciduous timber was in mixed stands with conifer timber, and the conifer timber supply in the region was still under-utilized. Similarly, wood supply for the sawmill was procured from the FMA, Coniferous Timber Quotas and purchased sources.

1990
A Detailed Forest Management Plan (DFMP) for the original FMA Area was submitted to the Province in accordance with the requirements of the FMA, and was subsequently approved in June of 1994. The period between the submission of the DFMP and its approval was unusually long, mainly because this was a time of evolving expectations for forest management plans and for the approval process, including public involvement. Thus three drafts were required, each with formal reviews, to satisfy both the company and the Province. The company also established its first public Forest Advisory Committee in 1990.

In 1990 Weyerhaeuser Company Ltd. acquired Pelican Mills Ltd. There were no significant changes as a result of the takeover by Weyerhaeuser although the company continued to seek additional Crown coniferous wood supplies in the form of Quotas. About the same time, the region experienced substantial expansion in the forest sector and virtually all-remaining Crown timber resources became committed.

1997
As virtually all of the Crown timber resource in the region was fully committed by 1997, it was a logical progression for Weyerhaeuser to seek to have its wood supply areas combined into one FMA Area. This involved determining which portions of the company's Quota areas in the R-3 and R-4 forest management units were required to support the company's AAC, and then amalgamating these areas with the original FMA Area. This would provide the company with greater security of supply and a better opportunity for forest management. The Province in return would receive a greater commitment from the company towards resource management. The FMA area was formally expanded in 1997.

1998
A Preliminary Forest Management plan for the amended FMA Area was submitted in January and subsequently approved in April 1998, and forms the basis for this DFMP submission.

2000
A new forest management plan was submitted in the fall of 2000 to AAF. Due to the inability of AAF being able to duplicate TSA model outputs, the FMP was rejected.

2001 FMA Boundary Changes and Expansion
Weyerhaeuser and Sundre Forest Products agreed to amend the R-2U forest management unit to support Weyerhaeuser's AAC share from the unit. The FMA area boundary was adjusted to reflect this.

The Province also completed an exercise to improve the accuracy of the existing FMA boundary from the current +/-500 metre accuracy to +/-20 metre accuracy. Minor changes occurred along the major watercourses and area adjustments were made to account for revised high water marks. Other minor changes resulted from the revised estimate of where the height of land occurs.

2004
On May 1st, 2004, Alberta created a Forest Management Unit designated as Sustained Yield Unit R12 that encompassed the following FMUs: R1Y, R2Y, R3Y, R4Y and R1. The total area of SYU R12 is approximately 520,000 hectares.

2005
A revised FMP, effective Nov. 18, 2000 was submitted and approved by AAF on November 10, 2006. FMA renewed as FMA# 0500042, effective May 1, 2005 (See Appendix 4-1 for the approval letter).

2008

A Mountain Pine Beetle Addendum was submitted to AAF on March 18th, with approval being received on June 24, 2008, with an effective date of May 1, 2007 (See Appendix 4- for the approval letter).

4.2.2 FMA#9700035

1998

A Preliminary Forest Management Plan was submitted on June 1, 1998 and subsequently was approved by the Province on February 1st, 1999. The plan covered FMU's E1, E2, W5 and W6.

2001

A Detailed Forest Management Plan was submitted to the Province in June of 2001in accordance with the requirements of the FMA. The plan was subsequently rejected by the Province due to technical difficulties in duplicating TSA model outputs.

2006

A revised FMP, effective May 1, 2007 was submitted and approved by AAF on January 24, 2008 (See Appendix 4-3 for approval letter).

2008

A Mountain Pine Beetle Addendum was submitted to AAF on March 20th, 2008 with approval being received on January 20, 2009, with an effective date of May 1, 2007 (See Appendix 4-4 for approval letter).

4.3 Past FMP Approved Annual Allowable Cuts

Table 4-1 shows the approved AACs from the 2007 Mountain Pine Beetle addendums for the five FMUs included under Weyerhaeuser's Pembina FMA. In accordance with AAF's Healthy Pine Strategy, the coniferous AACs include pine focused accelerated harvest levels intended to reduce the susceptibility of the pine forest to Mountain Pine Beetle infestation. Deciduous harvest levels are not accelerated.

Table 4-1. Previous FMP approved AACs by FMU (m^3/yr)

FMU	Coniferous			Deciduous		
	Primary	Incidental	Total	Primary	Incidental	Total
E15	126,390	15,647	142,037	22,121	18,057	40,178
E2	61,352	35,916	97,268	81,563	9,009	90,572
W5	22,264	7,905	30,169	38,335	8,051	46,386
W6	224,678	20,704	245,382	82,987	68,541	151,528
R12			954,301			278,372
Total			**1,469,157**			**607,036**

Notes:

1. Effective dates for FMUs E15, E2, W5 & W6 - May 1, 2007 to Apr 30, 2025 (18 yrs)
2. Effective dates for FMU R12 - May 1, 2007 to Nov 17, 2025 (18.55 yrs)
3. Volumes are net of cull and structure retention as follows:
   Cull - coniferous: 3% (E15, E2, W5, & W6) and 3.06% (R12)
   Cull - deciduous: 7% (E15, E2, W5, & W6) and 5.83% (R12)
   Structure retention: 8% (E15), 3% (E2, W5, & W6) and 5% (R12)
4. FMU R12 based on a single landbase, all others are divided.
5. Utilization Standard - Coniferous 15/11, Deciduous 15/10.

Post surge, coniferous AACs drop to 326,095 m^3/yr in the Edson FMUs and 440,363 m^3/yr in FMU R12 for a total coniferous AAC of 766,458 m^3/yr. The total post surge coniferous harvest level is 52% of the surge level.

Incidental deciduous AACs show in Table 4-1 are applicable up to April 30, 2024 only. After this the harvest levels reduce to 13,455 (E15), 8,510 (E2), 9,927 (W5) and 56,547 (W6) m^3/yr. The total deciduous harvest level falls to 591,817 m^3/yr.

4.4 Performance of Past FMPs

4.4.1 Pembina South (old DV DFMP) - 2006 to 2015

4.4.1.1 DFMP Approval Conditions

The DFMP letter of approval from AAF, dated November 10, 2006, had 12 conditions that applied as part of the approval process. The 12 conditions and status of each are described below.

Condition 7.1 – VOIT table: By January 31, 2007, Weyerhaeuser shall develop a VOIT table, consistent with the Alberta Forest Management Planning Standard – Annex 4, using the existing FMP goals, objectives and strategies as a starting point. The work must be completed to the satisfaction of the Senior Manager, Forest Planning Section.

> ***Status:*** VOITs table negotiated by Weyerhaeuser FMP and AAF, with an effective date of May 1, 2006 for reporting purposes (Approval date March 27, 2007).

Condition 8.1 – Spatial Harvest Sequence: **i)** Weyerhaeuser must follow the mapped 10-year harvest sequence as presented in the FMP; **ii)** to address operational planning concerns, all timber disposition holders are authorized to modify the SHS by deleting no more than 20% of the total sequenced area in each Landscape Management Unit (LMU) by decade, while harvesting no more than 100% of the total area within the SHS by decade; **iii)** Preference should be given to selecting stands from the second 10-year period of the SHS (years 16-25) when replacing the deleted stands (from ii above). Where this is not feasible, replacements may be from any other stands identified in the approved net landbase of the FMP, with the following exceptions: **a)** Late seral stage stands may be selected provided that the late seral stage targets are met; **iv)** where timber operators exceed the variance describe in (ii) above, the Area Manager, may require the completion of a compartment (LMU) assessment and the Senior Manager, Forest Planning Section may recommend the adjustment of the approved annual allowable cut (AAC) to reflect the impact of the variance; **v)** the department requires the variance from the SHS to be reported annually, and the 5-year Stewardship Report to analyze the variance from the SHS, and **vi)** Following the achievement of approval condition 17.1, the department will generally not request a modification of the approved harvest sequence for the first 15 years of the planning period unless required by a change in legislation or a policy approved by the Minister. See for an example of a variance report produced from the Silvacom SHS Manager).

> ***Status:***
>
> i) All operators were allocated a 10 year allocation of blocks in the Spatial Harvest Sequence (SHS)

ii) Variance types for either additions and deletions were defined in the Operating Ground Rules (OGRs)

iii) Operators, for the most part, accessed second decade blocks when first decade blocks were either deleted or deferred

iv) No Compartment assessments were requested.

v) Variance levels by Compartment were reported in the DFMP annual reports and in all General Development Plans (GDPs) submitted since May 1, 2008.

vi) SHS amended in 2008, effective May 1, 2007.

Condition 9.1 – Predicted future forest: **i)** By May 1, 2007, Weyerhaeuser shall forecast habitat availability of selected wildlife species and report the results. The analysis shall be submitted to the Senior Manager, Forest Planning Section and appended to the Preferred Forest Management Scenario of the FMP. The list of wildlife species shall be determined in consultation with the Fish and Wildlife Program Manager and the Senior Manager, Forest Planning Section, and **ii)** To address FMP implementation and enable variance analysis for Stewardship Reporting, the department will assume the levels of interior older forest, seral stages, and patch size distribution to be targets the companies will achieve. This shall be documented in the VOIT table developed to meet AC 7.1.

Status:

i) List of wildlife submitted with MPB addendum March 20, 2008 (Grizzly Bear and Trumpeter Swan); further to this, the 2017 FMP has the following species being used to forecast habitat availability: Grizzly Bear, Barred Owl, Old Forest Songbirds, East Slopes Cold Water fish species.

ii) VOIT table included analysis of interior older forests (VOIT#3), seral stages (VOIt#1) and patch size (VOIT#2) and associated targets in the MPB addendum.

Condition 10.1 – Structure Retention and Monitoring: **i)** All operators in FMU R12 will plan and carry out their operations to achieve the average structure retention target of 5% of the coniferous and 5% of the deciduous AAC. Species composition and timber profile representative of the original stand conditions shall be retained to achieve acceptable biodiversity results. Non-merchantable timber may also be used where it occurs in sufficient quantity, pattern and profile to supplement the desired conditions; **ii)** By January 31, 2007, Weyerhaeuser must develop standard operating procedures acceptable to the Senior Manager, Forest Planning Section for annually quantifying the structure (merchantable and non-merchantable) retained on harvested areas. the stand level retention monitoring report shall report the results and analysis of the structure retention monitoring program in the Stewardship Report; and **iii)** merchantable volume retained after May 1, 2006 for structure the exceeds the 5% target shall be chargeable s AAC production and shall be reconciled every 5 years at the end of each cut control period.

Status:

i) Most recent structure retention survey results for Weyerhaeuser indicated approximately 6.9% total merchantable retention by volume; no information was supplied by other operators.

ii) Structure retention procedure submitted to AAF March 30, 2007; no other operators were included in the process described.

iii) The results of the monitoring program developed by Weyerhaeuser were never intended to provide enough precision to be used against production, but were intended to provide enough detail to operators on whether to leave more or less retention in subsequent operating years based on prior results.

Condition 12.1 – Industrial timber salvage: **i)** all timber depleted (salvaged and non-salvaged merchantable timber) by non-forestry operations shall be reported as production for cut control purposes, except for low impact seismic programs where the average line width is less than 2.5 meters; **ii)** the volumes use shall be those from the published timber damage assessment tables or as otherwise agreed by the Senior Manager, Timber Production, Auditing and Revenue Section.; iii) the volumes shall be changed to the FMA by cover group (C, CD, DC and D); and **iv)** by January 31, 2007, in consultation with quota operators, Weyerhaeuser shall implement a salvage timber volume tracking and reporting system acceptable to the Senior Manager, Timber Production, Auditing and Revenue Section.

Status:

i) Salvage charged according by FMUs.

ii) Most current approved TDA table used

iii) Volumes estimated are charged to their respective conifer or deciduous groups. A single landbase is used in the TSA, and all species were tracked accordingly.

iv) On March 21, 2007, the company indicated that they would maintain status quo regarding industrial salvage and how is accounted for. The Company uses the normal industrial timber salvage tracking and reporting system. One hundred percent of the estimated TDA volume will be charged against Weyerhaeuser's Periodic Allowable Cut. No alternative process has been developed by AAF. Approved March 27, 2007.

Condition 13.1 – Public Involvement: **i)** by January 31, 2007, Weyerhaeuser shall provide the following information to the Senior Manager, Forest Planning Section; a) A report summarizing the public involvement activities (with dates) completed by Weyerhaeuser during the development of the FMP including a specific reference to the public review of the completed FMP submitted for approval, and b) a summary of comments received from each public involvement activity including those receive during revue of the completed FMP. The list shall identify how Weyerhaeuser addressed each comment and, where possible, identify specific references in the FMP; **ii)** on an on-going basis, Weyerhaeuser shall keep complete and accurate written records' of its consultation with the public, state holders, FAC and First Nations (i.e. comments received, and how concerns identified have been addressed and incorporated in forest management planning). This information shall be reported in Stewardship Report and future FMPs; and **iii)** when Alberta's policy for First Nations consultation is complete, the Company shall work with the department in identifying necessary action plans, and where required, sections with the FMP shall be amended.

Status:

i) Documents submitted December 8, 2006 to AAF. Approval was received on March 27, 2007.

ii) Weyerhaeuser records all consultations with stakeholders (most frequently trappers, grazing operators and individuals that directly contact them) and the general public (individuals not affiliated with a defined stakeholder group) with a consultation tracker managed by our Service Provider, Silvacom. Consultations with First Nations were tracked on AAF consultation logs. The DV Weyerhaeuser Forest Advisory Committee (WeyFAC) held its last session in January of 2011. Weyerhaeuser determined at the time that the FAC had outlived it functionality at the time, and determined to use these types of groups during FMP development only.

iii) See comments in ii) above.

Condition 14.1 – Alternative Regeneration Standards: By May 1, 2011, Weyerhaeuser must be using alternative regeneration performance standards acceptable to the Senior Manager, Operations Section.

Status:

i) Alberta initiated provincial level Regeneration Standards of Alberta (RSA) in 2009.

Condition 15.1 – Secondary Volume monitoring and replacement: By January 31, 2007, Weyerhaeuser shall develop a silviculture strategy to ensure appropriate stocking levels of secondary coniferous and deciduous species are replaced on harvested areas; and ii) the strategy shall be acceptable to the Senior Manager, Forest Planning Section.

Status:

i) Documents submitted December 7, 2006 to AAF.

ii) Strategy accepted by AAF on February 21, 2007. Approval was received on March 27, 2007.

Condition 16.1 – FireSmart strategy: Weyerhaeuser will develop a plan for reducing wildfire threat to the management area in consultation with the Forestry Manager of the Clearwater Area. The plan must meet the approval of the Senior Manager, Forest Planning Section and be included in the revised SHS being prepared for MPB planning.

Status:

i) Condition recognized as being incorporated as part of the MPB addendum Terms of Reference as per letter and associated table from Robert Stokes, dated March 27, 2007.

Condition 17.1 – Forest Health: i) Weyerhaeuser's forest health activities shall adhere to the "*Alberta Forest Health Strategy and the Shared Roles and Responsibilities between SRD and the Forest Industry*". The FMP shall be revised to acknowledge this shared commitment; and ii) by January 31, 2007, Weyerhaeuser shall analyze the harvest sequence in relation to the requirement s of the "*Mountain Pine*

Beetle Action Plans for Alberta" and provide a report to the Senior Manager, Forest Planning Section a) Weyerhaeuser shall re-sequence as necessary to comply with the requirements of the "*Interpretive Bulletin – Planning Mountain Pine Beetle Response Operations*", and b) Weyerhaeuser shall schedule the planning activities to achieve the mountain pine beetle susceptibility reduction targets identified it the "*Prevention (Pine) Strategy of the Mountain Pine Beetle Action Plan of Alberta*" and the "*Interpretive Bulleting – Planning Mountain Pine Beetle Response Operations*".

Status:

i) Condition recognized as being incorporated as part of the MPB addendum Terms of Reference, as per letter and associated table from Robert Stokes, dated March 27, 2007.

ii) See i) above.

Condition 18.1 – Performance Monitoring: i) Weyerhaeuser shall submit Annual Reports and Stewardship Reports reporting on all objectives and associated indicators (including 2.2a) as described in the FMP, Chapter 7, section 7.5. Where variance exists, the analysis shall discuss the reason for the variance and the company's corrective actions taken or proposed; and ii) a Stewardship Report acceptable to the Senior Manager, Forest Planning Section shall be submitted by November 30, 2011.

Status:

i) Annual reports submitted annually for the years 2007/08 thru 2015/16.

ii) Stewardship report submitted covering the years 2007/08 thru 2011/12 in the fall of 2013. Comments received by AAF on July 4, 2014.

Condition 21.0 – New Forest Management Plan: The next DFMP shall be received by the department for approval prior to May 1, 2015.

Status:

iii) Submission date of next FMP changed to April 1, 2016 to reflect a new FMA agreement #0900046, with revised dates of April 1, 2017 and December 1, 2017. The original date of April 2016 was amended to account for the new AVI taking longer to complete than expected. The second revision date of December 2017 was required to address issues completing the net land base determination as a result of the AVI being prolonged previously.

4.4.1.2 2007 DV MPB Addendum Approval Conditions

The MPB addendum letter of approval from AAF, dated June 28, 2008, had no specific conditions to be applied as part of the approval process.

4.4.1.3 Annual and Stewardship reporting

The FMP annual/stewardship report covered a total of 57 indicators. Table 4-2 below summarizes the reported variance to the expected targets for all indicators for the ten-year period May 1, 2006 to April 30, 2016 (See Appendix 4-3 for the 2016 Annual Report). The effective date of the land base was November 18, 2000, with the AAC being effective that date as well. The VOITs table was negotiated and approved as a condition of the 2005 FMP, with an effective date of the reporting being May 1, 2006. No data is presented for the period November 18, 2000 and April 30, 2006. Performance monitoring is described in sections 5.1 and 5.2 of the Mountain Pine Beetle Addendum.

Table 4-2. Summary of variances to the VOITs table targets by year since FMP approval to April 30, 2016.

Indicator	YEAR									
	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16
1	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
2	OV	OV	OV	OV	OV	OV	OV	OV	OV	OV
3	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
4	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
5	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
6	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
7	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
8	WV	WV	WV	WV	WV	WV	WV	WV	OV	WV
9	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
10	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
11	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
12	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
13	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
14	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
15	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
16	OV	WV	WV	WV	WV	WV	WV	WV	WV	WV
17	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
18	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
19	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
20	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
21	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
22	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
23	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
24	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
25	WV	WV	OV	WV	OV	OV	WV	OV	OV	OV
26	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
27	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
28	WV	WV	OV	WV	WV	WV	WV	WV	WV	WV
29	WV	WV	WV	WV	WV	WV	OV	OV	OV	WV
30	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
31	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
32	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
33	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
34	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
35	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
36	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
37	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV

Indicator	YEAR									
	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16
38	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
39	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
40	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
41	WV	WV	OV	WV	OV	WV	OV	WV	WV	WV
42	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
43	WV	OV	OV	OV	OV	OV	OV	OV	OV	OV
44	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
45	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
46	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
47	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
48	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
49	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
50	WV	WV	WV	WV	OV	WV	OV	WV	OV	OV
51	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
52	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
53	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
54	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
55	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
56	WV	WV	WV	WV	WV	WV	WV	WV	WV	WV
57	WV	WV	WV	WV	WV	OV	OV	OV	OV	OV

(WV = Within Acceptable Variance; OV = Outside acceptable variance)

A review of the above table show that 8 indicators were outside of acceptable variance at least once over the last 10 years. Table 4-3 summarizes the variance events for each of the 8 indicators.

Table 4-3. Summary of Indicators the outside the acceptable variance. In the table, blue hi-lighted indicators approximate Provincial VOITs while green hi-lighted indicators were measurable FMP objectives described as VOITs.

Indicator	Target	Comments	# years Outside Variance
2	Range of harvest areas reflect the approved SHS	It appears that the data used to generate the tables were polygon size, not block size. Polygon size varies considerably from forecasted block size due to the amount of linear disturbances across the landscape, most notably seismic lines that broke blocks into polygons or pieces of stands.	10
7	Area of Unsalvaged burned Forest	Normal structure retention met only	1
16	100% of designs meet standards of the Code of Practice for Water Course Crossings	There was one outage in 2006 where a large rain event caused erosion to a bridge abutment	1
25	95% (SR) on an annual basis for establishment surveys	Four years where establishment survey success ranged from 82.5% to 94.9%	6
28	100% of harvest areas are reforested within 2 years	One penalty issued for non-compliance	1
29	100% compliance (silviculture records)	3 penalties for non-compliance	3
41	No penalties or warnings from AAF as a result of poor timber utilization practices	3 penalties for non-compliance	3
43	All blocks will have incidental timber harvested	DV OSB facility closed in late 2006	9
50	Turn-around-time (TAT) of 6.5 hours to the sawmill	Four years where the TAT was below 5 hours, which was outside the anticipated variance allowed	4
57	Forest Advisory Committee (FAC) review of Weyerhaeuser planning and operations	The group was on hiatus as the company started to develop plans for the 2016 FMP.	5

Upon review of the above 9 indicators, of which 7 were previous FMP measureable objectives, and two were closely associated with the current VOIT table, no additional effort was needed to address these in the current plan.

On July 4, 2014, AAF completed a review of the 2006-2012 Drayton Valley stewardship report, with the following expectations:

1. Weyerhaeuser to update status on conditions of the Approval Decision

   Status: Section 4.3.1.1 above provides a status report of the conditions listed in the FMP approval decision.

2. Weyerhaeuser to review and address annual stewardship reporting template following a discussion with Area staff and their recommendations

   Status: Forest Management Planning Standard Interpretive Bulletin: Forest Stewardship Reporting Requirements issued with an effective date of June 15, 2017.

3. Weyerhaeuser to continue annual stewardship reporting

   Status: Reports continued to April 30, 2016, with the SHS variance being reported to April 30, 2017.

4. Over the next five years, Weyerhaeuser to work with Area staff to reduce SHS variance

   Status: The method used by AAF to calculate variance to the approved SHS is different from Weyerhaeuser's Silvacom SHS Manager. The SHS manager compared completed Forest Harvest Plans to the full 10-year SHS, whereas AAF compared harvested blocks compared to the approved SHS for the first five-years. For the most part the overall variance of Weyerhaeuser proposed activities were within acceptable limits described in the FMP.

5. Weyerhaeuser to include a feedback from all harvesting operators starting next annual reporting cycle

   Status: No action was taken by Weyerhaeuser in soliciting feedback, as this was interpreted to mean the next FMP, not the current FMP; next FMP VOITs table will indicate reporting requirement for the FMA holder and the other timber operators.

6. As stipulated in the FMA sections 10(1) and 10(2), Weyerhaeuser is required to conduct an acceptable public consultation process. The company must also ensure that First Nations (FN) consultation, as directed by provincial policy, is incorporated into its operation planning and subsequent FMP development process. Both public consultation process and FN consultation effort shall be ongoing, improved and documented

   Status: The Public Involvement Plan and First Nations/Métis Consultation Process was approved for the FMP. Several iterations of each were approved to reflect the revised FMP submission dates. The entire process with be reviewed for adequacy by AAF upon FMP submission. Many stakeholders input was solicited operationally as Forest Harvest Plans and Annual Operating Plans were developed and submitted for approval to AAF over the life of the current FMP.

4.4.2 Pembina North (old ED FMP) – 2007 to 2015

4.4.2.1 FMP Approval Conditions

The FMP letter of approval from AAF, dated January 28, 2008, had 8 conditions that applied as part of the approval process. The 12 conditions and status of each are described below.

Condition 8.1 – VOIT table: By April 1, 2008, Weyerhaeuser shall incorporate the revised VOIT table into the FMP. Targets for the VOITs shall be set using outputs from the approve Preferred Forest Management Scenario and timber supply analysis include in the April 2006 FMP

Status: VOITs table negotiated by Weyerhaeuser FMP and AAF, with an effective date of May 1, 2007 for reporting purposes (Approval date March 27, 2007).

Condition 9.1 – Predicted future forest: **i)** By April 1, 2008, develop a list of fine-filter species ,for which habitat will be modeled and the results incorporated into the April, 2016 FMP, and **ii)** the Mountain Pine Beetle Management Strategy FMP amendment (under development) will assess the impact of harvest on grizzly bear habitat.

Status:

i) List of wildlife submitted with MPB addendum March 20, 2008 (Grizzly Bear and Trumpeter Swan); further to this, the 2017 FMP has the following species being used to forecast habitat availability: Grizzly Bear, Barred Owl, Old Forest Songbirds, East Slopes Cold Water fish species.

ii) Grizzly bear impacts modeled in MPB addendum.

Condition 10.1 – Structure Retention and Monitoring: **i)** All operators in the Weyerhaeuser Edson FMA will plan and carry out their operations to achieve the average structure retention target of 3% in FMUs E2, W5 and W6 and 8% in FMU E15 of the coniferous and 3% in FMUs E2, W5 and W6 and 8% in FMU E15 of the deciduous AAC. Species composition and timber profile representative of the original stand conditions shall be retained to achieve acceptable biodiversity results. Non-merchantable timber may also be used to augment merchantable retention; **ii)** By April 1, 2008, Weyerhaeuser shall develop standard operating procedures for monitoring, measuring and reporting the retained structure (merchantable and non-merchantable) on harvested areas. The Company is expected to reach general agreement with embedded timber operators, and the result must be acceptable to the Senior Manager, Forest Planning Section; **iii)** merchantable volumes retained shall be reported in annual and Stewardship Reports; and **iv)** merchantable volume retained for structure the exceeds the 5% target shall be chargeable s AAC production and shall be reconciled every 5 years at the end of each cut control period.

Status:

i) Most recent structure retention survey results for Weyerhaeuser indicated approximately 2.5% total merchantable retention by volume for FMUs E2, W5 and W6, and 2.8 % for E15; no information was supplied by other operators.

ii) Structure retention procedure developed by Weyerhaeuser submitted to AAF March 30, 2007; no other operators were included in the process described.

iii) Retention estimates reported in Annual and Stewardship report.

iv) There has been no reconciliation to date, with the first period ending April 20, 2015. Audit is expected to be completed in calendar year 2016

Condition 12.1 – Industrial timber salvage: **i)** all timber depleted (salvaged and non-salvaged merchantable timber) by non-forestry operations shall be reported as production for cut control purposes, except for low impact seismic programs where the average line width is less than 2.5 meters and Timber Damage Assessment compensation is not requested; **ii)** the volumes use shall be those from the published timber damage assessment tables or as otherwise agreed by the Senior Manager, Timber Production, Auditing and Revenue Section.; **iii)** by April 1, 2008, in consultation with quota operators, Weyerhaeuser shall develop and implement a salvage timber volume tracking and reporting system acceptable to the Senior Manager, Timber Production, Auditing and Revenue Section.

Status:

i) Salvage charged according by FMUs.

ii) Most current approved TDA table used

iii) On March 18, 2008, the company indicated that they would maintain status quo regarding industrial salvage and how is accounted for. The Company uses the normal industrial timber salvage tracking and reporting system. One hundred percent of the estimated TDA volume will be charged against Weyerhaeuser's Periodic Allowable Cut. No alternative process has been developed by AAF. The DV condition was approved on March 27, 2007.

Condition 13.1 – Alternative Regeneration Standards: By May 1, 2011, Weyerhaeuser must be using alternative regeneration performance standards acceptable to the Senior Manager, Operations Section. The ARS will include standards for incidental species stocking to achieve replacement of incidental volumes.

Status:

i) Alberta initiated provincial level Regeneration Standards of Alberta (RSA) in 2009.

Condition 14.1 – Forest Health: i) Weyerhaeuser shall follow the "*Alberta Forest Health Strategy and the Shared Roles and Responsibilities between SRD and the Forest Industry*" when planning and conducting forest health operations; and ii) by May 1, 2008, Weyerhaeuser shall prepare a FMP amendment that meets the requirement s of the "*Mountain Pine Beetle Action Plans for Alberta*" and its "*Interpretive Bulletin – Planning Mountain Pine Beetle Response Operations*".

Status:

i) Appropriate AAF MPB documents used in preparation for amending the 2006 FMP.

ii) MPB addendum submitted March 25, 2008, with approval on September 15, 2008

Condition 15.1 – Forest Management Unit and Periodic Cut Administration: Weyerhaeuser shall administer, monitor, report and balance it FMA timber production by FMU, consistent with department requirements.

Status:

i) AAF audits show drain by FMUs E15, E2, W5 and W6.

Condition 17.1 – Revisions and Future Forest Management Plans: i) The April 2006 FMP shall be updated to meet the direction of and Approval conditions in this document. An updated version of the FMP shall be produced at the completion of the update in a format acceptable to the Senior Manager, Forest Planning Section; and ii) Weyerhaeuser shall prepare and submit the next FMP that meets the forest management planning standard by April 1, 2016.

Status:

i) Updated FMP submitted to AAF fall of 2008
ii) Submission date of next FMP changed to April 1, 2016 to reflect a new FMA agreement #0900046, with revised dates of April 1, 2017 and December 1, 2017. The original date of April 2016 was amended to account for the new AVI taking longer to complete than expected. The second revision date of December 2017 was required to address issues completing the net land base determination as a result of the AVI being prolonged previously.

Condition 18.1 – Performance Monitoring: i) Weyerhaeuser shall submit Annual Reports and Stewardship Reports that report the achievement of each target in the updated VOIT table. Where variances from the planned outcomes exist the Company shall assess and determine the reason for each variance an present the corrective action taken or proposed; and ii) a Stewardship Report acceptable to the Senior Manager, Forest Planning Section shall be submitted by November 30, 2011.

Status:

i) Annual reports submitted annually for the years 2007/08 thru 2015/16.

ii) Stewardship report submitted covering the years 2007/08 thru 2011/12 in the fall of 2013. Comments received by AAF spring 2014.

4.4.2.2 2007 Edson MPB Addendum Approval Conditions

The MPB addendum letter of approval from AAF, dated September 15, 2008, had no specific conditions to be applied as part of the approval process.

4.4.2.3 Annual and Stewardship reporting

The FMP annual/stewardship report covered a total of 44 indicators. Table 4-4 below summarizes the reported variance to the expected targets for all indicators for the nine-year period May 1, 2007 to April 30, 2016 (See Annex V for the 2016 Annual Reports).

Table 4-4. Summary of variances to the VOITs table targets by year since FMP approval to April 30, 2016.

Indicator	YEAR								
	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16
1	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	OV	OV	OV	OV	OV	OV	OV	OV	OV
3	NA	NA	NA	NA	NA	NA	NA	NA	NA
4	WV	WV	WV	WV	WV	WV	WV	WV	WV
5	WV	WV	WV	WV	WV	WV	WV	WV	WV
6	WV	WV	WV	WV	WV	WV	WV	WV	WV
7	WV	WV	WV	WV	WV	WV	WV	WV	WV
8	WV	WV	WV	WV	WV	WV	WV	WV	WV
9	WV	WV	WV	WV	WV	WV	WV	WV	WV
10	WV	WV	WV	WV	WV	WV	WV	WV	WV
11	WV	WV	WV	WV	WV	WV	WV	WV	WV
12	WV	WV	WV	WV	WV	WV	WV	WV	WV
13	OV	OV	OV	OV	OV	OV	OV	OV	OV
14	WV	WV	WV	WV	WV	WV	WV	WV	WV
15	WV	WV	WV	WV	WV	WV	WV	WV	WV
16	WV	WV	WV	WV	WV	WV	WV	WV	WV
17	NA	NA	NA	NA	NA	NA	NA	NA	NA
18	WV	WV	WV	WV	WV	WV	WV	WV	WV
19	WV	WV	WV	WV	WV	WV	WV	WV	WV
20	WV	WV	WV	WV	WV	WV	WV	WV	WV
21	WV	WV	WV	WV	WV	WV	WV	WV	WV
22	WV	WV	WV	OV	OV	WV	WV	WV	WV
23	NA	NA	NA	NA	NA	NA	NA	NA	NA
24	WV	WV	WV	WV	WV	WV	WV	WV	WV
25	WV	WV	WV	WV	WV	WV	OV	OV	WV
26	WV	WV	WV	WV	WV	WV	WV	WV	WV
27	WV	WV	WV	WV	WV	WV	WV	WV	WV
28	WV	WV	WV	WV	WV	WV	WV	WV	WV
29	WV	WV	NA	NA	NA	NA	NA	NA	NA
30	WV	WV	WV	WV	WV	WV	WV	WV	WV
31	WV	WV	WV	WV	WV	WV	WV	WV	WV
32	WV	WV	WV	WV	WV	WV	WV	WV	WV
33	NA	NA	NA	NA	NA	NA	NA	NA	NA
34	WV	WV	WV	WV	WV	WV	WV	WV	WV
35	WV	WV	WV	WV	WV	WV	WV	WV	WV
36	WV	WV	WV	WV	WV	WV	WV	WV	WV
37	WV	WV	WV	WV	WV	WV	WV	WV	WV
38	WV	WV	WV	WV	WV	WV	WV	WV	WV
39	WV	WV	WV	WV	WV	WV	WV	WV	WV
40	NA	NA	NA	NA	NA	NA	NA	NA	NA
41	WV	WV	WV	WV	WV	WV	WV	WV	WV
42	WV	WV	WV	WV	WV	WV	WV	WV	WV
43	WV	WV	WV	WV	OV	OV	OV	OV	OV
44	WV	WV	WV	WV	WV	WV	WV	WV	WV

(WV = Within Acceptable Variance; OV = Outside acceptable variance)

A review of the above table show that 5 indicators were outside of acceptable variance at least once over the last 9 years. Table 4-5 summarizes the variance events for each of the 5 indicators.

Table 4-5. Summary of Indicators outside the acceptable variance. In the table, blue hi-lighted indicators approximate Provincial VOITs while green hi-lighted indicators were measurable FMP objectives described as VOITs.

Indicator	Target	Comments	# years Outside Variance
2	Range of harvest areas reflect the approved SHS	It appears that the data used to generate the tables were polygon size, not block size. Polygon size varies considerably from forecasted block size due to the amount of linear disturbances across the landscape, most notably seismic lines that broke blocks into polygons or pieces of stands.	9
13	Stand retention of an average of 3% in FMUs E2, 5 and W6 and 8% in FMU E15 of all species utilized	Structure retention levels for E15 are consistently below expected targets.	9
22	95% (SR) on an annual basis for establishment surveys	Two years where establishment survey success ranged from 76% to 93%	2
25	100% of harvest areas are reforested within 2 years	Two penalties issued for non-compliance	2
43	Produce an annual report for the FAC regarding company activities and issues raised during the year	No reports completed since 2011 as WeyFAC ceased to operate	5

Upon review of the above 5 indicators, of which 2 were previous FMP measureable objectives, and four were closely associated with the current VOIT table, no additional effort was needed to address these in the current plan.

On July 7, 2014, AAF completed a review of the 2007-2012 Edson stewardship report, with the following expectations:

1. Weyerhaeuser to update status on conditions of the Approval Decision

   Status: Section 4.3.2.1 above provides a status report of the conditions listed in the FMP approval decision.

2. Weyerhaeuser to review and address annual stewardship reporting template following a discussion with Area staff and their recommendations

   Status: Forest Management Planning Standard Interpretive Bulletin: Forest Stewardship Reporting Requirements issued with an effective date of June 15, 2017.

3. Weyerhaeuser to continue annual stewardship reporting

   Status: reports continued to April 30, 2016, with the SHS variance being reported to April 30, 2017.

4. Over the next five years, Weyerhaeuser to work with Area staff to reduce SHS variance

   Status: The method used by AAF to calculate variance to the approved SHS is different from Weyerhaeuser's Silvacom SHS Manager. The SHS manager compared completed Forest Harvest Plans to the full 10-year SHS, whereas AAF compared harvested blocks compared to the approved SHS for the first five-years. For the most part the overall variance of Weyerhaeuser proposed activities were within acceptable limits described in the FMP.

5. Weyerhaeuser to include a feedback from all harvesting operators starting next annual reporting cycle

   Status: No action was taken by Weyerhaeuser in soliciting feedback, as this was interpreted to mean the next FMP, not the current FMP; next FMP VOITs table will indicate reporting requirement for the FMA holder and the other timber operators.

6. As stipulated in the FMA sections 10(1) and 10(2), Weyerhaeuser is required to conduct an acceptable public consultation process. The company must also ensure that First Nations (FN) consultation, as directed by provincial policy, is incorporated into its operation planning and subsequent FMP development process. Both public consultation process and FN consultation effort shall be ongoing, improved and documented

   Status: The Public Involvement Plan and First Nations/Métis Consultation Process was approved for the FMP. Several iterations of each were approved to reflect the revised FMP submission dates. The entire process with be reviewed for adequacy by AAF upon FMP submission. Many stakeholders input was solicited operationally as Forest Harvest Plans and Annual Operating Plans were developed and submitted for approval to AAF over the life of the current FMP.

4.4.3 Mountain Pine Beetle Addendum Results

Shortly after approval was given to each of the Pembina North and Pembina South FMPs in 2006/07, addendums to address the Mountain Pine Beetle issue were approved. The 2007 MPB addendums incorporated Alberta's Healthy Pine Strategy with the goal of altering the age-class structure of susceptible pine forests to increase their resistance to MPB infestations over the long-term. The strategy targeted a 75% reduction in the area of Rank 1 and 2 stands over a 20 year period.

For various reasons the 75% reduction target was not achievable in the 2007 MPB PFMS's. Final targets were for a 44% reduction for the Edson FMUs over the 20 year period from May 1 2004 to April 30, 2024, and a 58% reduction for FMU R12 over a 25 year period from November 18, 2000 to November 17, 2025.

As the harvest targets developed in the 2007 MPB PFMS's include periods prior to the implementation of the accelerated MPB harvest as well as periods after the start of the 2017 FMP, new harvest targets for the 10 year period from May 1, 2007 to April 30, 2017 were determined from the original 2007 MPB SHS's. The actual area of Rank 1 and 2 stands harvested by FMU over this 10 year period were then compared to these targets. The results are presented in Table 4-6.

Table 4-6. MPB results for the 10 year period from May 1, 2007 to April 30, 2017

Item	Note	Edson FMUs					Drayton Valley	Total
		E15	E2	W5	W6	Total	R12	
Target Total harvest area (Ha)	(a)	8,740	8,928	3,946	20,347	41,960	53,824	95,784
Target Rank 1 & 2 harvest area (Ha)	(b)	8,060	5,650	1,496	13,216	28,421	41,973	70,395
Target % Rank 1 & 2 harvest area	**(c) = b / a * 100**	**92%**	**63%**	**38%**	**65%**	**68%**	**78%**	**73%**
Actual Total area harvested (Ha)	(d)	4,602	5,982	641	12,844	24,069	25,292	49,361
Actual Rank 1 & 2 area harvested (Ha)	(e)	3,411	3,652	317	8,238	15,619	21,310	36,929
Actual % Rank 1 & 2 area harvested	**(f) = e / d * 100**	**74%**	**61%**	**50%**	**64%**	**65%**	**84%**	**75%**

(a) Total area scheduled for harvest in the 2007 MPB SHS's.
(b) Total Rank 1 and 2 area scheduled for harvest in the 2007 MPB SHS's.
(c) Target percentage of Rank 1 and 2 area scheduled for harvest.
(d) Actual area harvested.
(e) Actual Rank 1 and 2 area harvested (based on the definition used in the 2007 MPB Adendum).
(f) Actual percentage of Rank 1 and 2 area harvested.

Table 4-6 shows that over the 10 year period 73% of the total area scheduled for harvest (including all operators and broad cover groups) comprised Rank 1 and 2 stands. Over the same period, 75% of the total area actually harvested comprised Rank 1 and 2 stands, indicating that, across the DFA, the objective to target susceptible pine stands for harvest was accomplished over this period.

To further validate Weyerhaeuser's ongoing targeting of MPB susceptible stands, the profile by cover group from the 2007 MPB SHS for FMU R12 was compared to the profile actually harvested up to the start of the new FMP (Table 4-7). The proportions of the PL (pure pine) and PS (pine spruce) cover groups harvested are in line with the original SHS.

Table 4-7. Comparison of harvest profile between the 2007 MPB SHS and Actual in FMU R12

Cover Group	25 Yr SHS[1]		Actual Harvest[2]	
	Ha	%	Ha	%
CD	7,322	5.9%	2,986	7.8%
CX	7,364	6.0%	1,377	3.6%
DC	10,895	8.8%	3,425	8.9%
DX	24,072	19.5%	5,831	15.2%
PL	58,052	47.1%	19,106	49.9%
PS	12,282	10.0%	3,864	10.1%
SW	3,276	2.7%	1,707	4.5%
Total	**123,262**	**100.0%**	**38,296**	**100.0%**

[1] Includes the pre-surge period from Nov 18, 2000 to Apr 30, 2007 and the MPB surge period from May 1, 2007 to Nov 17, 2025
[2] Actual area harvested between Nov 18, 2000 and Apr 30, 2017

A table similar to the above was not created for the Edson FMUs as the stratification in these FMUs does not allow the pine strata to be separated from other coniferous stands.

Also evident in Table 4-6 is that the total area actually harvested over the 10 year period (49,361 ha) is only 52% of the original target (95,784 ha). This is largely due to overall reduced harvest levels experienced over this period as explained in section 1.1 of *Chapter 1 : Corporate Overview and Forest Management Approach.*

The ranking system for MPB susceptible stands changed in the 2017 FMP. The forecasted results for MPB susceptible stand reduction for the 2017 FMP is presented in *Chapter 6: Preferred Forest Management Scenario.*

4.4.4 Spatial Harvest Sequence Variance

The Spatial Harvest Sequence (SHS) was developed on each of the FMAs that reflected the Preferred Forest Management Scenario of the Mountain Pine Beetle Addendum. Table 4-8 and Table 4-9 summarize the SHS variances for all compartments for each FMA for the first two decades of the MPB addendum. SHS variance was determined as the sum of deletions and deferrals for Final Harvest Plans submitted each decade, independent of when they were actually harvested. AAF results in the stewardship report were calculated in a different manner and are not comparable to this table. The individual FMAs were within acceptable levels when viewed as a whole, while individual compartment exceeded thresholds 25% of the time (4 of 16 compartments) during the first decade of the approved SHS.

Table 4-8. Decade 1 SHS Variance*

Compartment / LMU	Sequenced Area[7] (ha)	Area Planned in First Decade	Remaining Area Available (ha)	Total SHS Variance (Deletions & Deferrals)
E15 – Moose Creek	7,263	4,817	2,446	14.6%
E2 - Edson	3,947	3,804	143	30.6%
W5 – Beaver Meadow	1,493	647	846	9.3%
W6 – Carrot Creek	633	1,150	-517	83.3%
W6 - Cynthia	7,722	7,024	698	14.5%
W6 – Wolf Lake	1,876	1,519	357	15.3%
Total Pembina North	22,934	18,961	3973	18.6%
R12 - Baptiste	7,111	7,152	-41	14.2%
R12 – Blackstone	5,454	1,007	4,447	1.3%
R12 - Elk River	3,804	5252	-1448	21.1%
R12 – Marshy Bank	2,018	986	1032	0.4%
R12 – Medicine Lake	577	0	577	0.0%
R12 - Nordegg River	11,819	10,541	1,278	23.1%
R12 – O'Chiese	7,247	8,214	-967	6.7%
R12 – Sand Creek	3,337	754	2,583	2.5%
R12 – Tall Pine	1,756	47	1,709	1.4%
R12 –Willesden Green	2,054	315	1,739	1.5%
Total Pembina South	45,177	34,268	10,909	11.8%

*decade 1 for Pembina North to April 30, 2014; decade 1 for Pembina South to April 30, 2015

Table 4-9. Decade 2 SHS Variance to April 30, 2017*

Compartment / LMU	Sequenced Area[7] (ha)	Area Planned in Second Decade	Remaining Area Available (ha)	Total SHS Variance (Deletions & Deferrals)
E15 – Moose Creek	7,265	2297	4,968	0.9%
E2 - Edson	3,947	1257	2,690	0.0%
W5 – Beaver Meadow	1,493	153	1,340	0.2%
W6 – Carrot Creek	633	9	624	4.5%
W6 - Cynthia	7,722	2520	5,202	0.0%
W6 – Wolf Lake	1,876	0	1,876	0.0%
Total Pembina North	22,936	6,236	16,700	1.0%
R12 - Baptiste	7,117	0	7,117	0.0%
R12 – Blackstone	5,454	202	5,252	0.9%
R12 - Elk River	3,804	449	3,355	0.7%
R12 – Marshy Bank	2,018	400	1,618	0.8
R12 – Medicine Lake	577	0	577	0.0%
R12 - Nordegg River	11,819	1059	10,760	0.6%
R12 – O'Chiese	7,247	1763	5,484	2.1%
R12 – Sand Creek	3,337	58	3,279	0.1%
R12 – Tall Pine	1,756	0	1756	0.0%
R12 –Willesden Green	2,054	0	2,054	0.0%
Total Pembina South	45,183	3,931	41,252	0.2%

*Decade 2 for Pembina North starts May 1, 2014; for Pembina South, May 1, 2015.

4.5 Significant Events

There have been no natural significant events, such are major fires or extensive areas of windthrow, on the DFA. A significant event would impact greater than 2.5% of the FMA, or approximate 25,000 hectares, and would have potentially lead to a recalculation of the AAC.

North of the Pembina River, smaller natural events occurred: the Cynthia Fire in 2015 (approximately 800 hectares); the MPB inflight in 2009 affected approximately 1,500 hectares to be logged for dues relief.

South of the Pembina River, smaller natural events occurred: the Lodgepole Fires in 2011 (approximately 750 hectares and 2014 (approximately 800 hectares); in 2006 a late spring snowstorm occurred across the north-central portion of the DFA created extensive top damage to mostly dense pine dominated stands. Salvage of a large number of stands took precedence for several years. New imagery use in the re-interpretation of the AVI and planner review of the SHS has continues to target these stands as they are encountered.

The most significant, non-natural event on the Defined Forest Area was the closure of the OSB facility in Drayton Valley in 2007. This directly affected the new FMA agreement, where 130,000 meters of deciduous was set aside for future bioenergy requirements. As well, there is continued erosion of the Active landbase use for timber production. The Oil and Gas industry continues to produce a heavy footprint on the DFA with the withdrawals of land for the building of well pads, pipelines, roads and powerlines.

Appendix 4-1 – FMA 0500042 - FMP Approval (November 18, 2000)

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Government of Alberta
2001 & 2002 IPAC *Gold Award* for Innovative Management

Forestry Division
Forest Management Branch

8th Floor 9920 - 108 Street
Edmonton, Alberta
Canada T5K 2M4

Telephone (780) 427-8474
Fax (780) 427-0084

November 10, 2006

Ref: 06325 – 010

Mr. Bob Winship
Weyerhaeuser Company Limited
P.O. Box 7739
Drayton Valley, Alberta
T7A 1S8

Dear Mr. Winship:

RE: APPROVAL – WEYERHAEUSER DRAYTON VALLEY FOREST MANAGEMENT PLAN

I am pleased to advise you of the approval of the Weyerhaeuser Forest Management Plan for the Drayton Valley Forest Management Agreement.

Attached is the department's Approval Decision documenting the approval conditions to be met. I encourage you to review the approval conditions and timelines to ensure Weyerhaeuser adheres to the requirements. Department staff will provide information and assistance as required.

Upon completion of the work to meet the conditions, please update the forest management plan and provide the updated version to the department.

Thank you for your company's diligent work in completing this plan, and I wish you every success in its implementation.

Yours truly,

Robert W. Stokes, RPF
Senior Manager
Forest Planning Section

Attachment

cc: Rick Watson, Weyerhaeuser, Grande Prairie
Paul Scott, Weyerhaeuser, Edson
Bruce Cartwright, Area Manager, Southern Rockies Area
FMB Section Managers

Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

Detailed Forest Management Plan Approval Decision

Weyerhaeuser Company Ltd.
Pembina Forestlands
Drayton Valley, Alberta

Forest Management Agreement #0500042

COLLEGE OF ALBERTA PROFESSIONAL FORESTERS
DOUGLAS SKLAR
RPF 28

Date: November 10, 2006
Effective: November 18, 2000

Approved by: ______________________

D. (Doug) A. Sklar, RPF
Executive Director
Forest Management Branch
Forestry Division

Executive Summary

The Weyerhaeuser – Drayton Valley forest management plan dated February 2006 is approved subject to the satisfactory completion of the Approval Conditions summarized below.

Approval Conditions

Condition	*Requirement*	*Approval Authority*	*Due Date*
7.1	*VOIT Table*	*Senior Manager, FPS*	*January 31, 2007*
8.1	*Spatial Harvest Sequence*	*Area Manager* *Senior Manager, FPS*	*January 31, 2007* *See 17.1ii*
9.1	*Predicted Future Forest*	*Senior Manager, FPS*	*May 1, 2007*
10.1	*Structure Retention and Monitoring*	*Senior Manager, FPS*	*January 31, 2007*
12.1	*Industrial Timber Salvage*	*Senior Manager, TPARS*	*January 31, 2007*
13.1	*Public Involvement*	*Senior Manager, FPS*	*January 31, 2007*
14.1	*Alternative Regeneration Standards*	*Senior Manager, FOS*	*May 1, 2011*
15.1	*Secondary Volume Monitoring and Replacement*	*Senior Manager, FPS*	*January 31, 2007*
16.1	*FireSmart Strategy*	*Senior Manager, FPS*	*January 31, 2007* *See 17.1ii*
17.1	*Forest Health*	*Senior Manager, FPS*	*January 31, 2007*
18.1	*Performance Monitoring*	*Senior Manager, FPS*	*Annually and November 30, 2011*
21.0	*Next Forest Management Plan*	*Executive Director*	*May 1, 2015*

Authorization

The Detailed Forest Management Plan for the Weyerhaeuser FMA area dated February 2006 is approved subject to the Approval Conditions being met and the Annual Allowable Cuts presented in this Approval Decision.

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Tables

Introduction

The approval of forest management plans is the mandate of the Executive Director of the Forest Management Branch (FMB), Forestry Division of the Department of Sustainable Resource Development (department). This Approval Decision documents the rationale, and conditions of approval for the Weyerhaeuser Company Ltd – Drayton Valley (Weyerhaeuser) Detailed Forest Management Plan (FMP) dated February 2006. This approval provides direction for the successful and efficient implementation of the FMP.

Weyerhaeuser regulated forestry professionals have prepared the FMP, and it has been reviewed by government professional staff (see Table 1). Professional validation indicates the FMP is accurate as well as practical and feasible and has been prepared with due diligence. I commend Weyerhaeuser and those people who have contributed to the FMP for their efforts to address the complex issues of forest management.

The conditions in this Approval Decision are consistent with the terms of the Forest Management Agreement (FMA) and failure by Weyerhaeuser to fulfill the direction provided in this Approval Decision shall place the Company in default of its FMA.

1.0 Government of Alberta Participants: Forest Management Plan Appraisal

The following Government of Alberta staff participated in the appraisal of the Weyerhaeuser FMP. Their comments and recommendations are addressed in this Approval Decision. I extend my thanks to the staff for their personal and professional commitment to the task.

Table 1. Government of Alberta Participants

Government Reviewers	Title	Registration	DFMP Component
Darren Aitkin, RPF	Growth & Yield Forester	CAPF # 662	Growth &Yield
Jim Allen	Wildlife Biologist		All Chapters
Jamie Bruha, RPF	Senior Operations Forester	CAPF # 419	Ground Rules and Plan Implications
Bert Ciesielski, RPF	Area Forester	CAPF # 366	All Chapters
Dave Coish, RPF	Forest Management Planning Forester	CAPF # 371	All Chapters
Eric Damkjar	Cultural Land Use Analyst, Archaeology and History		Chapter 2 & 5
Grant Klappstein, RPF	Growth & Yield Forester	CAPF# 768	Components of Timber Supply
Dan Lux	Forest Health Officer SW Region		Chapters 3, 5 & 6; spatial harvest sequence
Dave Morgan, RPF	Manager, Biometrics Unit	CAPF # 434	Chapter 6; 4 & Appendices
Daryl Price, RPF	Senior Manager, Resource Analysis Section	CAPF # 82	Chapter 4 & Appendices
Marty O'Byrne, RPF	Provincial Silviculture Specialist	CAPF # 118	All Chapters
John Stadt, RPBio	Forest Ecology Specialist	ASPB	Appendix 6-3, 6-6
Doug Schultz, RPF	Senior Manager, Timber Production, Auditing & Revenue Section	CAPF # 215	Chapter 6
Robert Stokes, RPF	Senior Manager, Forest Planning Section	CAPF # 500	All Chapters
Bev Wilson, RPF	Senior Timber Supply Analyst	CAPF # 391	Chapter 4 and appendices

CAPF – College of Alberta Professional Foresters
ASPB – Alberta Society of Professional Biologists

2.0 Forest Management Area

The area under consideration is the Forest Management Agreement area of Weyerhaeuser – Drayton Valley, FMA # 0500042 allocated to the Company through Order-in-Council 514/2005, dated November 16, 2005. The FMA area is within Forest Management Unit (FMU) R12.

The FMA is located in central Alberta (south and southwest of Drayton Valley), and spans the Lower Foothills and Upper Foothills natural sub-regions, with small portions of the Sub-Alpine, Alpine, and the Dry Mixedwood natural sub-regions. Chapter 1 of the FMP, the *General Description of the Sustained Yield Unit* describes the FMA in greater detail.

3.0 FMP Background

The original FMA required Weyerhaeuser to submit a Detailed Forest Management Plan by January 31, 2001. The Company submitted a FMP by this date but that plan did not meet department standards and was not approved. Since then, FMA boundary changes; quota rationalization; FMU amalgamation; and Company restructuring contributed to extended FMP re-submission delays. Several extensions were granted with the latest being to September 30, 2006.

Weyerhaeuser submitted its FMP on February 10, 2006 at which time the government review began. The department has identified a number of items to be addressed during implementation of the FMP. These are documented and comprise the discussion and conditions of FMP approval contained herein.

4.0 Public Involvement

FMA Sections 10(3) and 10(4) require Weyerhaeuser to conduct an acceptable public and First Nations consultation process. FMP Objectives 5.1 through 5.6; their associated strategies; and the Weyerhaeuser Public Involvement Plan describe work in this regard. To solicit feedback and facilitate public awareness of its forest management activities, Weyerhaeuser included a wide range of stakeholders and department staff on its Forest Advisory Committee. The focus of this group was the FMP and forest operations in general.

Weyerhaeuser is expected to enhance its effort to conduct meaningful public involvement throughout the FMP implementation. Meaningful consultation is characterized by sincere efforts to help stakeholders understand the implications of the plans, sincere efforts to make the plans available at a time and in a manner sufficient for stakeholders to read and study them, and sincere and accurate explanations of how the interests and concerns of the stakeholders have been addressed.

Requirements regarding the public involvement program are further discussed in the Approval Conditions section of this document.

5.0 Research

Weyerhaeuser's leadership and participation in forestry research is noted in Chapter 8 of the FMP. The Company's efforts are significant. However, there is scant mention in the FMP of how research results were used to formulate and support the objectives and strategies presented. A more specific discussion of research integration is warranted.

I encourage the Company to continue collaborating with the scientific community but also to increase its efforts to ensure there is a strong linkage to the operational forest planner and manager to ensure that current knowledge is used in planning and operational practice.

6.0 Approval Scope

This Approval Decision relates to the Weyerhaeuser FMP dated February 10, 2006. All coniferous and deciduous operators within FMU R12 shall conduct their activities in accordance with the FMP and the Approval Conditions.

Weyerhaeuser shall meet the requirements (dates and content) of the Approval Conditions unless the Executive Director, Forest Management Branch, agrees to alternate requirements in writing. Weyerhaeuser will execute meaningful dialogue with the designated department decision-maker during the development of the required submissions. Where deadlines for submissions are specified, Weyerhaeuser shall submit the documents at least one month prior to the date in order to allow department staff sufficient time for review.

In the Approval Decision **bold text** identifies specific timelines, requirements and the department manager responsible for the review. Non-bolded text provides the rationale for the condition and specific considerations to be addressed in meeting the condition.

In the event of an inconsistency between the FMP and existing, new, or revised legislation or regulation, the legislation or regulation shall apply.

7.0 Value, Objective, Indicator and Target (VOIT) matrix

FMPs prepared by industry are required to identify performance standards, which are described by Values, Objectives, Indicators and Targets (VOIT). These VOITs must be addressed in detail in the FMP.

Weyerhaeuser has identified Goals (which equate to Values) and Objectives in the FMP, but their respective indicators and targets have not been identified. These integral components of

FMPs are necessary for performance monitoring, accomplishment reporting and gauging the success of the FMP. The plan must be amended in the following way.

Approval Condition 7.1 - VOIT Table

i. **By January 31, 2007, Weyerhaeuser shall develop a VOIT table, consistent with the Alberta Forest Management Planning Standard - Annex 4, using the existing FMP goals, objectives and strategies as a starting point. The work must be completed to the satisfaction of the Senior Manager, Forest Planning Section.**

8.0 Spatial Harvest Sequence

The spatial (mapped) harvest sequence (SHS) is the most important output of the FMP as it implements the strategies the companies must follow to achieve the predicted future forest condition. While dependent on many factors, the future forest condition is strongly influenced by harvest patterns, intensity and schedules. It presents spatially and temporally how the integration of environmental, economic, and social values will be achieved on the FMA. Adherence to a properly planned harvest sequence is imperative to achieving the forecasted future forest.

Weyerhaeuser commits to tracking variance, but there is insufficient detail as to how this will be carried out.

Approval Condition 8.1 – Spatial Harvest Sequence

i. **Weyerhaeuser must follow the mapped 10-year harvest sequence as presented in the FMP (or as revised per Approval Condition 17.1).**

ii. **To address operational planning concerns, all timber disposition holders are authorized to modify the SHS by deleting no more than 20% of the total sequenced area in each Landscape Management Unit (LMU) by decade, while harvesting no more than 100% of the total area within the SHS by LMU, by decade.**

iii. **Preference should be given to selecting stands from the second 10-year period of the SHS (years 16-25) when replacing deleted stands (from ii above). Where this is not feasible, replacements may be from any other stands identified in the approved net landbase of the FMP, with the following exception:**

   a. **Late seral stage stands may be selected provided that the late seral stage targets are still met.**

iv. **Where timber operators exceed the variance described in (ii), the Area Manager, may require the completion of a compartment (LMU) assessment**

and the Senior Manager, Forest Planning Section may recommend the adjustment of the approved annual allowable cut (AAC) to reflect the impact of the variance.

v. **The department requires the variance from the SHS to be reported annually, and the 5-year Stewardship Report to analyze the variance from the SHS.**

vi. **Following the achievement of Approval Condition 17.1, the department will generally not request a modification of the approved harvest sequence for the first 15 years of the planning period unless required by a change in legislation or a policy approved by the Minister.**

9.0 Predicted Future Forest

The Timber Supply Analysis contains a description of the future forest that is based on a wildfire dominated natural disturbance regime. In defining this future forest, Weyerhaeuser uses a coarse-filter approach to maintaining species diversity. A fine-filter assessment of selected feature species was not provided.

Although the coarse filter approach is deemed to be effective for a majority of wildlife, fine filter assessments are used as checks against the coarse-filter approach. This can be accomplished using predictions of habitat availability for selected species throughout the planning period. The objective is to ensure that habitat for the species selected does not disappear through time.

Approval Condition 9.1 – Predicted Future forest

i. **By May 1, 2007, Weyerhaeuser shall forecast habitat availability for selected wildlife species and report the results. The analyses shall be submitted to the Senior Manager, Forest Planning Section and appended to the Preferred Forest Management Scenario of the FMP. The list of wildlife species shall be determined in consultation with the Fish and Wildlife Program Manager and the Senior Manager, Forest Planning Section.**

ii. **To address FMP implementation and enable variance analysis for Stewardship Reporting, the department will assume the levels of interior older forest, seral stages, and patch size distribution to be targets the companies will achieve. These shall be documented in the VOIT table developed to meet Approval Condition 7.1.**

10.0 Structure Retention in Harvested Areas

Throughout the province, forest industries practice green tree retention within harvested areas to create residual (post-harvest) stand structure. The department has approved detailed forest management plans that proposed structure retention targets ranging between 1% and 15% of the merchantable volume, with the view that the result will be a variety of forest conditions that when assessed, will enable a refinement of future targets. Weyerhaeuser's strategy to maintain an average of 5% of merchantable volume within stands falls within this range.

The FMP indicates that Weyerhaeuser has reduced the proposed harvest levels by a "flat-rate" volume reduction of 5% to account for merchantable volume retained for residual structure in harvested areas. This strategy is acceptable but needs to be supported by a program to monitor and report actual retained volumes for timber harvest production reconciliation for all operators.

Approval Condition 10.1 – Structure Retention and Monitoring

i. **All operators in FMU R12 will plan and carry out their operations to achieve the average structure retention target of 5% of the coniferous and 5% of the deciduous AAC. Species composition and timber profile representative of the original stand conditions shall be retained to achieve acceptable biodiversity results. Non-merchantable timber may also be used where it occurs in sufficient quantity, pattern and profile to supplement the desired condition.**

ii. **By January 31, 2007, Weyerhaeuser must develop standard operating procedures acceptable to the Senior Manager, Forest Planning Section for annually quantifying the structure (merchantable and non-merchantable) retained on harvested areas. The Stand Level Retention Monitoring Report shall report the results and analysis of the structure retention monitoring program in the Stewardship Report.**

iii. **Merchantable volume retained after May 1, 2006 for structure that exceeds the 5% target shall be chargeable as AAC production and shall be reconciled every 5 years at the end of each cut control period.**

11.0 Silviculture Strategy

Defining the silviculture practices that will be used to establish managed stands is important. FMPs must present the reforestation strategies to be used to achieve the timber yields from the regenerated stands. Silvicultural practices must be appropriate for the local range of conditions.

The Silviculture table presented in FMP (Appendix 6-1) is a reasonable summary of the silviculture tactics to be used to regenerate the future forest. These prescriptions are to be applied by all timber operators operating in the FMA.

12.0 Industrial Timber Salvage

Accounting for all sources of timber volume drain is critical to ensuring the approved AACs are sustainable. In Alberta, non-forestry industrial operations contribute to this drain and must be included in the total.

Weyerhaeuser's salvage strategy does not adequately address the following:

1. Accounting for salvaged and unsalvaged merchantable timber;
2. Charging timber volumes proportionally to timber dispositions;
3. Weakly defined tracking and reporting systems.

Approval Condition 12.1 – Industrial Timber Salvage

i. **All timber depleted (salvaged and non-salvaged merchantable timber) by non-forestry operations shall be reported as production for cut control purposes, except for low impact seismic programs where the average line width is less than 2.5 metres.**

ii. **The volumes used shall be those from the published timber damage assessment tables or as otherwise agreed by the Senior Manager, Timber Production, Auditing and Revenue Section.**

iii. **The volumes shall be charged to the FMA by cover group (C, CD, DC, D).**

iv. **By January 31, 2007, in consultation with quota operators, Weyerhaeuser shall implement a salvage timber volume tracking and reporting system acceptable to the Senior Manager, Timber Production, Auditing and Revenue Section.**

13.0 Public Involvement

Weyerhaeuser must demonstrate that meaningful consultation has been carried out in an open, inclusive and effective manner, for the general public, stakeholders, the Forest Advisory Committee (FAC) and First Nations. Specific goals, objectives and strategies have been provided that directed consultation activities, but the FMP does not provide evidence of the actual activities carried out or a listing of the specific concerns raised and how they have been addressed.

Approval Condition 13.1 – Public Involvement

i. **By January 31, 2007, Weyerhaeuser shall provide the following information to the Senior Manager, Forest Planning Section.**

   a. **A report summarizing the public involvement activities (with dates) completed by Weyerhaeuser during the development of the FMP including a specific reference to the public review of the completed FMP submitted for approval.**

   b. **A summary of comments received from each public involvement activity including those received during review of the completed FMP. The list shall identify how Weyerhaeuser addressed each comment and, where possible, identify specific references in the FMP.**

ii. **On an on-going basis, Weyerhaeuser shall keep complete and accurate written records of its consultations with the public, stakeholders, FAC and First Nations (i.e., comments received, and how concerns identified have been addressed and incorporated into forest management planning). This information shall be reported in the Stewardship Report and future FMPs.**

iii. **When Alberta's policy for First Nations consultation is complete, the Company shall work with the department in identifying necessary action plans, and where required, sections within the FMP shall be amended.**

14.0 Alternative Regeneration Standards

The Regeneration Survey Manual establishes provincial reforestation performance standards (provincial survey standard) that are intended to create fully stocked natural stand yields. These standards shall be used until alternative regeneration performance standards are developed that relate to each yield projection used in the FMP.

Approval Condition 14.1 – Alternative Regeneration Standards

i. **By May 1, 2011, Weyerhaeuser must be using alternative regeneration performance standards acceptable to the Senior Manager, Operations Section.**

15.0 Secondary Volume Monitoring and Replacement

The coniferous and deciduous AACs include both primary and secondary (incidental) volumes. The Provincial Reforestation Standards allow for incidental volumes of secondary species to contribute to the reforestation success of the harvest area. To ensure appropriate volumes are produced at maturity, a management strategy specifically addressing secondary volume replacement is necessary. Weyerhaeuser is developing alternative reforestation standards that will encompass incidental replacement, but in the interim, the FMP offers no guidance on this subject.

Approval Condition 15.1 - Secondary Volume Monitoring and Replacement

i. **By January 31, 2007, Weyerhaeuser shall develop a silviculture strategy to ensure appropriate stocking levels of secondary coniferous and deciduous species are replaced on harvested areas.**

ii. **The strategy shall be acceptable to the Senior Manager, Forest Planning Section.**

16.0 FireSmart Strategy

Weyerhaeuser has created a Fire Behaviour Prediction map as well as Crown Susceptibility Ratings for the management area. This is the first step in determining the treatments necessary to reduce fire threat for the planning period but more work is necessary. I believe that FireSmart planning can be integrated into the re-planning work to address Mountain Pine Beetle susceptibility reduction.

Decision Condition 16.1 – FireSmart Strategy

i. **Weyerhaeuser will develop a plan for reducing wildfire threat on the management area in consultation with the Forestry Manager of the Clearwater Area. The plan must meet the approval of the Senior Manager, Forest Planning Section and be included in the revised SHS being prepared for MPB planning.**

17.0 Forest Health

Weyerhaeuser's FMP contains an objective and several strategies for maintaining a healthy forest. The FMP infers the department is primarily responsible for forest health rather than communicating the shared responsibility. This does not align with the Alberta Forest Health Strategy and must be re-visited.

Approval Condition 17.1 – Forest Health

i. **Weyerhaeuser's forest health activities shall adhere to the "*Alberta Forest Health Strategy and the Shared Roles and Responsibilities between SRD and the Forest Industry*". The FMP shall be revised to acknowledge this shared commitment.**

ii. **By January 31, 2007, Weyerhaeuser shall analyze the harvest sequence in relation the requirements of the *Mountain Pine Beetle Action Plan for Alberta* and provide a report to the Senior Manager, Forest Planning Section.**

   a. **Weyerhaeuser shall re-sequence as necessary to comply with the requirements of the *Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations.***

   b. **Weyerhaeuser shall schedule planning activities to achieve the mountain pine beetle susceptibility reduction targets identified in the Prevention (Pine) Strategy of the *Mountain Pine Beetle Action Plan for Alberta* and the *Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations.***

18.0 Performance Monitoring

Annual Reports and 5-year Stewardship Reports are used to monitor the successful implementation of FMPs.

Approval Condition 18.1 – Performance Monitoring

i.) **Weyerhaeuser shall submit Annual Reports and Stewardship Reports reporting on all objectives and associated indicators (including 2.2(a)) as described in FMP Chapter 7, Section 7.5. Where variance exists, the analysis shall discuss the reason for the variance and the Company's corrective action taken or proposed.**

ii.) **A Stewardship Report acceptable to the Senior Manager, Forest Planning Section shall be submitted by November 30, 2011.**

19.0 Timber Quotas and Timber Production Control

The approval of the AAC effective date (November 18, 2000) for FMU R12 required that administrative adjustments be made to the timber production control records. The Hansen and Tall Pine Timber quotas and the Weyerhaeuser FMA are affected.

The quadrant (quota) and periodic (FMA) allowable cuts have been adjusted as of November 18, 2000, the effective date of the new AAC. All volume reconciliations (positive or negative) of the quadrant or periodic allowable cuts shall be made in subsequent quadrants. Refer to table 3.1 Quadrant and Periodic Allowable Cuts for 2000 to 2006.

Financial penalties will not be assessed against quota holders in cases where the department's administrative adjustments result in quota timber production to exceed 110% of the quadrant allowable cut.

20.0 Approved Annual Allowable Cuts

Refer to Tables 2.1, and 2.2: Historical Allocations and Approved Annual Allowable Cuts.

Refer to Tables 3.1, 3.2 and 3.3: Quadrant and Periodic Allowable Cuts.

21.0 Authorization

The Detailed Forest Management Plan for the Weyerhaeuser – Drayton Valley FMA area dated February 10, 2006 is approved subject to the Approval Conditions being met, and the Annual Allowable Cuts presented in this Approval Decision. The Annual Allowable Cuts are effective beginning November 18, 2000.

The next DFMP shall be received by the department for approval prior to May 1, 2015.

22.0 Regulated Forestry Professional Validation of Allocation Tables

The following regulated forestry professionals agree and validate that the following tables;

i. 2.1 Historical Allocations for FMU R12,
ii. 2.2 Allocations and Approved Annual Allowable Cuts for FMU R12,
iii. 3.1 FMA Periodic Allowable and Quadrant Cuts for 2000 to 2006,
iv. 3.2 Quota Periodic Allowable and Quadrant Cuts for 1996 to 2006, and
v. 3.3 Quota Periodic Allowable and Quadrant Cuts for 2006 to 2011,

are complete and accurate and document the timber dispositions, allocations, and approved harvest levels for FMU R12.

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Table 2.1 Historical Allocations for FMU R12

Company Name	Disposition #	Coniferous Timber			Deciduous Timber		
		Allocation	AAC[1] (m^3/yr)	Incidental AAC[1] (m^3/yr)	Allocation	AAC[2] (m^3/yr)	Incidental AAC[2] (m^3/yr)
Weyerhaeuser	FMA 8500023	48.47%	178,175	38,245	93.21%	244,032	10,930
Weyerhaeuser	CTQR020006	8.70%	32,000				
Weyerhaeuser	CTQR020009Y	5.52%	20,273				
Weyerhaeuser	CTQR020009U	22.69%	83,399				
Weyerhaeuser	DTARU20001				5.85%	15,315	
Weyerhaeuser	CTQR050008	2.11%	7,753				
Tall Pine Timber Co. Ltd.	CTQR010004	5.98%	22,000				
Tall Pine Timber Co. Ltd.	CTQR010005	1.24%	4,550				
Tall Pine Timber Co. Ltd.	CTQR040011	1.10%	4,051				
Dale Hansen	CTQR020007	2.46%	9,053				
Lodgepole Community Timber Program	CTP	1.10%	4,035				
Miscellaneous Timber Use	LTP	0.63%	2,328	386	0.94%	2,465	110
Total		100.00%	367,617	38,631	100%	261,812	11,040

[1] Coniferous utilization standard is 15/11/30

[2] Deciduous utilization standard is 15/10/30

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Table 2.2: Allocations and Approved Annual Allowable Cuts for FMU R12[1]

Company Name	Disposition #	Land Base Stand Type/Source	Coniferous Timber		Deciduous Timber	
			FMU Allocation (%)	AAC[2] (m^3/yr)	FMU Allocation (%)	AAC[3] (m^3/yr)
Weyerhaeuser	FMA0500042	C, CD, DC, & D	86.05%	421,025	91.94%	263,090
Weyerhaeuser	CTQR120005	C, CD, DC, & D	4.22%	20,669		
Weyerhaeuser	DTAR120001	C, CD, DC, & D			7.13%	20,402
Dale Hansen	CTQR120001 (R1 Q7)	C & CD	1.76%	8,600		
Tall Pine Timber Co. Ltd.	CTQR120002 (R1 Q4)	C & CD	3.23%	15,806		
Tall Pine Timber Co. Ltd.	CTQR120003 (R1 Q5)	C & CD	0.67%	3,269		
Tall Pine Timber Co. Ltd.	CTQR12004 (R4 Q11)	C & CD	2.30%	11,254		
Lodgepole Community Timber Program	CTP	C & CD	0.82%	4,000 (fixed volume)		
Miscellaneous Timber Use	LTP	C, CD, DC, & D	0.95%	4,669	0.93%	2,657
Total			100.00%	489,292	100.00%	286,149

1 Period beginning November 18, 2000
2 Coniferous utilization standard is 15/11/15
3 Deciduous utilization standard is 15/10/15

Table 3.1 FMA Periodic Allowable and Quadrant Cuts for 2000 to 2006

Company Name	Disposition Number	FMU	Periodic/Quadrant Cut Control Period	Approved Coniferous Quadrant Reconciliation Volume (m^3)	Approved Deciduous Quadrant Reconciliation Volume (m^3)	Coniferous Periodic/ Quadrant Allowable Cut (m^3)	Deciduous Periodic/ Quadrant Allowable Cut (m^3)	Comments
Weyerhaeuser	CTQR020006	R2	May 1, 1996 to November 17, 2000			145,622		QAAC : 4.550684931 years x 32,000 m^3/yr = 145,622 m^3. Quota production from Dec 2000 to April 2001 transferred to FMA8500023. Total production assessed against CTQ to November 17, 2000 was 96,689 m^3.
Weyerhaeuser	CTQR020009	R2	May 1, 1996 to November 17, 2000	1,949		473,728		QAAC : 4.550684931 years x 103,672 m^3/yr + 1,949 m^3 from previous quadrant = 473,728 m^3. Quota production from Dec 2000 to April 2001 transferred to FMA8500023. Total production assessed against CTQ to November 17, 2000 was 367,010 m^3.
Weyerhaeuser	CTQR050008	R5	May 1, 1996 to November 17, 2000	-1,664		33,617		QAAC : 4.550684931 years x 7,753 m^3/yr -1,664 m^3 from previous quadrant = 33,617 m^3. Quota production from Dec 2000 to April 2001 transferred to FMA8500023. Total production assessed against CTQ to November 17, 2000 was 25,570 m^3.
Weyerhaeuser	DTAR020001	R2	May 1, 1996 to April 30, 2001		8,918		203,708	QAAC : 5 years x 38,958 m^3/yr + 8,918 = 203,708 m^3. Quota production from May 1996 to April 2001 resulted in underproduction of 104,220 m^3. DTA split 60.69% in Sundre Forest Products Ltd. FMA under DTAR100002 and 39.31% rolled into Weyerhaeuser FMA. Underproduction allocated to DTAR100002 is 63,251 m^3 and 40,969 m^3 to FMA8500023.

Table 3.1 FMA Periodic Allowable and Quadrant Cuts for 2000 to 2006 (cont'd)

Company Name	Disposition Number	FMU	Periodic/Quadrant Cut Control Period	Approved Coniferous Quadrant Reconciliation Volume (m^3)	Approved Deciduous Quadrant Reconciliation Volume (m^3)	Coniferous Periodic/ Quadrant Allowable Cut (m^3)	Deciduous Periodic/ Quadrant Allowable Cut (m^3)	Comments
Weyerhaeuser	FMA8500023	R12	November 18, 2000 to November 17, 2005	13,789	40,969	2,118,914	1,356,419	Coniferous PAC : 421,025 m^3 x 5 yrs +(48,933 m^3 + 106,718 m^3 + 8,047 m^3 -149,909 m^3 (overcut)). Note the numbers in brackets are the AAC reconciliation tied to the cancellation of CTQR020006; CTQR020009 and CTQR050008 respectively, effective Nov. 17, 2000. Total audited production 2,014,752 m^3 + 3,985 m^3 + 153,301 m^3 + 9,366 m^3 = 2,181,404 m^3 Deciduous PAC : 263,090 m^3 x 5 years + 40,969 m^3. **Note:** The 40,969 m^3 is the AAC reconciliation tied to the cancellation of DTAR020001. Total audited production 1,198,016 m^3.
Weyerhaeuser	FMA0500042	R12	November 18, 2005 to April 30, 2006	-62,490	158,403	126,683	276,613	Coniferous PAC : 421,025 m^3 x .449315068 yrs - 62,490 m^3. Unaudited production to April 2006 was 208,587 m^3 for an overcut volume of 81,904 m^3. Deciduous PAC : 263,090 m^3 x .449315068 years + 158,403 m^3. Unaudited production to April 2006 was 122,372 m^3 for a carryover volume of 154,241 m^3.

Table 3.2 Quota Periodic Allowable and Quadrant Cuts for 1996 to 2006

Company Name	Disposition Number	FMU	Periodic/Quadrant Cut Control Period	Approved Coniferous Quadrant Reconciliation Volume (m^3)	Approved Deciduous Quadrant Reconciliation Volume (m^3)	Coniferous Periodic/ Quadrant Allowable Cut (m^3)	Deciduous Periodic/ Quadrant Allowable Cut (m^3)	Comments
Dale Hansen	CTQR020007	R2	May 1, 1996 to April 30, 2001			45,061		QAAC : May 1, 1996 to Nov 17, 2000 @ 9,053 m^3/yr + Nov 18, 2000 to April 30, 2001 @ 8,600 m^3/yr. Total audited production 42,547 m^3 for a carryover volume of 2,514 m^3. A non-competitive CTP was issued for 3,658 m^3 based on the old AAC and a total volume produced was 4,065 m^3. Excess production of 1,551 m^3 to be assessed against CTQR120001.
Dale Hansen	CTQR020007	R2	May 1, 2001 to April 30, 2004			25,800		QAAC : 8,600 m^3 x 3 years. Total audited production was 17,620 m^3 for a carryover volume of 8,180 m^3. Quota cancelled and replaced with CTQR120001.
Dale Hansen	CTQR120001	R12	May 1, 2004 to April 30, 2006	8,180		25,380		QAAC : 8,600 m^3 x 2 years + 8,180 m^3. Total audited production was 31,239 m^3 for an over production of 5,859 m^3.
Tall Pine Timber Co. Ltd.	CTQR010004	R1	May 1, 1996 to April 30, 2001			107,217		QAAC : May 1, 1996 to Nov 17, 2000 @ 22,000 m^3/yr + Nov 18, 2000 to April 30, 2001 @ 15,806 m^3/yr. Total audited production 83,853 m^3 for a carryover volume of 23,364 m^3.
Tall Pine Timber Co. Ltd	CTQR010004	R1	May 1, 2001 to April 30, 2004	23,364		70,782		QAAC : 15,806 m^3 x 3 years + 23,364 m^3. Total audited production was 47,252 m3 for a carryover volume of 23,530 m3. Quota cancelled and replaced with CTQR120002.
Tall Pine Timber Co. Ltd	CTQR120002	R12	May 1, 2004 to April 30, 2006	23,530		55,142		QAAC : 15,806 m^3 x 2 years – 23,530 m^3. Total unaudited production was 49,733 m^3 for a carryover volume of 5,409 m^3.

Table 3.2 Quota Periodic Allowable and Quadrant Cuts for 1996 to 2006 (cont'd)

Company Name	Disposition Number	FMU	Periodic/Quadrant Cut Control Period	Approved Coniferous Quadrant Reconciliation Volume (m^3)	Approved Deciduous Quadrant Reconciliation Volume (m^3)	Coniferous Periodic/ Quadrant Allowable Cut (m^3)	Deciduous Periodic/ Quadrant Allowable Cut (m^3)	Comments
Tall Pine Timber Co. Ltd	CTQR010005	R1	May 1, 1996 to April 30, 2001			22,174		QAAC : May 1, 1996 to Nov 17, 2000 @ 4,550 m^3/yr – Nov 18, 2000 to April 30, 2001 @ 3,269 m^3/yr. Total audited production 14,938 m^3 for a carryover volume of 7,236 m^3. An non-competitive CTP was issued for 7,812 m^3 and a total volume produced was 7,621 m^3. Excess CTP production of 385 m^3 to be applied to the next quadrant for CTQR010005.
Tall Pine Timber Co. Ltd	CTQR010005	R1	May 1, 2001 to April 30, 2004	-385		9,422		QAAC : 3,269 m^3 x 3 years - 385 m^3. Total audited production was 17,946 m^3 for an over production of 8,524 m^3. Quota cancelled and replaced with CTQR120003.
Tall Pine Timber Co. Ltd	CTQR120003	R12	May 1, 2004 to April 30, 2006	-8,524		-1,986		QAAC : 3,269 m^3 x 2 years - 8,524 m3. No production for this quadrant.
Tall Pine Timber Co. Ltd	CTQR040011	R4	May 1, 1996 to April 30, 2001			23,491		QAAC : May 1, 1996 to Nov 17, 2000 @ 4,051 m^3/yr + Nov 18, 2000 to April 30, 2001 @ 11,254 m^3/yr. Total audited production 21,070 m^3 for a carryover volume of 2,421 m^3.
Tall Pine Timber Co. Ltd	CTQR040011	R4	May 1, 2001 to April 30, 2004	2,421		36,183		QAAC : 11,254 m^3 x 3 years + 2,421. Total audited production was 8,095 m^3 for a carryover volume of 28,088 m^3. Quota cancelled and replaced with CTQR120004.
Tall Pine Timber Co. Ltd	CTQR120004	R12	May 1, 2004 to April 30, 2006	28,088		50,596		QAAC : 11,254 m^3 x 2 years + 28,088 m^3. Total unaudited production of 8,418 m^3 for a carryover volume of 42,178 m^3.

Table 3.3 Quota Periodic Allowable and Quadrant Cuts for 2006 to 2011

Company Name	Disposition Number	FMU	Periodic/Quadrant Cut Control Period	Approved Coniferous Quadrant Reconciliation Volume (m^3)	Approved Deciduous Quadrant Reconciliation Volume (m^3)	Coniferous Periodic/ Quadrant Allowable Cut (m^3)	Deciduous Periodic/ Quadrant Allowable Cut (m^3)	Comments
Weyerhaeuser	FMA0500042	R12	May 1, 2006 to April 30, 2011	-81,904	154,241	2,023,221	1,469,691	Coniferous PAC : 421,025 m^3 x 5 yrs - 81,904 m^3. Deciduous PAC : 263.090 m^3 x 5 yrs + 154,241 m^3.
Weyerhaeuser	CTQR120005	R12	May 1, 2006 to April 30, 2011	112,625		215,970		Assuming 5 yrs x 20,669 m^3/yr - ((Nov 18, 2000 to April 30, 2006) 20,669 * 5.448993 – 112,625 m^3)
Weyerhaeuser	DTAR120001	R12	May 1, 2006 to April 30, 2011		111,170		213,180	Assuming 5 yrs. x 20,402 m^3/yr. +((Nov 18, 2000 to April 30, 2006) 20,402 * 5.448993 – 111,170 m^3)
Dale Hansen	CTQR120001	R12	May 1, 2006 to April 30, 2011	-5,859		37,141		Assuming 5 yrs. x 8,600 m^3/yr - 5,859 m^3.
Tall Pine Timber Co. Ltd	CTQR120002	R12	May 1, 2006 to April 30, 2011	5,409		84,439		Assuming 5 yrs. x 15,806 m^3/yr + 5,409 m^3.
Tall Pine Timber Co. Ltd	CTQR120003	R12	May 1, 2006 to April 30, 2011	-1,986		14,359		Assuming 5 yrs. x 3,269 m^3/yr - 1,986 m^3.
Tall Pine Timber Co. Ltd	CTQR120004	R12	May 1, 2006 to April 30, 2011	42,178		98,448		Assuming 5 yrs. x 11,254 m^3/yr + 42,178 m^3.
Lodgepole Community Timber Program	CTP	R12	May 1, 2006 to April 30, 2011			20,000		Assuming 5 yrs. x 4,000 m^3/yr m^3 (coniferous).
Local Timber Use	LTP	R12	May 1, 2006 to April 30, 2011			23,345	13,285	Assuming 5 yrs. X 4,669 m^3/yr (coniferous) Assuming 5 yrs. X 2,657 m^3/yr (deciduous)
Total						2,516,923	1,696,156	

16/10/2006

Appendix 4-2 – FMA 0500042 – MPB Addendum Approval (May 1, 2007)

Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

Forest Management Plan Amendment

Mountain Pine Beetle Addendum
Forest Management Unit R12
Approval Decision

Weyerhaeuser Company Ltd.
Pembina Forestlands
Drayton Valley, Alberta

Forest Management Agreement
#0500042

COLLEGE OF ALBERTA PROFESSIONAL FORESTERS
DOUGLAS SKLAR
RPF 28

Date: June 24, 2008
Effective: May 1, 2007

Approved by: ______________
D. (Doug) Sklar, RPF
Executive Director
Forest Management Branch
Forestry Division

Table of Contents

1.0 Introduction

Alberta is experiencing a significant outbreak of mountain pine beetle (MPB) and is implementing control strategies with respect to this outbreak and strategies to prevent future outbreaks[1]. Weyerhaeuser Company Ltd. (Weyerhaeuser) addendum to its recently approved Forest Management Plan (FMP) meets the requirements established by Alberta for such amendments[2]. This decision provides the rationale for approval and direction for ongoing work.

It is important to note the implementation of this plan is not intended to control the current MPB outbreak but rather to take actions over the next twenty years to create a forest that is more resistant to such outbreaks by dramatically reducing the overall susceptibility of the pine forest (Pine Strategy). This is a prudent and necessary strategy to avoid the types of catastrophic changes being seen in British Columbia's pine forests, if the extent of the current outbreak is limited. However, if the current outbreak in Alberta expands as rapidly as the British Columbia outbreak, the strategies in this plan will have to be modified to address that reality.

Alberta has directed[3] that the key outcomes of three scenarios (the current management plan or status quo, the Pine Strategy and a MPB outbreak) be presented. I believe given the MPB outbreak in Alberta, the current management plans do not present likely scenarios and considering today's circumstances, comparison of the Pine Strategy and the MPB outbreak scenarios are the pertinent analyses.

Alberta's goal is to mitigate the effects of MPB on the social, environmental, and economic values of Alberta's forests. To achieve this goal, Alberta must make trade-offs which involve achieving a desired result, generally at the complete or partial expense of something else. Stakeholders are often interested in only one value and are not prepared to consider trade-offs; whereas Alberta must make trade-off decisions in order to reasonably meet its goal for the overall benefit of Albertans.

2.0 Forest Management Plans (FMP) and Priority of MPB Control Strategies

The approval of the FMP amendment results in a new spatial harvest sequence and timber supply. Commitments in the balance of the existing FMP remain in effect until they are replaced by a new FMP expected by April 1, 2016. The status of the MPB outbreak will likely be apparent in time for the preparation of the new FMP which will then be able to better address the trade-offs between key outcomes.

The major MPB infestation in British Columbia has spread into Alberta: specifically the Eastern Slopes of the Rocky Mountains, Banff and Jasper National Parks, the Bow Corridor in Kananaskis Country, the Crowsnest Pass, the Grande Prairie region, and east to Slave Lake. MPB infestations are located to the north, south and west of the Weyerhaeuser Drayton Valley FMA. In the event of an outbreak in the forest management unit (FMU), it will be crucial to take all appropriate steps to control the infestation by executing control activities (Level 1 and Level 2[4]) which will take priority over the spatial sequence in this amendment. I expect

[1] See the *Mountain Pine Beetle Action Plan for Alberta* (AP) and the *Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations* (IP) on the department of Sustainable Resource Development (SRD) website

[2] See the *Interpretive Bulletin - Planning Mountain Beetle Response Operations* on SRD website.

[3] See IP

[4] See AP for definitions

activities over the next few years to be a combination of control (Level 1 and Level 2) and prevention (Pine Strategy), and operational changes necessary to accomplish both will be handled through annual operating plans.

3.0 Habitat for Species of Special Concern (Grizzly Bear Habitat)

Grizzly Bear Model outputs indicate the implementation of Weyerhaeuser's Pine Strategy Plan impacts grizzly bear habitat. Existing linear disturbance density is reported as 0.66 km/km^2 and is predicted to increase to 0.72 km/km^2 as the Pine Strategy Plan is implemented. Operational planning can mitigate many of the impacts of timber harvest and should be used where conditions dictate.

Alberta's Grizzly Bear Recovery Plan (GBRP) has been accepted by the Minister of Sustainable Resource Development. The GBRP recognizes that reduced grizzly bear survival and reproductive success are linked to human activity in priority habitats. Access development increases this activity. The department is developing an implementation plan for the GBRP in the near term. When this is published the Company shall address these requirements in its operational plans and the next forest management plan will address this issue further.

4.0 Access

A Road Corridor Plan is presented outlining access to operating compartments. Access is essential to the management of MPB and the impacts will be mitigated with Weyerhaeuser's continued good planning, effective construction, timely reclamation, and reforestation. The company can act to make roads impassable and to quickly reclaim access into completed compartments. Access is difficult to restrict once routes are built and the government must take a solid stance on this issue in priority habitats. The plan is reasonable and implements the MPB Strategy efficiently.

5.0 Water Yield

Weyerhaeuser assessed the impact of the Pine Strategy Plan on the watersheds in the FMA. Maximum annual water yield increases range between 0.6 % and 25%. Seven watersheds (Stevens (25%), Colt (21%) Blanchard (19%), Wawa (18.3%), Tallpine (17.9%), Rehn (16.9%), and Big Beaver (15.3%) exceeded a 15% increase. The peaks are forecast to occur between year 14 and 28. The results are not unexpected and are acceptable outcomes from the planned operations to address MPB susceptible pine reduction.

6.0 Long Term Fibre Sustainability

The fibre flow proposed in the MPB Preferred Scenario is acceptable for the forest management unit. The coniferous increase from 489,292 m^3 to 954,301 m^3 is planned for 18 years followed by a reduction to 440,363 m^3 beginning in year 2025.

7.0 Pine Strategy Implementation

The department recognizes that uncertain economic conditions may limit the company's ability to fully implement the Pine Strategy amendment. At the time of this approval, the Weyerhaeuser Drayton Valley oriented strand board mill has curtailed its production indefinitely. This will severely impact the utilization of deciduous timber generated on this management unit.

The company has developed a rational and feasible FMP that achieves a significant reduction in MPB susceptible pine on its management area. On-going and timely communication with local government staff is essential to manage the issues identified, and those yet to be identified. Weyerhaeuser is encouraged to continue its efforts to keep the public and stakeholders advised of its operational plans and accomplishments in addressing the MPB situation.

The implementation of the Pine Strategy does not guarantee prevention of an outbreak in the near future, but in twenty years, will create a forest that is very resistant to such outbreaks. Should it occur, salvage strategies will address the outbreak to minimize the socio-economic and environmental impacts.

8.0 Embedded Timber Operators

Weyerhaeuser Company Ltd. has reached agreement with the embedded timber operators and the department regarding operational sequencing and annual allowable cut (AAC) sharing. Table 2 presents the approved AACs for each forest management unit and operator.

9.0 Performance Monitoring and Reporting

The effective implementation of the Pine Strategy throughout Alberta is very important, and timely information is vital to ensuring the best decisions are made and the most appropriate management strategies are developed. Considering this, the department will require Pine Strategy progress reports to be prepared to keep the department, other agencies and the public knowledgeable and current on the work completed. The department will publish these requirements at a later date.

10.0 Authorization

The Forest Management Plan Amendment for Forest Management Agreement 0500042 dated March 20, 2008 is approved as per the annual allowable cuts presented in Table 2.

The annual allowable cuts are effective beginning May 1, 2007.

The next forest management plan shall be received by the department in time for approval by April 1, 2016.

Table 1. Historical Annual Allowable Cuts (AAC) for FMU R12[1]

Company Name	Disposition #	Land Base Stand Type/Source	Coniferous Timber		Deciduous Timber	
			FMU Allocation (%)	AAC[2] m^3/yr	FMU Allocation (%)	AAC[3] (m^3/yr)
Weyerhaeuser	FMA0500042	C, CD, DC & D	86.05%	421,025	91.94%	263,090
Weyerhaeuser	CTQR120005	C, CD, DC & D	4.22%	20,669		
Weyerhaeuser	DTAR120001	C, CD, DC & D			7.13%	20,402
Dale Hansen	CTQR1200001 (R1 Q7)	C & CD	1.76%	8,600		
Tall Pine Timber Co. Ltd.	CTQR120002 (R1 Q4)	C & CD	3.23%	15,806		
Tall Pine Timber Co. Ltd.	CTQR120003 (R4 Q5)	C & CD	0.67%	3,269		
Tall Pine Timber Co. Ltd.	CTQR12004 (R4 Q11)		2.30%	11,254		
Lodgepole Community Timber Program	CTP	C & CD	0.82%	4,000 (fixed volume)		
Miscellaneous Timber Use	LTP	C, CD, DC & D	0.95%	4,669	0.93%	2,657
Total			**100.00%**	**489,292**	**100.00%**	**286,149**

[1] Period beginning November 18, 2000
[2] Coniferous utilization standard is 15/11/15 cm
[3] Deciduous utilization standard is 15/10/15 cm

Table 2. Approved Annual Allowable Cuts (AAC) for FMU R12[1]

Company Name	Disposition #	Land Base Stand Type/Source	Coniferous Timber		Deciduous Timber	
			FMU Allocation (%)	AAC[2] m^3/yr	FMU Allocation (%)	AAC[3] (m^3/yr)
Weyerhaeuser	FMA0500042[4]	C, CD, DC, D	87.40%	834,067	92.87%	258,524
Weyerhaeuser	CTQR120005	C, CD, DC, D	4.22%	40,272		
Weyerhaeuser	DTAR120001	C, CD, DC, D			7.13%	19,848
Dale Hansen	CTQR120001 (R1 Q7)	C, CD	1.76%	16,796		
Tall Pine Timber Co. Ltd.	CTQR120002 (R1 Q4)	C, CD	3.23%	30,824		
ll Pine Timber Co. Ltd.	CTQR120003 (R4 Q5)	C, CD	0.67%	6,394		
Tall Pine Timber Co. Ltd.	CTQR120004 (R4 Q11)	C, CD	2.30%	21,949		
Lodgepole Community Timber Program	CTP (fixed volume)	C, CD	0.42%	4,000		
Total			**100.00%**	**954,301**	**100.00%**	**278,372**

[1] **Effective beginning May 1 2007 and ending November 17, 2025**

[2] Coniferous utilization standard is 15/11/15 cm

[3] Deciduous utilization standard is 15/10/15 cm

[4] Pursuant to clause 7 (2) (a) (ii) of Weyerhaeuser Company Ltd.'s Forest Management Agreement (O.C. 514/2005) up to 1% of the Weyerhaeuser FMA coniferous (up to 8,341 m^3/yr. at 15/11/15 cm utilization) and deciduous (up to 2,585 m^3/yr. at 15/10/15 cm utilization) allocation is available for local timber use permits.

Table 3. Quota Periodic Allowable and Quadrant Cuts For 2006 to 2011

Company Name	Disposition Number	FMU	Periodic/Quadrant Cut Control Period	Approved Conifer Quadrant Reconciliation Volume (m^3)	Approved Deciduous Quadrant Reconciliation Volume (m^3)	Coniferous Periodic/ Quandrant Allowable Cut (m^3)	Deciduous Periodic/ Quandrant Allowable Cut (m^3)	Comments
Weyerhaeuser Company Ltd.	FMA0500042[1]	R12	May 1, 2006 to April 30, 2011	-124,279	194,201	3,422,387	1,491,387	**Assuming** ((0.5863 yrs x 421,025 m3/yr.coniferous at 15/11/15 cm) + (0.4137 yrs. x 395,764 m3 coniferous at 15/13/15 cm) + (4 yrs. x 784,023m3/yr. coniferous at 15/13/15 cm) - 124,279 m3 coniferous overcut at 15/13/15 from 2005-2006). **Assuming** (1 yr. x 263,090 m3/yr deciduous at 15/10/15) + (4 yrs. 258,524 m3 deciduous at 15/10/15 cm) + 194,201 m3 at 15/10/15 cm deciduous AAC reconciliation volume from 2005-2006)).
Weyerhaeuser Company Ltd.	CTQR120005	R12	May 1, 2006 to April 30, 2011	105,868	0	277,446 55,489	0	Assuming (0.5863 yrs. x 20,669 m3 coniferous at 15/11/15)+ (0.4137 yrs. x 19,429 m^3/yr coniferous at 15/13/15) + (4 yrs. x 37856 m3/yr coniferous at 15/13/15) + (105,868 m coniferous at 15/13/15 AAC reconciliation volume from November 18, 2000 to April 30, 2006).
Weyerhaeuser Company Ltd.	DTAR120001	R12	May 1, 2006 to April 30, 2011	0	111,170	0	210,964 42,192	Assuming (1 yrs. x 20,402 m^3/yr).+ (4 yrs. x 19,848 m3/yr). + 111,170 m^3 AAC reconciliation volume from November 18, 2000 to April 30, 2006.
Hansen, Dale	CTQR120001	R12	May 1, 2006 to April 30, 2011	-5,859	0	69,925 13,985	0	**Assuming** 1 year x 8,600 at 15/11/15 cm + 4 yrs. x 16,796 m3/yr. at 15/11/15 cm - 5,859 m3 at 15/11/15 cm overproduction from 2004-2006
Tall Pine Timber Company	CTQR120002	R12	May 1, 2006 to April 30, 2011	6,736	0	145,838 29,167	0	**Assuming** 1 yr x 15,806 + 4 yrs. at 15/11/15 cm x 30,824 m3/yr. at 15/11/15 cm + 6,736 m3 at 15/11/15 cm AAC reconciliation volume from 2004-2006.
Tall Pine Timber Company	CTQR120003	R12	May 1, 2006 to April 30, 2011	-1,986	0	26,859 5,371	0	**Assuming** 1 yr x 3,269 at 15/11/15 cm + 4 yrs. x 6,394 m3/yr at 15/11/15 cm. - 1,986 m3 at 15/11/15 cm overproduction from 2004-2006.
Tall Pine Timber Company	CTQR120004	R12	May 1, 2006 to April 30, 2011	42,178	0	141,228 28,245	0	**Assuming** 1 yr x 11,254 at 15/11/15 cm + 4 yrs. x 21,949 m3/yr. at 15/11/15 cm + 42,178 m3 at 15/11/15 cm AAC reconciliation volume from 2004-2006.
Community Timber Program	CTPS	R12	May 1, 2006 to April 30, 2011	0	0	20,000 4,000	0	**Assuming** 5 yrs. x 4,000 m3/yr. (coniferous) at 15/11/15 cm
Total						**4,103,683**	**1,702,351**	

[4] Pursuant to clause 7 (2) (a) (ii) of Weyerhaeuser Company Ltd.'s Forest Management Agreement (O.C. 514/2005) up to 1% of the Weyerhaeuser FMA coniferous PAC (up to 36,277 m^3 at 15/11/15 cm utilization) and deciduous PAC (up to 15,809 m^3 at 15/10/15 cm utilization) allocation is available for local timber use permits. Weyerhaeuser will apply a conversion factor of 0.94 when reporting coniferous volume harvested at 15/11/15 cm to convert production to 15/13/15 cm.

Appendix 4-3 – FMA 9700035 - FMP Approval (May 1, 2006)

Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

Forestry Division
Forest Management Branch

8th Floor 9920 - 108 Street
Edmonton, Alberta
Canada T5K 2M4

Telephone (780) 427-8474
Fax (780) 427-0084

Reference No: 06328-010

January 28, 2008

Mr. Paul Scott, RPF
Weyerhaeuser Company Limited
2509 Aspen Drive
Edson, Alberta
T7E 1S8

SUBJECT: APPROVAL – WEYERHAEUSER EDSON FOREST MANAGEMENT PLAN

Dear Mr. Scott:

I am pleased to advise that the Weyerhaeuser Company, Edson forest management plan is approved.

Attached is the Approval Decision documenting the rationale for, and conditions of the approval. Please ensure the Approval Conditions are met by the dates required.

Thank you for your diligent work preparing the plan, and I wish you every success in its implementation.

Yours truly,

Robert W. Stokes, RPF
Senior Manager
Forest Planning Section

cc: Brent Schleppe, Forestry Manager, Foothills Area
Distribution List

SUSTAINABLE RESOURCE
DEVELOPMENT

Forest Management Plan
Approval Decision

Weyerhaeuser Company Ltd.
Edson, Alberta

Forest Management Agreement
#9700035

Date: January 24, 2008
Effective: May 1, 2006

COLLEGE OF ALBERTA
DOUGLAS SKLAR
RPF 28
PROFESSIONAL FORESTERS

Approved by:

D. (Doug) A. Sklar, RPF
Executive Director
Forest Management Branch
Forestry Division

Executive Summary

The forest management plan dated April 2006 and supporting Timber Supply Analysis documentation dated November 2006, (submitted December 1, 2006) are approved subject to the satisfactory completion of the following approval conditions.

Approval Conditions

Condition	*Submission document or Requirement*	*Approval Authority*	*Date*
8.1	*VOIT Matrix*	*Senior Manager, FPS*	*April 1, 2008*
9.1	*Predicted Future Forest*	*Senior Manager, FPS*	*April 1, 2008*
10.1	*Structure Retention and Monitoring*	*Senior Manager, FPS*	*April 1, 2008*
12.1	*Industrial Timber Salvage*	*Senior Manager, TPARS*	*April 1, 2008*
13.1	*Alternative Regeneration Standards*	*Senior Manger, RS*	*May 1, 2011*
14.1	*Forest Health*	*Executive Director, FMB*	*May 1, 2009*
17.1	*Revisions and Future Forest Management Plans*	*Senior Manager, FPS*	*April 1, 2016*
18.1	*Performance Monitoring*	*Senior Manager, FPS*	*November 1, 2012*

Authorization

The Detailed Forest Management Plan for the Weyerhaeuser Edson FMA area dated April 2006 is approved subject to the Approval Conditions being met and the Annual Allowable Cuts presented in this Approval Decision.

Table of Contents

1.0 Introduction

The approval of forest management plans is the mandate of the Executive Director of the Forest Management Branch (FMB), Forestry Division of the Department of Sustainable Resource Development (department). This Approval Decision documents the rationale, and conditions of approval for the Weyerhaeuser Company Ltd. – Edson (Weyerhaeuser) Detailed Forest Management Plan (FMP) dated April 2006. This approval provides direction for the successful and efficient implementation of the FMP.

The FMP has been validated by a Regulated Forestry Professional (RFP). The department recognizes RFP-validated work as complete, accurate, and prepared with professional due diligence. The FMP has been reviewed and approved by government RFPs (see Table 1).

I commend Weyerhaeuser and those people who have contributed to the FMP for their efforts to address the complex issues of forest management.

The conditions in this Approval Decision are consistent with the terms of the Forest Management Agreement (FMA) and failure by Weyerhaeuser to fulfill the direction provided in this Approval Decision shall place the Company in default of its FMA.

2.0 Government of Alberta Participants: Forest Management Plan Appraisal

The following Government of Alberta staff participated in the appraisal of the Weyerhaeuser FMP. Their comments and recommendations are addressed in this Approval Decision. I extend my thanks to the staff for their personal and professional commitment to the task.

Table 1: Government of Alberta Participants

Government Reviewers	Title	Registration	FMP Component
Darren Aitkin, RPF	Growth & Yield Forester	CAPF # 662	Growth &Yield
Jan Ficht	Area Wildlife Biologist	-	All Chapters
Jamie Bruha, RPF	Senior Operations Forester	CAPF # 419	Ground Rules
Kevin Vanderhaeughe, RPF	FMA Forester	CAPF # 574	All Chapters
Stephen Wills, RPF	Forest Management Planning Forester	CAPF # 628	All Chapters
Grant Klappstein, RPF	Growth & Yield Forester	CAPF# 768	Components of Growth and Yield
Marty O'Byrne, RPF	Provincial Silviculture Specialist	CAPF # 118	Silviculture Table
Jan Schilf, RPF	Tenure Forester, Timber Production, Auditing & Revenue Section	CAPF # 240	Quadrant/Periodic Cuts
Nadine Pederson, RPF	Senior Timber Supply Analyst	CAPF #496	Chapter 6 and appendices
Stephen Wills	Forest Management Planning Forester	CAPF#628	All Chapters
Robert W. Stokes, RPF	Senior Manager, Forest Planning Section	CAPF#500	All Chapters

CAPF – College of Alberta Professional Foresters
CAPFT – College of Alberta Professional Forest Technologists
ASPB – Alberta Society of Professional Biologists

3.0 Forest Management Area

The area under consideration is the Forest Management Agreement area of Weyerhaeuser – Edson, FMA9700035 allocated to the Company through Order-in-Council 257/97, dated June 11, 1997. The FMA area is within Forest Management Units (FMU) E1, E2, W5 and W6.

The FMA is located in the Foothills natural region of west-central Alberta, and spans both the Lower Foothills and Upper Foothills natural sub-regions. Chapter 3 of the FMP, the *General Description of the FMA and Area* describes the FMA in greater detail.

4.0 FMP Background

To meet the FMA requirements Weyerhaeuser to submit a Detailed Forest Management Plan on June 28, 2001. Although there was agreement on much of the plan content, the timber supply analysis was incomplete and did not meet the department's requirements for approval. Since then, Company restructuring and integration issues with the embedded operators have extended completion timelines for FMP.

Weyerhaeuser re-submitted its FMP on April 12, 2006, followed by the Timber Supply Analysis on December 1, 2006. Review and feedback to the Company has been ongoing and productive. A number of items are identified as needing to be addressed during FMP implementation. These comprise the discussion and Approval Conditions contained herein.

5.0 Public Involvement

FMA Sections 10(1) and 10(2) require Weyerhaeuser to conduct an acceptable public consultation process. The FMP, Section 2.4, Appendices 1-5, 2-1, and 5-1, and Weyerhaeuser's Public Involvement Plan, document efforts in this regard. To solicit feedback and facilitate public awareness of its forest management activities, Weyerhaeuser included a wide range of stakeholders and department staff on its Forest Advisory Committee (WeyFAC). The focus of this group was the FMP and forest operations in general.

While efforts have been good, Weyerhaeuser is encouraged to enhance its effort to conduct meaningful public involvement throughout the FMP implementation. Meaningful consultation is characterized by sincere efforts to help stakeholders understand the implications of the plans, sincere efforts to make the plans available at a time and in a manner sufficient for stakeholders to read and study them, and sincere and accurate explanations of how the interests and concerns of the stakeholders have been addressed.

Weyerhaeuser must also ensure that First Nations consultation, as directed by provincial policy, is incorporated into its operational planning and subsequent FMP development processes.

6.0 Research

Weyerhaeuser's leadership and participation in forestry research is significant. However, there is little mentioned of how research results were used to formulate and support the FMP objectives and strategies. In future submissions a specific discussion of how Weyerhaeuser applies research findings and integrates them into its plans and operations is warranted.

I encourage the Company to continue collaborating with the scientific community but also to increase its efforts to ensure there is a strong linkage to operational practices.

7.0 Approval Scope

This Approval Decision relates to the Weyerhaeuser FMP dated April 2006 and supporting Timber Supply Analysis documentation dated November 2006, (submitted December 1, 2006). All coniferous and deciduous operators within the Weyerhaeuser Edson FMA shall conduct their activities in accordance with the FMP and the Approval Conditions.

Weyerhaeuser shall meet the requirements (dates and content) of the Approval Conditions unless the Executive Director, Forest Management Branch, agrees to alternate requirements in writing. Prior to identified submission dates, Weyerhaeuser will execute meaningful dialogue with the designated department decision-maker during the development so that submissions can be granted "agreement-in-principle" prior to formal submission by the condition date.

In the Approval Decision **bold text** identifies specific timelines, requirements and the department manager responsible for the review. Non-bolded text provides the rationale for the condition and specific considerations to be addressed in meeting the condition.

In the event of an inconsistency between the FMP and existing, new, or revised legislation or regulation, the legislation or regulation shall apply.

APPROVAL CONDITIONS

8.0 Value, Objective, Indicator and Target (VOIT) Matrix

FMPs prepared by industry are required to identify performance standards, which are described by Values, Objectives, Indicators and Targets (VOIT). These VOITs must be addressed in detail in the FMP.

Weyerhaeuser has worked cooperatively with the department to revise Sections 7 and 9 of the 2006 FMP to meet the Forest Management Planning Standard requirements for VOITs. General agreement has been reached (except: Habitat Availability). The following applies:

Approval Condition 8.1 - Value, Objective, Indicator and Target (VOIT) Matrix

i. **By April 1, 2008, Weyerhaeuser shall incorporate the revised VOIT table into the FMP. Targets for the VOITs shall be set using outputs from the approved Preferred Forest Management Scenario and timber supply analysis included in the April 2006 FMP.**

9.0 Predicted Future Forest

The Timber Supply Analysis contains a description of the future forest. Weyerhaeuser uses a coarse filter approach that assumes this will effectively maintain species diversity. Fine-filter assessments of selected feature species were not completed for the FMP.

The coarse filter approach is deemed effective for a majority of wildlife. When used in combination with fine filter assessments to "check" the predictions, this approach is acceptable. This can be accomplished using predictions of habitat availability for selected species throughout the planning period. The objective is to ensure that habitat for the species selected does not disappear through time.

Approval Condition 9.1 – Predicted Future Forest

i. **By April 1, 2008, develop a list of fine-filter species, for which habitat will be modeled and the results incorporated into the April, 2016 FMP.**

ii. **The Mountain Pine Beetle Pine Management Strategy FMP amendment (under development) will assess the impact of harvesting on grizzly bear habitat.**

10.0 Structure Retention and Monitoring

Forest managers practice green tree retention within harvested areas to create residual (post-harvest) stand structure. The department has approved FMPs with structure retention targets ranging from 1% to 15% of the merchantable volume. From this a variety of forest conditions will result throughout the province, that when assessed, will allow useful comparisons and enable refinement of future targets. Weyerhaeuser's strategy to maintain an average of 3% in FMUs E2, W5 and W6, and 8% in FMU E1 of merchantable volume within harvest areas falls within this range and is acceptable.

The FMP indicates that the harvest levels include the "flat-rate" volume reduction of 3% in FMUs E2, W5 and W6, and 8% in FMU E1 to account for merchantable volume retained for residual structure. This strategy must be supported by a program to monitor and report actual retained volumes for timber harvest production reconciliation for all operators.

The following applies:

Approval Condition 10.1 – Structure Retention and Monitoring

i. **All operators in the Weyerhaeuser Edson FMA will plan and carry out their operations to achieve the average structure retention target of 3% in FMUs E2, W5 and W6, and 8% in FMU E1 of the coniferous AAC and 3% in FMUs E2, W5 and W6, and 8% in FMU E1 of**

the deciduous AAC. Species composition and timber profile representative of the original stand conditions shall be retained to achieve acceptable biodiversity results. Non-merchantable timber may also be used to augment merchantable retention.

ii. **By April 1, 2008, Weyerhaeuser shall develop standard operating procedures for monitoring, measuring and reporting the retained structure (merchantable and non-merchantable) on harvested areas. The Company is expected to reach general agreement with embedded timber operators, and the result must be acceptable to the Senior Manager, Forest Planning Section.**

iii. **Merchantable volumes retained shall be reported in Annual and Stewardship Reports.**

iv. **Merchantable volume retained for structure in excess of the percentages identified in (i) above shall be chargeable as annual allowable cut (AAC) production and shall be reconciled every 5 years at the end of each cut control period.**

11.0 Silviculture Strategy

Defining the silviculture practices that will be used to establish managed stands and forecasted timber yields is important. FMPs must present the reforestation strategies to be used to achieve the timber yields from the regenerated stands. Silvicultural practices must be appropriate for the local range of conditions.

The Silviculture table presented in FMP (Appendix 8-3) is a reasonable summary of the tactics to be used to regenerate the future forest. All timber operators operating on the FMA are expected to apply these tactics.

12.0 Industrial Timber Salvage

Accounting for all sources of timber volume drain is critical to ensuring the approved AACs are sustainable. In Alberta, non-forestry industrial operations contribute to this drain and must be included in the total. Weyerhaeuser's proposal has several weaknesses to be addressed.

Weyerhaeuser's industrial timber salvage strategy must;

1. Account for all salvaged and unsalvaged merchantable timber as production
2. Inform embedded operators of available timber salvage
3. Equitably allocate timber salvage and production chargeability to all timber operators
4. Clearly define timber salvage tracking and reporting systems.

The following applies:

Approval Condition 12.1 – Industrial Timber Salvage

i. **All timber depleted (salvaged and non-salvaged merchantable timber) by non-forestry operations shall be reported as production for cut control purposes, except for low impact seismic programs where the average line width is less than 2.5 metres and Timber Damage**

Assessment compensation for is not requested.

ii. **The volumes used shall be those from the published timber damage assessment tables or as otherwise agreed by the Senior Manager, Timber Production, Auditing and Revenue Section.**

iii. **By April 1, 2008, in consultation with quota operators, Weyerhaeuser shall develop and implement a salvage timber volume tracking and reporting system acceptable to the Senior Manager, Timber Production, Auditing and Revenue Section.**

13.0 Alternative Regeneration Standards

The Regeneration Survey Manual establishes provincial reforestation performance standards (provincial survey standard) that are intended to create fully stocked natural stand yields. These standards shall be used until alternative regeneration performance standards are developed that relate to each yield projection used in the FMP. Incidental timber volumes are important and must be addressed. The Company proposes strategies to achieve incidental timber replacement and proposes that tracking the performance of this program will be accomplished through a requirement for incidental stocking to be included in its alternative regeneration standards (ARS). This is an acceptable approach.

The following applies:

Approval Condition 13.1 – Alternative Regeneration Standards

i. **By May 1, 2011, Weyerhaeuser shall implement its alternative regeneration performance standards acceptable to the Senior Manager, Reforestation Section. The ARS will include standards for incidental species stocking to achieve replacement of incidental volumes.**

14.0 Forest Health

The FMP presents one objective and several strategies for maintaining a healthy forest. The PFMS does not address the mountain pine beetle Pine Strategy Planning, the Province's primary forest health concern at this time. I am aware and encouraged that the Company is working on Pine Strategy Plans for its FMAs in Alberta and look forward to reviewing these in the months to come.

The following applies;

Approval Condition 14.1 – Forest Health

i. **Weyerhaeuser shall follow the *Alberta Forest Health Strategy and the Shared Roles and Responsibilities between SRD and the Forest Industry* when planning and conducting forest health operations.**

ii. **By May 1, 2009, Weyerhaeuser shall prepare a FMP amendment that meets the requirements of the *Mountain Pine Beetle Action Plan for Alberta* and its *Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations*.**

15.0 Forest Management Unit and Periodic Cut Administration

The amalgamation of Forest Management Units (FMU) (E1, E2, W5, and W6) into a single FMU has been discussed. Annual allowable cuts are set for each FMU in the province where timber dispositions are allocated. Timber production is monitored and controlled by FMU. All companies are therefore required to track production on an FMU basis. This has not been the FMA practice in recent years and this is a significant change to the company's administration of its production control system.

I acknowledge that Weyerhaeuser will engage the embedded operators in discussions to amalgamate the four FMUs for the mountain pine beetle FMP amendment, or the next FMP.

Approval Condition 15.1 - FMU and Periodic Cut Administration

i. **Weyerhaeuser will administer, monitor, report and balance its FMA timber production by FMU, consistent with department requirements.**

16.0 Strata Balancing

An unresolved matter regarding areas salvaged following the Chip Lake Fire in FMU W6 still remains. The department's letter of November 20, 2006, outlined the steps to align the FMA with current strata balancing requirements. Weyerhaeuser responded in a letter dated December 22, 2006. The department's direction of November 20, 2006 is appropriate and remains valid; however, this issue is best resolved through further discussions with the Senior Manager, Reforestation Section.

17.0 Revisions and Future Forest Management Plans

In meeting some of the Approval Conditions sections or sub-sections of the April 2006 FMP will require re-submission. The FMA schedule for the next FMP submission is July 2007. The department's interest is to maintain current and pertinent forest management plans and strict adherence to FMP schedules adds costs, but no measurable value. Updating the April 2006 FMP, will achieve many of the key requirements of the Alberta Forest Management Planning Standard and meet the department, company, stakeholders and the public needs for the next decade.

The following applies:

Approval Condition 17.1 – Revisions and Future Forest Management Plans

i. **The April 2006 FMP shall be updated to meet the direction and Approval Conditions in this document. An updated version of the FMP shall be produced at the completion of the update in a format acceptable to the Senior Manager, Forest Planning Section.**

ii. **Weyerhaeuser shall prepare and submit the next FMP that meets the forest management planning standards by the April 1, 2016.**

18.0 Performance Monitoring

Annual Reports and 5-year Stewardship Reports are used to monitor the successful implementation of FMPs.

The following applies:

Approval Condition 18.1 – Performance Monitoring

i.) **Weyerhaeuser shall submit Annual Reports and Stewardship Reports that report the achievement of each target in the updated VOIT table. Where variances from the planned outcomes exist the Company shall assess and determine the reason for each variance and present the corrective action taken or proposed.**

ii.) **A Stewardship Report acceptable to the Senior Manager, Forest Planning Section shall be submitted by November 1, 2012.**

19.0 Approved Annual Allowable Cuts

Refer to Tables 1 and 2: Historical Allocations and Approved Annual Allowable Cuts

Refer to Table 4: Quadrant and Periodic Allowable Cuts

20.0 Authorization

The Detailed Forest Management Plan for the Weyerhaeuser – Edson FMA dated April 2006 is approved subject to the Approval Conditions being met, and the Annual Allowable Cuts presented in this Approval Decision.

The Annual Allowable Cuts are effective beginning May 1, 2006.

21.0 Regulated Forestry Professional Validation of Allocation Tables

The following regulated forestry professionals agree and validate that the following tables;

i. Table 1: Historical Allocations
ii. Table 2: Approved Annual Allowable Cuts and Timber Allocations
iii. Table 3: Utilization and Operational Volume adjustments
iv. Table 4: Periodic and Quadrant Allowable Cuts

are complete and accurate and document the timber dispositions, allocations and approved harvest levels for FMUs E1, E2, W5 and W6.

COLLEGE OF ALBERTA PROFESSIONAL FOREST TECHNOLOGISTS
RAYMOND HILTS

COLLEGE OF ALBERTA PROFESSIONAL FORESTERS
JANET M.B. SCHILF
RPF 240

Table 1: Historical Allocations

Company Name	Disposition #	FMU	% Coniferous Allocation	Coniferous Timber		Utilization Standard	% Deciduous Allocation	Deciduous Timber		Utilization Standard
				AAC (m^3/yr)	Incidental %			AAC (m^3/yr)	Incidental %	
Weyerhaeuser	FMA9700035	E1	N/A	74,858	100.00%	15/11	N/A	36,305	100.00%	15/10
Edson Timber Products	CTQE010005	E1	3.41%	2,644		15/11				
Weyerhaeuser	DTAE910001	E91/E1						55		15/10
FMU Total				77,502				36,360		
Weyerhaeuser	FMA9700035	E2	N/A	6,570	20.00%	15/11		54,058	100.00%	15/10
EDFOR Co-Op Ltd.	CTQE020002	E2	78.60%	34,640	80.00%	15/11				
CTPP	CTPP	E2	6.49%	2,860		15/11	Fixed	1,500		15/10
Weyerhaeuser	DTAE910001	E91/E2						9,241		15/10
FMU Total				44,070				64,799		
Weyerhaeuser	FMA9700035	W5						16,386		15/10
CCTP	CCTP	W5	100.00%	17,013	100.00%	15/11	Fixed	4,000	100.00%	15/10
Weyerhaeuser	DTAE910001	E91/W5						6,379		15/10
FMU Total				17,013				26,765		
Weyerhaeuser	FMA9700035	W6	N/A	41,289	100.00%	15/11		96,909	100.00%	15/10
Millar Western	CTQW060002	W6	0.70%	1,306		15/11				
Blue Ridge Lumber	CTQW060010	W6	18.87%	35,186		15/11				
ANC Timber	CTQW060011	W6	43.14%	80,456		15/11				
Cold Creek Timber	CTQW060012	W6	5.36%	10,000		15/11				
CCTP	CCTP	W6	Fixed	18,252		15/11	Fixed	17,591		15/10
Weyerhaeuser	DTAE910001	E91/W6						2,160		15/10
FMU Total				186,489				116,660		

Table 2: Approved Allocations and AACs
Effective Date: May 1, 2006

Company	Disposition #	FMU	Coniferous Timber					Deciduous Timber				
			% Coniferous Allocation	AAC (m^3/yr)	Incidental %	Incidental AAC (m3/yr)	Utilization Standard	% Deciduous Allocation	AAC (m^3/yr)	Incidental %	Incidental AAC (m3/yr)	Utilization Standard
Weyerhaeuser	FMA9700035	E1	N/A	62,188	100.00%	24,549	15/11	N/A	22,102	100.00%	11,728	15/10
Edson Timber Products	CTQE010005	E1	4.70%	3,069			15/11					
Weyerhaeuser	DTA/CTQ Grazing	E1	0.058%	38		14			38		5	15/10
FMU Total				65,295		24,563			22,140		11,733	
Weyerhaeuser	FMA9700035	E2	N/A	5,538	20.00%	6,734	15/11		71,119	100.00%	4,773	15/10
EDFOR Co-Op Ltd.	CTQE020002	E2	78.60%	31,318	80.00%	30,414	15/11					
CTPP	CTPP	E2	6.49%	2,586			15/11	Fixed			1,500	15/10
Weyerhaeuser	DTA/CTQ Grazing	E2	1.012%	403		870			11,111		598	15/10
FMU Total				39,845		38,018			82,230		6,871	
Weyerhaeuser	FMA9700035	W5	N/A						23,914			
CCTP	CCTP	W5	100.00%	22,116	100.00%	7,878	15/11	Fixed	4,000	100.00%	11,324	15/10
Weyerhaeuser	DTA/CTQ Grazing	W5							10,193			15/10
FMU Total				22,116		7,878			38,107		11,324	
Weyerhaeuser	FMA9700035	W6	N/A	31,220	100.00%	25,991	15/11		81,473	100.00%	43,008	15/10
Millar Western	CTQW060002	W6	0.70%	1,120			15/11					
Blue Ridge Lumber	CTQW060010	W6	18.87%	30,190			15/11					
ANC Timber	CTQW060011	W6	43.14%	69,021			15/11					
Cold Creek Timber	CTQW060012	W6	6.25%**	10,000			15/11					
CCTP	CCTP	W6	Fixed	18,252			15/11	Fixed			17,591	15/10
Weyerhaeuser	DTA/CTQ Grazing	W6	0.118%	189		665			2,416		547	15/10
FMU Total				159,992		26,656			83,889		61,146	

*CTQ/DTA volumes from Table 7.19 of TSA documentation
**Percent will be revised with future AAC calculations

Table 3: Utilization and Operational Volume Adjustments

Company		Utilization used in FMU AAC Calculations			Operational Utilization				
	Disposition Number	Top Diameter (cm)	Butt Diameter (cm)	Stump Height (cm)	Top Diameter (cm)	Butt Diameter (cm)	Stump Height (cm)	Coniferous AAC (m3) based on Operational Utilization	Deciduous AAC (m3) based on Operational Utilization
Weyerhaeuser[1]	FMA9700035	11	15	15	13	15	15	148,409	244,927
ANC Timber [2]	CTQW060011	11	15	15	10	15	15	71,085	0
Millar Western [2]	CTQW060002	11	15	15	10	15	15	1,153	0

1 Conversion factor of 5% decrease in AAC from 15/11/15 cm to 15/13/15 cm

2 Conversion factor of 2.99% increase in AAC from 15/11/15 cm to 15/10/15 cm.

Appendix 4-4 – FMA 9700035 – MPB Addendum Approval (May 1, 2007)

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Forestry Division
Forest Management Branch

8th floor, 9920-108 Street
Edmonton, AB T5K 2M4

Telephone: (780) 422-2690
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06328-010

September 15, 2008

Mr. Bob Winship
Forest Resource Manager
Weyerhaeuser Company Ltd.
P.O. Box 7739
Drayton Valley, Alberta
T7A 1S8

Dear Mr. Winship:

RE: APPROVAL – WEYERHAEUSER EDSON MOUNTAIN PINE BEETLE ADDENDUM

Please find attached the revised Approval Decision for the Weyerhaeuser Edson Mountain Pine Beetle Addendum.

The changes, as discussed with Mr. Paul Scott, revise the approval tables but preserve the original rationale and conditions of approval.

Thank you for your attention to this matter.

Yours truly,

Robert W. Stokes, RPF
Senior Manager
Forest Planning Section

cc: Bill Tinge, Acting Forestry Manager, Foothills Area
Distribution List

Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT

Forest Management Plan Amendment

Mountain Pine Beetle Addendum
Forest Management Units E1, E2, W5, W6
Approval Decision

Weyerhaeuser Company Ltd.
Pembina Forestlands
Edson, Alberta

Forest Management Agreement
#9700035

COLLEGE OF ALBERTA PROFESSIONAL FORESTERS
DOUGLAS SKLAR
RPF 28

Date: June 27, 2008*
Effective: May 1, 2007

Approved by: ______________________
D. (Doug) Sklar, RPF
Executive Director
Forest Management Branch
Forestry Division

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* Tables revised September 15, 2008 with existing approval conditions

Table of Contents

1.0 Introduction

Alberta is experiencing a significant outbreak of mountain pine beetle (MPB) and is implementing control strategies with respect to this outbreak and strategies to prevent future outbreaks[1]. Weyerhaeuser Company Ltd. (Weyerhaeuser) addendum to its recently approved Forest Management Plan (FMP) meets the requirements established by Alberta for such amendments[2]. This decision provides the rationale for approval and direction for ongoing work.

It is important to note the implementation of this plan is not intended to control the current MPB outbreak but rather to take actions over the next twenty years to create a forest that is more resistant to such outbreaks by dramatically reducing the overall susceptibility of the pine forest (Pine Strategy). This is a prudent and necessary strategy to avoid the types of catastrophic changes being seen in British Columbia's pine forests, if the extent of the current outbreak is limited. However, if the current outbreak in Alberta expands as rapidly as the British Columbia outbreak, the strategies in this plan will have to be modified to address that reality.

Alberta has directed[3] that the key outcomes of three scenarios (the current management plan or status quo, the Pine Strategy and a MPB outbreak) be presented. I believe given the MPB outbreak in Alberta, the current management plans do not present likely scenarios and considering today's circumstances, comparison of the Pine Strategy and the MPB outbreak scenarios are the pertinent analyses.

Alberta's goal is to mitigate the effects of MPB on the social, environmental, and economic values of Alberta's forests. To achieve this goal, Alberta must make trade-offs which involve achieving a desired result, generally at the complete or partial expense of something else. Stakeholders are often interested in only one value and are not prepared to consider trade-offs; whereas Alberta must make trade-off decisions in order to reasonably meet its goal for the overall benefit of Albertans.

2.0 Forest Management Plans (FMP) and Priority of MPB Control Strategies

The approval of the FMP amendment results in a new spatial harvest sequence and timber supply. Commitments in the balance of the existing FMP remain in effect until they are replaced by a new FMP expected by April 1, 2016. The status of the MPB outbreak will likely be apparent in time for the preparation of the new FMP which will then be able to better address the trade-offs between key outcomes.

The major MPB infestation in British Columbia has spread into Alberta: specifically the Eastern Slopes of the Rocky Mountains, Banff and Jasper National Parks, the Bow Corridor in Kananaskis Country, the Crowsnest Pass, the Grande Prairie region, and east to Slave Lake. MPB infestations are located to the north, south and west of the Weyerhaeuser Edson FMA. In the event of an outbreak in the forest management unit (FMU), it will be crucial to take all appropriate steps to control the infestation by executing control activities (Level 1 and Level 2[4]) which will take priority over the spatial sequence in this amendment. I expect activities over

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[1] See the *Mountain Pine Beetle Action Plan for Alberta* (AP) and the *Interpretive Bulletin - Planning Mountain Pine Beetle Response Operations* (IP) on the department of Sustainable Resource Development (SRD) website

[2] See the *Interpretive Bulletin - Planning Mountain Beetle Response Operations* on SRD website.

[3] See IP

[4] See AP for definitions

the next few years to be a combination of control (Level 1 and Level 2) and prevention (Pine Strategy), and operational changes necessary to accomplish both will be handled through annual operating plans.

3.0 Habitat for Species of Special Concern (Grizzly Bear Habitat)

Resource selection function maps for grizzly bear indicate the area of high-suitability grizzly bear habitat in the FMA is small. For this reason the department agreed assessing the impact of this plan amendment on habitat was not required. Operational planning can mitigate many of the impacts of timber harvest and should be used where conditions dictate.

Alberta's Grizzly Bear Recovery Plan (GBRP) has been accepted by the Minister of Sustainable Resource Development. The GBRP recognizes that reduced grizzly bear survival and reproductive success are linked to human activity in priority habitats. Access development increases this activity. The department is developing an implementation plan for the GBRP in the near term. When this is published the Company shall address these requirements in its operational plans and the next forest management plan will address this issue further.

4.0 Access

A Road Corridor Plan is presented outlining access to operating compartments. Access is essential to the management of MPB and the impacts will be mitigated with Weyerhaeuser's continued good planning, effective construction, timely reclamation, and reforestation. The company can act to make roads impassable and to quickly reclaim access into completed compartments. Access is difficult to restrict once routes are built and the government must take a solid stance on this issue in priority habitats. The plan is reasonable and implements the MPB Strategy efficiently.

5.0 Water Yield

Weyerhaeuser assessed the impact of the Pine Strategy Plan on the watersheds in the FMA. Maximum annual water yield increases range between 0.06 % and 21.17%. Three watersheds (Granada (21.17%), Chevron (19.9%) and Cynthia (16.39%) exceeded a 15% increase although the Carrot Tower, West Eta and Mason approached that level. The peaks are forecast to occur after 20 years. The results are not unexpected and are acceptable outcomes from the planned operations to address MPB susceptible pine reduction.

6.0 Long Term Fibre Sustainability

The fibre flow proposed in the MPB Preferred Scenario is acceptable for the four forest management units. The increase (from 384,363 m^3 to 514,856 m^3) is planned for 17 years followed by a reduction to 326,095 m^3 after year 17.

7.0 Pine Strategy Implementation

The department recognizes that uncertain economic conditions may limit the company's ability to fully implement the Pine Strategy amendment. The company has developed a rational and feasible FMP that achieves a significant reduction in MPB susceptible pine on its management area. On-going and timely communication with local government staff is essential to manage the issues identified, and those yet to be identified. Weyerhaeuser is encouraged to continue its efforts to keep the public and stakeholders advised of its operational plans and accomplishments in addressing the MPB situation.

The implementation of the Pine Strategy does not guarantee prevention of an outbreak in the near future, but in twenty years, will create a forest that is very resistant to such outbreaks. Should it occur, salvage strategies will address the outbreak to minimize the socio-economic and environmental impacts.

8.0 Embedded Timber Operators

Weyerhaeuser Company Ltd. has reached agreement with the embedded timber operators and the department regarding operational sequencing and annual allowable cut (AAC) sharing. Table 2 presents the approved AACs for each forest management unit and operator.

9.0 Performance Monitoring and Reporting

The effective implementation of the Pine Strategy throughout Alberta is very important, and timely information is vital to ensuring the best decisions are made and the most appropriate management strategies are developed. Considering this, the department will require Pine Strategy progress reports to be prepared to keep the department, other agencies and the public knowledgeable and current on the work completed. The department will publish these requirements at a later date.

10.0 Authorization

The Forest Management Plan Amendment for Forest Management Agreement 9700035 dated March 20, 2008 is approved as per the annual allowable cuts presented in Table 2.

The annual allowable cuts are effective beginning May 1, 2007.

The next forest management plan shall be received by the department in time for approval by April 1, 2016.

Table 1: Historical Allocations

Company Name	Disposition #	FMU	Coniferous Timber					Deciduous Timber				
			% Coniferous Allocation	AAC (m^3/yr)	Incidental %	Incidental AAC (m^3/yr)	Utilization Standard	% Deciduous Allocation	AAC (m^3/yr)	Incidental %	Incidental AAC (m^3/yr)	Utilization Standard
Weyerhaeuser*	FMA9700035	E1	N/A	62,188	100.00%	24,549	15/11	N/A	22,102	N/A	11,728	15/10
Edson Timber Products	CTQE01F001	E1	4.70%	3,069			15/11					
Weyerhaeuser	DTA/CTQ Grazing	E1	0.058%	38		14		N/A	38	N/A	5	15/10
FMU Total			**100.00%**	**65,295**	**100.00%**	**24,563**		**100.00%**	**22,140**	**100.00%**	**11,733**	
Weyerhaeuser*	FMA9700035	E2	N/A	5,538	20.00%	6,734	15/11	N/A	71,119	N/A	4,773	15/10
EDFOR Co-Op Ltd	CTQE020002	E2	78.60%	31,318	80.00%	30,414	15/11					
CTPP	CTPP	E2	6.49%	2,586			15/11			**Fixed**	**1,500**	15/10
Weyerhaeuser	DTA/CTQ Grazing	E2	1.011%	403		870		N/A	11,111	N/A	598	15/10
FMU Total			**100.00%**	**39,845**	**100.00%**	**38,018**		**100.00%**	**82,230**	**100.00%**	**6,871**	
Weyerhaeuser*	FMA9700035	W5						N/A	23,914			15/10
CCTP	CCTP	W5	100.00%	22,116	100.00%	7,878	15/11	**Fixed**	**4,000**	100.00%	11,324	15/10
Weyerhaeuser	DTA/CTQ Grazing	W5						N/A	10,193			15/10
FMU Total			**100.00%**	**22,116**	**100.00%**	**7,878**		**100.00%**	**38,107**	**100.00%**	**11,324**	
Weyerhaeuser*	FMA9700035	W6	N/A	31,220	N/A	25,991	15/11	N/A	81,473	N/A	43,008	15/10
Millar Western	CTQW060002	W6	0.70%	1,120			15/11					
Blue Ridge Lumber	CTQW060010	W6	18.87%	30,190			15/11					
ANC Timber	CTQW060011	W6	43.14%	69,021			15/11					
Cold Creek Timber	CTQW060012	W6	6.25%**	10,000			15/11					
CCTP	CCTP	W6	**Fixed**	**18,252**			15/11			**Fixed**	**17,591**	15/10
Weyerhaeuser	DTA/CTQ Grazing	W6	0.118%	189	N/A	665		N/A	2,416	N/A	547	15/10
FMU Total			100.00%	**159,992**	100.00%	**26,656**		**100.00%**	**83,889**	**100.00%**	**61,146**	

* Up to 1% of the Weyerhaeuser FMA coniferous aac(1,562 $m^{3 \text{ at } 15/11}$) and deciduous aac(2,581$m^{3 \text{ at } 15/10}$) allocation is available for local timber use permits

**Percentage will be revised with future AAC calculations

Table 2: Allocations and Approved Annual Allowable Cuts

Company Name	Disposition #	FMU	Coniferous Timber					Deciduous Timber				
			% Coniferous Allocation	AAC (m^3/yr)	Incidental %	Incidental AAC (m^3/yr)	Utilization Standard	% Deciduous Allocation	AAC (m^3/yr)	Incidental %	Incidental AAC (m^3/yr)	Utilization Standard
Weyerhaeuser	FMA9700035	E1	N/A	120,412	100.00%	15,633	15/11	N/A	22,083	100.00%	18,052	15/10
Edson Timber Products	CTQE010005	E1	4.70%	5,940			15/11					
Weyerhaeuser	DTA/CTQ Grazing	E1	0.030%	38		14			38		5	15/10
FMU Total			**100.00%**	**126,390**	**100.00%**	**15,647**		**100.00%**	**22,121**	**100.00%**	**18,057**	
Weyerhaeuser	FMA9700035	E2	N/A	8,745	20.00%	6,313	15/11	N/A	70,442	N/A	6,911	15/10
EDFOR Co-Op Ltd	CTQE020002	E2	78.60%	48,223	80.00%	28,732	15/11					
CTPP	CTPP	E2	6.49%	3,981			15/11			**Fixed**	1,500	15/10
Weyerhaeuser	DTA/CTQ Grazing	E2	0.657%	403		870			11,121	N/A	598	15/10
FMU Total			**100.00%**	**61,352**	**100.00%**	**35,916**		**100.00%**	**81,563**	**100.00%**	**9,009**	
Weyerhaeuser	FMA9700035	W5						N/A	24,200			
CCTP	CCTP	W5	100.00%	22,264	100.00%	7,905	15/11	Fixed	4,000	100.00%	8,051	15/10
Weyerhaeuser	DTA/CTQ Grazing	W5							10,135			15/10
FMU Total			**100.00%**	**22,264**	**100.00%**	**7,905**		**100.00%**	**38,335**	**100.00%**	**8,051**	
Weyerhaeuser	FMA9700035	W6	N/A	55,297	N/A	20,039	15/11	N/A	80,112	N/A	50,579	15/10
Millar Western	CTQW060002	W6	0.70%	1,573			15/11					
Blue Ridge Lumber	CTQW060010	W6	18.87%	42,397			15/11					
ANC Timber	CTQW060011	W6	43.14%	96,926			15/11					
Cold Creek Timber	CTQW060012	W6	6.25%**	10,000			15/11					
CCTP	CCTP	W6	Fixed	18,252			15/11			Fixed	17,591	15/10
Weyerhaeuser	DTA/CTQ Grazing	W6	0.118%	233	N/A	665		N/A	2,875	N/A	371	15/10
FMU Total			**100.00%**	**224,678**	**100.00%**	**20,704**		**100.00%**	**82,987**	**100.00%**	**68,541**	

Footnotes See page 6

Table 2 Allocations and Approved Annual Allowable Cuts – Footnotes

*CTQ/DTA volumes from Table 7.19 of TSA documentation
**Percentage will be revised with future AAC calculations
***Pursuant to clause 8 (2) (c) of Weyerhaeuser Company Ltd.'s Forest Management Agreement (O.C. 521/2007) up to 1% of the Weyerhaeuser FMA Annual Allowable Cut will be made available to the Minister to issue timber dispositions for local use. The annual volume of timber available for local timber use permits that will be available will not exceed:

FMU E01: Conifer (1,204 m^3 pure and 156 m^3 incidental at 15/11/15 cm utilization)
Deciduous (221 m^3 pure and 181 m^3 incidental at 15/10/15 cm utilization)

FMU E02: Conifer (87 m^3 pure and 63 m^3 incidental at 15/11/15 cm utilization)
Deciduous (704 m^3 pure and 69 m^3 incidental at 15/10/15 cm utilization)

FMU W05: Conifer (0.0 m^3 pure and 0.0 m^3 incidental at 15/11/15 cm utilization)
Deciduous (242 m^3 pure and 0.0 m^3 incidental at 15/10/15 cm utilization)

FMU W06: Conifer (553 m^3 pure and 200 m^3 incidental at 15/11/15 cm utilization)
Deciduous (801 m^3 pure and 506 m^3 incidental at 15/10/15 cm utilization)

Table 3: Utilization and Operational Volume Adjustments

Company		Utilization used in FMU AAC Calculations			Operational Utilization			
	Disposition Number	Top Diameter (cm)	Butt Diameter (cm)	Stump Height (cm)	Top Diameter (cm)	Butt Diameter (cm)	Stump Height (cm)	Coniferous AAC (m3) based on Operational Utilization
Weyerhaeuser[1]	FMA9700035	11	15	15	13	15	15	175,231
ANC Timber [2]	CTQW060011	11	15	15	10	15	15	99,525
Millar Western [2]	CTQW060002	11	15	15	10	15	15	1,620

[1]Coniferous conversion factor of 5% decrease in AAC from 15/11/15 cm to 15/13/15 cm

[2]Coniferous conversion factor of 2.99% increase in AAC from 15/11/15 cm to 15/10/15 cm

Table 4. Weyerhaeuser Company Ltd. (Edson) - Periodic and Quadrant Allowable Cuts

Company Name	Disposition Number	FMU	Quadrant Period	Approved Quadrant Coniferous Reconciliation Volume (m^3)		Approved Quadrant Deciduous Reconciliation Volume (m^3)		Primary Deciduous Quadrant Allowable Cut (m^3)	Secondary Deciduous Quadrant Allowable Cut (m^3)	Primary Coniferous Quadrant Allowable Cut[1] (m^3)	Secondary Coniferous Quadrant Allowable Cut (m^3)	Comments
				Pure	Incidental	Pure	Incidental					
Weyerhaeuser Company Ltd.	FMA9700035	E01	July 1, 2002 to June 30, 2007	1,431	0	63,115	0	228,061	14,744	368,371	26,523	**Assuming** ((3 8329 yrs x 16,305 m3/yr at 15/10/30 cm) + (1 yr x 22,102 m3/yr at 15/10/15 cm) + (0 1671 yrs x 22,083 m3/yr at 15/10/15 cm) primary deciduous) + ((1 yr x 11 728 m3/yr at 15/10/15 cm) + (0 1671 yrs x 18,052 m3/yr at 15/10/15 cm) secondary deciduous) + (63 115 m3 primary deciduous at 15/10/30 cm reconciliation volume from 1997-2002 **Assuming** ((3 8329 yrs x 74,858 m3/yr at 15/11/30) + (0 5863 yrs x 62,188 m3 at 15/11/15 cm) + (0 4137 yrs x 59 079 m3 at 15/13/15cm) + (0 1671 yrs x 114,391 m3 at 15/13/15cm) primary coniferous) + ((0 5863 yrs x 24,549 m3 at 15/11/15 cm) + (0 4137 yrs x 23,322 m3 at 15/13/15 cm) + (0 1671 yrs x 14 851 m3 at 15/13/15 cm) secondary coniferous) + 1,431 m3 primary coniferous at 15/11/30 cm reconciliation volume from 1997-2002
Weyerhaeuser Company Ltd.	FMA9700035	E01	July 1, 2007 to April 30, 2012	-28,384	16,931	24,091	4,569	130,816	91,813 414,525	524,458	88,706	**Assuming** ((4 8329 yrs x 22,083 m3/yr primary deciduous at 15/10/15 cm) + (4 8329 yrs x 18 052 m3/yr secondary deciduous at 15/10/15 cm) + (24 091 m3 primary deciduous at 15/10/15 cm reconciliation volume from 2002-2007 + 4569 m3 secondary deciduous reconciliation volume from 2002-2007)) **Assuming** ((4 8329 yrs x 114 391 m3/yr primary coniferous at 15/13/15 cm)+ (4 8329 yrs x 14 851 m3/yr secondary coniferous at 15/13/15 cm) - (28,384 m3 primary coniferous at 15/13/15 reconciliation volume from 2002-2007) + (16,931 m3 secondary coniferous at 15/13/15 reconciliation volume))
Weyerhaeuser Company Ltd.	DTAF910001	E01	May 1, 2002-April 30, 2007	0	0	0	0	258	5	0	0	**Assuming** (4 yrs x 55 m3/yr primary deciduous at 15/10/30 cm) + (1 yr x 38 m3/yr primary deciduous at 15/10/15 cm) + (1 yr x 5 m3/yr secondary deciduous at 15/10/15 cm). DTA issued for deciduous AAC found in grazing leases within FMU E01 DTA was cancelled effective April 30, 2007 and volume re-issued as a FMU E01DTP
Weyerhaeuser Company Ltd.	DTPE01000X	E01	May 1, 2007-April 30, 2012	0	0	0	0	190	25 43	0	0	**Assuming** (5 yrs x 38 m3/yr primary deciduous at 15/10/15 cm) +(5 yrs x 5 m3/yr secondary deciduous at 15/10/15 cm) Five year DTP issued for deciduous AAC found within grazing leases with the FMU E01
Weyerhaeuser Company Ltd.	CTPE01000X	E01	May 1, 2007-April 30, 2012	0	0	0	0	0	0	181 50	67	**Assuming** (5 yrs x 36 2 m3/yr primary coniferous at 15/13/15 cm) +(5 yrs x 13 4 m3/yr secondary coniferous at 15/13/15) Five year CTP issued for coniferous AAC found within grazing leases with the FMU E01
Edson Timber Products Ltd.	CTQE01F001	E01	May 1, 2002-April 30, 2007	-235	0	0	0	0	0	13,410	0	**Assuming** (4 yrs x 2 644 m3/yr primary coniferous at 15/11/30 cm) + (1 yr x 3 069 m3/yr primary coniferous at 15/11/15 cm) - (235 m3 reconciliation from 1997-2002)
Edson Timber Products Ltd.	CTQE01F001	E01	May 1, 2007-April 30, 2012	-824	0	0	0	0	0	28,876 5725	0	**Assuming** (5 yr x 5,940 m3/yr primary coniferous at 15/11/15 cm) - (824 m3 overcut from 1997-2002)

212,433

Continued...

Company Name	Disposition Number	FMU	Quadrant Period	Approved Quadrant Coniferous Reconciliation Volume (m^3)		Approved Quadrant Deciduous Reconciliation Volume (m^3)		Primary Deciduous Quadrant Allowable Cut (m^3)	Secondary Deciduous Quadrant Allowable Cut(m^3)	Primary Coniferous Quadrant Allowable Cut[1](m^3)	Secondary Coniferous Quadrant Allowable Cut(m^3)	Comments
				Pure	Incidental	Pure	Incidental					
Weyerhaeuser Company Ltd.	FMA9700035	E02	July 1, 2002 to June 30, 2007	117	0	94,673	0	384,762	5,928	32,111	7,597	**Assuming** ((3 8329 yrs x 54 058 m3/yr at 15/10/30 cm) + (1 yr x 71 119 m3/yr at 15/10/15 cm) + (0 1671 yrs x 70 442 m3/yr at 15/10/15 cm) primary deciduous)) + ((1 yr x 4 773 m3/yr at 15/10/15 cm) + (0 1671 yrs x 6 911 m3/yr at 15/10/15 cm) secondary deciduous) + (94 673 m3 primary deciduous at 15/10/15 cm AAC reconciliation volume from 1997-2002)) **Assuming** ((3 8329 yrs x 6 570 m3/yr at 15/11/30 cm) + (0 5863 yrs x 5,538 m3/yr at 15/11/15 cm) + (0 4137 yrs x 5 261 m3/yr at 15/13/15 cm) + (0 1671 yrs x 8 308 m3/yr at 15/13/15 cm) primary coniferous) + ((0 5863 yrs x 6,734 m3/yr at 15/11/15 cm) + (0 4137 yrs x 6,397 m3/yr at 15/13/15 cm) + (0 1671 yrs x 5 997 m3/yr at 15/13/15 cm) secondary coniferous) + (117 m3 primary coniferous at 15/11/15 cm reconciliation volume from 2002-2007))
Weyerhaeuser Company Ltd.	FMA9700035	E02	July 1, 2007 to April 30, 2012	26,273	-912	-78,367	5,927	262,072	39,327	66,424	28,073	**Assuming** ((4 8329 yrs x 70 442 m3/yr primary deciduous at 15/10/15 cm) + (4 8329 yrs x 6 911 m3/yr secondary deciduous at 15/10/15) - (78 367m3 primary deciduous at 15/10/15 reconciliation volume from 2002-2007) + 5,927 m3 secondary deciduous at 15/10/15 reconciliation volume from 2002-2007)) **Assuming** ((4 8329 yrs x 8308 m3/yr primary coniferous at 15/13/15 cm) + (4 8329 yrs x 5 997 m3/yr secondary coniferous at 15/13/15 cm) + (26,273 m3 primary coniferous at 15/13/15 cm reconciliation volume from 2002-2007) - (912 m3 secondary coniferous at 15/13/15 reconciliation volume from 2002-2007))
Weyerhaeuser Company Ltd.	DTAE910001	E02	May 1, 2002 - April 30, 2007	0	0	0	0	48,075	598	0	0	**Assuming** (4 yrs x 9,241 m3/yr at 15/10/30 cm primary deciduous) + (1 yr x 11 111 m3/yr at 15/10/15 primary deciduous) + (1 yr x 598 m3/yr at 15/10/15 secondary deciduous). DTA issued for deciduous AAC found within grazing leases within FMU E02 DTA was cancelled effective April 30 2007 and rolled into DTAE020002
Weyerhaeuser Company Ltd.	DTAE020002	E02	May 1, 2007 - April 30, 2012	0	0	0	0	55,605 11,121	2,990 598	0	0	**Assuming** (5 yrs x 11 121 m3/yr at 15/10/15 cm pure deciduous) + (5 yrs x 598 m3/yr secondary deciduous at 15/10/15 cm) DTA was issued for the deciduous AAC found within grazing leases with the FMU
Weyerhaeuser Company Ltd.	CTQE020003	E02	May 1, 2007 - April 30, 2012	0	0	0	0	0	0	1,914 1209	4,133	**Assuming** (5 yrs x 383 m3/yr pure coniferous at 15/13/15 cm) + (5 yrs x 827 m3/yr incidental coniferous at 15/13/15 cm) CTQ issued for coniferous AAC found within grazing leases with the FMU E02
EDFOR Cooperative Ltd.	CTQE020002	E02	May 1, 2005 - April 30, 2007	0	0	0	0	0	0	65,958	30,414	**Assuming** (1 yr x 34 640 m3/yr pure coniferous at 15/11/30 cm) + (1 yr x 31 318 m3/yr pure coniferous at 15/11/15 cm) + (1 yr x 30 414 m3/yr secondary coniferous at 15/11/15 cm)
EDFOR Cooperative Ltd.	CTQE020002	E02	May 1, 2007 - April 30, 2012	-8,706	8,093	0	0	0	0	232,409 46,231	151,753 76,832	**Assuming** (5 yrs x 48 223 m3/yr pure coniferous at 15/11/15 cm) - (8,706 m3 overcut volume at 15/11/15 from 2005-2007) + (5 yrs x 28 732 m3/yr secondary coniferous at 15/11/15 cm) + (conifer reconciliation volume of 8 093 secondary volume **at 15/11/15** cm from 2005-2007)
E02 CTPP	CTP	E02	May 1, 2001 - April 30, 2007	-5,488	0	0	0	0	9,000	149,958	0	**Assuming** (5 yrs x 1 500 m3/yr secondary deciduous at 15/10/30 cm) + (1 year 1500 m3/yr secondary deciduous at 15/10/15 cm) **Assuming** (4 yrs x 37,500 m3/yr primary conifer at 15/11/30 cm) + (1 yr x 2 860 m3/yr primary conifer at 15/11/15 cm) + (1 yr x 2586 m3/yr primary coniferous at 15/11/15cm) - (5488 m3 primary coniferous overcut at 15/11/30 cm from 1997-2002)
E02 CTPP	CTP	E02	May 1, 2007 - April 30, 2012	5,072	0	0	0	0	7,500 1500	24,977 4995	0	**Assuming** (5 yrs x 1 500 m3/yr secondary deciduous at 15/10/15 cm) **Assuming** (5 yrs x 3 981 m3/yr primary coniferous at 15/11/15 cm) + (5 072 m3 primary coniferous at 15/11/15 cm reconciliation volume from 2001-2007)

Continued...

Company Name	Disposition Number	FMU	Quadrant Period	Approved Quadrant Coniferous Reconciliation Volume (m^3)		Approved Quadrant Deciduous Reconciliation Volume (m^3)		Primary Deciduous Quadrant Allowable Cut (m^3)	Secondary Deciduous Quadrant Allowable Cut(m^3)	Primary Coniferous Quadrant Allowable Cut(m^3)	Secondary Coniferous Quadrant Allowable Cut(m^3)	Comments
				Pure	Incidental	Pure	Incidental					
Weyerhaeuser Company Ltd.	FMA9700035	W05	July 1, 2002 to June 30, 2007	0	0 000	28,051	0	118,815	0	0	0	**Assuming** (3 8329 yrs x 16 386 m3/yr at 15/10/30 cm) + (1 yr x 23 914 m3/yr at 15/10/15 cm)+ (.01671 yrs x 24 200 m3/yr at 15/10/15 cm) primary deciduous) + (28 051 m3 at 15/10/30 cm reconciliation volume from 1997-2002)
Weyerhaeuser Company Ltd.	FMA9700035	W05	July 1, 2007 to April 30, 2012	0	0	-16,613	0	100,343	0	0	0	**Assuming** (4 8329 yrs x 24 200 m3/yr primary deciduous at 15/10/15 cm) - (16,613 m3 at 15/10/15 overcut from 2002-2007)
Weyerhaeuser Company Ltd.	DTAE910001	W05	May 1, 2002 to April 30, 2007	0	0	0	0	35,709	0	0	0	**Assuming** (4 yrs x 6,379 m3/yr primary deciduous at 15/10/30 cm) + (1 yr x 10,193 m3/yr primary deciduous at 15/10/15 cm) DTA issued for deciduous from grazing leases within FMU W05 DTA was cancelled April 30, 2007 and re-issued as DTAW050001
Weyerhaeuser Company Ltd.	DTAW050003	W05	May 1, 2007 to April 30, 2012	0	0	0	0	50,675 10,135	0	0	0	**Assuming** 5 yrs x 10,135 m3/yr primary deciduous at 15/10/15 cm. DTA was issued for the deciduous AAC found within grazing leases with the FMU W05
W05 CTPP	CTP	W05	May 1, 2001 to April 30, 2007	29,875	0	0	0	24,000	11,324	137,056	7,878	**Assuming** ((5 yrs x 4,000 m3/yr primary deciduous at 15/10/30 cm) + (1 year x 4000 m3/yr primary deciduous at 15/10/15 cm) + (1 yr x 11 324 m3/yr secondary deciduous at 15/10/15 cm)) **Assuming** ((5 yrs x 17 013 m3/yr primary coniferous at 15/11/30 cm) + (1 yr x 22,116 m3/yr primary coniferous at15/11/15 cm) + (1 yr x 7 878 m3/yr secondary conifrous at 15/11/15 cm) + (29,875 m3 primary coniferous at **15/11/30 cm** reconciliation volume from 1996-2001))
W05 CTPP	CTP	W05	May 1, 2007 to April 30, 2012	14,585	7,878	0	0	20,000 4000	40,255 8051	125,905	47,403	**Assuming** ((5 yrs x 4 000 m3/yr primary deciduous at 15/10/15 cm) + (5 yrs x 8051 m3/yr secondary deciduous at 15/10/15 cm) **Assuming** ((5 yrs x 22 264 m3/yr primary coniferous at 15/11/15 cm) + (5 yrs x 7905 m3/yr secondary coniferous at 15/11/15 cm) + (14 585 m3 of primary conifer reconciliation volume at 15/11/15 from 2001-07) + (7 878 m3 secondary coniferous reconciliation volume at 15/11/15 from 2001-07 reconciliation volume from 2001-2007)

Continued...

Company Name	Disposition Number	FMU	Quadrant Period	Approved Quadrant Coniferous Reconciliation Volume (m^3)		Approved Quadrant Deciduous Reconciliation Volume (m^3)		Primary Deciduous Quadrant Allowable Cut (m^3)	Secondary Deciduous Quadrant Allowable Cut (m^3)	Primary Coniferous Quadrant Allowable Cut[1] (m^3)	Secondary Coniferous Quadrant Allowable Cut (m^3)	Comments
				Pure	Incidental	Pure	Incidental					
Weyerhaeuser Company Ltd.	FMA9700035	W06	July 1, 2007 to April 30, 2012	-51,341	-146	207,679	13,512	[illegible]	~~257,955~~	202,459	91,858	**Assuming** ((4 8329 yrs x 80,112 m3/yr primary deciduous at 15/10/15 cm) + (4 8329 yrs x 50,579 m3/yr secondary deciduous at 15/10/15 cm) + (207,679 m3 primary deciduous at 15/10/15 cm reconciliation volume from 2002-2007)+ (13,512 secondary deciduous at 15/10/15 reconciliation from 2002-2007) **Assuming** (4 8329 yrs x 52,515 m3/yr primary coniferous at 15/13/15 cm)+ (4 8329 yrs x 19,037 m3/yr secondary coniferous at 15/13/15 cm) - (51341 m3 primary coniferous at 15/13/15 cm reconciliation volume) - (146 m secondary coniferous at 15/11/15 cm reconciliation from 2002-2007)
Weyerhaeuser Company Ltd.	DTAE910001	W06	May 1, 2002 to April 30, 2007	0	0	0	0	11,056	547	0	0	Assuming (4 yr x 2,160 m3/yr primary deciduous at 15/10/30 cm) + (1 yr. x 2,416 m3/yr primary deciduous at 15/10/15 cm) + (1 yr x 547 m3/yr secondary deciduous at 15/10/15 cm) DTA issued for deciduous AAC found within grazing leases with the FMU W06 DTA was cancelled effective April 30, 2007 and rolled into DTAW060010
Weyerhaeuser Company Ltd.	DTAW060010	W06	May 1, 2007 [illegible]	0	0	0	0	[illegible] 2875	[illegible] 371	0 ∅	0	**Assuming** (5 yrs x 2,875 m3/yr primary deciduous at 15/10/15 cm) + (5 yrs x 371 m3/yr secondary deciduous at 15/10/15 cm) The DTA issued for deciduous AAC found within grazing leases with the FMU W06
Weyerhaeuser Company Ltd.	CTQW060013	W06	May 1, 2007 to April 30, 2012	0	0	0	0	0	0	1,107 221	3,159 632	**Assuming** (5 yrs x 222 m3/yr primary coniferous at 15/13/15 cm) + (5 yrs x 632 m3/yr secondary coniferous at 15/13/15 cm) CTQ issued for coniferous AAC found within grazing leases with the FMU W06
Millar Western Forest Products Ltd.	CTQW60002	W06	May 1, 2006 [illegible]	1255*	0	0	0	0	0	7,634 1,520	0	**Assuming** (1 yr x 1,153 m3/yr primary coniferous at 15/10/15 cm) + (4 yrs x 1620 at 15/10/15 cm) + 1,255* m3 reconciliation volume from 2001-2006 *Carryover of 1,219 m3 at 15/11 converted to 1,255 m3 at 15/10 (2 99% difference) *The quota holder has chosen not to harvest their coniferous AAC reconciliation volume
Blue Ridge Lumber Inc.	CTQW060010	W06	May 1, 2006 [illegible]	-5,491	0	0	0	0	0	194,287 370,857	0	**Assuming** (1 yr at 30,190 m3/yr primary coniferous at 15/11/15 cm) + (4 yrs at 42,397 m3/yr primary conifer at 15/11/15 cm) - (5,491 m3 at 15/11/15 cm reconciliation from 2001-2006)
ANC Timber Ltd.	CTQW060011	W06	May 1, 2006 [illegible]	126,425	0	0	0	0	0	596,806 119,361	0	**Assuming** (1 yr x 71,085 m3 coniferous at 15/10/15 cm utilization) + (4 yrs x 99,824 m3/yr conifer at 15/10/15 cm) - (7,532 m3 coniferous reconciliation at 15/10/15 cm from 2001-2006) + (133,957 m^3 coniferous reconciliation volume at 15/10/15 cm from CTP W060103 and CTQW060204 for period 1994-2002)

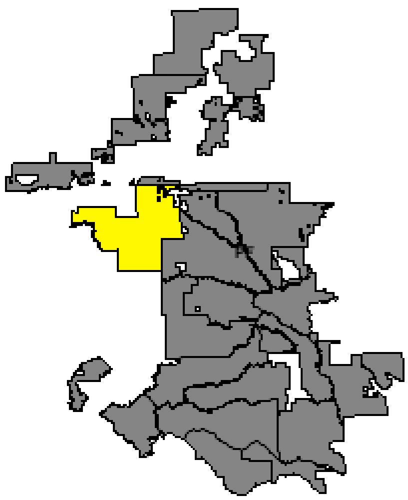
Continued...

Company Name	Disposition Number	FMU	Quadrant Period	Approved Quadrant Coniferous Reconciliation Volume (m^3)		Approved Quadrant Deciduous Reconciliation Volume (m^3)		Primary Deciduous Quadrant Allowable Cut (m^3)	Secondary Deciduous Quadrant Allowable Cut (m^3)	Primary Coniferous Quadrant Allowable Cut[1] (m^3)	Secondary Coniferous Quadrant Allowable Cut (m^3)	Comments
				Pure	Incidental	Pure	Incidental					
Cold Creek Timber Ltd.	CTQW0600012	W06	May 1, 2004 - April 30, 2009	13,393	0	0	0	0	0	63,393 12,678	0	**Assuming** (2 yrs x 10,000 m3/yr primary coniferous at 15/11/30 cm) + (3 yrs x 10,000 m3/yr primary coniferous at 15/11/15 cm) + (13,393 m3 reconciliation volume at 15/11/15 cm from 2001-2004)
W06 CTPP	CTPP	W06	May 1, 2001 to April 30, 2007	24,439	0	0	26,631	0	132,177	163,951	0	**Assuming** (5 yrs x 17,591 m3/yr secondary deciduous at 15/10/30 cm) + (1 yrs x 17,591 m3/yr secondary deciduous at 15/10/15 cm) + (26,631 m3 secondary deciduous reconciliation volume at 15/10/30 cm from 2001-2007) **Assuming** ((3 yrs x 28,252 m3/yr at 15/11/30 cm) + (2 yrs x 18,252 m3/yr at 15/11/30 cm) + (1 yrs x 18,252 m3/yr at 15/11/15 cm) primary coniferous)) + 24,439 m3 coniferous reconciliation volume at 15/11/30 cm from 1996-2001)
W06 CTPP	CTPP	W06	May 1, 2007 - April 30, 2012	31,405	0	0	17,463	0	105,418 21,063	122,665 24,533	0	**Assuming** (5 yrs x 17,591 m3/yr secondary deciduous at 15/10/15 cm) + 17,463 m3/yr secondary deciduous reconciliation volume at 15/10/15 cm from 2001-2007 **Assuming** (5 yrs x 18,252 m3/yr primary coniferous at 15/11/15 cm) + (31,405 m3 primary coniferous reconciliation volume at 15/11/15 cm from 2001-2007)

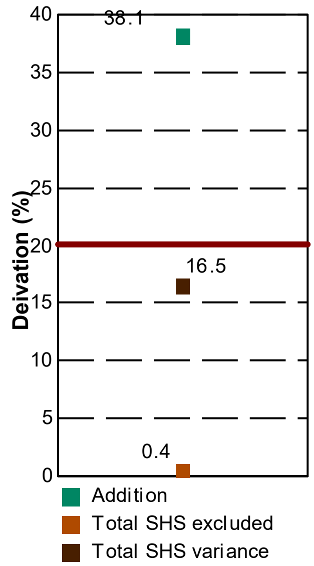
Appendix 4-5 – Example of SHS Variance Report

CUMULATIVE SPATIAL HARVEST SEQUENCE (SHS) VARIANCE MONITORING REPORT

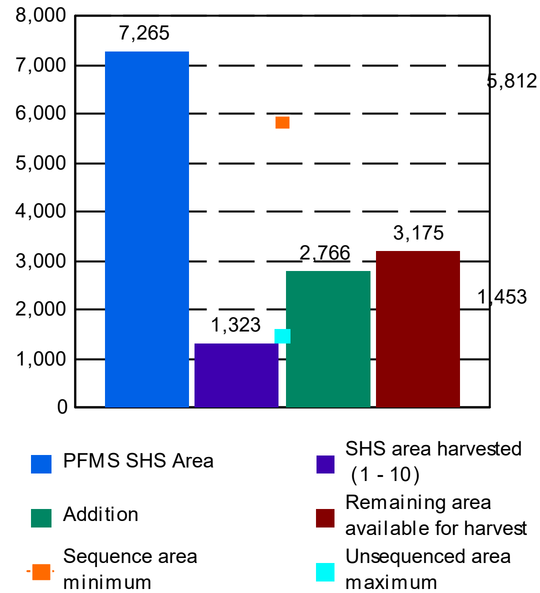
COMPARTMENT: MOOSE CREEK AREA OF INTEREST



20% THRESHOLD TRACKING



100% HARVEST AREA TRACKING (ha)

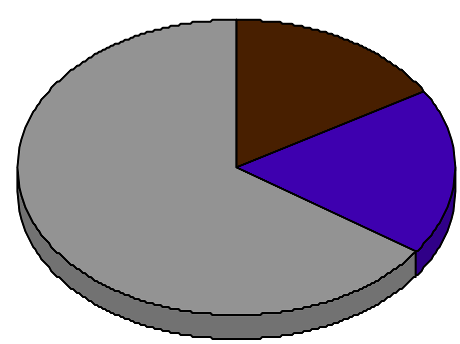


SHS MONITORING SUMMARY

SUMMARY CLASS	SPECIES GROUP AREA (ha) C-Sw	C-Sb	C-P	CD-Sw	CD-Sb	CD-P	DC-S	DC-P	D	NF	TOTAL AREA (ha)
PFMS 10 year SHS	535	260	4,508	113	7	460	218	326	836	0	7,265
SHS area harvested (1-10)	108	13	799	35	0	23	85	19	240	0	1,323
SHS area harvested (11-20)	8	1	816	0	0	50	15	76	88	0	1,054
Non-SHS net landbase harvested	79	12	662	36	4	154	88	103	281	0	1,419
Non-SHS passive landbase harvested	12	95	89	2	0	10	10	10	34	30	293
Remaining area available	328	139	2,142	40	3	223	19	118	193	-30	3,175

SUMMARY OF SHS AREA

SHS CATEGORIES	AREA (ha)	PERCENT (%)
Deletions		
Cover type inaccuracies	0.0	0.0
Management Considerations	13.0	0.2
Landbase errors	15.1	0.2
Operational Considerations	0.0	0.0
Total SHS area excluded	**28.1**	**0.4**
Deferrals		
Economic reasons	0.0	0.0
Management Considerations	59.2	0.8
Operational Considerations	857.2	11.8
100% Threshold Constraint	0.0	0.0
Isolated	0.8	0.0
Sliver polygons	249.8	3.4
Retention	0.1	0.0
Total SHS area deferred	**1,167.1**	**16.1**
Total SHS variance (Deletions + Deferrals)	**1,195.2**	**16.5**
SHS area harvested	1,323.2	18.2
Unplanned sequence area	4,746.2	65.3
Total SHS area	**7,264.6**	**100.0**



Total SHS variance (Deletions + Deferrals)	1,195.2	16.5%
SHS area harvested	1,323.2	18.2%
Unplanned sequence area	4,746.2	65.3%
Total:	7,264.6	100.0%

Weyerhaeuser

Pembina 2017-2026

Forest Management Plan

Chapter 5: VOITs

March 19, 2018

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5 Values, Objectives, Indicators and Targets (VOITs)

5.1 Introduction

5.1.1 Background

The *"Alberta Forest Management Planning Standard, Annex 4 – Performance Standards, Version 4.1-April 2006"* was used in the annual and stewardship reporting for the 2005/06 approved Pembina Edson and Drayton Valley Forest Management Plans (FMP). Annual performance reporting commenced with the 2006/07 results covering the Drayton Valley FMP, and the 2007/08 results covering the Edson FMP. A stewardship report for each was submitted in 2013 that reflected the years 2006 or 2007 through 2012. Annual reports continued to be submitted after the Stewardship report to the end of the tenth year for Edson and the eleventh year for Drayton Valley, culminating with the 2015/2016 annual reports. The results were used to provide opportunities in the development of the current FMP. A copy of each 2015/16 Annual reports can be found in Annex V - Stewardship.

5.1.1.1 Drayton Valley 2005 FMP Variances

The Drayton Valley Forest Management Plan (FMP) VOITs were reported for the ten-year period between May 1, 2006 and April 30, 2016. The FMP was amended effective May 1, 2007 to address concerns about the recent invasion of Mountain Pine Beetle (MPB) into Alberta from North-eastern British Columbia. A surge cut was implemented at that time.

There were 57 VOITs created, a majority as directed from the Province, with a minority created as a result of Forest Advisory Group input. For the 57 VOITs reported, a summary of variances from the anticipated targets follows, with rationale for those that were outside of acceptable variance:

- 47 VOITs (82.5%)were within variance all years
- 3 VOITs (5.3%) were within variance 9 years out of 10
    - #7: Live trees: Retain all unburned trees in green islands and retained patches; Burned trees:(Landscape view) Retain >10% of area with merchantable black (burnt) trees in salvage areas greater than 10 ha in size; (Harvest Area Scale) Retain >5% of area with merchantable black trees in salvage areas less than or equal to 10 ha in size– Rationale: retention was below expected values. This indicator is represented in indicator #7 in the 2017 VOITs table
    - #16: 100% of designs meet standards of the Code of Practice for Water Course Crossings – Rationale: heavy rain event washed out bridge abutment. This indicator is represented in indictor #9 in the 2017 VOITs table.
    - #28: 100% of harvest areas are reforested within two years –Rationale: one non-conformance of two-year treatment rule. This indicator is not represented in the 2017 VOITs table.
- 2 VOITs (3.5%) were within variance 7 years out of 10

- #29: 100% compliance – Rationale: 3 penalties incurred for data related issues resulting from high level of AAF scrutiny. This indicator is not represented in the 2017 VOITs table.
- #41: No penalties or warnings from AAF as a result of poor timber utilization practices – Rationale: 3 penalties for poor utilization practices of salvaged timber deemed to be the responsibility of the Company. This indicator is not represented in the 2017 VOITs table.

- 1 VOIT (1.8%) was within variance 6 years out of 10
  - #50: Average turn-around-time SAW – 6.5 hours – Rationale: Lower actual Turn-Around-Times due to over-estimate of target. This indicator is not represented in the 2017 VOITs table.
- 1 VOIT (1.8%) was within variance 5 years out of 10
  - #57: Produce an annual report for the FAC regarding Company activities and issues raised during the year – Rationale: Weyerhaeuser deemed the FAC to be unnecessary on a continual basis. This indicator is not represented in the 2017 VOITs table.
- 1 VOIT (1.8%) was within variance 4 years out of 10
  - #25: 95% on an annual basis for establishment surveys – Rationale: Establishment survey protocols have changed since establishing the target. This indicator is not represented in the 2017 VOITs table.
- 1 VOIT (1.8%) was within variance 9 years out of 10
  - #43: Number of blocks where incidental deciduous (AW and PB) timber is not harvested Zero - Rationale: Drayton Valley OSB facility closed in 2007, creating excessive deciduous supply on the FMA. This indicator is not represented in the 2017 VOITs table.
- 1 VOIT (1.8%) was within variance 10 years out of 10
  - #2: Range of harvest areas reflect the approved SHS - Rationale: output from the TSA not in line with the indicator, establishing an incorrect initial starting point to begin with. This indicator is represented in indicator #2 in the 2017 VOITs table

Edson 2006 FMP Variances

The Edson FMP VOITs were reported for the nine-year period between May 1, 2007 and April 30, 2016. The FMP was amended effective May 1, 2007 to address concerns about the recent invasion of MPB into Alberta from North-eastern British Columbia. A surge cut was implemented at that time.

There were 44 VOITs created, a majority as directed from the Province, with a minority created as a result of Forest Advisory Group input. For the 44 VOITs reported, a summary of variances from the anticipated targets follows, with rationale for those that were outside of acceptable variance:

- 39 VOITs (88.6%) were within variance all years
- 2 VOITs (4.5%) were within variance 8 years out of 10

  - #22: 95% on an annual basis for establishment surveys – Rationale: Establishment survey protocols have changed since establishing the target. This indicator is not represented in the 2017 VOITs table.
  - #25: 100% of harvest areas are reforested within two years –Rationale: two non-conformances of two-year treatment rule. This indicator is not represented in the 2017 VOITs table.
- 1 VOIT (2.3%) was within variance 5 years out of 10
  - #43: Produce an annual report for the FAC regarding Company activities and issues raised during the year – Rationale: Weyerhaeuser deemed the FAC to be unnecessary on a continual basis. This indicator is not represented in the 2017 VOITs table.
- 2 VOITs (4.5%) were within variance 10 years out of 10
  - #2: Range of harvest areas reflect the approved SHS - Rationale: output from the TSA not in line with the indicator, establishing an incorrect initial starting point to begin with. This indicator is represented in indictor #2 in the 2017 VOITs table.
  - #13: Stand retention of an average of 3% in FMUs E2, W5 and W6 and 8% in FMU E15 of all species utilized – Retention was outside acceptable variance for FMU E15 only. This indicator is represented in indictor #10 in the 2017 VOITs table.

5.1.2 Development Approach

Alberta identifies a total of 34 Indicators in Annex 4 of the Planning Standard. These indicators provided a baseline for the Plan Development Team as a starting point for discussions. The VOIT tables from the previous Pembina FMPs were reviewed as part of the development of a new VOITs table. Experts were brought in for specific VOITs, most notably the ecological VOITs concerning seral stages, interior older forest and patch size, as well as forest protection, species-of-concern, and reforestation. Three additional VOITs were developed based on consultation of the Provincial VOITs with affected First Nations and a Métis Settlement.

5.1.3 Agreement-In-Principle

During the development stage of the VOITs table, individual VOIT wording was reviewed and agreed upon by members of the PDT. Once agreement from the PDT occurred, then the opportunity to consult these VOITs was available. A draft version of the VOITs was shared with all timber operators on the Defined Forest Area on May 24, 2016. No comments were received that affected the draft VOITs.

A draft version of the VOITs was also sent out to the First Nations being consulted on April 15, 2016. No comments were received regarding the suggested Provincial VOITs, however, as noted above, additional VOITs were created to address First Nations and Métis Settlement concerns.

Table 5-1. VOIT summary table.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CCFM Criterion 1 - Biological Diversity										
CSA SFM Element - 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the FMA.										
Value - 1.1.1 Landscape scale biodiversity.										
1	1.1.1.1 Maintain biodiversity by retaining the full range of cover types and seral stages.	Area of Old, Mature, Young and Regenerating Forest by Ecological Unit - DX,(Hw); DC (HwPl, HwSw); CD(PlHw, SwHw, SbHw); PL (Pl pure and leading), SW (Sw pure and leading); CX (Sb pure and leading)	Over the 200-year planning horizon; a) Gross forested landbase: greater than 12% old forest, greater than 23% mature plus old forest, less than 32% young forest; less than 17% regenerating forest, and b) Active forested landbase: greater than 8% old forest, greater than 19% mature plus old forest, less than 54% young forest, less than 28% regenerating forest.	Targets and seral stage definitions shall be based on sound science, ecological considerations, wildlife zones, and disturbance regimes. Target shall ensure representation of natural range of ecosystem attributes (e.g., productivity class).	Planning Standard.	Spatial Harvest Sequence.	Periodic updates to DFA area inventory.	**FMP:** - Tables of indicators (values and targets) at 0, 10, 50, 100 and 200 years. - Maps of seral stages at 0, 10 and 50 years. **Performance:** 5 year Stewardship Reporting: none 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP	Area (ha) of Old; and Mature plus Old forest in the DFA by: Ecological Unit shall be between 90% and 100% of target. Area of young and regenerating forest in each DFA by Ecological Unit shall not exceed 110% of target area.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
2	1.1.1.2 Maintain biodiversity by avoiding landscape fragmentation.	a) Range of patch sizes for the DFA. Patch size categories are as follows: <=25 ha, 25-100 ha, 100-500 ha and 500+ ha.	Over the long-term the intent is to achieve a distribution of harvest area sizes that will result in a patch size pattern approximating patterns created by natural disturbances. By year ten of the FMP the target is to achieve the following percentages of harvested area by patch size category: <= 25 ha 39.6% 25 – 100 ha 39.1% 100 – 500 ha 19.3% > 500 ha 2.1%	Targets shall be based on sound science, ecological considerations, wildlife zones, and disturbance regimes. Target shall ensure representation of natural range of ecosystem attributes (e.g. cover class and productivity class).	Planning Standard.	Spatial Harvest Sequence.	Periodic updates to DFA inventory.	**FMP:** - Tables of area of forest in each harvest area size class on the DFA at 0, 10, and 50 years. Maps of harvest area size classes at 0, 10, and 50 yrs. **Performance:** 5 year Stewardship Reporting: none 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP	The target distribution is achieved; or demonstrated progress to achieving target in one rotation where the pattern has deviated significantly from the target.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
3	1.1.1.2 Maintain biodiversity by avoiding landscape fragmentation.	b) Area of old interior forest by Ecological Unit on the DFA.	b) Area of old interior forest (OIF) by ecological unit will be no less than the following % of the gross forested area within each ecological unit as defined at year 10 of the FMP. DX : 14% of the gross forested DX area at year 2027 DC : 18% of the gross forested DC area at year 2027 CD : 17% of the gross forested CD area at year 2027 C-PL : 32% of the gross forested C-PL area at year 2027 C-SW : 40% of the gross forested C-SW area at year 2027 CX : 42% of the gross forested CX area at year 2027	TSA output at year 10 of the PFMS	Planning Standard.	Spatial Harvest Sequence.	Periodic updates to forest inventory.	**FMP:** - Tables of indicators (values and targets) at Year 0, 10 and 50. - Maps of interior older forest at Year 0, 10 and 50. **Performance:** 5 year Stewardship Reporting: none 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP	The target is achieved for at least 80% of the planning period with variance not exceeding 20% below target.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
4	1.1.1.3 Maintain biodiversity by minimizing access.	a) Permanent all-weather forestry road density by DFA - km/km^2 Current Weyerhaeuser Status- 0.036 km/km^2 forestry roads (383 km of permanent forestry roads)	Less than 0.05 km/km^2 of permanent all-weather forestry roads built on the DFA through 2026.	Analysis of permanent all-weather forestry road densities for current and planned all-weather roads to be developed through 2026 Average DLO plan is approximately 10-20 km per year of permanent all-weather road construction	Planning Standard.	Coordinating access with other resource users, road closures and decommissioning.	Regular updates to forest inventory.	**FMP:** - Amount of permanent all-weather road density for the DFA at 0 and 10 years. - Map of existing open all-weather forestry roads **Performance:** Stewardship reports of permanent forestry road density on the DFA	Variance not to exceed +10% of the target to be achieved.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
5	1.1.1.3 Maintain biodiversity by minimizing access.	5a) Permanent forestry winter (seasonal) road density on the DFA Current Weyerhaeuser Status: 0.0084km/km^2 - 89 km of road 5b) Active temporary external block forestry road density on the DFA area. Current Weyerhaeuser Status: 0.002 km/km^2 - 21 km of roads	5a) Less than 0.03 km/km^{2}of permanent winter (seasonal) forestry road on the DFA 5b) Less than 0.002 km/km^2 of temporary external forestry road on the DFA	5a) Analysis of current status of permanent winter (seasonal) forestry road densities on the DFA by year 5b) Analysis of current status of temporary external block roads on the DFA	Planning Standard.	Road construction, maintenance and reclamation activities.	Road plan OGR 11.2.	**FMP:** Estimate of existing density of permanent winter forestry roads on the DFA **Performance:** 5a) Stewardship Reports of density of permanent winter (seasonal) forestry roads on DFA 5b) Stewardship Reports of density of temporary external block forestry roads on DFA area by year.	A variance not exceeding +/- 20% must be achieved.	Adjust strategies in subsequent FMPs.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
6	1.1.1.4 Maintain plant communities uncommon in DFA or province.	Area or occurrence of each identified uncommon plant community within the DFA area.	When encountered, maintain 80% of the identified uncommon plant community area, for each community confirmed to exist within the FMA, as defined within the Alberta Conservation Information Management System (ACIMS).	Alberta Conservation Information Management System (ACIMS) plant community classification and tracking list. Predict and identify occurrence of uncommon plant community. Maintaining a process to protect identified uncommon plant communities upon the DFA	Planning Standard.	Coordinating with other resource users, spatial planning of harvest and road construction, OGR.	Periodic updates to inventory.	**FMP:** Table with descriptive list of identified uncommon plant communities known to exist on the DFA (see chapter 3) **Performance:** Stewardship Reports of area of uncommon plant communities identified and percent area maintained.	The target is achieved.	Adjust strategies in subsequent FMPs.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
7	1.1.1.5 Maintain unique habitats provided by wildfire and blowdown events.	Area of unsalvaged burned forest.	a) Fires<1000 hectares of Active Landbase Follow FMP structure retention strategy consistent with normal harvesting practices (see VOIT 10 for retention percent) b) Fires>1000 hectares of Active Landbase Retain all unburned trees in green islands and retained patches recognizing timber condition, access, non-timber needs.	Targets based on "Fire Salvage Planning and Operations - Directive No. 2007-01" Ensure consistency with FireSmart objectives	"Fire Salvage Planning and Operations - Directive No. 2007-01"	Salvage planning.	Organization reports, FHPs	**FMP:** Table and map of fire disturbance history (see chapter 3) **Performance:** Stewardship Reports of fire disturbance by area for: a) fires less than 1000ha of active landbase - report totals only b) fires greater than 1000ha of active landbase - report totals salvaged, unsalvaged and total area disturbed.	Target is achieved or exceeded for both a) and b)	Adjust strategies in subsequent AOP's

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
8	1.1.1.5 Maintain unique habitats provided by wildfire and blowdown events.	Area of unsalvaged blowdown of merchantable forest.	In areas of significant (> 100 ha) merchantable blowdown, greater than 10% area will be left unsalvaged.	Targets are to be based on sound science, ecological considerations and disturbance regimes.	Planning Standard.	Salvage planning.	Final Harvest Plans	**FMP:** none **Performance:** Stewardship Reports of area of merchantable blowdown - salvaged, unsalvaged and total area disturbed.	The target is achieved or exceeded where areas of blowdown of merchantable forest of greater than 100 ha.	Adjust strategies in subsequent FMPs.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
9	1.1.1.6 Retain ecological values and functions associated with riparian zones.	Compliance with Operating Ground Rules (OGR).	No warnings or penalties assessed regarding riparian zones	OGR.	Federal Fisheries Act, Water Act.	Planning, OGR.	Compliance reporting systems.	**FMP:** none **Performance:** Stewardship Reporting of penalties assessed regarding riparian zones	The target is achieved.	Immediate remedial action and / or administrative penalty.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
Value - 1.1.2 Local/stand scale biodiversity.										
10	1.1.2.1. Retain stand level structure.	Percent of area with merchantable structure within the harvested area, representative of the status, sizes, and species of the overstorey trees within the harvested areas on the DFA.	A combination of merchantable single stems, clumps, and patches, that are representative of the stands harvested, comprising 4% of the harvested area within the DFA area. Conifer and Deciduous Note: A wide range in variability in harvest area-level retention is desired as long as the target level is achieved.	Wildlife zones, roadside vegetation screens, recreational values, aesthetics, local knowledge, ACIMS, Biodiversity / Species Observation Database (BSOD). **See Feb 3, 2015 Forest Management Planning Standard Annex 4 for wording change**	Occupational Health and Safety Act, Forest and Prairie Protection Act.	Implement residual structure retention strategies in OGRs.	Organization reports, air photo interpretation, ground surveys, post harvest assessments.	**FMP**: none **Performance:** Stewardship Reporting of the Percent of structure retention in harvest areas on the DFA area.	At the end of the 10-year FMP term the target is achieved or exceeded.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
11	1.1.2.1. Retain stand level structure.	Percentage of harvested area within the DFA with downed woody debris equivalent to preharvest conditions.	All harvest areas have downed woody debris retained on site - exception is roadside slash piled and burned	Sound ecological science	Planning Standard.	Minimize the occurrences of harvest area debris removal and/or disposal (other than roadside slash)	ARIS, Silviculture prescriptions	**FMP:** none **Performance**: Stewardship Reports of area of total disposal of DWD	The target is achieved.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
12	1.1.2.2. Maintain integrity of sensitive sites.	Sensitive sites (e.g. mineral licks, raptor nests, bear dens, unique ecological areas, etc.) within the DFA area.	Protect and report on all identified sites	Local knowledge, FHPs	Planning Standard.	Organization developed standards for sensitive site protection, OGRs 7.7.4.	Final Harvest Plans.	**FMP:** none **Performance:** Stewardship Reports of the number of identified sites consistent with OGRs	The target is achieved.	Adjust strategies in subsequent FMPs.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
13	1.1.2.3. Maintain aquatic biodiversity by minimizing impacts of water crossings.	Forestry water crossings in compliance with Code of Practice for Water Course Crossings within the DFA.	No warnings or penalties for non-compliances for the Code of Practice or OGRs for water course crossing	Code of Practice for Water Course Crossings: Sections 7 - 9 and Schedule 2.	Code of Practice for Water Course Crossings.	Road construction, maintenance and reclamation activities.	Road plan and OGR 11.4 (Watercourse Crossings).	**FMP**: none **Performance:** Stewardship Reports of warnings and penalties related to non-compliance with Codes of Practice for Water Course Crossings.	The target is achieved.	Act immediately to eliminate problems and adjust strategies in subsequent AOPs.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CSA SFM Element - 1.2 Species Diversity: Conserve species diversity by ensuring that habitats for the native species found in the DFA are maintained throughout time.										
Value - 1.2.1. Viable populations of identified plant and animal species.										
14	1.2.1.1. Maintain habitat for identified high value species (i.e., economically valuable, socially valuable, species at risk, species of management concern).	a) Number of hectares of primary and secondary habitat by DFA from the fRI Grizzly Bear model, as measured at time 0 (start of modelling time 0 - 2017). b) percent change in the Barred owl RSF habitat value and potential breeding pairs habitat value from 2017 by DFA; and c) Percent change in relative abundance value of four songbird species (Black-throated Green Warbler, Brown Creeper, Ovenbird, Varied Thrush) from 2017 by DFA.	ai) - Maintain or increase the number of hectares of combined primary and secondary habitat from the fRI Grizzly Bear model, as measured at time 0 (TSA modelling time 0 - 2017). aii) - 100% of temp roads will have effective access controls within the core and secondary grizzly bear range, during active grizzly bear season (May to December). b) maximum 15% reduction in the RSF indicators at 10 and 20 years and a maximum 15% reduction in the breeding pairs indicator at 10 and 20	Habitat models (provided by the Government of Alberta (GOA)).	Recovery plans for species at risk, Federal Species at Risk Act.	Spatial Harvest Sequence.	Updates to vegetation inventory and habitat modelling.	**FMP:** a) table and maps of current (time zero) and future (10 and 20 years) landscape condition for Core and Secondary habitat zones; b) tables of RSF and breeding pairs at 0, 10, 20, 50, 100 & 200 years and maps at 0, 10, 20 & 50 yrs. c) tables of relative abundance at 0, 10, 20, 50, 100 and 200 years and maps of relative abundance at 0,	At the end of the 10-year FMP term targets are achieved or exceeded.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
		d) East Slopes Cold Water Fish	years; c) maximum 15% reduction in the indicator over the 200 year planning horizon; and di) ECA target is 30% in Athabasca Rainbow Trout Ecologically Significant Habitat (see ARTR Recovery Plan). Watersheds with ECA values >30% due to existing (year 0) modelled disturbance, ECA values must demonstrate a continuous downward trend or not exceed 35% in years 0-20. ESH watersheds: West Carrot, East Carrot, Upper Moose, Upper Sang, Embarras, Erith, Rodney, Minnow, Svedberg, Swartz, Half Moon, Coyote, Raven, Cairn, Oldman, Shinningbank, Trout, Whitefish, Deer, Prairie, Mason,					10, 20 and 50 years; di-diii) Document effort made to modify SHS sequence to reduce ECA yield in FMP development **Performance:** 5 year Stewardship Report: none 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP		

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
			Sundance East, Obed, Athabasca, Sundance West, Edson, Groat, Mcleod) dii) ECA target is 30% for Bull Trout Watersheds, Watersheds with high ECA values >30% due to existing (year 0) modelled disturbance, ECA values must demonstrate a continuous downward trend or not to exceed 35% in years 0-20. Blackstone watersheds:(merged watersheds < 10,000ha): (Middle Blackstone, Hansen), East Rundell, Chungo, Upper Brown, Lower Wapiabi, Penti, Lookout, Sturrock, Upper Wapiabi, South Lookout, East Sturrock; Nordegg watersheds: East Nordegg, (North Rapid, Rapid) Nordegg, Owl, North Brewster, (North Colt, Sutherland) Wawa,							

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
			Stephens, Grey Owl; Brazeau watersheds: Broken Arm, Lower Blackstone, Negraiff, North Elk, Middle Marshybank, North Marshybank, South Marshybank ; (Elk River watersheds: South Elk. diii) ECA target is 30% for Arctic Grayling within the Pembina River watershed. Watersheds with high ECA values due to existing modelled disturbance ECA values must demonstrate a continuous downward trend or not to exceed 35% in years 0-20. Arctic Grayling watersheds: Paddy, Middle Pembina, Jerry, Rehn, Dismal, Baker, Upper Pembina, Tall Pine, Reservoir, Upper North Rat, (West Eta, Varty) East Eta, (Dzida, Tom), Lower North Rat, , East Zeta, West							

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
			Zeta, South Rat.							

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CSA SFM Element - 1.3 Genetic Diversity: Conserve genetic diversity by maintaining the variation of genes within species.										
Value - 1.3.1. Genetic integrity of natural tree populations.										
15	1.3.1.1. Retain "wild forest populations" for each native tree species in each seed zone through maintenance and/or establishment of in-situ reserves by Alberta and disposition holders.	The appropriate number and area (ha) of in-situ tree gene conservation reserves as directed by the FGRMCS.	Owners of the tree improvement program will determine the number of in situ gene conservation stands and allocate them to FMA holders who are partners in the tree improvement program. When this is done, individual FMA holders are responsible for conservation. This has yet to be determined.	Direction and detail as per FGRMCS Section 20.0, "In-situ Gene Conservation", in consultation with the other associate FMA holders and AAF	Standards regulated through Timber Management Regulation 144.2 and the FGRMCS and AAF	Field reconnaissance or survey to locate appropriate in-situ tree gene conservation reserves on the ground. Establish protective notation to identify in-situ tree gene conservation reserves in land standing records, and management plan to protect genetic resources.	Within each FMP and at each stewardship report interval, determine the status of all existing and planned *in-situ* reserves.	**FMP:** NA **Performance:** Stewardship Reports: update status	The target is achieved.	AAF will direct any required amendments or adjustments to targets.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
16	1.3.1.2 Retain wild forest genetic resources through ex-situ conservation for species under CPP programs.	Number of provenances, families and clone in trials and clone banks; and seed in the seed archive.	Establish and maintain active ex-situ conservation program for species under CPP programs in cooperation with AAF and in accordance with FGRMCS Section 17 and 29 and ex-situ conservation criteria (Appendix 4, Footnote 1). Subject also to Section 6.3 of the Gene Conservation Plan for Native Trees of Alberta (2008).	Adequacy of the ex-situ conservation program to capture a representative sample of wild tree genetic resources in ex-situ gene archives. Information for this to be provided by AAF.	Standards regulated through Timber Management Regulation 144.2 and the FGRMCS and consultation with AAF.	Seed collections, clone banking and establishment of genetic lines in genetic trials.	Conservation activities identified in FMP as per FGRMS.	**FMP:** Table showing number of genetic conservation areas required in each seed zone and number provided in DFA. Map showing locations of genetic conservation areas. (see Annex V) **Performance:** Stewardship Reports: Update status	No variance from targets as set by AAF is anticipated, but adjustment to targets and objectives are allowable as more research and development bring new data and parameters forward.	AAF will direct any required amendments or adjustments to targets.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CSA SFM Element - 1.4 Protected Areas: Respect protected areas identified through government processes.										
Value - 1.4.1. Areas with minimal human disturbances within managed landscapes.										
17	1.4.1.1 Integrate transboundary values and objectives into forest management.	Stakeholder consultation.	Ongoing consultation with relevant protected areas agencies as required	FHPs	Planning Standard.	Operation Planning of FHPs	Silvacom (or other as developed) Consultation Tracking Program	**FMP:** None **Performance:** Stewardship Reports of consultation initiatives undertaken with protected area agencies.	The target is achieved.	Adjust strategies in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CCFM Criterion 2 - Ecosystem Productivity										
CSA SFM Element - 2.1 Ecosystem Resilience:										
Value - 2.1.1 Reforested harvest areas.										
18	2.1.1.1 Reforest all harvested areas	Annual % of openings that: a) meet or exceed the RSA establishment survey minimum stocking and species composition standards for the declared regenerated yield stratum; and b) meet or exceed the RSA establishment survey minimum stocking and species composition standards for an alternate regenerated yield stratum, and c) do not achieve the RSA	The sum of Indicators a, b and c = 100% of openings	Direction from Alberta	Timber Management Regulations 141.6(1) and 141.6(2); Reforestation Standard of Alberta	Implementation of silviculture strategies that ensure the target stocking and species composition is achieved for the opening.	RSA establishment survey protocols	**FMP:** ARIS, AOP **Performance:** Stewardship Reports of: a) area that meets the RSA stratum requirements, and b) area that meets a different RSA stratum requirement, and c) area not meeting any RSA stratum requirements and require retreatment	None	Adjust silviculture strategies.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
		establishment survey minimum stocking and/or species composition standards for any regenerated yield strata and are re-treated within one year. Indicators a, b and c are to be reported separately.						within one-year		

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
19	2.1.1.2 Meet or exceed the C and D MAI standard for the population of openings surveyed in a given quadrant by the end of the fifth year of the plan.	Summed difference between target and actual C and D MAIs for openings surveyed in a five year quadrant, as reported to ARIS.	100%	Direction from Alberta	Timber Management Regulation 141.7(1) and 141.7(2); Reforestation Standard of Alberta	Implementation of silviculture strategies that ensure the target productivity is achieved for the population of openings.	RSA performance survey protocols.	**FMP:** MAI targets by yield group (see chapter 7 and Annex VII) **Performance:** Stewardship Reporting : Comparison of RSA MAI results for C and D and forecasted targets by Yield Group	Meet or exceed the target C and D MAI for the DFA	Adjust silviculture strategies and/ or Alberta adjusts AAC.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
Value - 2.1.2 Maintenance of forest landbase.										
20	2.1.2.1 Limit conversion of productive forest landbase to other uses.	Amount of change in forest landbase.	Report on the loss of the gross forest landbase area.	Forest inventory and land use data.	Planning Standard.	Promoting the minimization of non-forestry impacts to the landbase	AAF tracking of withdrawals and cancellations by FMA	**FMP:** none **Performance:** Stewardship Reporting of additions and deletions to the gross forest landbase	The target is achieved.	Adjust strategies next FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
21	2.1.2.2 Recognize lands affected by insects, disease or other natural events.	Amount of area affected by significant impacts of insects, fire, windthrow and other natural events.	Report the area affected by impacts of insects, fire, windthrow or other natural events.	AAF forest health surveys, inventory updates, fire reporting. Events that exceed 100 hectares in size will be reported, with the exception of fires. AAF tracks all fires on the DFA.	Planning Standard, Alberta Forest Health Strategy and Shared Roles and Responsibilities between AAF and the Forest Industry.	Maintain up-to-date information.	Alberta surveys with industry cooperation.	**FMP**: none **Performance**: Stewardship Reports of areas impacted by fire, insects, windthrow and other natural events	The target is achieved.	Address events as they occur.
Value - 2.1.3 Control invasive species										
22	2.1.3.1 Control non-native plant species (weeds).	Noxious weed program.	Effective suppression of noxious weeds	Noxious weed directive 2001-06	Directive 2001-06.	Noxious weed program	Field surveys	**FMP**: none **Performance**: Stewardship Reports of control efforts	The target is achieved.	Effective suppression of weeds.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CCFM Criterion 3 - Soil and Water Resources										
CSA SFM Element - 3.1 Soil quantity and quality - Conserve soil resources by maintaining soil quality and quantity.										
Value - 3.1.1 Soil productivity.										
23	3.1.1.1 Minimize impact of roading and bared areas in forest operations.	Silviculture Strategy Table (SST) that includes tactic to reforest temporary in-block roads	Follow Silviculture Strategy Table	Direction from Alberta.	OGRs and Soils Guidelines .	Silviculture strategy to reforest all roads within harvest areas while minimizing bared areas within harvest areas	Field inspection reports and audits.	**FMP:** None **Performance:** Stewardship Reports: none	The target is achieved.	Adjust strategies in next FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
24	3.1.1.2 Minimize incidence of soil erosion and slumping.	Incidence of soil erosion and slumping.	No warnings or penalties assessed regarding soil erosion or slumping.	Direction from Alberta.	OGRs and Soils Guidelines.	Effective planning and supervision of operations and adherence to relevant OGRs.	Field inspection reports and AAF FOMP reports	**FMP:** None **Performance:** Stewardship reports of non-compliance (warnings and penalties assessed)	The target is achieved.	Immediate remedial action to correct.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CSA SFM Element - 3.2 Water quantity and quality - Conserve water resources by maintaining water quality, flow regime and water quantity.										
Value - 3.2.1 Water quantity.										
25	3.2.1.1 Limit impact of timber harvesting on water yield.	Forecasted changes in water yields resulting from the approved SHS, as measured by Equivalent Clearcut Area (ECA)	a) ECA <30% b) Zero Water Act penalties	Equivalent Clearcut Area (ECA) water yield modelling	Water Act, Planning Standard.	Follow the SHS.	Spatial harvest sequence variance reporting	**FMP:** ECA results by watershed in excess of 500 hectares size **Performance:** a) 5-year Stewardship Report: SHS variance b) 5-year Stewardship report: penalties to the Water Act 10 year Stewardship Report: comparing time 0 of previous FMP to Classified	<20% variance to the SHS	Adjust strategies in the next FMP

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
								Landbase of new FMP		

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
Value - 3.2.2 Effective riparian habitats.										
26	3.2.2.1 Minimize impact of operations in riparian areas.	Riparian buffers maintained as outlined in OGRs.	No warnings or penalties assessed regarding riparian zones	Direction from Alberta.	OGRs.	Effective planning and supervision of operations and adherence to relevant OGRs.	Field inspection reports and AAF FOMP reporting.	**FMP:** None **Performance:** Stewardship reports of warnings and penalties assessed	The target is achieved	Immediate correction and / or administrative penalty.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CCFM Criterion 4 - Global Ecological Cycles										
CSA SFM Element - 4.1 Carbon uptake and storage										
Value - 4.1.1 Impact of forestry operations on carbon budgets.										
27	4.1.1.1 Maintain functioning forest ecosystems capable of contributing to global carbon cycles.	Results of carbon budget modeling.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CSA SFM Element - 4.2 Forest land conversion										
	There is no VOIT in support of Element 4.2.									

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CCFM Criterion 5 - Multiple Benefits to Society										
CSA SFM Element - 5.1 Timber and non-timber benefits										
Value - 5.1.1 Sustainable timber supplies.										
28	5.1.1.1 Establish appropriate AACs.	Process described in Annex 1 is followed and standards are met.	Complete compliance. AAF approves AACs as determined by the Timber Supply Analysis (TSA)	TSA and development of the Preferred Forest Management Scenario (PFMS) that results in the SHS	Forests Act and Timber Management Regulation; planning standard	Effective implementation of planning standard	Multiple means: TPRS, ARIS, AOPs, Stewardship Reports, filed inspection reports.	**FMP**: see chapter 6 - PFMS **Performance:** 5 year Stewardship Reporting: none 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP	Issue specific.	Adjust AAC using most current and relevant information.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CSA SFM Element - 5.2 Communities and sustainability										
Value - 5.2.1 Risk to communities and landscape values from wildfire is low.										
29	5.2.1.1 To reduce wildfire threat potential by reducing fire behaviour, fire occurrence, threats to values at risk and enhancing fire suppression capability.	1) Reduction in Fire Behaviour Potential within the FireSmart Community Zone.	Reduce the area (ha) in the high, very high and extreme Fire Behaviour Potential rating categories within the FireSmart Community Zones by 8% in 2027	Wildfire Threat Assessment completed by AAF and incorporated in the final SHS.	Planning Standard.	Spatial harvest sequence, thinning, partial harvest techniques.	Periodic updates to inventory	**FMP:** Maps and Tables of indicator at 0, 10, 20, and 50 yrs. **Performance:** 5-year Stewardship Report: None 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP	The target is achieved.	Adjust strategies next FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
30	5.2.1.1 To reduce wildfire threat potential by reducing fire behaviour, fire occurrence, threats to values at risk and enhancing fire suppression capability.	2) Reduction of Fire Behaviour Potential across the DFA area.	Reduce the area (ha) in the high, very high and extreme Fire Behaviour Potential rating categories within the DFA by 9% in 2027	Wildfire Threat Assessment completed by AAF and incorporated in the final SHS.	Planning Standard.	Spatial harvest sequence, thinning, partial harvest techniques.	Periodic updates to inventory	**FMP**: Maps and Tables of indicator at 0, 10, 20, and 50 yrs. **Performance**: 5-year Stewardship reports: None 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP	The target is achieved.	Adjust strategy in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
Value - 5.2.2 Provide opportunities to derive benefits and participate in use and management										
31	5.2.2.1 Integrate other uses and timber management activities.	Public Consultation Processes	Engage with interested users/users groups	Identification of interests	OGR	FHPs, AOPs, GDPs, GTAs	FHPs	**FMP**: Public Involvement Process undertaken and issues addressed in the FMP (see chapter 2) **Performance**: Stewardship Reporting of Number of Consultations with interested parties	The target is achieved.	Adjust activities

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
Value - 5.2.3 Forest productivity.										
32	5.2.3.1 Maintain Long Run Sustained Yield Average.	Regenerating stand yields compared to natural stand yields.	No decrease from the natural stand strata yields.	FMP Timber Supply Analysis.	Planning Standard.	Effective implementation of plans.	Stewardship Report.	**FMP:** Summary in the Timber Supply of LRSY (see chapter 6) **Performance:** 5 year Stewardship Reporting: none 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP	The target is achieved.	Adjust strategy in subsequent FMP.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CCFM Criterion 6 - Accepting Society's Responsibility for Sustainable Development										
CSA SFM Element - 6.1 Aboriginal and treaty rights and Aboriginal forest values										
Value - 6.1.1 Compliance with government regulations and policies.										
33	6.1.1.1 Implement Public Involvement Program.	Meet Alberta's current expectations for First Nations and Métis consultation.	Consult at the community level with designated representatives of affected First Nations and Métis Settlements.	Alberta to provide direction.	Alberta's First Nations and Métis Consultation guidelines on Land and Natural Resource Management	Effective implementation of Alberta's First Nations and Métis Settlement consultation requirements.	Consultation Logs and effectiveness of consultation process	**FMP:** First Nation and Métis consultation plan (see chapter 2) **Performance:** Stewardship reports summarizing First Nation and Métis consultation.	The target is achieved.	Adjust strategy to reflect AAF direction.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
34	6.1.1.2 Exercise of Treaty and Aboriginal rights on the DFA	First Nation and Métis gathering sites	Protect all site specific gathering areas (e.g. hunting, fishing, harvesting of forest resources) identified during any consultation process or shared by the First Nation or Métis Community	First Nations and Métis Settlement Consultation	Alberta's First Nations and Métis Settlement Consultation guidelines on Land and Natural Resource Management	Effective implementation of Alberta's First and Métis Settlement Nation consultation requirements.	Consultation Logs and effectiveness of consultation process	**FMP:** First Nation and Métis Settlement consultation plan (see chapter 2) **Performance:** Stewardship reports summarizing of disturbance of sites	The target is achieved.	Adjust strategy to reflect AAF direction.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
35	6.1.1.2 Exercise of Treaty and Aboriginal rights on the DFA	First Nation or Métis cultural sites	Protect all site specific cultural sites identified during any consultation process or shared by the First Nation or Métis Community	First Nations and Métis Settlement Consultation	Alberta's First Nations and Métis Settlement Consultation guidelines on Land and Natural Resource Management	Effective implementation of Alberta's First Nation and Métis Settlement consultation requirements.	Consultation Logs and effectiveness of consultation process	**FMP:** First Nation and Métis Settlement consultation plan (see chapter 2) **Performance:** Stewardship reports summarizing of disturbance of sites	The target is achieved.	Adjust strategy to reflect AAF direction.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
CSA SFM Element - 6.2 Public participation and information for decision-making										
Value - 6.2.1 Meaningful public involvement is achieved.										
36	6.2.1.1 Implement Public Participation	Opportunities provided for public input into the Forest Management Plan, Annual Operating Plan, General Development Plan, and Herbicide Plan.	Provide ongoing opportunities for public involvement into the Forest Management Plan, Annual Operating Plan, General Development Plan and Herbicide Plan.	Public involvement processes	Planning Standard.	Hold open houses or other venues to seek public input into plans annually	Silvacom (or other as developed) Consultation Tracking Program	**FMP**: Summary of public consultation in FMP development process. **Performance**: Stewardship Reports of opportunities provided to the public for input in forest management planning	The target is achieved.	Adjust activities.

VOIT #	Objective	Indicator	Target	Means to Identify Target	Legal/ Policy Require-ments	Means of Achieving Objective and Target	Monitoring and Measure-ment	Reporting	Acceptable Variance	Response
37	6.2.2.1 Promote economic opportunities between the company and First Nations and Métis Settlements	First Nations / Métis Settlement service agreements.	Report on service agreements or in-kind services provided to First Nations and Métis Settlements	First Nations and Métis Settlement Consultation	Alberta's First Nations and Métis Settlement Consultation guidelines on Land and Natural Resource Management	Effective implementation of Alberta's First Nation and Métis Settlement consultation requirements.	Consultation Logs and effectiveness of consultation process	**FMP:** First Nation and Métis Settlement consultation plan **Performance:** Stewardship reports summarizing First Nation & Métis service agreements.	The target is achieved.	Adjust strategy to reflect AAF direction.

5.2 Reporting Requirements

Reporting requirements were developed to be consistent with the “Forest Management Planning Standard Interpretive Bulletin: Stewardship Reporting Requirements, June 15, 2017”. A series of annual reports (AR), culminating in the five-year stewardship report (SR), will be comprised of a set of mandatory components and/or VOITs. The Mandatory components will all be reported in the Stewardship report, while some of the VOITs will be reported on an annual and/or periodic (five year or next FMP summary) basis. Annual reporting will continue through the life of the plan, with the VOITs table being updated at the next FMP. The annual reports are for information and tracking purposes only, and are not submitted for review or approval. The Stewardship Report will be submitted to AAF for approval by the Director, Forest Resource Management Section, Forest Management Branch, or their designate. Missing values from the tables in this section will become available when the Stewardship Report is completed. Annual and stewardship reports are expected to be available by November 1st following the end of the reporting year.

5.2.1 Mandatory Components

Mandatory components are designed to achieve two objectives. First, they provide information about the FMP implementation that cannot be fully captured by VOITs. As well, the mandatory components standardize the assessment of key performance indicators between different FMPs across the Province, and will assist the integration of the FMP with other higher level plan initiatives.

The FMA holder will report on all mandatory components of the stewardship report, while Quota Holders report on specific components as identified:

1. Fulfillment of FMP approval decision conditions – Report on all conditions that have an expected completion date of not later than April 30, 2022.
2. DFA-specific management objectives (Healthy Pine Strategy) – Report on the area of Rank 1 and 2 pine polygons identified in period one (2017-2021) of the plan against actual area cut to determine percent completion of objective.
3. Quota Holders - SHS variance – the intent is to create an updated SHS Manager with Silvacom once the SHS has been approved. SHS polygonal (AVI stand) variances of additions, deletions or deferrals must be greater than or equal to 2.0 hectares in size (substantial) to be used in the calculations of variance, and polygons smaller than 2.0 hectares in size would be tracked as slivers but are not used in the calculations of variance. Calculations of variance will be explained in more detail in Chapter 7 – Implementation and Monitoring.
4. Land base changes (FMA Area only) - AAF will supply Weyerhaeuser, on an annual basis, a land base summary for the FMA. These changes are determined on the FMA year, from December 1st to November 30th of each year. Non-FMA areas will not be reported on unless provided by AAF along with the FMA area land base changes, and are consistent with the dates used to generate the FMA area report.
5. Quota Holders - AAC sustainability – Summary of volumes harvested by species group for the DFA using forecasted (yield curve forecast) and delivered (scaled volume) for conifer and deciduous.

6. Growth and Yield Program Maintenance – The Growth and Yield Monitoring Plan, as approved, will track G&Y plots that are established or re-measured each year.
7. Seed availability – Report the amount of seed (kg.) by seed zone, stream class (wild or orchard) and estimated number of program year availability that are on hand.
8. Quota Holders – FGRMS Reporting –Report the amount of Stream 1 and Stream 2 deployment, and any in-situ conservation areas established

5.2.1.1 Approval decision conditions

The Stewardship shall report on the completion status of the approval decision conditions as per Table 5-2 below.

Table 5-2. FMP Approval Decision Accomplishment Report

Approval Condition #	Due Date	Approval Date	Comments

5.2.1.2 DFA-Specific Management Objectives

Stewardship reports shall include references in response to provincial strategies to reduce forest insect risks. The PFMS has utilized the Healthy Pine Strategy that has recognized a surge cut in the first decade of the plan, and a normal, even-flow AAC from decades 2 to 40. Table 5-3 summaries the result of this strategy.

Table 5-3. MPB Mitigation Overview – Reduction of threatened stands

DFA	Years	MPB Ranked Stands	Total Area (Ha.)	SHS Area (Ha.)	Harvested Area (Ha.)	Comments
Pembina	2017-2026	Rank 1	65,925	29,206		
		Rank 2	54,751	19,875		

5.2.1.3 Spatial Harvest Sequence Variance

The stewardship report assesses variance to the approved 20-year Spatial Harvest Sequence (SHS), by compartment, by decade. The intent of the implementation of the FMP is that operators will have no more that 20% of the SHS be classified as additions during development of Forest Harvest Plans (FHP). This threshold is measured for each compartment during consecutive FHPs, at each General Development Plan (GDP) and in the Annual and Stewardship Reports.

Weyerhaeuser's intent is to automate the process to determine SHS variance. Similar processes were used to measure variance to the SHS in both of the previous Pembina FMPs. Table 5-4 is an example of the summary results of the SHS Variances.

Table 5-4. Summary of SHS variance by Compartment by decade.

Harvest Profile				As-Built																Planned for Harvest (ha)						Combined As-Built Variance		
				Harvested (ha)						Variance: Substantial			Variance: Slivers				SHS Assessment (Excluding Slivers)									Substantial		
Compartment	Provincial Yield Strata	Approved DFA 10 Year SHS	Operator Approved FMP 10 Year SHS	SHS 1-10 yr	SHS 11-20 yr	SHS 21-70 yr	Contributing Landbase Outside SHS	Non-Contributing Landbase	Total	Additions	Deletions	Deferrals	Additions	Deletions & Deferrals	Total	Total Slivers (%)	SHS Variance (Additions %)	Difference in Area (Subst. Add. - D& D)	Difference in Area Total Harvested - 10 yr FMP SHS	SHS 1-10 yr	SHS 11-20 yr	SHS 21-70 yr	Contributing Landbase Outside SHS	Non-Contributing Landbase	Total	Additions	Deletions	Deferrals
Macmillan	All	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C-PL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C-SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C-SB																											
	CD-PL																											
	CD-SW																											
	DC-PL																											
	DC-SW																											
	D-HW_X																											
	D-HW_W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: * Deletions and Deferrals to be provided in shapefile format for next FMP

5.2.1.4 Land Base Changes

Stewardship reports shall include summaries on factors affecting the FMA land base only for the period December 1 to November 30 each year. Table 5-4 summarizes removals from the FMA. The reporting period will be by FMA year, to utilize AAF reporting periods for the FMA. The table will track these changes from the effective date of the landbase, or to the closes AAF reporting period.

Table 5-5. Summary Dispositions removed from the FMA, by FMA year. This area can be loosely defined as 'gross forested landbase' for this reporting purpose.

Affected Area Types	Nov. 30, 2015	Nov. 30, 2016	Nov. 30, 2017	Nov.30, 2018	Nov. 30, 2019	Nov. 30, 2020	Nov. 30, 2021
Ranked Crown Disposition Areas							
Farm Development Sale – FDS	0.0	0.0					
Disposition Reservation - DRS	7127.8	7143.4					
Miscellaneous Town site Lease - MTS	0.0	0					
Public Land Sale – PLS	0.0	0					
Provisional Roadway – RDS	716.7	733.0					
Subtotal	**7844.5**	**7876.4**					
Difference since start of period	**0.0**	**(31.9)**					

Ranked Industrial Disposition Areas			
Mineral Surface Lease - AER (MSL)	15472.7	15674.3	
Mineral Surface Lease - AAF (DMS)	0.0	0	
License of Operation - AER (LOC)	8854.1	8970.8	
License of Operation - AAF (DLO)	1414.5	1415.2	
Pipeline Agreement - AER (PLA)	17775.3	18038.1	
Pipeline Agreement - AAF (DPL)	136.5	136.8	
Pipeline Installation Lease (PIL)	164.8	166.0	
Easement (EZE)	2126.7	2141.7	
Vegetation Control Easement AER (VCE)	168.9	168.8	
Vegetation Control Easement AAF (RVC)	1.2	1.5	
Rural Electric Association Easement (REA)	18.7	18.7	
Miscellaneous Lease – AER (MLL)	492.6	503.3	
Miscellaneous Lease – AAF (DML)	496.6	503.8	
Miscellaneous Permit (MLP)	12.1	12.1	
Surface Mineral Lease (SML)	645.2	676.8	
Surface Mineral License (SMC)	28.3	41.5	
Farm Development Lease(FDL)	6.2	6.2	
Registered Roadway (RRD)	2276.9	2276.3	
Right-of-way Entry Agreement (ROE)	2410.1	2408.1	
Right-of-way Lease (ROW)	0.0	0	
Forestry Road (FRD)	303.9	303.6	
Recreation Lease (REC)	294.3	294.3	
Subtotal	**53099.6**	**53757.8**	
Difference since start of period	**0.0**	**678.3**	

Data Source for Industrial Activity: AAF annual report for the FMA with effective dates of December 1 through November 30

Stewardship reports shall also include summaries on factors affecting the DFA land base only. Table 5-8 summaries factors affecting the DFA. The reporting period will be by calendar year to coincide with reporting periods for AAF regarding fires and insect and disease surveys

Table 5-6. Summary of Natural Calamities affecting the DFA, by Calendar year

Affected Area Types	2017	2018	2019	2020	2021	Total
Natural Calamities						
Area Burned						
Area affected by wind						
Area affected by insects						
Area affected by disease						
Other affected areas						
Subtotal						

Note: areas affected by fires, insects and diseases are supplied by AAF as a result of annual surveys

5.2.1.5 AAC Sustainability

The stewardship report assesses FMP approved AAC sustainability by monitoring two key indicators:

1. Volume of delivered timber, and
2. Volumes forecasted to be delivered

The company will provide forecasted volumes compared to delivered volume summaries for both conifer and deciduous by timber year by DFA. See Table 5-7 for breakdown.

Table 5-7. AAC Sustainability – Projected and Harvested Annual Volume Summary

Timber Year	Coniferous		Deciduous	
	Forecasted	Delivered	Forecasted	Delivered
2017				
2018				
2019				
2020				
2021				
Total				

5.2.1.6 Growth and Yield Program Update

The Growth and Yield program manages the collection and analysis of tree data for current and future timber yield validation purposes. Natural stand permanent sample plots (PSPs) and temporary sample plots (TSPs) have been established in immature and mature fire origin stands. Regenerating stand PSPs and TSPs have been established in stands harvested and reforested over the last 30 years. The Growth and Yield Monitoring Plan provides greater detail for these plots. Table 5-8 and Table 5-9 summarize the collection of PSP/TSP and GYMP data (Annex VIII).

Table 5-8. Growth and Yield PSP activity

Year	Natural Stand PSPs		Regenerating Stand PSPs			
	Re-measurement		Establishment		Re-measurement	
	plan	actual	plan	actual	plan	actual
2017						
2018						
2019						
2020						
2021						

Table 5-9. Growth and Yield TSP activity

Year	Natural Stand TSPs		Regenerating Stand TSPs			
	Re-measurement		Establishment		Re-measurement	
	plan	actual	plan	actual	plan	actual
2017						
2018						
2019						
2020						
2021						

5.2.1.7 Seed Availability

Table 5-10 summarizes the current inventory and expected collections for the FMP period. Several seedlots (red text) will require seed to be collected in the near future to meet requirements of the FMP.

Table 5-10. Seed zone inventories for Weyerhaeuser Pembina.

Most recent Inventory Date by seedlot	Seed Zone	Species	Supply	Forecasted seed		Actual Seed	
				Required for the decade (kg)	Supply in years	Usage (kg)	Estimated # of years available
PL							
July 2016	CM 3.5	PL	13.997	6.7	20.1		
July 2016	DM 2.3	PI	0	0.72	10		
July 2016	LF 1.5	PL	60.70	81.4	7.46		
July 2016	LF 2.1	PL	189.315	62.84	30.1		

July 2016	LF 2.2	PL	75.755	111.22	6.8		
July 2016	UF 1.4	PL	64.547	38.52	16.76		
July 2016	UF 2.4	PL	5.199	14.44	3.60		
July 2016	SA 1.2	PL	49.956	9.33	53.54		
July 2016	SA 2.2	PL	0	0.58	0.58		
SW or SE							
July 2016	HASOC I	SW	118.558	14.89	79.62		
July 2016	CM 3.5	SW	64.959	0	NA		
July 2016	LF 1.5	SW	126.449	0	NA		
July 2016	LF 2.1	SW	29.663	0	NA		
July 2016	LF 2.2	SW	88.422	0.16	552.63		
July 2016	UF 1.4	SW/SE	35.174	5.01	70.21		
July 2016	UF 2.4	SW	19.306	1.04	185.63		
July 2016	SA 1.2	SW	45.55	5.11	89.31		
July 2016	SA 2.2	SW	0	0.061	0.061		

5.2.1.8 FGRMS Reporting

Alberta Forest Genetic Resource Management and Conservation Standards (FGRMS) requires that companies establish and report in-situ genetic conservation areas for species under an approved CPP plan.

Table 5-11. FGRMS Stream 1 (Wild) Seed Deployment

Species	Seed Zone	Year	Area Planted (ha)	# of Seedlings Planted	Area Planted for retreatment (ha)	# of Seedlings Planted
SW	LF 1.5	2017	1	2,400	0	0
SW	LF 2.1	2017	1	2,310	0	0
SW	LF 2.2	2017	3	4,320	0	0
SW	UF 1.4	2017	1	1,350	0	0
PL	CM 3.5	2017	56	73,515	0	0
PL	LF 1.5	2017	438	536,070	15	14,175
PL	LF 2.1	2017	203	241,485	3	4,050
PL	LF 2.2	2017	1,189	1,486,325	75	89,065
PL	SA 1.2	2017	119	151,740	0	0
PL	UF 1.4	2017	401	558,790	0	0
PL	UF 2.4	2017	328	393,620	0	0

Table 5-12. FGRMS Stream 2 (Seed Orchard) Seed Deployment

Species	Stream 2	Year	Area Planted (ha)	# of Seedlings Planted	Area Planted for retreatment	# of Seedlings Planted
SWg	HASOC Region I	2017	615	751,101	0	0

Table 5-13. FGRMS In-situ Conservation Areas

Species	CPP Region	In-situ conservation Area#	Conservation Area Status	Conservation Area Monitoring Schedule and Plan	Conservation Area Description	Conservation Area Land Use Notation
SW	Region I					

5.2.2 VOIT Components

The VOITs agreed to by the PDT based on the 34 Provincial VOITs, identified in the Forest Management Planning Standard, have three classifications:

- Dynamic (operational) VOITs – the outcome of these VOITs can change dramatically year to year and reflect specific operational outcomes. These VOITs will be reported by all operators on the DFA.
- Modelled VOITs – these VOITs are more static, and represent forecasted outcomes based on the approved PFMS SHS. The changes are more analytical in nature, and are difficult to measure over short periods of time (1-9 years) unless dramatic changes have occurred to the base data that drove the analysis. These VOITs will be reviewed in the subsequent FMP.
- Non-Provincial VOITS – these VOITs are Weyerhaeuser accepted VOITs brought forward by specific stakeholder groups, or VOITs specifically developed by Weyerhaeuser that they desire to report on. These VOITs will be reported only by Weyerhaeuser.

5.2.2.1 Dynamic VOITs

Dynamic VOITs are VOITs that are affected greatly by operational activities on the DFA. They tend to vary widely from year to year. Table 5-14 lists the dynamic VOITs for the PFMS.

Table 5-14. Dynamic VOITs for the Weyerhaeuser Pembina FMP

VOIT#	Indicator	Indicator Number	Reporting
4	Permanent all-weather forestry road density by DFA – km/km^2	1.1.1.3	Density (km/km^2) of permanent all-weather forestry roads on the DFA
5a	Permanent forestry winter (seasonal) road density on the DFA	1.1.1.3	a) density (km/km^2) of permanent winter forestry road on the DF
5b	Active temporary external block forestry road density on the DFA	1.1.1.3	b) density (km/km^2) of temporary external block forestry roads on the DFA

VOIT#	Indicator	Indicator Number	Reporting
6	Area of occurrence of each identified uncommon plant communities identified within the DFA area	1.1.1.4	Area of uncommon plant communities identified on the DFA and percent area maintained
7a	Area of unsalvaged burned timber	1.1.1.5	Area of fires <1000 hectares in size
7b	Area of unsalvaged burned timber	1.1.1.5	Area salvaged, unsalvaged, and total area disturbed by fires that exceed 1000 hectares in size
8	Area of unsalvaged blowdown of merchantable timber	1.1.1.5	Area salvaged, unsalvaged and total area disturbed by wind
9	Compliance with OGRs	1.1.1.6	Penalties assessed regarding riparian zones
10	Percent of area with merchantable residual structure within the harvested areas, representative of the status, sizes, and species of the overstorey trees within the harvested areas of the DFA	1.1.2.1	Percent of structure retention in harvest areas on the DFA
11	Percent of harvested area within the DFA with downed woody debris equivalent to pre-harvest conditions	1.1.2.1	Area of total disposal of Down Woody Debris
12	Sensitive sites (e.g. mineral licks, raptor nests, bear dens, unique ecological areas, etc.) within the DFA area	1.1.2.2	Number of identified sites consistent with the operating ground rules
13	Forestry water crossings in compliance with Code of Practice for watercourse crossings within the DFA	1.1.2.3	Warning or penalties related to non-compliance with Codes of Practice for water course crossings
15	The appropriate number and area of in-situ tree gene conservation reserves as directed by FGRMCS	1.3.1.1	Update status
16	Number of provenances, families and clones in trials and clone banks; and seed in seed archives.	1.3.1.2	Update status
17	Stakeholder consultation	1.4.1.1	Consultation initiatives undertaken with protected area agencies
18a	Annual % of openings that meet or exceed the RSA establishment survey minimums stocking and species composition stands for the declared regeneration stratum	2.1.1.1	a) area that meets the RSA stratum requirements
18b	Annual % of openings that meet or exceed the RSA establishment survey minimums stocking and/or species composition stands for an alternate regenerated yield stratum	2.1.1.1	b) area that meets a different RSA stratum requirement

VOIT#	Indicator	Indicator Number	Reporting
18c	Annual % of openings that do not achieve the RSA establishment survey minimums stocking and species composition stands for any regenerated yield stratum and are re-treated within one year	2.1.1.1	c) area not meeting any RSA stratum requirements and require retreatment within one year
19	Summed difference between target and actual C and D MAIs for openings surveyed in a 5th year quadrant	2.1.1.2	Comparison of RSA MAI results for C and D and forecasted targets by Yield Group
20	Amount of change in forest landbase	2.1.2.1	Additions and deletions to the gross forest landbase
21	Amount of area affected by significant impacts of insects, fire, windthrow and other natural events.	2.1.2.2	Areas impacted by fire, insects, windthrow and other natural events
22	Noxious weed program	2.1.3.1	Control efforts
23	Silviculture Strategy Table (SST) that includes tactic to reforest temporary in-block roads	3.1.1.1	None – strategy recognized in the Silviculture Strategies Table (SST)
24	Incidence of soil erosion and slumping	3.1.1.2	Non-compliance – warning and penalties assessed
26	Riparian buffers maintained as outlined in the OGRs	3.2.2.1	Non-compliance – warning and penalties assessed
31	Public consultation processes	5.2.2.1	Number of consultations with interested parties
33	Meet Alberta's current expectations for First Nations and Métis consultations	6.1.1.1	Summary of First Nations and Métis consultations
36	Opportunity provided for public input into the Forest Management Plan, Annual Operating Plan, General Development Plan and the Herbicide Plan.	6.2.1.1	Opportunities provided to the public for input into forest management planning

5.2.2.2 Modelled VOITs

Modelled VOITs are forecasted or modelled values. Unless model inputs have changed their values will be identical to those in the FMP. These VOITs cannot be determined by monitoring operational activities on the DFA. If harvest planning follows the approved SHS within allowable variance, the next time analysis would occur would be at the next FMP. Table 5-15 lists the modelled VOITs on the DFA.

Table 5-15. Modelled VOITs for the Weyerhaeuser Pembina FMP

VOIT#	Indicator	Indicator Number	Reporting
1	Area of old, mature, young and regenerating	1.1.1.1	SHS variance

VOIT#	Indicator	Indicator Number	Reporting
	forest by ecological unit for the DFA		
2	Range of patch sizes for the DFA	1.1.1.2	SHS variance
3	Area of old interior forest of each ecological unit on the DFA area	1.1.1.2	Next FMP
14a	Number of hectares of primary and secondary habitat from the FRI Grizzly Bear model, as measured at time 0	1.2.1.1	Next FMP
14b	Percent change in the Barred owl RSF habitat value and potential breeding pairs habitat value from 2017 by DFA	1.2.1.1	Next FMP
14c	Percent change in relative abundance value of four songbird species (Black-throated Green Warbler, Brown Creeper, Ovenbird, Varied Thrush) from 2017 by DFA	1.2.1.1	Next FMP
14d	East Slope Cold Water Fish	1.2.1.1	Next FMP
25	Forecasted change in water yields resulting from the approved SHS as measured by ECA	3.2.1.1	SHS variance
28	Process described in Annex 1is followed and standards are met	5.1.1.1	Next FMP
29	Reduction in fire behavior potential within the FireSmart Community Zone	5.2.1.1	Next FMP
30	Reduction in fire behaviour potential across the DFA	5.2.1.1	Next FMP
32	Regenerating stands yields compared to natural stand yields	5.2.3.1	Next FMP

5.2.2.3 Non-Provincial VOITs

Outside the scope of the Forest Management Plan, Stewardship Reports may include other information represented as company specific VOITs pertaining to sustainable forest management activities in the DFA. These VOITs are voluntary, with the expectation that AAF will provide no feedback to the company at the time of annual or stewardship reporting. These VOITs are listed in Table 5-16 below.

Table 5-16. Non-Provincial VOITs for the Weyerhaeuser Pembina FMP

VOIT#	Indicator	Indicator Number	Reporting
34	First Nations and Métis gathering sites	6.1.1.2	Sites disturbed

VOIT#	Indicator	Indicator Number	Reporting
35	First Nations and Métis cultural sites	6.1.1.2	Sites disturbed
37	Service Agreements signed with First Nations or Métis Settlements	6.2.2.1	Service or in-kind agreements signed

5.3 Detailed VOITs

The following section provides detailed information regarding each of the VOITs in the 2017-2026 FMP. Information provided for each VOIT includes:

- Expanded details for the information in the VOIT table 5-1;
- FMP reporting where required; and
- Expanded indicator definitions

VOITs are presented in the same order as the VOIT table. VOITs can be quickly referenced using the information in heading level 2:

- VOIT Index number;
- AAF VOIT hierarchy numbering; and
- A short descriptive name.

5.3.1 Biological Diversity

5.3.1.1 VOIT 1 (1.1.1.1) Seral Stages by Ecological Unit

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the FMA.

Value: 1.1.1 Landscape scale biodiversity.

Objective: 1.1.1.1 Maintain biodiversity by retaining the full range of cover types and seral stages.

Indicator

Area of Old, Mature, Young and Regenerating Forest by Ecological Unit – DX (Hw); DC (HwPl, HwSw); CD (PlHw, SwHw, SbHw); PL (Pl pure and leading), SW (Sw pure and leading); CX (Sb pure and leading)

Target

Over the 200-year planning horizon;

a) Gross forested landbase: greater than 12% old forest, greater than 23% mature plus old forest, less than 32% young forest; less than 17% regenerating forest, and
b) Active forested landbase: greater than 8% old forest, greater than 19% mature plus old forest, less than 54% young forest, less than 28% regenerating forest.

Table 5-17 and Table 5-18 in section 5.4.1 present the percentage of area by seral stage at selected points in time for the gross and active landbases respectively. Table 5-19 to Table 5-22 show the area by ecological unit within each seral stage for the gross landbase, while Table 5-23 to Table 5-26 show the area by ecological unit within each seral stage for the active landbase.

Figures 6-22 and 6-24 in *Chapter 6 : Preferred Forest Management Scenario* show the trends in the old forest seral stage by ecological unit for the gross and active landbases respectively. In the TSA, a minimum constraint of 5% for each ecological unit over the 200 year planning period was applied to the old forest seral stage on the active landbase. No constraints were applied to the gross landbase.

Note: Old forest retention shall include the full natural range of ages.

Means to Identify Target

Targets and seral stage definitions shall be based on sound science, ecological considerations, wildlife zones, and disturbance regimes. Target shall ensure representation of natural range of ecosystem attributes (e.g., productivity class). See results in Section 5.4.1, Table 5-16 and Table 5-17.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Spatial Harvest Sequence (SHS).

Target Monitoring and Measurement

Periodic updates to DFA inventory.

Reporting

2017 FMP: Tables of indicators (values and targets) at 0, 10, 50, 100 and 200 years; maps of seral stages at 0, 10 and 50 years. See section 5.4.1 for reporting on this VOIT.

Performance:

5 year Stewardship Reporting: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

Area (ha) of Old; and Mature plus Old forest in the DFA by: Ecological Unit shall be between 90% and 100% of target. Area of young and regenerating forest in each DFA by Ecological Unit shall not exceed 110% of target area.

Response

Adjust strategies in subsequent Forest Management Plans (FMP).

Definitions

Seral Stages: A stage in forest succession. A series of plant community conditions that develop during ecological succession from a major disturbance to the climax stage. Most common characteristics/classifications include tree species and age (initiation, establishment, aggradation (stem exclusion), mature, old-growth [Song, 2000]). Weyerhaeuser Pembina 2017-2027 FMP uses the following seral stage classes as agreed to by the PDT on March 19, 2015:

- For conifer dominated stands where total conifer is equal to or exceeds 50% and the leading species is conifer:
  - Regenerating - defined as stands between disturbance date and 30 years old representing the period from disturbance to initial crown closure
  - Young - defined as stands between 31 and 80 years old; in other words when the stands first start to reach merchantability
  - Mature – defined as stands between 81 and 140 years old
  - Old Forest – defined as stands 141 years and older

- For deciduous dominated stands where total deciduous is equal to or exceeds 50% and the leading species is deciduous:
  - Regenerating - defined as stands between disturbance and 20 years old representing the period from disturbance to initial crown closure

- Young - defined as stands between 21 and 70 years old; in other words when the stands first start to reach merchantability
- Mature – defined as stands between 71 and 120 years old
- Old Forest – defined as stands 121 and older

Ecological Unit: The ecological units are based on a roll-up of the base10 provincial strata. They are as follows: DX (Hw), DC (HwPl, HwSw), CD (PlHw, SwHw, SbHw), PL (Pl pure or leading pure conifer), SW (Sw pure or leading pure conifer), and CX (Sb pure or leading pure conifer).

5.3.1.2 VOIT 2 (1.1.1.2a) Opening Patch Size

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.2a Maintain biodiversity by avoiding landscape fragmentation (part a)

Indicator

Range of patch sizes for the DFA. Patch size categories are as follows: <=25 ha, 25-100 ha, 100-500 ha and 500+ ha.

Target

Over the long-term the intent is to achieve a distribution of harvest area sizes that will result in a patch size pattern approximating patterns created by natural disturbances. By year ten of the FMP the target is to achieve the following percentages of harvested area by patch size category:

<= 25 ha	39.6%
25 – 100 ha	39.1%
100 – 500 ha	19.3%
> 500 ha	2.1%

The areas by patch size category presented in Section 5.4.2 Table 5-27 were determined based on the following time periods:

- Year 0: active forested landbase between minus 20 and zero years of age (1997-2017)
- Year 10: active forested landbase between minus 10 and 10 years of age (2007-2027)
- Year 50: active forested landbase between year 30 and year 50 years of age (2047-2067)

Note:

The block and harvest size patch targets applied in the TSA process (Chapter 6 section 6.5.10) and those reported here (VOIT 2) are not directly comparable. The TSA patch targets were not intended to reflect ecological patches, but rather economically operable patches that allow operators to harvest a number of blocks within a defined area to minimize logging equipment moves, while VOIT 2 patch targets are intended to approximate patterns created by natural disturbances. Consequently there are differences in how the patch targets were defined, such as:

- Patch size categories
  - Blocks : 0 – 5 ha, 5 – 30 ha, 30 – 50 ha, 50 – 100 ha, 100 – 300 ha and 300+ ha
  - Harvest patches : 0 – 50 ha, 50 – 100 ha, 100 – 250 ha and 250 + ha
  - VOIT 2 : 0 – 25 ha, 25 – 100 ha, 100 – 500 ha, 500+ha
- Adjacency distances (inter-stand distance used to determine whether a stand is part of a patch)
  - Blocks : 5m
  - Harvest patches : 300m
  - VOIT 2 : 15m

While the overall objectives of the TSA targets and VOIT 2 may be similar, *i.e.* to aggregate stands for harvest into larger patches, only the TSA targets were actively controlled in the PFMS. The weightings used to influence the outcome of the TSA targets were higher during the first 20 years than for the remainder of the planning horizon as the focus was on producing spatially operable patches for the 20 year SHS. While not directly related, this approach will have influenced the outcome for VOIT 2 as well, thus the reason why the results at year 10 show less fragmentation than at year 50.

Weyerhaeuser is a partner in the LandWeb project, which will estimate the natural range of variability (NRV) for the DFA. The analysis was, however not complete in time for incorporation into the 2017 FMP. Consequently, the patch targets for this VOIT were developed without these results. When available the NRV results will be used to develop improved long-term patch targets for future FMPs.

Means to Identify Target

Targets shall be based on sound science, ecological considerations, wildlife zones, and disturbance regimes. Target shall ensure representation of natural range of ecosystem attributes (e.g. cover class and productivity class). See Section 5.4.2 Table 5-27.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Adhering to the Spatial Harvest Sequence.

Target Monitoring and Measurement

Periodic updates to DFA inventory.

Reporting

2017 FMP: Tables of area of forest in each harvest area size class on the DFA at 0, 10, and 50 years. Maps of harvest area size classes at 0, 10, and 50 years. See section 5.4.2 for reporting on this VOIT.

Performance:

5 year Stewardship Reporting: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

The target distribution is achieved; or demonstrated progress to achieving target in one rotation where the pattern has deviated significantly from the target.

Response

Adjust strategies in subsequent FMPs.

Definitions

Harvest Area:

Polygons as identified in the SHS that represent future unique harvest blocks.

5.3.1.3 VOIT 3 (1.1.1.2b) Old interior forest

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.2b Maintain biodiversity by avoiding landscape fragmentation (part b)

Indicator

Area of old interior forest by Ecological Unit (as defined in section 5.3.1.1) on the DFA.

Target

Area of old interior forest (OIF) by ecological unit will be no less than the following percentages of the gross forested area (see section 5.4.3) within each ecological unit as defined at year 10 of the FMP.

DX : 14% of the gross forested DX area at year 2027

DC : 18% of the gross forested DC area at year 2027

CD : 17% of the gross forested CD area at year 2027

C-PL : 32% of the gross forested C-PL area at year 2027

C-SW : 40% of the gross forested C-SW area at year 2027

CX : 42% of the gross forested CX area at year 2027

Means to Identify Target

TSA output at year 10 of the PFMS. See Section 5.4.3 Table 5-28.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Spatial Harvest Sequence (SHS).

Target Monitoring and Measurement

Periodic updates to forest inventory.

Reporting

2017 FMP: Tables of indicators (values and targets) at year 0, 10, and 50; maps of interior older forest at year 0, 10, and 50. See section 5.4.3 for reporting on this VOIT.

Performance:

5 year Stewardship Reporting: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

The target is achieved for at least 80% of the planning period with variance not exceeding 20% below target.

Response

Adjust strategies in subsequent FMPs.

Definitions

Old Interior Forest: Old interior forest patches are defined as any patch greater than 120 ha that is composed of stands greater than 120 years old, using a 15m adjacency distance.

5.3.1.4 VOIT 4 (1.1.1.3a) Permanent all-weather forestry road density

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.3a Maintain biodiversity by minimizing access (part a)

Indicator

Permanent all-weather forestry road density by DFA – km/km^2.

Current Weyerhaeuser Status- 0.036km/km^2 forestry roads (383 km of permanent forestry roads)

Target

Less than 0.05 km/km^2 of permanent all –weather forestry roads built on the DFA through 2026

Means to Identify Target

Analysis of permanent all-weather forestry road densities for current and planned all-weather roads to be developed through 2026. Average DLO plan is approximately 10-20 km per year of permanent all-weather road construction

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Coordinating access with other resource users, road closures and decommissioning. See Section 5.4.4, Figure 5-13.

Target Monitoring and Measurement

Regular updates to forest inventory.

Reporting

2017 FMP: Amount of permanent all-weather road density for the DFA at 0 and 10 years. Map of existing open all weather forestry roads. See section 5.4.4 for reporting on this VOIT.

Performance: Stewardship reporting of permanent forestry road density on the DFA.

Acceptable Variance

Variance not to exceed +10% of the target to be achieved.

Response

Adjust strategies in subsequent FMPs.

Definitions

Permanent all-weather forestry road: Department Licenses of Occupation (DLOs) within the FMP area.

5.3.1.5 VOIT 5 (1.1.1.3b) Open seasonal / temporary forestry road density

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.3b Maintain biodiversity by minimizing access (part b)

Indicator

5a) Permanent forestry winter (seasonal) road density on the DFA.

Current Weyerhaeuser Status: 0.0084 km/km^2 - 89km of road

5b) Active temporary external block forestry road density on the DFA.

Current Weyerhaeuser Status: 0.002 km/km^2 - 21 km of roads

Target

5a) Less than 0.03 km/km^2 of permanent winter (seasonal) forestry road on the DFA.

5b) Less than 0.002 km/km^2 of temporary external forestry road on the DFA.

Means to Identify Target

5a) Analysis of current status of permanent winter (seasonal) forestry road densities on the DFA by year.

5b) Analysis of current status of temporary external block roads on the DFA.

See Section 5.4.5, Figure 5-14.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Road construction, maintenance and reclamation activities.

Target Monitoring and Measurement

Road plan (Operating Ground Rule) OGR 11.2.

Reporting

2017 FMP: Estimate of existing density of permanent winter forestry and active temporary external block forestry roads on the DFA. Map of permanent winter forestry roads. See section 5.4.4 for map.

Performance: Stewardship Report of:

5a) Density of permanent winter (seasonal) forestry roads on DFA

5b) Density of temporary external block forestry roads on DFA area by year.

Acceptable Variance

A variance not exceeding +/- 20% must be achieved.

Response

Adjust strategies in subsequent FMPs.

Definitions

Open seasonal/temporary forestry road: Generally road used in the winter under frozen condition only

5.3.1.6 VOIT 6 (1.1.1.4) Uncommon plant communities

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.4 Maintain plant communities uncommon in DFA or province.

Indicator

Area or occurrence of each identified uncommon plant community within the DFA.

Target

When encountered, maintain 80% of the identified uncommon plant community area, for each community confirmed to exist within the FMA, as defined within the Alberta Conservation Information Management System (ACIMS).

Means to Identify Target

Alberta Conservation Information Management System (ACIMS) plant community classification and tracking list. Predict and identify occurrence of uncommon plant community. Maintaining a process to protect identified uncommon plant communities upon the DFA. See Section 5.4.6 for a list of species.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Coordinating with other resource users, spatial planning of harvest and road construction, and OGR.

Target Monitoring and Measurement

Periodic updates to inventory.

Reporting

2017 FMP: List of Species. See section 5.4.6 for reporting on this VOIT.

Performance: Stewardship Reporting of area of uncommon plant communities identified and percent area maintained.

Acceptable Variance

The target is achieved.

Response

Adjust strategies in subsequent FMPs.

Definitions

Alberta Conservation Information Management System (ACIMS): ACIMS is a data centre that provides biodiversity information on Alberta's species, natural ecological communities and sites. Information about the location, condition, status and trends of selected elements is collected, updated, analyzed and disseminated (Alberta, 2016a).

5.3.1.7 VOIT 7 (1.1.1.5a) Salvageable unsalvaged burned forest

CCFM Criterion: 1 – Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.5a Maintain unique habitats provided by wildfire and blowdown events (part a)

Indicator

Area of unsalvaged burned forest.

Target

a) Fires < 1000 hectares of Active Landbase: Follow FMP structure retention strategy consistent with normal harvesting practices (see VOIT 10 for retention percent).
b) Fires > 1000 hectares of Active Landbase: Retain all unburned trees in green islands and retained patches recognizing timber condition, access, non-timber needs.

Means to Identify Target

Targets based on "Fire Salvage Planning and Operations – Directive No. 2007-01". Ensure consistency with FireSmart objectives.

Legal/Policy Requirement

"Fire Salvage Planning and Operations – Directive No. 2007-01".

Means of Achieving Objective and Target

Salvage planning.

Target Monitoring and Measurement

Organization reports, FHPs.

Reporting

2017 FMP: Table and map of fire disturbance history. See Chapter 3: Landscape Assessment.

Performance: Stewardship reporting of fire disturbance by area for:

a) Fires less than 1000 ha of active landbase– report totals only
b) Fires greater than 1000 ha of active landbase – report totals salvaged, unsalvaged and total area disturbed

Acceptable Variance

Target is achieved or exceeded for both a) and b).

Response

Adjust strategies in subsequent AOPs.

Definitions

Salvageable: In regards to trees killed by natural causes (ex. fire, insects, disease, blowdown), those that are still commercially viable as merchantable if harvested.

Unsalvaged: commercially viable trees left in the state they are found as a result of the disturbance; in this case, fire is the disturbance.

5.3.1.8 VOIT 8 (1.1.1.5b) Salvageable unsalvaged blowdown forest

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.5b Maintain unique habitats provided by wildfire and blowdown events (part b)

Indicator

Area of unsalvaged blowdown of merchantable forest.

Target

In areas of significant (>100 ha) merchantable blowdown, greater than 10% area will be left unsalvaged.

Means to Identify Target

Targets are to be based on sound science, ecological considerations and disturbance regimes.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Salvage planning.

Target Monitoring and Measurement

Final Harvest Plans

Reporting

2017 FMP: None.

Performance: Stewardship reporting of area of merchantable blowdown – salvaged, unsalvaged and total area disturbed.

Acceptable Variance

The target is achieved or exceeded where areas of blowdown of merchantable forest of greater than 100 ha.

Response

Adjust strategies in subsequent FMPs.

Definitions

Salvageable: In regards to trees killed by natural causes (ex. fire, insects, disease, blowdown), those that are still commercially viable as merchantable if harvested.

Unsalvaged: commercially viable trees left in the state they are found as a result of the disturbance; in this case, wind is the disturbance.

5.3.1.9 VOIT 9 (1.1.1.6) Operating Ground Rules (OGR) compliance

CCFM Criterion: 1 – Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.1 Landscape scale biodiversity

Objective: 1.1.1.6 Retain ecological values and functions associated with riparian zones.

Indicator

Compliance with Operating Ground Rules (OGR).

Target

No warnings or penalties assessed regarding riparian zones.

Means to Identify Target

Operating Ground Rules (OGR).

Legal/Policy Requirement

Federal Fisheries Act, Water Act.

Means of Achieving Objective and Target

Planning, OGR.

Target Monitoring and Measurement

Compliance reporting systems.

Reporting

2017 FMP: None.

Performance: Stewardship Reporting of penalties assessed regarding riparian zones.

Acceptable Variance

The target is achieved.

Response

Immediate remedial action and/or administrative penalty.

Definitions

Riparian Zone: Strips of green vegetation influenced by water and found around creeks, sloughs, rivers, and lakes (Alberta, 2015).

5.3.1.10 VOIT 10 (1.1.2.1a) Merchantable structure retention

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.2 Local/Stand Scale Biodiversity

Objective: 1.1.2.1a Retain stand level structure (part a)

Indicator

Percent of area with merchantable structure within the harvested area, representative of the status, sizes, and species of the overstorey trees within the harvested areas on the DFA.

Target

A combination of merchantable single stems, clumps, and patches, that are representative of the stands harvested, comprising 4% of the harvested volumes within the DFA. Conifer and Deciduous

Note: A wide range in variability in harvest area-level retention is desired as long as the target level is achieved.

Means to Identify Target

Wildlife zones, roadside vegetation screens, recreational values, aesthetics, local knowledge, ACIMS, Biodiversity / Species Observation Database (BSOD). See Feb 3, 2015 Forest Management Planning Standard Annex 4 for wording change.

Legal/Policy Requirement

Occupational Health and Safety Act, Forest and Prairie Protection Act.

Means of Achieving Objective and Target

Implement residual structure retention strategies in OGRs.

Target Monitoring and Measurement

Organization reports, air photo interpretation, ground surveys, post harvest assessments.

Reporting

2017 FMP: None

Performance: Stewardship Reporting of the percent of structure retention in harvest areas on the DFA.

Acceptable Variance

At the end of the 10-year FMP term the target is achieved or exceeded.

Response

Adjust strategies in subsequent FMPs.

Definitions

Merchantable residual structure: live, commercially viable trees retained post-harvest to create old forest characteristics in young and mid-aged regenerating stands.

Single stems: Individual trees left standing in a harvest area; a component of dispersed retention.

Clumps: Small groups of trees left standing in a harvest area; a component of dispersed retention.

Patches: Undisturbed islands of trees left standing within the harvest area boundary but not connected to the edge.

Retention: Merchantable timber left standing within the planned harvest area boundary, generally expressed as a percent of the total estimated merchantable volume in the block.

5.3.1.11 VOIT 11 (1.1.2.1b) Downed woody debris

CCDM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.2 Local/Stand Scale Biodiversity

Objective: 1.1.2.1b Retain stand level structure (part b)

Indicator

Percentage of harvested area within the DFA with downed woody debris equivalent to preharvest conditions.

Target

All harvest areas have downed woody debris retained on site – exception is roadside slash piled and burned.

Means to Identify Target

Sound ecological science.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Minimize the occurrences of harvest area debris removal and/or disposal (other than roadside slash).

Target Monitoring and Measurement

ARIS, silviculture prescriptions.

Reporting

2017 FMP: None.

Performance: Stewardship Reports of area of total disposal of DWD.

Acceptable Variance

The target is achieved.

Response

Adjust strategies in subsequent FMP.

Definitions

Downed woody debris: Dead trees that are present in the stand prior to logging, either vertical or horizontal in stature.

5.3.1.12 VOIT 12 (1.1.2.2) Sensitive sites

CCFM Criterion: 1 – Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.2 Local/Stand Scale Biodiversity

Objective: 1.1.2.2 Maintain integrity of sensitive sites

Indicator

Sensitive sites (e.g. mineral licks, raptor nests, bear dens, unique ecological areas, etc.) within the DFA.

Target

Protect and report on all identified sites.

Means to Identify Target

Local knowledge, FHPs.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Organization developed standards for sensitive site protection, OGRs 7.7.4.

Target Monitoring and Measurement

Final Harvest Plans.

Reporting

2017 FMP: None.

Performance: Stewardship Reporting of the number of identified sites consistent with OGRs.

Acceptable Variance

The target is achieved.

Response

Adjust strategies in subsequent FMPs.

5.3.1.13 VOIT 13 (1.1.2.3) Forestry water crossings

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.1 Ecosystem Diversity: Conserve ecosystem diversity at the landscape level by maintaining the variety of communities and ecosystems that occur naturally in the Defined Forest Area (DFA)

Value: 1.1.2 Local/Stand Scale Biodiversity

Objective: 1.1.2.3 Maintain aquatic biodiversity by minimizing impacts of water crossings.

Indicator

Forestry water crossings in compliance with Code of Practice for Water Course Crossings within the DFA.

Target

No warnings or penalties for non-compliances for the Code of Practice or OGRs for water course crossing.

Means to Identify Target

Code of Practice for Water Course Crossings: Sections 7 - 9 and Schedule 2.

Legal/Policy Requirement

Code of Practice for Water Course Crossings.

Means of Achieving Objective and Target

Road construction, maintenance and reclamation activities.

Target Monitoring and Measurement

Road plan and OGR 11.4 (Watercourse Crossings).

Reporting

2017 FMP: None.

Performance: Stewardship Reporting of warnings and penalties related to non-compliance with Codes of Practice for Water Course Crossings.

Acceptable Variance

The target is achieved.

Response

Act immediately to eliminate problems and adjust strategies in subsequent AOPs.

Definitions

Forestry water crossings: The locations and structures designated within harvest areas for which machinery to move across watercourses.

5.3.1.14 VOIT 14 (1.2.1.1) Suitable habitat for native species

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.2 Species Diversity: Conserve species diversity by ensuring that habitats for the native species found in the DFA are maintained throughout time

Value: 1.2.1. Viable populations of identified plant and animal species

Objective: 1.2.1.1 Maintain habitat for identified high value species (i.e., economically valuable, socially valuable, species at risk, species of management concern).

Indicator

a) Number of hectares of primary and secondary habitat by DFA from the fRI Grizzly Bear model, as measured at time 0 (start of modelling time 0 - 2017).

b) percent change in the Barred owl RSF habitat value and potential breeding pairs habitat value from 2017 by DFA; and

c) percent change in relative abundance value of four songbird species (Black-throated Green Warbler, Brown Creeper, Ovenbird, Varied Thrush) from 2017 by DFA.

d) East Slopes Cold Water Fish

Target

ai) - Maintain or increase the number of hectares of combined primary and secondary habitat from the fRI Grizzly Bear model, as measured at time 0 (TSA modelling time 0 - 2017).
aii) - 100% of temp roads will have effective access controls within the core and secondary grizzly bear range, during active grizzly bear season (May to December).

b) maximum 15% reduction in the RSF indicators at 10 and 20 years and a maximum 15% reduction in the breeding pairs indicator at 10 and 20 years;

c) maximum 15% reduction in the indicator over the 200 year planning horizon; and

di)ECA target is 30% in **Athabasca Rainbow Trout** Ecologically Significant Habitat (see ARTR Recovery Plan). Watersheds with ECA values >30% due to existing (year 0) modelled disturbance, ECA values must demonstrate a continuous downward trend or not exceed 35% in years 0-20. ESH watersheds: West Carrot, East Carrot,Upper Moose, Upper Sang, Embarras, Erith, Rodney, Minnow, Svedberg, Swartz, Half Moon, Coyote, Raven, Cairn, Oldman, Shinningbank, Trout, Whitefish, Deer, Prairie, Mason, Sundance East, Obed, Athabasca, Sundance West, Edson, Groat, Mcleod.

dii) ECA target is 30% for **Bull Trout Watersheds**, Watersheds with high ECA values >30% due to existing (year 0) modelled disturbance, ECA values must demonstrate a continuous downward trend or not to exceed 35% in years 0-20. **Blackstone watersheds**:(merged watersheds < 10,000ha): (*Middle Blackstone, Hansen*), East Rundell, Chungo, Upper Brown, Lower Wapiabi, Penti, Lookout, Sturrock, Upper Wapiabi, South Lookout, East Sturrock; **Nordegg watersheds**: East Nordegg, (*North Rapid, Rapid*) Nordegg, Owl, North Brewster, (North Colt, Sutherland) Wawa, Stephens, Grey Owl; **Brazeau watersheds**: Broken Arm, Lower Blackstone, Negraiff, North Elk, Middle Marshybank, North Marshybank, South Marshybank ; (Elk River watersheds: South Elk.

diii) ECA target is 30% for Arctic Grayling within the Pembina River watershed. Watersheds with high ECA values due to existing modelled disturbance ECA values must demonstrate a continuous downward trend or not to exceed 35% in years 0-20. **Arctic Grayling watersheds**: Paddy, Middle Pembina, Jerry, Rehn, Dismal, Baker, Upper Pembina, Tall Pine, Reservoir, Upper North Rat, (*West Eta, Varty*) East Eta, (*Dzida, Tom*), Lower North Rat, , East Zeta, West Zeta, South Rat.

Means to Identify Target

For songbirds, see section 6.6.4.1.1

For Barred Owl, see section 6.6.4.1.3

For Grizzly Bear, see section 6.6.4.1.4

For East Slopes fish species, see section 6.6.4.1.5

Legal/Policy Requirement

Recovery plans for species at risk, Federal Species at Risk Act.

Means of Achieving Objective and Target

Spatial Harvest Sequence.

Target Monitoring and Measurement

Updates to vegetation inventory and habitat modelling.

Reporting

2017 FMP:

a) table and maps of current (time zero) and future (10 and 20 years) landscape condition for Core and Secondary habitat zones;

b) tables of RSF and breeding pairs at 0, 10, 20, 50, 100 & 200 years and maps at 0, 10, 20 & 50 yrs.

c) tables of relative abundance at 0, 10, 20, 50, 100 and 200 years and maps of relative abundance at 0, 10, 20 and 50 years;

di-diii) Document effort made to modify SHS sequence to reduce ECA yield in FMP development

See *Chapter 6: Preferred Forest Management Scenario* for reporting on this VOIT.

Performance:

5 year Stewardship Report: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

At the end of the 10-year FMP term targets are achieved or exceeded.

Response

Adjust strategies in subsequent FMP.

Definitions

Resource Selection Function: A model that provides the probability of use of a resource unit, i.e., the probability that Barred Owls will select different forest types for nesting habitat.

Fish Sustainability Index (FSI): A quantitative tool used to assign a conservation status to a population or management unit (HUC8) of fish.

5.3.1.15 VOIT 15 (1.3.1.1) In situ genetic conservation

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.3 Genetic Diversity: Conserve genetic diversity by maintaining the variation of genes within species

Value: 1.3.1. Genetic integrity of natural tree populations

Objective: 1.3.1.1 Retain "wild forest populations" for each native tree species in each seed zone through maintenance and/or establishment of in-situ reserves, by Alberta and disposition holders.

Indicator

The appropriate number and area (ha) of in-situ tree gene conservation reserves as directed by the FGRMCS.

Target

Owners of the tree improvement program will determine the number of in situ gene conservation stands and allocate them to FMA holders who are partners in the tree improvement program. When this is done, individual FMA holders are responsible for conservation. This has yet to be determined.

Means to Identify Target

Direction and detail as per FGRMCS Section 20.0, "In-situ Gene Conservation", in consultation with the other associate FMA holders and AAF.

Legal/Policy Requirement

Standards regulated through Timber Management Regulation 144.2 and the FGRMCS and AAF.

Means of Achieving Objective and Target

Field reconnaissance or survey to locate appropriate in-situ tree gene conservation reserves on the ground. Establish protective notation to identify in-situ gene conservation reserves in land standing records, and management plan to protect genetic resources.

Target Monitoring and Measurement

Within each FMP and at each stewardship report interval, determine the status of all existing and planned *in-situ* reserves.

Reporting

2017 FMP: None

Performance: Stewardship Reports: update status

Acceptable Variance

The target is achieved.

Response

AAF will direct any required amendments or adjustments to targets.

Definitions

Seed zone: A geographic area with relatively uniform ecology and genetic population structure. Limiting the reforestation of cutblocks to seedlings from the corresponding seed zone allows native trees, and by extension native plants of all species, to be moved some distance without risk of mal-adaptation or erosion of genetic integrity and conserves genetic biodiversity (Alberta, 2014).

5.3.1.16 VOIT 16 (1.3.1.2) Genetic integrity

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.3 Genetic Diversity: Conserve genetic diversity by maintaining the variation of genes within species

Value: 1.3.1. Genetic integrity of natural tree populations

Objective: 1.3.1.2 Retain wild forest genetic resources through ex-situ conservation for species under CPP programs.

Indicator

Number of provenances, families and clone trials and clone banks; and seed in the seed archive.

Target

Establish and maintain active ex-situ conservation program for species under CPP programs in cooperation with AAF and in accordance with FGRMCS Section 17 and 29 and ex-situ conservation criteria (Appendix 4, Footnote 1). Subject also to Section 6.3 of the Gene Conservation Plan for Native Trees of Alberta (2008).

Means to Identify Target

Adequacy of the ex-situ conservation program to capture a representative sample of wild tree genetic resources in ex-situ gene archives. Information for this to be provided by AAF.

Legal/Policy Requirement

Standards regulated through Timber Management Regulation 144.2 and the FGRMCS and consultation with AAF.

Means of Achieving Objective and Target

Seed collections, clone banking and establishment of genetic lines in genetic trials.

Target Monitoring and Measurement

Conservation activities identified in FMP as per FGRMS.

Reporting

2017 FMP: None

Performance: Stewardship Reports: Update status.

Acceptable Variance

No variance from targets as set by AAF is anticipated, but adjustment to targets and objectives are allowable as more research and development bring new data and parameters forward.

Response

AAF will direct any required amendments or adjustments to targets.

Definitions

Gene bank: A repository of tree genetic material for the purposes of maintaining diverse samples for reforestation.

Tree improvement program: The regulation and development of forest reproductive materials and gene conservation for the sustained productivity and health of the forest (Alberta, 2016b).

5.3.1.17 VOIT 17 (1.4.1.1) Trans boundary values

CCFM Criterion: 1 - Biological Diversity

CSA SFM Element: 1.4 Protected Areas: Respect protected areas identified through government processes

Value: 1.4.1. Areas with minimal human disturbances within managed landscapes

Objective: 1.4.1.1 Integrate trans-boundary values and objectives into forest management

Indicator

Stakeholder consultation.

Target

Ongoing consultation with relevant protected areas agencies as required.

Means to Identify Target

FHPs

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Operation Planning of FHPs.

Target Monitoring and Measurement

Silvacom (or others as developed) Consultation Tracking Program

Reporting

2017 FMP: None.

Performance: Stewardship Reporting of consultation initiatives undertaken with protected area agencies.

Acceptable Variance

The target is achieved.

Response

Adjust strategies in subsequent FMP.

Definitions

Stakeholder: A person, group, agency or other entity that has a share or interest in the FMP and the activities occurring on the FMP Area.

5.3.2 Ecosystem Productivity

5.3.2.1 VOIT 18 (2.1.1.1) Reforest all harvested areas

CCFM Criterion: 2 - Ecosystem Productivity

CSA SFM Element: 2.1 Ecosystem Resilience

Value: 2.1.1 Reforested harvest areas

Objective: 2.1.1.1 Reforest all harvested areas.

Indicator

Annual % of openings that:

a) meet or exceed the RSA establishment survey minimum stocking and species composition standards for the declared regenerated yield stratum; and

b) meet or exceed the RSA establishment survey minimum stocking and species composition standards for an alternate regenerated yield stratum, and

c) do not achieve the RSA establishment survey minimum stocking and/or species composition standards for any regenerated yield strata and are re-treated within one year.

Indicators a, b and c are to be reported separately.

Target

The sum of Indicators a, b and c = 100% of openings.

Means to Identify Target

Direction from Alberta.

Legal/Policy Requirement

Timber Management Regulations 141.6(1) and 141.6(2); Reforestation Standard of Alberta.

Means of Achieving Objective and Target

Implementation of silviculture strategies that ensure the target stocking and species composition is achieved for the opening.

Target Monitoring and Measurement

RSA establishment survey protocols.

Reporting

2017 FMP: None

Performance: Stewardship Reporting:

a) Area that meets the RSA stratum requirements, and
b) Area that meets a different RSA stratum requirement, and
c) Area not meeting any RSA stratum requirements and require retreatment within one-year

Acceptable Variance

None.

Response

Adjust silviculture strategies.

Definitions

RSA: Reforestation Standard of Alberta; the Alberta government's standard for sustained yield management on crown land. Harvested blocks must meet certain stocking requirements in both the establishment and performance stages for forest operators to successfully meet reforestation obligations.

5.3.2.2 VOIT 19 (2.1.1.2) Regenerated stand productivity

CCFM Criterion: 2 - Ecosystem Productivity

CSA SFM Element: 2.1 Ecosystem Resilience

Value: 2.1.1 Reforested harvest areas

Objective: 2.1.1.2 Meet or exceed the C and D MAI standard for the population of openings surveyed in a given quadrant by the end of the fifth year of the plan.

Indicator

Summed difference between target and actual C and D MAIs for openings surveyed in a five year quadrant, as reported to ARIS.

Target

100%.

Means to Identify Target

Direction from Alberta.

Legal/Policy Requirement

Timber Management Regulation 141.7(1) and 141.7(2); Reforestation Standard of Alberta.

Means of Achieving Objective and Target

Implementation of silviculture strategies that ensure the target productivity is achieved for the population of openings.

Target Monitoring and Measurement

RSA performance survey protocols.

Reporting

2017 FMP: MAI targets by yield group. See Table 4-3 in Annex VII: Yield Curve Development.

Performance:

Stewardship Reporting: Comparison of RSA MAI results for C and D and forecasted targets by Yield Group

Acceptable Variance

Meet or exceed the target C and D MAI for the DFA.

Response

Adjust silviculture strategies and/ or the AAF adjusts AAC.

Definitions

MAI: Mean Annual Increment; The average annual growth rate of individual trees or stands up to a specified point in time. Expressed as volume/hectares/year.

C: Conifer component; D: Deciduous component

5.3.2.3 VOIT 20 (2.1.2.1) Productive forest conversion

CCFM Criterion: 2 - Ecosystem Productivity

CSA SFM Element: 2.1 Ecosystem Resilience

Value: 2.1.2 Maintenance of forest landbase

Objective: 2.1.2.1 Limit conversion of productive forest landbase to other uses.

Indicator

Amount of change in forest landbase.

Target

Report on the loss of the gross forest landbase area.

Means to Identify Target

Forest inventory and land use data.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Promoting the minimization of non-forestry impacts to the landbase.

Target Monitoring and Measurement

AAF tracking of withdrawals and cancellations by FMA.

Reporting

2017 FMP: None.

Performance: Stewardship Reporting of additions and deletions to the gross forest landbase.

Acceptable Variance

The target is achieved.

Response

Adjust strategies next FMP.

Definitions

TSA: Timber Supply Analysis; A process consisting of calculations/computer models with built-in assumptions regarding forest growth patterns that is used to determine the Annual Allowable Cut (AAC) and the Spatial Harvest Sequence (SHS).

Gross forest landbase: The area contained within the boundary of the DFA. This includes the company's FMA area and the grazing leases contained within the DFA. In other words, the active and passive landbase together constitute the gross landbase.

5.3.2.4 VOIT 21 (2.1.2.2) Impacts of insects, fire, windthrow and other natural events

CCFM Criterion: 2 - Ecosystem Productivity

CSA SFM Element: 2.1 Ecosystem Resilience

Value: 2.1.2 Maintenance of forest landbase

Objective: 2.1.2.2 Recognize lands affected by insects, disease or other natural events.

Indicator

Amount of area affected by significant impacts of insects, fire, windthrow and other natural events.

Target

Report the area affected by impacts of insects, fire, windthrow or other natural events.

Means to Identify Target

AAF forest health surveys, inventory updates, fire reporting. Events that exceed 100 hectares in size will be reporting, with the exception of fires. AAF tracks all fires on the DFA.

Legal/Policy Requirement

Planning Standard, Alberta Forest Health Strategy and Shared Roles and Responsibilities between AAF and the Forest Industry.

Means of Achieving Objective and Target

Maintain up-to-date information.

Target Monitoring and Measurement

Alberta surveys with industry cooperation.

Reporting

2017 FMP: None.

Performance: Stewardship Reporting of areas impacted by fire, insects, windthrow and other natural events.

Acceptable Variance

The target is achieved.

Response

Address events as they occur.

5.3.2.5 VOIT 22 (2.1.3.1) Noxious weed program

CCFM Criterion: 2 - Ecosystem Productivity

CSA SFM Element: 2.1 Ecosystem Resilience

Value: 2.1.3 Control invasive species

Objective: 2.1.3.1 Control non-native plant species (weeds)

Indicator

Noxious weed program.

Target

Effective suppression of noxious weeds.

Means to Identify Target

Noxious weed directive 2001-06.

Legal/Policy Requirement

Directive 2001-06.

Means of Achieving Objective and Target

Noxious weed program.

Target Monitoring and Measurement

Field surveys.

Reporting

2017 FMP: None.

Performance: Stewardship Reporting of control efforts.

Acceptable Variance

The target is achieved.

Response

Effective suppression of weeds.

Definitions

Noxious weed: A plant designated in accordance with the Alberta Weed Control Regulation as a noxious weed and includes the plant's seeds. A person shall control a noxious weed that is on land the person owns or occupies (Alberta, 2011).

5.3.3 Soil and Water Resources

5.3.3.1 VOIT 23 (3.1.1.1) Reforest in-block temporary roads

CCDM Criterion: 3 - Soil and Water Resources

CSA SFM Element: 3.1 Soil quantity and quality - Conserve soil resources by maintaining soil quality and quantity

Value: 3.1.1 Soil productivity

Objective: 3.1.1.1 Minimize impact of roading and bared areas in forest operations

Indicator

Silviculture Strategy Table (SST) that includes tactic to reforest temporary in-block roads.

Target

Follow Silviculture Strategy Table.

Means to Identify Target

Direction from Alberta.

Legal/Policy Requirement

OGRs and Soils Guidelines.

Means of Achieving Objective and Target

Silviculture strategy to reforest all roads within harvest areas while minimizing bared areas within harvest areas.

Target Monitoring and Measurement

Field inspection reports and audits.

Reporting

2017 FMP: None

Performance: Stewardship Reports: None

Acceptable Variance

The target is achieved.

Response

Adjust strategies in subsequent FMPs.

5.3.3.2 VOIT 24 (3.1.1.2) Soil erosion and slumping

CCFM Criterion: 3 - Soil and Water Resources

CSA SFM Element: 3.1 Soil quantity and quality - Conserve soil resources by maintaining soil quality and quantity

Value: 3.1.1 Soil productivity

Objective: 3.1.1.2 Minimize incidence of soil erosion and slumping

Indicator

Incidence of soil erosion and slumping.

Target

No warnings or penalties assessed regarding soil erosion or slumping.

Means to Identify Target

Direction from Alberta.

Legal/Policy Requirement

OGRs and Soils Guidelines.

Means of Achieving Objective and Target

Effective planning and supervision of operations and adherence to relevant OGRs.

Target Monitoring and Measurement

Field inspection reports and AAF FOMP reports.

Reporting

2017 FMP: None.

Performance: Stewardship reports of non-compliance (warnings and penalties assessed).

Acceptable Variance

The target is achieved.

Response

Immediate remedial action to correct.

5.3.3.3 VOIT 25 (3.2.1.1) Forecasted changes in water yields

CCFM Criterion: 3 - Soil and Water Resources

CSA SFM Element: 3.2 Water quantity and quality - Conserve water resources by maintaining water quality, flow regime and water quantity

Value: 3.2.1 Water quantity

Objective: 3.2.1.1 Limit impact of timber harvesting on water yield

Indicator

Forecasted changes in water yields resulting from the approved SHS, as measured by Equivalent Clearcut Area (ECA).

Target

a) ECA <30%

b) Zero Water Act penalties

Means to Identify Target

Equivalent Clearcut Area (ECA) water yield modeling. See Appendix 6-4.

Legal/Policy Requirement

Water Act, Planning Standard.

Means of Achieving Objective and Target

Follow the SHS.

Target Monitoring and Measurement

Spatial Harvest Sequence variance reporting.

Reporting

2017 FMP: ECA results by watershed in excess of 500 hectares in size. See *Chapter 6: Preferred Forest Management Scenario* for reporting on this VOIT.

Performance:

a) 5-year Stewardship Report: SHS variance

b) 5-year Stewardship report: penalties to the Water Act

c) 10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

<20% variance to the SHS

Response

Adjust strategies in the next FMP.

Definitions

ECA: Equivalent Clearcut Area; a model applied in the PFMS that uses stand age to approximate the amount of water that flows overland. As vegetation ages and grows, it intercepts more water and reduces flows.

5.3.3.4 VOIT 26 (3.2.2.1) Effective riparian habitat

CCFM Criterion: 3 - Soil and Water Resources

CSA SFM Element: 3.2 Water quantity and quality - Conserve water resources by maintaining water quality, flow regime and water quantity

Value: 3.2.2 Effective riparian habitats

Objective: 3.2.2.1 Minimize impact of operations in riparian areas

Indicator

Riparian buffers maintained as outlined in OGRs.

Target

No warnings or penalties assessed regarding riparian zones.

Means to Identify Target

Direction from Alberta.

Legal/Policy Requirement

OGRs.

Means of Achieving Objective and Target

Effective planning and supervision of operations and adherence to relevant OGRs.

Target Monitoring and Measurement

Field inspection reports and AAF FOMP reporting.

Reporting

2017 FMP: None

Performance: Stewardship reporting of warnings and penalties assessed.

Acceptable Variance

The target is achieved.

Response

Immediate correction and/or administrative penalty.

Definitions

Riparian Zones: Strips of green vegetation influenced by water and found around creeks, sloughs, rivers, and lakes (Alberta, 2015).

NLB: Net Land Base determination where land is classified as either contributing to the timber producing landbase (ACTIVE) or is not contributing to the timber producing landbase (PASSIVE).

5.3.4 Global Ecological Cycles

5.3.4.1 VOIT 27 (4.1.1.1) Global Carbon Cycles

CCFM Criterion: 4 – Global Ecological Cycles

CSA SFM Element: 4.1 Carbon uptake and storage

Value: 4.1.1 Sustainable timber supplies

Objective: 4.1.1.1 Maintain functioning forest ecosystems capable of contributing to global carbon cycles.

Indicator

Results of carbon budget modeling.

Target

N/A

Means to Identify Target

N/A

Legal/Policy Requirement

N/A

Means of Achieving Objective and Target

N/A

Target Monitoring and Measurement

N/A

Reporting

N/A

Acceptable Variance

N/A

Response

N/A

5.3.5 Multiple Benefits to Society

5.3.5.1 VOIT 28 (5.1.1.1) Appropriate AACs

CCFM Criterion: 5 - Multiple Benefits to Society

CSA SFM Element: 5.1 Timber and non-timber benefits

Value: 5.1.1 Sustainable timber supplies

Objective: 5.1.1.1 Establish appropriate AACs.

Indicator

Process described in Annex 1 is followed and standards are met.

Target

Complete compliance. AAF approves AACs as determined by the Timber Supply Analysis (TSA).

Means to Identify Target

TSA and development of the Preferred Forest Management Scenario (PFMS) that results in the SHS.

Legal/Policy Requirement

Forests Act and Timber Management Regulation; Planning Standard

Means of Achieving Objective and Target

Effective implementation of planning standard

Target Monitoring and Measurement

Multiple means: TPRS, ARIS, AOPs, Stewardship Reports, field inspection reports

Reporting

2017 FMP: See *Chapter 6: Preferred Forest Management Scenario.*

Performance:

5 year Stewardship Reporting: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

Issue specific

Response

Adjust AAC using most current and relevant information.

Definitions

Quadrant timber production: The volume of wood harvested within each 5-year period of the FMP.

5.3.5.2 VOIT 29 (5.2.1.1a) Fire Behaviour Potential in FireSmart Communities

CCFM Criterion: 5 - Multiple Benefits to Society

CSA SFM Element: 5.2 Communities and Sustainability

Value: 5.2.1 Risk to communities and landscape values from wildfire is low

Objective: 5.2.1.1a To reduce wildfire threat potential by reducing fire behaviour, fire occurrence, threats to values at risk and enhancing fire suppression capability (part a)

Indicator

Reduction in Fire Behaviour Potential (FBP) within the FireSmart Community Zone.

Target

Reduce the area (ha) in the high, very high, and extreme Fire Behaviour Potential rating categories within the FireSmart Community Zones by 8% in 2027.

Means to Identify Target

Use FBP maps from AAF and the Preferred SHS.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Spatial Harvest Sequence, thinning, partial harvest techniques. See Section 5.4.7 Table 5-28.

Target Monitoring and Measurement

Periodic updates to inventory.

Reporting

2017 FMP: Maps and tables of indicator at 0, 10, 20, and 50 yrs. See section 5.4.7 for reporting on this VOIT.

Performance:

5-year Stewardship reports: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

The target is achieved.

Response

Adjust strategies in subsequent FMPs.

Definitions

FBP: Fire Behaviour Potential; a rating or classification of a forest stand's likelihood of burning as a reflection of fuel type and topography. FBP is one input into the AAF's Fire Behaviour Prediction model.

5.3.5.3 VOIT 30 (5.2.1.1b) Fire Behaviour Potential in DFA

CCFM Criterion: 5 - Multiple Benefits to Society

CSA SFM Element: 5.2 Communities and Sustainability

Value: 5.2.1 Risk to communities and landscape values from wildfire is low

Objective: 5.2.1.1b To reduce wildfire threat potential by reducing fire behaviour, fire occurrence, threats to values at risk and enhancing fire suppression capability (part b)

Indicator

Reduction of Fire Behaviour Potential (FBP) across the DFA.

Target

Reduce the area (ha) in the high, very high, and extreme Fire Behaviour Potential rating categories within the DFA by 9% in 2027.

Means to Identify Target

Use FBP maps from AAF and the Preferred SHS. See Section 5.4.8 Table 5-29.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Spatial harvest sequence, thinning, partial harvest techniques.

Target Monitoring and Measurement

Periodic updates to inventory.

Reporting

2017 FMP: Maps and tables of indicator at 0, 10, 20, and 50 yrs. See section 0 for reporting on this VOIT.

Performance:

5-year Stewardship reports: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

The target is achieved.

Response

Adjust strategies in subsequent FMPs.

5.3.5.4 VOIT 31 (5.2.2.1) Communication Initiatives

CCFM Criterion: 5 - Multiple Benefits to Society

CSA SFM Element: 5.2 Communities and Sustainability

Value: 5.2.2 Provide opportunities to derive benefits and participate in use and management

Objective: 5.2.2.1 Integrate other uses and timber management activities

Indicator

Public Consultation Processes

Target

Engage with interested users/user groups

Means to Identify Target

Identification of interests.

Legal/Policy Requirement

OGR

Means of Achieving Objective and Target

FHPs, AOPs, GDPs, GTAs

Target Monitoring and Measurement

FHPs

Reporting

2017 FMP: Public Involvement Process undertaken and issues addressed in the FMP. See Annex III: Public Involvement.

Performance: Stewardship Reporting of Number of Consultations with interested parties.

Acceptable Variance

The target is achieved.

Response

Adjust activities.

5.3.5.5 VOIT 32 (5.2.3.1) Regenerated stand yield comparison

CCFM Criterion: 5 - Multiple Benefits to Society

CSA SFM Element: 5.2 Communities and Sustainability

Value: 5.2.3 Forest productivity

Objective: 5.2.3.1 Maintain Long Run Sustained Yield Average

Indicator

Regenerated stand yields compared to natural stand yields.

Target

No decrease from the natural stand strata yields.

Means to Identify Target

FMP Timber Supply Analysis. See Annex VII.

Legal/Policy Requirement

Planning Standard.

Means of Achieving Objective and Target

Effective implementation of plans.

Target Monitoring and Measurement

Stewardship Report

Reporting

2017 FMP: Summary of Long Run Sustained Yield (LRSY) in *Chapter 6: Preferred Forest Management Scenario*.

Performance:

5 year Stewardship Reporting: none

10 year Stewardship Report comparing time 0 of previous FMP to Classified Landbase of new FMP

Acceptable Variance

The target is achieved.

Response

Adjust strategy in subsequent FMPs.

Definitions

LRSY: Long Run Sustained Yield; the hypothetical timber harvest that can be maintained indefinitely from a management area once all stands have been converted to a managed state under a specific set of management activities.

5.3.6 Accepting Society's Responsibility for Sustainable Development

5.3.6.1 VOIT 33 (6.1.1.1) Alberta First Nations and Métis Settlement Consultation expectations

CCFM Criterion: 6 - Accepting Society's Responsibility for Sustainable Development

CSA SFM Element: 6.1 Aboriginal and treaty rights and Aboriginal forest values

Value: 6.1.1 Compliance with government regulations and policies

Objective: 6.1.1.1 Implement Public Involvement Program

Indicator

Meet the Alberta's current expectations for First Nations and Métis Settlement consultation.

Target

Consult at the community level with designated representatives of affected First Nations and Métis Settlements.

Means to Identify Target

Alberta to provide direction.

Legal/Policy Requirement

Alberta's First Nations and Métis Settlement Consultation Guidelines on Land and Natural Resource Management.

Means of Achieving Objective and Target

Effective implementation of Alberta's First Nation and Métis Settlement consultation requirements.

Target Monitoring and Measurement

Consultation logs and effectiveness of consultation process.

Reporting

2017 FMP: First Nations and Métis Settlement consultation plan. See Annex IV: Consultation.

Performance: Stewardship reports summarizing First Nation and Métis Settlement consultation

Acceptable Variance

The target is achieved.

Response

Adjust strategy to reflect AAF direction

5.3.6.2 VOIT 34 (6.1.1.2) Alberta First Nations and Métis Settlement Consultation expectations

CCFM Criterion: 6 - Accepting Society's Responsibility for Sustainable Development

CSA SFM Element: 6.1 Aboriginal and treaty rights and Aboriginal forest values

Value: 6.1.1 Compliance with government regulations and policies

Objective: 6.1.1.2 Exercise of Treaty and Aboriginal rights on the DFA

Indicator

First Nations and Métis gathering Sites

Target

Protect all site specific gathering areas (e.g. hunting, fishing, harvesting of forest resources) identified during any consultation process or shared by the First Nation or Métis Community

Means to Identify Target

First Nations and Métis Settlement Consultation.

Legal/Policy Requirement

Alberta's First Nations and Métis Settlement Consultation guidelines on Land and Natural Resource Management

Means of Achieving Objective and Target

Effective implementation of Alberta's First Nation and Métis Settlement consultation requirements.

Target Monitoring and Measurement

Consultation logs and effectiveness of consultation process.

Reporting

2017 FMP: First Nations and Métis Settlement consultation plan. See Annex IV: Consultation.

Performance: Stewardship reports summarizing disturbance of sites

Acceptable Variance

The target is achieved.

Response

Adjust strategy to reflect AAF direction

5.3.6.3 VOIT 35 (6.1.1.2) Alberta First Nations and Métis Settlement Consultation expectations

CCFM Criterion: 6 - Accepting Society's Responsibility for Sustainable Development

CSA SFM Element: 6.1 Aboriginal and treaty rights and Aboriginal forest values

Value: 6.1.1 Compliance with government regulations and policies

Objective: 6.1.1.2 Exercise of Treaty and Aboriginal rights on the DFA

Indicator

First Nations and Métis cultural Sites

Target

Protect all site specific cultural sites identified during any consultation process or shared by the First Nation or Métis Community

Means to Identify Target

First Nations and Métis Settlement Consultation.

Legal/Policy Requirement

Alberta's First Nations and Métis Settlement Consultation guidelines on Land and Natural Resource Management

Means of Achieving Objective and Target

Effective implementation of Alberta's First Nation and Métis Settlement consultation requirements.

Target Monitoring and Measurement

Consultation logs and effectiveness of consultation process.

Reporting

2017 FMP: First Nations and Métis Settlement consultation plan. See Annex IV: Consultation.

Performance: Stewardship reports summarizing disturbance of sites

Acceptable Variance

The target is achieved.

Response

Adjust strategy to reflect AAF direction

5.3.6.4 VOIT 36 (6.2.1.1) Public input into Forest Management Activities

CCFM Criterion: 6 - Accepting Society's Responsibility for Sustainable Development

CSA SFM Element: 6.2 Public participation and information for decision-making

Value: 6.2.1 Meaningful public involvement is achieved.

Objective: 6.2.1.1. Implement Public Participation

Indicator

Opportunities provided for public input into the Forest Management Plan, Annual Operating Plan, General Development Plan and Herbicide Plan.

Target

Provide ongoing opportunities for public involvement into the Forest Management Plan, Annual Operating Plan, General Development Plan and Herbicide Plan.

Means to Identify Target

Public involvement processes

Legal/Policy Requirement

Planning Standard

Means of Achieving Objective and Target

Hold open houses or other venues to seek public input into plans annually

Target Monitoring and Measurement

Silvacom (or other as developed) Consultation Tracking Program

Reporting

2017 FMP: Summary of public consultation in FMP development process. See Annex III: Public Involvement.

Performance: Stewardship Reports of opportunities provided to the public for input in forest management planning

Acceptable Variance

The target is achieved.

Response

Adjust activities

5.3.6.5 VOIT 37 (6.2.2.1) Alberta First Nations Consultation expectations

CCFM Criterion: 6 - Accepting Society's Responsibility for Sustainable Development

CSA SFM Element: 6.2 Public participation and information for decision-making

Value: 6.2.2 First Nation Economic Participation

Objective: 6.1.1.1 Promote economic opportunities between the company and First Nations or Métis Settlements

Indicator

First Nations/Métis Settlement service agreements

Target

Report on service agreements or in-kind services provided to First Nations and Métis Settlements

Means to Identify Target

First Nations and Métis Consultation

Legal/Policy Requirement

Alberta's First Nations and Métis Settlement Consultation guidelines on Land and Natural Resource Management

Means of Achieving Objective and Target

Effective implementation of Alberta's First Nation and Métis Settlement consultation requirements.

Target Monitoring and Measurement

Consultation Logs and effectiveness of consultation process

Reporting

2017 FMP: First Nations and Métis Settlement consultation plan. See Annex IV: Consultation.

Performance: Stewardship reports summarizing First Nation and Métis Settlement Service Agreements

Acceptable Variance

The target is achieved.

Response

Adjust strategy to reflect AAF direction

5.4 VOIT Reporting

This section provides detailed reporting for a few VOITs that are not reported elsewhere in the FMP documentation.

5.4.1 VOIT 1 (1.1.1.1) Seral Stages by Ecological Unit

Reporting Requirement :

- Tables of indicators for the gross and active landbases at 0, 10, 50, 100 and 200 years;
- Maps of seral stages on the gross and active landbases at 0, 10 and 50 years.

Table 5-17. Area by seral stage on the gross landbase

Year	Regenerating		Young		Mature		Old		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	128,959	14%	176,545	19%	519,966	55%	112,239	12%	937,709	100%
2027	157,399	17%	150,916	16%	466,214	50%	163,180	17%	937,709	100%
2067	130,518	14%	303,408	32%	166,448	18%	337,334	36%	937,709	100%
2117	145,761	16%	263,118	28%	101,131	11%	427,698	46%	937,709	100%
2217	137,068	15%	266,334	28%	98,472	11%	435,835	46%	937,709	100%

Table 5-18. Area by seral stage on the active landbase

Year	Regenerating		Young		Mature		Old		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	122,402	22%	97,305	18%	271,334	50%	56,423	10%	547,464	100%
2027	153,953	28%	113,947	21%	203,054	37%	76,511	14%	547,464	100%
2067	130,518	24%	296,851	54%	60,524	11%	59,570	11%	547,464	100%
2117	145,761	27%	263,118	48%	93,279	17%	45,306	8%	547,464	100%
2217	137,068	25%	266,334	49%	98,472	18%	45,590	8%	547,464	100%

Table 5-19. Area by ecological unit in the regenerating seral stage on the gross landbase

Year	Regenerating Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	28,250	22%	8,877	7%	14,962	12%	56,101	44%	17,833	14%	2,936	2%	128,959	100%
2027	24,811	16%	10,345	7%	16,442	10%	87,927	56%	15,150	10%	2,725	2%	157,399	100%
2067	34,116	26%	7,753	6%	9,646	7%	38,126	29%	40,471	31%	406	0%	130,518	100%
2117	46,078	32%	5,854	4%	10,205	7%	72,016	49%	10,481	7%	1,127	1%	145,761	100%
2217	39,069	29%	8,657	6%	9,547	7%	70,567	51%	8,524	6%	704	1%	137,068	100%

Table 5-20. Area by ecological unit in the young seral stage on the gross landbase

Year	Young Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	50,201	28%	11,396	6%	8,766	5%	37,150	21%	13,380	8%	55,652	32%	176,545	100%
2027	60,026	40%	14,619	10%	9,810	7%	28,284	19%	16,046	11%	22,131	15%	150,916	100%
2067	92,848	31%	33,039	11%	26,426	9%	122,255	40%	25,177	8%	3,663	1%	303,408	100%
2117	79,761	30%	24,115	9%	20,984	8%	74,003	28%	63,131	24%	1,123	0%	263,118	100%
2217	82,825	31%	23,398	9%	19,649	7%	81,993	31%	56,841	21%	1,628	1%	266,334	100%

Table 5-21. Area by ecological unit in the mature seral stage on the gross landbase

Year	Mature Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	110,127	21%	28,629	6%	26,412	5%	134,173	26%	59,541	11%	161,083	31%	519,966	100%
2027	87,188	19%	20,345	4%	21,594	5%	107,530	23%	53,130	11%	176,426	38%	466,214	100%
2067	31,151	19%	10,139	6%	7,537	5%	24,831	15%	14,110	8%	78,681	47%	166,448	100%
2117	33,125	33%	19,445	19%	11,561	11%	30,834	30%	3,171	3%	2,996	3%	101,131	100%
2217	44,046	45%	15,057	15%	6,172	6%	22,542	23%	10,446	11%	209	0%	98,472	100%

Table 5-22. Area by ecological unit in the old seral stage on the gross landbase

Year	Old Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	25,458	23%	10,763	10%	2,542	2%	14,282	13%	19,677	18%	39,516	35%	112,239	100%
2027	42,011	26%	14,356	9%	4,837	3%	17,966	11%	26,105	16%	57,905	35%	163,180	100%
2067	55,921	17%	8,735	3%	9,073	3%	56,495	17%	30,673	9%	176,438	52%	337,334	100%
2117	55,072	13%	10,251	2%	9,932	2%	64,854	15%	33,648	8%	253,942	59%	427,698	100%
2217	48,096	11%	12,553	3%	17,314	4%	66,605	15%	34,620	8%	256,647	59%	435,835	100%

Table 5-23. Area by ecological unit in the regenerating seral stage on the active landbase

Year	Regenerating Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	27,033	22%	8,512	7%	14,241	12%	54,619	45%	17,261	14%	736	1%	122,402	100%
2027	24,500	16%	10,262	7%	16,110	10%	86,935	56%	14,862	10%	1,283	1%	153,953	100%
2067	34,116	26%	7,753	6%	9,646	7%	38,126	29%	40,471	31%	406	0%	130,518	100%
2117	46,078	32%	5,854	4%	10,205	7%	72,016	49%	10,481	7%	1,127	1%	145,761	100%
2217	39,069	29%	8,657	6%	9,547	7%	70,567	51%	8,524	6%	704	1%	137,068	100%

Table 5-24. Area by ecological unit in the young seral stage on the active landbase

Year	Young Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	42,687	44%	9,981	10%	6,689	7%	28,390	29%	9,092	9%	466	0%	97,305	100%
2027	53,242	47%	13,344	12%	8,515	7%	24,867	22%	13,663	12%	315	0%	113,947	100%
2067	91,631	31%	32,674	11%	25,705	9%	120,773	41%	24,605	8%	1,463	0%	296,851	100%
2117	79,761	30%	24,115	9%	20,984	8%	74,003	28%	63,131	24%	1,123	0%	263,118	100%
2217	82,825	31%	23,398	9%	19,649	7%	81,993	31%	56,841	21%	1,628	1%	266,334	100%

Table 5-25. Area by ecological unit in the mature seral stage on the active landbase

Year	Mature Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	92,125	34%	23,770	9%	22,152	8%	91,009	34%	41,200	15%	1,079	0%	271,334	100%
2027	70,791	35%	16,270	8%	16,796	8%	62,067	31%	36,314	18%	816	0%	203,054	100%
2067	23,637	39%	8,724	14%	5,055	8%	14,499	24%	8,149	13%	460	1%	60,524	100%
2117	31,908	34%	19,080	20%	10,662	11%	29,092	31%	2,245	2%	292	0%	93,279	100%
2217	44,046	45%	15,057	15%	6,172	6%	22,542	23%	10,446	11%	209	0%	98,472	100%

Table 5-26. Area by ecological unit in the old seral stage on the active landbase

Year	Old Forest													
	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	21,851	39%	9,460	17%	2,168	4%	10,298	18%	12,251	22%	396	1%	56,423	100%
2027	35,163	46%	11,846	15%	3,828	5%	10,446	14%	14,965	20%	263	0%	76,511	100%
2067	34,311	58%	2,572	4%	4,844	8%	10,917	18%	6,579	11%	348	1%	59,570	100%
2117	25,948	57%	2,672	6%	3,399	8%	9,205	20%	3,947	9%	135	0%	45,306	100%
2217	17,755	39%	4,610	10%	9,882	22%	9,213	20%	3,993	9%	137	0%	45,590	100%

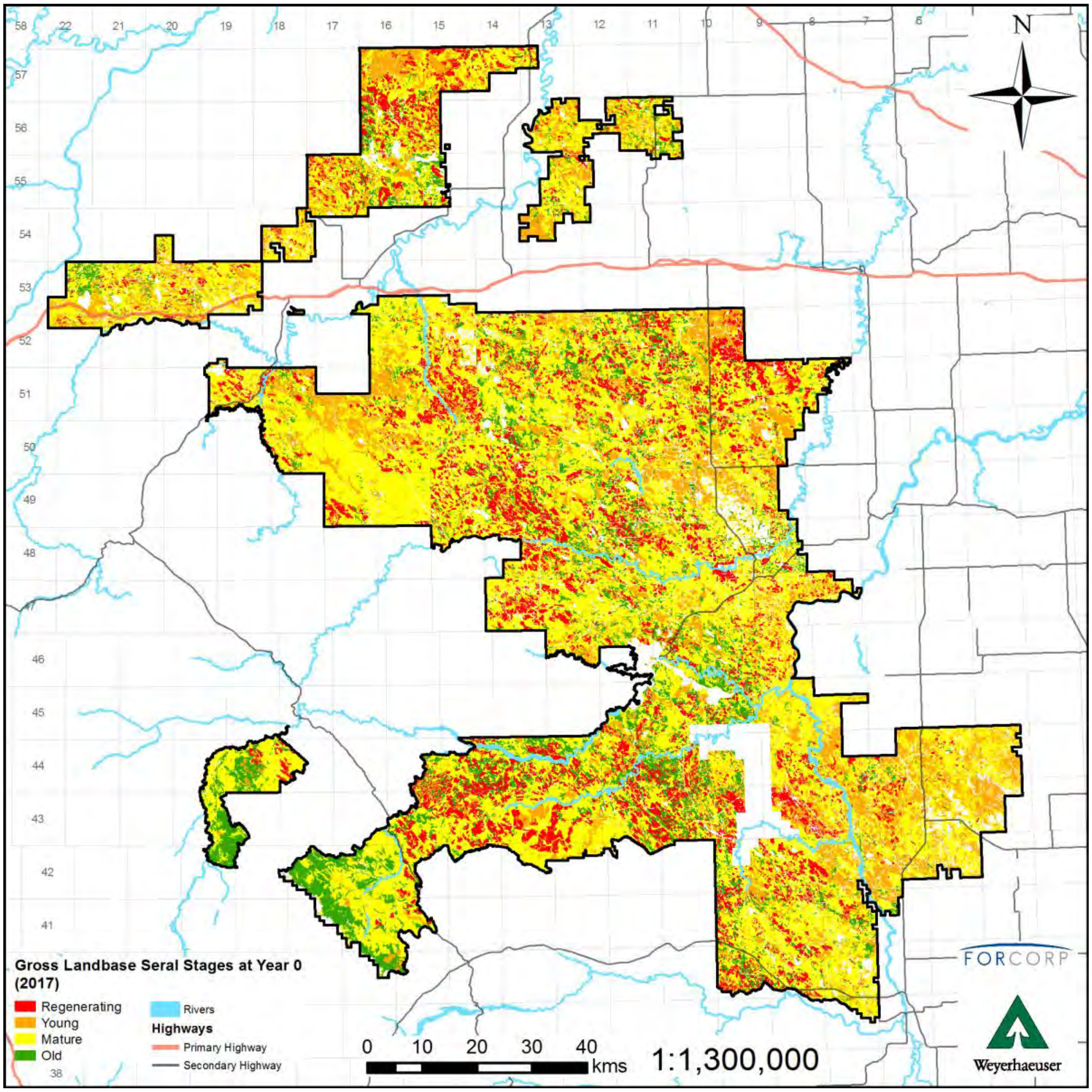

Figure 5-1. Seral stages on the gross landbase at year 0 (2017)

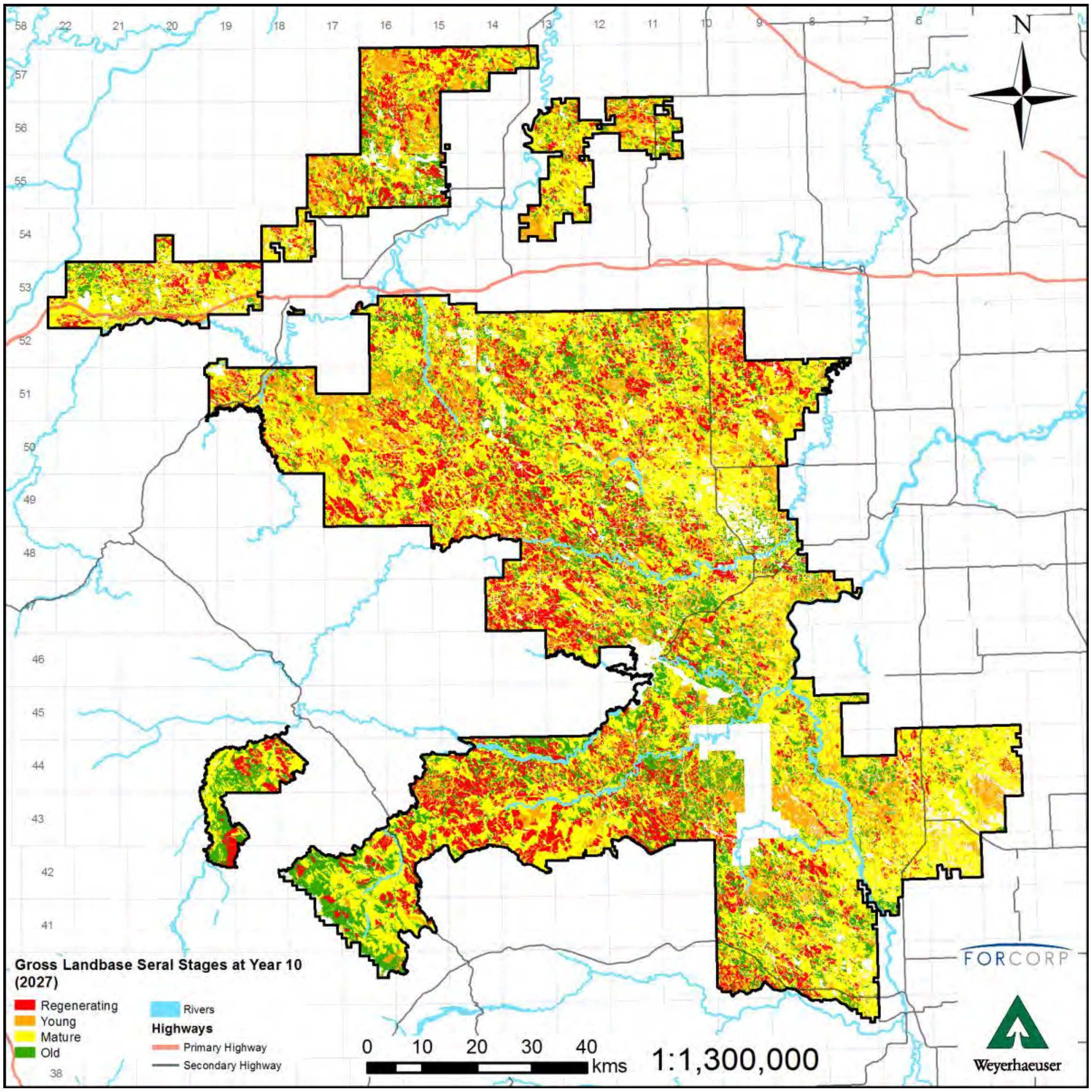

Figure 5-2. Seral stages on the gross landbase at year 10 (2027)

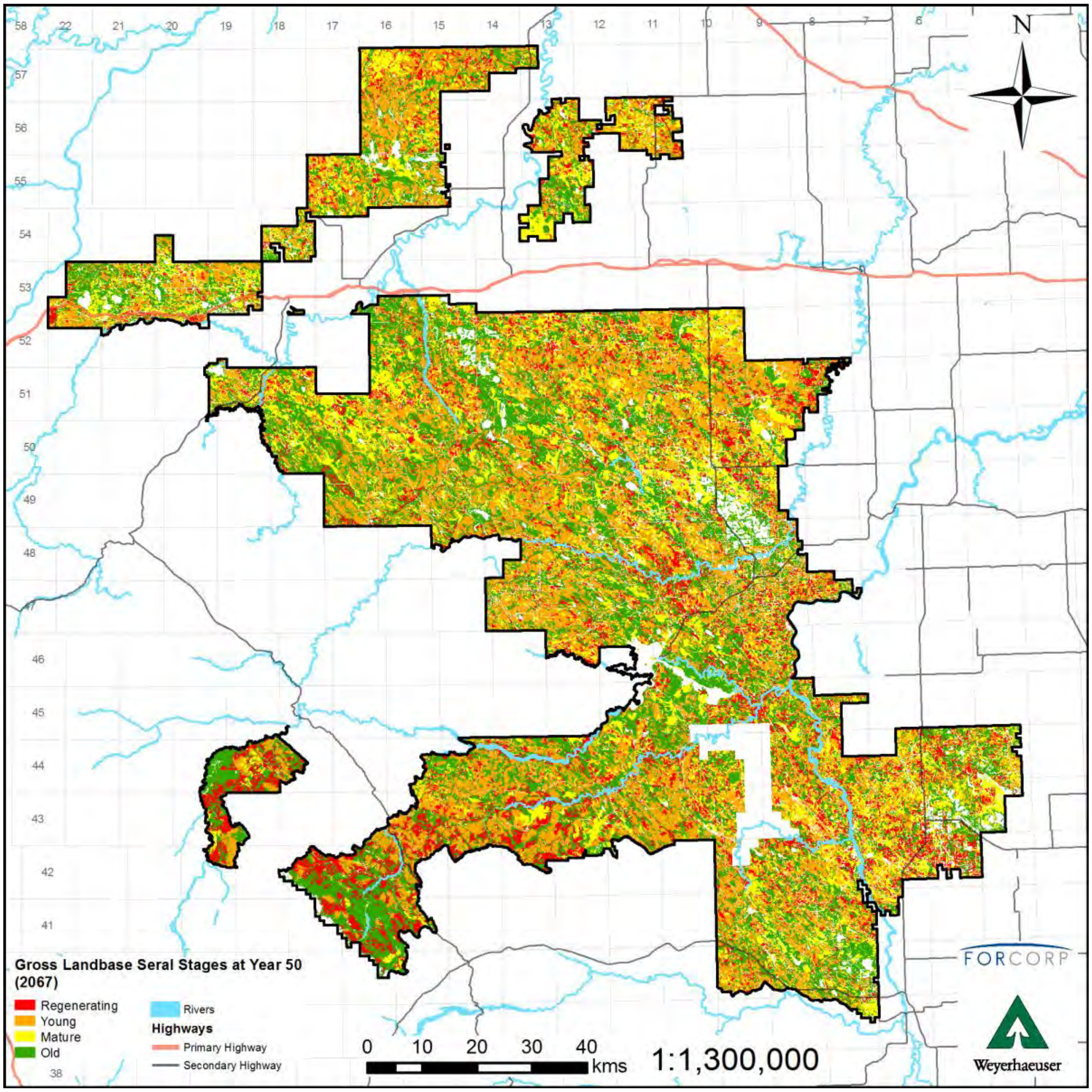

Figure 5-3. Seral stages on the gross landbase at year 50 (2067)

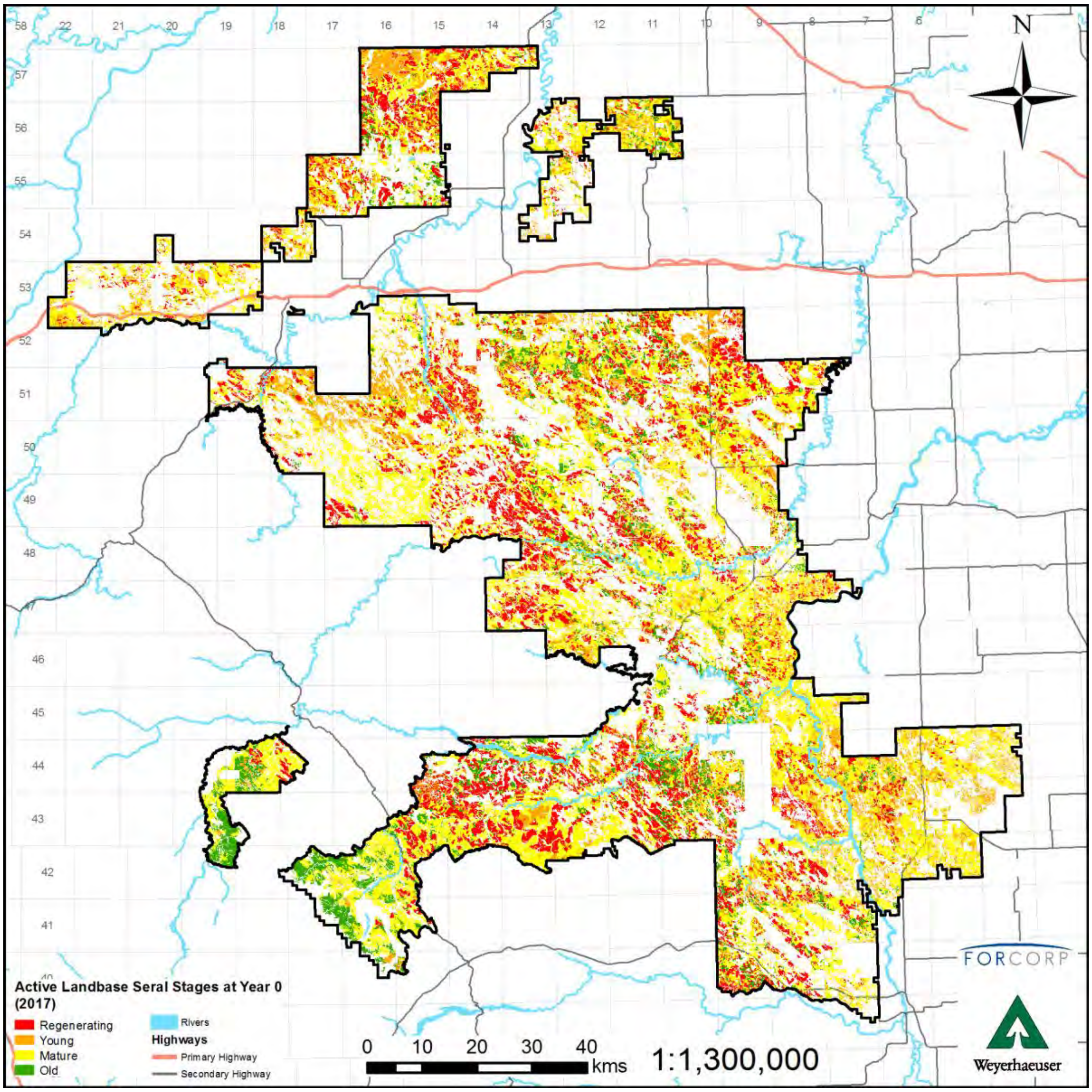

Figure 5-4. Seral stages on the active landbase at year 0 (2017)

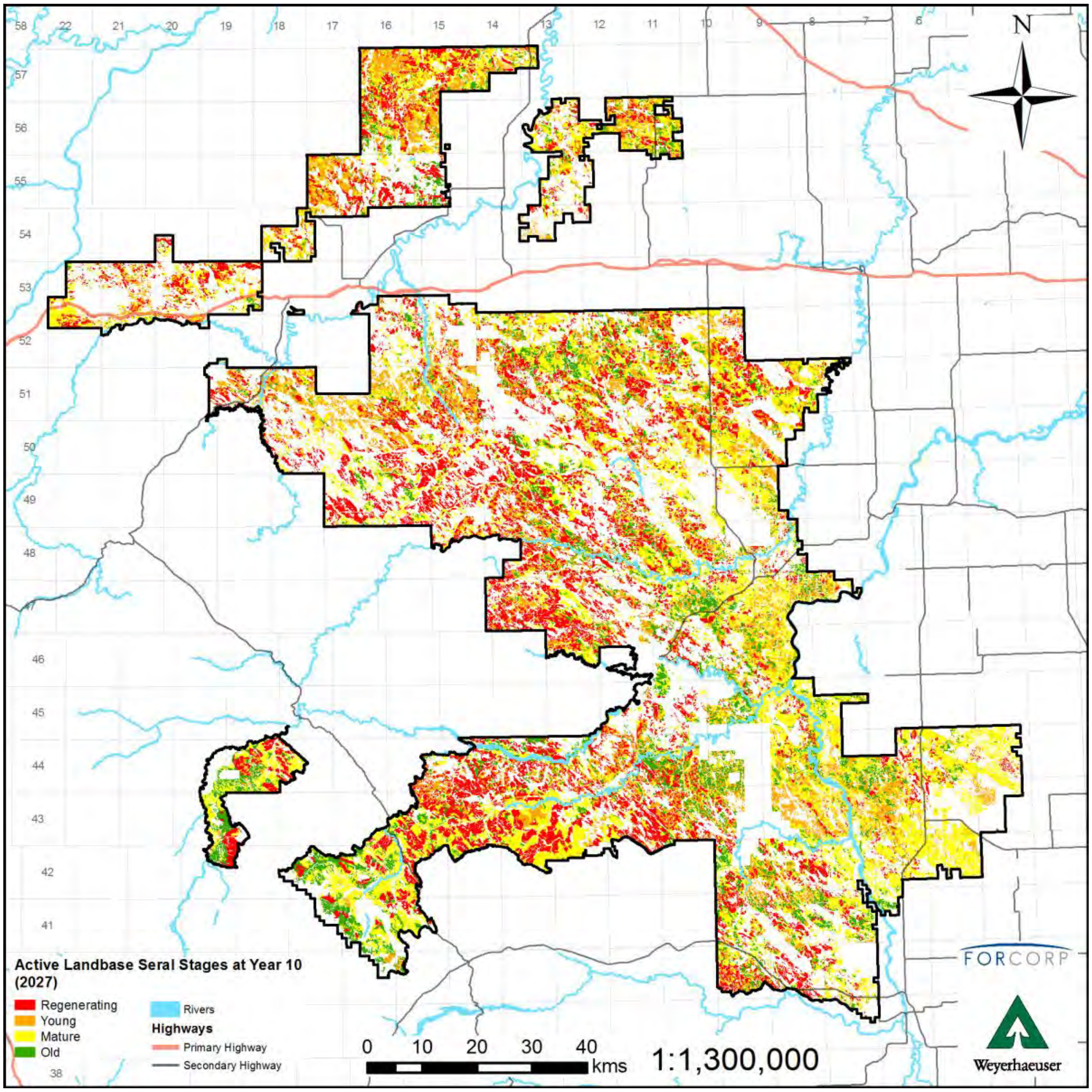

Figure 5-5. Seral stages on the active landbase at year 10 (2027)

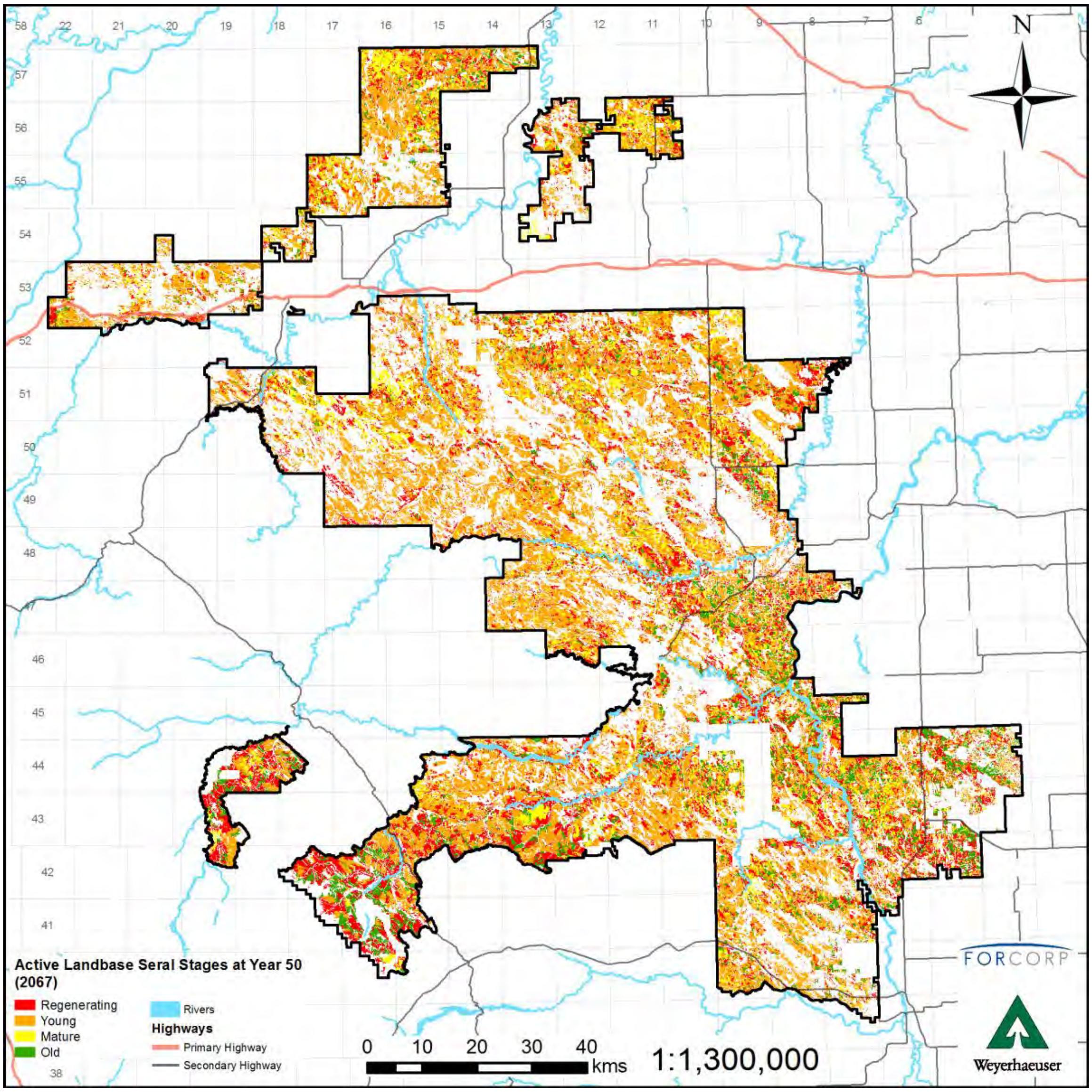

Figure 5-6. Seral stages on the active landbase at year 50 (2067)

5.4.2 VOIT 2 (1.1.1.2a) Opening Patch Size

Reporting Requirement:

- Tables of area of forest in each harvest area size class on the DFA at 0, 10, and 50 years.
- Maps of harvest area size classes at 0, 10, and 50 years.

Table 5-27. Area by patch size category at years 0, 10 and 50

Patch Size Category	Year 0 (2017)			Year 10 (2027)			Year 50 (2067)		
	Area	% Total	Avg Size	Area	% Total	Avg Size	Area	% Total	Avg Size
	Ha	%	Ha	Ha	%	Ha	Ha	%	Ha
<= 25 Ha	41,576	41.6%	6.3	49,922	39.6%	6.8	62,766	58.9%	3.8
25 - 100 Ha	41,471	41.5%	44.3	49,255	39.1%	45.4	29,247	27.4%	42.5
100 - 500 Ha	16,244	16.3%	171.0	24,305	19.3%	162.0	13,271	12.4%	172.4
> 500 Ha	651	0.7%	651.0	2,651	2.1%	662.8	1,362	1.3%	1,362.0
Total	**99,942**	**100.0%**	**13.1**	**126,133**	**100.0%**	**14.7**	**106,646**	**100.0%**	**6.2**

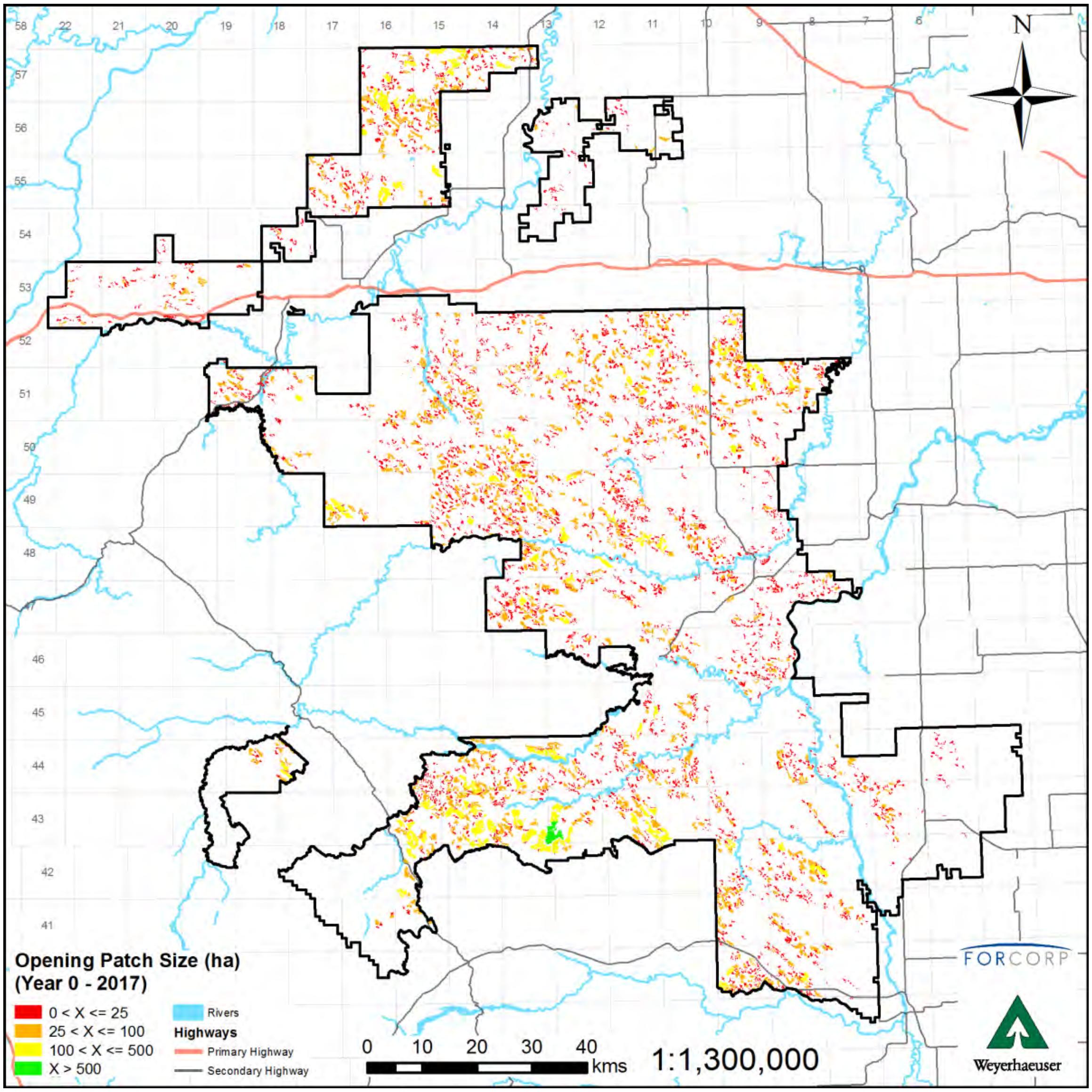

Figure 5-7. Map of opening patch sizes at year 0 (2017)

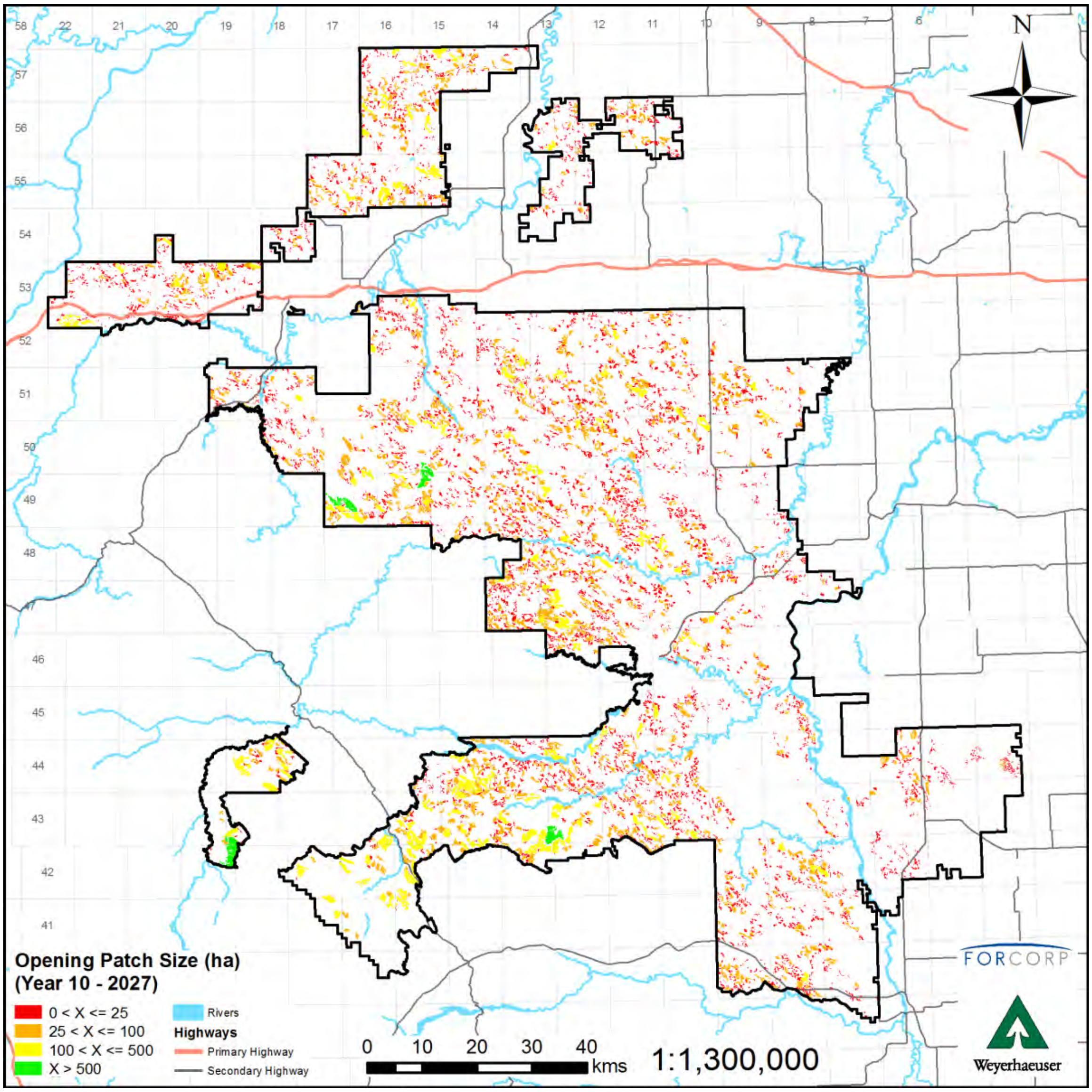

Figure 5-8. Map of opening patch sizes at year 10 (2027)

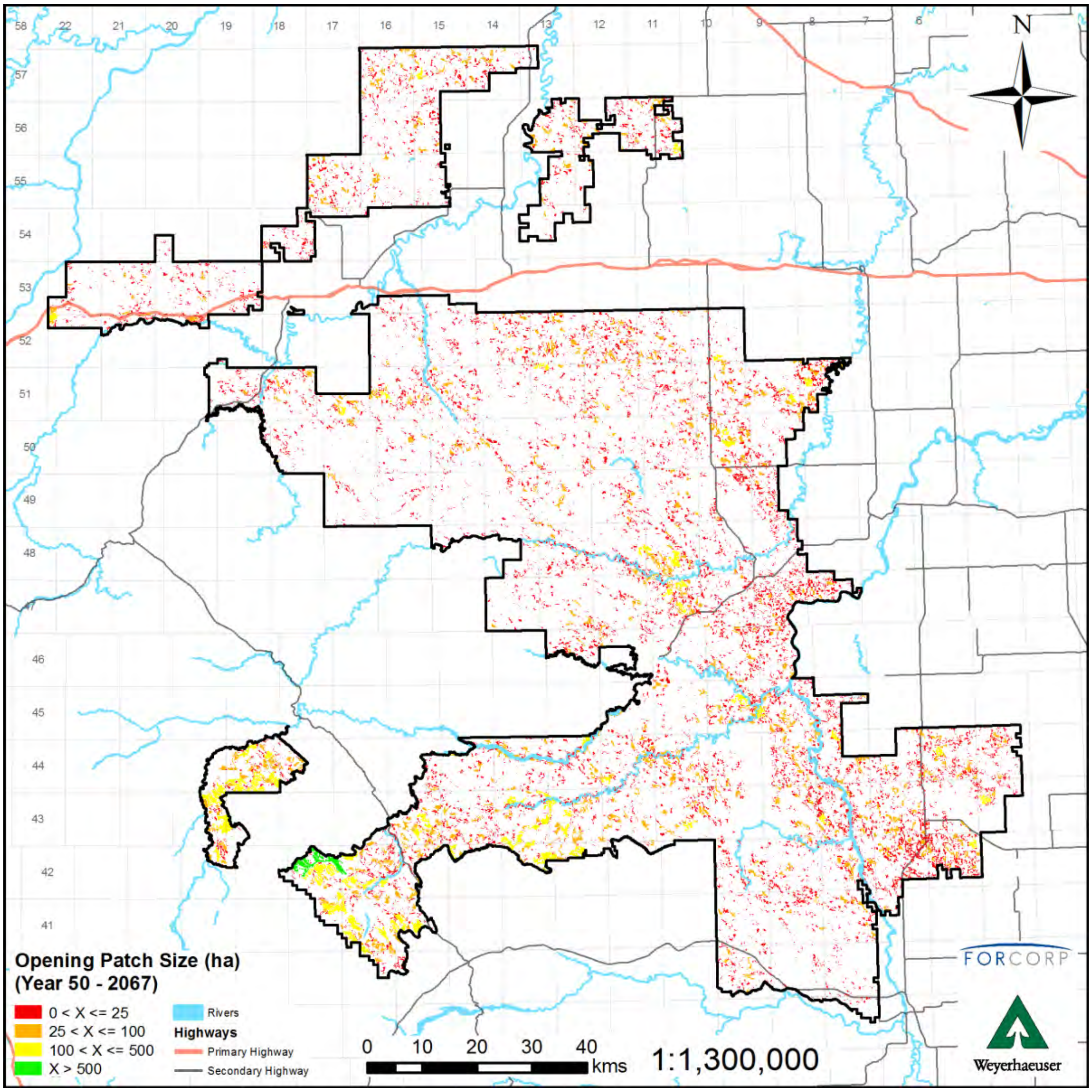

Figure 5-9. Map of opening patch sizes at year 50 (2067)

5.4.3 VOIT 3 (1.1.1.2b) Old Interior Forest

Reporting requirement:

- Tables of indicators at years 0, 10, and 50;
- Maps of interior older forest at years 0, 10, and 50.

Table 5-28. Area of old interior forest by ecological on the gross landbase at years 0, 10 and 50

Year	DX		DC		CD		PL		SW		CX		Total	
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%	Ha	%
2017	24,354	11%	10,557	18%	10,467	20%	93,170	39%	41,924	38%	91,161	35%	271,633	29%
2027	29,228	14%	10,509	18%	8,849	17%	77,221	32%	44,655	40%	108,416	42%	278,877	30%
2067	30,819	14%	5,267	9%	7,051	13%	51,296	21%	29,871	27%	196,183	76%	320,487	34%

Note:
Percentages are based on gross forested area by ecological unit, as follows:

Ecological Unit	Gross Forested Area (Ha)
DX	214,036
DC	59,665
CD	52,682
PL	241,707
SW	110,431
CX	259,187
Total	**937,709**

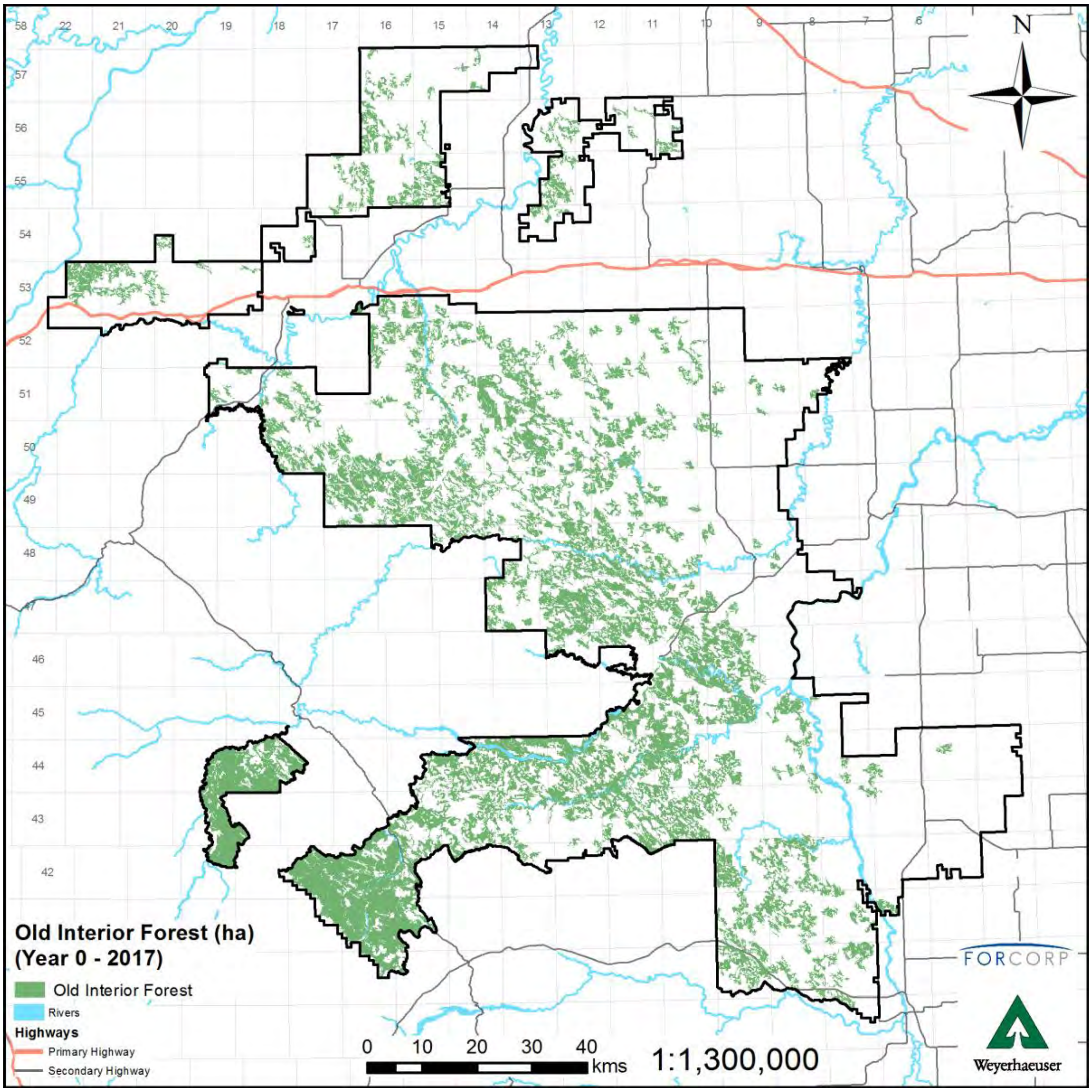

Figure 5-10. Map of old interior forest on the gross landbase at year 0 (2017)

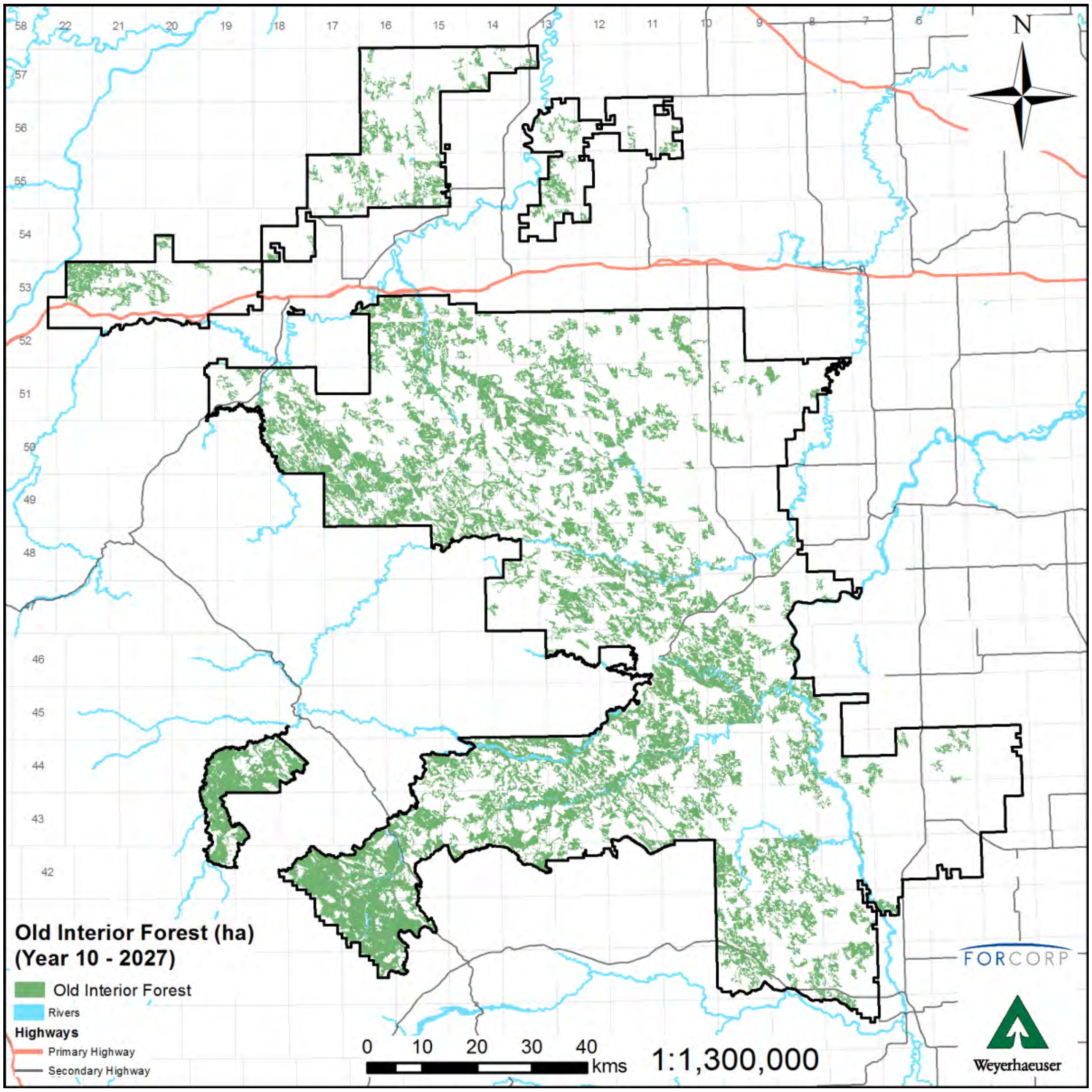

Figure 5-11. Map of old interior forest on the gross landbase at year 10 (2027)

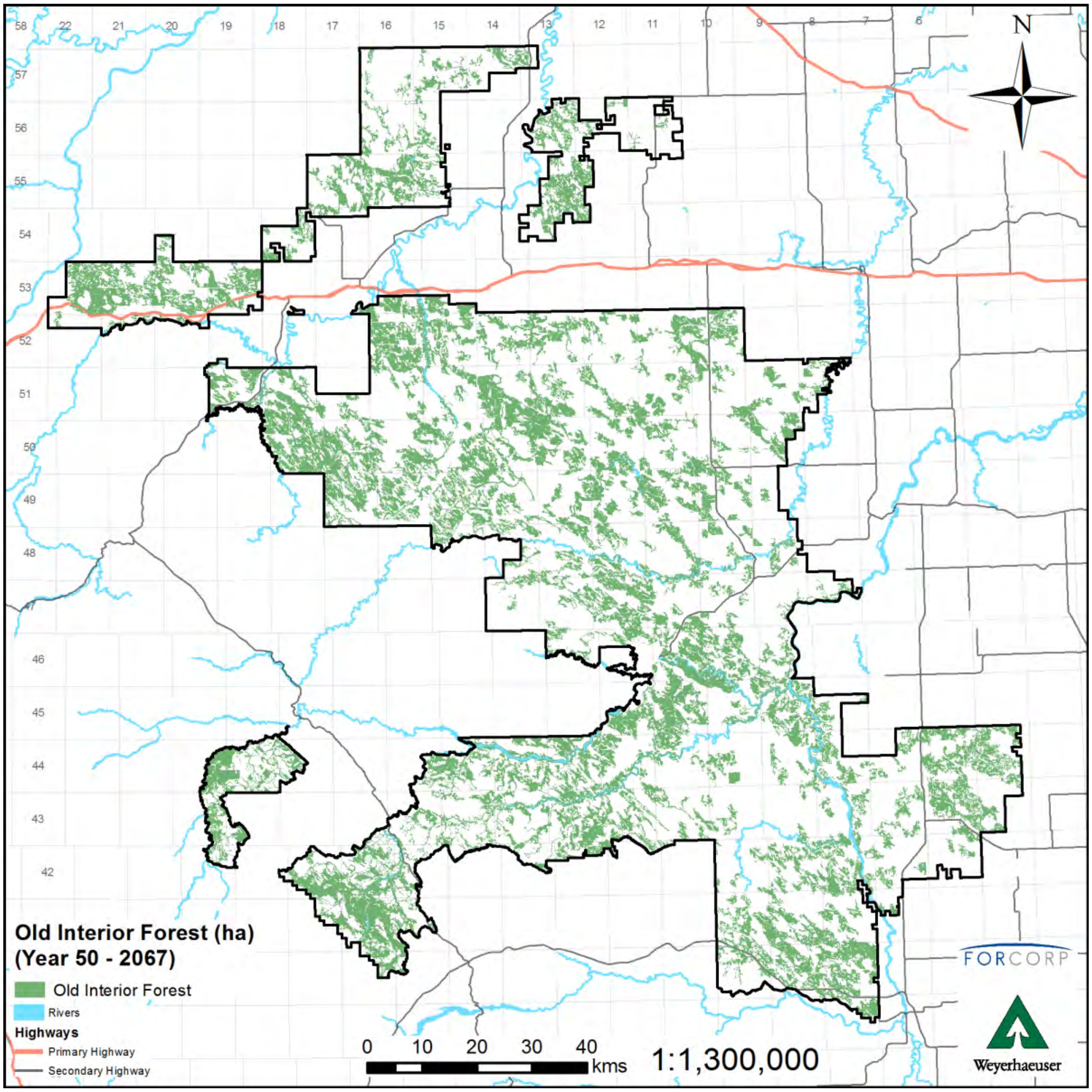

Figure 5-12. Map of old interior forest on the gross landbase at year 50 (2067)

5.4.4 VOIT 4 (1.1.1.3a) Permanent All-Weather Forestry Road Density

Reporting requirement:

- Map of existing open all-weather forestry roads (383 km).

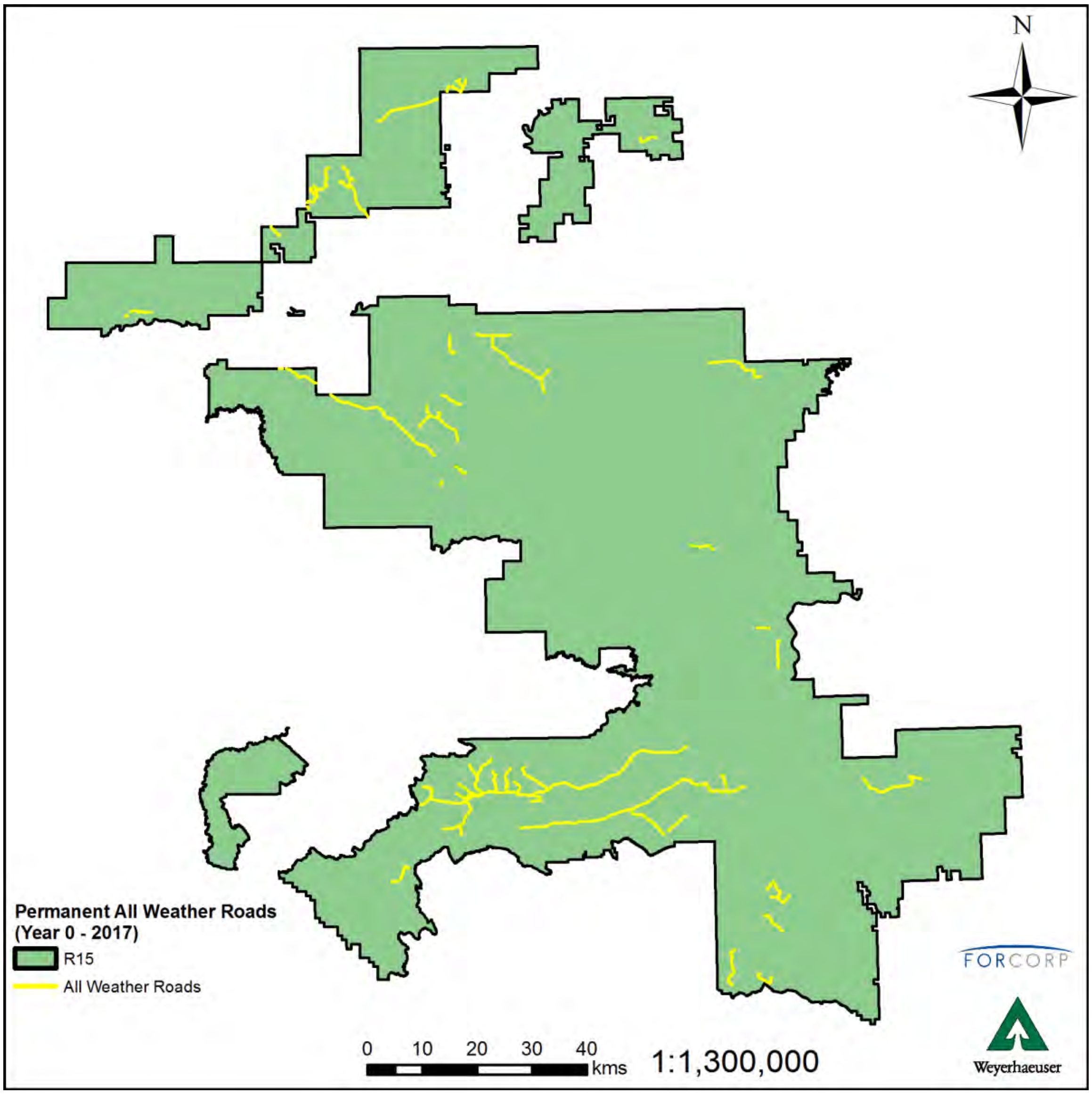

Figure 5-13. Map of existing all weather roads on the DFA.

5.4.5 VOIT 5 (1.1.1.3b) Open Seasonal/Temporary Forestry Road Density

Reporting requirement:

- Map of existing seasonal roads (89 km).

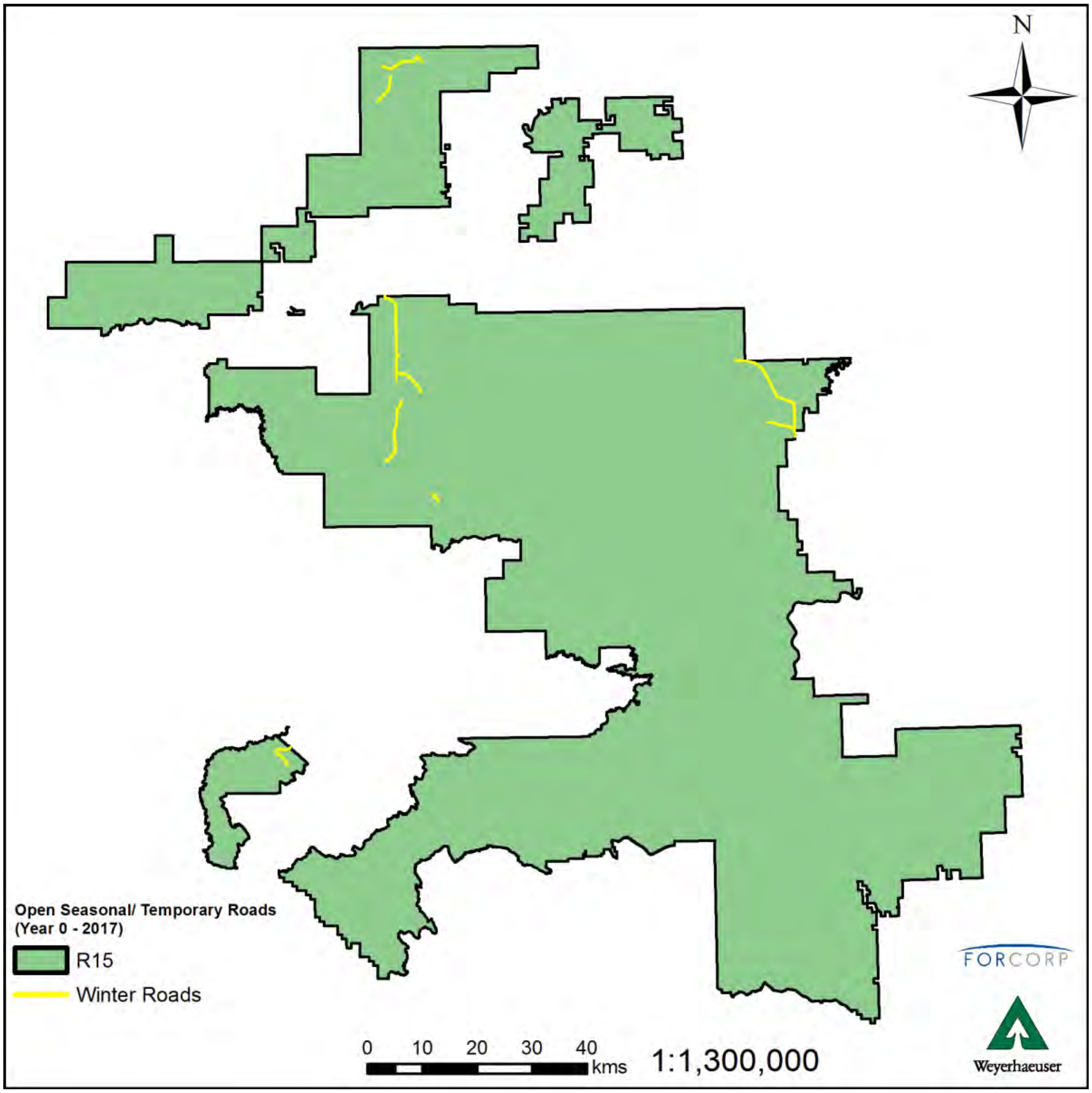

Figure 5-14. Map of existing winter roads on the DFA.

5.4.6 VOIT 6 (1.1.1.4) Uncommon Plant Communities

Reporting requirement:

List of Species:
Anemone quinquefolia (wood anemone)
Anomobryum filiforme (moss)
Botrychium campestre (field grape fern)
Bryum arcticum (moss)
Bryum purpurascens (moss)
Campylium radicale (Campuylium moss)
Collema subflaccidum (tree jelly lichen)
Conocephalum salebrosum (cat-tongue liverwort)
Cystopteris montana (mountain bladder fern)
Dicranella crispa (curl-leaved fork moss)
Dicranum tauricum (broken-leaf moss)
Gymnocarpium disjunctum (western oak fern)
Hypocenomyce anthracophila (small clam lichen)
Lactuca biennis (tall blue lettuce)
Leptogium tenuissimum (Lilliput jellyskin lichen)
Leptogium teretiusculum (jellyskin lichen)
Luzula acuminate (wood-rush)
Moerckia hibernica (liverwort)
Najas flexilis (slender naiad)
Oxytropis campestris var. *davisii* (northern locoweed)
Pellia endiviifolia (liverwort)
Phaeophyscia kairamoi (shadow lichen)
Physconia perisidiosa (crescent frost lichen)
Pinus albicaulis (whitebark pine)
Primula egaliksensis (Greenland primrose)
Ramalina obtusata (hooded ramalina)
Ramalina sinensis (fan ramalina)
Rhodobryum ontariense (Ontario Rhodobryum moss)
Rinodina exigua (spoke pepper-spore lichen)
Rorippa curvipes (blunt-leaved watercress)
Salix reticulata ssp. *reticulata* (net-veined willow)
Seligeria campylopoda (moss)
Seligeria donniana (Donian beardless moss)
Splachnum rubrum (red collar moss)
Tayloria splachnoides (splachnoid cyrtodon moss)

5.4.7 VOIT 29 (5.2.1.1a) Fire Behaviour Potential in FireSmart Communities

Reporting requirement :

Maps and tables of indicator at 0, 10, 20, and 50 yrs.

Table 5-29. Area of high, very high and extreme FBP within Firesmart Community Zones

	2017	2027		2037		2067	
Fire Risk	Area (ha)	Area (ha)	% Reduction from 2017	Area (ha)	% Reduction from 2017	Area (ha)	% Reduction from 2017
High to Extreme	88,628	81,497	8.0	75,082	15.3	61,032	31.1

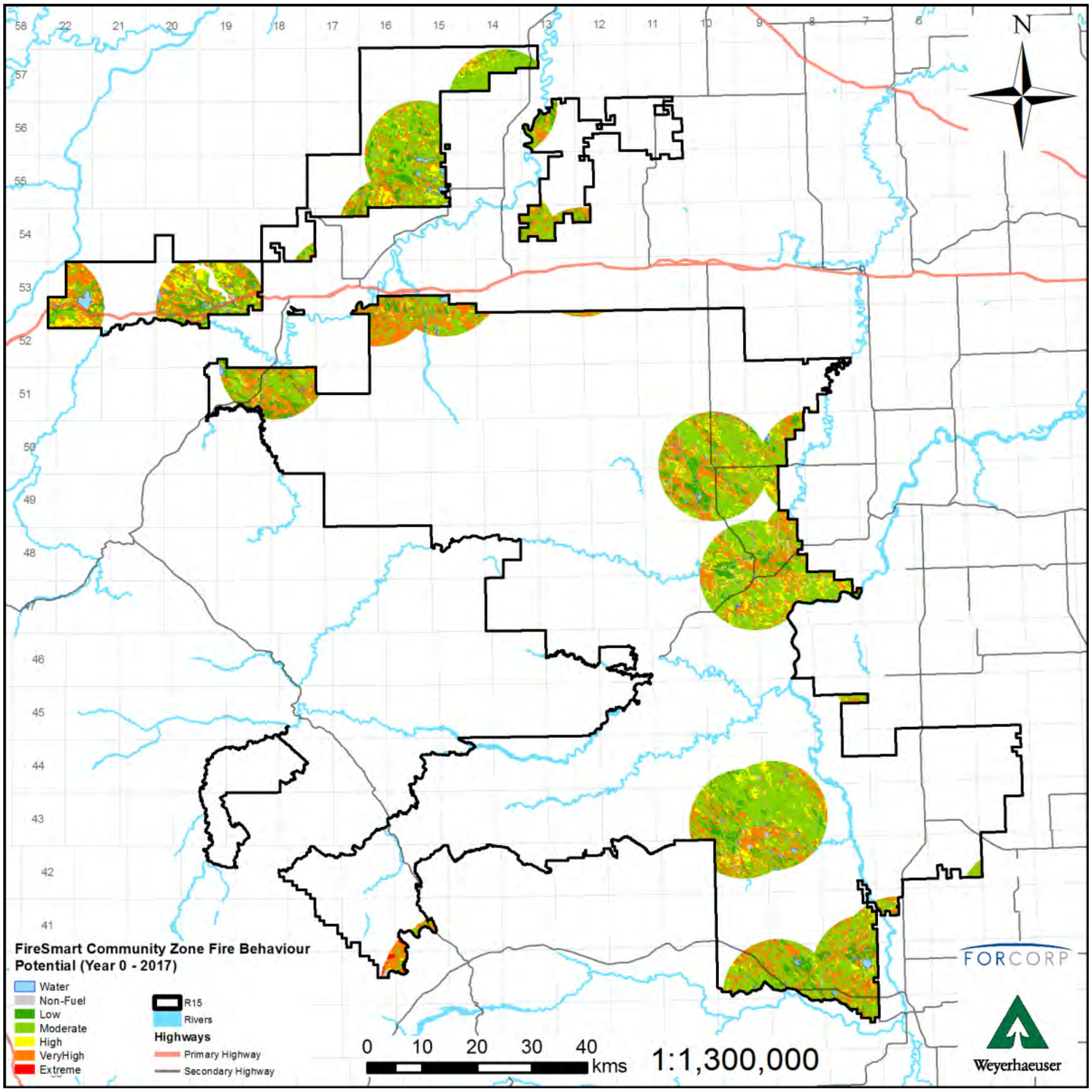

Figure 5-15. Map of Fire Behaviour Potential within Firesmart Community Zones at year 0 (2017)

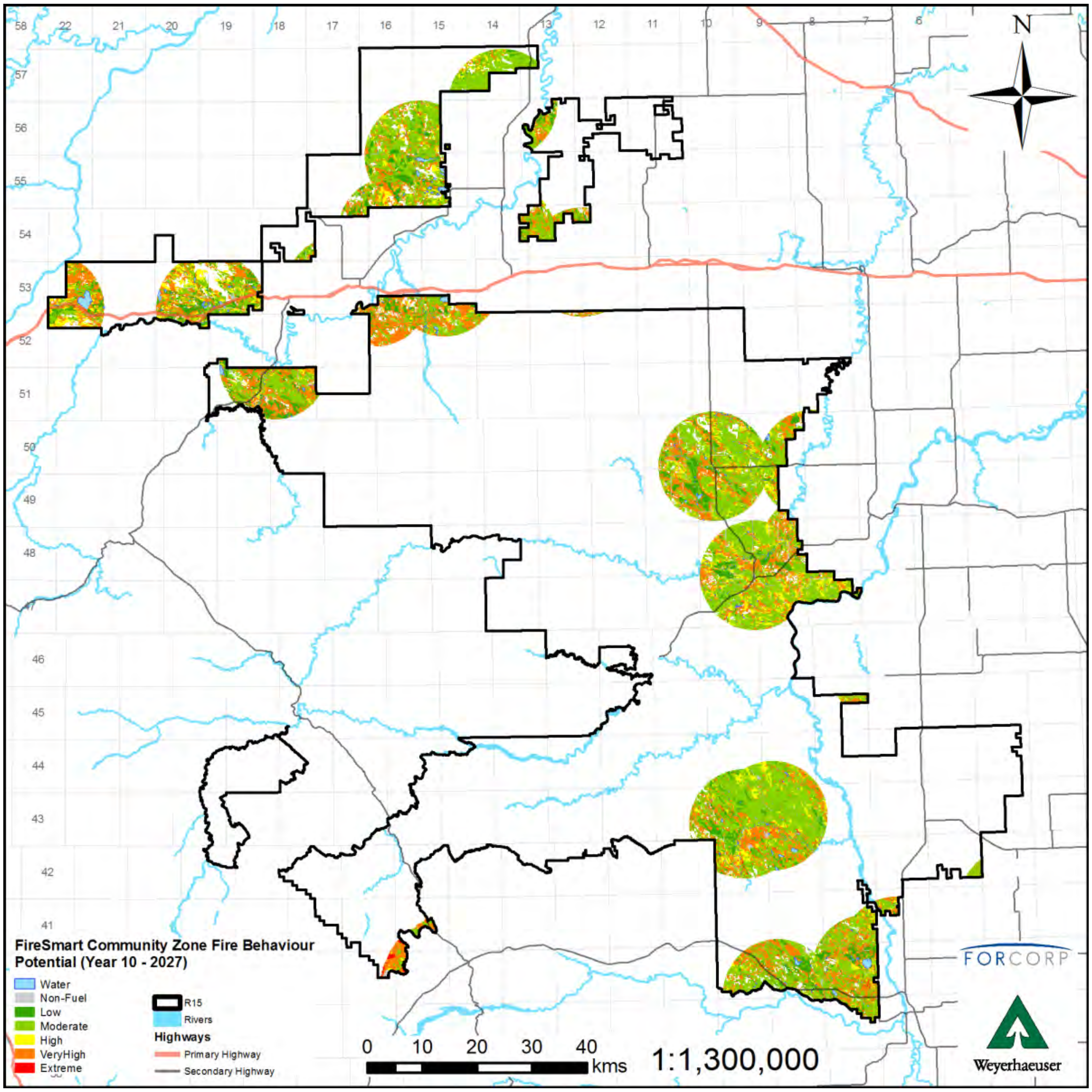

Figure 5-16. Map of Fire Behaviour Potential within Firesmart Community Zones at year 10 (2027)

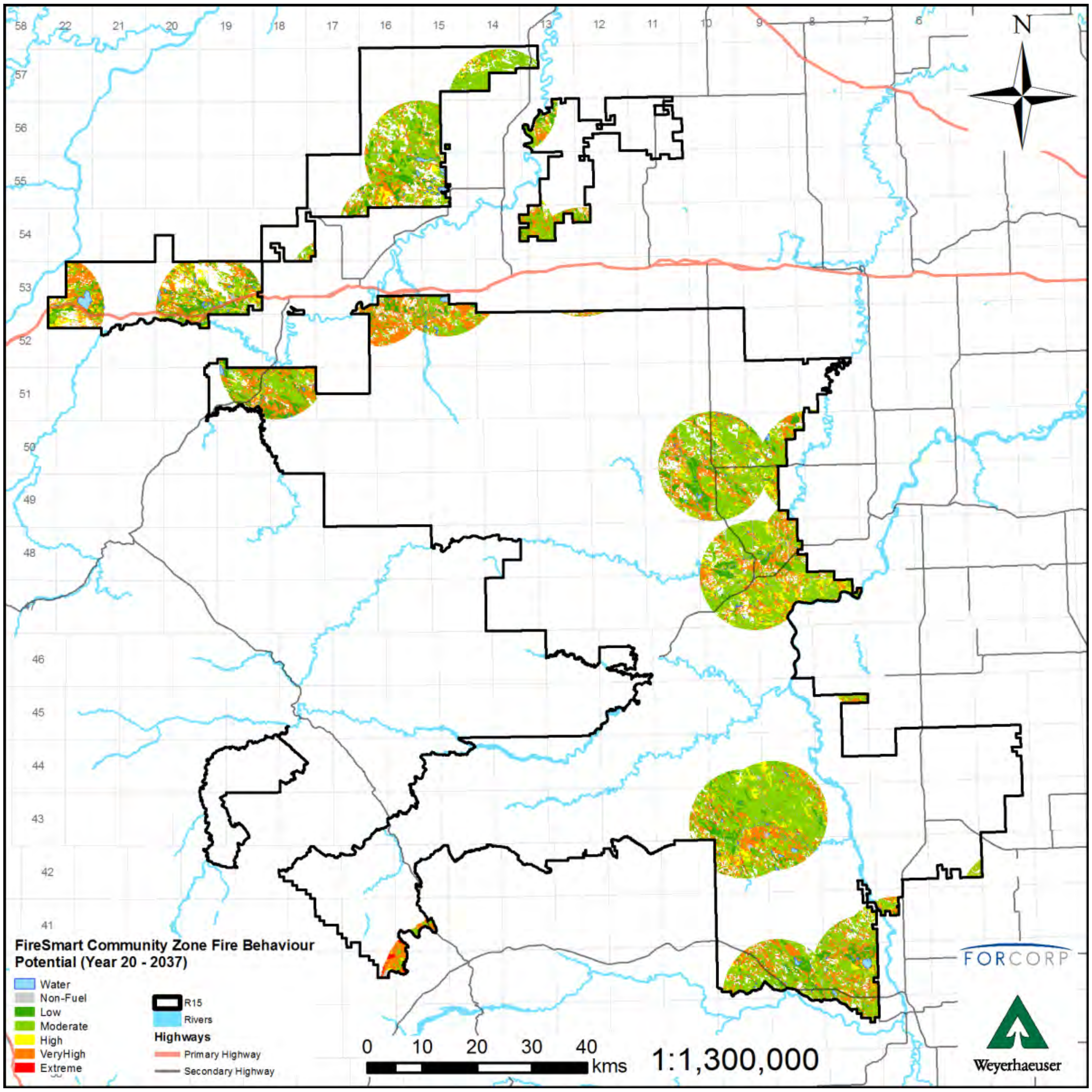

Figure 5-17. Map of Fire Behaviour Potential within Firesmart Community Zones at year 20 (2037)

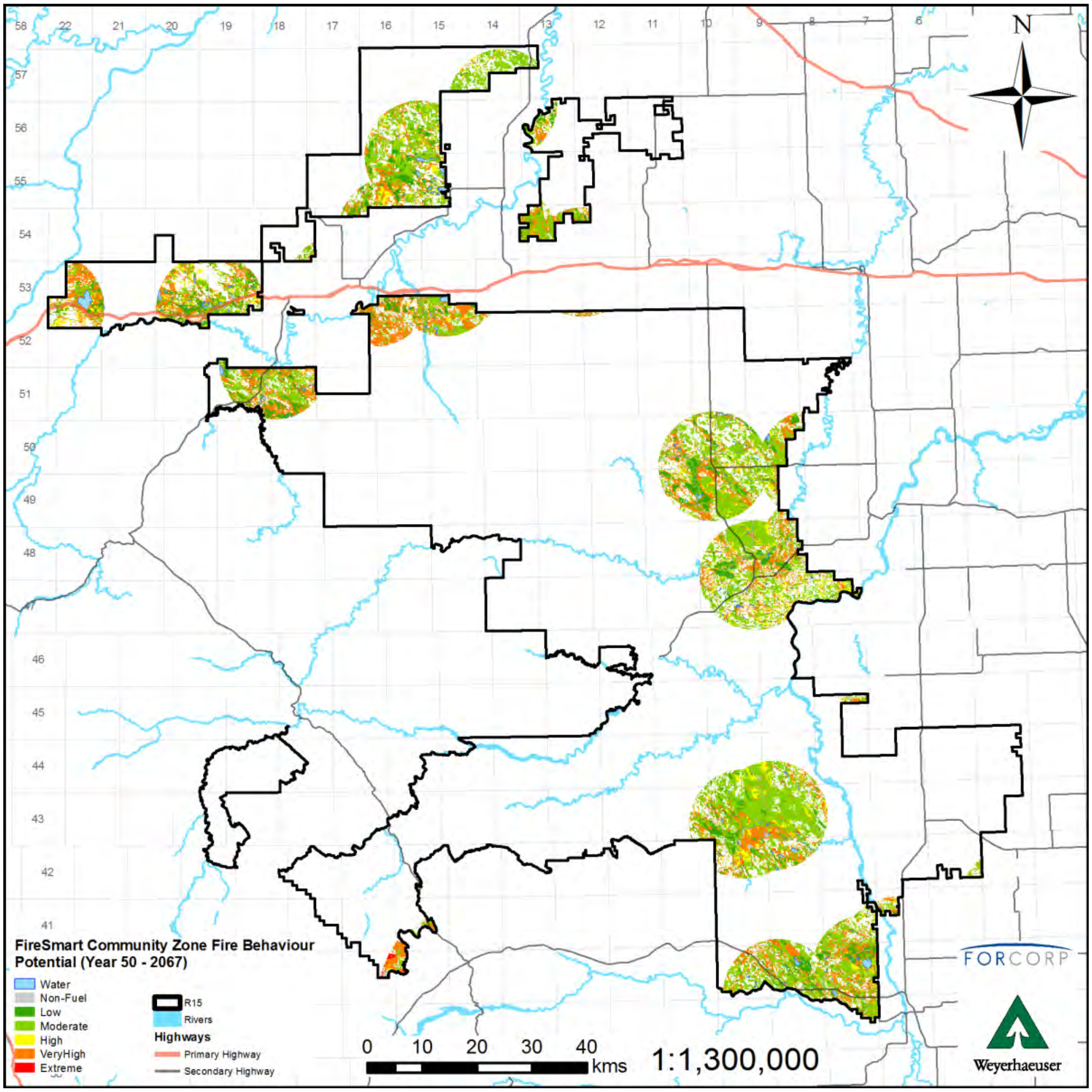

Figure 5-18. Map of Fire Behaviour Potential within Firesmart Community Zones at year 50 (2067)

5.4.8 VOIT 30 (5.2.1.1b) Fire Behaviour Potential in the DFA

Reporting requirement :

Maps and tables of indicator at 0, 10, 20, and 50 yrs.

Table 5-30. Area of high, very high and extreme FBP within the DFA

	2017	2027		2037		2067	
Fire Risk	Area (ha)	Area (ha)	% Reduction from 2017	Area (ha)	% Reduction from 2017	Area (ha)	% Reduction from 2017
High to Extreme	442,459	402,430	9.0	372,612	15.8	294,081	33.5

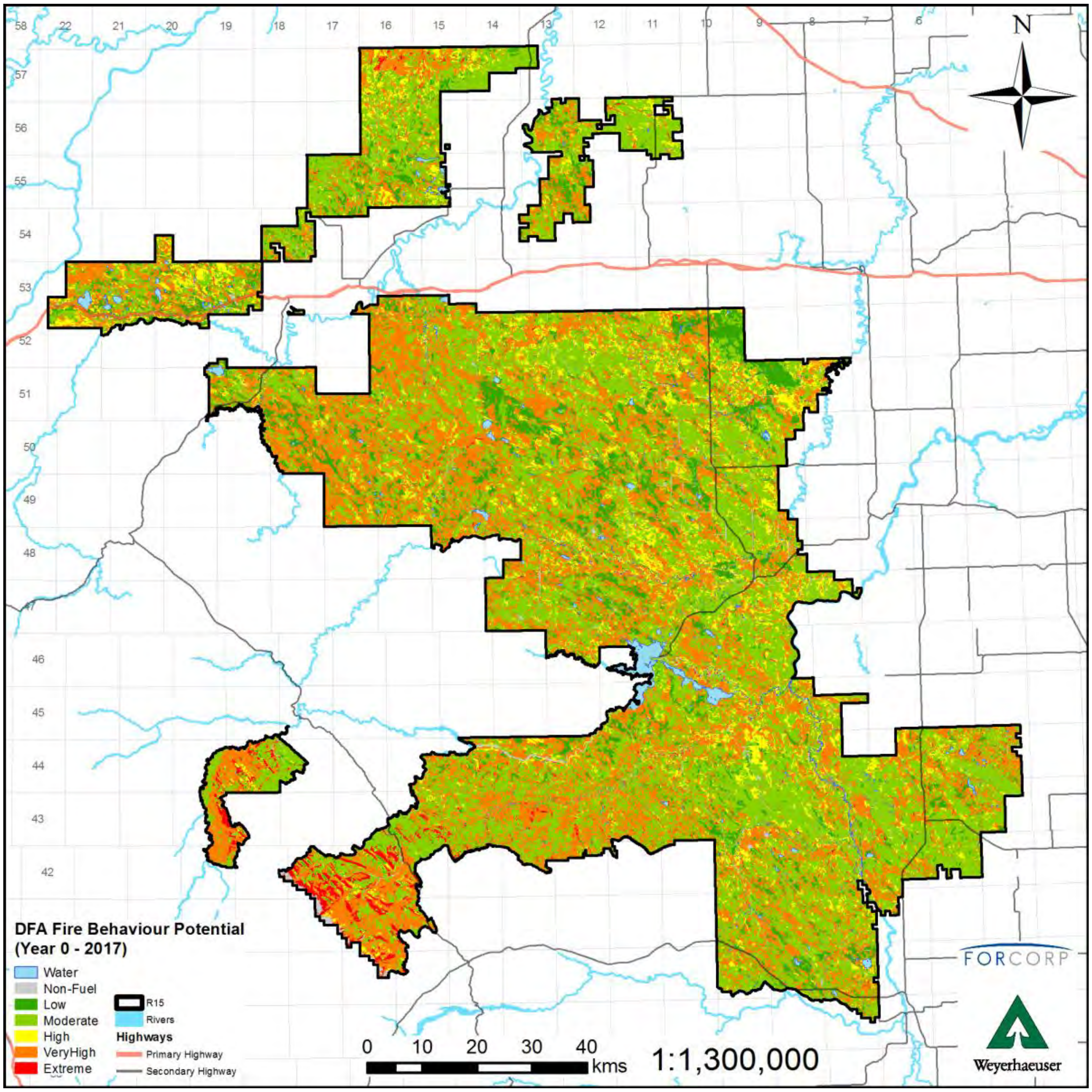

Figure 5-19. Map of Fire Behaviour Potential within the DFA at year 0 (2017)

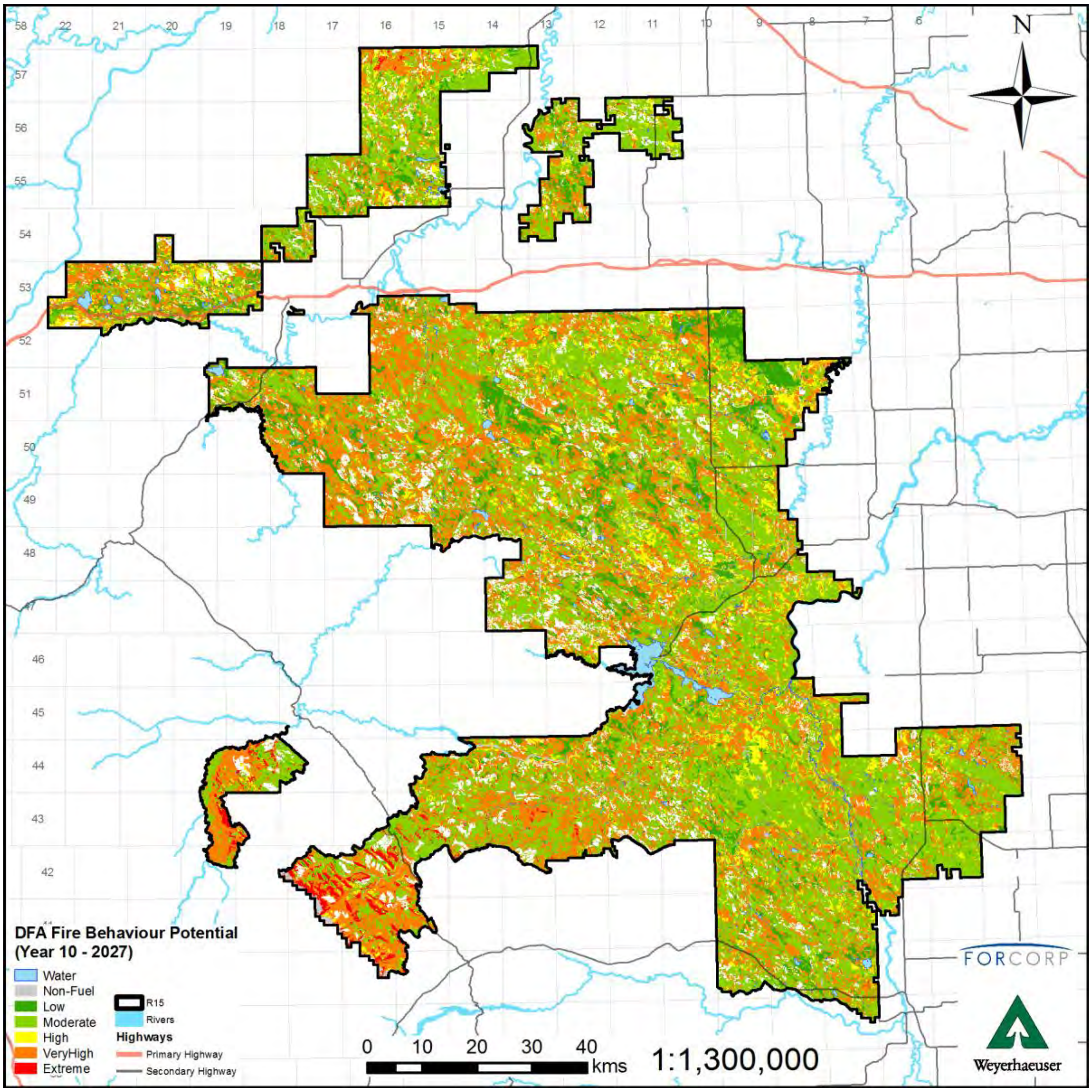

Figure 5-20. Map of Fire Behaviour Potential within the DFA at year 10 (2027)

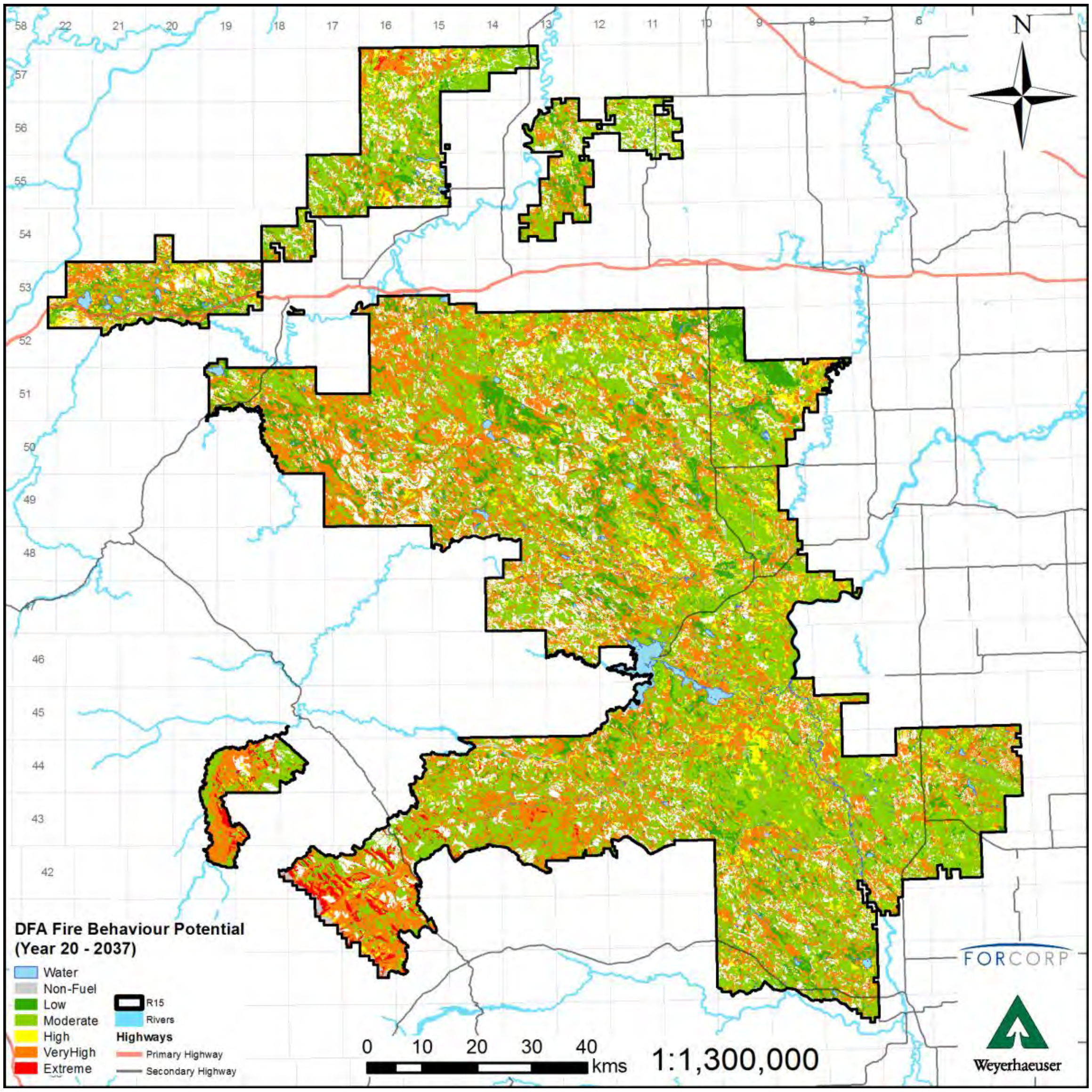

Figure 5-21. Map of Fire Behaviour Potential within the DFA at year 20 (2037)

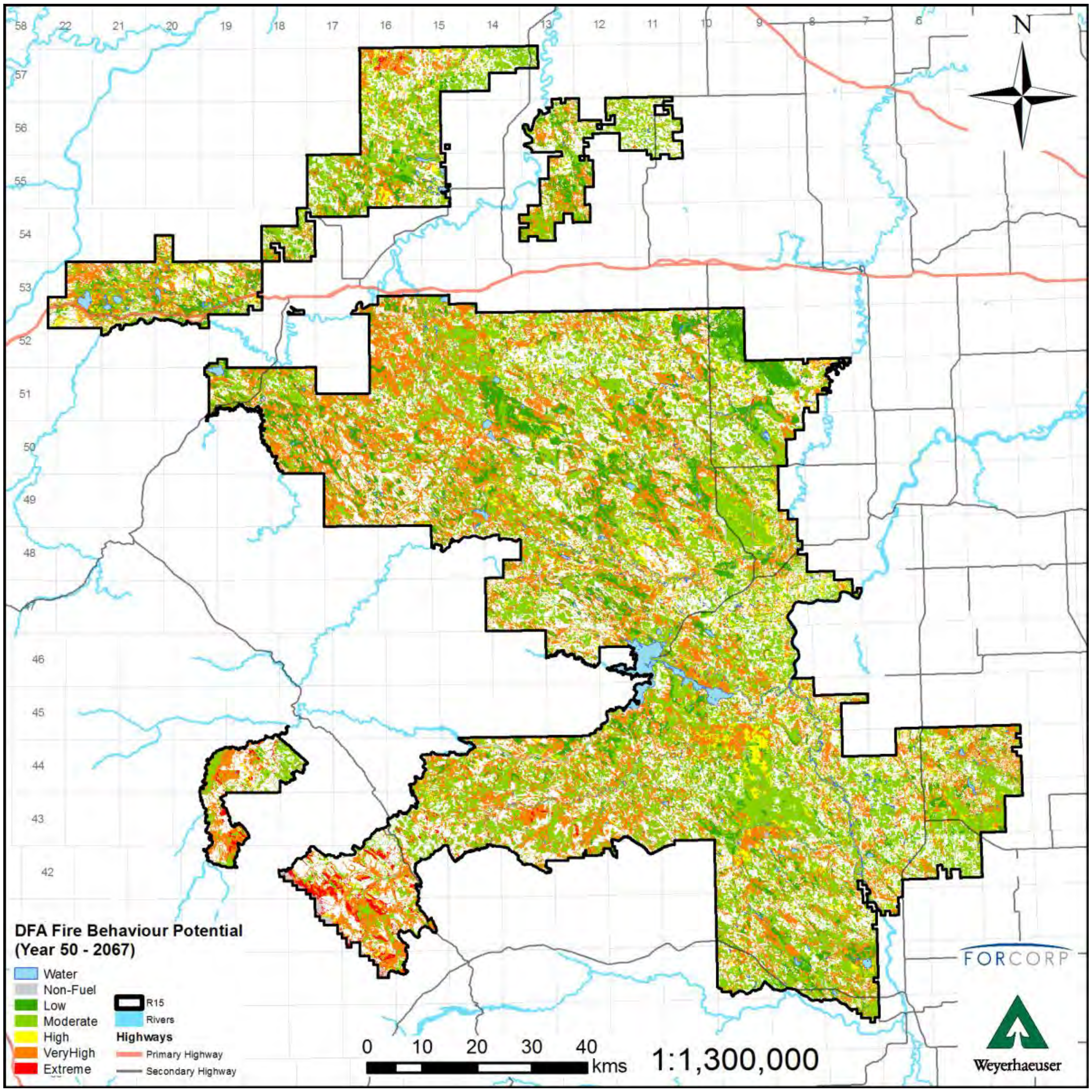

Figure 5-22. Map of Fire Behaviour Potential within the DFA at year 50 (2067)

Weyerhaeuser

Pembina 2017-2026

Forest Management Plan

Chapter 6: Preferred Forest Management Scenario

March 19, 2018

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6 Preferred Forest Management Scenario

6.1 Managing for Sustainability

Forests are living, functioning, ecosystems which are not static but rather constantly changing through growth, decay and renewal. In the boreal forest, these processes can be slow, with changes observed in decades instead of years; but there are also more rapid agents of change such as wildfire and mountain pine beetle (MPB) infestations which can burn or kill large tracks of forest in short time periods. Successful forest management must embrace and work with change rather than against it. It is within this context of both rapid and slow change that Canadian sustainable forest management has been developed. To embrace change, sustainable does not necessarily mean equal or constant, but rather adaptive, responsive and tied to performance. For instance, The Regeneration Standards of Alberta (RSA), establish not only minimum thresholds for the growth of regenerating stands, but link regeneration performance to timber harvest levels. In this way harvest levels adapt to the growth and sustainability of the forest.

The natural forests on the eastern slopes of the Rockies are comprised of large contiguous conifer dominated areas. Through a combination of chance, effective fire control and even flow timber policy, today's natural forests are aging, becoming mature to over mature. While timber harvesting and regeneration has created areas of younger vigorous growth, large extents of mature natural forests remain. Alberta's management approach has been to gradually harvest and regenerate the natural forest replacing it with younger forests to maintain a healthy forested condition. The underlying management assumption is that while the structure and species composition will change as stands age, they will remain largely intact until they are harvested. Through an application of sustainable forest management, timber harvest levels have been set by a combination of an even flow timber policy and management for multiple values, the combined effect of which has been to slow the rate of harvest while increasing the overall age of the forest. This trade-off was deliberate, putting little weight on the increasing risk for rapid change from ecological processes which are inherent in over mature forests. Until recently, for the Weyerhaeuser Forest Management Agreement (FMA) area and those adjacent to it, these assumptions have held, but the recent MPB infestation which has decimated pine forests to the west and north are now directly threatening the FMA area thus invalidating the underlying management assumptions of gradual change.

Now that the MPB infestation has decimated the FMAs to the north, Weyerhaeuser's FMA is now part of the largest concentration of high risk pine in Alberta. With the knowledge of the MPB outcomes clearly demonstrated in the infested FMAs, adaptation in the definition of forest sustainability and the management trade-offs are called for. With the extensive pine component across the FMA at risk of short term loss, Weyerhaeuser has responded by adapting the management trade-offs between harvest levels and mature forests, effectively increasing the weighting applied to risk of loss. In the case of a severe MPB infestation such as that which has recently spread through Jasper and the north eastern slopes FMAs, it matters not if the pine is killed by MPB or is harvested and regenerated, mature pine will not be available to contribute to the mid-term timber supply and other non-timber values. As the other FMA holders have done, Weyerhaeuser has responded by increasing the short-term harvest of pine and deferred spruce stands to support future harvest.

The impacts of the dynamics discussed above on the Preferred Forest Management Scenario (PFMS), particularly as they relate to the mid-term timber supply, are examined in further detail in section 6.6.4.

6.2 Overview

With harvesting rotation ages of between 60 and 100 years, the calculation of long-term sustainable harvest levels in the boreal forest necessitates long forest management planning horizons to adequately capture and incorporate the growth dynamics and impacts of forest management activities. In Alberta a planning horizon of at least 200 years is required (section 5.8 of the Planning Standard[1]) to ensure the plan covers no less than two rotations. Over this extended timeframe computer based timber supply modeling is necessary to evaluate the outcomes from different management activities and trade-offs between various timber and non-timber values. In developing a recommended management approach for the 2017 FMP, numerous scenarios, both non-spatial and spatial, were modeled and evaluated by the Plan Development Team (PDT) in order to gain insight into the implications and trade-offs of different management alternatives. The outcome from this process is the Preferred Forest Management Scenario, which contains the timber harvesting schedule and regeneration activities planned for the next ten to twenty years, as well as predictions for the long-term sustainable harvest level and the impacts on other values over the 200 year time period.

The final PFMS was generated using the spatially explicit landscape level Patchworks timber supply analysis (TSA) modeling software to ensure that all management issues and targets, ranging from non-timber values, *e.g.*, changes in wildlife habitat, to operational objectives such as harvest patch size and pattern, were evaluated.

Some of the issues evaluated through the forecasting process include the following:

- Landscape level objectives
  - Reduction of MPB susceptible stands,
  - Retention of seral stages,
  - Maintenance of wildlife habitat, using AAF's non-timber assessment (NTA) tools and indicators, and
  - Minimizing watershed runoff, using the Equivalent Clearcut Area (ECA) methodology.
- Operational level objectives
  - Operability of the Spatial Harvest Sequence (SHS),
  - Continuity of embedded timber operator traditional spheres-of-interest,
  - Maintenance of minimum harvest ages,
  - Maintenance of minimum merchantable timber growing stock levels, and
  - Capture the impact of regenerated stand yields and planting of improved stock.

Prior to the finalization of the PFMS, scenario outputs and results were discussed and reviewed by the PDT as well as by quota holders and representatives of the AAF at separate Timber Operator Working Group meetings. In addition, all timber operators were provided with the opportunity to review their SHS and make adjustments where necessary to ensure that it would be operationally feasible.

The purpose of this chapter is to describe and document the PFMS. Details on the process and scenarios leading up to the PFMS are described in *Annex IX: Timber Supply Analysis*. The PFMS provides the

[1] Alberta Forest Management Planning Standard. Version 4.1, April 2006. Alberta Sustainable Resource Development, Public Lands and Forest Division, Forest Management Branch.

annual harvest levels, which are used to assign the annual allowable cut (AAC), and apportions the harvest to each timber operator for the next 10 years. It also describes the harvesting and silviculture actions that Weyerhaeuser and timber operators plan to take over the next ten years, and the predicted response of the forest to these actions over a 200 year planning horizon. The outputs derived from the PFMS are used to provide indicators and targets for the Values, Objectives, Indicators and Targets (VOITs) in Chapter 5 and are incorporated into the guidelines for FMP implementation over the 10-year period, from May 1, 2017, to April 30, 2027, as documented in *Chapter 7 – Implementation*.

This chapter summarizes the forest management goals and strategies applied in the development of the PFMS, describes the modeling inputs and assumptions, and presents the predicted outcomes from the modeling process.

6.2.1 Forest Management Goals

The principles applied in the development of the PFMS reflect Weyerhaeuser's Forest Management Goals described in *Chapter 1: Corporate Overview and Forest Management Approach*.

Ecological, societal and economic values are represented in the PFMS through the following nine forest management goals:

1. Ensure that Weyerhaeuser's Edson and Drayton Valley facilities remain globally competitive with respect to fiber supply from the DFA area while recognizing that other facilities share similar desires.
2. Maintain forest diversity at the stand and landscape level in terms of structure, composition and function.
3. Maintain the productive capacity of the forest ecosystem.
4. Maintain the process and function of watersheds.
5. Improve public acceptability of forest management activities.
6. Improve Relationships with First Nation and Métis Communities.
7. Integrate forest management activities with the needs of other resource users.
8. Protect unique archeological and ecological sites.
9. Increase the sustainable harvest level of deciduous and coniferous timber.

The intent of the PFMS is to implement forest management strategies and practices that work towards the achievement of the above goals

6.2.2 PFMS Strategies

To facilitate the achievement of Weyerhaeuser's Forest Management Goals, the following strategies were implemented in the development of the PFMS.

- Amalgamate five FMUs into a single new FMU (represented hereafter as R15) to streamline planning and reporting processes;
- Use a combined (single) coniferous and deciduous landbase to better integrate coniferous and deciduous harvesting operations across the DFA ;
- Model a 200 year planning horizon to ensure sustainability and to forecast implications of management decisions over the long term;
- Model an accelerated coniferous harvest over the first 10 years in line with current levels to continue the objectives of the Healthy Pine Strategy;
- Even flow total conifer (post surge) and total deciduous harvest volumes over the planning horizon;

- Incorporate and sequence unused coniferous volume as requested by timber operators. The volumes to be incorporated as part of the accelerated harvest level;
- Incorporate existing planned blocks into the Spatial Harvesting Sequence (SHS) to improve operability and reduce variance;
- Retain stand level structure retention within harvest areas;
- Apply silviculture treatments to achieve RSA predicted yields;
- Deploy improved white spruce seed within the Region I White Spruce Tree Improvement Zone to improve future timber yields;
- Manage harvest sequencing to achieve desirable thresholds in predicted habitat levels using AAF NTA indicators;
- Manage harvest sequencing to achieve desirable thresholds on watershed runoff using the ECA model;
- Maintain 5% of the managed forest by ecological unit as old seral stage. This is over and above the forested area on the passive landbase (36.6% of the gross landbase area) that is not available for harvest.

6.3 Landbase Summary

Weyerhaeuser's Pembina Timberlands Defined Forest Area (DFA) is located within a single Forest Management Unit (FMU), R15. The total land area of the DFA is 1,067,415 hectares. Within the DFA, area is allocated to Weyerhaeuser through their Forest Management Agreement (FMA) as well as through coniferous timber quotas (CTQ) and deciduous timber allocations (DTA) on the non-FMA areas. The FMA covers 89.5% (955,220 ha) of the DFA with the remaining 10.5% being non-FMA area. A number of other coniferous operators also have access to timber on the DFA through CTQ's.

The landbase is a spatial representation of the DFA as at May 1, 2015. Primarily developed to support the timber supply analysis (TSA) process, the landbase contains attributes such stand age, timber yield strata, timber productivity and areas to be deferred or excluded from timber harvesting activity. Landbases have evolved, and now support an ever expanding array of non-timber values such as wildlife habitats and watershed analysis. At the same time, linkages to other datasets, such as the Alberta Regeneration Information System (ARIS) and Digital Integrated Dispositions (DIDs) have tightened. Together, these changes have considerably increased the time and effort required for landbase development and approval. The netdown landbase is one of the key products of the 2017 FMP and agreement-in-principle for the landbase was received from AAF on March 28, 2017, representing a significant milestone in FMP development. Development of the netdown landbase is described in detail in *Annex VI: Landbase Development*.

Table 6-1 provides a summary of the FMP area by broad deletion category and the area suitable for timber harvesting by broad cover group (BCG) resulting from the netdown process. Approximately 51% (547,464 ha) of the DFA area falls within the active or contributing landbase, while the remaining 49% is either non-forested or has been removed from the active landbase and will not be harvested or contribute to the AAC for the DFA. Only 3.8% of active landbase falls outside Weyerhaeuser's FMA area.

Table 6-1. Landbase summary

Category	Area (Ha)	% of Total
Passive Landbase		
Administrative	52,729	4.9%
Access	25,141	2.4%
Anthropogenic	76,638	7.2%
Water Features (excluding buffers)	13,672	1.3%
Water Buffers	48,795	4.6%
Non-Forested Areas	12,143	1.1%
Natural Disturbances	718	0.1%
Operational Deletions	14,488	1.4%
Subjective Deletions	275,629	25.8%
Total Deletions	**519,951**	**48.7%**
Active Landbase		
Deciduous (D)	183,695	17.2%
Deciduous/Coniferous (DC)	51,722	4.8%
Coniferous/Deciduous (CD)	45,250	4.2%
Coniferous (C)	266,797	25.0%
Total Active Landbase	**547,464**	**51.3%**
Gross Landbase	**1,067,415**	

6.4 Yield Curve Summary

6.4.1 Overview

Yield curves describe tree growth and the change in timber yields over the life of a forested stand. They are used in the TSA process to assign volumes to stands based on the stand type and age of the stand. In this way stand volumes can be aggregated at a point in time to determine total standing volume or growing stock and harvest volumes can be assigned as stands are cut by the TSA model.

Yield curves were developed from permanent sample plot (PSP) data in natural stands, growth and yield monitoring plots in managed stands and data from Reforestation Standard of Alberta (RSA) performance survey programs across the DFA. Alberta's Growth and Yield Projection System (GYPSY) was used to model the growth of stands for yield curve development. Stratification was based on Weyerhaeuser's eight base yield strata assigned through the net landbase development process. The strata are a slight modification of Alberta's base 10 yield strata, as outlined in the Planning Standard.

Annex VII: Yield Curve Development provides a detailed description of the yield curve development process. The yield curves received agreement-in-principle from AAF on March 28, 2017 and are used in the TSA process.

6.4.1.1 Yield Curves

A total of 32 yield curves were developed to provide input into the TSA process. These yield curves were broken down into three main groups as follows:

Natural stands (NAT): includes all fire-origin stands. Modeling was completed using GYPSY and stratification was based on the AVI attributes.

Pre-1991 managed stands (M91): includes all openings that were harvested prior to March 1, 1991. Modeling was based on the natural stand yield curves with additional site index adjustments using results from the Regenerated Site Productivity study conducted in 2007. Stratification was based on the AVI attributes.

Post-1991 managed stands (RSA): represent all exiting openings that were harvested on or after March 1, 1991. Modeling was based on GYPSY projection of RSA performance survey data. Strata were based on the RSA strata at the sampling unit (SU) level for all surveyed openings. Silviculture declaration and treatment information from ARIS were used to stratify the rest of the blocks at the opening level.

Weyerhaeuser also developed tree improvement (genetic) yield curves for Region I white spruce (I1) to reflect yield increases resulting from the deployment of genetically improved stock from the controlled parentage program (CPP). These curves are only applied to white spruce stands within Region I that are harvested and regenerated within Weyerhaeuser's sphere-of-interest.

Deciduous decline factors were applied to deciduous yield curves to address stand mortality and decay processes that were not adequately represented in GYPSY outputs.

6.4.1.2 Utilization Standard

Gross merchantable tree length volumes were compiled to a utilization standard based on a 15cm stump diameter outside bark and a 15cm stump height and a 3.66m minimum merchantable length for both coniferous and deciduous species groups. Top diameter inside bark was 11cm for coniferous and 10cm for deciduous species.

6.4.1.3 Yield Curve Adjustments

Yield curves produced through the yield curve development process represent gross merchantable volumes, as cull, decay and other factors were not accounted for during yield curve development process. These losses were accounted for through the application of scaling factors applied to the yield curves during the timber supply process.

6.4.1.3.1 Cull

Two sources of cull were identified and quantified by Weyerhaeuser, *i.e.*:

- Field operational cull, which includes waste left in the bush due to processor operator decisions to remove rot, butt flare, crook, sweep etc, and
- Mill scale cull, which includes scale deductions at the mill scaling deck to determine the proportion of sound wood in logs.

Cull deduction factors are applied to the yield curves to ensure consistent application of the cull deductions to reported volumes. Cull deductions by species and stand type are shown in Table 6-2.

Table 6-2. Cull deductions by species and stand type

Species Group	Species	Field Cull	Scale Cull		
			Natural Stands		Managed Stands
			≤ 130 years	> 130 years	
Deciduous	Aw	1.90%	10.0%	17.4%*	7.0%
	Pb		5.3%		
	Bw		4.6%		
Conifer	All	1.20%	1.2%		1.2%

** implemented as part of the deciduous stand decline function*

6.4.1.3.2 Seismic Lines

Traditionally seismic lines have been cut into landbases and the area removed from the contributing landbase. This however has the effect of drastically increasing the polygon count in the landbase and aggregation of stands into operationally feasible units becomes more complex as similar AVI stand types become fragmented allowing the model to schedule them differently. For this reason, seismic lines are excluded from the modelling landbase. The area lost to seismic lines on the active landbase is, however, addressed through strata based yield curve adjustments in the TSA process. Adjustments are applied to natural and regenerating pre-91 stands only. Post-91 cutblocks are not impacted as the RSA sample program accounts for seismic area.

Table 6-3 shows the extent of seismic lines by stratum in natural stands and pre-91 cutblocks on the active landbase. Natural stand and pre-91 yield curves are adjusted by the percentage seismic factor for each stratum in the TSA process.

Table 6-3. Seismic line extent on natural and pre-91 managed stands in the active landbase

Stratum	Gross Area (ha)	Seismic Area (ha)	Net Area (ha)	% Seismic
Aw	147,597	4,493	143,105	3.04
AwPl	16,166	478	15,687	2.96
AwSx	24,631	773	23,858	3.14
SwAw	16,776	513	16,263	3.06
PlAw	16,009	495	15,514	3.09
SbAw	726	32	694	4.46
Sw	64,097	1,525	62,572	2.38
Pl	140,130	3,570	136,560	2.55
Sb	2,388	85	2,302	3.57
Total	**428,519**	**11,964**	**416,555**	**2.79**

6.4.1.3.3 Partially Stocked Openings

In accordance with the ARIS Net Landbase Reconciliation Procedures (Alberta 2015), all openings with a “Not Satisfactorily Restocked” (NSR) condition resultant from a performance survey must be assigned yield curves based on their stocking.

Stands with stocking less than or equal to 50% and which are declared as non-forested by AVI 2.1.1 standards were removed from the productive landbase. Stands with stocking > 50% remained in the active landbase and were assigned to one of the following two categories for yield curve assignment purposes:

- Openings with total stocking <= 50%. A weighted average stocking percentage was calculated for all openings on the landbase and used to determine an adjustment factor to be applied to the RSA yield curves for all the openings. The adjustment factor is 51.6%.
- Openings with total stocking > 50% and < 80%. A weighted average stocking percentage was calculated for all the openings and used to determine an adjustment factor to be applied to the RSA yield curves for all the openings. The adjustment factor is 89.5%.

The process used to calculate the above adjustment factors is described in *Annex VI: Net Landbase Development*.

6.4.1.3.4 Final Yield Curves

The yield adjustment factors described above were applied to the 32 yield curves outlined in *Annex VII: Yield Curve Development* for use in the TSA modeling process.

6.4.2 Long-run Sustained Yield

The long-run sustained yield (LRSY) represents the maximum theoretical harvest level that could be maintained if the forest was regulated and there were no operating constraints. LRSY is simply the sum of the maximum Mean Annual Increment (MAI) multiplied by the area for each stratum. LRSY values for both the natural yield curves and regenerated yield curves are presented in Table 6-4 and Table 6-5 respectively.

Table 6-4. LRSY values for natural yields

Stratum	Maximum MAI[1]			Area	LRSY (Gross)			LRSY (Net)[2]		
	Age	Conifer	Decid		Conifer	Decid	Total	Conifer	Decid	Total
	Years	m3/ha/yr	m3/ha/yr	ha	m3/year	m3/year	m3/year	m3/year	m3/year	m3/year
Pl	110	2.34	0.27	184,316	431,298	49,765	481,064	410,241	43,292	453,533
Sb	130	1.04	0.06	2,677	2,784	161	2,945	2,618	142	2,760
Sw	120	1.73	0.63	79,804	138,061	50,277	188,338	131,550	44,272	175,821
PlAw	90	1.9	0.81	20,276	38,524	16,423	54,947	36,439	14,101	50,540
SbAw	130	1.54	0.57	741	1,141	422	1,563	1,079	367	1,445
SwAw	130	1.54	0.57	24,233	37,319	13,813	51,132	35,292	11,989	47,281
AwPl	130	0.9	1.41	18,614	16,753	26,246	42,998	15,868	22,770	38,638
AwSx	140	0.95	1.12	33,108	31,453	37,081	68,534	29,738	32,100	61,838
Aw	80	0.43	2.54	183,695	78,989	466,585	545,574	74,756	405,735	480,491
Total				**547,464**	**776,322**	**660,773**	**1,437,095**	**737,581**	**574,768**	**1,312,348**

[1] Maximum MAI based on coniferous for C, CD & DC strata and deciduous for D strata.

[2] Net of field and scale cull and seismic adjustments.

Table 6-5. LRSY values for regenerated yields

Stratum	Maximum MAI[1]				LRSY (Gross)			LRSY (Net)[2]		
	Age	Conifer	Decid		Conifer	Decid	Total	Conifer	Decid	Total
	Years	m3/ha/yr	m3/ha/yr	ha	m3/year	m3/year	m3/year	m3/year	m3/year	m3/year
Pl	90	3.6	0.55	184,316	663,536	101,374	764,910	647,707	92,486	740,193
Sb	90	3.67	0.31	2,677	9,825	830	10,655	9,591	757	10,348
Sw	100	2.7	0.82	79,804	215,471	65,439	280,911	210,331	59,702	270,033
PlAw	90	2.74	1.29	20,276	55,555	26,156	81,711	54,230	23,862	78,092
SbAw	110	1.7	1.16	741	1,259	859	2,119	1,229	784	2,013
SwAw	100	2.08	1.57	24,233	50,405	38,046	88,452	49,203	34,711	83,914
AwPl	90	2.42	1.77	18,614	45,046	32,947	77,993	43,971	30,058	74,030
AwSx	100	1.83	1.89	33,108	60,588	62,574	123,162	59,143	57,089	116,231
Aw	70	0.22	2.71	183,695	40,413	497,814	538,226	39,449	454,170	493,619
Total				**547,464**	**1,142,099**	**826,039**	**1,968,138**	**1,114,853**	**753,620**	**1,868,473**

[1] Maximum MAI based on coniferous for C, CD & DC strata and deciduous for D strata.

[2] Net of field and scale cull.

6.5 PFMS Assumptions and Targets

The inputs, assumptions and targets applied in the Patchworks model to produce the PFMS are described in this section. The development of the PFMS is the result of ongoing adjustments to assumptions, targets and target weightings over a period of time in order to obtain the best possible balance of timber and non-timber values to meet all the objectives. It also includes review and manual intervention by timber operators to ensure that the final SHS is operationally feasible. Following the interventions, however the model was re-run to ensure that any manual changes did not adversely affect sustainability or non-timber value targets over the long-term.

6.5.1 Sustained Yield Unit

Weyerhaeuser's previous FMP consisted of five sustained yield units (SYU) in two separate FMA's. The Edson FMA (9700035) area was made up of four FMU's (E15, E2, W5 and W6) with each FMU being a SYU. The Drayton Valley FMA (0500042) area consisted of one FMU (R12) which was also a SYU. In 2009 Weyerhaeuser amalgamated their two FMA's into one, known as Pembina Timberlands. For the 2017 FMP Weyerhaeuser has also amalgamated all the FMU's into one new one, FMU R15 which now represents a single SYU. As the Pembina Timberlands FMA does not cover the entire FMU area, final harvest levels include both FMA and non-FMA areas.

6.5.2 Planning Period

A 200 year planning horizon comprised of 40 periods of five years each was used for the TSA modeling process. With a landbase effective date of May 1, 2015 and modeling start date of May 1, 2017, the spatial model was advanced by including two years of harvest activity prior to the 2017 start date. This was done to ensure that openings harvested between 2015 and 2017 (referred to as PLAN2 blocks) were transitioned correctly and their ages reset prior to the 2017 start date. The Patchworks model therefore contains 41 periods, with period 1 corresponding to the first 2 years only. The 200 year planning horizon comprises periods 2 to 41.

6.5.3 Natural Breakup and Succession

On the active landbase it is assumed that as stands reach the defined maximum age for the cover type, the stand breaks up and is replaced by a new young stand. On the passive landbase however, it is assumed that the stands are reset to an age that allows them to continue to contribute as old growth for wildlife habitat and seral stage constraints. Table 6-6 shows the ages applied in the TSA model.

Table 6-6. Breakup and renewal ages

Broad Cover Group	Breakup Age	Renewal Age	
		Active LB	Passive LB
	Yrs	Yrs	Yrs
C	300	0	171
CD	300	0	171
DC	200	0	131
D	200	0	131

Following harvest or breakup, all stands transition back to the same pre-disturbance stratum. There is one exception to this rule, *i.e*. black spruce (Sb) on a RSA yield stratum. These stands are transitioned to Pine (Pl)[2]. All future harvested stands transition to a RSA yield stratum while stands that breakup remain on natural yield curves.

6.5.4 Operability Criteria

6.5.4.1 Harvest Age

Clearcut harvesting was the only silviculture system applied in the TSA modeling. The only criterion used initially to determine harvest eligibility was harvest age. Although maximum AAC will be achieved when stands are harvested at maximum mean annual increment (MAI), harvest is often limited to older ages to ensure more favourable harvest economics. The following minimum ages by broad cover group were implemented:

- C, CD and DC – 81 years, and
- D - 71 years.

The ages presented above are lower limits only. The model is free to harvest stands at any age above these limits in order to achieve the management objectives, including non-timber values and the need to maintain old growth levels on the active landbase.

6.5.4.2 Stand Height

Following the initial review of the 20 year SHS by timber operators, it was found that the model was selecting a number of stands for harvest that were less than 15m in height. As stands of this height are considered marginally merchantable, they were deferred from harvest for the first 20 years unless they were included as part of plan blocks to be harvested during the first decade.

[2] See the Transition Matrix section in *Chapter 7: FMP Implementation.*

6.5.5 Seral Stage

Seral stages classify the forest into ecological development phases that represent a stand's life cycle. Coniferous and deciduous stands develop and age differently such that the age at which a coniferous stand becomes "old" will be different to the age when a deciduous stand is classified as old. The document *LB-013: Seral Stage and Ecological Unit Definitions* in Annex VI describes the seral stage classifications used in the 2017 FMP. These are summarized in Table 6-7.

Table 6-7. Seral stage definitions

Seral Stage	Coniferous Age (Yrs)	Deciduous Age (Yrs)
Regenerating	< 30	< 20
Young	31 - 80	21 - 70
Mature	81 - 140	71 - 120
Old Forest	141 +	121 +

A minimum constraint of 5% is applied to the old forest seral stage by ecological unit (PL, SW, CX, CD, DC and DX) on the active landbase as a coarse filter approach to maintaining wildlife habitat on the active landbase.

6.5.6 Regeneration Delay

Regeneration delay is built into the development of RSA yield curves. No additional delay between the time of harvest and regeneration of the stand was included in the TSA models.

6.5.7 Structure Retention

A structure retention factor of 4% is assumed for all species and operators. This reduction is not included in the model but is applied as a reduction factor to harvest volumes post modeling to determine the final AAC for the DFA. For those operators with fixed volumes, their final volumes are not affected by this process, *i.e.* fixed volumes are not reduced by 4%, but the effect is shared with all non-fixed volume operators.

6.5.8 Sustainability

In order to ensure long-term sustainability of the forest, models are constrained to ensure non-declining operable coniferous and deciduous growing stock levels for the last 50 years or 10 periods of the planning horizon.

6.5.9 Mountain Pine Beetle

The MPB Addendum's completed for both the Drayton Valley and Edson FMA areas in 2008 included a surge cut up to the year 2025 as part of Alberta's Healthy Pine Strategy. With the large area of mature pine still remaining on the DFA, the intent is to continue targeting MPB susceptible pine stands for harvest during the early stages of the FMP. In 2016 AAF issued a revised methodology for evaluating stands for pine strategy stand ranking (Alberta 2016). This method uses the stand susceptibility index

(SSI), compartment risk and a stand level predicted R value to rank stand susceptibility to MPB risk. Figure 6-1 shows the final stand rankings on the DFA.

Not all stands identified in the landbase as Rank 1 or 2 were targeted as such in the TSA model. Only stands that were assigned as Rank 1 or 2 based on the above criteria and met the following conditions were carried over as Rank 1 or 2 in the Patchworks landbase:

- Greater than 10% overstorey pine content,
- Greater than 60 years of age at the landbase effective date,
- Contain less than 40% Sw content in the overstorey, and
- Fall within the Aw, AwPl, Pl or PlAw strata. Remaining strata had little area remaining once filtered for above Sw content.

The methodology for assigning Rank 1 and 2 attributes is described in *Annex IX* (*Appendix V: TSA-006 MPB - Prioritizing Pine Stands)*.

The following objectives were applied in the PFMS:

- Conifer surge cut aimed at reducing the area of operable Rank 1 & 2 stands by 100% in the first 20 years (by 2036), and
- Any remaining operable Rank 1 & 2 stands after the first 20 years continue to be targeted for harvest until all the stands are removed.

6.5.10 Opening Patches

The spatial arrangement of the existing forest is highly fragmented in some parts of the DFA due to past harvesting and other industrial development, resulting in smaller patches being available for harvest. In the Patchworks model, harvest patch size targets were applied to control spatial harvest patterns. The goal was to encourage the model to group stands for harvest to provide a desirable range of opening sizes. In order to achieve this, two different types of opening patch targets were implemented:

Blocks. To simulate harvest blocks, stands within 5m of each other scheduled for harvest within a 5 year period were aggregated into patches with targets used to reduce the number of smaller openings and increase the number of larger ones. The following range in patch sizes was applied: 0 – 5 ha, 5 – 30 ha, 30 – 50 ha, 50 – 100 ha, 100 – 300 ha and 300+ ha.

Harvest Patches. In addition to blocks, the clustering of stands into larger harvest patches within a 5 year period was encouraged by creating patches from stands within 300m of each other. The range in patch sizes was as follows: 0 – 50 ha, 50 – 100 ha, 100 – 250 ha and 250 + ha. These harvest patches were not intended to reflect ecological patches, but rather economically operable patches that allow operators to harvest a number of blocks within a defined area without having to move logging equipment to new logging areas.

6.5.11 Natural Range of Variability

Weyerhaeuser is a partner in the LandWeb project, which will estimate the natural range of variability (NRV) for the DFA. The analysis was, however not complete in time for incorporation into the 2017 FMP. The results will be reviewed against the approved plan once completed to look for future opportunities.

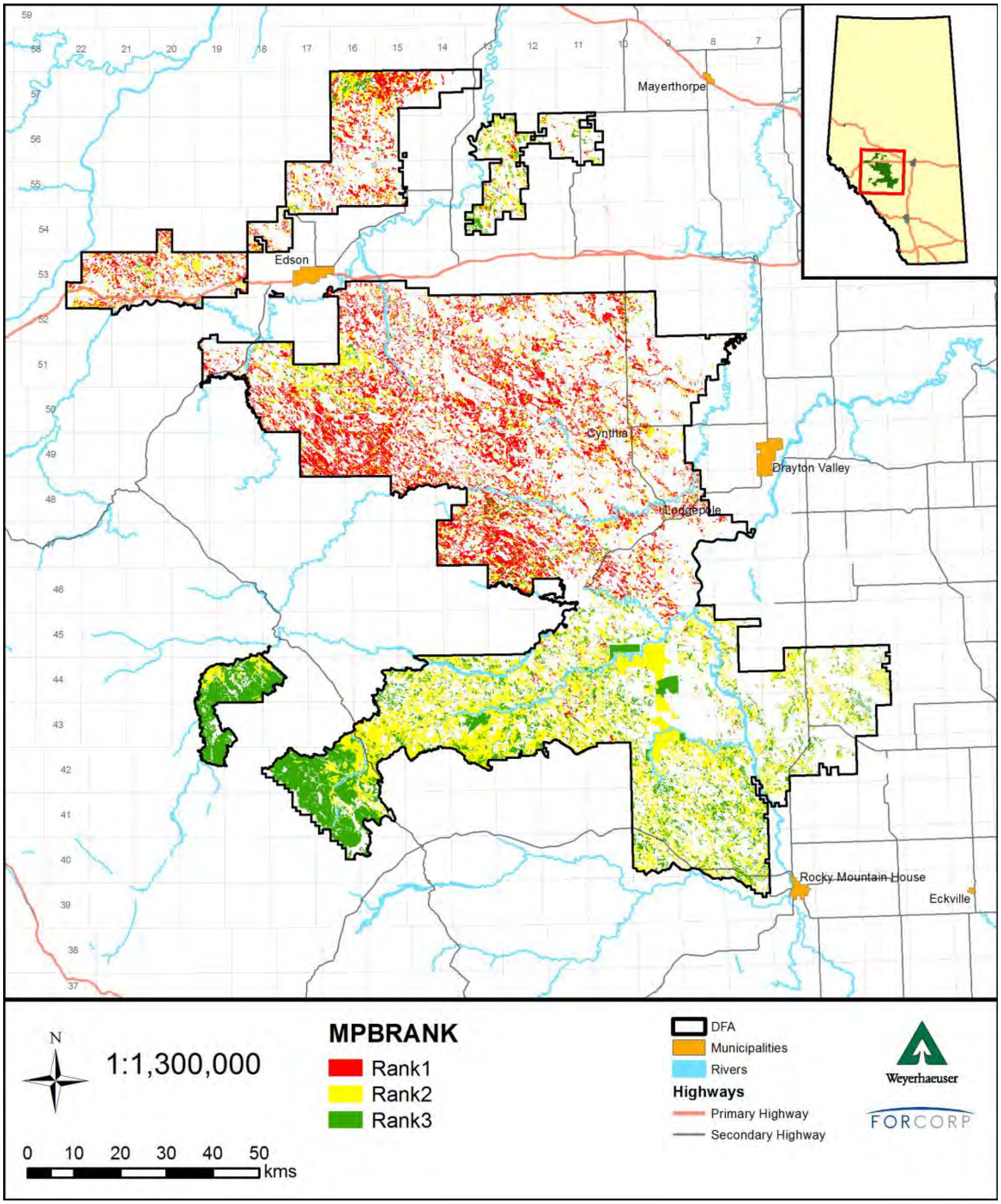


Figure 6-1. Pine stand ranking on the DFA

6.5.12 Old Interior Forest

In the TSA model a patch target was created to monitor the amount of and change in old interior forest on the landbase. Old interior forest patches were defined as any patch greater than 120 ha that is composed of stands greater than 120 years old. A 15m adjacency distance was used. Patches include all strata in both the active and passive forested areas of the landbase. This definition of old interior forest is slightly different to that outlined in the Planning Standard, however it has the advantage that it can be incorporated and controlled, if necessary, from within the TSA model. Post processing to determine the extent of old interior forest was therefore avoided.

6.5.13 Spheres-of-Interest

Including Weyerhaeuser, there are 12 different tenure holders operating on the DFA. Historically the Quota Holders and Community Timber Permit Programs (CTPP) were issued dispositions to operate specific stand types within the old FMU areas[3]. With the amalgamation of the previous five FMUs into a single new one, the old FMU boundaries have disappeared, however Volume Supply Area (VSA) boundaries have been maintained for the CTPP. In order to maintain each tenure holder's traditional operating area, they were allocated to areas based on Working Areas and broad cover groups (BCG) to ensure that current (MPB Addendum SHS) Spheres-of-Interest were maintained. This was applied for the first 20 years only as no allocations were made to tenure holders after the first 20 years.

6.5.14 Recent Harvest Activity and Planned Blocks

Steps were taken to ensure that any harvest activity on the DFA between the effective date of the landbase (May 1, 2015) and the modelling start date (May 1, 2017) were accounted for so that they would not be included in the SHS. Additionally, areas currently being planned for harvest over the next few years were flagged for inclusion in the SHS. Attributes were assigned to these stands in the modelling landbase as follows:

- PLAN2 – stands harvested between 2015 and 2017. These stands were harvested by Patchworks prior to the first period of the planning horizon so that their age could be reset to zero and placed on a trajectory based on the model transition rules.
- PLAN10 – stands currently planned for harvest within the first decade of the SHS.
- PLAN20 – stands planned for harvest within the first two decades of the SHS. This assignment was only used for CTPP blocks in the old R12 FMU area as their planned blocks exceeded their volume allocation for the first decade.

6.5.15 Seed Stands

Prior to the finalization of the Alberta Vegetation Inventory (AVI) used for this FMP, Weyerhaeuser ran a number of Patchworks scenarios based on the 2007 MPB amendment spatial harvest sequences and old AVI as a preliminary process to identify stands that would be desirable to include in the 2017 FMP SHS. All operators were provided with the opportunity to review the Patchworks outputs and to validate the stands selected by the model. The intent was that they would be used as "seed" stands in the 2017 FMP TSA process around which other operable stands would be selected by the model to form opening patches. Targets were used to encourage the harvesting of these stands, but they were weighted so as to not override other important objectives, such as the targeting of MPB susceptible pine stands. The document *LB-001: Conversion of the Patchworks SHS Validated Polygons (Scenario P10005) to the new AVI* in Annex VI provides details of the process used to identify the seed stands.

[3] See *Annex IX Appendix I: TSA-001 FMU Amalgamation* for more information on past allocations.

6.5.16 Access Control

Access control or timing constraints are used in Patchworks to define hard limits on stand availability for harvest. These constraints are over and above the operability criteria already applied in the modelling assumptions. For example, a number of temporary exclusion areas were defined in the landbase where no stands were to be harvested in the first 10 or 20 years. Timing constraints were used to ensure that this was implemented in the model.

The field ACCESS_C1 in the modelling landbase was used in initial development of the PFMS. As stands were selected and validated for the 20 year SHS, the field ACCESS_C2 was used to lock down the SHS stands while allowing the model to validate the long-term impacts of the SHS against all the timber and non-timber indicators in the development of the final PFMS scenario.

The following timing constraints were applied in ACCESS_C1:

Temporary exclusions as identified in the net landbase:

- BEARLAKE – no harvesting in the Bear Lake area for the first 10 years. This was done in support of future planning in the Trout Creek/Pioneer Working Areas based on feedback from some of the concerned residents at Bear Lake. The exclusion will be reviewed at each subsequent FMP to determine validity of retaining the exclusion; if more development has occurred with Oil and Gas, then there may be no reason to keep the area excluded from logging opportunities. This exclusion is supported by EDFOR for the decade.
- CRIMSON – no harvesting in the Crimson area for the first 20 years. This is due to possible expansion of Crimson Lake Provincial Park.
- OCHIESE – no harvesting in a specified area south of the O'Chiese First Nation Reserve for the first 20 years. This area may potentially be removed from the FMA over the life of the 2017 FMP as an expansion to the O'Chiese First Nation Reserve.
- RODNEY – no harvesting in a specified area in the Rodney Work Area for the first 20 years. This is based on agreement with the Edson Wildlife Biologist to alternate very large patches of harvest and non-harvest areas.

Additional exclusions applied in the development of the PFMS:

- BLKMTN – no harvesting in the Black Mountain Work Area for the first 20 years. This area was excluded from the 20-year SHS due to a lack of input from all affected stakeholders which was deemed necessary to address any potential concerns when developing new, permanent access into the area. The only way to access the Black Mountain working area is by developing access through the Wapiabi Provincial Recreation Area.
- CHUNGO – no harvesting in the Chungo Lookout Work Area for the first 20 years. This is based on previous commitments made to Jasper National Park.
- R12E15Graz – no harvesting in the grazing reserves in the old E15 and R12 FMUs for the first 15 years. This is a subjective exclusion that will be reviewed at the next plan as hardwood requirements change based on the needs of the Edson OSB facility or other bioenergy facility requirements for feedstock.
- R12PureD – no harvesting of pure deciduous (Aw stratum) stands in the old R12 FMU, with the exception of the Brazeau compartment, for the first 15 years. This is a subjective exclusion that will be reviewed at the next plan as hardwood requirements change based on the needs of the Edson OSB facility or other bioenergy facility requirements for feedstock.

Other deferrals:

- DEFER20 – stands to be deferred for the first 20 years. Mostly isolated stands from the stands from the sliver elimination process, and stands marked for deferral during the SHS validation process *i.e.,* stands not expected to be operationally merchantable or feasible to log in the next twenty years but have potential for harvest in future periods.
- DEFER70 - stands to be deferred for the first 70 years. Mostly small structure retention stands to be deferred until the next rotation.

Plan blocks:

- PLAN2. Stands known or expected to be harvested prior to the model start date.
- PLAN10. Blocks already planned for harvest during the first decade and which generally have FHP approval.
- PLAN20. Same as PLAN10 but was introduced to allow CTPP plan blocks in the old R12 FMU to be harvested over the first 20 years as the volume from the plan blocks exceeded their allocated volume for the first 10 years.

Seed stands. These are stands identified from the old AVI that were considered potential stands for harvest during the first 20 years. Targets and access control were used to encourage the model to harvest these stands, but they were not weighted as highly as other targets such as plan blocks or MPB susceptible stands.

- SEED1_10. Seed stands available for the first decade.
- SEED11_20. Seed stands available for the second decade.
- SEED1_20. Seed stands available for either of the first two decades.

SHS. This was used in the final PFMS to lock down the 20 year SHS stands.

6.6 Preferred Forest Management Scenario

The PFMS was developed within the context of forest sustainability, representing a balance between timber and non-timber values. It was influenced by input from a wide range of interests, including Weyerhaeuser, AAF, embedded timber operators, First Nations and Métis, the Stakeholder Advisory Group, and other public stakeholders. The PFMS is not solely the result of computer analysis but, rather, an iterative refinement of model projections combined with human intervention. Weyerhaeuser and PDT members combined model projections with their knowledge of the forest, forest management and legislation to refine each successive scenario until the overall results were deemed acceptable to all involved. Once approved by AAF, the PFMS will direct the amount and location of timber harvesting and regeneration activities by all timber operators on the DFA for the period 2017 – 2027, or until the next FMP is approved.

Two primary products derived from the PFMS that are required for FMP implementation are:

- The recommended harvest level, and
- The Spatial Harvest Sequence.

While the PFMS contains a 200-year spatial harvest sequence, only the first 20 years, beginning with the 2017/18 timber year and ending in the 2036/37 timber year have been allocated to disposition holders on the DFA based on their timber rights and current spheres-of-interest.

The following sections present the results and outcomes of the PFMS in some detail. The PFMS is represented by scenario number PW70006.

Implementation and reporting guidance for the FMP is described in *Chapter 7: FMP Implementation.*

6.6.1 Harvest Levels

6.6.1.1 Overview

Sustainable harvest volumes are a primary consideration in the development of the PFMS. These volumes provide the supply of timber to forest companies allowing them to operate their mills in an efficient and cost effective manner. The deciduous and coniferous landbases for the DFA are combined into a single landbase, meaning that the harvest levels include both primary and secondary volumes for each of the species groups.

Table 6-8 shows forecasted average annual coniferous and deciduous harvest levels over different time periods for the entire sustained yield unit. The first decade is shown separately as it includes an accelerated coniferous harvest with the goal of targeting MPB susceptible stands on the landbase over the short-term.

The accelerated coniferous harvest includes both a surge cut and unused volumes requested by timber operators. Unused volumes are the under produced harvest volumes from the previous quadrant. These volumes were provided by each company and were included in the modeled harvest targets (see section 6.6.2.1).

All volumes presented in this chapter are net of 4% structure retention.

Table 6-8. Average annual harvest volumes for the SYU

Species	Years		
	1 - 10 m^3/Yr	11 - 200 m^3/Yr	1 - 200 m^3/Yr
Coniferous	1,468,548	949,913	975,845
Deciduous	523,638	524,033	524,013

Note : All volumes are net of 4% structure retention.

The coniferous accelerated harvest level during the first 10 years approximates the currently approved surge harvest of 1,469,157 m^3/yr for all existing FMUs. As described in the section 6.6.2.3 below, of the 1,468,548 m^3/yr, the recommended coniferous harvest level or Annual Allowable Cut (AAC) is 1,273,430 m^3/yr or 121% of the 200 year average evenflow harvest level (scenario W8000[4]). With the addition of unused volumes, necessary to target and reduce MPB susceptible pine stands as per the Healthy Pine Strategy, the total coniferous harvest for the first decade increases to 139% of the 200 year average evenflow harvest level.

While section 5.6(iv) of the Planning Standard requires that the accelerated harvest should not exceed 125% of the un-accelerated average evenflow harvest level over the first 20 years of the planning horizon, this short-term accelerated harvest is necessary based on the urgent need to target MPB susceptible pine stands on the FMA area. As discussed in section 6.1, with the extensive pine component across the FMA at increasing risk of short-term loss, Weyerhaeuser has responded by increasing the short-term harvest of pine and deferred spruce stands to support future harvest. This strategy is in line with direction from AAF to "*maintain current Prevention (Pine) Strategy, while considering non-timber values*" in the approval of Weyerhaeuser's FMP Issues and Management Direction Summary[5]. Non-timber values are addressed in section 6.6.5 of this document.

[4] See *Annex IX: Timber Supply Analysis*.
[5] See *Annex II: Terms of Reference*.

Post-surge, the 190 year coniferous average harvest level is 90% of the 200 year average evenflow non-spatial base scenario (W8000) as required in section 5.6(iv) of the Planning Standard. There is no accelerated harvest on the deciduous volume; the 200 year average deciduous harvest level is 524,013 m^3/yr.

Figure 6-2 shows the trend in the harvest levels over the 200 year period.

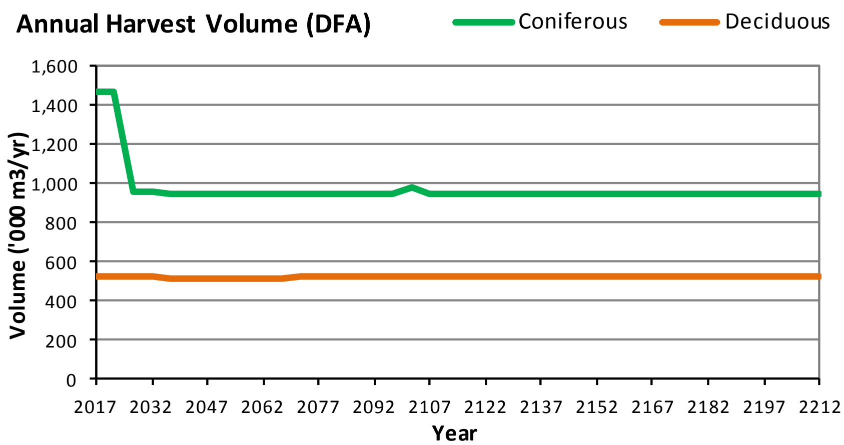


Figure 6-2. Annual harvest volumes for the SYU

Figure 6-3 and Figure 6-4 show the annual coniferous and deciduous harvest volumes by stratum across the DFA.

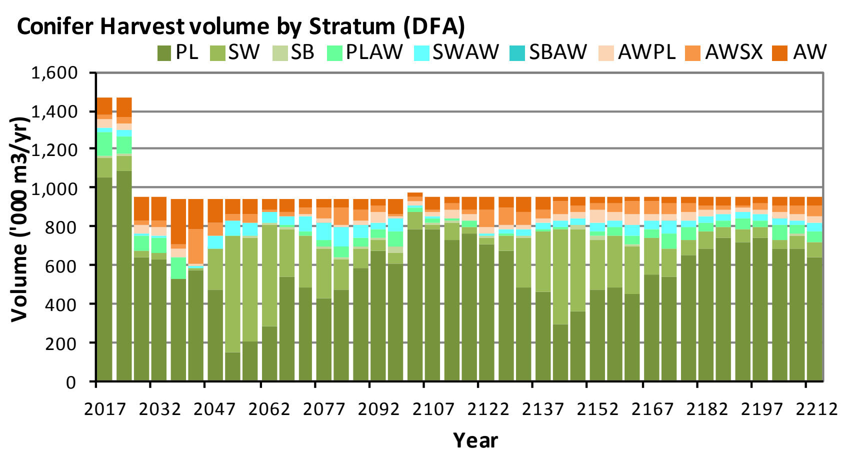


Figure 6-3. Annual coniferous harvest volume by stratum for the SYU

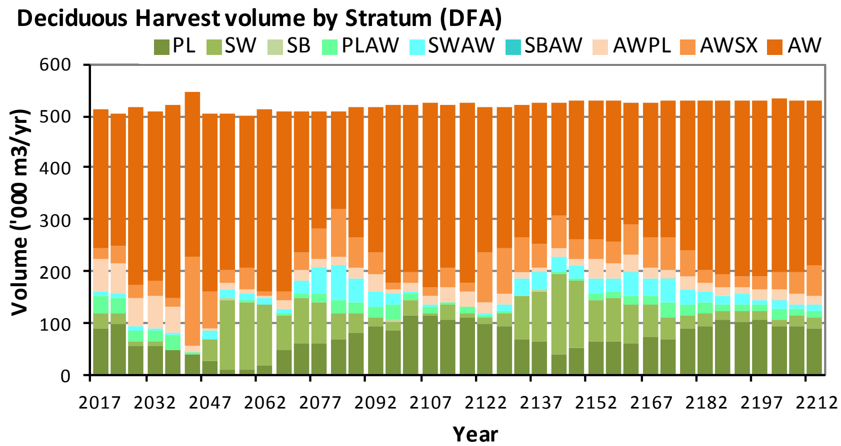


Figure 6-4. Annual deciduous harvest volume by stratum for the SYU

The targeting of MPB susceptible pine stands (Rank 1 and 2 MPB stands) early on in the planning period is clearly evident in Figure 6-3. Harvesting of mature white spruce (SW) strata is delayed until most of the susceptible pine is harvested after 30 to 35 years. The majority of the deciduous harvest (Figure 6-4) emanates from pure aspen (AW) strata.

Figure 6-5 shows the proportion of the harvest volume that is harvested by yield curve type. For the first 40 to 45 years only natural stands are harvested. Once harvested, the stands are assigned to RSA yield curves, including genetically enhanced white spruce within Region I1 (Figure 6-6), which have higher yields than natural curves. These higher yields help to increase harvest levels over the entire planning horizon. The risk associated with the higher RSA yields is analyzed in *Annex IX: Timber Supply Analysis*.

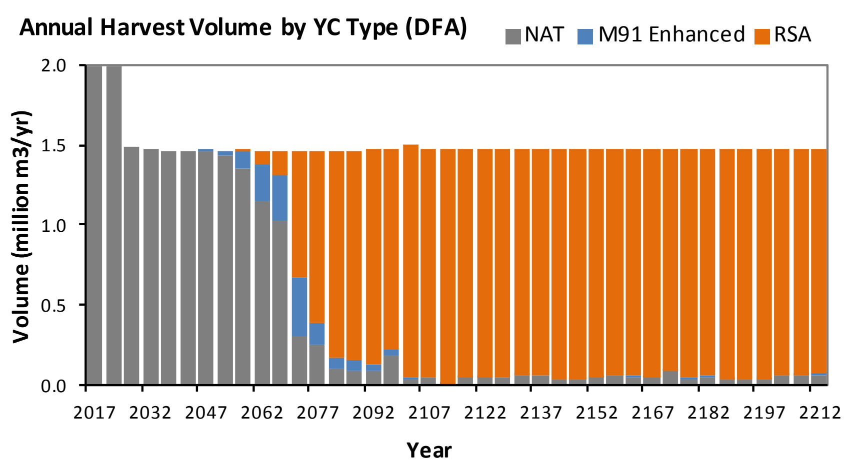


Figure 6-5. Annual harvest volume by yield curve type on the SYU

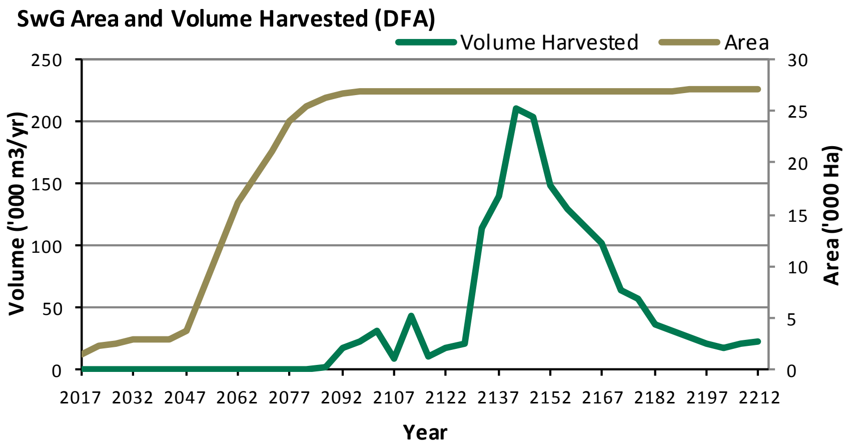


Figure 6-6. Cumulative area and volume of genetically improved white spruce (SwG) stock harvested.

6.6.1.2 FMA and Non-FMA Harvest Levels

Weyerhaeuser's FMA does not cover FMU R15 in its entirety. Approximately 10.5% of the gross landbase area and 3.8% of the active landbase area falls outside the FMA area. For the determination sustainable harvest levels, the entire area was treated as a single SYU. As all timber operators, including Weyerhaeuser, have access to timber on the entire FMU through coniferous timber quotas (CTQ) or deciduous timber agreements (DTA), there was no need to run separate TSA's for the FMA and non-FMA areas. However to support the issuance of timber licences on the non-FMA portion, the harvest levels are reported separately.

Table 6-9 shows the average harvest levels assigned to the FMA and non-FMA areas. On average approximately 2% of the coniferous harvest and 5% of the deciduous harvest is located in the non-FMA area.

Table 6-9. Average annual harvest volumes for the FMA and non-FMA areas

Species	Location	Years					
		1 - 10		11 - 200		1 - 200	
		m^3/Yr	% of total	m^3/Yr	% of total	m^3/Yr	% of total
Coniferous	FMA	1,444,111	98.3%	929,032	97.8%	954,786	97.8%
	NonFMA	24,437	1.7%	20,882	2.2%	21,060	2.2%
	Total	**1,468,548**	**100.0%**	**949,913**	**100.0%**	**975,845**	**100.0%**
Deciduous	FMA	490,792	93.7%	497,574	95.0%	497,235	94.9%
	NonFMA	32,846	6.3%	26,459	5.0%	26,778	5.1%
	Total	**523,638**	**100.0%**	**524,033**	**100.0%**	**524,013**	**100.0%**

Note : All volumes are net of 4% structure retention.

Coniferous Year 1-10 volumes include 195,118 m^3/yr of unused volume.

Figure 6-7 and Figure 6-8 show the trend in the FMA and non-FMA harvest levels over the planning horizon for coniferous and deciduous respectively. The FMA harvests are even flow ± 5% while the non-FMA levels fluctuate widely.

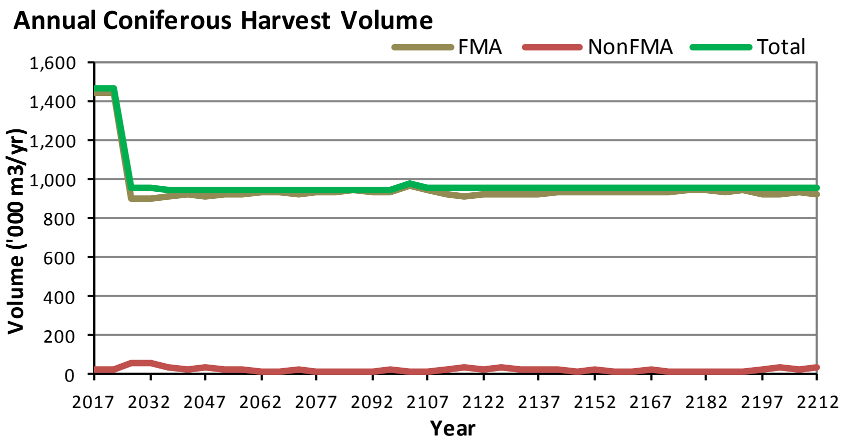


Figure 6-7. Annual coniferous harvest volumes for the FMA and Non-FMA areas

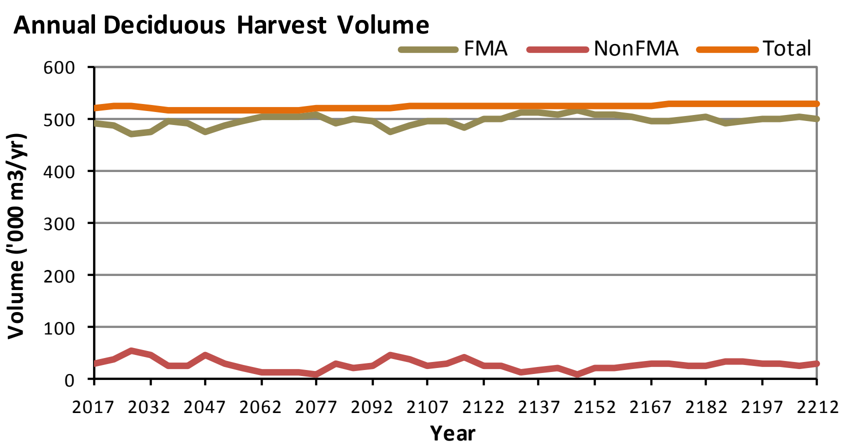


Figure 6-8. Annual deciduous harvest volumes for the FMA and Non-FMA areas

6.6.1.3 Compartment Harvest Levels

Table 6-10 shows the annual harvest levels by compartment. The compartments are listed from north to south (more or less). Over 62% of the coniferous volume harvested in the first two decades emanates for the five most northerly compartments. Over the longer term these compartments account for 55% of the coniferous harvest. The increased harvest level over the first two decades in these compartments is due to the targeting of susceptible pine stands, the majority of which exist in these compartments (see Figure 6-1). Deciduous harvest levels in the northern compartments are also higher during the first two decades than the long-term average. This is partially due to the targeting of MPB susceptible stands, but also as a result of the decision to avoid harvesting pure deciduous stands in the southern compartments during the first 15 years of the plan.

Table 6-10. Annual harvest levels by compartment

Compartment	Decade 1		Decade 2		70 yr Average		200 yr Average	
	m^3/yr	%	m^3/yr	%	m^3/yr	%	m^3/yr	%
Coniferous								
Edson	130,564	8.9%	105,911	11.1%	86,338	8.5%	82,429	8.4%
Beaver Meadows	38,757	2.6%	40,168	4.2%	26,942	2.6%	21,228	2.2%
Wolf Lake	358,633	24.4%	239,026	25.0%	207,304	20.3%	204,870	21.0%
Macmillan	164,340	11.2%	154,070	16.1%	141,183	13.8%	126,787	13.0%
Brazaeu	227,074	15.5%	97,203	10.2%	106,859	10.5%	104,954	10.8%
South Canal	131,079	8.9%	65,384	6.8%	107,088	10.5%	95,945	9.8%
Medicine Lake	49,850	3.4%	69,170	7.2%	53,682	5.3%	49,889	5.1%
Baptiste	94,604	6.4%	93,565	9.8%	69,289	6.8%	69,912	7.2%
Nordegg	146,757	10.0%	41,945	4.4%	99,915	9.8%	111,077	11.4%
West Country	126,890	8.6%	50,240	5.3%	122,703	12.0%	108,755	11.1%
Total	**1,468,548**	**100.0%**	**956,683**	**100.0%**	**1,021,304**	**100.0%**	**975,845**	**100.0%**
Deciduous								
Edson	115,835	22.1%	99,524	19.0%	76,945	14.8%	81,177	15.5%
Beaver Meadows	33,918	6.5%	48,826	9.3%	24,945	4.8%	16,687	3.2%
Wolf Lake	102,842	19.6%	79,885	15.2%	68,360	13.1%	67,774	12.9%
Macmillan	139,108	26.6%	146,965	28.0%	110,716	21.3%	94,454	18.0%
Brazaeu	49,153	9.4%	32,619	6.2%	62,652	12.0%	69,506	13.3%
South Canal	19,112	3.6%	18,202	3.5%	52,688	10.1%	56,162	10.7%
Medicine Lake	11,121	2.1%	52,989	10.1%	60,384	11.6%	63,225	12.1%
Baptiste	22,628	4.3%	35,863	6.8%	34,449	6.6%	37,923	7.2%
Nordegg	18,564	3.5%	6,305	1.2%	17,376	3.3%	21,971	4.2%
West Country	11,358	2.2%	3,742	0.7%	11,610	2.2%	15,134	2.9%
Total	**523,638**	**100.0%**	**524,920**	**100.0%**	**520,125**	**100.0%**	**524,013**	**100.0%**

Note : All volumes are net of 4% structure retention.

6.6.1.4 Comparison to Previous FMP AACs

Table 4-1 in section 4.3 of *Chapter 4 : Previous FMPs* summarizes the approved AACs from the 2007 Mountain Pine Beetle Addendums, while Table 6-8 in this section summarizes the proposed harvest levels for the 2017 FMP PFMS. All volumes are net of cull and structure retention.

For the first 8 years of the 2017 FMP, from May 1, 2017 to Apr 30, 2025, the 2007 MPB total coniferous harvest level is similar to the 2017 FMP; 1,469,517 m^3/yr (2007 MPB) vs 1,468,548 m^3/yr (2017 FMP). By November 18, 2025, however the 2007 MPB coniferous harvest drops by 48% to 766,458 m^3/yr while the 2017 FMP coniferous harvest remains at 1,468,548 m^3/yr for a further two years before dropping by 35% to 949,913 m^3/yr for the remainder of the 200 year period. The 2017 FMP post surge harvest level is 24% higher than the 2007 MPB post surge AAC.

At 524,013 m^3/yr, the 2017 FMP proposed deciduous harvest level is approximately 14% lower than the 607,036 m^3/yr approved for the first 17 years of the 2007 MPB plans.

The higher post surge coniferous and lower deciduous harvest levels in the 2017 FMP compared to the 2007 MPB AACs are the result of a number of factors, including:

- Higher yields. For the 2017 FMP stand growth was modelled using GYPSY, with yield curves developed for natural stands, pre-1991 managed stands and post-1991 managed or RSA stands. The previous FMPs included natural yield curves only. RSA curves are based on regenerated stands where a more intensive regeneration treatment is assumed resulting in higher timber yields. As stands are harvested by the TSA model, they transition to the higher yielding RSA curves resulting in increased yields over time. Figure 6-5 shows that for the first 40 to 50 years almost exclusively natural stands are harvested, but after this period almost all stands harvested are assigned to higher yielding RSA curves. Sensitivity analysis, back-to-natural (BTN) scenario (PW70010) Table 3-10 in *Appendix IX : Timber Supply Analysis*, indicates that, after the first 20 years, coniferous and deciduous harvest levels are 22% and 18% higher respectively when compared to what would have been achieved with natural stand yields only.

- Strategy to maximize coniferous harvest. TSA objectives for the 2007 MPB plans were to maximize the total harvest volume (FMU R12) and total primary harvest volume (FMUs E15, E2, W5 and W6). Both these objectives focus on maximizing the combined coniferous and deciduous harvest levels. For the 2017 FMP, the strategy was changed to maximize the total coniferous harvest volume, with a minimum constraint placed on the deciduous harvest level. Reasons for this change in strategy include:
  - Since the closure of the Drayton Valley OSB mill in 2007 the demand for deciduous fibre off the DFA has reduced;
  - The demand for coniferous timber, on the other hand remains high. Weyerhaeuser has invested millions of dollars in the Drayton Valley Sawmill since 2008 in order to increase mill efficiency and capacity to allow it to fully utilize the timber volumes associated with the continued implementation of the Healthy Pine Strategy.

While the two points discussed above account for the majority of the differences in harvest levels between the previous FMPs and the 2017 PFMS, there are a number of other changes that will also have had an impact, such as:

- the amalgamation of five FMUs into a single SYU,
- new inventory,
- new landbase net down procedures,
- changing from divided to single combined landbases for FMUs E15, E2, W5 and W6, and
- the inclusion of non-timber assessment (NTA) targets in the 2017 FMP.

6.6.2 Timber Allocations

6.6.2.1 Unused Volumes

Unused volume is volume that has not been charged against production in a quadrant or period. These quadrants are not consistent with the FMP period (Weyerhaeuser is currently in the May 1, 2015 to April 30, 2020 quadrant), as shown in Table 6-11 below. Requests for unused volumes have to be made by disposition holders to the Executive Director, AAF, prior to approval, and no later than two years after the end of the quadrant. All estimated coniferous unused volume requests already made or that are expected to be made by timber operators are included in the final allocations to ensure the volumes are included in the first decade SHS. In some cases, timber operators have over-produced in their last quadrant, resulting in a reduced allocation in the first quadrant of the SHS.

Table 6-11 summarizes the unused coniferous volumes by timber operator, with negative volumes indicating over-production. The net total unused volume is 1.95 million m^3, of which approximately 80% is for Weyerhaeuser. No unused volumes are included for CTPP programs. Unused volumes, along with the surge volumes, comply with all AAF requirements, and have been analyzed against non-timber values (section 6.6.5). No unused deciduous volumes have been modelled.

Table 6-11. Estimated net quadrant coniferous reconciliation volumes

Operator	Current Quadrant Period	R15	Percent of Total	Request made to AAF by operator
ANC CTQ W060011	20160501-20210430	0	0.0%	NA
ANC CTQ W060011	20110501-20160430	3,490	0.2%	expected to
BRISCO CTQ E150001	20120501-20170430	0	0.0%	NA
BRL CTQ W060010	20160501-20210430	42,397	2.2%	NA
BRL CTQ W060010	20110501-20160430	16,954	0.9%	18-Apr-17
EDFOR CTQ E020002	20120501-20170430	-7,000	-0.4%	NA
MWI CTQ W060002	20110501-20160430	0	0.0%	NA
MWI CTQ W060002	20160501-20210430	-6,290	-0.3%	NA
MWI CTQ W060012 fixed	20140501-20190430	-15,000	-0.8%	NA
HFP CTQ R120001	20160501-20210430	16,796	0.9%	NA
HFP CTQ R120001	20110501-20160430	83,975	4.3%	expected to
TPTL CTQ R120002	20160501-20210430	40,000	2.1%	NA
TPTL CTQ R120003	20160501-20210430	0	0.0%	NA
TPTL CTQ R120004	20160501-20210430	0	0.0%	NA
TPTL CTQ R120002	20110501-20160430	114,948	5.9%	expected to
TPTL CTQ R120003	20110501-20160430	11,690	0.6%	expected to
TPTL CTQ R120004	20110501-20160430	65,790	3.4%	expected to
WY FMA9600046	20100501-20150430	1,669,039	85.5%	Jan. 18, 2017
WY FMA9600046	20150501-20200430	-85,610	-4.4%	NA
CTPP E2	20120501-20170430	0	0.0%	NA
CTPP W5	20120501-20170430	0	0.0%	NA
CTPP W6	20120501-20170430	0	0.0%	NA
CTPP R12	20110501-20160430	0	0.0%	NA
CTPP R12	20160501-20210430	0	0.0%	NA
Total		**1,951,179**	**100.0%**	

Note : Only primary volumes are represented and WY volumes do not include current non-FMA allocations.

Reasons for the under utilization of coniferous volumes by Weyerhaeuser since the approval of the 2007 MPB addendums are discussed in Chapter 1.

6.6.2.2 Timber Operator Allocations

In order to streamline the planning process, Weyerhaeuser has requested amalgamation[6] of the existing 5 Forest Management Units (FMUs) that cover the Edson (E15, E2, W5, W6) and Drayton Valley (R12) areas into a single FMU (R15) for the 2017 FMP. Each of the previous FMUs, however contained one or more disposition holders who share the FMU annual allowable cut with Weyerhaeuser. In addition, a single combined landbase has been modelled for the new FMU, as opposed to the separate distinct deciduous and coniferous landbases previously applied in the Edson FMUs. A process was developed to determine timber allocations under a new single FMU with a combined landbase that ensures all timber rights are maintained. The process is outlined in *of Annex IX (Appendix I: TSA-001 (Revised) FMU Amalgamation – Quota Allocations)*. The process to determine new allocations was done independently

[6] While Weyerhaeuser has Agreement-In-Principle to proceed with modelling a single FMU, final approval for the amalgamation is only expected on approval of the 2017 FMP.

of the final PFMS calculations to ensure that the allocations are based on baseline conditions, i.e. even flow harvest and are not influenced by management strategies such as a coniferous surge cut, which is included in the PFMS.

Allocations presented in Table 6-12 are prior to the application of structure retention. In the case of fixed volume allocations however, no reduction for structure retention is applied to the volumes as presented.

Table 6-12. Timber allocations by tenure holder

Tenure Holder	Variable / Fixed Allocation	Coniferous % of FMU AAC	Deciduous % of FMU AAC
Weyerhaeuser	Variable	69.31% *	93.81% *
BRISCO Wood Preservers	Variable	0.45%	
Edfor Co-Operative Ltd.	Variable	7.21%	
Blue Ridge Lumber Inc.	Variable	3.38%	
ANC Timber Ltd.	Variable	7.73%	
Millar Western (CTQ W060002)	Variable	0.13%	
Millar Western (CTQ W060012)	Fixed	10,000	
Dale Hansen	Variable	0.99%	
Tall Pine Timber Co. Ltd.(CTQ R120002)	Variable	1.82%	
Tall Pine Timber Co. Ltd.(CTQ R120003)	Variable	0.38%	
Tall Pine Timber Co. Ltd.(CTQ R120004)	Variable	1.29%	
CTTP(VSA1 or former FMU E2)	Fixed		1,500
CTTP(VSA1 or former FMU E2)	Variable	0.38%	
CTTP(VSA2 or former FMU W5)	Fixed		4,000
CTTP(VSA2 or former FMU W5)	Variable	3.92%	2.55%
CTTP(VSA3 or former FMUs E15 & W6)	Fixed	18,252	17,591
CTTP(VSA4 or former FMU R12)	Fixed	4,000	

* Weyerhaeuser is allocated the volume remaining after all other allocations have been made. Weyerhaeuser's percentage may therefore vary slightly from the numbers shown.
Weyerhaeuser's allocation includes 1% for Local Use.

6.6.2.3 Decade 1 Harvest Levels and Allocations

Timber allocations in decade 1 of the PFMS are complicated by the inclusion of unused coniferous volumes and a coniferous surge cut. Unused volumes are separate from the final harvest levels or Annual Allowable Cut (AAC). The methodology to determine the average annual coniferous harvest level for the first decade was as follows:

Total coniferous harvest for the first 10 years (from Table 6-8) = 14,685,480 m^3 (1,468,548 x 10)

Total estimated coniferous unused volume (from Table 6-11) = 1,951,179 m^3

Total coniferous harvest net of unused volumes = 12,734,301 m^3

Average annual coniferous harvest net of unused volumes = **1,273,430** m^3/yr

Table 6-13 shows the how the coniferous unused volumes and annual harvest level are allocated to timber operators for the first decade. Table 6-14 shows the deciduous harvest level and allocations for decade 1. As no accelerated cut was implemented for deciduous volumes, the harvest level is based on the 200 year average harvest.

For both the coniferous and deciduous allocations, the non-FMA portion is based on what was scheduled for harvest in the first decade as these volumes are represented in the final SHS.

Table 6-13. Coniferous harvest levels and allocations for decade 1

Company	Disposition #[1]	Location	Allocation	Decade 1		
				Unused Vol[4]	Harvest Level	Total[5]
			m^3 / %	m^3/yr	m^3/yr	m^3/yr
Weyerhaeuser Company	FMA 0900046	FMA	68.80%	158,343	876,165	1,034,508
	CTQ[2]	NonFMA[3]	0.99%		12,577	12,577
	Total		**69.79%**	**158,343**	**888,741**	**1,047,084**
ANC Timber Ltd.	CTQ W060011	FMU	7.73%	349	98,436	98,785
BRISCO Wood Preservers Ltd.	CTQ E150001	FMU	0.45%	0	5,730	5,730
Blue Ridge Lumber Inc.	CTQ W060010	FMU	3.38%	5,935	43,042	48,977
Dale Hansen	CTQ R120001	FMU	0.99%	10,077	12,607	22,684
EDFOR Co-operative Ltd.	CTQ E020002	FMU	7.21%	-700	91,814	91,114
Millar Western Forest Products Ltd.	CTQ W060002	FMU	0.13%	-629	1,655	1,026
Millar Western Forest Products Ltd.	CTQ W060012	FMU	10,000	-1,500	10,000	8,500
Tall Pine Timber Co. Ltd	CTQ R120002	FMU	1.82%	15,495	23,128	38,623
Tall Pine Timber Co. Ltd	CTQ R120003	FMU	0.38%	1,169	4,797	5,966
Tall Pine Timber Co. Ltd	CTQ R120004	FMU	1.29%	6,579	16,469	23,048
CTPP (E2)	CTPP	FMU	0.38%	0	4,839	4,839
CTPP (W5)	CTPP	FMU	3.92%	0	49,918	49,918
CTPP (W6)	CTPP	FMU	18,252	0	18,252	18,252
CTPP (R12)	CTPP	FMU	4,000	0	4,000	4,000
Total				**195,118**	**1,273,430**	**1,468,548**

[1] CTQ numbers may change to reflect new FMU R15.

[2] Includes existing CTQ's : CTQ E01000x, CTQ E02000x & CTQ W06000x for quotas approved but never issued by AAF.

[3] Based on assigned volumes for decade 1. Weyerhaeuser's portion of the NonFMA harvest is 51.5% for decade 1.

[4] Unused volumes are estimates.

[5] All volumes are net of 4% structure retention.

Table 6-14. Deciduous harvest levels and allocations for decade 1

Company	Disposition #	Location	Allocation	Decade 1[1]
				Harvest Level
			m^3 / %	m^3/yr
Weyerhaeuser	FMA 0900046	FMA	87.44%	458,207
	DTA[2]	NonFMA[3]	5.60%	29,358
	Total		**93.04%**	**487,565**
CTPP (E2)	CTPP	FMU	1,500	1,500
CTPP (W5) - Fixed	CTPP	FMU	4,000	4,000
CTPP (W5) - Variable	CTPP	FMU	2.55%	13,357
CTPP (W6)	CTPP	FMU	17,591	17,591
Total				**524,013**

[1] Based on 200 year average at the FMU level. All volumes net of 4% structure retwntion.

[2] Includes existing DTA's : DTA E910001 & DTA R120001

[3] Based on assigned volumes for decade 1. Weyerhaeuser's portion of the NonFMA harvest is 85.6% for decade 1.

6.6.2.4 Final Harvest Levels and Allocations

Table 6-15 and Table 6-16 show the final recommended harvest levels and allocations for the 200 year period.

Table 6-15. Final coniferous harvest levels (excluding unused volumes) and allocations

Company	Disposition #[1]	Location	Allocation	Years 1 - 10[3]	Years 11 - 200[3]
			m^3 / %	m^3/yr	m^3/yr
Weyerhaeuser Company	FMA 0900046/CTQ	FMU	69.79% [2]	888,741	654,855
ANC Timber Ltd.	CTQ W060011	FMU	7.73%	98,436	73,438
BRISCO Wood Preservers Ltd.	CTQ E150001	FMU	0.45%	5,730	4,271
Blue Ridge Lumber Inc.	CTQ W060010	FMU	3.38%	43,042	32,122
Dale Hansen	CTQ R120001	FMU	0.99%	12,607	9,388
EDFOR Co-operative Ltd.	CTQ E020002	FMU	7.21%	91,814	68,467
Millar Western Forest Products Ltd.	CTQ W060002	FMU	0.13%	1,655	1,192
Millar Western Forest Products Ltd.	CTQ W060012	FMU	10,000	10,000	10,000
Tall Pine Timber Co. Ltd	CTQ R120002	FMU	1.82%	23,128	17,252
Tall Pine Timber Co. Ltd	CTQ R120003	FMU	0.38%	4,797	3,579
Tall Pine Timber Co. Ltd	CTQ R120004	FMU	1.29%	16,469	12,285
CTPP (E2)	CTPP	FMU	0.38%	4,839	3,601
CTPP (W5)	CTPP	FMU	3.92%	49,918	37,213
CTPP (W6)	CTPP	FMU	18,252	18,252	18,252
CTPP (R12)	CTPP	FMU	4,000	4,000	4,000
Total				**1,273,430**	**949,913**

[1] CTQ numbers may change to reflect new FMU R15.

[2] The percentage shown is for the first decade. For the remaining period Weyerhaeuser's allocation is 68.94%.

[3]All volumes net of 4% structure retention.

Table 6-16. Final deciduous harvest levels and allocations

Company	Disposition #	Location	Allocation	Years 1 - 200[1]
			m^3 / %	m^3/yr
Weyerhaeuser	FMA 0900046/DTA	FMU	93.04%	487,565
CTPP (E2)	CTPP	FMU	1,500	1,500
CTPP (W5) - Fixed	CTPP	FMU	4,000	4,000
CTPP (W5) - Variable	CTPP	FMU	2.55%	13,357
CTPP (W6)	CTPP	FMU	17,591	17,591
Total				**524,013**

[1]All volumes net of 4% structure retention.

6.6.3 Indicators

6.6.3.1 Harvest Area

Table 6-17 shows the average annual area harvested by stratum over the DFA for the first two decades as well as 70 year and 200 year averages. Figure 6-9 shows the area harvested by stratum by period over the 200 year planning horizon.

The elevated area harvested during the first decade (two periods) reflects the accelerated conifer surge cut for the first 10 years. The pine (PL) stratum makes up a significant proportion of the harvest area for the first 20 to 30 years as MPB susceptible pine stands are targeted for removal during this period. The harvesting of older mature white spruce (SW) stands is delayed for the first 40 years.

Table 6-17. Area harvested by stratum

Stratum	Decade 1		Decade 2		70 yr Average		200 yr Average	
	Ha/yr	%	Ha/yr	%	Ha/yr	%	Ha/yr	%
Aw	1,577	20.7%	2,101	35.7%	1,831	30.9%	1,781	32.4%
AwPl	425	5.6%	442	7.5%	210	3.5%	180	3.3%
AwSx	282	3.7%	263	4.5%	398	6.7%	331	6.0%
Pl	4,147	54.4%	2,463	41.8%	2,001	33.8%	2,036	37.0%
PlAw	533	7.0%	369	6.3%	222	3.7%	173	3.1%
Sb	60	0.8%	13	0.2%	26	0.4%	27	0.5%
Sw	444	5.8%	153	2.6%	987	16.7%	770	14.0%
SwAw*	159	2.1%	85	1.4%	242	4.1%	201	3.7%
Total	**7,627**	**100.0%**	**5,890**	**100.0%**	**5,918**	**100.0%**	**5,499**	**100.0%**

* Includes SbAw

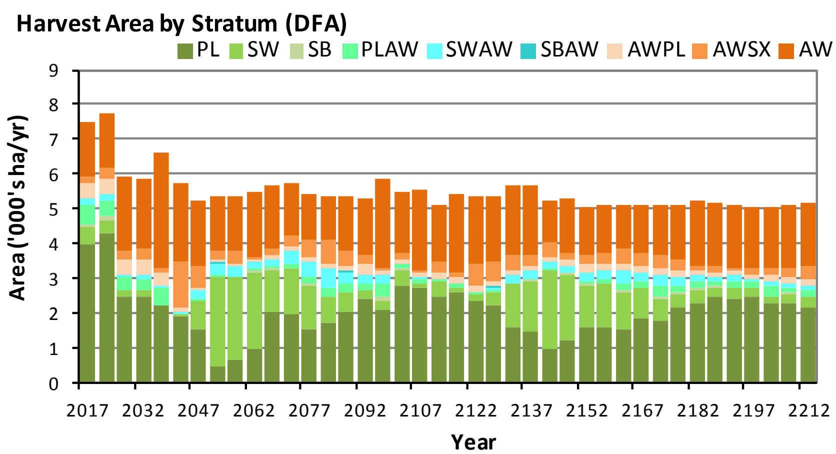


Figure 6-9. Area harvested by stratum

Table 6-18 and Figure 6-10 show the area harvested during the first 20 years compared to the landbase profile, based on the initial or time zero operable area. Operable area is that area within the active landbase that is eligible for harvest as defined by operability criteria, *i.e.* age, as defined in section 6.5.4.1.

With emphasis on harvesting MPB susceptible pine during the first two decades, the proportion of pure pine (Pl) and pine mixedwood strata (PlAw and AwPl) harvested during the first 20 years is higher than the initial landbase profile. Harvesting of pure white spruce (Sw) and white spruce mixedwood (SwAw, AwSx) strata is consequently delayed. Proportionally less Aw is harvested during the first decade due to the accelerated coniferous cut and the greater focus on pine mixedwoods during this period.

Table 6-18. Percent of area harvested by stratum compared to initial operable area

Stratum	Percent of Area		
	Time 0 Operable Area	SHS Decade 1	SHS Decade 2
Aw	35.1%	20.7%	35.7%
AwPl	3.3%	5.6%	7.5%
AwSx	5.7%	3.7%	4.5%
Pl	31.4%	54.4%	41.8%
PlAw	3.3%	7.0%	6.3%
Sb	0.5%	0.8%	0.2%
SbAw	0.1%	0.0%	0.0%
Sw	16.5%	5.8%	2.6%
SwAw	4.1%	2.1%	1.4%
Total	**100.0%**	**100.0%**	**100.0%**

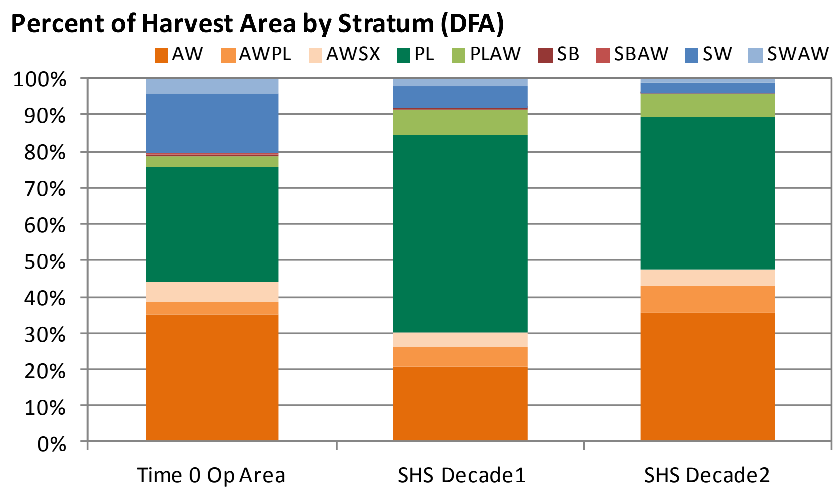


Figure 6-10. Percent of area harvested by stratum compared to initial operable area

6.6.3.2 Stand Productivity

The average productivity of stands harvested as measured by volume per unit area (m^3/ha) is presented by stratum in Table 6-19. Figure 6-11 shows the trend over the 200 year period for aggregated coniferous and deciduous strata. Initial productivity is over 260 m^3/ha as older pine stands are harvested but drops off over the first 25 years as less mature pine stands are targeted. After this productivity increases as the older white spruce stands are harvested. The impact of the higher yielding RSA yield curves is evident in the last 80 years of the planning horizon as productivity averages at almost 290 m^3/ha. The average productivity over the last 80 years is approximately 10% higher than over the first 70 years of the planning horizon.

Table 6-19.Stand productivity by stratum

Stratum	Decade 1 m3/ha	Decade 2 m3/ha	70 yr Avg m3/ha	200 yr Avg m3/ha
Aw	227	221	219	203
AwPl	238	236	239	296
AwSx	248	246	254	281
Pl	281	280	293	324
PlAw	262	260	268	306
Sb	131	147	146	180
Sw	255	265	279	284
SwAw*	233	232	263	284
Average	**261**	**252**	**260**	**273**

* Includes SbAw

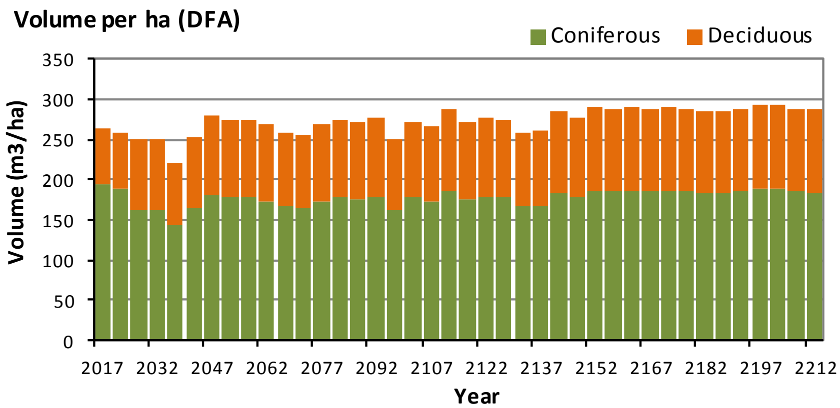


Figure 6-11. Stand productivity for coniferous and deciduous strata

6.6.3.3 MPB Risk

A primary objective for the 2017 FMP is to decrease the risk of a major MPB infestation on the DFA by reducing the amount of MPB susceptible stands. Stands were assigned a MPB rank based on the stand susceptibility index, compartment risk and a stand level predicted R value. See section 6.5.9 for more details. Stands assigned a rank 1 or 2 were targeted for harvest early in the planning period. Table 6-20 shows that after the first 10, 20 and 30 years approximately 40%, 70% and 90% of the rank 1 and 2 are harvested respectively. Figure 6-12 shows the rate of harvest over the planning horizon.

Table 6-20. MPB rank 1 and 2 stands remaining after 10, 20 and 30 years

	Ha	%
Inventory at time 0	120,676	
Remaining after 10 years	71,595	59.3%
Remaining after 20 years	36,910	30.6%
Remaining after 30 years	11,019	9.1%

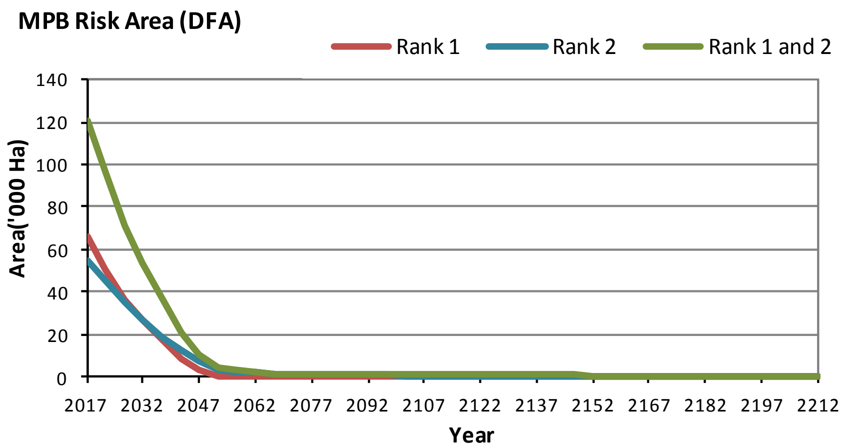


Figure 6-12. MPB rank 1 and 2 stand inventory

While the intent was to try and realize 100% reduction of rank 1 and 2 stands over the first 20 years, this would have required that only rank 1 and 2 stands be harvested over this period. This was not possible due to operational realities such as, blocks already planned for harvest over this period, and the need to balance all timber and non-timber values, including wildlife habitat and watershed runoff.

6.6.3.4 Harvest Age

Table 6-21 shows the average harvest ages by stratum for the first two decades as well as the 70 and 200 year averages. Average harvest ages for coniferous and deciduous species over the 200 year period are shown in Figure 6-13.

Starting at approximately 134 years, the coniferous average harvest age remains relatively level for the first 30 years before increasing to over 160 years and remaining there for a 20 year period. It then drops sharply to 100 years and remains between 85 and 105 years for the remainder of the planning horizon. This pattern is the result of targeting younger MPB susceptible pine stands early on causing older non-susceptible strata, *e.g*. white spruce, to be bypassed. These older stands are then scheduled for harvest once the susceptible pine is depleted. The sharp drop off coincides with the harvesting of second rotation RSA stands.

The deciduous harvest age follows a similar pattern to the coniferous, but does not increase as sharply or for as long as the coniferous curve.

Long-term average harvest ages remain above 100 year for all strata.

Table 6-21. Average harvest age by stratum

Stratum	Decade 1 Years	Decade 2 Years	70 yr Avg Years	200 yr Avg Years
Aw	117	119	114	101
AwPl	122	123	119	109
AwSx	120	122	123	106
Pl	129	128	127	104
PlAw	129	129	124	115
Sb	143	154	148	112
Sw	141	135	146	116
SwAw*	127	129	135	119
Average	**126**	**124**	**126**	**106**

* Includes SbAw

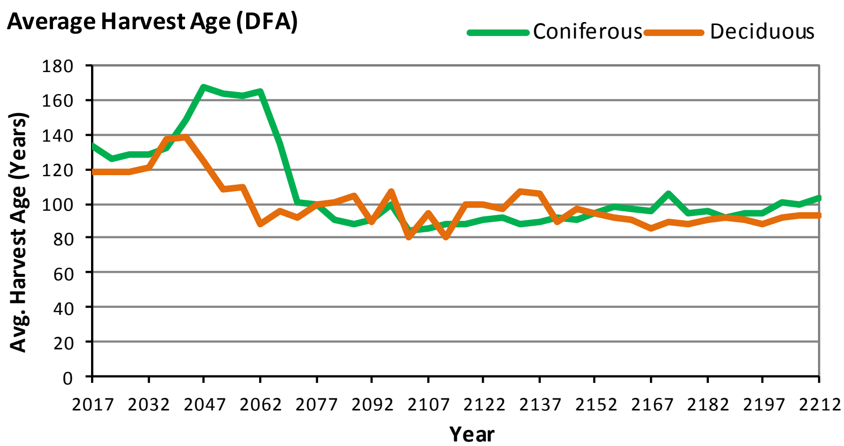


Figure 6-13. Average coniferous and deciduous harvest ages

6.6.3.5 Piece Size

Average piece size, measured in trees per m^3 (tpm), for both coniferous and deciduous species over the 200 year period are presented in Figure 6-14. The trends for both species show a similar but opposite pattern to the average harvest age (Figure 6-14). Over the first 20 to 30 years piece sizes improve as older stands are harvested before falling to approximately 3.5 tpm with the introduction of second rotation stands.

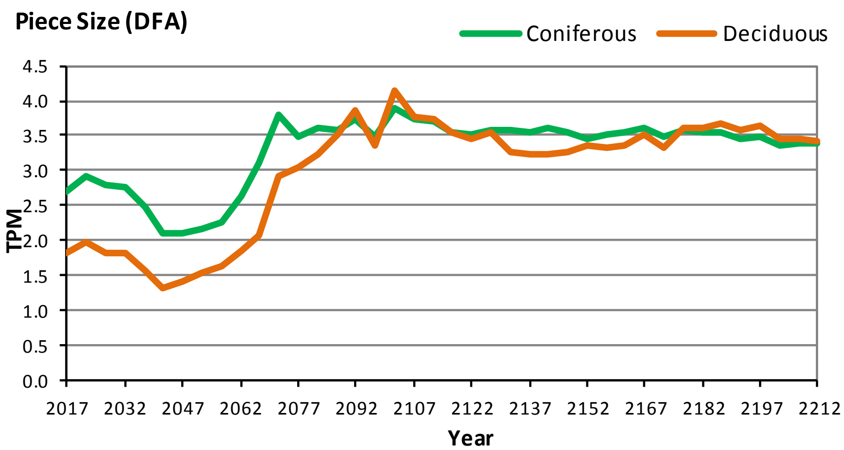


Figure 6-14. Average piece size

Weyerhaeuser is aware of this falling piece size dynamic which is essentially unavoidable based on the existence of current older age classes and the change to a younger regulated forest condition over time.

6.6.3.6 Cycle Times

Predicted average cycle or turnaround times to Weyerhaeuser's Drayton Valley Sawmill (DVSM) and Edson OSB mill are shown in Figure 6-15. While the average turnaround times fluctuate from period to period, the trend for both is flat. This indicates that, over the long-term, the average haul distance to both mills is stable. The turnaround time was not controlled in the Patchworks model.

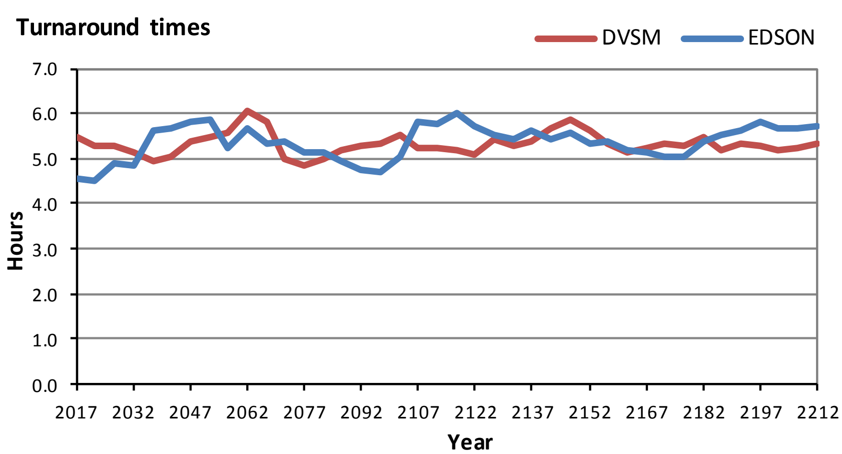


Figure 6-15. Average turnaround times to Weyerhaeuser's mills

6.6.3.7 Growing Stock

Figure 6-16 shows the trend in operable coniferous and deciduous growing stock on the DFA over the 200 year planning period. Operable growing stock represents the merchantable volume within those stands on the active landbase that meet the operability requirements in that period. Consequently it represents the volume that is actually available for harvest in that period. The only operability requirement applied in the TSA model is minimum harvest age (see section 6.5.4). The operable growing stock is required to show a non-declining trend during the last quarter (50 years) of the planning horizon.

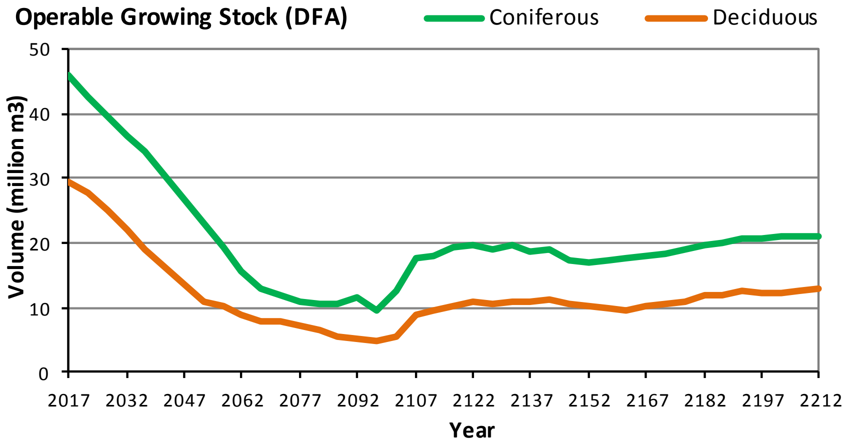


Figure 6-16. Coniferous and deciduous operable growing stock

Both the coniferous and deciduous operable growing stock show a steep drop for the first 80 years before increasing slightly and levelling off for the remainder of the planning period. The initial decline in growing stock is typical for a mature forest with high levels of standing merchantable volume at the modelling start date. The increased volumes projected in RSA yield curves helps to lift the growing stock level after the low point at year 80.

The strata making up the operable coniferous and deciduous growing stock are shown in Figure 6-17and Figure 6-18 respectively.

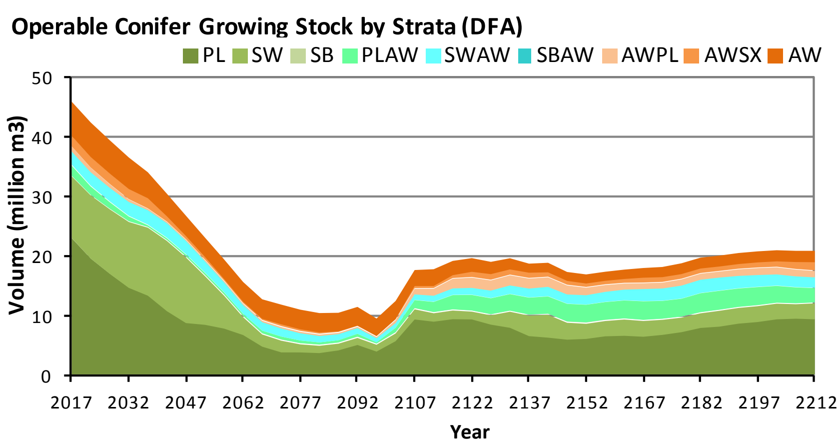


Figure 6-17. Operable coniferous growing stock by stratum

Figure 6-17 shows the amount of merchantable coniferous volume initially contained in the pure pine (PL) and white spruce (SW) strata. After 2097 (year 80), however the proportion of coniferous growing stock within mixedwood strata increases due to higher proportions of coniferous species in mixedwood RSA yield curves.

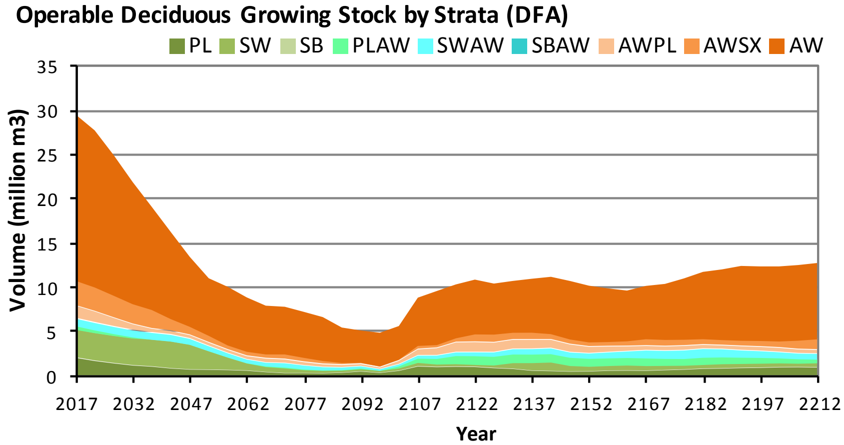


Figure 6-18. Operable deciduous growing stock by stratum

Deciduous volume within pure aspen (AW) stands dominate deciduous growing stock levels (Figure 6-18).

6.6.3.8 Age Class

Figure 6-19 shows the predicted age class distribution of the gross forested landbase in 20 year classes from 0 to 200 over the 200 year planning period. As the mature stands on the active landbase are harvested and the stands on the passive landbase age, the landbase becomes both a regulated and old forest at the same time.

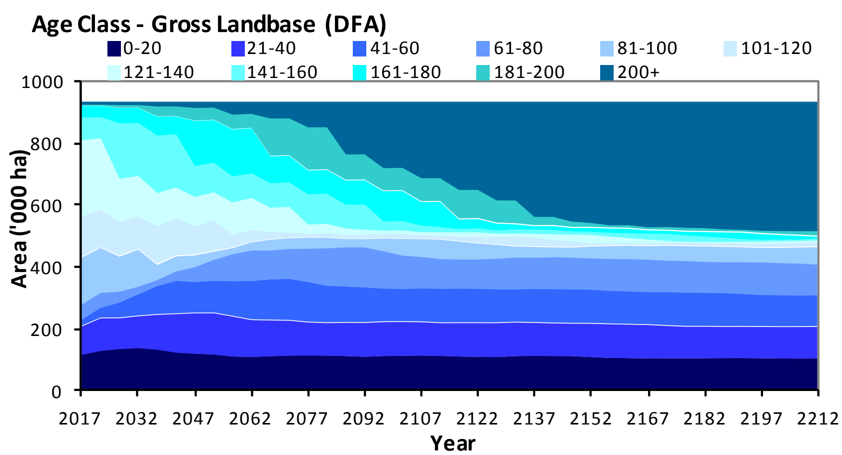


Figure 6-19. Age class distribution on the gross forested landbase

The age class distribution on the active landbase (Figure 6-20) is forecasted to be fairly constant after becoming a regulated forest within the first 50 years of the planning horizon. Most of the area is contained within age classes from 0 to 80 years of age, but a consistent level of older age class (> 120) is maintained over the planning horizon.

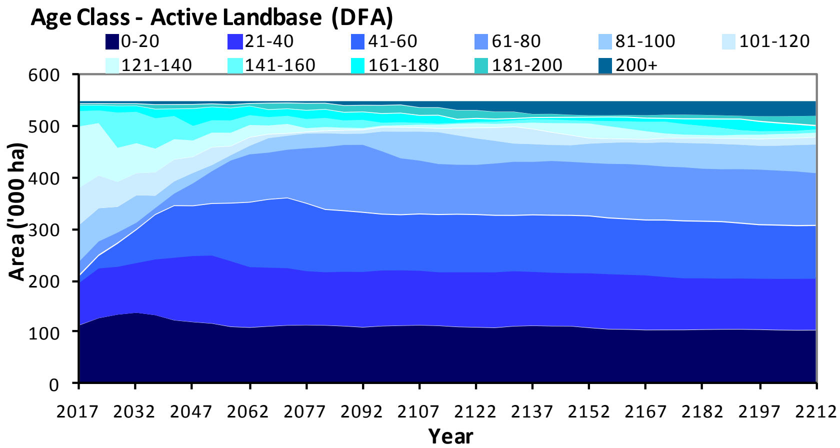


Figure 6-20. Age class distribution on the active landbase

6.6.3.9 Seral Stage

Seral stages used to classify the forest into development phases that represent a stands life cycle are defined in section 6.5.5. Figure 6-21 shows the predicted area distribution of the various seral stages on the gross forested landbase over the 200 year planning horizon. At the start of the planning period a significant portion of the forest is mature. As stands on the passive landbase never get harvested, the area of old seral stage increases as they age, resulting in approximately 50% of the forested landbase being considered old. This has important implications for non-timber values such as wildlife habitat.

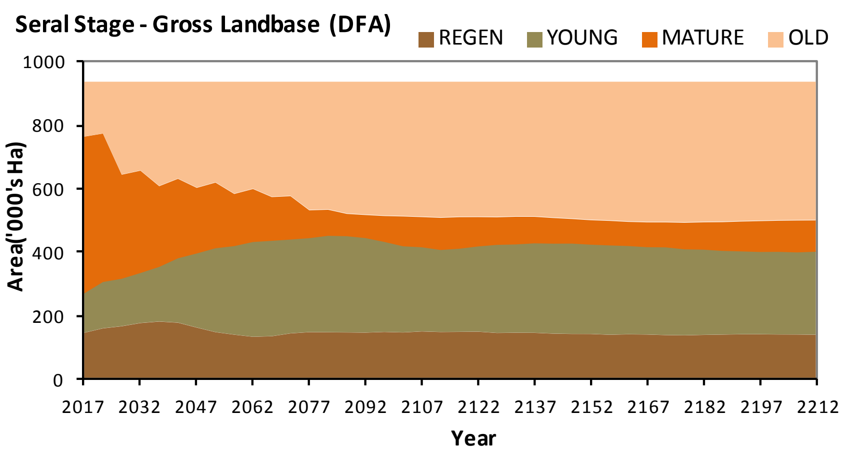


Figure 6-21. Seral stage distribution on the gross forested landbase

Figure 6-22 shows the percent of old seral stage by ecological unit on the gross landbase. While most of the ecological units are forecasted to have around 20% of their total area within the old seral stage after the first 50 years, almost 100% of the black spruce (SB) ecological unit will be old after the first 80 years. This is due to the fact that only 1% (2,677ha) of the SB is part of the active landbase, with the remaining 99% (256,510ha) part of the passive landbase and consequently never harvested.

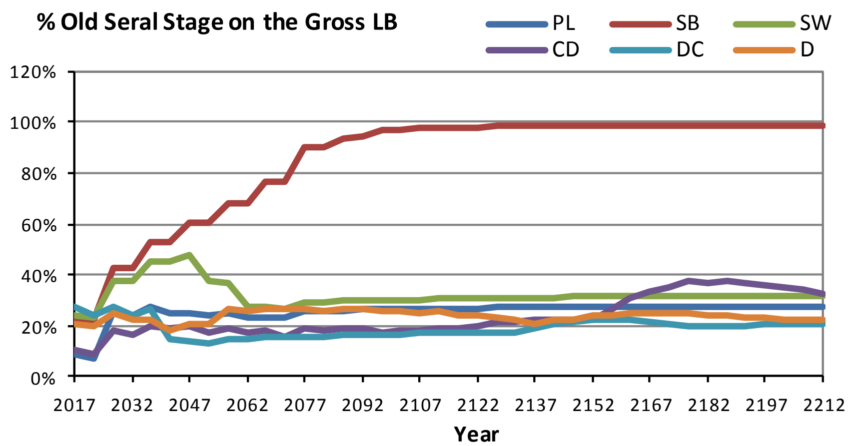


Figure 6-22. Percent of old seral stage by ecological unit on the gross forested landbase

Figure 6-23 shows the predicted seral stage distribution on the active landbase. While a large portion the active landbase is either mature or old at the start of the planning period, the majority of the forest is either young or regenerating after the first 20 years. A small percentage of old forest is, however preserved throughout the 200 year period.

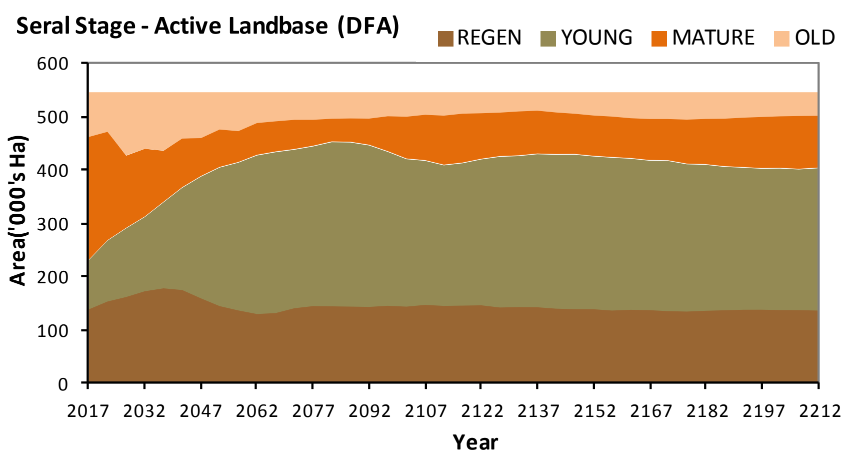


Figure 6-23. Seral stage distribution on the active landbase

In order to maintain old forest on the active landbase as a coarse filter approach contributing towards non-timber values, each ecological unit was constrained in Patchworks to maintain a minimum of 5% in the old seral stage, as shown in Figure 6-24. Only the CD and D ecological units remained above the 5% minimum for the entire 200 year period.

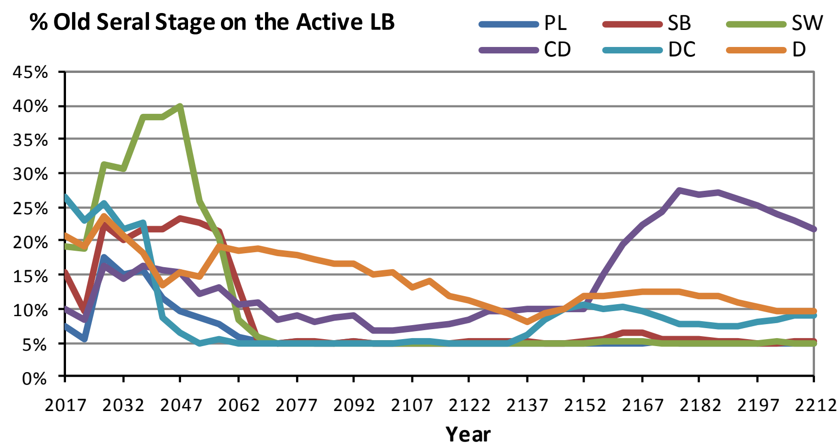


Figure 6-24. Percent of old seral stage by ecological unit on the active landbase

Figure 6-25 shows the seral stage distribution over time on that part of the forested passive landbase that could potentially be reinstated as part of the active landbase in future FMPs. Included are lake and river buffers (deletion category: WATERBUF), operational deletions (deletion categories: SLOPE, NSR, ARISRECON, OPDEL, SHS and OPBUFFER) and subjective deletions (deletion categories: UNPRODUCTIVE, TPR, LARCH, BIRCH, BLKSPRUCE, PINE and ISO). These deletions represent a total of 331,000 ha of forested landbase which all becomes part of the old seral stage over time.

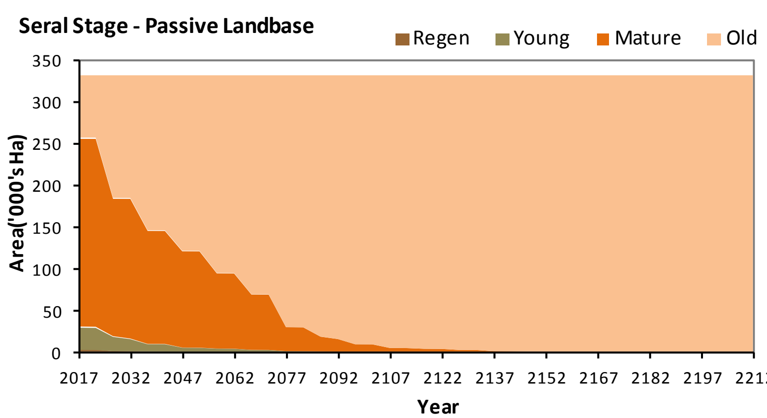


Figure 6-25. Seral stage distribution on part of the passive landbase

6.6.3.10 Opening Patch Sizes

As explained in section 6.5.10, harvest patch size targets were applied in the Patchworks model to control spatial harvest patterns. Two different types of opening patch targets were implemented, *ie*. harvest blocks and harvest patches.

Harvest blocks are aggregates of stands within 5m of each other. They were controlled to achieve a distribution of sizes (Figure 6-26). Small harvest blocks in the 0-5ha and 5-30ha classes were discouraged, particularly during the first 20 years, while larger block sizes were encouraged.

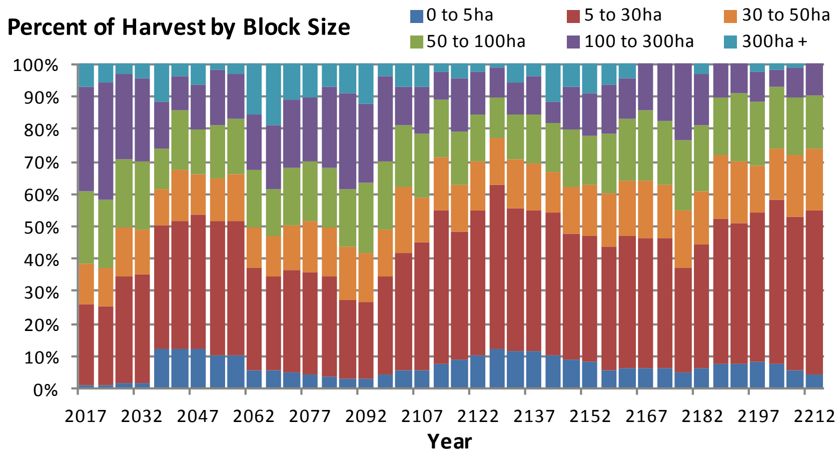


Figure 6-26. Percent of area harvested by harvest block size category

To emulate the annual clustering of harvesting operations and promote a more operational sequence, harvest patch targets were also created in Patchworks. Stands were considered to be part of the same patch if they were within 300m of each other. Figure 6-27 shows the predicted distribution of harvest patch sizes. The smaller 0-50 ha class was discouraged in an attempt to achieve operationally efficient patch sizes. This was however difficult to achieve in some parts of the DFA due to the existing forest being highly fragmented as a result of past harvesting and other industrial development.

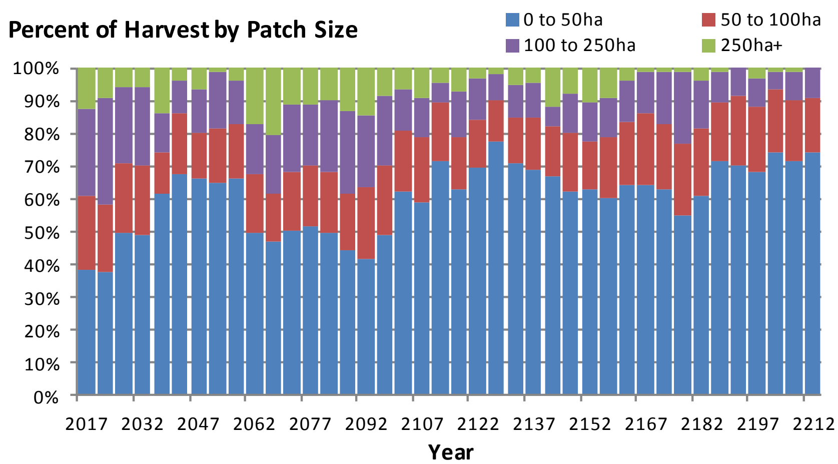


Figure 6-27. Percent of area harvested by harvest patch size category

6.6.3.11 Interior Old Forest

Old interior forest patches are defined as any patch greater than 120 ha that is composed of stands greater than 120 years old, using a 15m adjacency distance. Figure 6-28 shows the percentage of area that is greater than 120 years old that resides within a 120 ha or greater patch. With an initial value of approximately 65%, the percentage of interior old forest is predicted to increase gradually over time, leveling off at just under 80%. Additional reporting on this metric can be found in *Chapter 5: VOITs*.

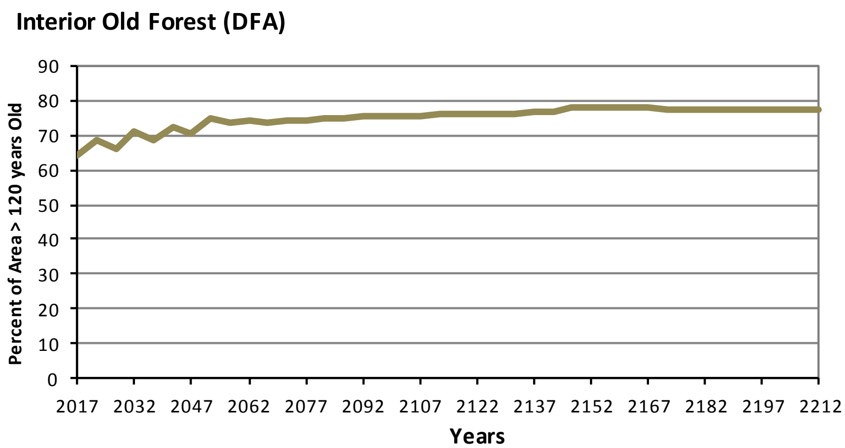


Figure 6-28. Percent of Interior Old Forest on the DFA

6.6.4 Mid-term Timber Supply

As explained in section 6.1, Weyerhaeuser's 2017 PFMS attempts to balance the need to harvest MPB susceptible pine stands in line with the Healthy Pine Strategy over the short-term, while scheduling aging white spruce stands in the mid-term. The surge cut for the first 10 years helps to address the MPB risk by reducing the amount of highly susceptible mature pine and creating young regenerating stands to support future harvest and non-timber values. However, not all the available pine can be harvested over the surge period resulting in a continuing focus on pine for a further 25 years after the surge period. Deferring the harvest of spruce until older ages carries the risk of additional losses in natural stand growing stock due to breakup and decay as the stands age. Figure 6-9 demonstrates the shift in the species harvested over time from the pine at the beginning to largely spruce as the harvest age increases (Figure 6-13).

Low points for both coniferous and deciduous growing stock levels occur approximately 60 to 90 years in the future, after which they're predicted to increase (Figure 6-16). This is a critical period for timber supply when operational flexibility may be limited. Given the old age of the spruce stands and the risk from MPB, the reduction in growing stock predicted in the mid-term will most likely occur even if current harvest levels are reduced. The PFMS was selected to balance current and mid-term AAC risks.

The low points in growing stock levels mentioned above coincide with the transition from harvesting the natural forest to harvesting a managed forest (Figure 6-5). Accurate predictions of regenerated harvest volumes are critical in supporting the mid-term AAC and long-term sustainability. Data collected from regenerated stands predict higher timber yields than natural stands, supporting higher harvest levels. As the older natural stands are harvested they are replaced by higher yielding managed regenerating stands which are harvested at a younger age thereby ensuring that timber is available for harvest once the natural stands are depleted over the mid-term.

Species predictions in the RSA yield curves are also important to maintaining harvest levels over the mid- to long-term. Figure 6-17 indicates that after the first 60 to 90 years, dependence on mixedwoods (PlAw, SwAw and AwPl strata) to maintain the coniferous harvest level increases. This is not due to an increase in available mixedwood stands but is rather due to an increased proportion of coniferous species in the mixedwood RSA yield curves. Weyerhaeuser will continue to monitor the yields and species distribution in the managed regenerated stands to address future risks inherent in not achieving the RSA assumptions.

Other strategies to address mid-term timber supply and long-term sustainability that were either implemented or considered for implementation in the development of the 2017 PFMS include:

- Regenerated stand productivity. Managed stand site index estimates obtained from the Regenerated Stand Productivity study conducted in 2007-2008 for aspen, poplar, lodgepole pine and white spruce were used to enhance natural stand yields for pre-1991 managed stands.
- Tree Improvement. Weyerhaeuser developed tree improvement (genetic) yield curves for Region I white spruce (I1) to reflect yield increases resulting from the deployment of genetically improved stock from the controlled parentage program.
- Non-declining yield functions were applied to both coniferous and deciduous operable growing stock levels for the last 50 years of the 200 year planning horizon. This ensured that there was no sudden drop in the growing stock towards the end of the planning horizon.
- The post-surge coniferous harvest level was constrained to be no less than 90% of the 200 year average even flow harvest level.
- Minimum harvest age. Minimum harvest ages for managed regenerated stands could potentially have been reduced by 10 years or more, compared to natural stand ages, in order to access additional volume over the mid-term. This option was, however not implemented as it was not required in the PFMS to achieve the forest management objectives.

6.6.5 Non-Timber Assessments

6.6.5.1 Wildlife Habitat

The objective of VOIT 14 (1.2.1.1) of Weyerhaeuser's 2017 FMP is to maintain habitat for identified high value species. These species are identified as being barred owl, grizzly bear, specific songbirds and east slopes cold water fish.

In the past, fine-filter species values were modelled and evaluated by the AAF only after the preferred Spatial Harvest Sequence was submitted for approval. Waiting until after completion and submission of the preferred SHS to evaluate risks to wildlife habitat and other non-timber values results in significant uncertainty in the assessment and final approval of a preferred harvest scenario. The cost and time required to rerun the TSA, if required, can be high.

AAF recently introduced a number of habitat models for use in FMP development to allow companies to include the assessment of fine-filter species values directly into the forest management planning process and thereby reducing the likelihood that the TSA will need to be re-run or approval delayed. Some of the models, songbirds and marten can be integrated directly into Patchworks, while the barred owl and grizzly bear models cannot be processed directly in Patchworks due to the spatial modeling requirements for these species.

The objective in the TSA was to limit the impact of harvesting activities on wildlife habitat by applying targets where necessary to achieve results within the thresholds required by AAF. This section provides information on the inclusion of the various species into the TSA process and summaries of the outputs for each of the wildlife species modelled.

6.6.5.1.1 Songbirds

Songbird metrics are derived from curves provided by AAF that define the relative abundance (RA) of each songbird within each forest strata. These curves were incorporated directly into the Patchworks model to allow control and reporting within the model. Two sets of RA curves were provided for each of the following songbirds; Bay-breasted Warbler (BBWA), Brown Creeper (BRCR), Black-throated Green Warbler (BTGW), Canada Warbler (CAWA), Ovenbird (OVEN) and Varied Thrush (VATH). The first curve is a standard curve that assumes no linear features while the second curve assumes the existence of hard linear (HLIN) features *i.e.*, roads. Details on the incorporation of HLIN features into the landbase and the TSA integration process can be found in *Annex IX* (*Appendices VI and IX)*.

Of the above listed species, Weyerhaeuser is not required to report on the Bay-breasted and Canada Warblers as the DFA is at the fringe of their range, resulting in very few sightings of these species during tri-annual surveys. Weyerhaeuser and AAF biologists agreed that modelling of these two species would not be necessary.

Thresholds for the reduction in RA value over time compared to the time zero value are:

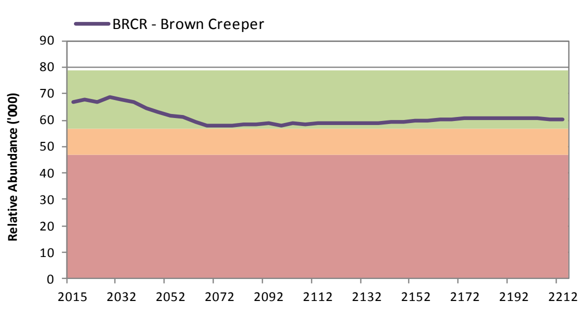
- 0 – 15% - Low risk. Considered acceptable, no further action required.
- 15 – 30% - Moderate risk. Considered outside acceptable limits, constraints will have to be applied in the TSA model.
- > 30% - High risk. Significant impact on habitat suitability, constraints will have to be applied in the TSA model.

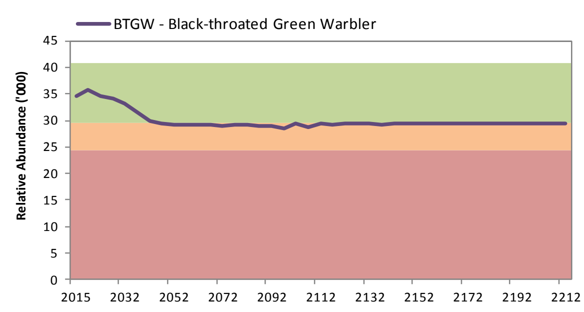
Table 6-22 shows the relative abundance values for four songbirds at years 0, 10, 20, 50, 100 and 200 and the percentage change from year 0 at each time step. Only the black-throated green warbler falls slightly below the 15% threshold (moderate risk) at years 50 and 100. By the end of the planning horizon the RA value is at the 15% threshold.

Table 6-22. Songbird RA values

Songbird		Year 0	Year 10		Year 20		Year 50		Year 100		Year 200	
		RA Value	RA Value	% Chg	RA Value	% Chg	RA Value	% Chg	RA Value	% Chg	RA Value	% Chg
BRCR	Brown Creeper	66,845	67,022	0.3%	67,586	1.1%	59,096	-11.6%	59,087	-11.6%	60,242	-9.9%
BTGW	Black-throated Green Warbler	34,691	34,704	0.0%	33,149	-4.4%	29,204	-15.8%	29,419	-15.2%	29,499	-15.0%
OVEN	Ovenbird	214,443	205,258	-4.3%	197,094	-8.1%	207,552	-3.2%	201,289	-6.1%	203,042	-5.3%
VATH	Varied Thrush	13,122	12,643	-3.6%	12,728	-3.0%	12,390	-5.6%	13,276	1.2%	13,416	2.2%

Figure 6-29 shows the trend in the RA values for each of the four songbirds over the 200 year period. The green band represents a change of less than negative 15% from current levels (range of low risk); orange indicates a negative 15 to negative 30% change (range of moderate risk); and red shows a negative 30% or greater change (range of high risk).





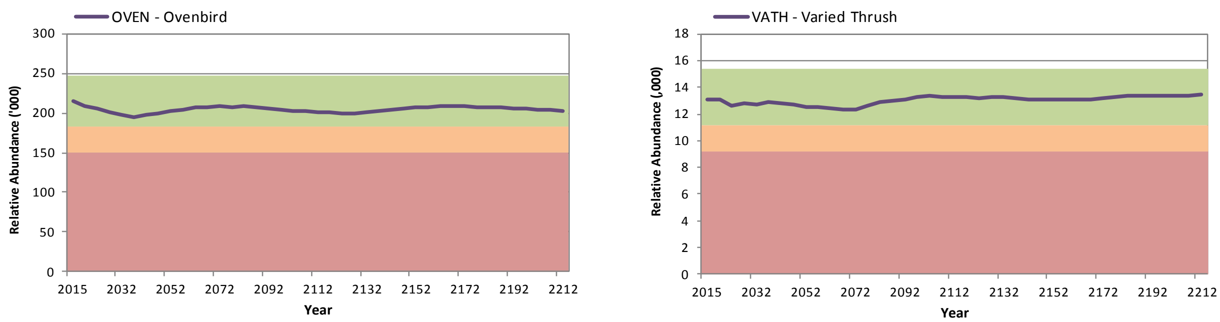


Figure 6-29. Songbird RA values

Neither the Ovenbird nor Varied Thrush required any controls to be applied in Patchworks as they remained above the 15% threshold over the entire 200 year period. Minimum targets were used for the Brown Creeper and Black-throated Green Warbler in particular in order to prevent their RA values from dropping below the 15% threshold.

Maps showing the predicted relative abundance on the DFA for each of the four songbirds for years 0, 10, 20 and 50 are presented in Appendix 6-1.

6.6.5.1.2 Marten

While the marten is not listed as a high value species in VOIT 14, Weyerhaeuser decided to include it as it is a species of concern to a number of stakeholders.

Marten indicators are included in the Patchworks model in a similar fashion as the songbirds. The marten model uses a habitat suitability index (HSI) in place of relative abundance, but the methodology of reporting is the same. The curves provided by AAF are based on a set of strata defining combinations of aspen, pine and white spruce and further split by site condition. Details on the TSA integration process can be found in *Annex IX* (*Appendix X: TSA-013 - Marten Habitat Modelling)*.

Thresholds for the reduction in HSI value over time compared to the time zero value are:

- 0 – 15% - Low risk. Considered acceptable, no further action required.
- 15 – 30% - Moderate risk. Considered outside acceptable limits, constraints will have to be applied in the TSA model.
- > 30% - High risk. Significant impact on habitat suitability, constraints will have to be applied in the TSA model.

Table 6-23 shows the HSI values at years 0, 10, 20, 50, 100 and 200 and the percent change in the marten HSI values from the time zero value. Figure 6-30 shows the trend in HSI values over the planning horizon. No controls were used in Patchworks for marten.

Table 6-23. Marten habitat suitability index values

Species	Year 0	Year 10		Year 20		Year 50		Year 100		Year 200	
	RA Value	RA Value	% Chg	RA Value	% Chg	RA Value	% Chg	RA Value	% Chg	RA Value	% Chg
Marten	207,060	189,836	-8.3%	186,843	-9.8%	184,509	-10.9%	183,356	-11.4%	191,302	-7.6%

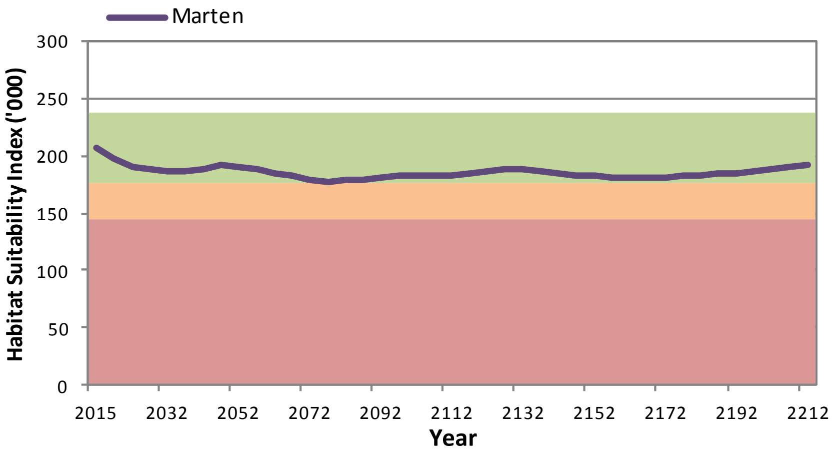


Figure 6-30. Marten habitat suitability index values

6.6.5.1.3 Barred Owl

For assessing changes in barred owl habitat, AAF has developed a model that can be used to describe the habitat at various points in time based on changes to the forest following Timber Supply Analysis modeling. The barred owl model could not be integrated with Patchworks. Current and future landbase conditions exported from the Patchworks model were used as inputs into the barred owl model, which is run in ArcGIS. The model creates a series of raster models of the DFA, including the percentage of older hardwood forest, percentage of older white spruce and balsam fir, area-to-perimeter ratio of forested stands greater than 30 years old, distance to old hardwood and white spruce older than 90 years, and distance to nearest forest openings younger than 30 years old. Using the pixel values from each of these derived raster models, a resource selection function (RSF) is then calculated for each raster across the landbase. Finally, the RSF rasters are then aggregated into larger rasters to estimate the habitat suitability for barred owl breeding pairs. The larger raster cells require a specific combination of the original raster values to be considered suitable for a breeding pair.

As the barred owl model could not be integrated directly into the TSA model, direct control in the TSA model to improve habitat suitability was not possible. However, the following patch targets based on relevant deciduous and mixedwood strata (Aw, AwSw & SwAw) were included in Patchworks :

- The first target attempts to encourage a better area-to-perimeter (ATOP) metric in the above strata over 30 years of age, and
- The second target encourages larger patches of stands of the above strata greater than 90 years of age.

Patches of 400 ha or greater where stands are no more than 15m apart were targeted in both of the above patch targets.

Details on the barred owl modeling process can be found in *Annex IX* (*Appendix VII: TSA-010 – Barred Owl Habitat Modelling)*.

As with the songbirds and marten, thresholds for the decrease in RSF value over time compared to the time zero value are:

- 0 – 15% - Low risk. Considered acceptable.
- 15 – 30% - Moderate risk. Considered outside acceptable limits.

- > 30% - High risk. Significant impact on habitat suitability.

The barred owl model was post-processed using outputs from the Patchworks PFMS scenario. The model produces two outputs based on habitat quality, RSF, which models the probability of occurrence, and the number of potential breeding pairs. Results were compiled for years 0, 10, 20, 50, 100 and 200 as presented in Table 6-24.

Table 6-24. Barred owl RSF values and potential breeding pairs

Year	Resource Selection Function		Potential Breeding Pairs	
	Mean RSF	% Change from Period 0	Count	% Change from Period 0
0	0.1346	-	668	-
10	0.1357	0.80	657	-1.7
20	0.1358	0.85	665	-0.5
50	0.1204	-10.58	500	-25.2
100	0.1241	-7.86	521	-22.0
200	0.1248	-7.27	535	-20.0

The change in mean RSF value over time remained well within the 15% threshold, indicating low risk of habitat loss. Change in the number of potential breeding pairs is also low risk for the first 20 years but drops below the 15% threshold (moderate risk) by year 50. Despite efforts to improve the breeding pair habitat through the inclusion of favourable habitat patch targets as explained above, the number of breeding pairs consistently remained below the 15% threshold over the periods reported.

The predicted outcomes of the barred owl habitat assessment were examined by the PDT who deemed the outcome over the first 20 years to be acceptable or low risk. Closer review of the results show that the 15% threshold for potential breeding pairs is first breached at approximately year 35, indicating a low risk outcome for at least the first 35 years. Recognizing the impact that forest harvesting activities can have on barred owl habitat however, strategies to mitigate this impact have been implemented by Weyerhaeuser. These strategies are presented in Chapter 7, section 7.10.3.4.5.

Maps of barred owl RSF values and potential breeding pair locations on the DFA for years 0, 10 and 50 are presented in Appendix 6-2.

6.6.5.1.4 Grizzly Bear

Grizzly bear habitat was modeled using the Foothills Research Institute's (fRI) habitat state model. Grizzly bear habitat was not explicitly modeled in the TSA, as the tools were not designed for direct incorporation in TSA models. Aggregating stands into larger harvest blocks helps to mitigate impacts on grizzly bear mortality as condensed harvesting reduces the amount of and time that roads are left open and used.

With the habitat areas being spread out between a number of small parcels of Grizzly Bear Watershed Units (GBWU) and the three population units on the DFA, it was decided that results should be reported at the landbase rather than watershed level. This ensured that harvest operations within these smaller parts of watersheds did not misrepresent what was happening to the entire watershed area. Details on the grizzly bear modeling process can be found in *Annex IX* (*Appendix VIII: TSA-011 – Grizzly Bear Habitat Modelling)*.

The target for grizzly bear habitat is to maintain or increase the number of hectares of combined primary and secondary habitat as compared to the time zero value. Table 6-25 shows the results from the fRI's habitat state model using outputs from the PFMS scenario. The combined primary and secondary habitat for all population units on the DFA increased by 11% and 12% relative to time 0 after 10 and 20 years respectively.

Maps showing the extent and change in grizzly bear habitat on the DFA at years 0, 10 and 20 are presented in Appendix 6-3.

Table 6-25. Grizzly bear habitat

Attribute	Projection				
	Year 0	Year 10		Year 20	
	Ha	Ha	% Chg from Year 0	Ha	% Chg from Year 0
Primary Habitat	26,361	35,917	36%	38,112	33%
Secondary Habitat	41,285	39,343	-5%	38,498	-7%
Primary and Secondary Habitat	**67,646**	**75,260**	**11%**	**76,610**	**12%**
Non-critical Habitat	87,729	75,203	-14%	71,509	-22%
Secondary Sink	16,270	19,447	20%	21,170	25%
Primary Sink	10,340	12,075	17%	12,697	20%

6.6.5.1.5 East Slopes Cold Water Fish

Sensitive cold water fish species of concern in the DFA include the Athabasca Rainbow Trout, Bull Trout and Arctic Grayling. AAF is in the process of developing models and/or indicators to determine the impact of disturbances on the habitat quality of these species. These were unavailable for this FMP. In the absence on these models, Equivalent Clearcut Area (discussed in the next section) was used as a measure of fish habitat disturbance for groups of watersheds representing the above mentioned species. The watershed groupings, showing the watershed name and number, are as follows[7]:

Athabasca Rainbow Trout : Groat (1), Cairn (2), Mcleod (3), Oldman (4), Shinningbank (5), Trout (7), Whitefish (12), Deer (14), Edson (19), Prarie (22), Mason (23), Sundance East (25), Obed (26), Sundance West (27), Athabasca (28), West Carrot (37), East Carrot (39), Upper Moose (41), Upper Sang (47), Minnow (48), Embarras (49), Rodney (54), Swartz (57), Erith (58), Svedberg (59), Coyote (66), Half Moon (71) and Raven (72).

Bull Trout. Four different watershed groupings were implemented for bull trout, as follows:

1. Blackstone Watersheds : *Middle Blackstone (112)/Hansen (142)*, East Rundell (114), Chungo (145), Upper Brown (113), Lower Wapiabi (153), Penti (152), Lookout (151), Sturrock (159) and Upper Wapiabi (158). The South Lookout and East Sturrock watersheds are omitted because they cover less than 500 ha within the DFA.
2. Nordegg Watersheds : East Nordegg (101), *North Rapid (117)/Rapid (132)*, Nordegg (102), Owl (116), North Brewster (121), *North Colt (131)/Sutherland (138)*, Wawa (129), Stephens (125) and Grey Owl (130).
3. Brazeau Watersheds : Broken Arm (100), Lower Blackstone (105), Negraiff (95), North Elk (90), Middle Marshybank (118), North Marshybank (106) and South Marshybank (133).

[7] Some smaller watersheds were merged for ECA reporting purposes. These watersheds are hydrologically connected and adjacent to each other, and do not exceed 10,000 ha in size. The merged watersheds are *italicized* in the listings.

4. Elk River Watersheds : South Elk (89).

Arctic Grayling : Upper North Rat (50), *West Eta (51)/Varty (63)*, East Eta (53), Lower North Rat (62), *Tom (64)/Dzida (67)*, Paddy (69), South Rat (73), East Zeta (74), West Zeta (75), Upper Pembina (77), Middle Pembina (78), Jerry (80), Rehn (81), Dismal (82), Baker (84), Tall Pine (85) and Reservoir (86).

Figure 6-31 shows the location of the above watershed groupings on the DFA.

The ECA target for each of the above listed watersheds is 30% for years 0 to 20. For watersheds with ECA values >30% due to existing (year 0) disturbances, ECA values must demonstrate a continuous downward trend or not exceed 35% in years 0 to 20. Table 6-26, Table 6-27 and Table 6-28 shows the predicted ECA values at years 0, 10 and 20 for the Athabasca Rainbow Trout, Bull Trout and Arctic Grayling watersheds respectively.

Table 6-26 . ECA values for Athabasca Rainbow Trout watersheds

Watershed		Full Watershed Area	Area in DFA	Watershed ECA percentage		
				Year 0	Year 10	Year 20
Number	Name	ha	ha	2017	2027	2037
1	Groat	13,247	3,752	29%	35%	34%
2	Cairn	15,578	2,018	8%	11%	12%
3	Mcleod	17,839	2,946	20%	21%	28%
4	Oldman	14,939	5,526	18%	27%	32%
5	Shinningbank	19,469	6,637	31%	29%	23%
7	Trout	26,296	19,781	26%	30%	30%
12	Whitefish	21,913	8,810	21%	23%	25%
14	Deer	13,757	5,775	27%	27%	21%
19	Edson	37,509	2,975	15%	17%	22%
22	Prarie	15,083	2,209	11%	14%	22%
23	Mason	11,188	1,502	9%	10%	17%
25	Sundance East	24,444	11,415	5%	18%	25%
26	Obed	13,119	11,306	5%	10%	14%
27	Sundance West	87,943	17,705	8%	14%	19%
28	Athabasca	58,254	1,586	3%	8%	19%
37	West Carrot	9,241	7,183	14%	16%	14%
39	East Carrot	7,505	7,488	19%	28%	30%
41	Upper Moose	13,762	10,065	3%	9%	13%
47	Upper Sang	8,894	8,894	26%	25%	25%
48	Minnow	15,446	15,447	23%	22%	18%
49	Embarras	7,160	2,141	13%	28%	25%
54	Rodney	4,156	4,156	11%	16%	15%
57	Swartz	24,282	16,419	6%	11%	17%
58	Erith	6,252	2,973	6%	13%	12%
59	Svedberg	11,625	11,625	3%	12%	20%
66	Coyote	26,175	24,216	11%	28%	32%
71	Half Moon	19,920	19,867	23%	28%	27%
72	Raven	16,442	9,463	14%	25%	29%
Total / Average		**561,437**	**243,879**	**15%**	**21%**	**23%**

Table 6-27. ECA values for Bull Trout watersheds

Watershed		Full Watershed	Area in	Watershed ECA percentage		
		Area	DFA	Year 0	Year 10	Year 20
Number	Name	ha	ha	2017	2027	2037
Blackstone Watersheds						
112/142	Middle Blackstone / Hansen	13,775	8,847	8%	17%	29%
114	East Rundell	9,529	9,516	36%	43%	39%
145	Chungo	27,377	11,664	0%	9%	11%
113	Upper Brown	24,866	2,461	1%	13%	12%
153	Lower Wapiabi	1,443	1,444	0%	0%	0%
152	Penti	5,100	4,114	0%	5%	5%
151	Lookout	6,257	6,040	8%	19%	21%
159	Sturrock	5,800	5,549	7%	4%	3%
158	Upper Wapiabi	17,789	3,744	0%	2%	2%
Total / Average		**111,935**	**53,379**	9%	16%	18%
Nordegg Watersheds						
101	East Nordegg	5,797	5,798	5%	5%	6%
117/132	North Rapid / Rapid	11,380	7,508	23%	26%	26%
102	Nordegg	33,360	33,360	19%	18%	15%
116	Owl	4,995	4,994	16%	23%	21%
121	North Brewster	8,160	8,161	32%	40%	34%
131/138	North Colt / Sutherland	14,105	3,374	30%	36%	32%
129	Wawa	9,655	9,581	27%	37%	34%
125	Stephens	14,390	14,379	25%	32%	30%
130	Grey Owl	5,128	4,350	6%	13%	18%
Total / Average		**106,970**	**91,505**	21%	24%	23%
Brazeau Watersheds						
100	Broken Arm	10,697	3,496	17%	23%	29%
105	Lower Blackstone	22,181	19,229	24%	30%	28%
95	Negraiff	10,090	5,870	10%	11%	12%
90	North Elk	13,459	10,536	12%	27%	27%
118	Middle Marshybank	5,002	2,685	0%	1%	1%
106	North Marshybank	15,266	10,622	11%	21%	20%
133	South Marshybank	10,789	5,185	0%	25%	24%
Total / Average		**87,484**	**57,623**	14%	24%	23%
Elk River Watersheds						
89	South Elk	16,445	4,525	15%	33%	35%
Grand Total / Average		**322,834**	**207,032**	16%	22%	22%

Table 6-28. ECA values for Arctic Grayling watersheds

Watershed Number	Name	Full Watershed Area ha	Area in DFA ha	Watershed ECA percentage Year 0 2017	Year 10 2027	Year 20 2037
50	Upper North Rat	10,123	10,123	12%	23%	25%
51/63	West Eta / Varty	7,650	7,650	15%	23%	30%
53	East Eta	13,417	13,416	24%	30%	33%
62	Lower North Rat	6,691	6,691	14%	19%	30%
64/67	Tom / Dzida	6,176	6,176	14%	21%	33%
69	Paddy	22,877	22,878	12%	16%	23%
73	South Rat	17,467	17,466	20%	24%	25%
74	East Zeta	6,245	6,244	23%	28%	31%
75	West Zeta	13,019	13,019	26%	34%	37%
77	Upper Pembina	33,770	12,987	27%	31%	32%
78	Middle Pembina	2,934	2,934	21%	25%	26%
80	Jerry	3,058	3,058	12%	19%	25%
81	Rehn	5,645	5,646	20%	22%	26%
82	Dismal	27,826	17,793	19%	29%	32%
84	Baker	3,940	3,939	11%	11%	10%
85	Tall Pine	15,812	15,813	12%	24%	29%
86	Reservoir	5,859	5,859	8%	11%	11%
Total / Average		**202,511**	**171,694**	**18%**	**24%**	**28%**

While a few individual watersheds exceed the target threshold values, averages for the grouped watersheds are within threshold levels. Mitigation strategies, as outlined in Chapter 7 section 7.9.1.2 will be applied under the following circumstances:

- ECA results are between 30 and 50 % (moderate risk), and
- ECA exceeds 30 to 35% within identified sensitive cold water fish species (Athabasca Rainbow Trout, Bull Trout and Arctic Grayling) watersheds, as per VOIT 14 (Chapter 5 Section 5.3.1.14).

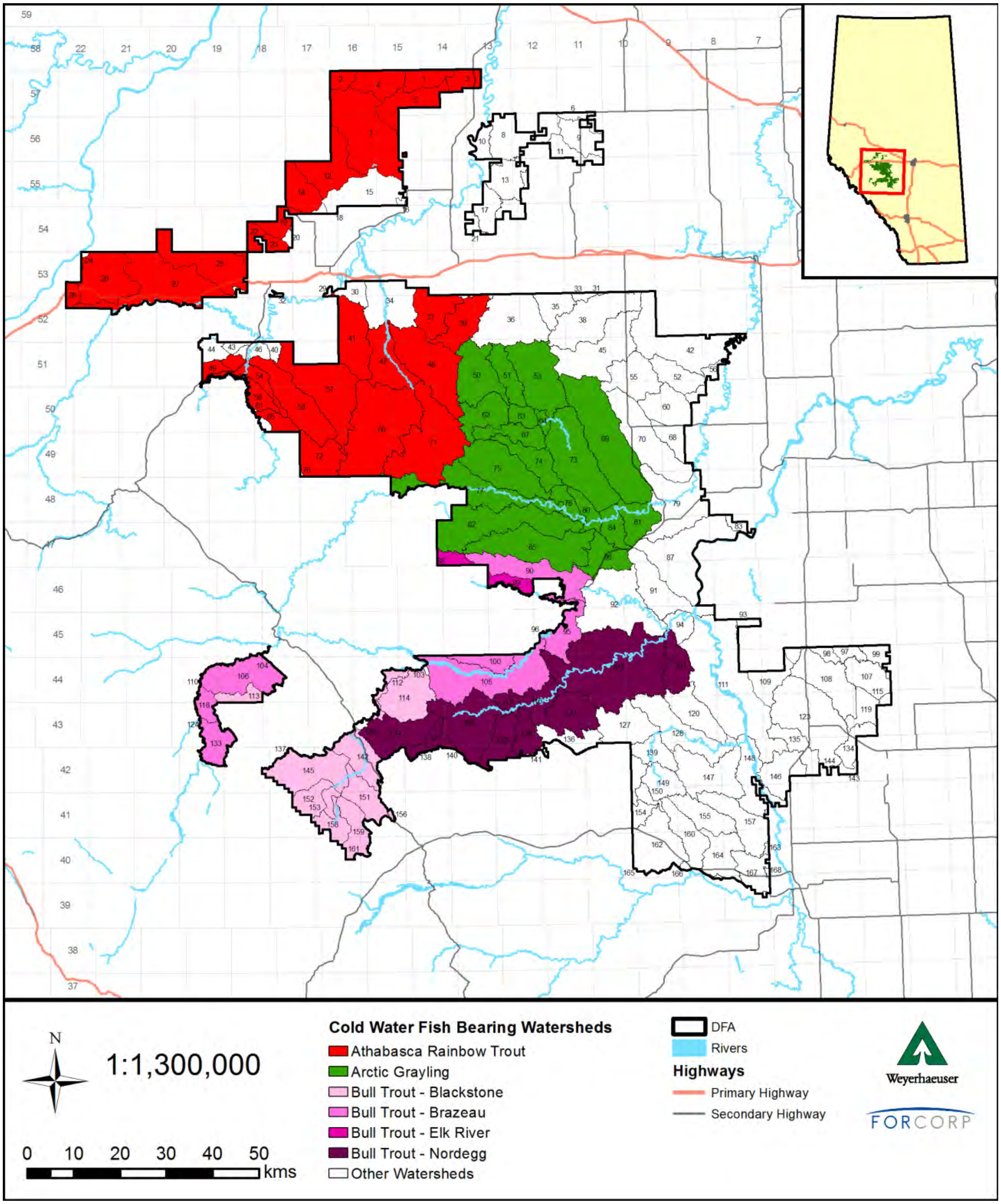


Figure 6-31. Cold water fish watersheds

6.6.5.2 Watershed Analysis

Watershed runoff was evaluated using the Equivalent Clearcut Area (ECA) methodology. This method uses ECA curves that match each of strata based yield curves used to determine volumes. Each curve is based on a value ranging from one (1) at stand age zero *ie*. at maximum runoff, and a value of zero (0), or no runoff, when the total volume yield curve reaches maximum current annual increment (CAI). Figure 6-32 shows the relationship between the volume and calculated ECA curve for a single yield stratum. Following disturbance (age zero), the ECA value is 1, meaning that the entire harvest area contributes to the ECA area. At approximately 70 years of age (when max CAI occurs) the ECA value falls to zero signifying that hydrologic recovery is complete and ECA area will be zero, and will remain zero until the next disturbance.

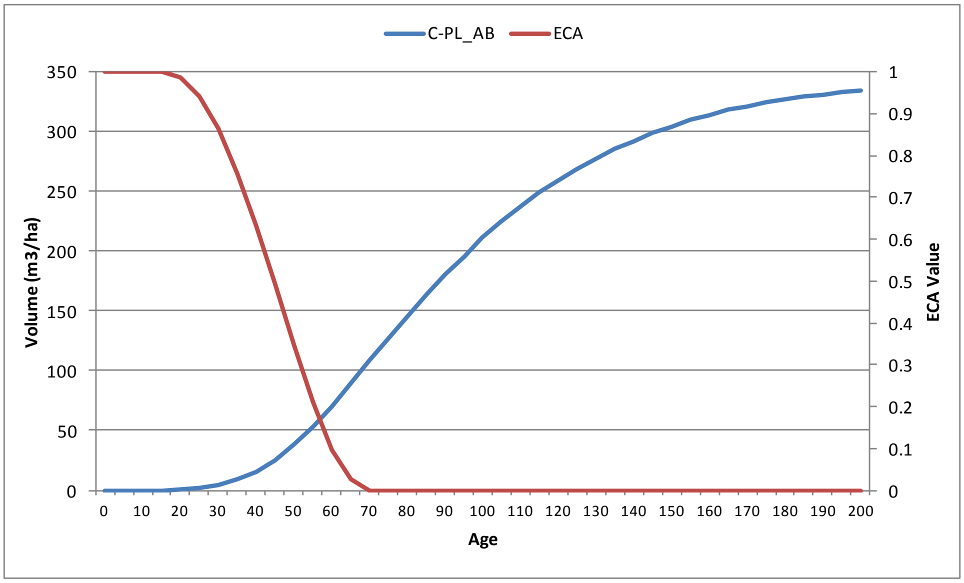


Figure 6-32. Volume and ECA curves for the natural curve C-PL_AB

The advantage of this methodology is that the ECA yields can be incorporated directly into Patchworks allowing control and reporting of ECA values by watershed over the entire planning horizon. The total ECA value for each watershed is divided by the total area of the watershed to determine the percentage. The following ECA thresholds are used to define the risk levels associated with vegetation removal in each watershed:

- ECA < 30% - low risk;
- ECA is 30 – 50% - moderate risk, operational strategies may be required for mitigation;
- ECA > 50% - high risk, targets applied in the TSA model to keep the ECA % below this level.

There are a total of 165 watersheds on the Weyerhaeuser DFA, of which 22 are less than 500 ha in size (within the DFA). Only watersheds with a minimum size of 500 ha within the DFA boundary are assessed. For additional information on the application of the ECA methodology in the TSA model see *Annex IX* (*Appendix XI: TSA-014 – Watershed Assessment (ECA): Integrating ECA into the Spatial TSA Modelling).*

Figure 6-33 presents an area weighted ECA result for all watersheds on the DFA over the 200 year time period. As a result of the controls applied in the TSA model, no watersheds breech the 50% threshold at any time over the 200 years. Approximately 5 to 20% of the total watershed area remains in the 30 to

49% moderate risk category over the planning horizon. Operational strategies to deal with these watersheds are included in *Chapter 7: FMP Implementation*.

A table showing the predicted ECA values for each watershed at years 0, 10, 20, 50 and 100 is included in Appendix 6-4, together with maps for the same periods.

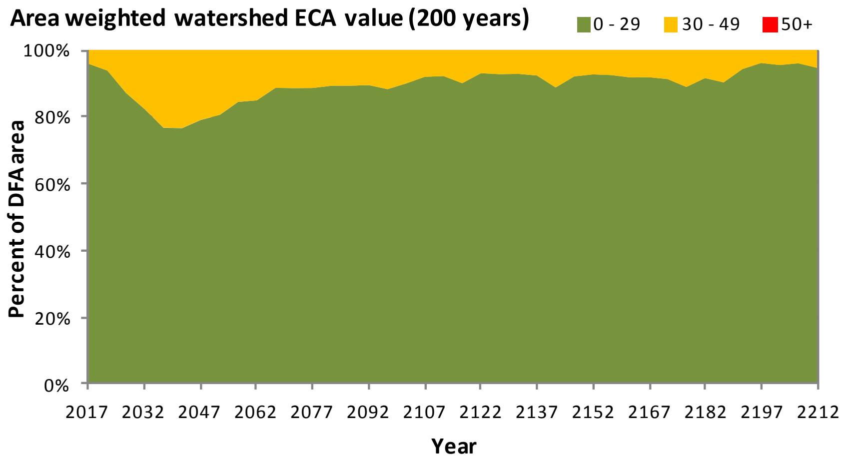


Figure 6-33. Area weighted ECA values over the 200 year period

6.6.6 Spatial Harvest Sequence

The SHS is one of the primary outputs of the PFMS. It directs harvesting activities for all operators on the DFA for the next 10 to 20 years. The stands selected for harvest will provide each operator with their recommended harvest levels and the impacts of harvesting the stands in the recommended periods have been evaluated against all the timber and non-timber values and indicators described in the previous sections. Two maps of the 20 year PFMS SHS are included in *Annex X: Spatial Harvest Sequence*. One map shows the total SHS by decade while the second shows the total SHS by timber operator.

6.6.6.1 Operator SHS Sign-off

Timber operators on the DFA were requested to provide a letter indicating that they were provided adequate opportunity to review and provide input into the final spatial harvest sequence. Letters were received from all operators and copies are included in *Annex X: Spatial Harvest Sequence*.

6.6.6.2 Strata Description Table

Strata description tables (SDT) for each timber operator and the entire DFA, as required in section 6.2 of the Planning Standard, are included in *Annex X: Spatial Harvest Sequence*.

6.6.7 PFMS Datasets

PFMS modelling data and outputs are described in section 4 of *Annex IX: Timer Supply Analysis*.

6.7 References

Alberta 2006. Alberta Forest Management Planning Standard. Version 4.1, April 2006. Alberta Sustainable Resource Development, Public Lands and Forest Division, Forest Management Branch. 112 pages.

Alberta 2015. ARIS Net Landbase Reconciliation Procedures. February 10, 2015.

Alberta 2016. Alberta Agriculture and Forestry. Forestry Division. Priority Setting in the Pine Strategy. September 20, 2016.

Weyerhaeuser 2005. Sustained Yield Unit R12 Detailed Forest Management Plan 2000-2015. December 2005. Weyerhaeuser Company Ltd. Drayton Valley, Alberta.

Weyerhaeuser 2006. Detailed Forest Management Plan 2004-2014. April 2006. Weyerhaeuser Company Ltd. Edson, Alberta.

Weyerhaeuser 2008. Mountain Pine Beetle Addendum. Weyerhaeuser Company Ltd. Edson, Alberta. (FMA # 9700035)

Weyerhaeuser 2008. Mountain Pine Beetle Addendum. Weyerhaeuser Company Ltd. Drayton Valley, Alberta. (FMA # 0500042)

Appendix 6-1 – Maps of songbird relative abundance

Maps showing the forecast relative abundance for four different songbirds at years 0, 10, 20 and 50 are presented in this appendix. See section 6.6.5.1.1 for more information.

1. Brown Creeper – Year 0 (2017)
2. Brown Creeper – Year 10 (2027)
3. Brown Creeper – Year 20 (2037)
4. Brown Creeper – Year 50 (2067)
5. Black-throated Green Warbler – Year 0 (2017)
6. Black-throated Green Warbler – Year 10 (2027)
7. Black-throated Green Warbler – Year 20 (2037)
8. Black-throated Green Warbler – Year 50 (2067)
9. Ovenbird – Year 0 (2017)
10. Ovenbird – Year 10 (2027)
11. Ovenbird – Year 20 (2037)
12. Ovenbird – Year 50 (2067)
13. Varied Thrush – Year 0 (2017)
14. Varied Thrush – Year 10 (2027)
15. Varied Thrush – Year 20 (2037)
16. Varied Thrush – Year 30 (2067)

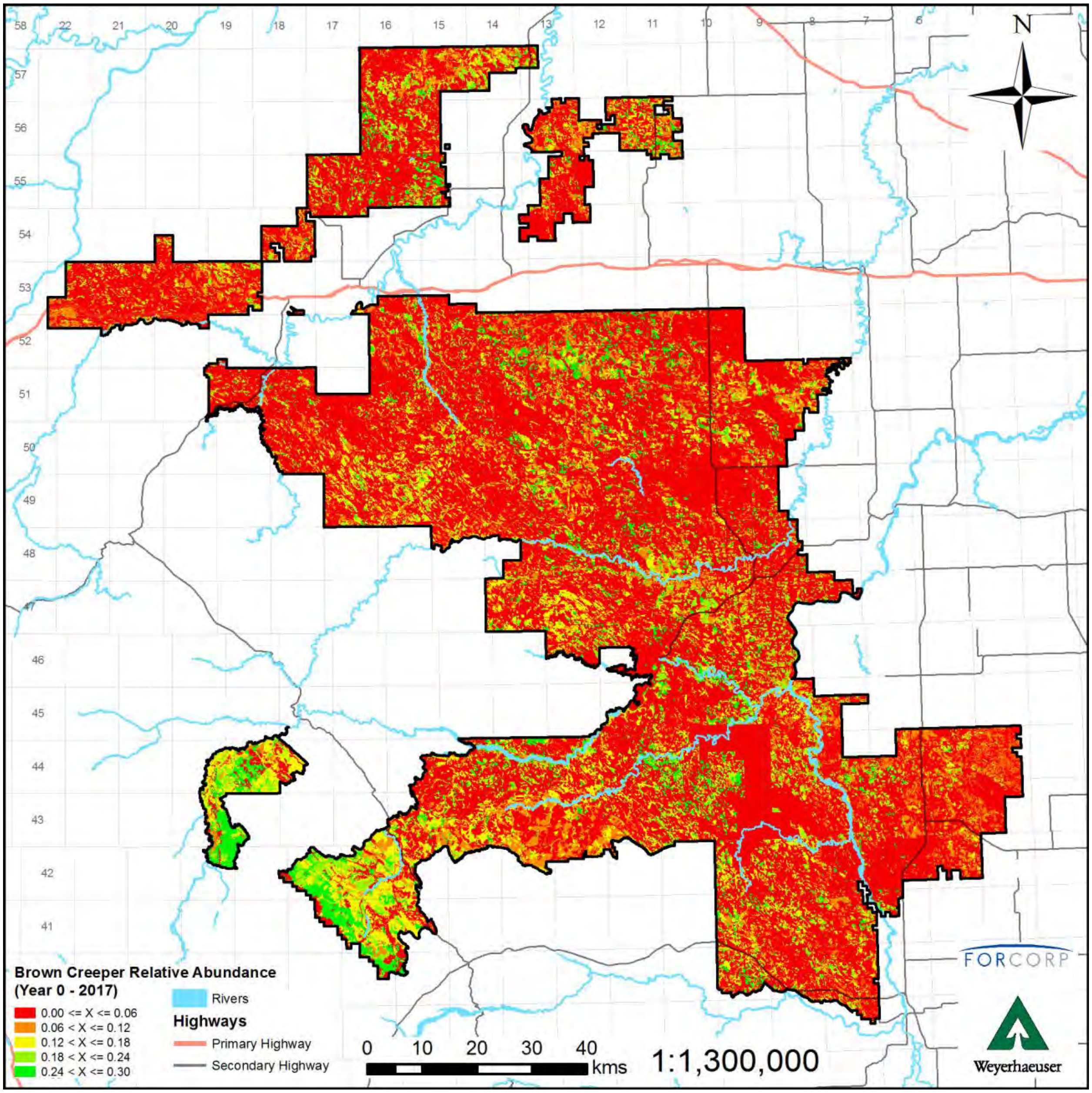


Figure 6-34. Map of Brown Creeper relative abundance at year 0

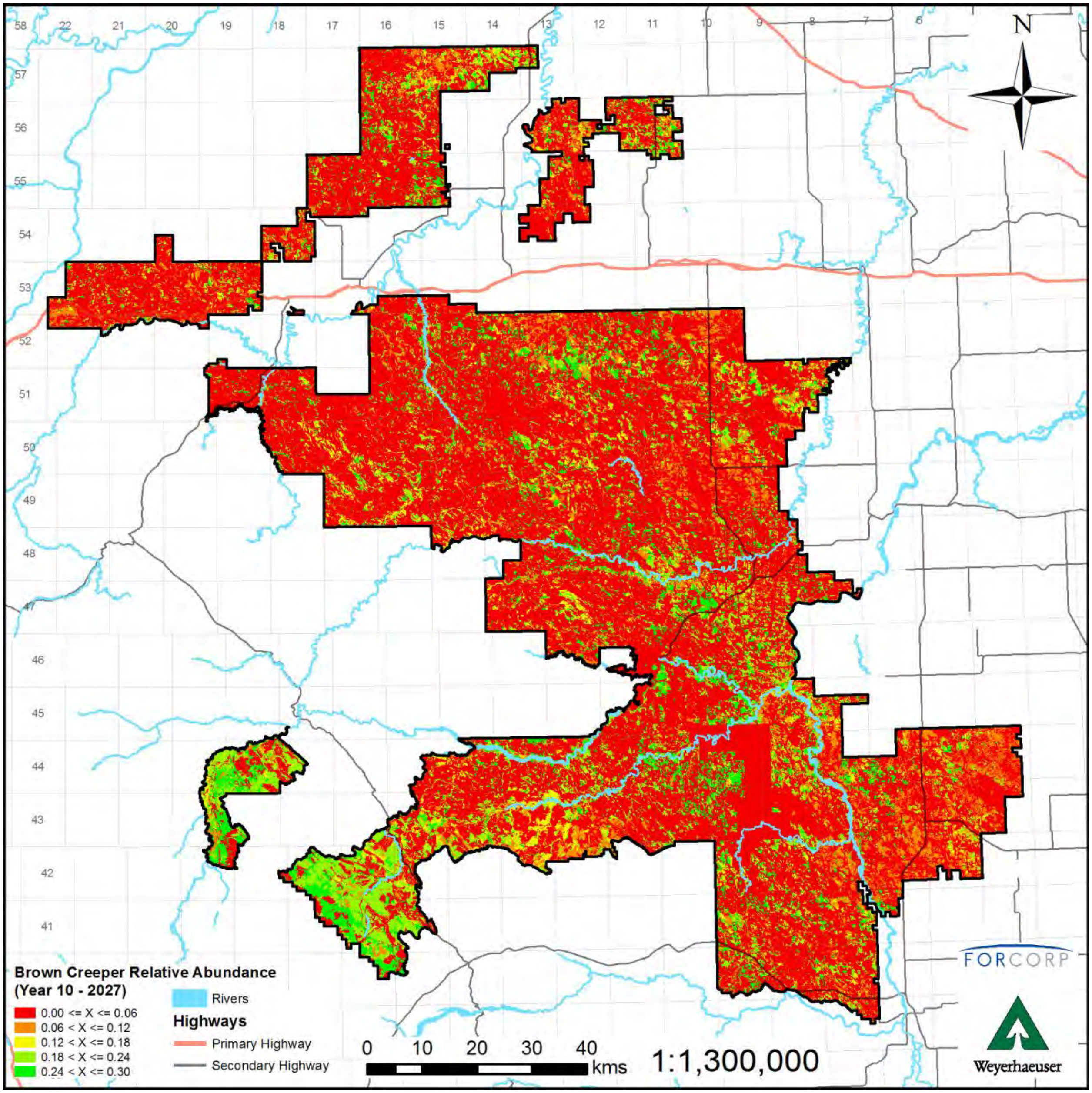


Figure 6-35. Map of Brown Creeper relative abundance at year 10

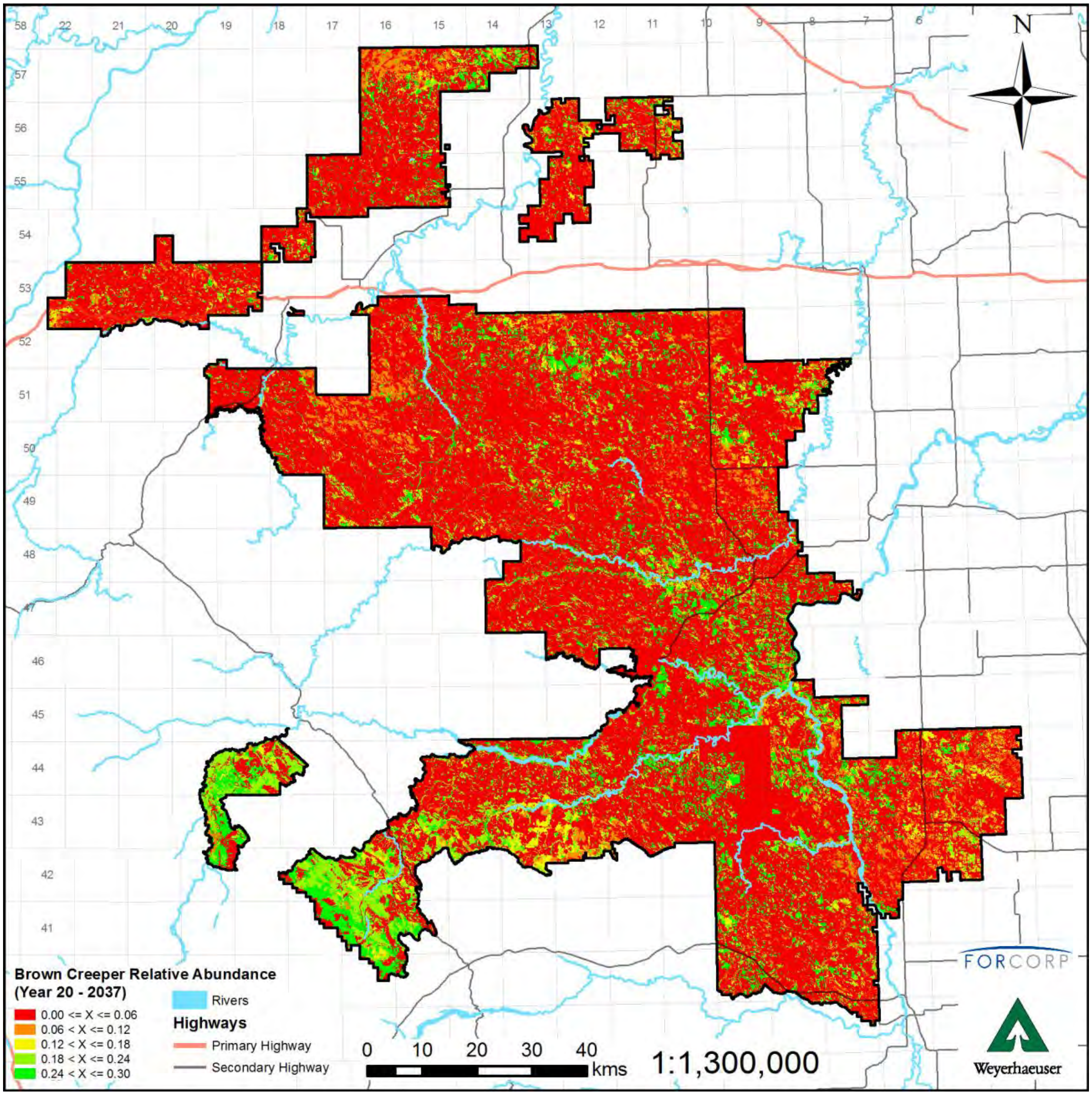


Figure 6-36. Map of Brown Creeper relative abundance at year 20

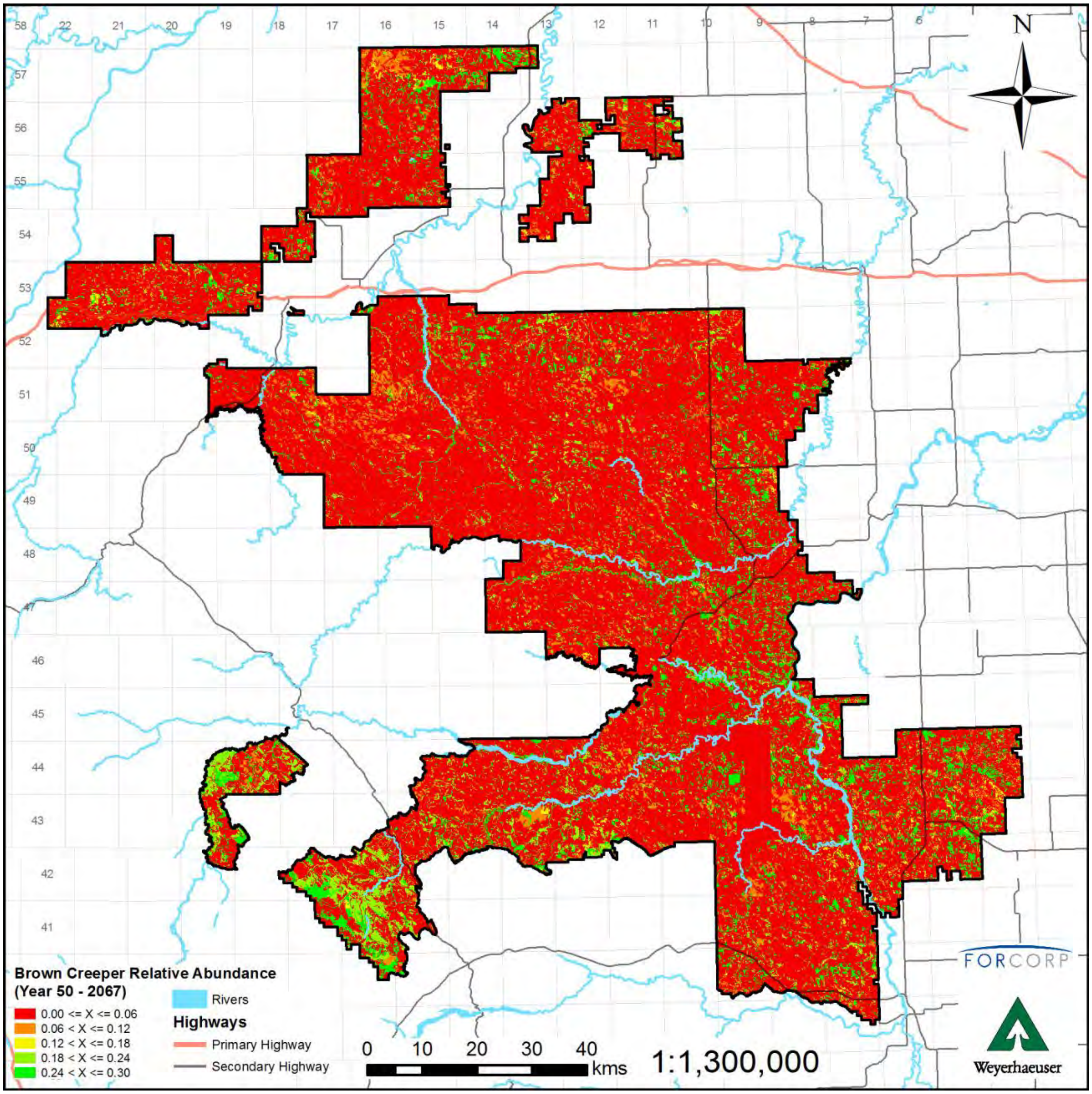


Figure 6-37. Map of Brown Creeper relative abundance at year 50

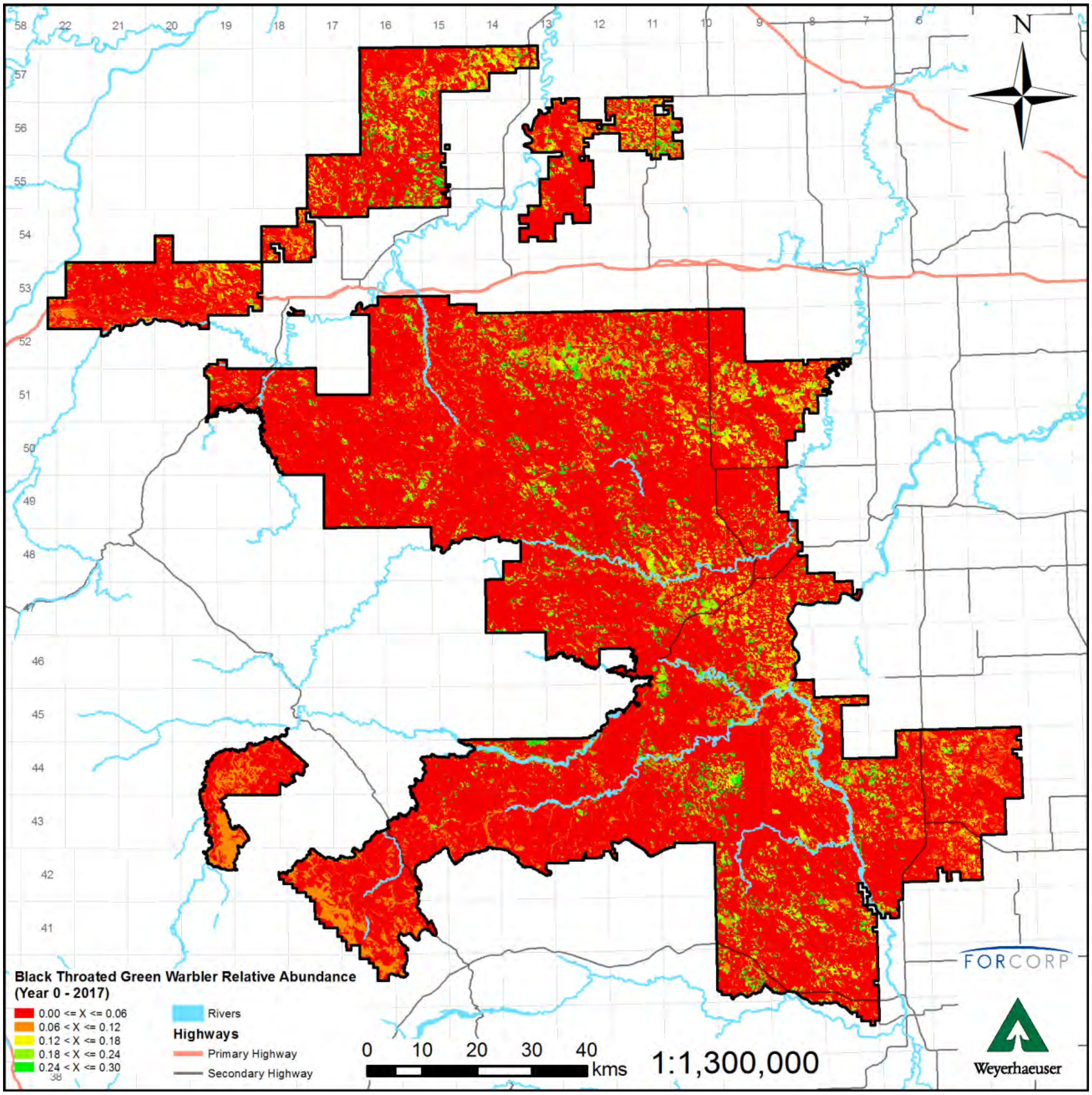


Figure 6-38. Map of Black-throated Green Warbler relative abundance at year 0

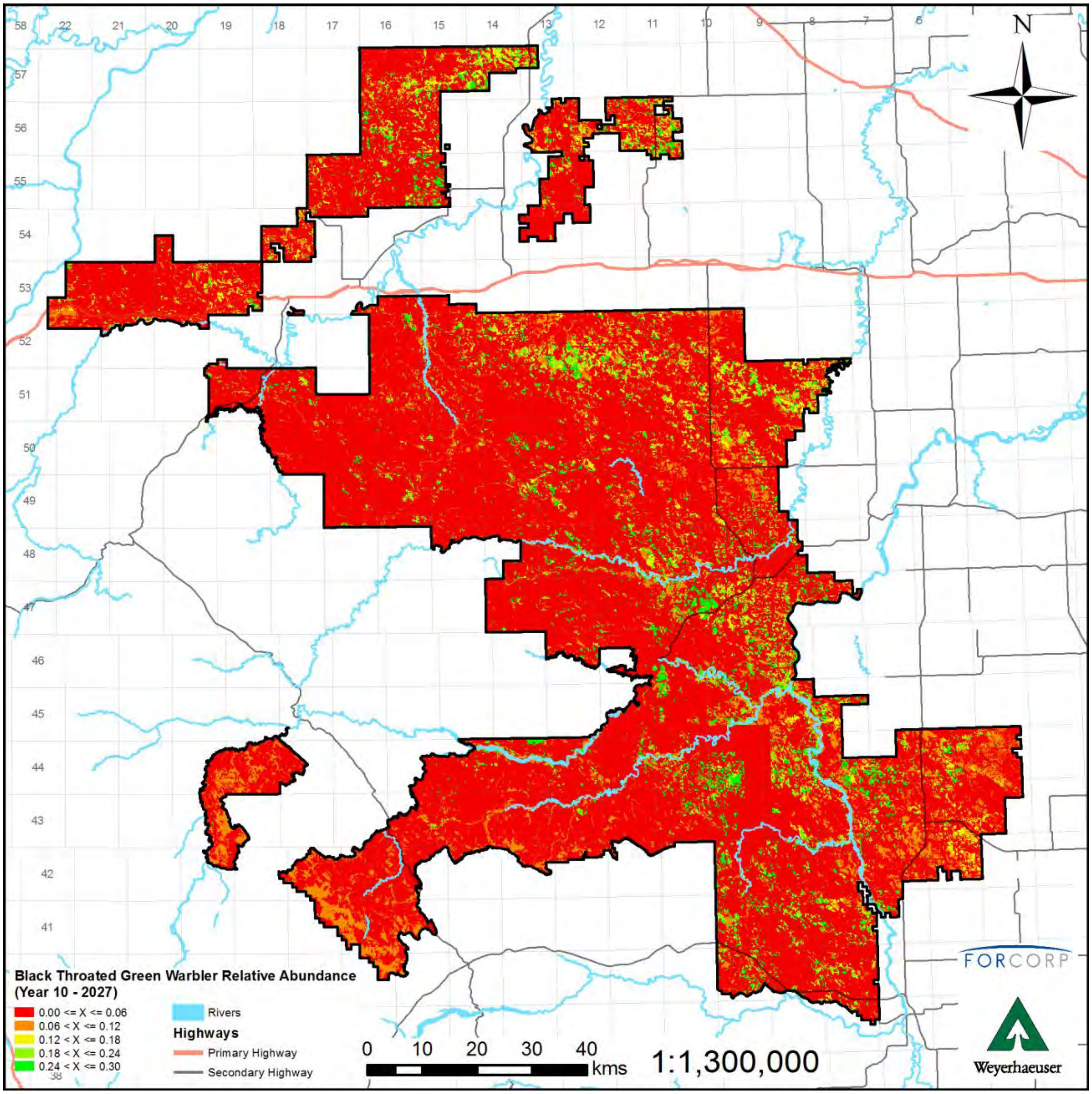


Figure 6-39. Map of Black-throated Green Warbler relative abundance at year 10

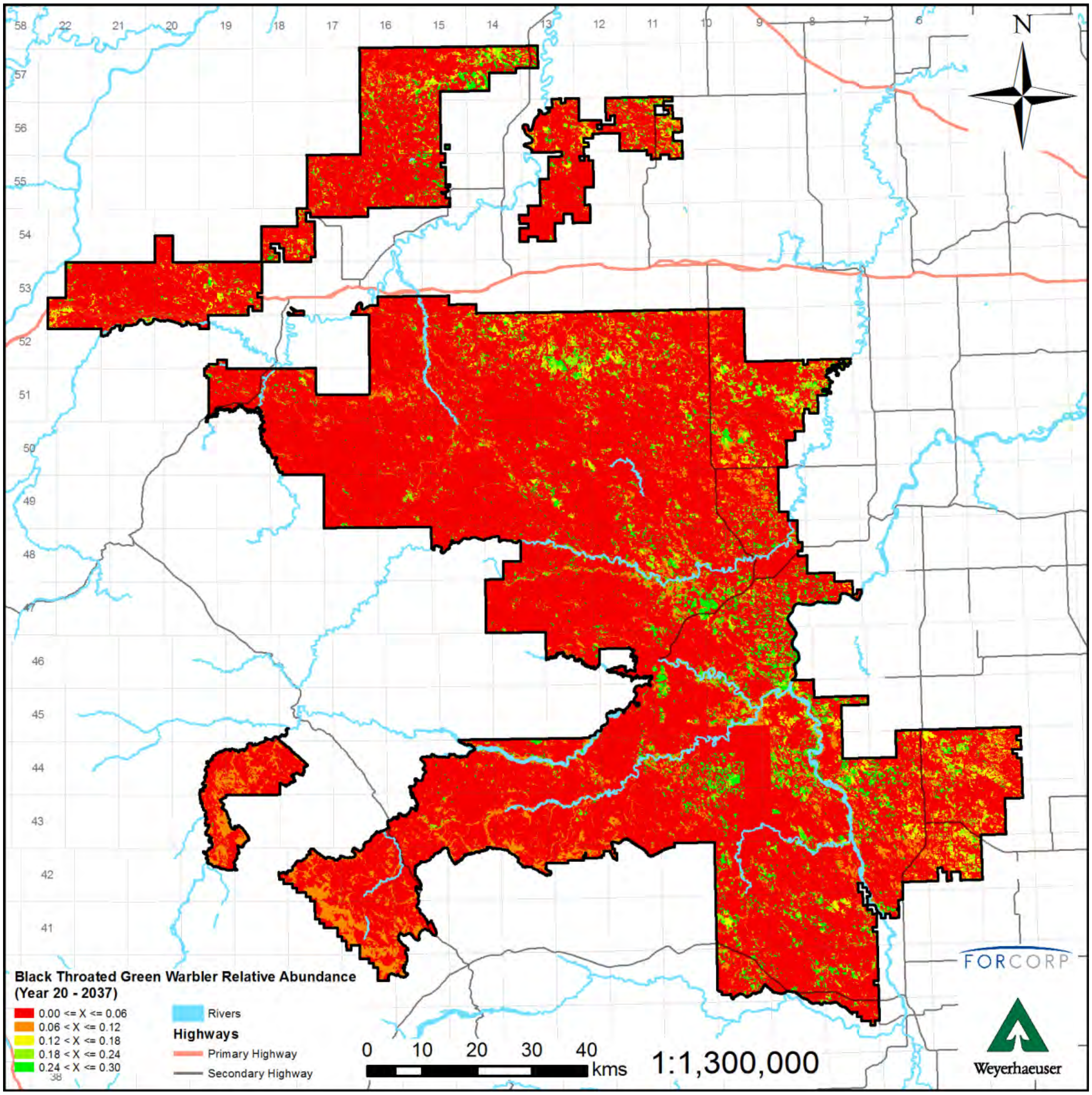


Figure 6-40. Map of Black-throated Green Warbler relative abundance at year 20

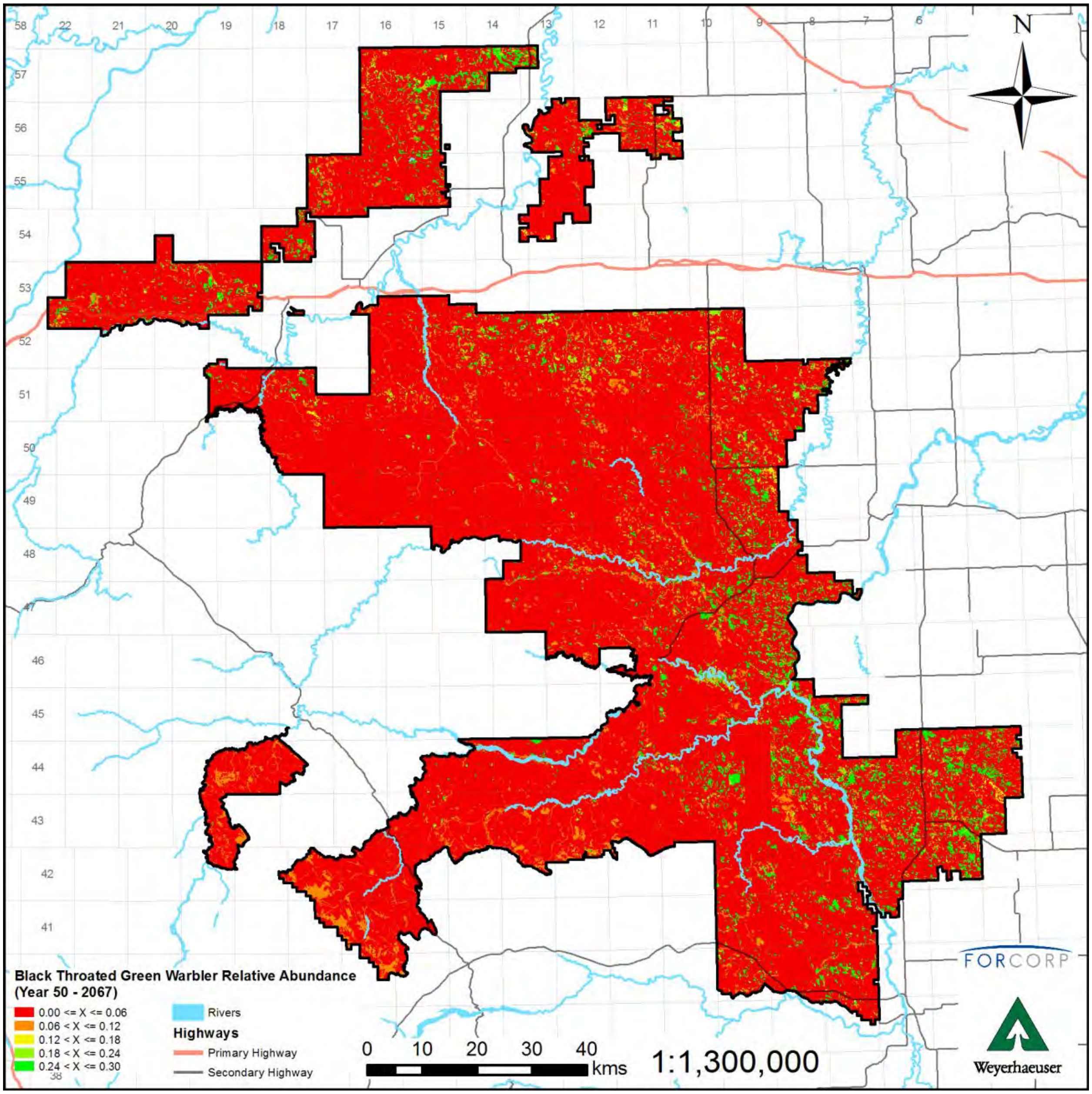


Figure 6-41. Map of Black-throated Green Warbler relative abundance at year 50

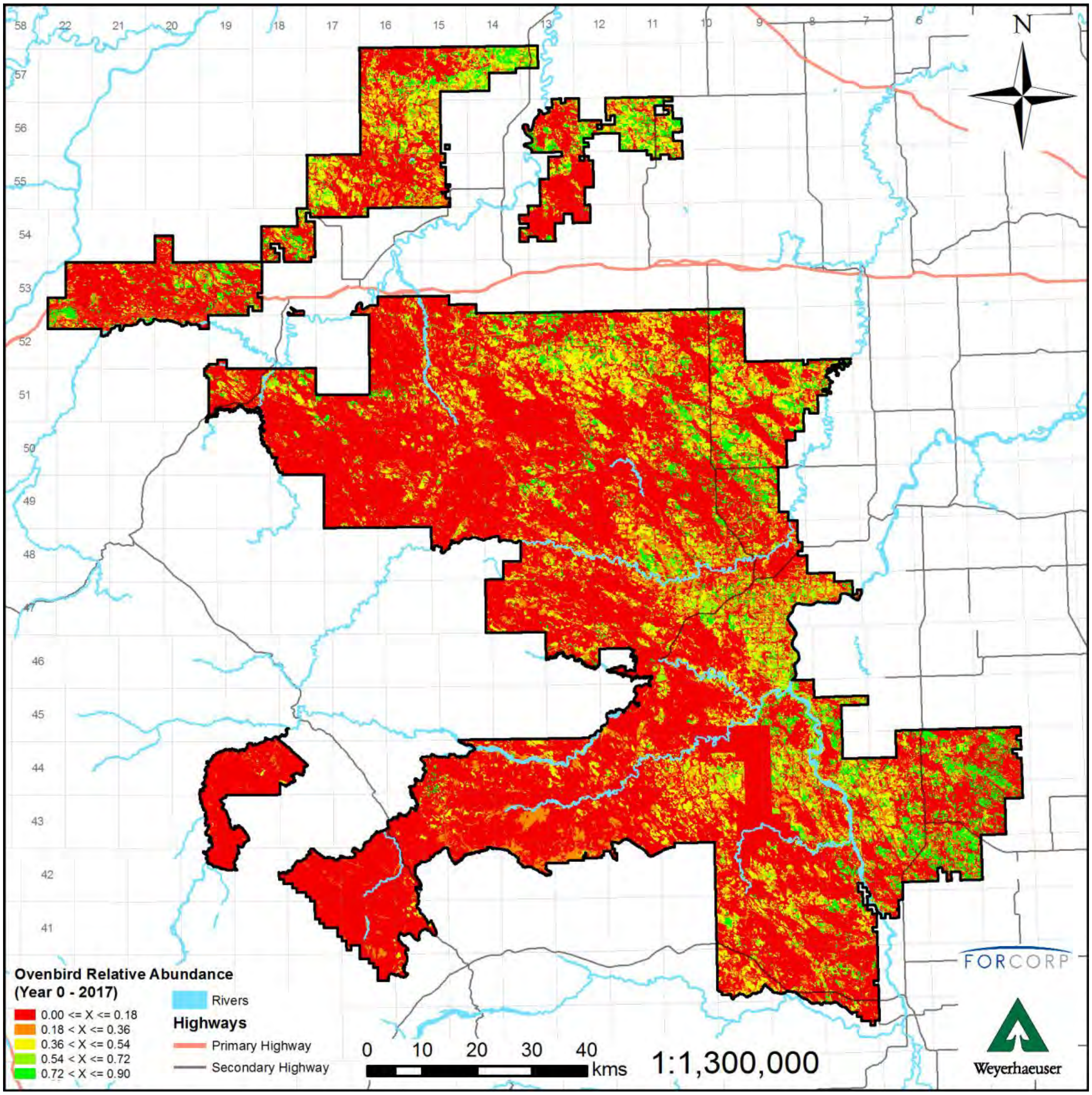


Figure 6-42. Map of Ovenbird relative abundance at year 0

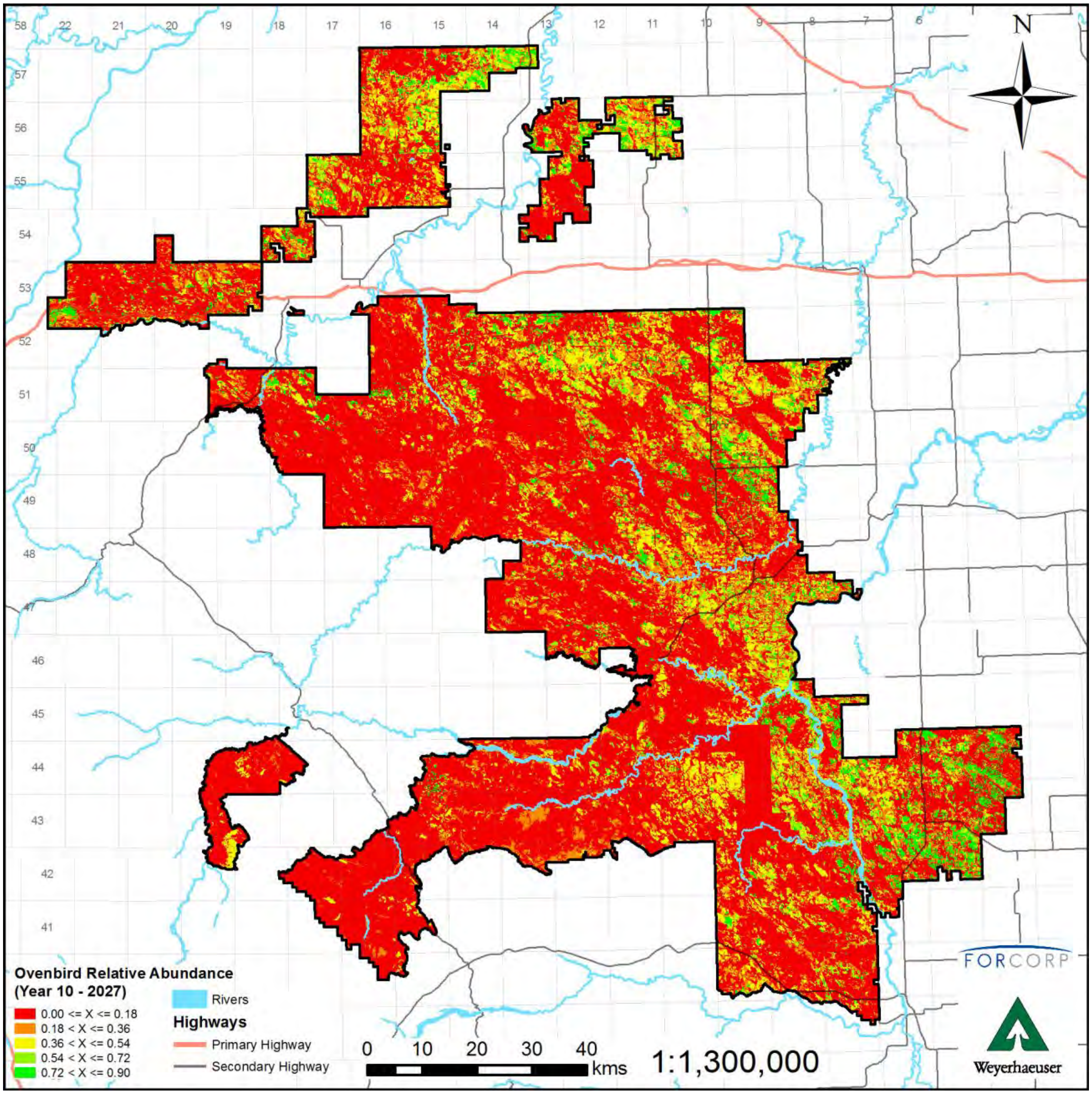


Figure 6-43. Map of Ovenbird relative abundance at year 10

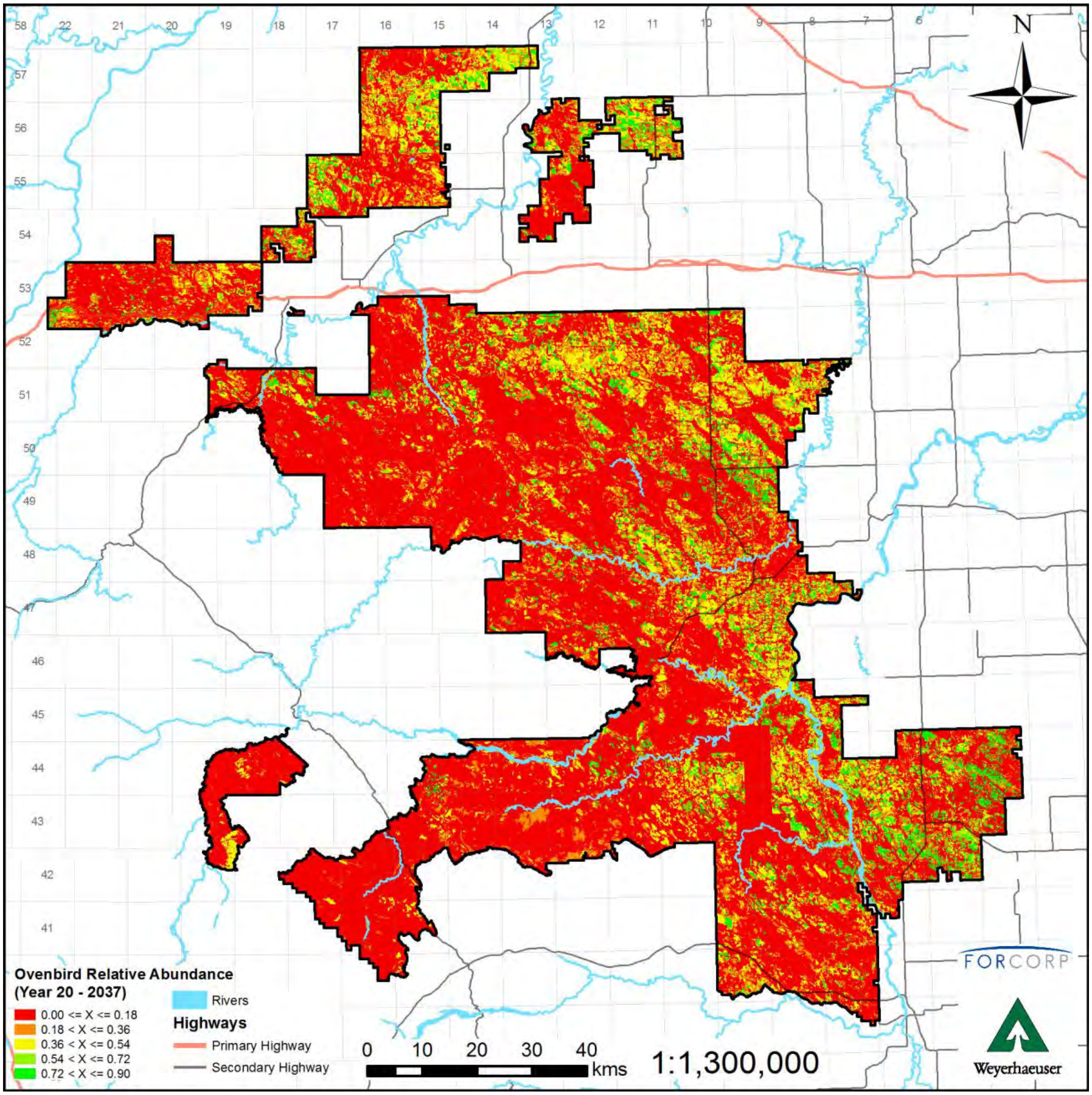


Figure 6-44. Map of Ovenbird relative abundance at year 20

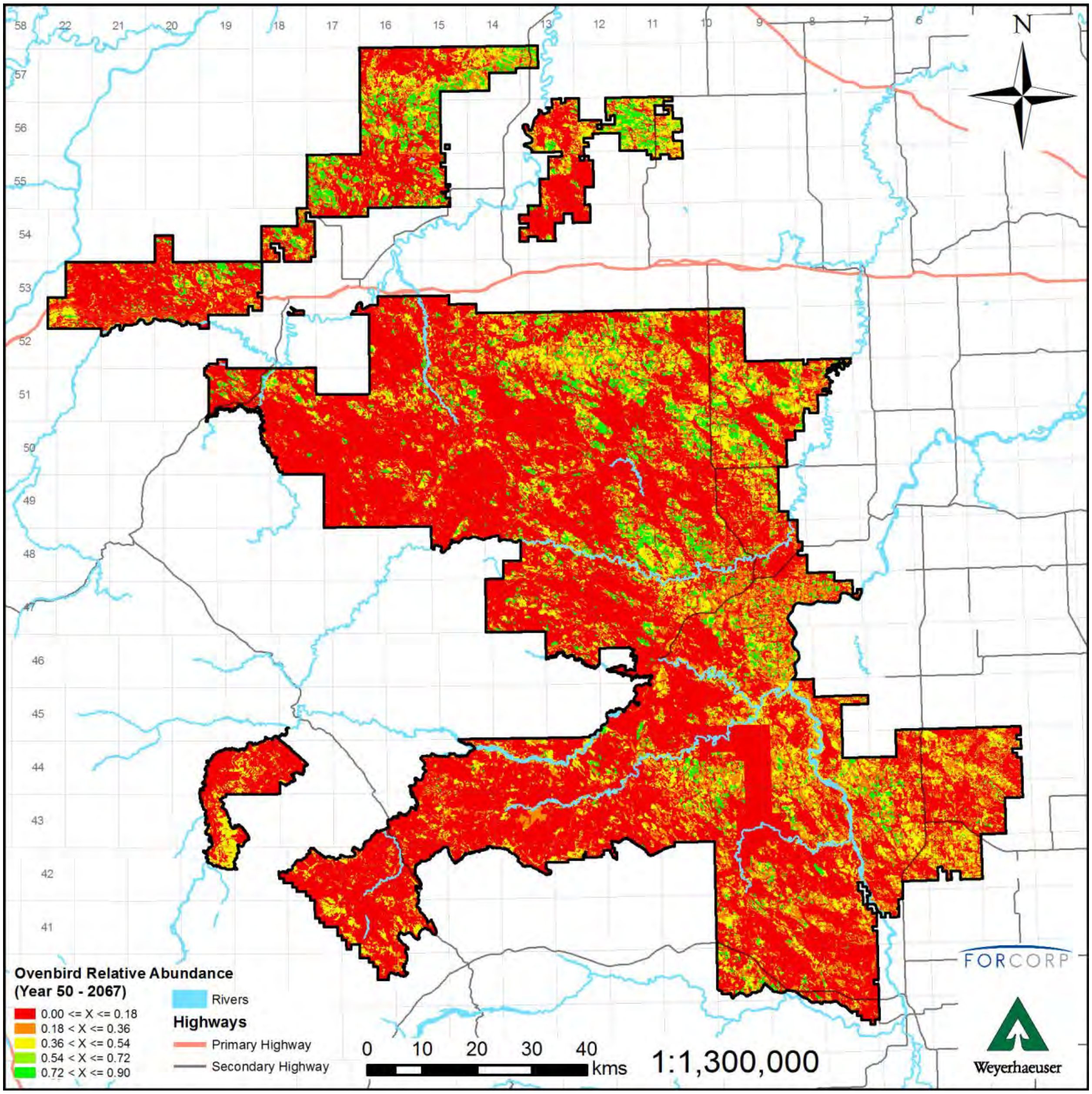


Figure 6-45. Map of Ovenbird relative abundance at year 50

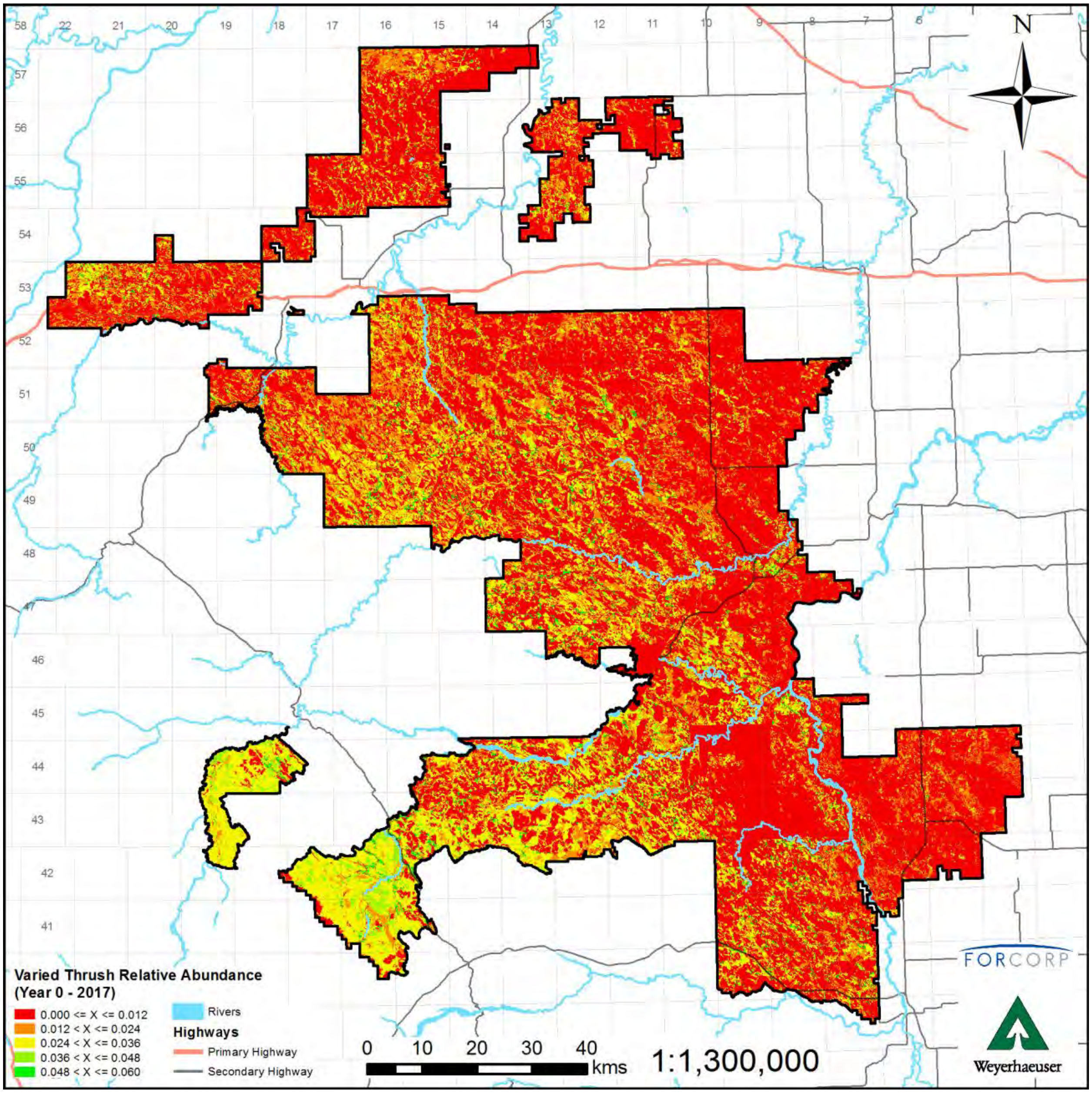


Figure 6-46. Map of Varied Thrush relative abundance at year 0

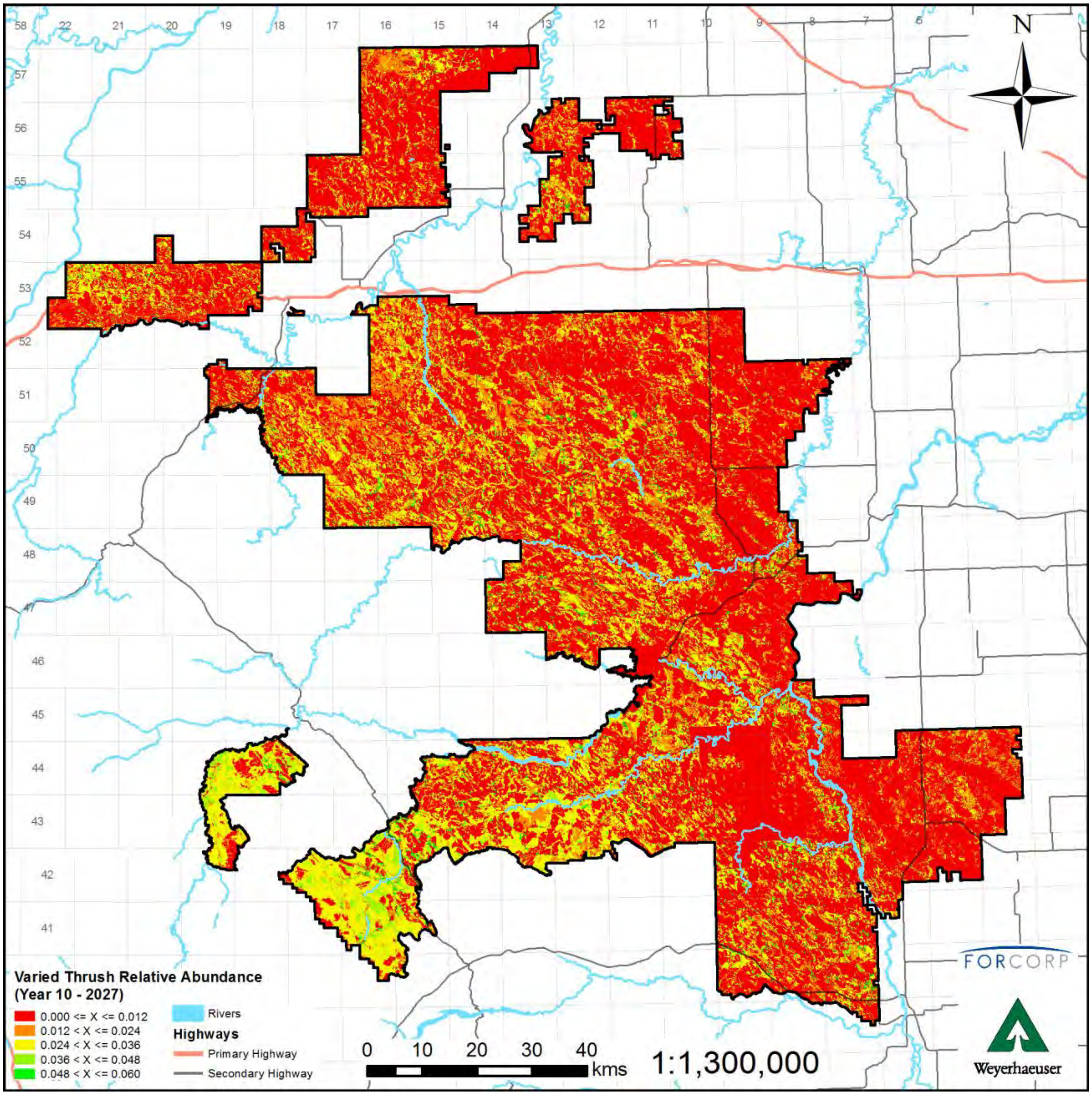


Figure 6-47. Map of Varied Thrush relative abundance at year 10

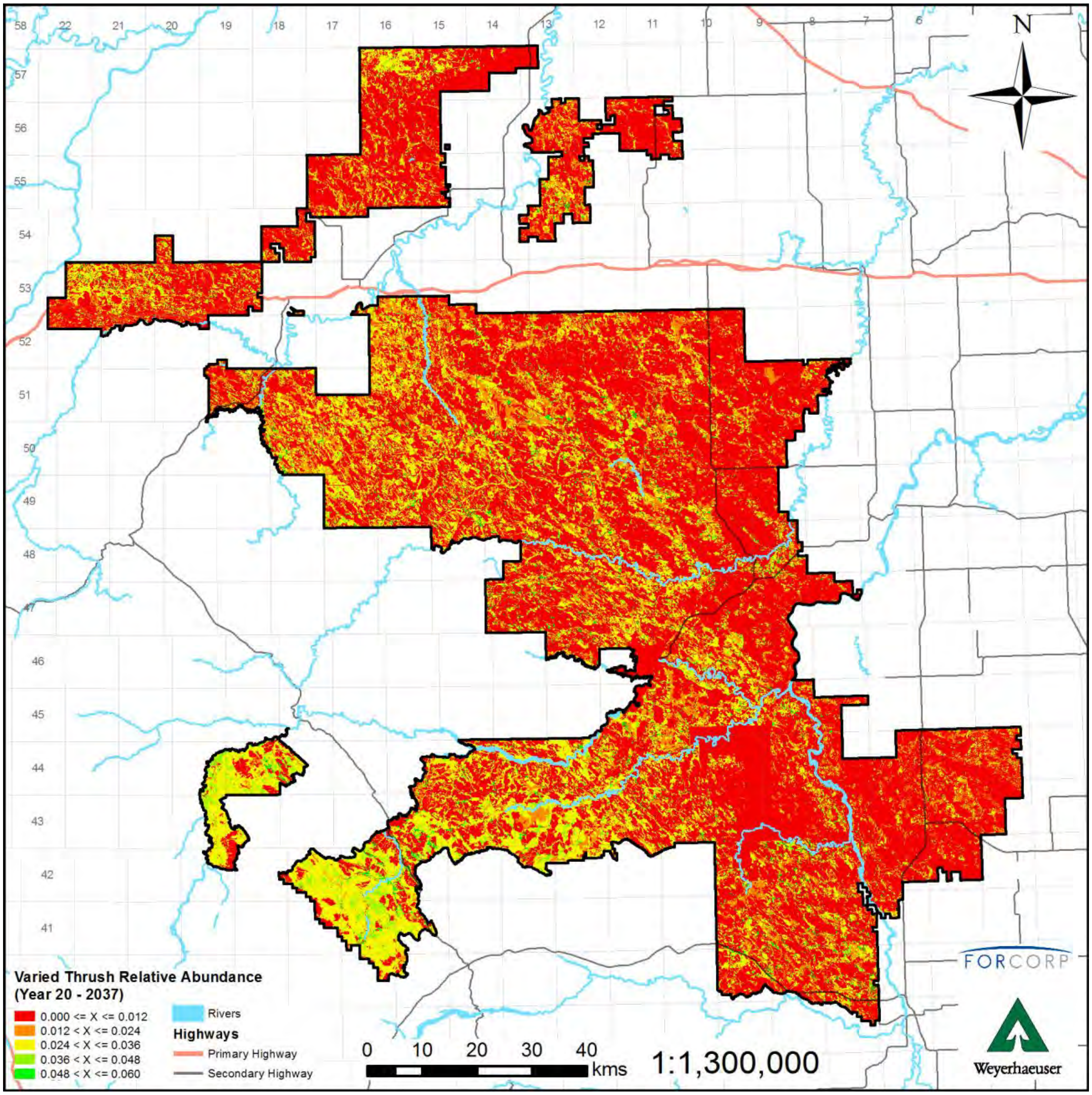


Figure 6-48. Map of Varied Thrush relative abundance at year 20

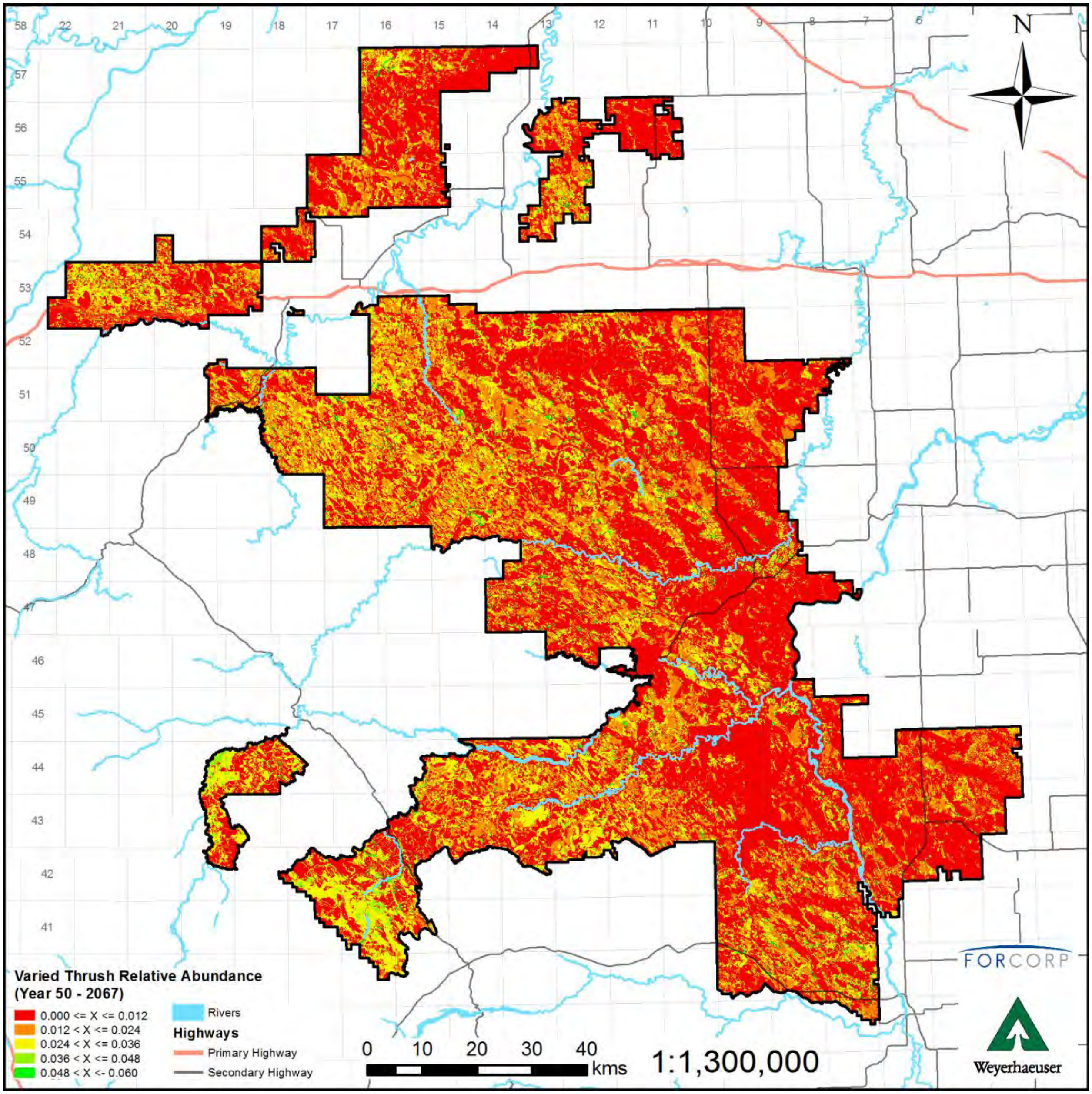


Figure 6-49. Map of Varied Thrush relative abundance at year 50

Weyerhaeuser

Appendix 6-2 – Maps of barred owl RSF values and potential breeding pair locations on the DFA

Maps of barred owl RSF values and potential breeding pair locations on the DFA for years 0, 10, 20 and 50 are presented in this appendix. For more information see section 6.6.5.1.3.

1. RSF values – Year 0 (2017)
2. RSF values – Year 10 (2027)
3. RSF values – Year 20 (2037)
4. RSF values – Year 50 (2067)
5. Potential Breeding Pairs – Year 0 (2017)
6. Potential Breeding Pairs – Year 10 (2027)
7. Potential Breeding Pairs – Year 20 (2037)
8. Potential Breeding Pairs – Year 50 (2067)

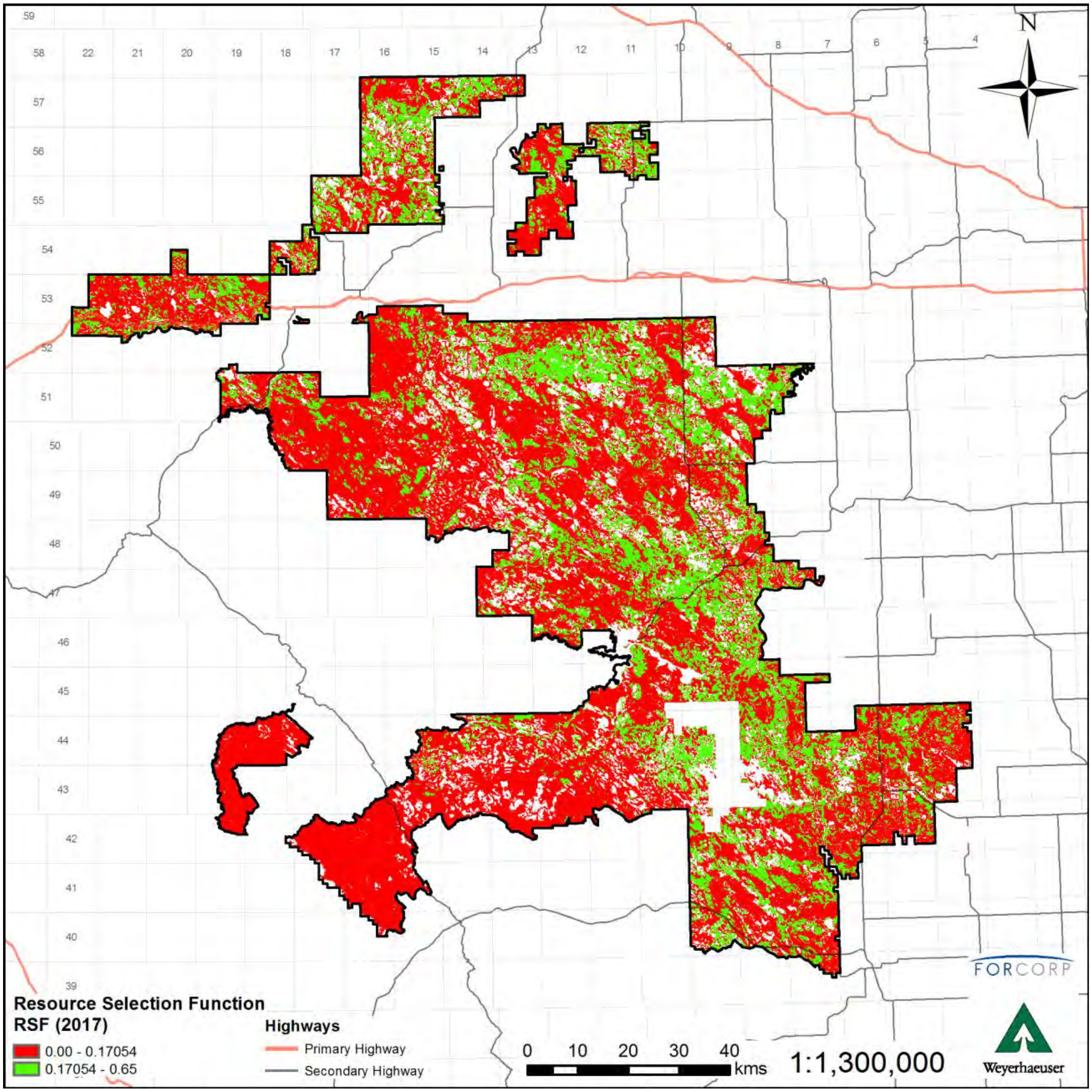


Figure 6-50. Map of Barred Owl RSF values at year 0

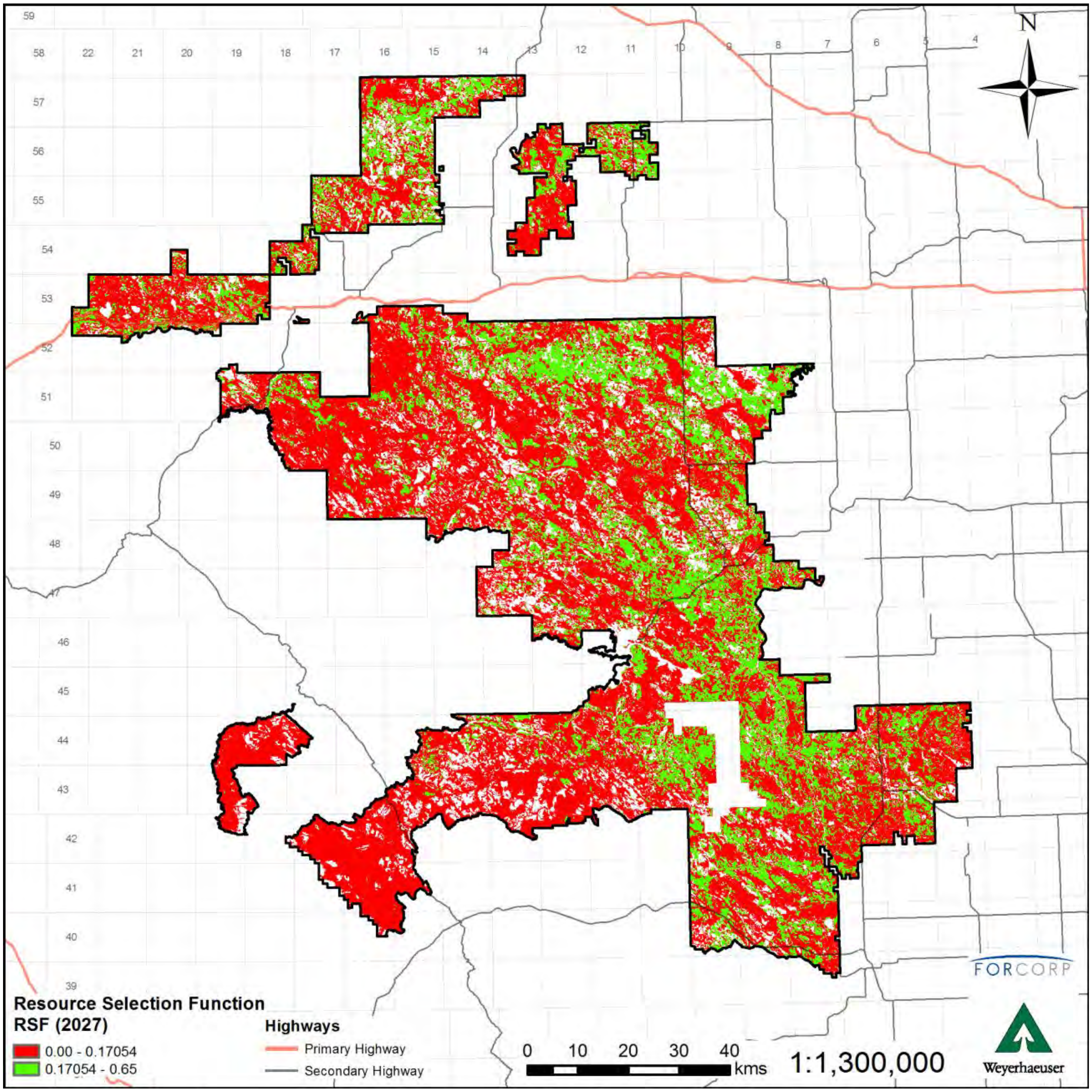


Figure 6-51. Map of Barred Owl RSF values at year 10

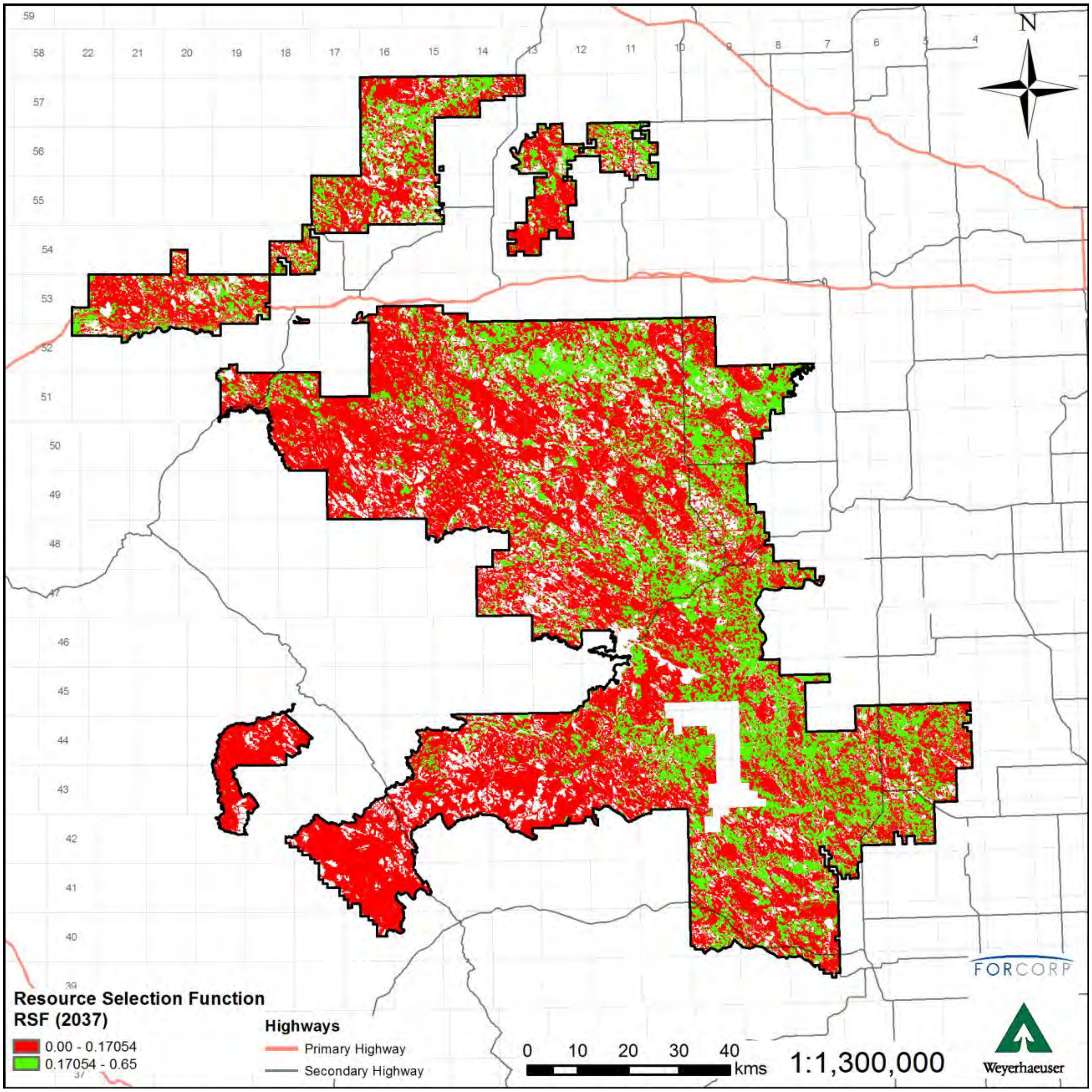


Figure 6-52. Map of Barred Owl RSF values at year 20

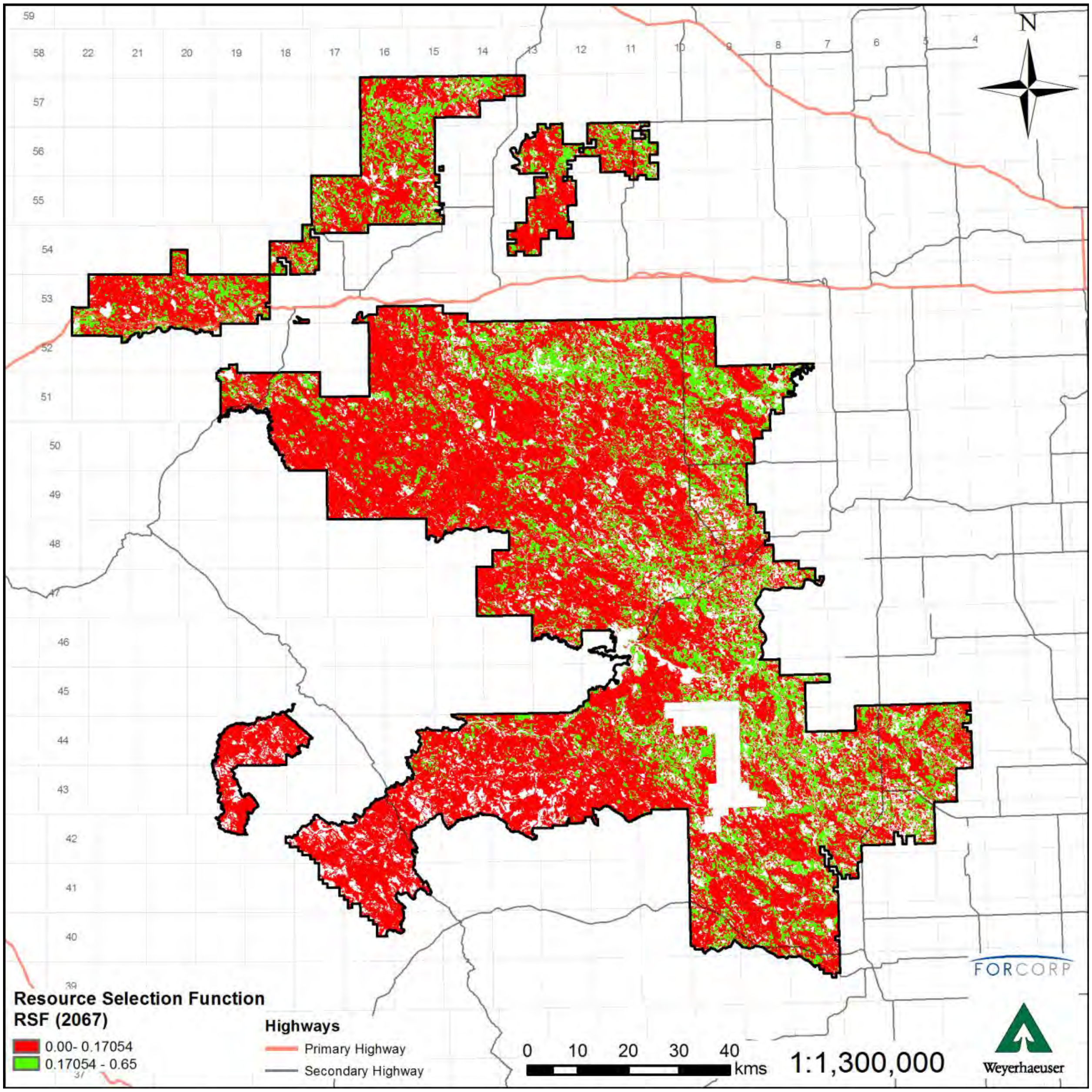


Figure 6-53. Map of Barred Owl RSF values at year 50

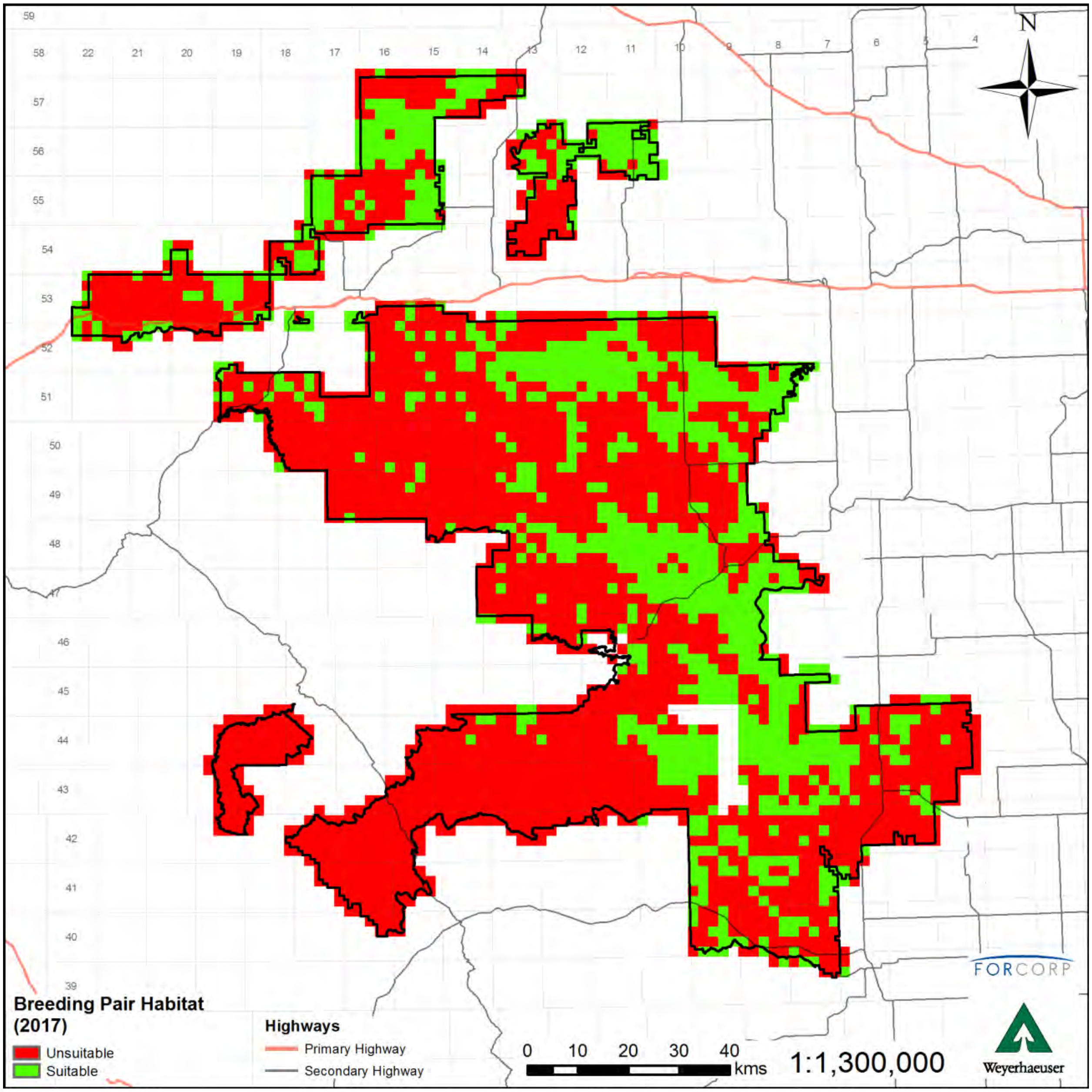


Figure 6-54. Map of Barred Owl breeding pair habitat at year 0

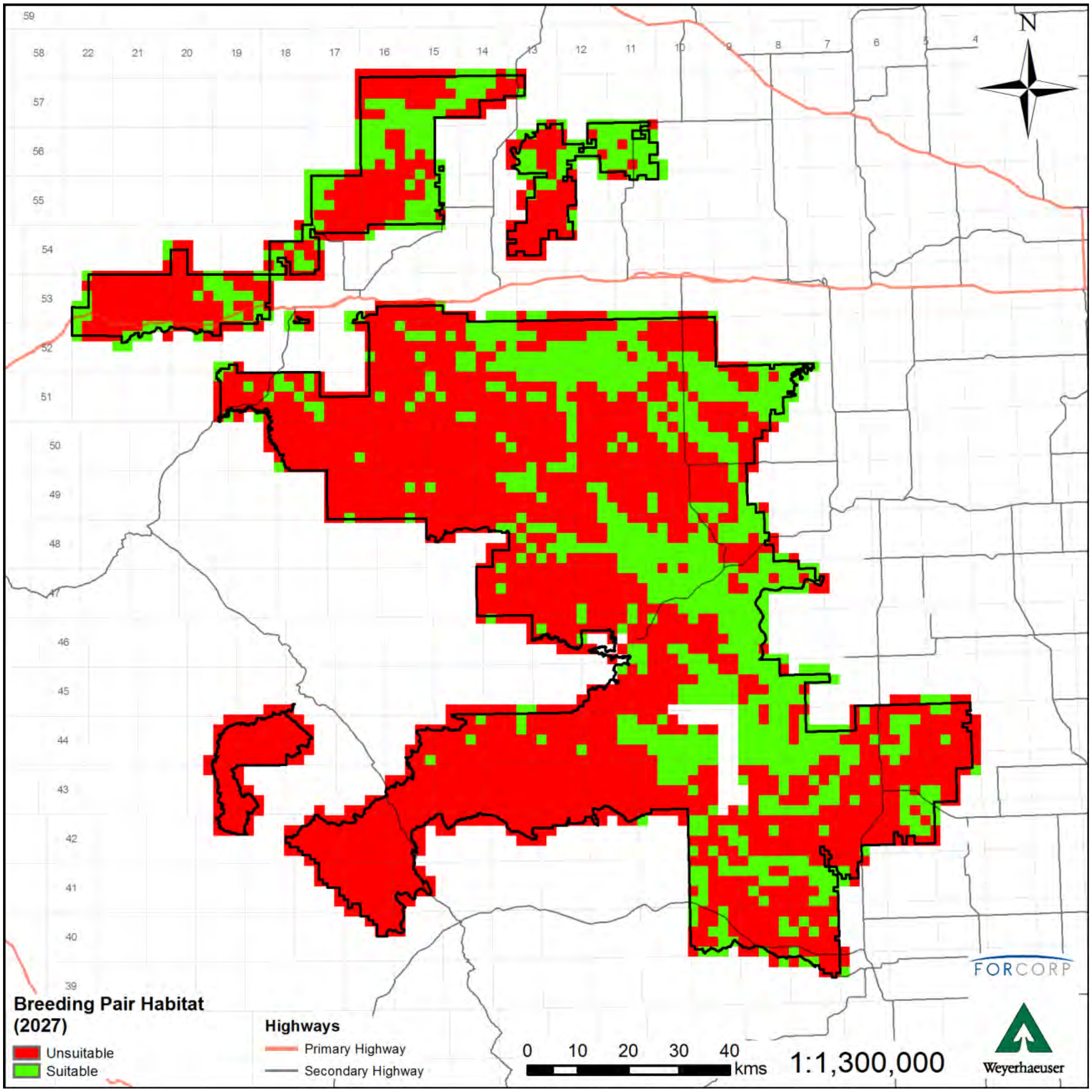


Figure 6-55. Map of Barred Owl breeding pair habitat at year 10

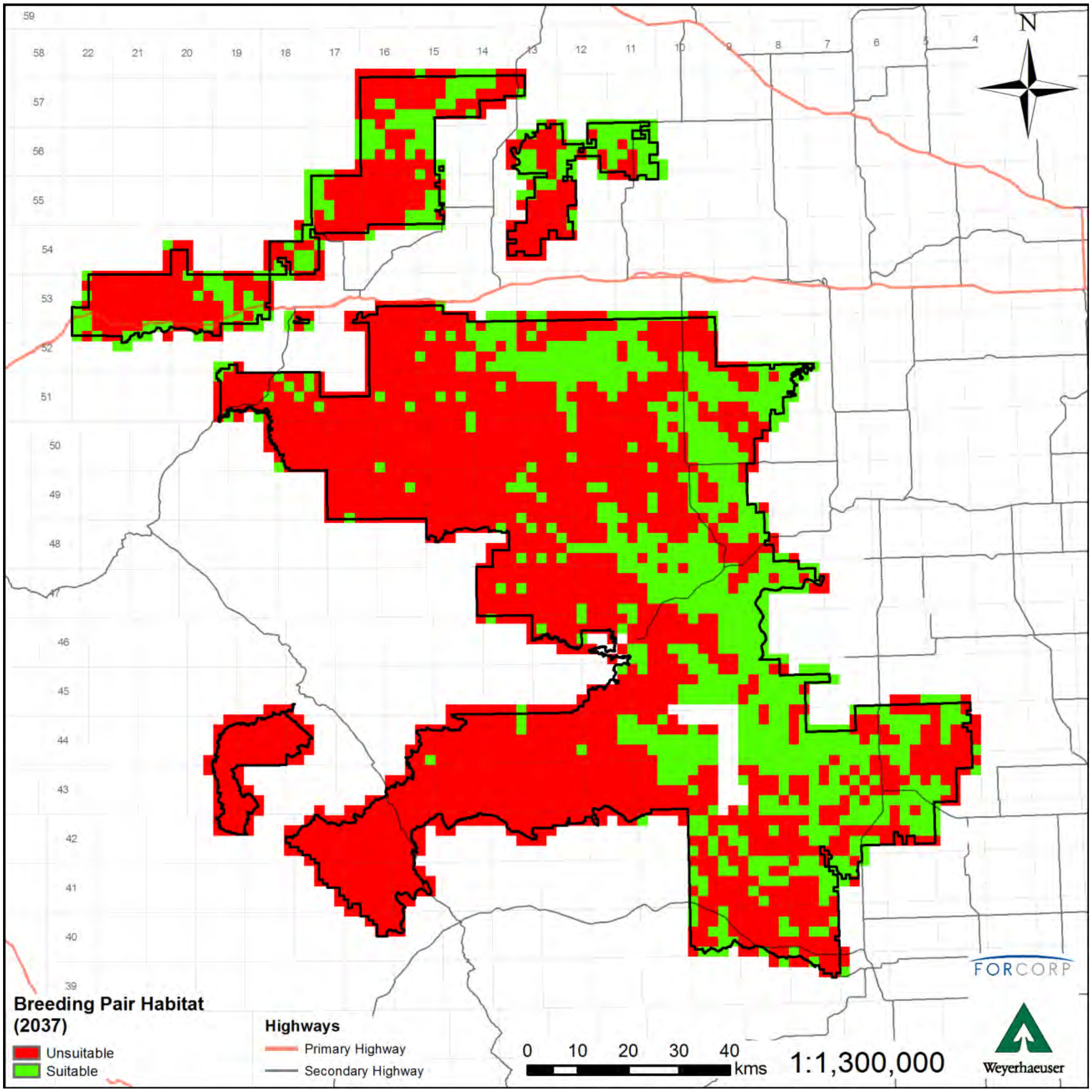


Figure 6-56. Map of Barred Owl breeding pair habitat at year 20

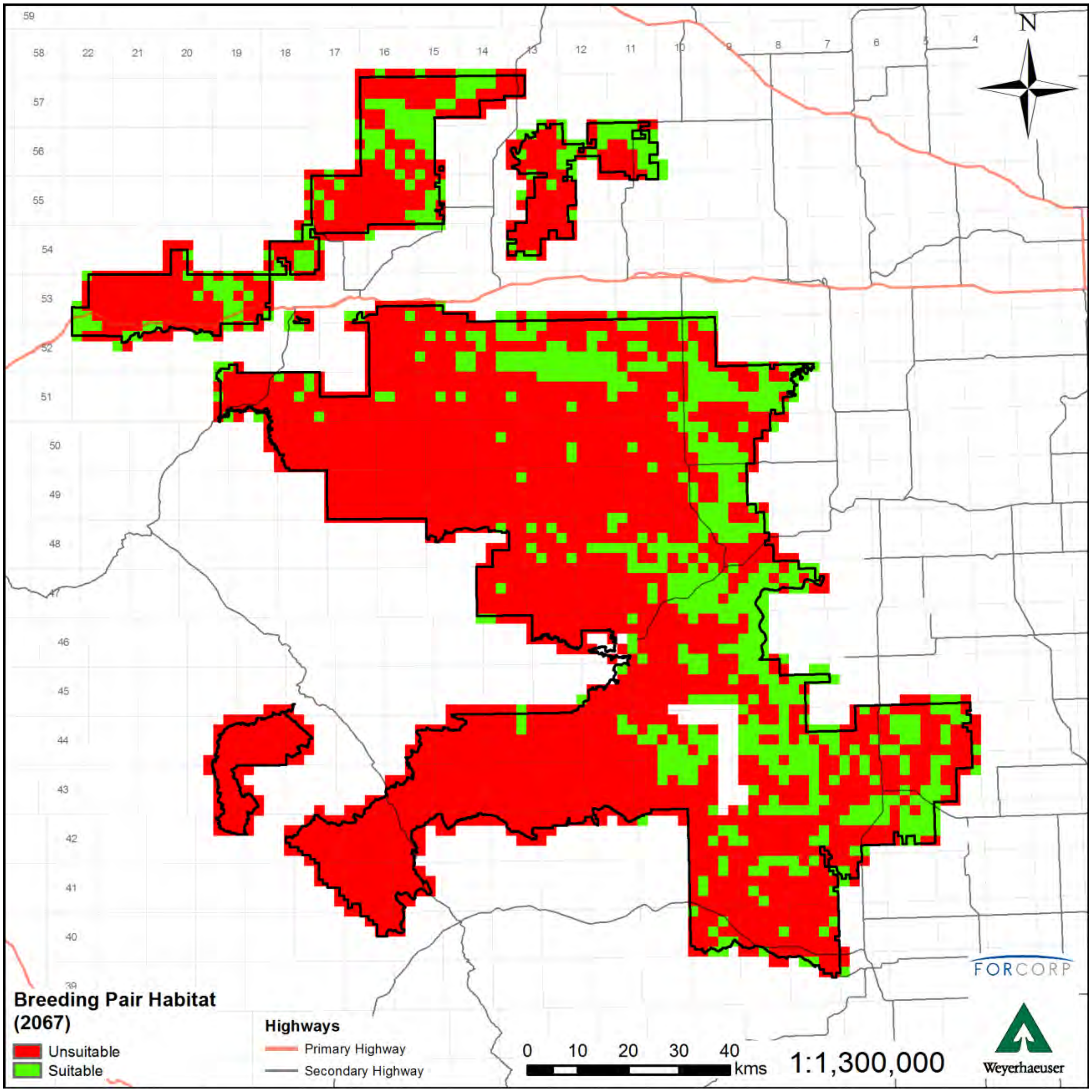


Figure 6-57. Map of Barred Owl breeding pair habitat at year 50

Appendix 6-3 – Maps of grizzly bear habitat on the DFA

Maps of grizzly bear habitat on the DFA for years 0, 10 and 20 are presented in this appendix. For more information see section 6.6.5.1.4.

1. Grizzly bear habitat – Year 0 (2017)
2. Grizzly bear habitat – Year 10 (2027)
3. Grizzly bear habitat – Year 20 (2037)

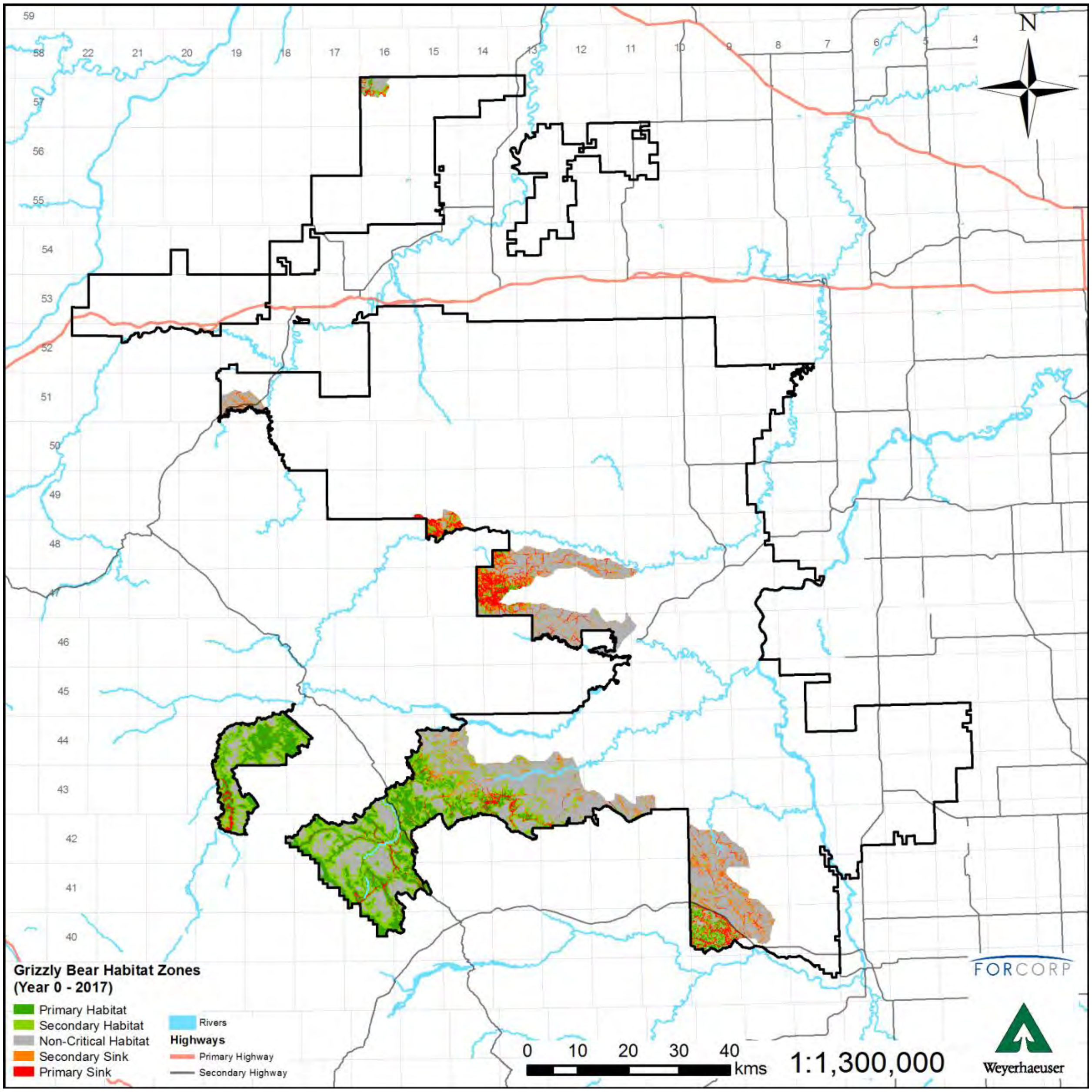


Figure 6-58. Map of Grizzly Bear habitat at year 0

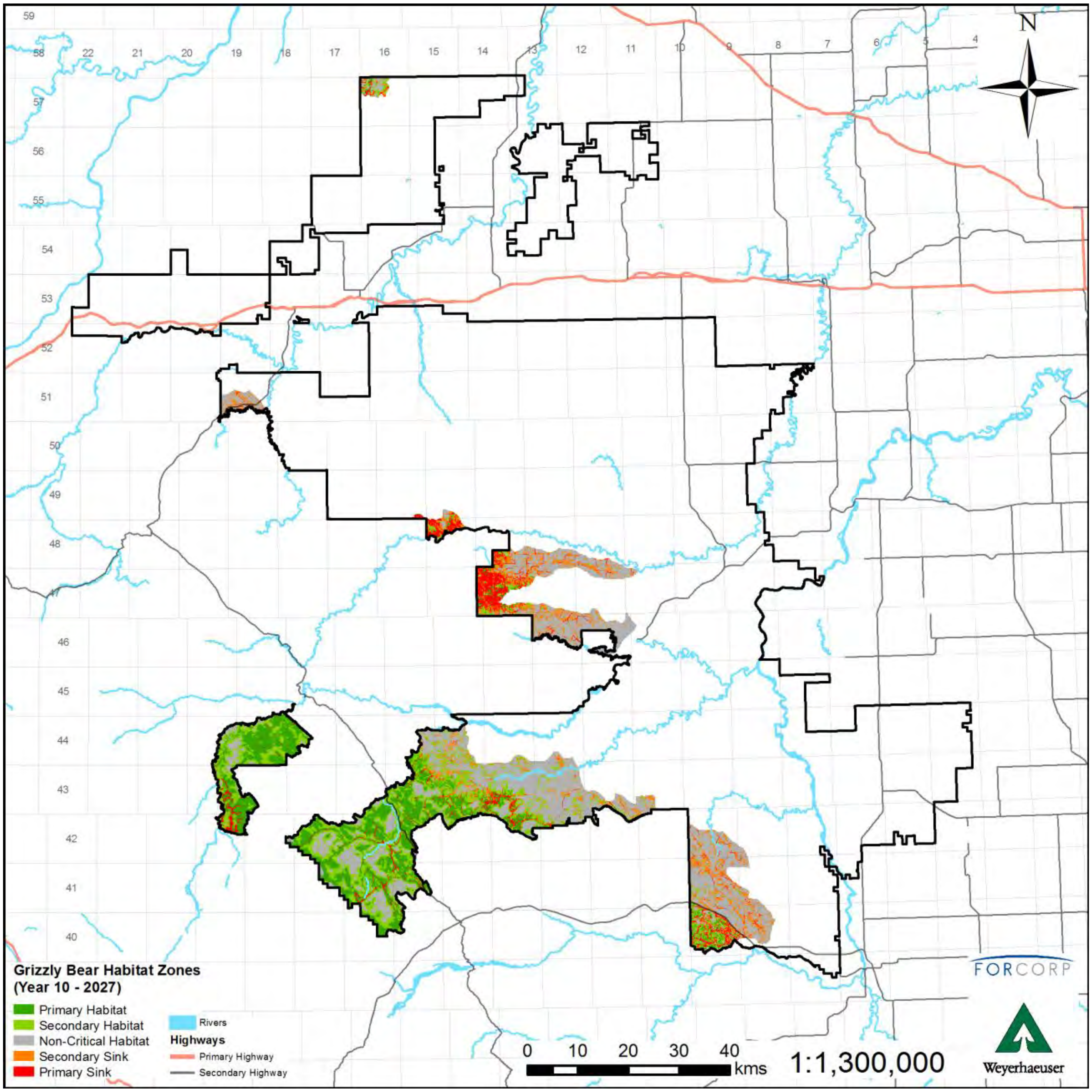


Figure 6-59. Map of Grizzly Bear habitat at year 10

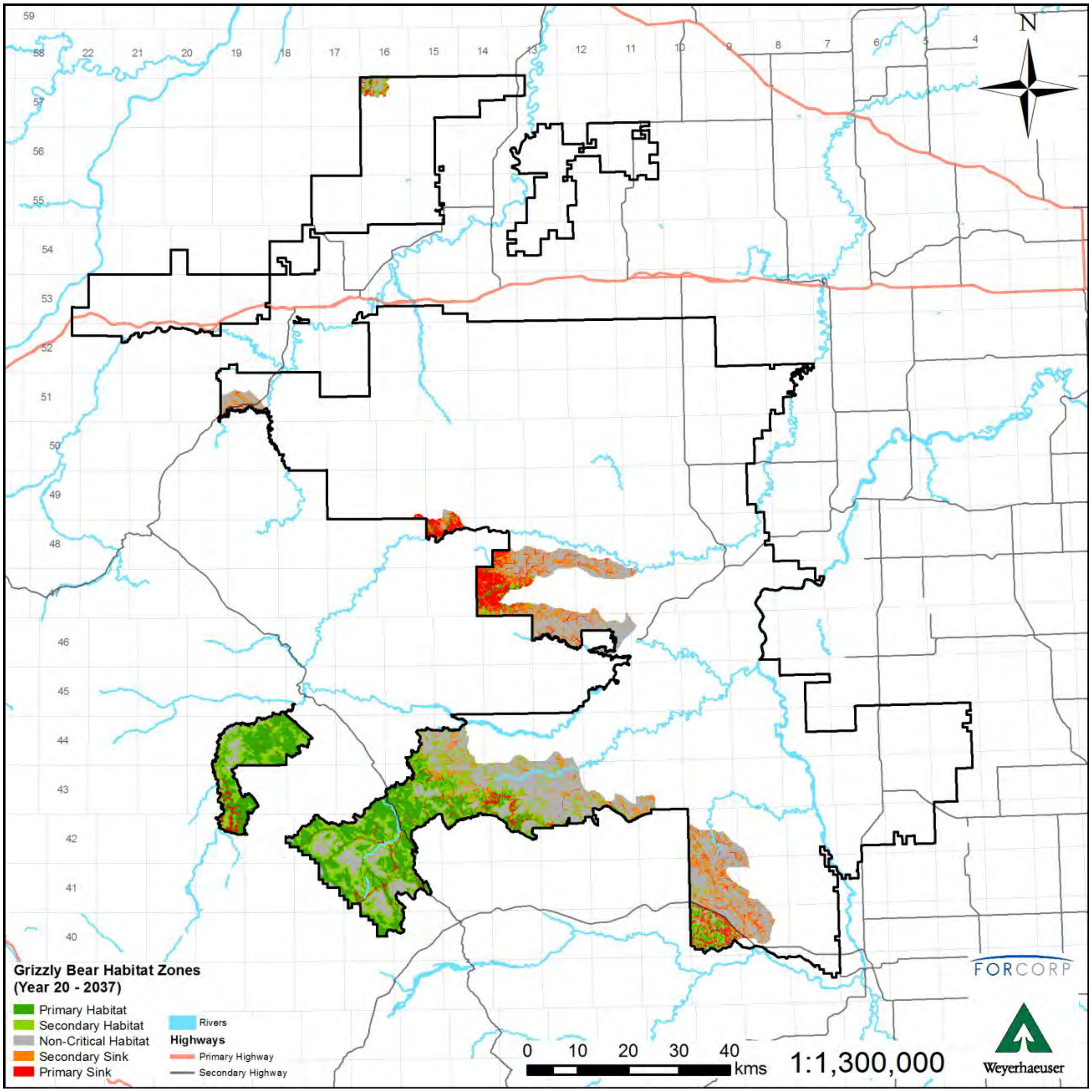


Figure 6-60. Map of Grizzly Bear habitat at year 20

Appendix 6-4 – Table and maps of watershed ECA values on the DFA

A table and maps of watershed ECA values on the DFA for years 0, 10, 20, 50 and 100 are presented in this appendix. For more information see section 6.6.5.2.

4. Table of ECA values by watershed for years 0, 10, 20, 50 and 100
5. Map of watersheds and ECA value for year 0 (2017)
6. Map of watersheds and ECA value for year 10 (2027)
7. Map of watersheds and ECA value for year 20 (2027)
8. Map of watersheds and ECA value for year 50 (2067)
9. Map of watersheds and ECA value for year 100 (2117)

Weyerhaeuser

Table 6-29. ECA values by watershed at years 0, 10, 20, 50, 100

Weyerhaeuser Watershed ECA Analysis				Patchworks Scenario PW70006				
		Full Watershed	Area in	Watershed ECA percentage by year				
Watershed		Area	DFA	Year 0	Year 10	Year 20	Year 50	Year 100
Number	Name	ha	ha	2017	2027	2037	2067	2117
1	Groat	13,247	3,752	29%	35%	34%	29%	30%
2	Cairn	15,578	2,018	8%	11%	12%	13%	22%
3	Mcleod	17,839	2,946	20%	21%	28%	9%	37%
4	Oldman	14,939	5,526	18%	27%	32%	31%	25%
5	Shinningbank	19,469	6,637	31%	29%	23%	21%	33%
6	Paddle	15,414	1,496	16%	23%	26%	45%	17%
7	Trout	26,296	19,781	26%	30%	30%	16%	32%
8	Hardluck	15,695	9,003	15%	25%	31%	31%	16%
9	Graham	9,443	4,873	21%	32%	44%	44%	17%
10	South Mcloed	13,331	2,513	9%	12%	24%	33%	12%
11	East Poison	34,204	3,747	21%	30%	47%	46%	15%
12	Whitefish	21,913	8,810	21%	23%	25%	13%	25%
13	Middle Poison	6,454	5,487	10%	12%	16%	20%	10%
14	Deer	13,757	5,775	27%	27%	21%	20%	21%
15	Bear	13,890	9,855	13%	23%	30%	11%	27%
17	West Poison	6,496	3,875	9%	14%	17%	17%	10%
19	Edson	37,509	2,975	15%	17%	22%	17%	20%
20	Fairless	8,042	972	13%	19%	20%	13%	20%
21	Lower Carrot	11,503	1,473	18%	8%	3%	10%	6%
22	Prarie	15,083	2,209	11%	14%	22%	15%	16%
23	Mason	11,188	1,502	9%	10%	17%	18%	18%
25	Sundance East	24,444	11,415	5%	18%	25%	14%	21%
26	Obed	13,119	11,306	5%	10%	14%	10%	13%
27	Sundance West	87,943	17,705	8%	14%	19%	15%	15%
28	Athabasca	58,254	1,586	3%	8%	19%	34%	19%
30	Lower Moose	6,274	2,457	2%	13%	16%	15%	12%
33	East Lobstick	6,293	763	33%	45%	49%	27%	45%
34	Lower Sang	13,991	10,033	8%	14%	17%	13%	15%
35	West Lobstick	13,811	4,385	21%	26%	24%	28%	24%
36	Granada	37,648	16,257	13%	18%	24%	36%	18%
37	West Carrot	9,241	7,183	14%	16%	14%	13%	14%
38	Nojack	13,516	13,371	18%	22%	29%	30%	20%
39	East Carrot	7,505	7,488	19%	28%	30%	26%	23%
40	Marsh	8,664	1,287	21%	20%	22%	11%	32%
41	Upper Moose	13,762	10,065	3%	9%	13%	15%	14%
42	Bigoray	27,636	16,171	32%	30%	28%	24%	22%
43	East Fickle	1,838	979	16%	26%	23%	11%	23%
44	West Fickle	14,852	2,584	15%	21%	14%	6%	14%
45	Chip	14,035	14,035	20%	25%	35%	28%	22%
46	Peco	2,010	1,979	19%	16%	12%	15%	18%
47	Upper Sang	8,894	8,894	26%	25%	25%	18%	25%
48	Minnow	15,446	15,447	23%	22%	18%	11%	18%
49	Embarras	7,160	2,141	13%	28%	25%	11%	26%
50	Upper North Rat	10,123	10,123	12%	23%	25%	13%	19%

Weyerhaeuser Watershed ECA Analysis (Continued)

Patchworks Scenario PW70006

Watershed Number	Name	Full Watershed Area ha	Area in DFA ha	Watershed ECA percentage by year Year 0 2017	Year 10 2027	Year 20 2037	Year 50 2067	Year 100 2117
51	West Eta	5,158	5,159	19%	29%	36%	24%	25%
52	Macmillan	5,310	5,309	17%	23%	29%	29%	13%
53	East Eta	13,417	13,416	24%	30%	33%	26%	24%
54	Rodney	4,156	4,156	11%	16%	15%	14%	14%
55	Bruce	8,343	8,343	26%	37%	33%	30%	26%
56	Kathy	15,360	1,999	10%	14%	15%	34%	14%
57	Swartz	24,282	16,419	6%	11%	17%	17%	17%
58	Erith	6,252	2,973	6%	13%	12%	12%	12%
59	Svedberg	11,625	11,625	3%	12%	20%	17%	17%
60	Sinkhole	7,632	7,116	21%	24%	23%	25%	17%
62	Lower North Rat	6,691	6,691	14%	19%	30%	25%	20%
63	Varty	2,493	2,492	5%	12%	19%	22%	10%
64	Tom	1,147	1,147	13%	15%	15%	16%	14%
65	Corser	4,644	605	13%	13%	12%	17%	15%
66	Coyote	26,175	24,216	11%	28%	32%	21%	26%
67	Dzida	5,029	5,029	14%	23%	37%	26%	22%
68	Cynthia	14,652	3,574	19%	16%	14%	28%	24%
69	Paddy	22,877	22,878	12%	16%	23%	22%	14%
70	Keyera	13,909	13,902	9%	13%	17%	22%	14%
71	Half Moon	19,920	19,867	23%	28%	27%	13%	25%
72	Raven	16,442	9,463	14%	25%	29%	19%	24%
73	South Rat	17,467	17,466	20%	24%	25%	23%	17%
74	East Zeta	6,245	6,244	23%	28%	31%	16%	25%
75	West Zeta	13,019	13,019	26%	34%	37%	23%	30%
77	Upper Pembina	33,770	12,987	27%	31%	32%	19%	28%
78	Middle Pembina	2,934	2,934	21%	25%	26%	32%	13%
79	Lower Pembina	15,374	14,003	8%	10%	11%	17%	13%
80	Jerry	3,058	3,058	12%	19%	25%	50%	12%
81	Rehn	5,645	5,646	20%	22%	26%	24%	29%
82	Dismal	27,826	17,793	19%	29%	32%	17%	27%
83	Rockyview	13,748	1,160	20%	14%	7%	24%	16%
84	Baker	3,940	3,939	11%	11%	10%	38%	23%
85	Tall Pine	15,812	15,813	12%	24%	29%	20%	22%
86	Reservoir	5,859	5,859	8%	11%	11%	24%	18%
87	Sand	28,596	17,891	17%	10%	9%	30%	30%
89	South Elk	16,445	4,525	15%	33%	35%	25%	34%
90	North Elk	13,459	10,536	12%	27%	27%	16%	25%
91	Lower Saskatchewan	8,858	8,858	16%	18%	14%	20%	22%
92	Brazeau	17,885	17,886	7%	10%	10%	14%	12%
93	Lower Wolf	14,069	882	5%	2%	3%	26%	28%
94	Upper Saskatchwan	3,120	3,120	2%	6%	12%	28%	14%
95	Negraiff	10,090	5,870	10%	11%	12%	11%	12%
97	Mink	11,294	1,772	0%	0%	14%	28%	13%
98	Horseshoe	9,165	2,288	3%	9%	21%	29%	15%
99	Garden	5,249	2,322	1%	1%	11%	21%	9%
100	Broken Arm	10,697	3,496	17%	23%	29%	13%	26%

Weyerhaeuser

Weyerhaeuser Watershed ECA Analysis (Continued)

Patchworks Scenario PW70006

Watershed Number	Name	Full Watershed Area ha	Area in DFA ha	Watershed ECA percentage by year Year 0 2017	Year 10 2027	Year 20 2037	Year 50 2067	Year 100 2117
101	East Nordegg	5,797	5,798	5%	5%	6%	17%	13%
102	Nordegg	33,360	33,360	19%	18%	15%	17%	19%
105	Lower Blackstone	22,181	19,229	24%	30%	28%	17%	28%
106	North Marshybank	15,266	10,622	11%	21%	20%	28%	24%
107	Wilson	5,916	5,787	0%	6%	12%	19%	11%
108	North Open	10,369	10,367	3%	7%	13%	25%	13%
109	Middle Wolf	11,895	4,507	15%	19%	16%	26%	33%
111	North Saskatchewan	32,937	32,081	10%	9%	12%	28%	21%
112	Middle Blackstone	6,542	1,989	15%	13%	17%	20%	17%
113	Upper Brown	24,866	2,461	1%	13%	12%	49%	13%
114	East Rundell	9,529	9,516	36%	43%	39%	16%	41%
115	Sundre	9,312	556	1%	0%	6%	19%	10%
116	Owl	4,995	4,994	16%	23%	21%	21%	18%
117	North Rapid	1,943	1,943	13%	22%	29%	18%	23%
118	Middle Marshybank	5,002	2,685	0%	1%	1%	35%	5%
119	Middle Open	5,307	3,704	3%	1%	2%	12%	1%
120	North O'Chiese	7,329	7,330	28%	13%	5%	13%	18%
121	North Brewster	8,160	8,161	32%	40%	34%	17%	34%
123	Upper Wolf	18,457	18,429	8%	9%	10%	24%	16%
125	Stephens	14,390	14,379	25%	32%	30%	27%	32%
127	Chiefs	9,040	8,399	24%	26%	21%	19%	24%
128	O'chiese	11,850	11,849	13%	10%	9%	14%	12%
129	Wawa	9,655	9,581	27%	37%	34%	35%	30%
130	Grey Owl	5,128	4,350	6%	13%	18%	24%	14%
131	North Colt	2,674	2,180	40%	39%	35%	24%	31%
132	Rapid	9,437	5,565	27%	27%	25%	31%	25%
133	South Marshybank	10,789	5,185	0%	25%	24%	32%	26%
134	South Open	8,842	3,591	2%	1%	2%	18%	4%
135	Lobstick	6,246	4,829	8%	5%	9%	35%	14%
136	Brewster	17,030	6,859	18%	31%	35%	25%	32%
138	Sutherland	11,430	1,194	12%	30%	28%	35%	28%
139	Sunchild	4,668	4,481	13%	11%	11%	16%	18%
142	Hansen	7,233	6,858	6%	19%	33%	38%	16%
143	Welch	7,571	816	1%	0%	10%	25%	16%
145	Chungo	27,377	11,664	0%	9%	11%	37%	10%
146	Big Beaver	8,706	6,553	2%	6%	17%	30%	15%
147	Baptiste	11,601	11,601	22%	22%	26%	20%	25%
148	East Baptiste	9,328	8,221	5%	5%	12%	25%	14%
149	West Baptiste	4,930	4,930	22%	23%	21%	20%	24%
150	Lower Chambers	1,408	1,408	33%	45%	38%	12%	40%

Weyerhaeuser Watershed ECA Analysis (Continued)

Patchworks Scenario PW70006

Watershed Number	Name	Full Watershed Area ha	Area in DFA ha	Watershed ECA percentage by year Year 0 2017	Year 10 2027	Year 20 2037	Year 50 2067	Year 100 2117
151	Lookout	6,257	6,040	8%	19%	21%	34%	22%
152	Penti	5,100	4,114	0%	5%	5%	29%	6%
153	Lower Wapiabi	1,443	1,444	0%	0%	0%	17%	4%
154	West Chambers	13,749	1,959	21%	20%	23%	27%	34%
155	South Baptiste	6,265	6,265	9%	16%	23%	18%	24%
157	Noname	9,473	8,588	5%	6%	11%	15%	13%
158	Upper Wapiabi	17,789	3,744	0%	2%	2%	28%	8%
159	Sturrock	5,800	5,549	7%	4%	3%	19%	10%
160	East Chambers	6,526	6,468	16%	20%	19%	8%	20%
162	Upper Chambers	15,848	11,313	21%	26%	26%	21%	26%
164	Rocky	8,048	6,823	11%	18%	19%	14%	20%
166	Highway	14,140	582	20%	30%	24%	13%	23%
167	House	6,127	5,055	3%	5%	13%	15%	9%

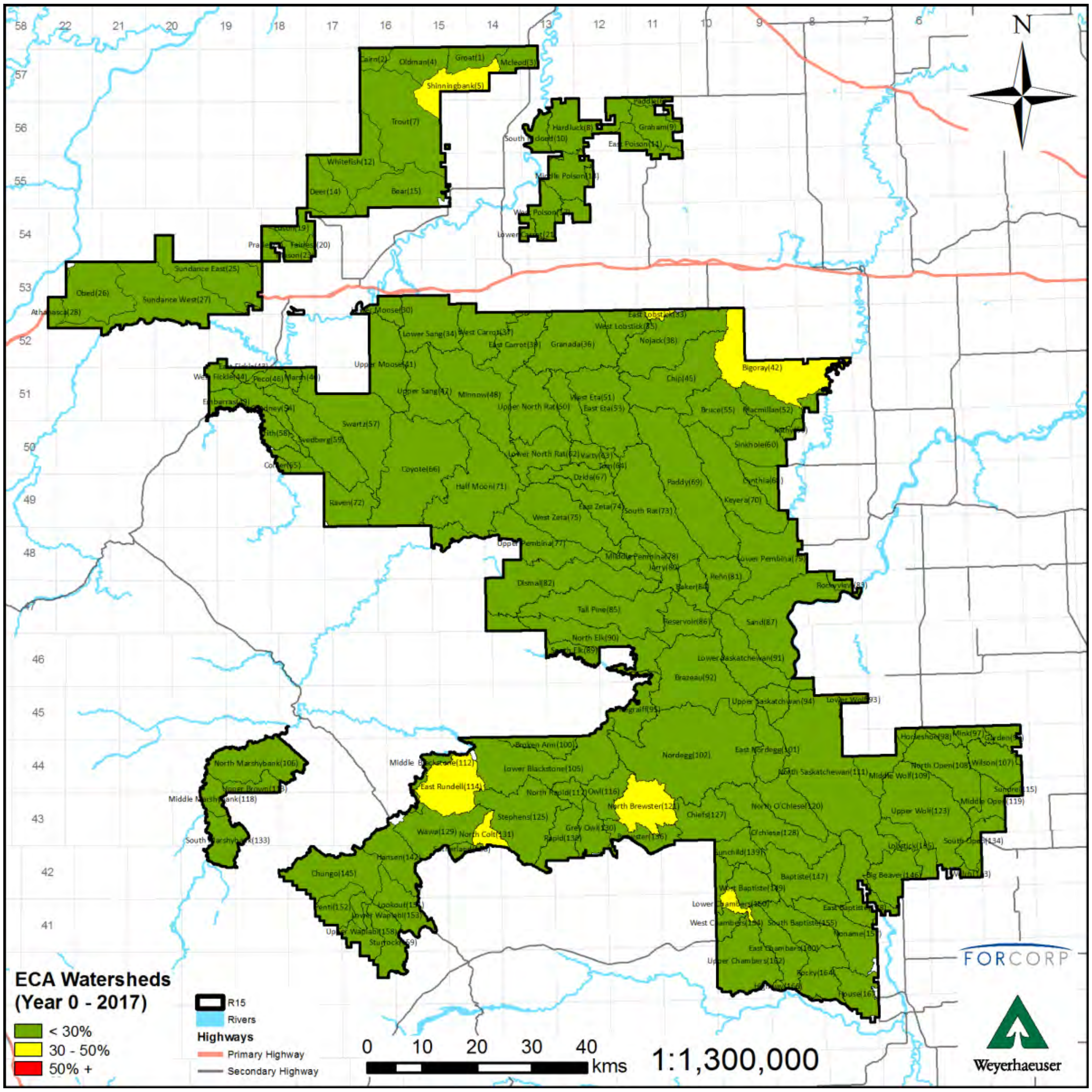


Figure 6-61. Map of ECA values by watershed at year 0

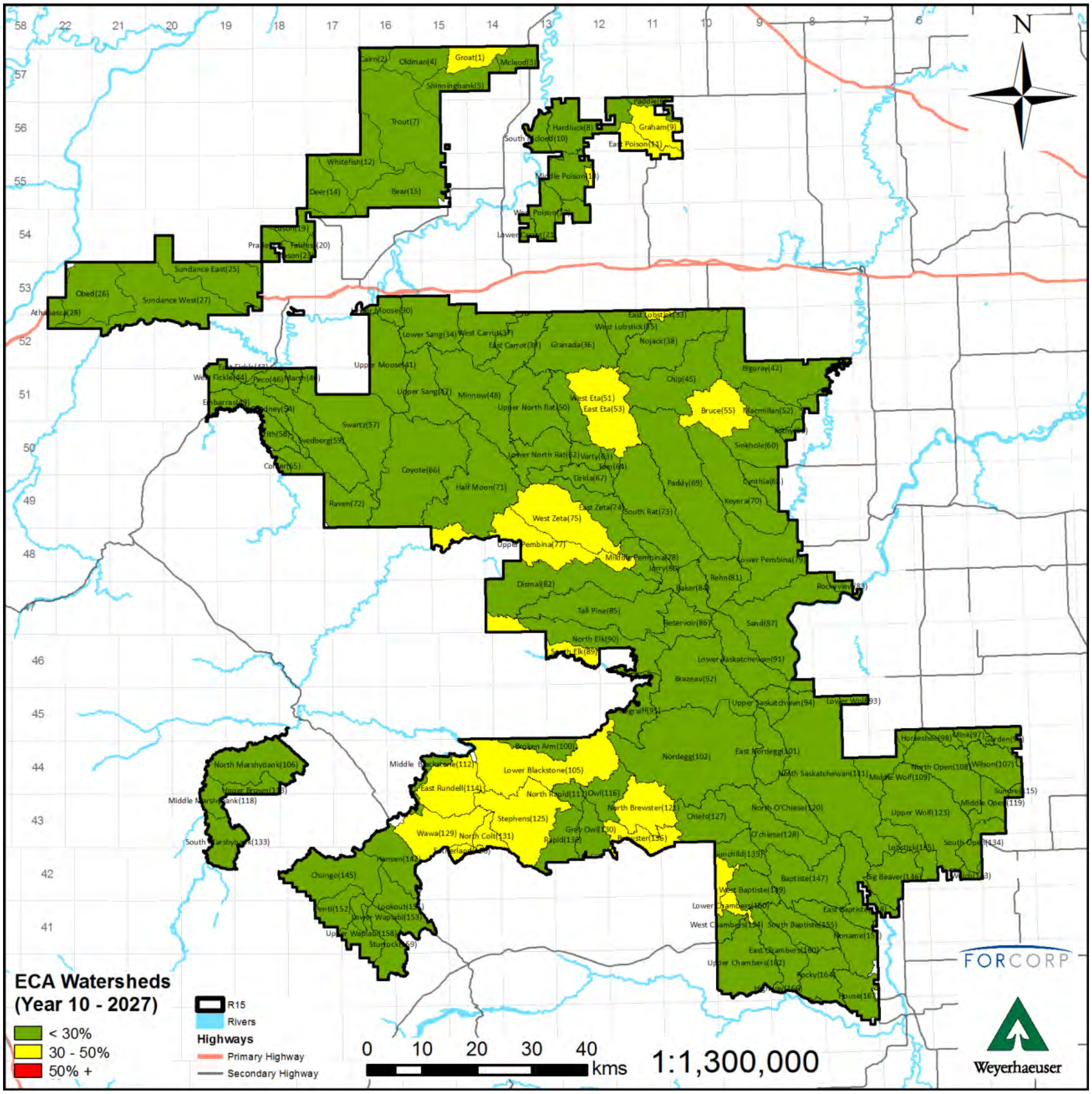


Figure 6-62. Map of ECA values by watershed at year 10

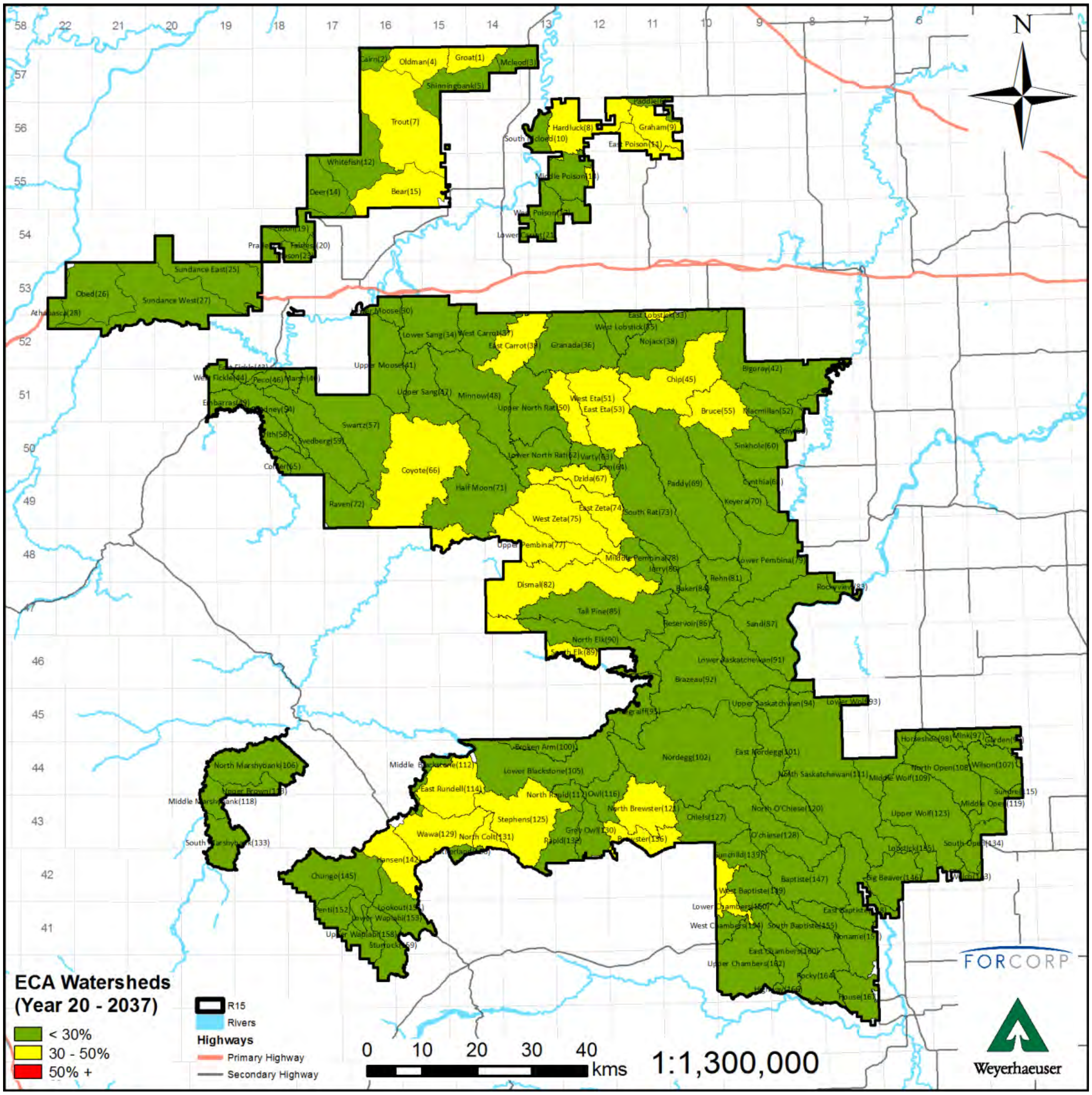


Figure 6-63. Map of ECA values by watershed at year 20

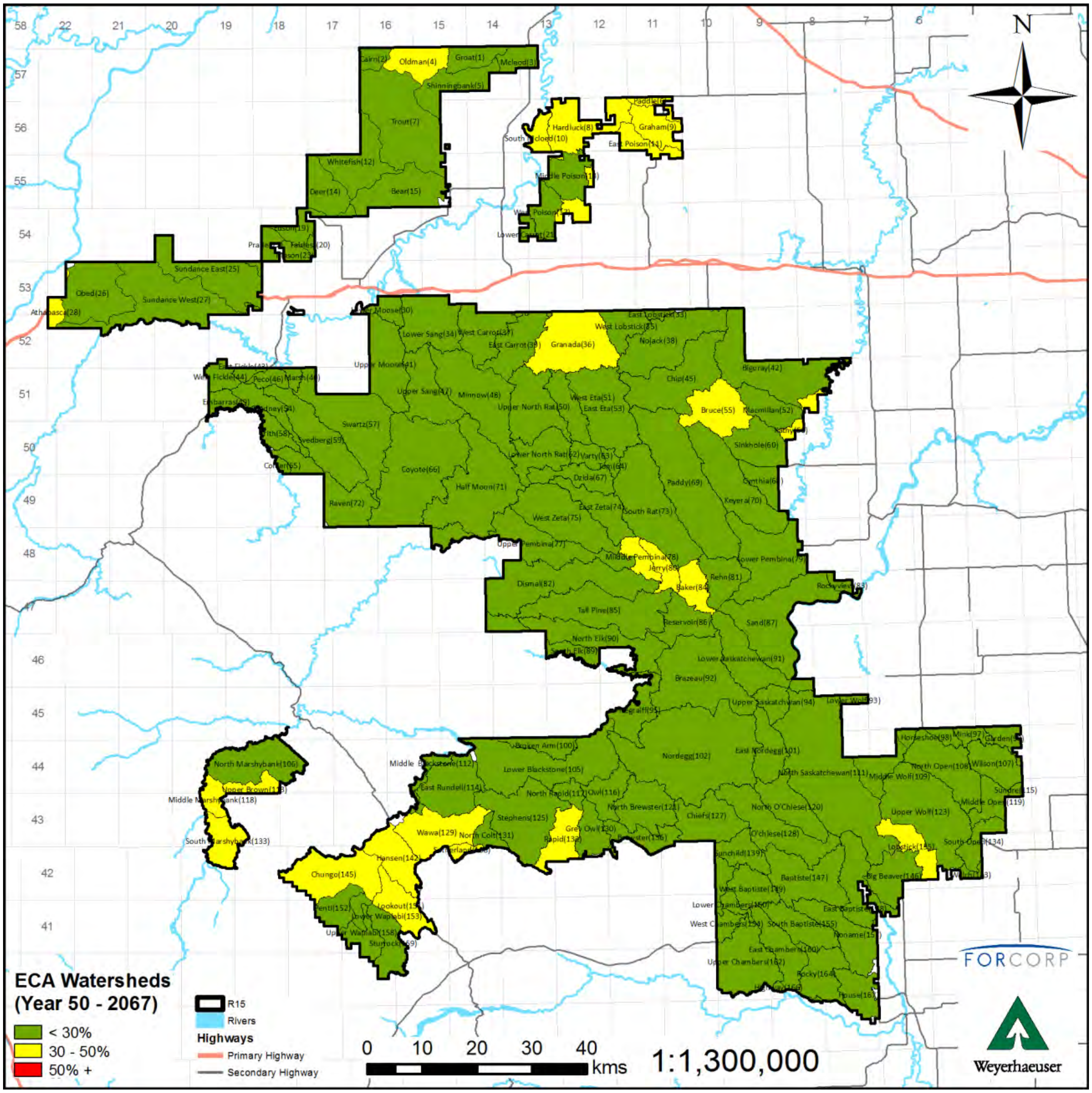


Figure 6-64. Map of ECA values by watershed at year 50

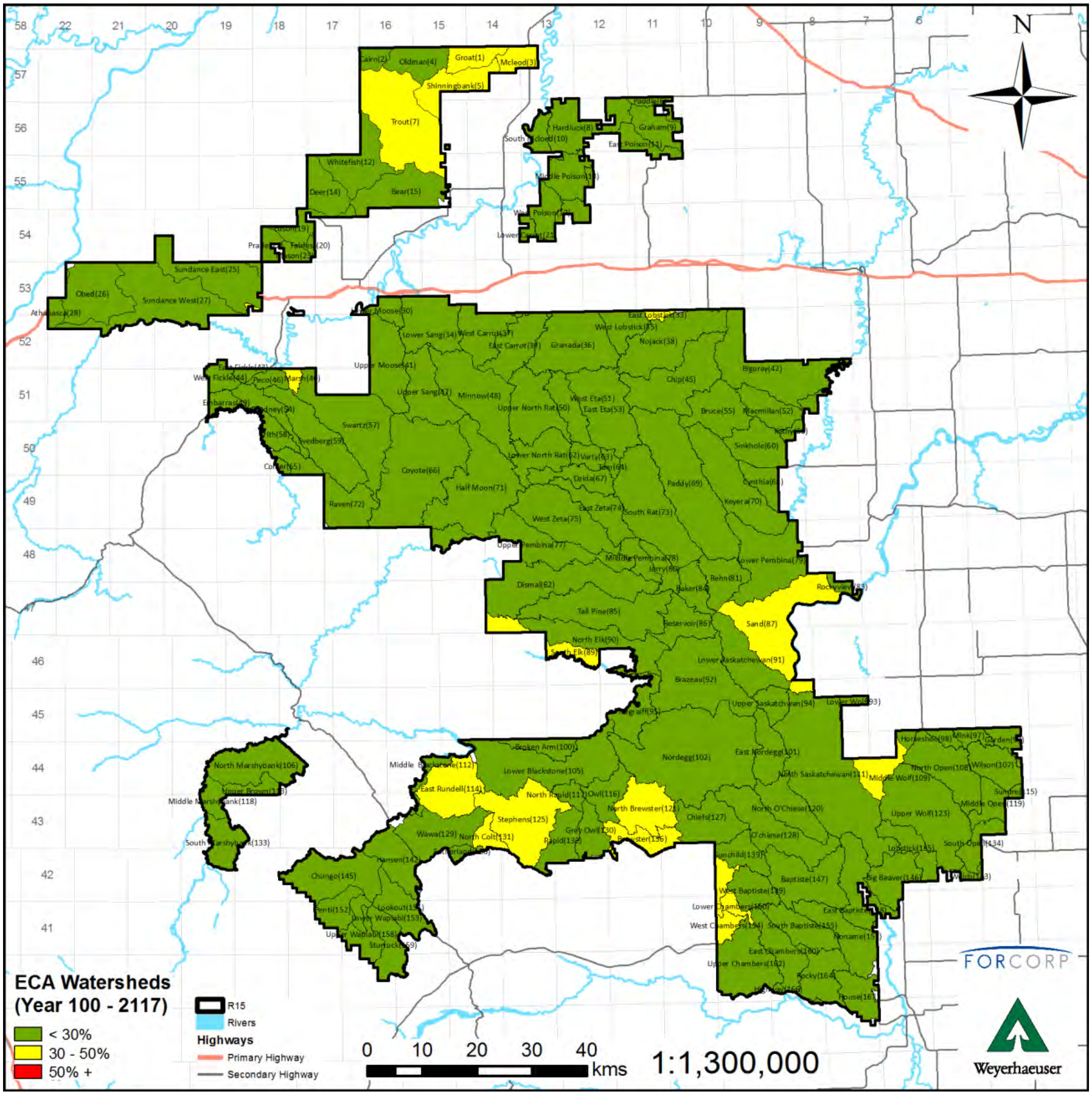


Figure 6-65. Map of ECA values by watershed at year 100

Weyerhaeuser

Pembina 2017-2026

Forest Management Plan

Chapter 7: FMP Implementation

March 19, 2018

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7 FMP Implementation

The implementation plan will provide direction for conducting forest management practices on the Defined Forest Area (DFA) for the life of the Forest Management Plan (FMP). Weyerhaeuser and the other timber operators will practice adaptive management upon the Defined Forest Area, the benefits of which include:

- Confidence in forest management practices by identifying variances between forecasted conditions and actual conditions
- Flexibility in adjustments to management for identified variances, and
- Accumulation of an information base for continuous improvement for future planning requirements

The avenue for implementation of the FMP will be the Weyerhaeuser Pembina Operating Ground Rules (OGRs), which detail the development of the following: General Development Plan (GDP), Silviculture Schedule, Fire Control Plan, and an Operational Schedule, all under the umbrella called the Annual Operating Plan (AOP). As well, the OGRs provide details and best management practices to be used in developing the AOP, utilization practices, integration with other users of the DFA, watershed protection criteria, habitat management practices, silviculture requirement, soils protection, forest health issues, road development, camp management, and reporting requirements to Alberta Agriculture and Forestry (AAF).

7.1 Alberta Regional Land Use Planning

Under Alberta's Regional Land Use Framework, forest management plans are deemed to be a sectorial or operational plan subservient to regional and sub-regional land use planning. The DFA overlaps two planning regions for Alberta – the North Saskatchewan and the Upper Athabasca. At the time of this FMP submission, the North Saskatchewan Regional Land Use Planning process was underway, and during the period of this FMP it is expected that the Upper Athabasca regional planning process will be underway as well. It is expected that the land use decisions and Biodiversity Management Frameworks associated with these regional plans will require revisions to the FMP. However, until such time as the regional plans are completed, this FMP submission relies on the existing Eastern Slopes Integrated Resource Plans as the source for guiding land use management.

7.2 FMP Commitments

Throughout the development of the FMP, a number of commitments were made. As well, there are some inherent commitments identified in the Alberta Forest Management Planning Standard – April 2006.

7.2.1 Forest Inventory Updates

Once the Forest Management Plan is approved, the FMA holder must resubmit the AVI used in the CLB to Forest Management Branch (FMB). FMB will incorporate the data into their provincial repository. The ARIS reconciled polygon boundaries will then become the "cutblock boundaries of record". FMA holders will receive an approval letter for the modified AVI from the Executive Director, FMB. At that time, the AVI will remain as updated until a new AVI is completed.

There will be a number of opportunities to acquire new or updated information on an ongoing basis. This type of work may include, but is not limited to:

- Cooperation with other agencies on landscape management assessments (e.g. fire management, land use developments, non-timber harvesting disturbance events, etc.)
- Wet areas mapping enhancements and refinements
- Historical Resources Modelling validation and updates
- LiDAR acquisition

For ongoing operations, there is a renewed commitment to acquire digital imagery to update disturbances on the DFA and report results as described in the new AAF Digital Submission Directive. Weyerhaeuser will attempt to coordinate imagery acquisition with other Timber Operators on the DFA to minimize costs.

It is Weyerhaeuser's intent, as part of the development of the next FMP, to update the Alberta Vegetation Inventory (AVI) by maintaining the current polygon boundaries while updating the vegetation attributes within the polygon. Polygon boundaries adjustments will be made to correctly represent new cutovers, disturbances, land use, and/or changes detected during the RSA process. Research and development with advanced metrics is occurring and may be included in the updated AVI at a future date.

7.2.2 Research and Long-term Monitoring

Research and long-term monitoring is an ongoing process for many companies that have a Forest Management Agreement. Prior to the FMA, Weyerhaeuser also funded research in their Quota Allocation areas. Some of this research was specific to the FMA while other research is more general in nature and could be applied across any of Weyerhaeuser's timber holdings in Alberta.

Many information gaps are still present in forest management and forest management practices. Weyerhaeuser will continue to participate in research projects and monitoring to try to fill these gaps.

The following is a list of some of the research, monitoring, or inventory programs either completed or in progress on the FMA.

- Wetland management
- Stand condition and site factors affecting the regeneration of healthy and over-mature deciduous,
- Grizzly Bear
- Raptor monitoring surveys, and
- Songbird monitoring surveys.

7.2.3 Growth and Yield Monitoring Program

The Growth and Yield Monitoring Program (GYMP) (see Annex VIII) describes Weyerhaeuser's commitment to monitor the capacity of the forest for the FMP. This includes natural stands as well as regenerating (managed) stands. Weyerhaeuser will monitor fire origin (Permanent Sample Plots - PSP) and regenerating stand (Growth and Yield Monitoring Plots) performance consistent with the GYMP shown in Annex VIII. Involvement in the Provincial Growth and Yield Initiative (PGYI) will be the cornerstone of the monitoring program as it moves forward. Plots already established that are additional to the PGYI program requirements will be maintained for the life of the plan.

7.2.4 First Nations and Métis Settlements

Forest management planning presents an opportunity for Alberta's First Nations and Métis communities to look at broad landscapes with long term forecasts of natural and anthropogenic development. Key to ensuring this opportunity is used by our local First Nations and Métis communities is for Weyerhaeuser to facilitate the transfer of the FMP information to those communities in a manner that is understood, and can be compared to the Traditional Knowledge and desires of those communities for those landscapes that represent their Traditional Lands. In order to achieve this, the conventional information products used for Government approvals tend not to suffice for those communities, and Weyerhaeuser will need to work with them to develop other means to gain more input and involvement in forest management. By way of example, this will include the development of different information products, community-level means of information interpretation capacity (skills and systems), and improved relationship building.

Weyerhaeuser consultation on the 2017-2026 FMP included Alexander First Nation, Alexis Nakota Sioux Nation, O'Chiese First Nation, Paul First Nation, Sunchild First Nation, Stoney Bearspaw Nation, Stoney Chiniki Nation, Stoney Wesley Nation, and East Prairie Métis Settlement. In response to input received, Weyerhaeuser created three new VOITs (#34, 35, and 37) which reflected community values. In addition, the following commitments were made with the Stoney Bearspaw, Chiniki, and Wesley Nations (Section 7.2.4.1). Commitments were not made with any other individual communities at this time.

7.2.4.1 Stoney Bearspaw, Chiniki, and Wesley First Nation

Weyerhaeuser over the years has undertaken twice annual pipe ceremonies with the Stoney Chiniki First Nation from the Bighorn Community. Weyerhaeuser will continue with these events in the years that we are operating in their traditional areas, generally the West Country and Nordegg Compartments.

As well, we will work closely with all three constituents of the Bighorn (Bearspaw, Chiniki and Wesley) in identifying appropriate harvest areas where teepee poles are abundant and dry firewood is available that could be delivered to a central location at the Bighorn and be made available for all three Stoney First Nations.

7.2.5 OHV Use

Off Highway (motorized) Vehicle (OHV) use has become a predominant land use issue in the Foothill regions, as evidenced by various land use planning processes at both provincial and municipal Government levels. The environmental impacts of recreational OHV use is integrated with the overall footprint impacts by industry at the landscape level. Hence improved strategies for OHV use will by necessity engage those making the footprint most often used by OHV users. Weyerhaeuser is of the position that the issue requires a longer term / larger geographical scale plan, integrated within an overall Integrated Land Management approach, and will continue to advocate for this. In addition the Company will work cooperatively with Governments to support the development of designated, managed trails that mutually support the FMP and forthcoming regional land use plans.

7.2.6 VOIT reporting

Reporting of VOITs will be consistent with the information provided in Chapter 5: VOITs. Annual reports will be produced for internal use by Weyerhaeuser to track performance, with a roll-up occurring at the end of the 5th year. At that time a Stewardship Report will be submitted to AAF for review and approval by November 1st.

7.2.7 Spatial Harvest Sequence (SHS) Variance reporting

SHS variance tracking will measure the success of following the approved 10-year SHS through approval until the next FMP is approved. Weyerhaeuser is committed to updating their current variance reporting system (SHS Manager) to reflect new requirements from AAF. Tracking of SHS variance will occur in Forest Harvest Plans (FHP), General Development Plans (GDP) and in the Stewardship report.

7.2.8 Cone Collection Plans

Any amount of area that is scheduled for harvest in the SHS within the FMP must have some type of plan associated with it. There are many options available under RSA and FGRMS that can be used to address small areas. Some examples (but not limited to):

1. Seed collection plan.
2. Apply for a variance on deployment of seed.
3. Strata balancing.
4. Minimum percentages for stocking.
5. Purchase seed from another source.

The following sections address individual operator deficiencies noted in Section 7.7.4.

7.2.8.1 Weyerhaeuser Pembina

There are several seedlot deficiencies noted in Section 7.7.4 (Table 7-6) that will need to be addressed, as follows:

Lodgepole Pine Seedlots

PL DM 2.3 – deficiency of 0.11 kg of seed – no collection will occur; use seedlot WES 42-7-5-1991PL that is within 8 miles and 20 meters in elevation.

PL LF 1.5 – deficiency of 96.8 kg of seed for Weyerhaeuser needs, plus 14.69 kg for Tall Pine Timber, plus 1.52 kg for Dale Hansen; total deficiency of 113.01 kg - start collecting in 2018, with collection being completed by 2022.

PL LF 2.2 - deficiency of 128 kg of seed for Weyerhaeuser needs, plus 4.52 kg for Tall Pine Timber, plus 11.8 kg for Dale Hansen; total deficiency of 144.32 kg - start collecting in 2018, with collection being completed by 2022.

PL UF 2.4 – deficiency of 25.9 kg of seed – collected in 2017, with seed currently at the extraction plant.

PL SA 2.2 - deficiency of 0.8 kg of seed – will collect by 2022.

White Spruce Seedlots

SW SA 2.2 – deficiency of 0.005 kg – Weyerhaeuser Pembina will use strategy #2 (Apply for a variance) or strategy #5 (Purchase seed from another source) for small amounts of seed.

7.2.8.2 Alberta Newsprint Company

There are no seedlot deficiencies noted in Section 7.7.4 (Table 7-7) that need to be addressed related to the proposed SHS in the DFA. The company acknowledges: “The intent is that this seed (shown in Table 7-7) is being used for your FMP area. We are collecting seed in our FMA to meet our needs there”, that they have sufficient seed for the DFA and have plans in place for other non-DFA commitments.

7.2.8.3 Blue Ridge Lumber

There are no seedlot deficiencies noted in Section 7.7.4 (Table 7-8) that need to be addressed related to the proposed SHS in the DFA. The company acknowledges “The seed supply for Blue Ridge is sufficient for our needs for the next 10 years. We only deploy LF 1.5 seed in blocks harvested in our Weyco FMA (W6) operations, and as shown in the table – the current inventory exceeds the expected demand.” Therefore, BRL have sufficient seed for the DFA and other non-DFA commitments.

7.2.8.4 BRISCO

There is one seedlot deficiencies (Table 7-9) related to the proposed SHS in the DFA.

SW LF 2.1 – deficiency of 0.15 kg of seed - The company will use strategy #5 (Purchase seed from another source)

7.2.8.5 Dale Hansen Ltd

There are several seedlot deficiencies noted in Section 7.7.4 (Table 7-10) that need to be addressed. Weyerhaeuser will undertake the following to support DHL:

Lodgepole Pine Seedlots

PL LF 1.5 – deficiency of 1.52 kg of seed - start collecting in 2018, with collection being completed by 2022.

PL LF 2.2 – deficiency of 11.8 kg of seed - start collecting in 2018, with collection being completed by 2022.

White Spruce Seedlots

SW LF 1.5 – deficiency of 0.034 kg of seed – will use HASOC I seedlot to meet this commitment

7.2.8.6 EDFOR

There are several seedlot deficiencies noted in Section 7.7.4 (Table 7-11) that need to be addressed, as follows:

Lodgepole Pine Seedlots

PL LF 1.5 – deficiency of 12.4 kg of seed - start collecting in 2018, with collection being completed by 2022.

PL LF 2.1 - deficiency of 33.4 kg of seed - start collecting in 2018, with collection being completed by 2022.

PL UF 1.2 – deficiency of 1.5 kg of seed – collected in 2018, with seed currently at the extraction plant.

PL UF 1.4 - deficiency of .73 kg of seed – will collect by 2022.

White Spruce Seedlots

SW LF 1.5 – deficiency of 2.36 kg – start collecting in 2018, with collection being completed by 2022.

SW UF 1.2 – deficiency of 0.6 kg – start collecting in 2018, with collection being completed by 2022.

SW UF 1.4 – deficiency of 0.17 kg – start collecting in 2018, with collection being completed by 2022.

7.2.8.7 Millar Western

There are no seedlot deficiencies noted in Section 7.7.4 (Table 7-12) that need to be addressed related to the proposed SHS in the DFA. The following information was received from Millar Western in support of the seed requirements on the DFA:

Available PL Seed

Based on an analysis of the SHS's for Millar Western and Weyerhaeuser's DFMPs, Millar Western expects to harvest a total of 1,066 hectares of PL in LF 1.5 (780ha in W13 +286ha in W6). Millar Western typically plants PL at a density of 1400 stems/ha. This equates to a PL requirement of 1,492,400 seedlings over the next 10 years. As indicated in the table above, Millar Western currently has enough seed to meet all of the PL regeneration requirements in LF 1.5. The actual requirement of PL seedlings is expected to be somewhat lower than stated, due to Millar Western's intention to incorporate LFN treatments on appropriate pine sites. Millar Western will also seek to collect additional PL in LF 1.5 as the opportunity presents itself.

Available SW Seed

Based on an analysis of the SHS's for Millar Western and Weyerhaeuser's DFMPs, Millar Western expects to harvest a total of 841 hectares of SW in LF 1.5 (649ha in W13 +192ha in W6). Millar Western typically plants SW at a density of 1400 stems/ha. This equates to a SW requirement of 1,177,400 seedlings over the next 10 years. As indicated in the table above, Millar Western currently has enough seed to meet all of the SW regeneration requirements in LF 1.5. No additional cone collection initiatives are anticipated for SW in LF1.5.

7.2.8.8 Tall Pine Timber Company

There are several seedlot deficiencies noted in Section 7.7.4 (Table 7-13); the company has committed to the following:

Lodgepole Pine Seedlots

PL CM 3.5 – deficiency of 3.3 kg of seed – The company will use strategy #5 (Purchase seed from another source – Weyerhaeuser)

PL LF 1.5 – deficiency of 14.69 kg of seed - The company will use strategy #5 (Purchase seed from another source - Weyerhaeuser)

PL LF 2.1 - deficiency of 1.1 kg of seed - The company will use strategy #5 (Purchase seed from another source - Weyerhaeuser)

PL LF 2.2 – deficiency of 4.52 kg of seed – The company will use strategy #5 (Purchase seed from another source - Weyerhaeuser)

PL UF 1.4 - deficiency of 9.52 kg of seed – The company will use strategy #5 (Purchase seed from another source – Provincial Seed supply)

White Spruce Seedlots

SW CM 3.5 – deficiency of 0.21 kg of seed – The company will use strategy #5 (Purchase seed from another source – Weyerhaeuser HASOC)

SW LF 2.2 – deficiency of 0.001 kg of seed – The company will use strategy #5 (Purchase seed from another source - Weyerhaeuser)

SW UF 1.4 - deficiency of 0.001 kg of seed – The company will use strategy #5 (Purchase seed from another source - Weyerhaeuser)

7.2.8.9 Community Timber Permit Programs

There are several seedlot deficiencies noted in Section 7.7.4 (Table 7-14) that need to be addressed, as follows:

PL CM 3.5 – deficiency of 1.72 kg of seed – FRIAA can commit to addressing the deficiency within the next 5 years, or by 2022

SW UF 1.2 – deficiency of 0.11 kg of seed – FRIAA will use strategy #2 (Apply for a variance) or strategy #5 (Purchase seed from another source) for small amounts of seed.

7.2.9 MPB Monitoring

The company will continue to work closely with area AAF staff to ensure best available information is at hand and can be used in operational planning.

7.2.10 Amalgamation of FMUs

The five FMUs - E15, E2, W5, W6 and R12 are to be amalgamated into a single FMU, R15, upon approval of the FMP. A letter received from the Senior Manager, Forest Resource Management Section, on July 22, 2015 stated that all requirements have been met and the amalgamation will proceed.

7.3 Preferred Forest Management Scenario

The Preferred Forest Management Scenario (PFMS) supports the Values, Objectives, Indicators and Targets (VOITs) described in Chapter 5 of the plan, as well as other values not captured by the Provincial VOITs. Examples of these would be: economic feasibility, timber profile, and mill requirements. These values were used by timber operators throughout the process by assessing their impact on determining the appropriate AAC.

The timber supply model being used (Patchworks) provides information on the shape, size, and distribution of harvest areas for the 200-year planning horizon (2017-2216). Harvest areas approved in Forest Harvest Plans (FHPs) or laid out in the field but have not been submitted for FHP approval were incorporated in the plan and have been scheduled for harvest in the first decade (2017-2026) of the plan. These blocks are shown in the Timber Supply Analysis (TSA) as PLAN10 blocks.

7.3.1 Twenty Year Spatial Harvest Sequence

Timber Operators had the opportunity to 'operationalize' the spatial harvest sequence (SHS) to their own company requirements prior to finalizing the PFMS. This occurred over several iterations of spatial outputs, with most planners spending a fair amount of time undertaking the task. This was an attempt to more closely align with variance thresholds set by AAF in the application of the SHS until a new SHS is developed under the next FMP. The impact of these decisions on each iteration of the SHS were assessed against the non-timber values and reviewed by AAF. These non-timber values included: Grizzly Bear, Barred Owl, Old Forest Songbirds and Equivalent Clearcut Area (ECA). The model for East Slope Cold Water fish was not available for this FMP, however ECA was used as a surrogate to determine the VOIT.

Every polygon in the 20-year SHS is assigned an operator, first by major species group, then with some fine tuning to avoid excessive integration or access/isolation issues in the future. The intent was to ensure that 95-105% of the allowable cut, by operator, was assigned spatially. Operationally, if operators determine that exchanging polygons among operators makes sense, with agreement, the exchange in polygons would not be viewed as a variance to the approved SHS, but a fine-tuning of each operators 'denominator' that is used to assess variance by the province for the decade.

A copy of the 20 year SHS is included in Annex X. The first decade of the FMP starts on May 1st, 2017, while the second decade commences on May 1, 2027.

7.3.1.1 Variance to the SHS

An interactive mapping tool developed by *FORCORP Solutions Inc.* aided in the interactive review and edit of the Patchworks outputs that led to the determination of the final PFMS SHS. Each operator had three opportunities to influence the outcome to achieve the desired PFMS SHS prior to signing off.

However, there are justifiable reasons why stand conditions (e.g. age, health condition, species) unaccounted for in the inventory may arise that would result in endangered timber conditions or a requirement to harvest damaged, dying, or dead timber that could not be forecasted by Patchworks. Similarly, there may also be site-specific management objectives that could not be accounted for in the FMP analysis, or that arose after the FMP submission. Table 7-1 describes potential reasons why there may be variances to the plan. The table is not an exhaustive list, but identifies the most common reasons when operationalizing a strategic plan.

During the Timber Supply Forecasting process, the SHS was appraised and confirmed to be convertible to a FHP for operations by all operators. Variance from the SHS is acceptable for additions where they make up less than 20% the total SHS area in a compartment, by operator, by decade. If the 20% threshold is exceeded, a management review (appraisal) is expected for each subsequent FHP for that compartment only, for the remaining part of the first decade.

Additions can occur under a number of scenarios: a SHS polygon of similar strata has been deleted for any number of reasons (wrong inventory age, species, etc.) prior to the addition; an addition has occurred where the planner feels that the polygon is at risk of further deterioration (deciduous senescence); an addition has occurred where a natural disturbance event has occurred to a stand not scheduled for harvest (MPB, windthrow, weather event, fire); or an addition has been made due to management considerations (isolation avoidance, grazing integration, minimize future access development, etc.). See Table 7-1 below for reasons that may provide justification to include or exclude polygons from the SHS. No approval mechanisms are implied in the Table below.

Table 7-1. List* of potential justifiable reasons to add or exclude SHS polygons during FHP development.

1. *Substantial Additions* ♦ fire damaged, or ♦ affected by MPB green attack, or ♦ rapidly deteriorating stand volume or condition, or ♦ blowdown, or ♦ pending alternate land uses such as new oil and gas development, grazing applications or amendments, or ♦ merchantable parts of passive landbase polygons immediately adjacent to SHS polygons being laid out that would become isolated in left unharvested.
2. *Substantial Subtractions* a) *Deferrals* ♦ Stakeholder concerns (trapper cabins, grazing operations, recreational concerns, etc.), or ♦ Rights-bearing communities' interests require avoidance, or ♦ Stand is unmerchantable at this time, but is expected to be so in the future, or ♦ Immature stands below minimum harvest age. b) *Deletions* ♦ Inclusion of wrong strata into spatial sequence due to errors in AVI (e.g. pure black spruce, any larch component, leading birch), or ♦ Unique finds that should have permanent protective buffers applied, or ♦ New landuse developments not previously recognized, or ♦ Ground Rules requirements (e.g. unknown creek to be buffered, identification of unknown sensitive site).

*note: this is not an all-inclusive list;

Structure retention islands large enough to digitally map (> 0.5 hectare) do not contribute to SHS variance. Substantial deletions or deferrals can be offset with additions. Deletions or deferrals of less than 2.0 hectares (slivers) will not count against variance but will be tracked for reporting purposes only.

Variance estimates for new plans are provided in each FHP. The GDP summarizes variance levels by compartment by decade each year. If variance (additions) by compartment is less than or equal to 20% of the total compartment area at the time of submission, the FHP is to be approved upon acceptance (time of delivery from timber operator to AAF), even if individual FHP variance levels exceed 20%. If variance levels are equal to or exceed the 20% threshold, by compartment, by decade, AAF may undertake a management review (appraisal) of each subsequent FHP in that compartment. The review by AAF that results in a compartment assessment being completed would provide guidance for the operator in developing future compartment specific FHPs.

Variance levels are reset each decade. For example, the first decade of this plan is anticipated to be May 1, 2017 to April 30, 2027, if the FMP is approved on or before April 30, 2018. If the FMP is approved during the 2018 operating year (between May 1, 2018 to April 30, 2019) the first decade will represent only 9 years (e.g. polygons harvested during the 2017-2018 operating year would be removed from the decade for variance reporting purposes). For FHPs scheduled to be harvested after April 30, 2027, the variance is reset to zero and is reported separately from decade 1. Polygons remaining unplanned at the end of the first decade will be available for inclusion into an FHP developed during decade 2. Deferrals should not be added to the second decade, but will be reviewed during subsequent FMP development for inclusion in any PFMS-SHS.

It is Weyerhaeuser's intent to update the Silvacom-on-Line SHS Manager, with the ability to report variances, by compartment, by operator, by decade. This will be consistent with the previous FMP variance tracking, updated to reflect current reporting standards of AAF. Variance reports will be completed for all operators upon submission of shape files to Weyerhaeuser for input into their planning layer and processing by the SHS Manager. Additions, deletions, or deferrals will be tracked by their respective strata, but have no influence on variance reporting.

All timber operators will track these variances against their respective sequencing for the decade(s) as identified in the approved FMP.

7.4 Access Planning and Development

The DFA overlays a substantive source of petroleum and natural gas resources, contained in a diverse range of geological formations. The area has a long history of light crude oil development, and now also more recent developments for Foothills natural gas and so called "unconventional" sources. As a consequence, the DFA has an extensive infrastructure of oilfield road development, as well as long term public road corridors. Therefore Weyerhaeuser is a minor permanent road developer for the DFA, relying more on others' roads and public routes.

Chapter 3 of the FMP provides a good overview of the current access infrastructure, and the following provides a qualitative overview by dividing the DFA landscape into broad descriptions of access development (Figure 7-1):

Zone 1: The Majority of the DFA:

The majority of the DFA is accessed by public routes at, or near to, Secondary Highway standards. The remaining network is a mosaic of industrial access roads, ranging from high densities in the east and decreasing density towards the west. The strategic challenge here is that this mosaic is a consequence of mostly ad hoc development, and does not necessarily represent coordinated, integrated access. The greater need will be to establish longer term, larger geo-scale access routes which will entail both aligning and reclaiming existing road infrastructure.

Zone 2: Secondary Corridors

There are several areas of the DFA where secondary corridor routes have been developed by Weyerhaeuser to coordinate industrial access e.g. Weyerhaeuser's Rapid Creek and River Road routes. It is Weyerhaeuser's intent to build on this approach by developing a recommended secondary road corridor map at the appropriate geographical scale (e.g. "road-shed") to promote integration of all industrial access across the DFA. Weyerhaeuser will promote this approach with oil and gas developers, as well as for input to any opportunity for sub-regional integrated land management planning. This will entail the development of new access, aligning and upgrading existing access, and reclaiming existing access which no longer fits the desired landscape outcomes. Planning for secondary corridor routes will be accomplished through the General Development Plan process.

Zone 3: West Country

The West Country landscape management unit of the DFA is characterized by the Upper Foothills sub-region, and has relatively little access development when compared to the rest of the DFA. This part of the DFA represents forested lands seen as important for watershed protection, recreational use and grizzly bear management. This portion of the DFA will require extra planning, design and management requirements for new and existing access. Primary corridors including the Wapiabi, Gap, Chungo, Donsan, and Canyon Creek roads will provide primary access to the majority of Zone 3. Weyerhaeuser expects to upgrade some portions of these roads for safety or operational reasons.

The exception is the access into the Chungo Lookout and Race Creek Work Areas which does not exist at this time. Two possible routes have been identified which will provide the required access (see Figure 7-1). Weyerhaeuser intends to work with a cross section of government agencies in order to finalize an acceptable access route given the sensitivity of the area and potential conflict with adjacent land management objectives.

Secondary and tertiary roads will derive from the Operational planning process based on considerations of managing MPB infestations, minimizing foot-print, managing impacts to water, adherence to grizzly bear management plans, or recreational use plans. Weyerhaeuser's previous experience planning in steep slope terrain suggests that Compartment Assessments will often be used as a tool to evaluate the trade-offs in the above mentioned objectives.

7.5 Planning Hierarchy

The FMP provides higher, strategic level direction to the DFA. The FMP has taken direction from subsequent regional plans or Integrated Land Management objectives. Landscape level values (e.g. Grizzly Bear, Barred Owl, songbird habitat, structure retention, interior older forest patches, seral stage maintenance, etc.) are accounted for during the development of the Preferred Forest Management Scenario Spatial Harvest Sequence (PFMS SHS).

Prior to scheduling harvest plans in the operating schedule, either a Compartment Assessment or a Forest Harvest Plan must be submitted and approved. Once FHPs have been approved, they can be scheduled in the Annual Operating Plan.

The Weyerhaeuser Pembina Operating Ground Rules (OGRs) are the practices used in planning and conducting forest management operations which constitute the methods used to implement decisions made in the FMP or higher-level plans such as Integrated Resource Plans. In the event that no direction is given in strategic level plans, the OGRs will establish practices that minimize the chance of negative impacts from forest management operations.

7.5.1 Compartment Assessment

There are two main circumstances where a compartment assessment may be required:

1) It is recognized that circumstances in certain areas of the DFA may change ***significantly*** once the FMP has been approved. It is possible that the SHS approved in the FMP may not be appropriate considering these changes. Where AAF and the timber operator deem it necessary, a Compartment Assessment may be completed to adjust the approved SHS for the area. These changes may include any of the following, singularly or in combination: forest fires, large scale windthrow or other disturbance events, multiple stand damaging insect or disease infestations, major changes in land use direction, etc. An approved compartment assessment for these defined areas would make further FHP reviews unnecessary, and variances to the approved SHS will continue to be tracked but for reporting purposes only.

2) A compartment level variance of greater than 20.0% additions to the total SHS area, by compartment and by decade, may also suggest that a compartment assessment may be required. The Compartment Assessment shall provide direction to the timber operator for all future FHPs in the compartment for the remaining decade(s) of the approved SHS. Once a compartment assessment has been approved by AAF, all variance reporting will be continued for the remainder of the decade and until a new FMP SHS is in place, however no further compartment FHP assessments would be required for that decade.

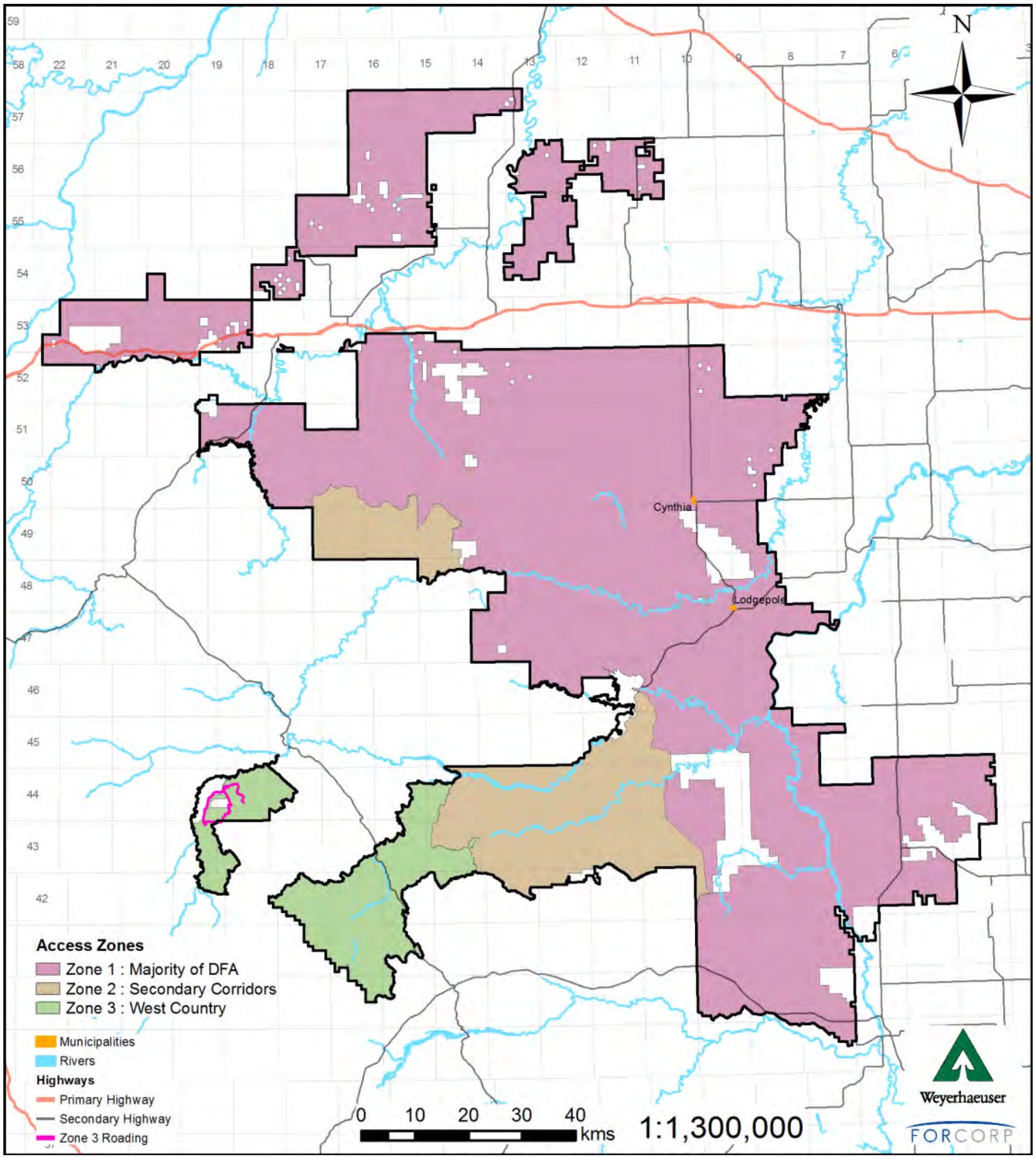


Figure 7-1. Access zones

7.5.2 Forest Harvest Plan (FHP)

The primary components of a Forest Harvest Plan are a map and report that clearly show and document the laid-out harvest area boundaries, retention islands or patches, and exterior block roads and watercourse crossings. The design shall be valid for a period of five years following the end of the operating year in which they were approved unless issues deemed ***significant*** by AAF arise during this period that would dictate a re-evaluation of the FHP. FHPs are acceptable at the time of submission to AAF if variance levels have not exceeded the 20% threshold described in Section 7.3.1.1. FHPs must be submitted for approval prior to being included in any AOP.

The FHP will also address operational issues identified during the development and review of the FMP. These issues were generally identified during the consultation or public input processes by First Nations, Métis Settlements, and stakeholders such as Grazing Operators and Trappers. In general, the primary goal to mitigate most issues was advance notification of forest management activities as far out as possible for these primary users of the forest resources on the DFA. Additional mitigations and commitments are discussed in Sections 7.2.4 and 7.2.4.1.

7.5.3 Annual Operating Plan (AOP)

The AOP is comprised of a series of plan components that are generally submitted at different times of the year due to the approval/reviewing requirements. The components of the AOP are as follows:

i. General Development Plan
ii. Fire Control Plan
iii. Silviculture Schedule (Reforestation Plan)
iv. Operating Schedule and Timber Production Plan

Each component plan or schedule can be approved either separately or as a whole, but issues with one component should not unduly affect approvals of other component plans for that operating year.

7.5.3.1 General Development Plan (GDP)

The GDP, using the approved SHS for direction, gives a description of a forest operator's proposed harvest, permanent road building and reclamation schedules. Maps and tables are based on generalized geographic proximal locations (grouped blocks, working areas, licenses, compartments, etc.) and are not specific to any individual block. Individual block issues will be dealt with at the FHP stage.

The primary components for the 5-year period covered by the GDP include: a forecast of the areas scheduled for harvest; the status and forecast of the respective cut control periods; a summary of variance from the SHS for completed FHPs by decade by compartment; and long-term (secondary corridor) road plans scheduled for construction or reclamation.

Consultation of the GDP with First Nations and Métis Settlements is a requirement of Alberta's First Nations Consultation and Métis Settlement Guidelines on Land Management and Resource Development. However, the GDP content submitted to AAF often does not satisfy tests of adequacy for information sharing with Indigenous communities, so Weyerhaeuser will continue to develop more appropriate means and content for plan information sharing with the DFA's Indigenous communities.

It is Weyerhaeuser's intent to pursue the utility of the GDP in ensuring the implementation of FMP strategies, and addressing ongoing issues, in collaboration with other timber operators on the DFA.

7.5.3.2 Fire Control Plan

The Fire Control Plan is generally submitted prior to the start of the fire season. The Plan addresses requirements concerning forest fire pre-suppression, prevention, detection, reporting, and suppression by Weyerhaeuser. The content of the Fire Control Plan is in turn determined by a separate Fire Control Agreement between Weyerhaeuser and AAF, which also sets forth general responsibilities and liabilities of both parties in relation to fire suppression and events.

7.5.3.3 Silviculture Schedule

A silviculture schedule is generally submitted in the spring of each year (Silviculture AOP), and describes prescriptions by stratum, with a schedule of treatments for the upcoming year. The proposed silviculture schedule provides a link between reforestation operations and the FMP. The silviculture schedule must be based on the most current knowledge of treatments (by stratum) which lead to reforestation success in terms of achieving the FMP objectives for regenerating stand yields, and meeting the Alberta reforestation standards.

7.5.3.4 Operating Schedule and Timber Production

The Operating Schedule should include the following administrative components:

- Disposition Holder name
- List of dispositions to be operated
- Effective date of the Operating Schedule
- Submission date
- Facility where timber will be processed, and
- Timber allocations where production will be charged to.

The Operating Schedule articulates in detail the activities proposed for the current year and must be approved by AAF before timber operations shall commence. The Operating Schedule can only contain blocks and/or roads approved in an FHP submission. The Schedule should be submitted on or before May 1st of each year.

The Operating Schedule should include the following information:

- Maps of blocks scheduled to be harvested, along with associated inter-block road and creek crossings.
- A list of blocks with anticipated conifer and deciduous volumes to be generated, summarized by license or compartment.
- A list of non-DLO inter-block roads to be constructed or reclaimed, with the exception of reads that are 100 meters or less away from other access points already in place.
- A list of outstanding operations from previous AOPs.

A Timber Production Summary should also be included at the same time as the Operating Schedule. The Timber Production Summary should provide a summary of current quadrant production, and estimated production of the upcoming operating year.

7.5.4 Timber Harvest Planning and Operating Ground Rules

The Provincial Ground Rule Template and the current Weyerhaeuser Pembina Operating Ground Rules (OGRs) were used to guide the development of a revised set of OGRs. These OGRs were approved by AAF with an effective date of November 1, 2017. An amendment will be required upon FMP approval, expected in the spring of 2018.

7.6 Timber Harvesting

7.6.1 Annual Allowable Cut (AAC)

7.6.1.1 AAC Levels

Annual allowable cuts (AACs) are expected to be effective as of May 1, 2017. Prior to that date, the previous approved AACs from the 2007 MPB addendums are in place. Table 7-2 and Table 7-3 show the proposed new AACs by operator.

Table 7-2. Final coniferous harvest levels (excluding unused volumes) and allocations.

Company	Disposition #[1]	Location	Allocation m^3 / %	Years 1 - 10[3] m^3/yr	Years 11 - 200[3] m^3/yr
Weyerhaeuser Company	FMA 0900046/CTQ	FMU	69.79% [2]	888,741	654,855
ANC Timber Ltd.	CTQ W060011	FMU	7.73%	98,436	73,438
BRISCO Wood Preservers Ltd.	CTQ E150001	FMU	0.45%	5,730	4,271
Blue Ridge Lumber Inc.	CTQ W060010	FMU	3.38%	43,042	32,122
Dale Hansen	CTQ R120001	FMU	0.99%	12,607	9,388
EDFOR Co-operative Ltd.	CTQ E020002	FMU	7.21%	91,814	68,467
Millar Western Forest Products Ltd.	CTQ W060002	FMU	0.13%	1,655	1,192
Millar Western Forest Products Ltd.	CTQ W060012	FMU	10,000	10,000	10,000
Tall Pine Timber Co. Ltd	CTQ R120002	FMU	1.82%	23,128	17,252
Tall Pine Timber Co. Ltd	CTQ R120003	FMU	0.38%	4,797	3,579
Tall Pine Timber Co. Ltd	CTQ R120004	FMU	1.29%	16,469	12,285
CTPP (E2)	CTPP	FMU	0.38%	4,839	3,601
CTPP (W5)	CTPP	FMU	3.92%	49,918	37,213
CTPP (W6)	CTPP	FMU	18,252	18,252	18,252
CTPP (R12)	CTPP	FMU	4,000	4,000	4,000
Total				**1,273,430**	**949,913**

[1] CTQ numbers may change to reflect new FMU R15.

[2] The percentage shown is for the first decade. For the remaining period Weyerhaeuser's allocation is 68.94%.

[3] All volumes net of 4% structure retention.

Table 7-3. Final deciduous harvest levels and allocations.

Company	Disposition #	Location	Allocation m^3 / %	Years 1 - 200[1] m^3/yr
Weyerhaeuser	FMA 0900046/DTA	FMU	93.04%	487,565
CTPP (E2)	CTPP	FMU	1,500	1,500
CTPP (W5) - Fixed	CTPP	FMU	4,000	4,000
CTPP (W5) - Variable	CTPP	FMU	2.55%	13,357
CTPP (W6)	CTPP	FMU	17,591	17,591
Total				**524,013**

[1] All volumes net of 4% structure retention.

7.6.1.2 Utilization Standards

The standard utilization factors are as follows:

- 15cm stump diameter/11cm top diameter/15cm stump height for conifer
- 15cm stump diameter/10cm top diameter/15cm stump height for deciduous

7.6.1.3 Quadrant Periods for AAC Drain

7.6.1.3.1 Current Quadrant Periods for AAC Drain

The FMA defines the period allowable cut as “the total of the annual allowable cuts approved for a five-year cut control period” (Section 1.1h). Any periodic overproduction will be accounted for in subsequent periods as described in section 17(2) of the FMA. Weyerhaeuser will balance the specific AAC’s by following the approved SHS.

The currently approved control periods for FMA 9700046 are as follows:

- Period one - December 1, 2009 to April 30th, 2015
- Period two - May 1st, 2015 to April 30th, 2020
- Period three- May 1st, 2020 to April 30th, 2025
- Period four - May 1st, 2025 to April 30th, 2030

Quadrant periods for the other timber operators are listed below:

- Alberta Newsprint Company, Blue Ridge Lumber and Millar Western, Dale Hansen Ltd, Tall Pine Timber Company, Weyerhaeuser Pembina (CTQ – R12, WY DTA – R12): 2016-2021
- EDFOR Cooperatives, BRISCO Wood: 2017-2022
- Millar Western – Fixed Quota: 2014-2019
- Weyerhaeuser (DTA E91): 2012-2017

All of the current DTAs and CTQs presently in place will be replaced with new certificates for FMU R15 upon approval of the plan.

7.6.1.3.2 Proposed Quadrant Periods for AAC Drain

To simplify future reporting of volume drain from the DFA, a single quadrant period is being proposed. The period proposed upon approval of the FMP for all operators is: May 1, 2017 to April 30, 2022. For the FMA, the following two periods would therefore be: May 1, 2022-April 30, 2027 and May 1, 2027 to April 30, 2030. With renegotiation of the FMA expected to occur in 2020, the final period(s) may have to be adjusted to reflect the new FMA. Quadrant alignment is anticipated to be consistent with the effective date of approval of this FMP.

7.6.2 Harvest System and Methods

The harvesting and hauling methods adopted by the Company were selected to meet the following criteria:

- ensure safe operations;
- minimize environmental impacts;
- secure and reliable work force
- increase the efficiency in implementing dominant silviculture regimes;

- minimize the cost of delivered wood;
- meet requirements for piece size, wood quality, and delivery schedules; and
- align with SFI certification requirements.

Table 7-4 below represents the predominate harvesting methods currently used by Weyerhaeuser.

Table 7-4. Harvesting Methods Currently Used by Weyerhaeuser.

Phase	Deciduous	Coniferous
felling	Feller buncher	Feller buncher
skidding	Grapple skidder, or forwarder ("wide" tired during unfrozen conditions)	Grapple skidder, or forwarder ("wide" tired during unfrozen conditions)
limbing / topping	Mechanical stump side or roadside processor	Mechanical stump side or roadside processor
bucking	Mechanical roadside	Mechanical roadside
hauling	Shortwood (104 inches)	Cut-to-length

7.6.3 Harvest Season

The key strategy for Weyerhaeuser's harvest and haul operations is to utilize the least amount of people and equipment over the maximum amount of working time annually, under a predictable and reliable schedule. This strategy supports the safety, competitiveness and security of the harvest and haul force. The challenge it presents is ensuring it does not unduly impact the management of other resources or interests of other resource users, which involves issues such as soil damage during transition seasons and wet weather, habitat disturbance during breeding seasons, others' road infrastructure in wet conditions, etc. Tactics to implement this strategy while addressing resource management risks will include, but without limitation to, the following:

- Precise and accurate match of site with harvesting methods and seasonal scheduling;
- Appropriate harvest and haul methods (e.g. low ground pressure equipment, forwarding in-block and intermediate haul route locations, equipment operation techniques);
- Detailed block planning (sensitive areas mapping, harvesting prescriptions, correct scheduling);
- Scheduling hauling independently of road-side logging (e.g. frozen period advanced logging with non-frozen period haul or vice versa);
- Advanced temporary, precisely scheduled and appropriately designed road construction;
- Continuing with migratory / nesting bird pre-harvest survey and risk modeling;

7.6.4 In-block Roads

In-block roads are all expected to be temporary in nature, and are reclaimed either after the haul has been completed, or in some cases, after site preparation has occurred. These roads are reforested consistent with the blocks they pass through. All crossing structures are removed when the roads are reclaimed. If roads are hauled under non-frozen conditions, de-compaction of the travelling surface must occur to return the site to full productivity. All roads are rolled-back to redistribute

organic matter back over the exposed soil surfaces.

7.7 Silviculture Program

One of the underlying goals of this management plan is to increase the sustainable harvest level of deciduous and coniferous timber from the DFA. This goal is supported by a set of regeneration assumptions, silviculture strategies, and reforestation standards intended to increase growth and yield in regenerating stands from an otherwise “natural” state (i.e. “managed” stand conditions).

To sustain the productivity of the forest growing stock, a strategy of prompt, successful regeneration will be used. Planning regeneration activities prior to harvest and scheduling treatments as soon as logistically feasible after harvest will facilitate prompt regeneration. Planting of spruce or pine, or natural seeding for pine will be used to establish coniferous seedlings. Suckering will re-establish deciduous seedlings, augmented by ingress of conifer seedlings. There may be some planting of deciduous seedlings on roads and landings over the life of the plan.

The provincial regeneration standards (RSA base10) will be used to evaluate the performance of regenerating harvest areas.

All regenerating stands will pass an establishment standard. If an opening does not pass the establishment standard then one or more of the following tactics will be employed to address the failed status.

- Re-treat using combinations of site preparation, planting, tending, or
- Leave stands to grow where height performance is the cause for failure, or
- Change the opening stratum declaration in recognition of tree species currently on site that could meet any of the reforestation standards available.

Balsam fir and alpine fir are considered an acceptable crop tree for coniferous species. Fir species constitute a part of the inventory and their presence is incorporated in the development of yield curves. Merchantable fir is utilized as a component of the coniferous harvest. Where understorey fir exists in an opening it is often retained to provide value in aesthetics, habitat, structure, and fibre production.

7.7.1 Reforestation Prescriptions

Reforestation prescriptions are a critical point in the sustainable forest management planning system where growth and yield stratum targets from the FMP are delivered through well-planned silviculture treatments. Knowledge of how sites respond to different treatments result in better treatments, and greater probability of success in meeting growth and yield stratum targets for height, stocking, density and ultimately, stratum volumes. Reforestation prescriptions are guided in large part by the current species growing for a given stand, its site description (soil type, nutrient capacity, moisture, anticipated vegetative competition), harvesting plan, and available reforestation tactics (site preparation, seedling availability, vegetation control). Thirty years of operating on the DFA has helped develop the Silviculture Strategy Table, described in section 7.7.2. Silviculture prescriptions generally rely upon a small suite of tools for site preparation advanced planning for seedling orders, and accurate harvest scheduling. Vegetative competition is a prominent constraint to reforestation success. Prompt site preparation and planting can address this constraint to some extent, but ultimately follow-up control of competing vegetation is often required. The use of herbicides is an effective way of controlling excessive grass, herbaceous or deciduous competition while establishing conifer across the DFA.

7.7.2 Silviculture Strategies Table

The Silviculture Strategies Table (SST) was developed with input from all timber operators, and can be found in Appendix 7-1. No distinction is made between Natural Sub-regions in the table. Natural Sub-regions are described in section 3.2.8 in Chapter 3, Landscape Assessment.

The Silviculture Strategies Table describes, for each yield strata, the following: silviculture system, site preparation requirements, seedling establishment criteria, seedling density targets, and any expected interventions that may be required. It is intended to be used along with professional judgment and specifics for a given site, and does not preclude consideration for alternative or experimental strategies when warranted, and incorporated into the Silviculture Schedule.

The SST prescription for enhanced white spruce in Region I (SwG) ensures that cutblocks are to be planted with 100% improved stock in order to match yield curve assumptions.

7.7.3 Understorey Avoidance

The current growing stock and forest condition on the DFA does not present extensive conditions of stands with dense understories. Notwithstanding this, the requirement for understorey protection through operator avoidance will be a standard practice in all timber harvest planning and operations. All timber harvesting operations will have the training and knowledge to use tactics to avoid damage to understories, and will meet general expectations for protection without specific advanced planning and other measures, unless otherwise warranted for exceptional cases (see Section 7.9.6 by example). Recognition of the regenerating growth contribution of protected understorey growing stock will be accomplished by the Reforestation Standards of Alberta protocols.

7.7.4 Seed Requirements

Table 7-5 summarizes the results of using the following formula to determine average #seedlings per kilogram of seed inventory for both white Spruce (natural), lodgepole pine (natural) and genetically improved (SWg) seed, using the WEE and WES seed Inventories provided from the Provincial Seed Supply Officer on September 12, 2017:

Seedlings per kilogram = #seeds per kg in inventory x purity x seed inventory/BCMOF factor based on germination rate (see* Appendix 7-2 *for explanation of the BC method).

Table 7-5. Estimated production of seedlings per kilogram of Weyerhaeuser Pembina seed stored.

Seedlot	Estimated seedling production from each kg of stored seed
Average PL	113,220
Average SW	180,060
Average PL CM3.5	129,095
Average PL-LF1.5	104,744
Average PL-LF2.1	123,028
Average PL LF2.2	102,273
Average PL UF1.4	102,019
Average PL UF2.4	100,145
Average PL SA1.2	107,904
Average SW CM3.5	225,249
AverageSW-LF1.5	140,088
AverageSW-LF2.1	203,998
AverageSW-LF2.2	237,674
Average SW UF1.4	192,670
Average SW UF2.4	197,089
Average SW SA1.2	174,333
Average SWg	143,594

Source data: Provincial Seed Supply Officer; Weyerhaeuser Pembina seed only

Table 7-6 to Table 7-14 reflect estimated seed requirements to meet reforestation commitments of the PFMS for the first decade for all operators.

Table 7-6. Seed Requirements for Weyerhaeuser based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
CM 3.5	13.4	1,729,873	1,018	589	0	0
DM 2.3	0	0	0	7.47	0.11	0.11
LF 1.5	57.2	5,991,357	3,745	10,081.46	96.78	96.78
LF 2.1	187.7	23,092,355	14,433	7,111.50	0	0
LF 2.2	59.5	6,085,244	3,803	11,985.91	128.0	128.0
UF 1.4	58.5	5,968,112	3,730	3,465.41	0	0
UF 2.4	1.6	160,232	100	1,723.81	25.93	25.93
SA 1.2	48.3	5,211,763	3,257	989.11	0	0
SA 2.2	0	0	0	54.07	0.76	0.76
SW						
HASOC I	114.8	16,484,591	10,303	5,678.67	0	0
LF 1.5	126.4	17,707,123	11,067	0.36	0	0
LF 2.1	29.7	6,058,740	3,787	1.13	0	0
LF 2.2	88.4	21,010,381	13,031	19.42	0	0
UF 1.4	35.2	6,781,984	4,239	521.38	0	0
UF 2.4	19.3	3,803,818	2,377	343.9	0	0
SA 1.2	45.6	7,949,585	4,968	491.37	0	0
SA 2.2	0	0	0	0.69	0.005	0.005

*Weyerhaeuser seedlot seedlings per kg specific information used if known; average if not known

Table 7-7. Seed Requirements for Alberta Newsprint Company based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
LF 1.5	25.11	2,842,954	1,777	1,390	0	0
LF 2.1	53.30	6,557,392	4,098	2,244	0	0
UF 1.4	14.53	1,645,087	1,028	206	0	0
SW						
LF 1.5	16.94	3,050,216	1,906	60	0	0
LF 2.1	100.67	20,536,478	12,835	55	0	0
UF 1.4	0	0	0	0.1	0.0008	0.0008

*average seedlot information used for non-Weyerhaeuser operators if adequate information unavailable

Table 7-8. Seed Requirements for Blue Ridge Lumber based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
LF 1.5	58.1	6,578,082	4,111	2,008.5	0	0
SW						
LF 1.5	27.0	4,861,620	3,039	93.5	0	0

*average seedlot information used for non-Weyerhaeuser operators if adequate information unavailable

Table 7-9. Seed Requirements for BRISCO based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
LF 2.1	5.4	611,388	382	220.20	0	0
SW						
LF 2.1	0	0	0	1.66	0.015	0.015

*average seedlot information used for non-Weyerhaeuser operators if adequate information unavailable

Table 7-10. Seed Requirements for Dale Hansen Ltd. based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
LF 1.5	0	0	0	107.4	1.52	1.52
LF 2.2	0	0	0	749.6	11.8	11.8
SW						
LF 1.5	0	0	0	3.8	0.034	0.034
LF 2.2	16.4	3,716,415	2,323	0	0	0

* HFP seed inventory information used in table, with BCMOF factors applied

Table 7-11. Seed Requirements for EDFOR based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
LF 1.5	0	0	0	822	1.16	1.16
LF 2.1	3.449	350,024	219	2293	25.9	25.9
UF 1.2	3.083	339,481	212	318	1.5	1.5
UF 1.4	0	0	0	52	0.73	0.73
SW						
LF 1.5	0	0	0	167	2.36	2.36
LF 2.1	7.144	885,499	553	442	0	0
UF 1.2	0	0	0	76	0.6	0.6
UF 1.4	0	0	0	21	0.17	0.17

* EDFOR seed inventory information used in table, with BCMOF factors applied.

Table 7-12. Seed Requirements Millar Western based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
LF 1.5	13.3	1,505,826	941	286	0	0
SW						
LF 1.5	80.6	14,512,836	9,071	192	0	0

*average seedlot information used for non-Weyerhaeuser operators if adequate information unavailable

Table 7-13. Seed Requirements Tall Pine Timber Company based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
CM 3.5	0	0	0	209	0.49	0.49
LF 1.5	2.799	316,903	198.1	1,238	14.69	14.69
LF 2.1	0	0	0	77	1.1	1.1
LF 2.2	0	0	0	321	4.52	4.52
UF 1.4	0			674	9.52	9.52
SW						
CM 3.5	0	0	0	27	0.21	0.21
LF 1.5	1.049	261,215	163.3	85	0	0
LF 2.2	0	0	0	1	0.001	0.001
UF 1.4	0	0	0	1	0.001	0.001

* TPT seed inventory information used in table, with BCMOF factors applied

Table 7-14. Seed Requirements for the combined CTP Programs based on PFMS.

Seed Zone	Current Inventory of Seed (kg)	Number of Seedlings that could be planted with current inventory	Area that could be cut in this zone 2017-2026 (ha) @1600/ha	Approximate area to be cut in this seed zone 2017-2027 (ha)	Seed required to collect 2017-2026 (kg)	Seed collection requirements 2017-2026 (kg)
PL						
CM 3.5	0	0	0	122	1.72	1.72
LF 1.5	38.2	4,325,004	2,703	2183	0	0
LF 2.1	36.564	4,139,776	2587	94	0	0
UF 1.2	50.52	5,719,874	3575	10	0	0
SW						
CM 3.5	14.3	2,574,858	1,609	138	0	0
LF 1.5	86.4	15,557,184	9,723	1164	0	0
LF 2.1	49.785	8,964,287	5,603	26	0	0
UF 1.2	0	0	0	14	0.11	0.11

*average seedlot information used for non-Weyerhaeuser operators if adequate information unavailable

Individual operators will need to address their own seed deficiencies on their own timelines. Approval for the collection of seed is done through the Silviculture Schedule.

7.7.5 Growth Targets

Reforestation targets are based on the regenerating yield curves as described in Annex VII under yield curve development. Table 7-15 describes the MAI's for both conifer and deciduous for each regenerating strata.

Table 7-15. RSA MAI performance targets for FMU R15.

Yield Group	GoA Base 10	Yield Type	Culmination MAI (m^3/ha/yr)		
			Conifer	Deciduous	Total
Hw_W	Hw	DEC	0.25	2.00	2.25
Hw_X	Hw	DEC	0.18	2.94	3.12
HwPl	HwPl	CON	2.37	1.75	4.12
HwSx	HwSx	CON	1.80	1.72	3.52
Pl	Pl	CON	3.55	0.53	4.08
PlHw	PlHw	CON	2.69	1.27	3.96
Sw	Sw	CON	2.65	0.81	3.46
SwG	Sw	CON	2.76	0.81	3.57
SwHw	SwHw	CON	2.04	1.56	3.60

7.7.6 Transition Matrix

Reforestation transitions are based on the regenerating of Natural, pre-1991, or post 1991 stands to RSA as described in Annex VII Yield Curve Development. Table 7-16 describes the transition of natural to managed stands. These transitions occur 100% of the time and can be described as like-to-like stratum, however these transitions are to fully stocked C/D crown closure for those strata identified as originating from any crown closure class (A or B or C or D) in the Silviculture Strategy Table (SST) shown in Appendix 7.1.

Table 7-16. Transition Matrix for FMU R15.

Yield Type		Current Yield Group	Regenerate To RSA	Regenerate To TI
NATURAL	NAT	C-PL_AB	Pl	
NATURAL	NAT	C-PL_CD	Pl	
NATURAL	NAT	C-SB	Pl	
NATURAL	NAT	C-SW	Sw	SwG
NATURAL	NAT	CD-PL	PlHw	
NATURAL	NAT	CD-SX	SwHw	
NATURAL	NAT	DC-PL	HwPl	
NATURAL	NAT	DC-SX	HwSx	
NATURAL	NAT	D-HW_W	Hw_W	
NATURAL	NAT	D-HW_X	Hw_X	
PRE-1991 ENHANCED	M91	C-PL_AB_E	Pl	
PRE-1991 ENHANCED	M91	C-PL_CD_E	Pl	
PRE-1991 ENHANCED	M91	C-SB_E	Pl	
PRE-1991 ENHANCED	M91	C-SW_E	Sw	SwG
PRE-1991 ENHANCED	M91	CD-PL_E	PlHw	
PRE-1991 ENHANCED	M91	CD-SX_E	SwHw	
PRE-1991 ENHANCED	M91	DC-PL_E	HwPl	
PRE-1991 ENHANCED	M91	DC-SX_E	HwSx	
PRE-1991 ENHANCED	M91	D-HW_W_E	Hw_W	
PRE-1991 ENHANCED	M91	D-HW_X_E	Hw_X	
PRE-1991 BASIC	M91	C-PL_AB_B	Pl	
PRE-1991 BASIC	M91	C-PL_CD_B	Pl	
PRE-1991 BASIC	M91	C-SB_B	Pl	
PRE-1991 BASIC	M91	C-SW_B	Sw	SwG
PRE-1991 BASIC	M91	CD-PL_B	PlHw	
PRE-1991 BASIC	M91	CD-SX_B	SwHw	
PRE-1991 BASIC	M91	DC-PL_B	HwPl	
PRE-1991 BASIC	M91	DC-SX_B	HwSx	
PRE-1991 BASIC	M91	D-HW_W_B	Hw_W	
PRE-1991 BASIC	M91	D-HW_X_B	Hw_X	
POST-1991 MANAGED	RSA	Hw	Hw_W	
POST-1991 MANAGED	RSA	Hw	Hw_X	
POST-1991 MANAGED	RSA	Hw_W	Hw_W	
POST-1991 MANAGED	RSA	Hw_X	Hw_X	
POST-1991 MANAGED	RSA	HwPl	HwPl	
POST-1991 MANAGED	RSA	HwSx	HwSx	
POST-1991 MANAGED	RSA	Pl	Pl	
POST-1991 MANAGED	RSA	PlHw	PlHw	
POST-1991 MANAGED	RSA	Sb	Pl	
POST-1991 MANAGED	RSA	SbHw	SwHw	
POST-1991 MANAGED	RSA	Sw	Sw	SwG
POST-1991 MANAGED	RSA	SwG		SwG
POST-1991 MANAGED	RSA	SwHw	SwHw	

TI: Tree Improvement, genetic stock used in I1 Sw seed zone in Weyerhaeuser openings only.

7.7.6.1 Transition of Black Spruce to Pine

The amount of black spruce strata to be harvested on the DFA will be small compared to white spruce or lodgepole pine. Most of the areas included for harvest are the fringes of the passive landbase that have been included during the layout process, and are the result of including merchantable areas from the passive landbase into the active landbase. A small component of black spruce, in association with lodgepole pine, is already in the active landbase, but makes up such a small percentage that cone collecting and seed extraction would not be warranted. The amount of area required to reforest with black spruce seedlings would also be hard to forecast, making it extremely difficult to have seedlings available when required. The amount of Sb strata proposed for harvest annually is described in Table 6-27. The 20-year average per year is 36 hectares, or 0.5% of the annual total by area.

7.7.7 Genetic Resources and Tree Improvement Program

There are three Tree Improvement programs with cooperatives for use on Weyerhaeuser's Pembina FMA:

- White Spruce, *Picea glauca* using native selections is called 'Region I' and administered through Huallan Seed Orchard Company (HASOC).
- Aspen, *Populus tremuloides*, uses both native and hybrids and is called 'Aspen breeding region 2' and administered through Western Boreal Aspen Corp. (WBAC).

- Lodgepole pine, Pinus contorta using native selections is a program under development at the time of this FMP submission for Region A, in cooperation with West Fraser Hinton.

Each program follows the Alberta Forest Genetic Resource Management and Conservation Standards and has an associated Controlled Parentage Plan. All programs were initiated prior to the 2016 Standards being approved and are in transition. Programs are currently in draft form and will be submitted to AAF in 2018. Brief details for each program are as follows:

White spruce

- White spruce program started in 1993 with the provincial government and three other industry partners (Canadian Forest Products, Hinton Wood Products a division of West Fraser mills, Millar Western Forest Products, and ANC Timber).
- Orchard was established in 2000 and is located west of Grande Prairie.
- Genetic test series were establish in 2001 at four locations to test selected parents progeny. Weyerhaeuser has one test on Drayton FMA in TWP 44 Rge. 7, which is 8 ha. in size.
- First evaluation of test at or after age 14 in 2015 following rule: 4 years plus 10% of expected rotation.
- Genetic gain from first generation will be between 2 and 5%, until 2015 evaluation.
- Cone production from orchard has started and full production target is 2007 to 2010.
- Deployment area will be all conifer site types on FMA up to 1200m in elevation.
- First generation of seed will be deployed on 50% of area.
- Second generation orchard is currently being developed through first generation.

Aspen

- Aspen program started in 1993 and in addition Weyerhaeuser currently has three other members (Daishowa Marubeni and Norbord) involved in the program.
- Facilities for breeding where developed in 1996.
- First breeding started in 1998.
- First genetic test (clonal trial) established in 2001.
- First genetic test to evaluate progeny from breeding established in 2001.
- First evaluation of tests at or after age 7 in 2008.
- Two test sites have been developed; one on private land north of Drayton Valley and a second location on Drayton Valley's FMA north-west of Cynthia in Twp 50 Rge 11. A third test site is being planned for Edson FMA in Twp 55 Rge 17.
- Plan is to establish a series of operational plantations. They will not exceed 17 ha as per the Alberta Forest Genetic Resource Management and Conservation Standards (2016).
- Operational testing will investigate several deployment scenarios:
    - Nursery production of clones.
    - Hybrids with natives, both mixtures and clonal blocks.
    - Stock types, planting densities, and site preparation techniques.

- Monitoring will be intensive and several attributes associated with trial series evaluated:
    - Relative growth performance of native and hybrids.
    - Regeneration of improved stock after harvest.
    - Gene flow between improved stock and natives.
- Plantations on FMA will utilize clones of superior trees from testing.
- Gain from material will benefit from both intensive silviculture and genetics.

Plantations are expected to achieve Mean Annual Increments (MAI) of 8 m^3 ha per year.

Pine

- Lodgepole pine program started in 2014 with the provincial government and other industry partners: Hinton Wood and Sundre Forest Products, divisions of West Fraser Mills.
- An orchard was established in 2016 located west of Edson at the Pressley Orchard.
- An orchard is being established north of Drayton Valley in 2018 at the Tree Improvement Center.
- Cone production is expected to start no sooner than 5 years post establishment.

7.8 Forest Protection

7.8.1 Fire Prevention and Suppression

Wildfire is the dominant natural disturbance agent on the landscape, responsible for a significant part of the landscape and site level diversity.

The aim of wildfire management is to balance the ecological role of fire while protecting human life, communities, watersheds and sensitive soils, natural resources and infrastructure. AAF retains the responsibility for forest fire prevention and suppression for forest tenures, and the role of FMA holders is to support AAF in this capacity as set forth in regulation, policy and specific Fire Control Agreements. Conversely a key responsibility for tenure holders is to minimize the hazards and risk of fire as a result of their operations.

Weyerhaeuser will continue to work cooperatively with government agencies at the provincial and municipal levels to protect the forest values through means such as:

- Complying with the terms and conditions of the Fire Control Agreement for the prevention and initial suppression of fire, as detailed annually in a Fire Control Plan;
- Supporting local FireSmart programs as described in the next section;
- Contributing to AAF forces in suppressing fires on the FMA Area;
- Contributing to the reduction in forest fuel loading and patterns at the landscape level through timber harvesting and conversion to younger forest types;
- Managing known fire risks created from timber operations (e.g. debris disposal by burning, mobile equipment operation).

The Wildfire Management staff produced a plan entitled "Weyerhaeuser Pembina - FireSmart Management 2017 (Chapter 3 Appendix 3-3) which included the recommendations listed below. Commentary on how each recommendation was addressed in development of the PFMS is also included.

Recommendation #1 - Areas with continuous coniferous fuels are susceptible to large fires, especially in the absence of large wildfires historically. Were possible, harvesting should be designed to reduce the continuity of these coniferous fuel types with a priority being proximity to communities.

Use of the MPB Rank 1 and 2 as priorities acted as a surrogate to target conifer stands, with pine content the priority.

Recommendation #2 – While the focus has historically been on the reduction of fuel types with conifer overstorey (FBP fuel types C-2 and C-3) it is important to note that mixedwood forest types are also highly susceptible to wildfire particularly those in a heavy conifer understorey and should be considered in reducing wild fire risk to communities. This particular fuel type (M-2) was responsible for the majority of wildfire spread during the Fort McMurray wildfire event in May 2016.

The make-up of the Pembina landscape is different than the more northern boreal forests. Coniferous understories are less prevalent in the lower foothills.

Recommendation #3 – Work with Alberta Wildfire Management Staff to identify priority areas within the contributing landbase and explore opportunities to mitigate high risk black spruce stands in the non-contributing landbase.

The amount of area in the active (contributing) landbase that fits this category is approximately ½ of 1 percent, so this was not actively pursued as a strategy

Recommendation #4 – A commitment must be made to implement recommendations from the Edson Forest Area Wildfire Management Plan (to be completed by March 2018) and the Rocky Wildfire Management Plan (to be completed by Spring 2018). These plans identify cumulative risk on the landscape as an accumulation of fire likelihood and impact to a suite of identified social and landscape level values.

Weyerhaeuser will work proactively with the Forest Areas in developing wildfire management plans to the extent possible, keeping in mind the allowable variances for the approved preferred SHS that address a multitude of other non-forest values.

7.8.2 FireSmart Communities

The goal of FireSmart in the FMP is to create a landscape in which a catastrophic fire is minimized. This is accomplished through a combination of:

- Reducing the fire behavior potential,
- Reducing the exposure of values at risk to wildfire
- Targeting timber harvest to locations with problematic forest fuel types,
- The consideration of species conversion, reduced stand stocking densities and reduce coarse woody debris retention in locations harvested near communities, and
- Ensuring linkages to other FireSmart strategies, such as Community Wildfire Mitigation Strategies.

The PFMS SHS attempted the following:

- Reduction of large continuous coniferous and mixedwood fuel types, and
- Utilized existing Community FireSmart plans where available,

Operational plans may be adjusted to reflect the recommendations of the Edson Forest Area and Rocky Wildfire management plans when they become available. Of importance when implementing FireSmart strategies is their impact on Active versus Passive landbase. Their intent should be ensure the Active landbase continues to support the AAC for the DFA, while actively moderating forest fuels on the Passive landbase.

7.8.3 Forest Health Strategy

The preferred SHS is driven mostly by forest age classification, with the exception of MPB rank 1 and 2 stands. The timber supply model also focused on scheduling older stands first, based on AVI origin, all things being the same. The intent is to follow the approved SHS as closely as possible, however, natural events cause stands of equal AVI characteristics to deteriorate in unequal fashion, justifying their potential to be a priority for harvest. Forest health concerns, when justifiable, allow for the opportunity to vary from the approved SHS, when the following is encountered:

- Priority for addition – timber is extensively damaged by industrial activity, fire, wind, snow, insects, etc.; or stands are showing extensive levels of rapid decline (e.g. >25% of stems are dead or damaged)

In the reverse, opportunity is also present to defer harvest to offset additions to the approved SHS, if the following is encountered:

- Timber is immature; few signs of instability; stands are merchantable, but deferral of harvest is preferable to harvesting today.

7.8.3.1 Mountain Pine Beetle

With the fly-overs of the Mountain Pine Beetle (*Dendroctonus ponderosae*) in 2006 and 2009 from northwestern British Columbia, the Province instituted a MPB Action Plan (Dec. 2007) and a MPB Management Strategy (Dec. 2007).

For industry planning purposes, the intent of the MPB strategy is twofold:

1) Reduce the amount of susceptible pine on the landscape by 100%[1] of the current level within 20 years, and
2) Change the age class distribution of pine across the landscape.

The DFA contains some of the most susceptible pine forests in Alberta. Current populations continue to be endemic in nature, however due to the front of the epidemic zone moving southward from the 2006 and 2009 fly-overs, and the movement of beetles through the Yellowhead Corridor from population epicenters in Jasper National Park, many of the Pembina Compartments are ranked high for risk of infestation due to both stand conditions and proximity to spread sources.

The DFA is risk ranked according to the following three criteria: Stand Susceptibility Index (SSI), Predicted-r value, and Compartment Risk. This gives a MPB ranking of either 1, 2 or 3. In this plan, it is still the intent to reduce the amount of Rank 1 and 2 stands over the next 20 years, and beyond if necessary. There is approximately 120,676 hectares currently Ranked as either 1 or 2, and the TSA cannot reduce the targeted stands to the appropriate level within timelines to address the risk, due to

[1] While the Healthy Pine Strategy aimed at reducing the Rank 1 and 2 stands by 75% in 20 years, it was decided to model a 100% reduction in the PFMS in order to maximize the reduction over this time period given that a number of other values, particularly non-timber values, were also being targeted. Table 7-17 shows that a 70% reduction was achieved in the PFMS over the 20 year period.

the constraints on the TSA in support of even-flow supply management and sustainability . Table 7-17 summarizes the reduction of Rank 1 and 2 pine stands in the first several decades of the FMP.

Table 7-17. MPB Rank 1 and 2 Stands (Scenario PW70006).

	Ha	%
Inventory at time 0	120,676	
Remaining after 10 years	71,595	59.3%
Remaining after 20 years	36,910	30.6%
Remaining after 30 years	11,019	9.1%

7.8.3.2 Other Insects and Diseases

AAF and tenure holders have a shared responsibility for pest monitoring and control for the Green Zone. Monitoring and control efforts will include, but not limited to, the following:

- Report any and all sightings of forest insect and disease;
- Direct timber harvesting operations to infested or attacked stands to help control spread and salvage damaged timber;
- Sequence forest types to reduce susceptible forest cover;
- Assist and participate in ongoing monitoring and management programs.

7.8.3.3 Windthrow or other weather-related damaging agents

Weyerhaeuser will work with district AAF staff in a co-operative effort to harvest areas where natural events (e.g. windthrow, snow or hail damage) causing extensive damage have occurred. This would also involve Quota Holders in areas that are under license to them.

7.8.3.4 Invasive Plant Species

The invasion of noxious and prohibited noxious weeds in the forested areas of the Municipal Districts and Counties continues to be a concern. Weyerhaeuser recognizes that its timber harvesting operations are a potential mechanism for spreading such weeds and will cooperate with the Municipal Districts, Counties, the Government of Alberta (GoA) and other stakeholders in the control of all noxious weeds in its operating areas.

Hand picking and disposal will be promoted for spot encounters; however Weyerhaeuser will use chemical control methods under permit as deemed necessary.

It is also important, when entering or leaving grazing dispositions, to clean all equipment so that weed seeds are neither introduced on to or from active grazing dispositions. Weyerhaeuser undertakes noxious and invasive weed surveys prior to logging on any grazing disposition. This will help in reducing the need for future weed control efforts on and off these dispositions.

7.9 Protection of Forest Resources

7.9.1 Hydrologic Resources

7.9.1.1 Watershed Analysis

Weyerhaeuser has analyzed all watersheds on the DFA for possible hydrologic issues. The objective of the process is to limit any unintended effects that timber harvesting would have on the yield of water from the watershed. Each watershed was analyzed using a model called the "Equivalent Clearcut Area" (ECA) model, developed by Dr. Uldis Silins at the University of Alberta. The model simulates the cumulative effects for the various watersheds on the DFA of increases in water yield as a result of timber harvesting, followed by hydrologic recovery with reforestation and new growth over time, on water yield over the entire growth cycle for the forested area.

Results of the watershed analysis for the PFMS can be found in Chapter 6. In summary, the TSA was constrained to ensure that timber harvesting levels in any given watershed did not exceed allowable limits as determined by the ECA analysis.

7.9.1.2 Watershed Mitigation Strategies

Watershed mitigation strategies will be applied, as necessary, under the following circumstances:

- Watersheds where ECA results are between 30 and 50 % (moderate risk), and
- Watersheds where ECA exceeds 30 to 35% within identified sensitive cold water fish species (Athabasca Rainbow Trout, Bull Trout and Arctic Grayling) watersheds, as per VOIT 14.

The following mitigation strategies will be applied:

- Use best practices for road construction, maintenance and reclamation to reduce potential for road-related risks to fish habitat;
- Selection of road corridors to avoid sensitive fish-bearing watercourses;
- Enhance operations around stream crossings;
- Careful consideration given when balancing additions with deletions and deferrals so that there is no net additional area in affected watersheds;
- Watersheds in this category will be flagged within our GIS database to alert planners to review mitigation strategies;
- Incorporate watershed values when locating structure retention;
- Utilizing LiDAR and wet area mapping to enhance planning;
- Consider leaving above average retention requirements, especially in proximity to ephemerals, intermittents, or other water source or collection areas; and
- Other operational strategies are covered in the Operating Ground Rules, *e.g.*: minimize ground disturbance during operations.

7.9.2 Aesthetics

The FMP has not identified any particular area or zone in the DFA requiring exceptional requirements for aesthetic management purposes. However, an objective at the FHP stage is to mitigate the impact of timber harvesting on the visual quality of any forested landscape where timber harvesting will occur. By way of example, areas where tactics might be applied are those:

- Within, adjacent to or viewed from designated recreational sites or tourist developments,

- Adjacent to or viewed from major lakes and rivers,
- Adjacent to rural/urban forest interfaces,
- Site-specific areas identified during the referral and public review process, or
- Adjacent to primary and secondary highways in Alberta.

Tactics to reduce the impact of timber harvesting on visual quality may include, but are not limited, to:

- Modification of the SHS polygons shapes or sizes,
- Retention of forest structure and lesser vegetation at strategic vantage points in the harvest area,
- Vegetative buffers, or
- Utilizing natural topography to break up the line-of-sight.

7.9.3 Unique or Rare Sites

Unique sites are those that are limited in occurrence on the DFA. Rare sites are those that are uncommon anywhere.

Within the DFA are rare physical environments that host rare plant communities and/or species, and also provide habitat opportunities for small mammals, amphibians, reptiles and invertebrate species. Rare physical environments may also refer to unique geological formations or land forms markedly different from the surrounding area.

Examples of these sites include the presence of large glacial erratics, hoodoos, bat hibernacula and rare plant communities.

1) Weyerhaeuser will protect rare physical environments at the stand level, as outlined in the stand level ecological guideline (found in EMS Operational Controls).
2) Rare physical environments of regional significance will be identified during the development of Detailed Forest Management Plans and / or at the harvest design phase of operations. Plans to protect the unique features of these areas will be developed. These plans may include:
    - Excluding operations from the area
    - Placing special notation on the area (e.g. PNT)
    - Modifying operations in terms of harvest pattern, method and /or timing

7.9.4 Wetlands, Bogs, and Swamps

Wetlands are prevalent across the western boreal forest and are important features on the DFA. Wetlands, including shallow open water, marshes, swamps, fens and bogs, are an integral component of forest ecosystems and thus play an important role in ecosystem based management. Wetlands provide numerous ecological, social, and economic benefits that include: providing habitat for plants and animals some of which are rare and/or at risk species; sequestering and storing of atmospheric carbon, contributing to annual water budgets; and, helping regulate surface and subsurface water supplies and flow.

Research shows that wetland and forest can be interdependent, and thus healthy wetlands and healthy forests work together to create functioning forest ecosystems (e.g., Devito et al. 2012; Devito et al. 2016; McEachern 2016; Petrone et al. 2016). Sustainable forest management is therefore key to maintaining healthy wetlands and conversely functioning wetlands are important to achieving healthy forests. Wetlands and forest management activities intersect in a number of ways. In the context of forest management, when roads cross wetlands the performance of the road can be compromised due to wet soil conditions and flowing water. This can result in increased construction and maintenance costs and may impact worker and public safety. From a wetland conservation perspective, forest management activities have the potential to affect wetland quality, wetland quantity, and wetland/watershed hydrology across the landscape.

Wetland conservation is becoming part of the legal, certification, and social license obligations that forest companies must meet. In Alberta the provincial Wetland Policy (Government of Alberta 2013) applies to all wetlands and came into effect in the White Area of the province June 1, 2015 and in the Green Area as of July 4, 2016. Under this policy, impacts on wetlands must be avoided where possible. Where avoidance is not possible, impacts must be minimized by demonstrating improved practices to support the intent of the policy (e.g., implementing Best Management Practices). In addition, in 2015 the Sustainable Forestry Initiative (SFI) revised its forest management standard to include wetlands. Wetlands are now included in Principle 3 (Protection of Water Resources) and Objective 3 (Protection and Maintenance of Water Resources) of the new Standard (SFI 2015). To conform to this Standard, forest companies must develop a program that addresses the management and protection of wetlands to maintain water reach, flow, and quality during all stages of forest management.

Sustainable forest management and sustaining wetland habitats are intertwined and achievable. Weyerhaeuser has been working with Ducks Unlimited Canada (DUC) since 2006 to identify opportunities for maintaining wetlands and waterfowl on the DFA. Past joint projects include: wetland mapping, waterfowl research including mapping areas of high waterfowl abundance and the development of Best Management Practices (BMPs) related to road placement and construction in wetlands. In 2016, Weyerhaeuser began working with DUC and a coalition of forest industry partners on projects to conserve wetlands and waterfowl habitat through a Forest Management and Wetland Stewardship Initiative (FMWSI). The FMWSI is developing guiding principles for strategic planning considerations in wetland environments, BMPs for operational planning and operations when working in or near wetlands, and BMPs to assess and reduce the risk of incidental take of waterfowl as a result of forest operations.

Weyerhaeuser is committed to continue working with DUC on this and other projects through the life of this FMP. In addition to helping efforts to maintaining wetland habitat and waterfowl populations, this collaborative work assists Weyerhaeuser meet their regulatory and social obligations. For example, by incorporating an assessment of wetlands within the DFA, and engaging with DUC to identify and implement best management planning and operating practices when working in or near wetlands, Weyerhaeuser will be well positioned to address the intent of the Alberta Wetland Policy (Government of Alberta 2013) and the SFI 2015 – 2019 Forest Management Standard (SFI 2015). See Appendix 7-3 for an extended version of this summary.

7.9.5 Archeological and Historical Information

Most historic buildings occur in urban or developed rural environments and are unlikely be affected by forestry operations. However, structures relating to past industrial, commercial or recreational activities can occur in forested areas and require consideration. This generally includes old, derelict trapper cabins that are in many stages of deterioration. Historical cabins are buffered with a radius of 25 meters around the cabin.

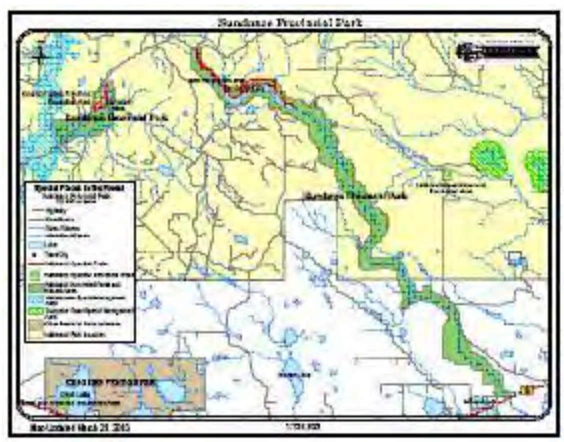
Archaeological resources represent thousands of years of landscape use, are distributed widely, generally are not previously known, and are concealed by vegetation and sediment deposits. Effective detection and avoidance of archaeological resources through predictive modelling and in-field investigation represents a principal objective of this program.

Historic resources reflecting Aboriginal traditional uses are highly sensitive to development impact and may occur in a wide variety of locations planned for forestry-related development activity. Such resources are managed according to the procedures outlined in the Government of Alberta's First Nations or Métis Consultation Guidelines on Land Management and Resource Development and require consideration by forest industry planning. Each site identified during layout or the consultation process is protected with treed buffers according to importance as determined by the First Nations community.

7.9.6 The Sundance Provincial Park Special Management Zone

A 500-metre Special Management Zone surrounds Sundance Provincial Park. The purpose of this zone is to protect the ecological integrity of the Park without unduly restricting industrial activity.

The following guidelines (or most currently approved version) will be applied to forest management activities occurring on lands lying within 500 metres of the boundary of Sundance Provincial Park.



Access

1. No new permanent access.
2. All block roads are to be rolled back immediately following logging or site preparations.
3. No new gravel pits.

Timber Harvesting

1. Harvesting should be planned to maintain the range of forest vegetation, age classes, and stand structures appropriate for the area,
    1.1. Natural disturbance patterns should be mimicked as closely as possible,

1.2. Deciduous and coniferous forest types should be maintained, appropriate to their historic presence,

1.3. Uneven-aged or mixedwood stands should be harvested in a manner to perpetuate this condition (e.g. shelterwood harvesting, small patch retention, green tree and snag retention, understorey protection, etc.), and

1.4. Even-aged stands will be harvested to regenerate stands of the same condition (e.g. clearcutting to promote even-aged stands).

2. Detailed block plans and ecological assessments should be done, for each block, prior to harvest.
3. Visual Sensitivity analysis should be done, for each block, prior to harvest.
4. Minimize soil disturbance and retain a protective cover of vegetation and/or duff layer.
5. Stump-side processing is preferred except where it might impede reforestation.
6. Harvesting design should consider fuel management to reduce the risk of a catastrophic fire in the provincial park.

Silviculture

1. High importance should be placed on protecting advance growth.
2. Natural reforestation methods should be used where they will reliably reforest the area (dragging pine for naturals, suckering of aspen).
3. Where planting is prescribed, use seed sources adapted to the site.

7.10 Maintenance of Biodiversity

7.10.1 Biodiversity

The intent of the FMP to help forest diversity at the stand and landscape level in terms of structure, composition, and function is intended to:

- Provide habitat for different species,
- Conserve habitat for rare and endangered species, and
- Maintain a forest of all different age classes over the period of the Plan.

On different spatial scales, the diversity of species and communities reflects a complex set of environmental conditions (topography, climate, soil, etc.) that change over time. Forest ecosystems are complex and dynamic mosaics of vegetation patches varying in size, composition, age structure and distribution. Their dynamic heterogeneity is driven by natural processes (e.g., succession), by stand-replacing events (e.g., fire, insect outbreaks, or disease epidemics), and by disturbances that occur on smaller scales (e.g., mortality of individual trees).

Depending on site-specific environmental conditions (e.g., soil, topography, climate), plants and animal species occur in different assemblages (communities) according to the stage of succession, the time since disturbance, and the scale (i.e., extent, intensity) of that last disturbance. To some degree, species are adapted to the disturbance regime of the region they inhabit. Hence, it is widely believed that the long-term sustainability of the forest ecosystem and the ecological requirements of most species can be addressed by emulating the inherent natural processes of disturbance and succession characteristic of a site and/or a region. Natural disturbance processes result in the maintenance of a variety of stand sizes, seral stages and stand attributes and structures across landscapes (*coarse filter approach*), within the range of natural variation in the system (i.e., the "*natural disturbance model*").

The Pembina FMP will address concerns about the conservation of biodiversity by adopting a coarse filter approach. This requires managing the forest ecosystems as a whole, recognizing their dynamic nature, the autecology and successional patterns of the major tree species, and the dependence of all biota on the presence of a variety of structures and seral stages widely distributed over a forested landscape. The coarse filter approach requires:

a) Planning and operating over large landscapes;
b) Maintaining landscape interspersion, diversity, and connectivity, and minimizing anthropogenically generated fragmentation;
c) Retaining some structural diversity at the stand level; and
d) Implementing a monitoring and adaptive management strategy so that new information is gained quickly and this information feeds into management strategies.

Consistent with the above concepts, in its progress towards ecologically sustainable forest management practices, Weyerhaeuser has developed operationally-based ecological guidelines. These guidelines have been integrated with timber supply analysis, operational considerations, and societal values, within the forest management planning process. These guidelines will also be used in the development of the operating guidelines for the FMA.

The coarse filter approach will be complemented by a fine filter component to address the habitat needs of feature species[2] and both approaches will be integrated in Weyerhaeuser's forest management plans.

7.10.2 Fish and Wildlife

The main strategy to address specific wildlife and fisheries concerns will be to follow the guidelines contained in the Integrated Resource Plans (IRP) for the region. These Plans identify primary fisheries and wildlife resource concerns for the FMA area, and outline critical wildlife habitat (Zone 2 areas). The IRP management guidelines reflect potential concerns and benefits from forest management activities.

The general guidelines are summarized as follows:

a) Sportfish populations and habitat will be protected by minimizing contact between resource developments and streams, by maintaining water quality and by reclaiming disturbed sites.

[2] "Feature" species are those that are rare, threatened, endangered or of social value.

b) Disturbance of wildlife populations during sensitive time periods will be minimized.
c) Fish and Wildlife Division will continue to review and provide input for government referrals on land use activities with potential for impact on wildlife and fisheries resources. Emphasis will be placed on avoiding unnecessary negative impacts and on working co-operatively with resource users to take advantage of opportunities for habitat enhancement.
d) Harassment and habitat destruction around known colonial nesting sites, raptor nests, bear den sites, and natural mineral licks will be minimized.
e) Disturbance of wildlife will be reduced by managing access.

7.10.3 Operational Planning Considerations

FMA specific ground rules on planning, harvesting and reclamation will be implemented to protect fish and wildlife habitat during timber harvesting operations. These ground rules are negotiated by AAF and the timber operators and, in addition to protecting habitat, also support the broader IRP guidelines and integrate with forest management objectives.

Several factors are particularly important in operational planning considerations:

A. **Structure retention;**
B. **Old growth strategy;**
C. **Harvest Patterns; and**
D. **Recognition of areas of special importance to plant and wildlife species;**

Each of these factors is discussed below.

7.10.3.1 Structure Retention

The retention of trees, snags and woody debris in harvest areas (individual cutblocks as reported by individual ARIS opening number) is a significant component of ecologically based forest management.

a) Retaining trees within harvest areas creates harvest designs that more closely mimic post-disturbance conditions and therefore lessen the impact of logging on ecosystem structure and function. Tree clumps and single trees increase the structural diversity of the regenerating stand, retain some later seral conditions such as a multi-layered canopy, provide a future supply of large snags and down logs, and increase micro-site variability for a more diverse plant understorey. They also provide ecological sites (refugia) from which unaffected plant and animal species can disperse into the surrounding harvest area.

b) Snags (dead trees) play a very important role in a fully functioning forest ecosystem. In addition to their value in recycling nutrients, snags provide habitat for many species of plants, invertebrates, birds and mammals. The absence of snags is a major limiting factor for cavity nesting birds, influencing their occurrence and distribution. Retention of large snags on cut-over areas may be prescribed to provide habitat for cavity nesters.

c) Woody debris left in piles and dispersed over the block provides valuable hiding and nesting cover for a variety of small mammals as well as microsites for habitat. However, no debris piles will be left within any FireSmart community zone (generally a 10-kilometer distance from a FireSmart community's center).

To achieve or maintain stand level structural diversity, the following general principles will be followed by all operators:

a) Safety is a primary concern and must be ensured always.

b) Efforts will be made to retain some form of vertical structure (merchantable and non-merchantable) in the majority of harvest areas. There may be no patches of residual structure in any particular harvest area[3]. Previous efforts by Weyerhaeuser suggest that a small percentage of cutovers have no merchantable retention, generally because of the small harvest area size. To reflect this, harvest areas of less than 5.0 hectares may have less than the target of 4% retention, including zero retention if the harvest area size or configuration limits retention capabilities. The amounts of retention within harvest areas over 5.0 hectares may vary as site conditions and site-specific objectives allow. Features such as wet sites, mineral licks, non-merchantable areas and patches of understorey provide opportunities to retain various structural components (clumps, etc.) and contribute to stand diversity in the regenerating forest. These types of features will be retained within harvest blocks (where possible) along with representative merchantable timber consistent with the stands being harvested. These practices will also protect soil and sensitive sites that may harbour rare plants and smaller, less visible wildlife species.

Retention opportunities are available on a site-specific basis and depend on many factors, such as, but not limited to:

- Representative of preharvest stand conditions (species, age, size, adjacency to differing seral stages, etc.);
- Topography;
- Identified values (historical, cultural, sensitive site protection, monitoring plots, etc.);
- Operational and economic feasibility.

Retention options for both merchantable and non-merchantable trees are available for consideration, such as:

- Island patches varying in size, shape and location;
- Clumps or groups of green trees;
- Single green trees;
- Snags; and
- Coarse, down woody debris piles.

Preference will be given to leaving larger islands or clumps over single tree retention, but all are considered to have inherent value. Retention should be protected from the aerial application of herbicides.

[3] Government of Alberta. 2016. Alberta Timber Harvest Planning and Operating Ground Rules Framework for Renewal. Section 7.4 Structure Retention, pg.36-38.

To represent the impacts of merchantable retention in this plan, the AAC has been reduced by 4% for both conifer and deciduous. Therefore, the approved AACs are net of merchantable retention. The reporting of merchantable retention may occur at the FHP, GDP and Stewardship Reporting stages. The estimate of area retained at the FHP stage will require that some, or all, of the retention patches will be laid out at the same time as the harvest area boundary. This will facilitate a more accurate estimate of area remaining after harvest. Merchantable retention will be measured by area remaining within a harvest area after all harvesting activity has been completed. Area percent is assumed to be equivalent to volume percent for monitoring and reporting purposes. Weyerhaeuser will attempt to verify this through analysis of current data or future retention results and make adjustments accordingly. All timber operators are expected to monitor their respective retention results annually for reporting purposes.

In support of VOITs 7 and 8 (Chapter 5), additional merchantable retention will be left in areas affected by large wildfire or blowdown events. The additional retention will still strive to meet the overall average of 4% retention, by area, across the DFA, however this should not diminish the intent to have some merchantable retention in all harvest areas.

7.10.3.2 Old Forest Strategy

Forest ecosystems are a complex mosaic of stands of different age, structure, and composition, reflecting a continuous process of renewal through establishment, growth, death and re-establishment. Natural disturbance events such as fire, insects, and disease play a critical role in maintaining a balanced forest ecosystem and functioning ecological processes.

The overmature seral stage ("old growth") is an important component of forests and landscapes. It not only provides habitat for numerous "old growth"-dependent species, but its presence is considered essential to the long-term sustainability of forest ecosystems.

This section outlines Weyerhaeuser's approach to the maintenance of "old growth" in the Pembina FMA area.

A definition of old growth

There is no widespread agreement on what constitutes "old growth" forest. Peterson (1995) listed 26 different definitions from different authors and geographic areas. In general, all definitions refer to "old growth" as being a unique successional stage in the life of a plant community, where the structural and compositional features support specific "old growth" ecological processes.

The State of Canada's Environment classified "old growth" forests where trees are 140 years or older (Watson 1993). This contrasts with the 275-300 year range for coniferous forests referred to by Achuff (1989) for Canada's five Rocky Mountain National Parks. In the United States, the Forest Service has characterized old growth as "*later stage(s) in forest development which may be distinctive in composition but are always distinctive in structure from earlier (young and mature) successional stages*" (Moir, 1992). However, Hunter and White (1997), after an extensive review of numerous studies on forest ecology and development, concluded that there is no evidence of the existence of distinct thresholds between what might be called a mature forest and "old growth." According to Hunter and White (1997), forest succession and development is a continuum of changes in structure and composition where no specific age can provide an "*unambiguous threshold on which to base a definition*."

The absence of an age where "mature forest" can be distinguished from old growth does not imply that older stands are similar to younger ones or that older stands do not provide important ecological and wildlife values due to unique structural and compositional characteristics. On the contrary, the absence of a discrete age for distinguishing between mature forest and "old growth" suggests that managers need to identify the characteristics that make older stands valuable and to manage for this ecological uniqueness. The work of Hunter and White would also suggest that these unique characteristics will vary by ecosystem and at times ecosites. To date, there are no templates that can be used in all situations.

Further, "old-growth" attributes that provide ecological and social values may be reached at different ages depending on the:

1. site-specific ecology of the forest stand;
2. successional stage and disturbance history;
3. structural and compositional characteristics;
4. relative contribution to the forest landscape; and
5. the relative rarity of this stage of development.

The quality of the growing space (Site Index) is also an important factor because trees grow larger, faster on better sites. The management of late seral stages may depend on their specific degree of structural diversity, on what Spies and Franklin (1988) called an index of "old-growthness." Many of the preceding considerations also apply to all other successional stages.

Amount of Old Forests

In the absence of an agreed upon definition of "old growth", the FMP will ensure that a certain amount of forest older than "rotation age"[4] will always be present within the active landbase of the DFA. Ecological Units are groupings of the Provincial Base10 RSA strata. Document LB-013 defines both Seral Stages and Ecological Units (see Appendix 7-4). Table 7-18 describes each ecological unit and the associated age to determine 'old' forest in the DFA, while Table 7-19 summarizes the seral stage definitions.

Table 7-18. Ecological Units by Age Definitions for Late Seral Stages.

Ecological Unit	Old Forest (OF) Age	% of Active Landbase
DX	>120	5
DC	>120	5
CD	>140	5
C-PL	>140	5
C-SW	>140	5
C-X	>140	5

[4] Rotation is defined by the Society of American Foresters (1958) as "the period of years required to establish and grow timber crops to a specified condition of maturity".

Table 7-19. Seral Stage Definitions.

Coniferous - C & CD		Deciduous - D & DC	
Seral Stage	**Age (years)**	**Seral Stage**	**Age (years)**
Regenerating	0 to 30	Regenerating	0 to 20
Young	31 to 80	Young	21 to 70
Mature	81 to 140	Mature	71 to 120
Old Forest	141+	Old Forest	121+

Old forests of each dominate type will be maintained within the DFA to accommodate plant and wildlife species dependent on these older forest types. Minimum retention levels will be 5% of old forests for each ecological unit by area.

Practices to retain stand level structure in harvest areas (i.e., retention of large live and dead trees) will provide structural diversity in regenerating forests and create some old forest structures throughout the rotation. Similarly, residual patches of >0.5 ha should retain some old forest characteristics in harvest areas immediately after harvest, while smaller patches and single residual trees may create old forest structures late in rotation (J. Schieck, 2000).

7.10.3.3 Harvest Patterns

Fire is a natural abiotic factor that has played an important function in the development of the forest ecosystem. Fires have been important in maintaining the diversity and vigor of the forested foothills, as they have in many other regions of Alberta (Kelsall, Telfer, and Wright, 1977). Young forests, almost all of which are the results of past fires, are characterized by thick stands of small lodgepole pine or aspen, depending on the site. These stands support a large number of wildlife and plant species. Old Forest stands occur on sites that have escaped recent forest fires. These stands may contain organisms native to this geographic area but which are found nowhere else due to the characteristics of these stands. More importantly, these organisms may contribute significantly to the overall biodiversity of the region and, further, they may be important to the ecological maintenance of these ecosystems.

The FMP is striving for even-aged management under an even-flow policy as defined by the Planning Standard. Spatial distribution of different age classes can also be accomplished under a “normal” age class distribution. Restoring a pre-1900 age-class distribution would produce a forest where most stands would be very young. The reduction in the abundance of older-aged stands would potentially reduce the diversity of wildlife species dependent on late seral stage forest. However, an age-class distribution, such as the one dominant today (see Chapter 3 – Landscape Assessment for details), results in larger expanses of forest reaching old age with an increased risk of fire, insect infestation or disease outbreak. The aging forests also limits availability of early seral stages and, hence, the habitat for wildlife species that depend on those stages.

In planning for future forest landscapes, the FMP is striving for even-aged management under an even-flow policy as defined by the Planning Standard. Seral stage constraints will attempt to maintain a range of older age structures consistent with the inherent ecological processes.

The amount and distribution of Old Forest are highly influenced by topography and climate, which influence landscape-burning patterns (Andison, 1997 and Feunekes, 1993). The amount and distribution will likely vary, depending on elevation, aspect, slope and soil moisture. Generally, old forests are more likely to be found on sites with higher levels of soil moisture; such as on northwest, north-northeast and east facing slopes. South and southwest facing slopes and well-drained sites have the highest chance of being burned. Hence, these sites burn more frequently and are the least likely to support old forest stands (White, 1985).

7.10.3.3.1 Natural Range of Variability

Weyerhaeuser is a partner in the LandWeb project, which will estimate the natural range of variability (NRV) for the DFA. At present, the analysis is not complete for this plan, but will be reviewed against the approved plan when completed to look for future opportunities.

7.10.3.4 Recognition of Species of Special Management Concern

In a forest ecosystem, unique sites (natural mineral licks, natural springs, etc.) can often host rare plant communities and/or species and provide habitat for small mammals, amphibians, reptiles, and invertebrate species. When these sites are identified, they will be integrated into operational forest management planning. As well, selected species of special management concern have been identified. They are as follows: Grizzly Bear, Trumpeter Swan and Ungulates found in Major River Valleys, as well as Barred Owl and Old Forest songbirds.

Additionally, it is important to protect various breeding and denning sites from disturbance. Example of these and their appropriate buffers are shown in Table 7-20 below.

Table 7-20. Buffers for protecting important sites.

Sensitive Sites	Width of Buffers
Salamander, Amphibian and Reptiles	100 meters
Bat Hibernacula	100 meters
Colonial Bird Nesting Areas	100 meters
Sandhill Crane Nesting Areas	100 meters
Wolverine Den	100 meters
Natural Mineral Licks	100 meters
Raptor Nest	100 meters
Grizzly Bear den	100 meters
Black Bear Den	30 meters
Natural Springs	20 meters
Beaver Ponds with no out outflow	20 meters
Beaver Ponds with outflow	30 meters

7.10.3.4.1 Ungulate Winter Range

Were possible, operations on identified key ungulate winter ranges are scheduled for summer or late fall to avoid disturbing animals during critical periods when energy reserves are low. Area timing restrictions are outlined on the “Fish and Wildlife Division Referral Map for Geophysical Programs.

If unavoidable, these areas should be operated through means that would:

- Compress the period of activity to reduce impacts on wildlife.
- Harvesting operations within these zones at any one time should be concentrated to allow ungulates access to escape terrain and to provide continuing secure habitat.
- Harvesting operations should occur as early in the winter as possible.

7.10.3.4.2 Migratory Birds

The majority of migratory songbirds in Canada are protected under the Migratory Birds Convention Act (MBCA). The purpose of the Act is to protect and conserve migratory birds during their critical breeding season and its regulations prohibit the disturbance and/or destruction of migratory birds, nests and eggs in Canada. Forest harvesting and other forest activities can unintentionally result in what is known as 'Incidental Take'. This is defined as the killing or harming of migratory birds and/or the destruction of their nests or eggs as a result of human activities that do not directly aim to affect migratory birds. These unintentional actions can negatively impact both individual birds, as well as bird populations over time, especially considering the cumulative effects of all human activities.

Weyerhaeuser initiated a process to mitigate harvest impacts on breeding birds in 2012 and continues to further develop and improve these practices. Weyerhaeuser long term bird survey data was used to develop a decision matrix that identified high, medium and low risk stands prior to harvest. Mitigation actions accompany each of these different risk ratings. An improved model is under development which will help identify more fine scale risk rankings for all forested stands. This will be accompanied by a document of beneficial management practices and guidance on how and when to use them.

7.10.3.4.3 Grizzly Bear

The grizzly bear (*Ursus arctos*) is listed as *'Threatened'* under the Alberta Wildlife Act and as a species of *'Special concern'* by COSEWIC (Committee on the Status of Endangered Wildlife in Canada). A provincial recovery plan for the grizzly bear was approved in 2008. The plan refers to "habitat" and "mortality risk" maps developed by the Foothills Model Forest Grizzly Bear Research Program as a way to evaluate impacts of different activities on grizzly bear habitat. The maps are based on Resource Selection Functions models and describe areas of high habitat value for grizzly bears and areas of low mortality risk. These maps and associated data are intended to provide operational tools to adjust harvest designs and road density and alignment.

Over the past 18 years, the Foothills Research Institute's Grizzly Bear Program has made significant advances in improving our understanding of how grizzly bears use forested landscapes within their range in Alberta. Some of this information has been used by AAF to delineate new grizzly bear management zones (core and secondary habitats) along the eastern slopes. This research has helped to identify grizzly bear population units within the province, which are further subdivided into Grizzly Bear Watershed Units (GBWU). These units are loosely based on major watersheds and are the approximate the size of an adult female Grizzly Bear home range (~ 700 km^2). Each GBWU is classified as being either Core or Secondary habitat for grizzly bears. Habitat value is determined through a combination of current landscape condition and GPS location data from collared grizzly bear. It is expressed through a Resource Selection Function (RSF). Mortality risk measures are included and are driven by Open Road Density. The intent of the draft Alberta Grizzly Bear Recovery Plan 2016-2022 will be followed as well.

In order to determine where the key focus areas within the DFA might be, the plan produced time zero snapshots relative to grizzly bear use and habitat. Proposed developments were added to the model, which regenerated the RSF, Mortality Risk and Open Road Density values, and assessed the impact of the development on the baseline or current metrics. The FMP utilized the Foothills Research Institute Grizzly Bear Research Program (FRIGRP) and provided output on these four variables:

1. Resource Selection Function

Resource Selection Function (RSF) is a metric used to measure presence and amount of grizzly bear habitat which shows probability of grizzly bear presence on the landscape. Research completed by the

FRIGRP to validate RSF maps shows a strong correlation between high RSF values and current grizzly bear distribution. The objectives, as laid out by AAF, are to maintain or increase maximum RSF values in core areas and to increase maximum RSF values in secondary areas.

2. Mortality Risk

Mortality risk represents areas where there is an increased probability of human caused mortality to grizzly bears. It is largely a function of open access and available habitat, and should be developed in conjunction with open route density. Objectives are to maintain or reduce mortality risk where possible.

3. Open Road Density

For the purposes of the modeling exercise, Open Road Density was defined as the total length of all open roads divided by the area of each GBWU. Research has shown a strong correlation between grizzly bear mortality rates and human access. Regulating human access within grizzly bear zones can reduce the risk of human-caused bear mortality. The Grizzly Bear Recovery Plan speaks to the need to measure human use and recommends Open Road Density as one way to do that. The target for Open Road Density in Core grizzly bear areas is 0.6 km/km^2 and 0.75 km/km^2 in Secondary grizzly bear areas.

The results of the model analysis summarize current and predicted future (at 10 and 20 years) primary and secondary grizzly bear habitat for the DFA and are presented in Chapter 6 under Non-Timber Assessments.

AAF wildlife staff examined the forecasted outcomes of the Grizzly Bear habitat assessment resulting from the Preferred Forest Management Strategy. Outcomes were deemed acceptable or low risk (i.e. habitat supply for species falls within a desired range over time) and no further action is required.

However, to ensure the continued existence of a viable population of grizzly bear on the DFA, it is of critical importance to reduce the overall amount of permanent access in prime grizzly bear habitat so to minimize bear mortality risk. This strategy is based on the assumption that there will be only a few new permanent roads built by the company in the first decade of the FMP.

Suggested strategies include:

- Any AOP roads that are constructed (non-permanent) will be reclaimed as quickly as possible, and
- Reclaim any permanent roads not required into the future.

Due to the structure of the current process, consideration can only be given to forest harvesting impacts on grizzly bear in this FMP. There are other issues, such as education, other industrial activity, and human use restrictions that Weyerhaeuser has little or no control over and cannot be addressed here.

7.10.3.4.4 Trumpeter Swan

The net landbase has taken into account known locations of Trumpeter Swan (*Cygnus buccinator*). Lake buffers were increased to 200 meters from the nominal 100 meters. The Pembina ground rules provide direction for planning and operating within vicinities of lakes known to have or have had populations of Trumpeter Swan. There are also constraints for an additional 600 meters away from the lake buffers between April 1 and September 30th.

7.10.3.4.5 Barred Owl

Weyerhaeuser and other FMA holders have contributed funding in support of developing a regionally specific Barred Owl model. The model in use is based on a Resource Selection Function (RSF) model first developed by Russell (2008). The model has two outputs: RSF, which models the probability of occurrence, with the measure being habitat quality; and the Potential Breeding Pair Habitat.

The RSF model has a number of variables:

- Distance to openings other than water (open area or cutblock <30 years of age)
- Proportion of softwood
- Proportion of hardwood
- Distance to nearest stand >89 years
- Area: Perimeter of contiguous stands >30 years

Two modifications to the model occurred; exclude areas over 1800 meter ASL, and include lodgepole pine in the conifer variable.

Outputs in the FMP occurred at the following intervals: Tables of suitable habitat at years 0, 10, 50, 100 and 200; with maps at year 0, 10 and 50. Outputs of the Barred Owl model are presented in Chapter 6 under Non-Timber Assessments.

AAF wildlife staff examined the forecasted outcomes of the barred owl habitat assessment resulting from the Preferred Forest Management Strategy. Outcomes were deemed acceptable or low risk (habitat supply for the species falls within a desired range) over the short- to medium-term *i.e.* the first 20 to 35 years of the plan. Despite this, Weyerhaeuser recognizes the impact that forest harvesting activities can have on barred owl habitat and consequently has implemented operational strategies to mitigate this impact where possible. These strategies include:

- Migratory Bird Nesting Tool (MBNT). All blocks planned for harvest during specific nesting periods are assessed with the MBNT. For barred owls, blocks scheduled for harvest between March 15 and April 15 in a medium or higher risk category are assessed utilizing Owl calls. If a response is received then a nest sweep is conducted. When a nest is located, potential actions include:
  - Move to a block with a lower risk rating, or
  - Shift the timing of harvest, or
  - Buffer the nest area with a 30m or greater buffer, which will be retained as part of the structure retention target.

- Structure retention. In blocks with preferred barred owl habitat, *i.e*. old aspen/spruce mixedwoods, the integrity of large diameter snags and decadent overstorey aspen/poplar will be retained where possible with surrounding retention to provide preferred nesting habitat.

- Access. The majority of the preferred breeding pair habitat (Figure 6-54 Chapter 6 Appendix 6-2) is located within access development zone 1 (Figure 7-1). This zone is already accessible by permanent public routes and industrial access roads, with no new permanent roads planned for the area. Temporary roads will be constructed to follow existing linear disturbances *e.g*. seismic lines where possible.

7.10.3.4.6 Songbirds

AAF has developed a resource abundance (RA) model which uses landbase conditions to classify AVI polygons by RA value for each songbird species. The time zero model was run using AVI, the compartment boundaries, and buffered seismic lines.

The model used for this analysis was developed by AAF (version 1.1, December 2016), and all assumptions of that model are applied to this analysis. To create the final output, the model consists of three scripts. The first script overlays a 7 ha grid (~264.6 m sides for each grid cell) over the DFA and is used to calculate the percentage of hard and soft linear features within the FMU in the third script. The second script calculates the percent coverage for each tree species within each AVI polygon. The third script uses the outputs from the first two scripts, along with the buffered seismic lines and compartment layers to calculate the songbird coefficient for each species. The final products include two tables, which show the RA values by species within each compartment, and a polygon feature class which contains all of the outputs used to create the tables, and can be used to visualize the table outputs. The tables show two calculations of the RA value, with one output considering the effects of both hard linear (roads) and soft linear (seismic lines) features. The second table produced does not include the soft linear features in the RA calculation.

To ensure that sufficient habitat for each species is maintained throughout the planning horizon, a threshold of a 15% loss in RA was set for each species. With each species having unique habitat requirements and population counts (base level abundances) this ensures harvest activity will have a limited impact over the life of the plan.

AAF wildlife staff examined the forecasted outcomes of the Songbird RSF assessment resulting from the PFMS. Outcomes were deemed acceptable or low risk (i.e. habitat supply for species falls within a desired range over time) and no further action is required. Outputs of the Songbird RSF model are presented in Chapter 6 under Non-Timber Assessments. The requirements for each species are presented in Chapter 5 under VOIT 14.

7.10.3.4.7 Marten

American marten (*Martes americana*) is a high value species to several stakeholders that use the DFA. To address any concerns that stakeholders may have, a model developed by AAF was run to determine current habitat suitability across the landbase. This was not a requirement of AAF, but a choice made by Weyerhaeuser in support to the Stakeholder Advisory Group.

The model used for this analysis was developed by AAF (last updated in 2015), and all assumptions of that model are applied to this analysis. To run this model for the Pembina Timberlands, the model required a current landbase with fields identifying polygon height, tree species, tree species percentages, and tree density. In addition to these fields, a compartment layer was also used to compile the data for reporting purposes.

The model determines Habitat Suitability Index (HSI) through a formula which requires the total stand density, the combined percentage of spruce and fir, the stand height, and the total conifer percentage. The formula calculated the HSI for each polygon, and from these values a raster model was created. The output raster has a pixel size is 0.25 ha (50 m x 50 m), and values range between 0 (unsuitable habitat) and 1 (high suitability). From this raster, the descriptive statistics for each compartment can then be calculated.

Outputs of the Marten RSF model are presented in Chapter 6 under Non-Timber Assessments.

AAF wildlife staff reviewed the forecasted outcomes of the marten habitat assessment resulting from the Preferred Forest Management Strategy. Outcomes were deemed acceptable or low risk (i.e. habitat supply for species falls within a desired range over time) and no further action is required.

7.11 Public Involvement in ongoing Forest Management Activities

7.11.1 Primary Stakeholders

7.11.1.1 First Nations and Métis

The GoA has established a number of Policies (The Government of Alberta's Policy on Consultation with First Nations on Land and Natural Resource Management, 2013, and The Government of Alberta's Policy on Consultation with Métis Settlements on Land and Natural Resource Management, 2015) and Guidelines (The Government of Alberta's Guidelines on Consultation with First Nations on Land and Natural Resource Management, July 28, 2014, and The Government of Alberta's Guidelines on Consultation with Métis Settlements on Land and Natural Resource Management, April 1, 2016) related to First Nations and Métis consultations over the last decade. For forestry purposes, the General Development Plan (GDP) requires Level 2, or Standard, consultation, each year.

The FMP recognizes that timberlands operations have the potential to impact Treaty Rights or traditional uses. The objective is to minimize any adverse impact to Treaty rights or the use of traditional sites. These sites may include, but is not limited to, the following:

- Sacred sites
- Ceremonial sites
- Prayer Sites
- Oral History Sites
- Historic trails
- Camp sites
- Cabin sites
- Grave sites
- Hunting sites
- Fishing sites
- Gathering sites for
  - Berries
  - Medicinal plants
  - Minerals
  - Quarry/stones

Potential impacts may include the following:

- Temporary disruption of travel on historic trails,
- Temporary disruption of camping activities due to operations,
- Temporary displacement of game during periods of increased operational activities,
- Temporary disruption of use of ceremonial, spiritual or prayer sites during periods where noise may be a deterrent for use , or
- Temporary disruption within gathering areas until vegetation communities re-establish post-harvest.

When consulting with either group, it is expected that timber operators will act in good faith during the consultation process, and should undertake to:

- Take responsible measures to explore any issues or concerns raised,
- Respond to any issues or concerns raised promptly,
- Provide a reasonable amount of time for a response to the proposed GDP, and
- Consider options to avoid, minimize, or mitigate adverse impacts on site specific Treaty Rights or traditional uses identified.

Company staff will undertake to make themselves available to attend Community open houses/information sessions to keep the communities informed of upcoming activities on the DFA.

7.11.1.2 Grazing Operators

In April of 2011, the GoA released an updated Grazing and Timber Integration Manual. Timber operators developing FMPs that overlap grazing dispositions must follow this manual. Grazing dispositions include permits, licenses and leases.

Timber operators and the grazing disposition holder(s) will develop joint Grazing-Timber Agreements (GTA) when new activities occur on the disposition. These agreements set periods and/or conditions for the integration of harvesting and grazing. These agreements also provide several principles to assist in integration; as well as cost sharing of any activities (cross fencing projects) that would assist in mitigating any impacts on either party, and scheduled joint inspections, which includes invasive and noxious weeds (before, during, and after operations). These agreements are signed off by both parties prior to commencing operations and become part of the operating conditions for each disposition holder.

The GTA objectives are the maintenance of forage production with that of timber production. The realization is that there are impacts on both resources at the same time, and the intent of the GTA is to minimize conflict between the two users of the forest landbase.

7.11.1.3 Trappers

The FMP is committed to involving the trapping community in harvest design development and implementation. It is understood that timber harvesting can directly and immediately affect the habitat of furbearers harvested by trapping (Proulx, 1998). Timber operators will work with the trappers in an attempt to minimize the impact of timber harvesting on the trapping sector.

Timber operators will consult individual registered trappers during the harvest plan development to discuss:

- Location of proposed harvesting areas during development of FHPs and AOPs,
- Harvesting methods including stand retention levels, recognition of unique areas, and timing,
- Access (location, reclamation, and control methods), and
- Planned reforestation activities.

Timber operators should attempt to contact the trapper in person to discuss the development of the harvest design and to obtain pertinent information from the trapper such as cabin locations, unique areas, location of active lines and traps, etc. Follow-up contact with the trapper will be made upon submission of the AOP as notification of intent to operate on the trapline that AOP year.

Company staff will undertake to make themselves available to attend some of the local trapper association meetings to keep them informed of upcoming planned activities on the DFA.

7.11.1.4 Oil and Gas

There are 3 components of Weyerhaeuser's approach to recognizing the impact of the petroleum sector upon the FMA. They include:

1. Minimizing the impact through coordinated land use planning
2. Accounting for timber losses resulting from industrial activity
3. Well site and road reclamation program

1. Minimizing losses through coordinated land use planning

Weyerhaeuser is committed to applying the multiple-use concept to ensure that the timber harvesting landbase in the DFA is sustainable over the long term. The goal of integrating with the management activities of other resource users will be achieved by the continued commitment to the GoA's policy of Integrated Resource Planning (IRP). The policy recognizes that managing one resource affects the management of other resources. The IRP process determines how the resource management objectives are to be achieved by establishing resource management guidelines.

The company's intent is to establish and maintain clear lines of communication with all major industrial players across the DFA. Major developments (main all-weather permanent roads) by both industries tend to bring them together to ensure that impacts across the landscape are minimized where possible. AAF plays a major function in insuring that this co-ordination and planning occurs. The development of common corridors is an example of an end product resulting from this communication and coordination.

All industrial dispositions, when they occur on the FMA, are referred to the company for consent. Each disposition is reviewed for potential impacts on Company operations (i.e. research plots, permanent sample plots, road systems, etc.) and approved, amended, or rejected accordingly. Company concerns are usually directed to the disposition holder and/or to AAF when appropriate.

2. Accounting for Losses due to Industrial Activity

Effective May 1, 2017, salvage will be charged as it crosses the scale for all timber operators. See Appendix 7-5 for the approval of this process. Timber that is waived as production will be charged against production using provincial tables to estimate volumes.

3. Well site and Road Reclamation

Well sites and roads that are no longer required by the energy sector do not need tree cover established on them prior to the dispositions being cancelled and returned to the FMA. In 2005, Weyerhaeuser began working cooperatively with the energy sector to vegetate these areas to tree cover, using a portion of the money the company has collected through the timber damage assessment process to fund this work.

In the long term, the goal is to have all abandoned well sites without a reclamation certificate, along with their associated road, pipeline and electrical rights of ways, reforested to trees. The intent is to work cooperatively with the energy sector during the reclamation process; the energy company will do the site preparation work, Weyerhaeuser will do the tree planting.

It needs to be emphasized that at this time the initial goal of this program is to re-establish forest cover, not timber production. The long-term performance of trees on reclaimed well sites is not well understood. We need to first develop an understanding as to whether the sites can be brought to or near to the stated goal of equivalent capability for survival and growth.
Company staff will attempt to attend some of the local Synergy group meetings to keep them informed of new activities on the DFA.

7.11.1.5 ATV Clubs

All-Terrain Vehicle (ATV) clubs were represented on the Stakeholder Advisory Group during the development of the FMP. ATV usage has increased dramatically over the last number of years. Activity in the area is increasing locally as restrictions are placed in other parts of the Province by users that traditionally recreated west and south of Calgary.

The biggest desire of the group was the opportunity to develop trail systems with the help of the FMA holder and AAF. Discussions focused on involvement in the Integrated Resource Planning (IRP) process. The Company will provide GIS mapping capacity to local groups to some extent, where feasible. The opportunity was also discussed about the opportunity, with the Province, to initiate the IRP process for a pilot area on the FMA.

Company staff will undertake to make themselves available to attend ATV clubs meetings, if requested, to keep them informed of planned activities on the DFA.

7.11.1.6 Snowmobile Clubs

Snowmobile clubs were represented by the Off-Highway Vehicle representatives on the Stakeholder Advisory Group during the development of the FMP. Snowmobile usage has increased dramatically over the last number of years, however their use is generally restricted to designated snowmobile trails that are registered with the Province as an CNT (consultative notation). There are several well used trails on the DFA, most noticeable the trail to Robb and the trail to Silver Summit, a local down-hill ski site located between Edson and Whitecourt.

Company staff will undertake to make themselves available to attend some of the Snowmobile club meetings, if requested, to keep them informed of planned activities on the DFA. Currently the operational planners work closely with the local clubs if our activities are in proximity of their trail systems, and only then.

7.11.1.7 Fish and Game Clubs

Fish and Game clubs were represented on the Stakeholder Advisory Group during the development of the FMP. Hunting and fishing activity has always been an important economic part of the DFA.
Company staff will undertake to make themselves available to attend Fish and Game club meetings, if requested, to keep them informed of planned activities on the DFA.

7.11.2 Secondary Stakeholders

Generally, secondary stakeholders have no direct link to the DFA. Secondary stakeholders fall into two distinct groups: Municipal governments and tourism outfitters.

7.11.2.1 Municipal Governments

The following list includes municipal governments potentially interested in the DFA:

- Town of Edson
- Town of Drayton Valley
- Town of Rocky Mountain House
- Yellowhead County
- Brazeau County
- Clearwater County

Company staff will undertake to make themselves available to attend some of the town or county municipal meetings as invited to keep them informed of planned activities on the DFA.

7.11.2.2 Tourism Operators

There were two Tourism operators identified on the DFA: Skadi Wilderness Adventures, and Rose Creek Recreation Trails Association. Each will be identified on a stakeholders list to share dates for upcoming open houses or other events staff feel might be of interest to them.

7.11.3 General Public

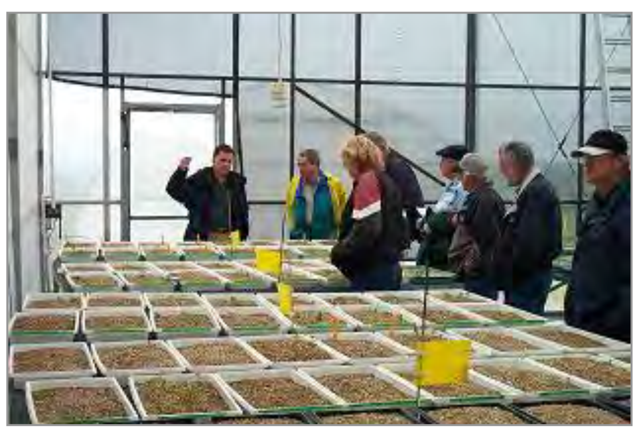
The General Public for the most part are those individuals or groups that are neither Primary nor Secondary stakeholders. The intent is to ensure any individuals or groups whom may have an interest in forest management activities on the DFA be made aware of, or has access to, information about those activities, and furthermore have a means of engaging company staff.

Basic strategies to be employed include creating easily understood information products, use of internet and online media, integration with common public information media, and proactively promoting awareness, commonly through the use of open houses in Edson, Rocky Mountain House, and Drayton Valley for the AOP, GDP and Herbicide plans. Other venues will be considered upon request.

There are currently two Synergy Groups that overlap the DFA (one in Edson, one in Drayton Valley) that Weyerhaeuser planning staff will have some involvement with over the life of the FMP.

7.12 Research and Future Considerations

7.12.1 Research



Research and long-term monitoring is an ongoing process for many companies that have a FMA.

During the development and discussions leading up to the final FMP, it was evident that there were information gaps still present in forest management and forest management practices. Weyerhaeuser will continue to participate in research projects and monitoring programs to try to fill these gaps.

The following is a list of expected research and monitoring programs anticipated to continue on the DFA for the life of the FMP:

- Sustainable Forest Management Research with the University of Alberta
- Stand condition and site factors affecting the regeneration of healthy and over-mature aspen
- Raptor monitoring surveys – tri-annual
- Songbird monitoring surveys – tri-annual
- Grizzly Bear monitoring in association with the Foothills Research Institute
- Wetlands research in association with Ducks Unlimited (DU)
- Tree improvement cooperative programs

7.12.2 Future Considerations

7.12.2.1 Enhanced Forest Management

Development of an enhanced forest management program for future implementation on the DFA is continuing. As such this FMP does not incorporate the benefits of enhanced forest management activities. The intent of the enhanced forest management program for the period of this plan is to establish trials to:

- Gain operational experience in implementing these activities,
- Demonstrate the results of these activities, and
- Provide a basis for evaluating the forest response to these activities.

The enhanced forest management activities are focused in the following areas:

- Rehabilitation of landbase that is returned to the DFA directly related to petroleum development, and
- Tree improvement (white spruce, lodgepole pine, and hardwood programs).

Knowledge gained from these trials will aid in determining an appropriate enhanced forest management strategy for submission in future detailed forest management planning.

The Forest Growth Organization of Western Canada (FGROW) is an amalgamation of the following organizations:

- Western Boreal Growth and Yield Cooperative (WESBOGY)
- Foothills Growth and Yield Association (FGYA)
- Mixedwood Management Association (MWMA)
- Alberta Forest Growth Organization (AFGO)
- Tree Improvement Alberta

Weyerhaeuser continues to provide both in-kind and financial support to FGROW with the general objective of building capacity to support the rational implementation of enhanced forest management. The company is also actively involved in:

- Huallen Seed Orchard (HASOC), and
- Western Boreal Aspen Coop (WBAC)

Weyerhaeuser also collaborates and is involved with the:

- Sustainable Forest Management – Centre of Excellence
- University of Alberta Institute for Enhanced Forest Management

7.12.2.2 Land Management

Weyerhaeuser will make the DFA available for potential land management pilot projects that will attempt to address conflicting issues. Three main issues identified to date are:

- Off-Highway Vehicle usage,
- Access development control in selected zones, in particular primary and secondary grizzly bear habitats, and
- Impacts of petroleum development on a shrinking timber producing landbase.

All three issues will continue to dominate local and regional discussions for multiple use and footprint on the landscape.

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Appendix 7-1 – Silviculture Strategies Table

The Silviculture Strategies Table describes, for each yield strata, the following: silviculture system, site preparation requirements, seedling establishment criteria, seedling density targets, and any expected interventions that may be required. The table was developed with input from all timber operators.

Managed FMP Yield Strata	Managed FMP Yield Strata Landbase Designation Code	FMP Yield Strata Transition Sources (Mature Stands)	FMP Yield Strata Transition Sources (Mature Stands)	Stand Structure (Species Proportions)	Limitations to Crop Establishment (Site, Climate)	Silviculture System	Site Preparation	Seedling Establishment (includes LFN)	Seedling Density (SPH Target per Species Type)	Reforestation Phase Intervention (Post-seedling establishment)	Comments
Hw_W	TBD	D-HW_W	AW (AB) ; AW (CD) ; PB (AB) ; PB(CD) ;	AW, PB; Pure deciduous: > or equal to 80% deciduous content by either AW or PB as leading species; conifer component of Sw or PL < or equal to no more than 20%	Poor suckering capacity of root systems; Browsing by ungulates; browsing by domestic animals on grazing dispositions; cold/wet soils	Clear cut	LFN; scalp or elevated site for conifer establishment if required	LFN :deciduous suckering and conifer ingress; straight plant roads and landings as required	15,000 deciduous; 1400 conifer on in-block roads	In-fill planting as required to meet stocking establishment requirements when deciduous stocking is found to be deficient	In-fill planting will likely lead to a transition to a mixedwood block. In W5, W6 old FMU areas.
Hw_X	TBD	D-HW_X	AW (AB) ; AW (CD) ; PB (AB) ; PB(CD) ;	AW, PB; Pure deciduous: > or equal to 80% deciduous content by either AW or PB as leading species; conifer component of Sw or PL < or equal to no more than 20%	Poor suckering capacity of root systems; Browsing by ungulates; browsing by domestic animals on grazing dispositions; cold/wet soils	Clear cut	LFN; scalp or elevated site for conifer establishment if required	LFN :deciduous suckering and conifer ingress; straight plant roads and landings as required	15,000 deciduous; 1400 conifer on in-block roads	In-fill planting as required to meet stocking establishment requirements when deciduous stocking is found to be deficient	In-fill planting will likely lead to a transition to a mixedwood block. In E15, E2, R12 old FMU areas.
HwPl	TBD	DC-PL	AW(ABCD) + (PL); PB (ABCD) + (PL);	AW, PB; Mixedwood deciduous leading: > or equal to 50% deciduous content leading species either AW or PB and < 50% conifer content, PL leading as the primary conifer	Poor suckering capacity of deciduous root systems; Browsing by ungulates; browsing by domestic animals on grazing dispositions; competition of deciduous for conifer natural or planted seedlings	Clear cut	scalped site/ elevated site for conifer establishment	planting of Pl, LFN for deciduous	1000-1600 conifer; 10,000 deciduous	competition control by chemical or mechanical means to maintain conifer component	
HwSx	TBD	DC-SX	AW(ABCD) + (SW or SB); PB (ABCD) + (SW or SB);	AW, PB leading or in combination; Mixedwood deciduous leading: > or equal to 50% deciduous leading by either AW or PB and < 50% conifer content, SW leading as the primary conifer	Poor suckering capacity of deciduous root systems; Browsing by ungulates; browsing by domestic animals on grazing dispositions; deciduous competition for conifer; cooler/wetter soils	Clear cut	scalped site/elevated sites	Planting of Sw; LFN for deciduous and conifer	1000-1600 conifer; 10,000 deciduous	competition control by chemical or mechanical means to maintain conifer component	
SwHw	TBD	CD-SX	SW (ABCD)/PL or FB + (AW or PB or Bw)	SW leading conifer mixedwood; conifer content > or equal to 50% or <80%, with SW as species1 and secondary conifer component of PL or FB or SB at times; deciduous content <50% and > 20%, AW or PB or BW leading as the hardwood component;	Poor suckering capacity of deciduous root systems; Browsing by ungulates; browsing by domestic animals on grazing dispositions; cooler/ wetter soils	Clear cut	scalped site/elevated sites	Planting of SW; LFN for deciduous and conifer	1000-1600 conifer, 5000 deciduous	competition control by chemical or mechanical means to maintain conifer component	
PlHw	TBD	CD-PL	PL (ABCD) /(SW or SB or FB) + (AW or PB or BW);	PL leading conifer mixedwood; conifer content > or equal to 50% or <80%, with PL as species1 and secondary conifer component of SW or FB or SB at times; deciduous content <50% and > 20%, AW or PB or BW leading as the hardwood component; secondary conifer component of SW at times	Poor suckering capacity of root systems; Browsing by ungulates; browsing by domestic animals on grazing dispositions; dryer soils	Clear cut	Drag/ scalped site/ elevated site	Planting of PL; LFN for deciduous and conifer; direct seeding as supplemental to the planting of PL	1000-1600 conifer, 5000 deciduous	competition control by chemical or mechanical means to maintain conifer component	
Sw	TBD	C-SW	SW(AB)/PL/FB; SW (CD)/ PL/FB + (AW or PB or Bw)	SW leading pure conifer: > or equal to 80% conifer content with SW as species1 and secondary conifer component of PL or FB or SB at times, and either AW or PB or BW	cool, wetter soils	Clear cut	scalped sites, elevated sites	Planting of SW	1400-1800 conifer; 2000 deciduous	competition control by chemical or mechanical means to maintain conifer component	
SwG	TBD	C-SW	SW (AB)/PL; SW (CD)/ PL + (AW or PB or Bw or FB)	SW leading pure conifer: > or equal to 80% conifer content with SW as species1 and secondary conifer component of Pl or FB or SB at times, and either AW or PB or BW	cool, wetter soils	Clear cut	scalped sites, elevated sites	Planting of SW-G	1400-1800 SW-G; 2000 deciduous	competition control by chemical or mechanical means to maintain conifer component	Blocks to be planted 100% to with Tree Improvement Region I SW seedlots only; all NSR eligible other than Upper Foothills and Sub_Alpine;
Pl	TBD	C-PL_AB C-PL_CD	PL (AB) or PL (CD) + (AW or PB or BW or SW or PL or FB)	PL leading pure conifer: > or equal to 80% conifer content with PL as species1, and either AW or PB or BW or PL or SB	dryer sites	Clear cut	Drag/ scalped site/ elevated site	planting, LFN seed, direct seeding	1400-1800 conifer; 2000 deciduous	competition control by chemical or mechanical means to maintain conifer component	
Temporary inner-block roads and landings	TBD	ALL	All yield Strata	All stand structures	cool, wet soils/compaction/nutrient deficiency	Clear cut	decompaction/roll-back	planting/LFN/direct seeding	1400-1800 conifer; 2000-10,000 deciduous	NA	Decompaction generally only required on temporary roads and landings hauled under non-frozen conditions/sites that have sufficient deciduous regeneration post-rollback may be LFN
Transition Matrix											
Pl	TBD	C-SB	SB(ABCD) + PL + (AW or PB or BW or SW or FB or LT)	**SB leading pure conifer: > or equal to 80% conifer content and either Pl or SW or AW or PB or BW or FB or LT**	wetter, **colder** sites	Clear cut	Drag/ scalped site/ elevated site	planting, LFN seed, direct seeding	1400-1800 conifer; 2000 deciduous	competition control by chemical or mechanical means to maintain conifer component	Transition stands from black spruce leading pure conifer to lodgepole pine leading pure conifer; and passive landbase pure conifer black spruce fringe areas included during the operationalization of the SHS

Appendix 7-2 – British Columbia 2007 Sowing Guidelines

The 2007 BC Sowing Guidelines are used by the Alberta Provincial Seed Supply Officer to forecast seed requirements for all timber operators in Alberta. The tables supply factors for pine and non-pine species and are applied based to seedlots based on the germination capacity of seedlots. See Section 7.7.4 for more detail.

https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/tree-seed/seed-planning-use/sowing-guidelines

Home | Cone & Seed | Gene Resource Mgmt | Legislation & Standards | FIA | Publications

> SPAR homepage

2007 Sowing Guidelines

The sowing guidelines are:

- a set of calculations that convert the amount of seedlings requested by forest professionals to the quantity of seed that needs to be removed from long-term freezer storage for a seedling request.
- the default conversion factor on SPAR.
- used to calculate the number of potential seedlings for an entire seedlot as well as the number of seedlings producible per gram of seed.
- used by many forest companies and nurseries, however, some adjust the grams of seed required (usually downwards) based on past experience or limitations placed on high-value seed by the owner.

The sowing guidelines have undergone revisions in 1996, 1999 and most recently in 2001. Additional details on the 1999 (select Vol 3 #4) or 2001 (select Vol 5#2) can be downloaded from the following link: http://www.for.gov.bc.ca/hti/publications/notes/notes.htm

Some nurseries have asked to have their nursery specific guidelines entered as a default in SPAR. This intuitively seems reasonable, but it produces problems when one is comparing production figures across nurseries. The same amount of seed could be used to produce different quantities of seedlings at different nurseries. The problems become multiplied when one considers the impacts of changing nurseries on seedling production.

Nursery Grams Adjustment Screen

To assist with nurseries wishing to be efficient with seed a new **Nursery Grams Adjustment Screen** has been added to SPAR (look on the Services menu). Nurseries can now select sowing requests based on:

- Request Agency (Client)
- Species
- Stock type
- Container type
- Planting year/season
- Stock age

and bring these up on one common screen where gram quantity can be adjusted. Previously each sowing request would need to be brought up individually and changes entered, making it a relatively slow process.

Minor adjustments to the sowing guidelines are being introduced for 2007 sowing. The change is only for **lodgepole pine (Pli)** seedlots and the reduction amounts to a 6.3% to 8% decrease in allocated seed depending on seedlot germination capacity (%). For seed owners this means that these guidelines suggest that they should be able to obtain more trees. For nurseries it means that less seed will be provided to produce Pli seed if they have followed these guidelines in the past. This change is in response to the need for improved seed efficiencies with Pli due to various challenges such as mountain pine beetle, wildfires, and the low inventory of seed orchard seed.

The new Pli guidelines and current guidelines for other species are illustrated in Figure 1 for GC values between 70 and 100% (covering most Pli seedlots).

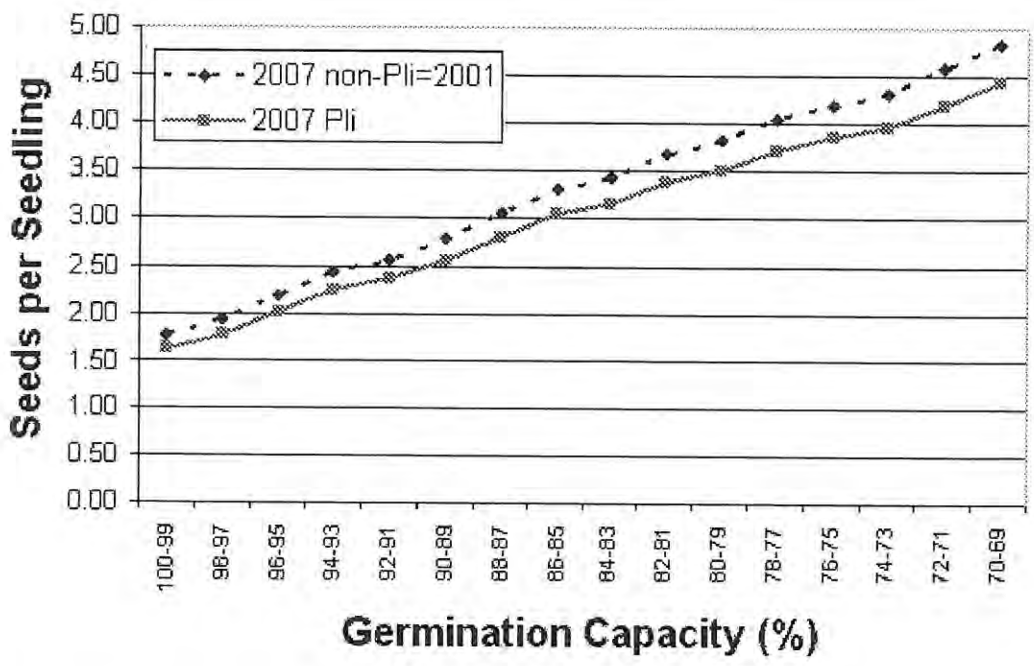
- The changes have been realized by reducing the correction or oversow factor by 0.1.
- This factor is entered to two decimal places and allows for a streamlined reduction in seeds per seedling across the germination range.
- The new 2007 Pli guidelines do not provide specific sowing factor or correction factor terms as these small reductions in seed are best implemented by each nursery with consideration to their sowing equipment and attitude to risk.

To compare seeds supplied per seedling, at 99% and 100% GC the term is reduced from 1.75 to 1.61 while at 69 and 70% GG the seeds per seedling goes from 4.81 to 4.43. A comparison of the changes in seeds per seedling for GC values between 100 and 21% (the lowest GC value in the guidelines) are illustrated in Table 1. The seeds per seedling number is important as it the value used in the calculations converting seeds to seedling and vice versa. The equations are the same as those presented in 2001, but are repeated here for ease of reference.

$$\text{Grams of seed} = \frac{\text{No. of Seedlings Requested} \times \text{Seeds Supplied per Seedling}}{\text{Seeds per gram}}$$

$$\text{Potential Seedlings} = \frac{\text{Grams of Seed} \times \text{Seeds per Gram}}{\text{Seeds Supplied per Seedling}}$$

Figure 1. A comparison of seeds per seedling supplied through the 2007 Pli guidelines and 2007 non-Pli guidelines (=2001 guidelines) from 69 to 100% germination capacity.



Dave Kolotelo - Susan Zedel - Al McDonald

Table 1. A comparison of the seeds supplied per seedling and % reduction of the 2007 Pli guidelines and 2007 guidelines for other species.

Germination Capacity (%)	2007 non-Pli Seeds/Seedling	2007 Pli Seeds/Seedling	% Reduction Seeds/Seedling
100-99	1.75	1.61	8.0
98-97	1.91	1.76	7.9
96-95	2.18	2.01	7.8
94-93	2.43	2.24	7.8
92-91	2.56	2.36	7.8
90-89	2.78	2.56	7.9
88-87	3.05	2.81	7.9
86-85	3.30	3.04	7.9
84-83	3.43	3.16	7.9
82-81	3.68	3.39	7.9
80-79	3.81	3.51	7.9
78-77	4.04	3.72	7.9
76-75	4.18	3.85	7.9
74-73	4.31	3.97	7.9
72-71	4.56	4.20	7.9
70-69	4.81	4.43	7.9
68-67	4.95	4.56	7.9
66-65	5.20	4.79	7.9
64-63	5.34	4.92	7.9
62-61	5.60	5.16	7.9
60-59	5.76	5.31	7.8
58-57	5.88	5.42	7.8
56-55	6.14	5.66	7.8
54-53	6.29	5.80	7.8
52-51	6.55	6.04	7.8
50-49	6.71	6.19	7.8
48-47	6.87	6.34	7.7
46-45	7.15	6.60	7.7
44-43	7.32	6.76	7.7
42-41	7.50	6.93	7.6
40-39	7.69	7.11	7.5
38-37	7.89	7.30	7.5
36-35	8.11	7.51	7.4
34-33	8.34	7.73	7.3
32-31	8.60	7.98	7.2
30-29	8.78	8.16	7.1
28-27	9.00	8.38	6.9
26-25	9.27	8.65	6.7
24-23	9.60	8.98	6.5
22-21	9.86	9.24	6.3

Appendix 7-3 – Ducks Unlimited Canada Report

Weyerhaeuser received the following report on the DFA's wetlands from Ducks Unlimited Canada on September 28, 2017. The report expands on the information presented in Section 7.9.4.

Weyerhaeuser Pembina Timberland
Detailed Forest Management Plan
Ducks Unlimited Canada Input
September 28, 2017

Introduction

Wetlands, although poorly understood by many sectors of society, are prevalent across the western boreal forest and are important features on Weyerhaeuser Company Limited's (Weyerhaeuser hereafter) Pembina Timberland Forest Management Area. Wetlands, including shallow open water, marshes, swamps, fens and bogs, are an integral component of forest ecosystems and thus play an important role in ecosystem based management. Wetlands provide numerous ecological, social, and economic benefits that include: providing habitat for plants and animals some of which are rare and/or at risk species; sequestering and storing of atmospheric carbon, contributing to annual water budgets; and, helping regulate surface and subsurface water supplies and flow.

Research shows that wetland and forest can be interdependent, and thus healthy wetlands and healthy forests work together to create functioning forest ecosystems (e.g., Devito et al. 2012; Devito et al. 2016; McEachern 2016; Petrone et al. 2016). Sustainable forest management is therefore key to having maintaining healthy wetlands and conversely functioning wetlands are important to achieving healthy forests. Wetlands and forest management activities intersect in a number of ways. In the context of forest management, when roads cross wetlands the performance of the road can be compromised due to wet soil conditions and flowing water. This can result in increased construction and maintenance costs and may impact worker and public safety. From a wetland conservation perspective, forest management activities have the potential to affect wetland quality, wetland quantity, and wetland/watershed hydrology across the landscape.

Wetland conservation is becoming part of the legal, certification, and social license obligations that forest companies must meet. In Alberta the provincial Wetland Policy (Government of Alberta 2013) applies to all wetlands and came into effect in the White Area of the province June 1, 2015 and in the Green Area as of July 4, 2016. Under this policy, impacts on wetlands must be avoided where possible. Where avoidance is not possible, impacts must be minimized by demonstrating improved practices to support the intent of the policy (e.g., implementing Best Management Practices). In addition, in 2015 the Sustainable Forestry Initiative (SFI) revised its forest management standard to include wetlands. Wetlands are now included in Principle 3 (Protection of Water Resources) and Objective 3 (Protection and Maintenance of Water Resources) of the new Standard (SFI 2015). To conform to this Standard, forest companies must develop a program that addresses the management and protection of wetlands to maintain water reach, flow, and quality during all stages of forest management.

Sustainable forest management and sustaining wetland habitats are intertwined and achievable. Weyerhaeuser has been working with Ducks Unlimited Canada (DUC) since 2006 to identify opportunities for maintaining wetlands and waterfowl in their managed forests. Past joint projects include: wetland mapping, waterfowl research including mapping areas of high waterfowl abundance, and the development of Best Management Practices (BMPs) related to road placement and construction in wetlands. In addition, DUC wetland mapping was used to develop caribou conservation strategies in Saskatchewan. In 2016, Weyerhaeuser began working with DUC and a coalition of forest industry partners on projects to conserve wetlands and waterfowl habitat through a Forest Management and

Wetland Stewardship Initiative (FMWSI). The FMWSI is developing guiding principles for strategic planning considerations in wetland environments, BMPs for operational planning and operations when working in or near wetlands, and BMPs to assess and reduce the risk of incidental take of waterfowl as a result of forest operations.

Weyerhaeuser is committed to continue working with DUC on this and other projects through the life of this DFMP. In addition to helping efforts to maintaining wetland habitat and waterfowl populations, this collaborative work assists Weyerhaeuser meet their regulatory and social obligations. For example, by incorporating an assessment of wetlands within the Pembina FMA, and engaging with DUC to identify and implement best management planning and operating practices when working in or near wetlands, Weyerhaeuser will be well positioned to address the intent of the Alberta Wetland Policy (Government of Alberta 2013) and the SFI 2015 – 2019 Forest Management Standard (SFI 2015).

References:

Devito, K, Mendoza, C. and C. Qualizza. 2012. Conceptualizing water movement in the Boreal Plains: Implications for watershed reconstruction. Synthesis report prepared for the Canadian Oil Sands Network for Research and Development, Environmental and Reclamation Research Group. 164 p.

Devito, K.J., Mendoza, C., Petrone, R.M., Kettridge, N., and J.M. Waddington. 2016. Utikuma Region Study Area (URSA) – Part 1: Hydrogeological and ecohydrological studies (HEAD). *The Forestry Chronicle*. 92(1): 57-61.

Government of Alberta. 2013. Alberta Wetland Policy. Alberta Environment and Sustainable Resource Development. Edmonton, Alberta. 26pp.

McEachern, P. 2016. Forest Watershed and Riparian Disturbance Project (FORWARD). *The Forestry Chronicle*. 92(1): 29-31.

Petrone, R., Devito, K.J., and C. Mendoza. 2016. Utikuma Region Study Area (URSA) – Part 2: Aspen harvest and recovery study. *The Forestry Chronicle.* 92(1): 62-65.

Sustainable Forestry Initiative. 2015. SFI 2015 – 2019 Forest Management Standard. Washington, DC. 13pp.

Overview of Wetlands and Waterfowl in the Pembina FMA

Wetlands

Wetlands are prominent features across the boreal forest and provide a variety of ecological goods and services. Understanding where and what kind of wetlands occur across the FMA, and how these wetlands function can assist forest planners and operators in making decisions to help conserve the numerous goods and services wetlands provide, to meet legislated or forest certification requirements, and help reduce road construction and maintenance costs. For example, knowing where the different types of wetlands are located, in combination with having an understanding of typical water flow characteristics, can assist forest planners locate roads to avoid wetlands or implement road construction techniques that mitigate potential impacts on wetlands. For more information about wetlands in the boreal forest please refer to Appendix A.

In 2009, DUC completed wetland mapping of the Weyerhaeuser FPMs of northwestern Alberta (Ducks Unlimited Inc. 2009). According to this inventory, wetlands make up 33.5% (320,456ha) of the Pembina FMA (See Table 1 and Appendix B, Figure B1). All 5 classes of wetlands are represented; however the vast majority of wetlands are fens and swamps. Following the Alberta Wetland Classification System (Alberta Environment and Sustainable Resource Development 2015; see Appendix A for more details) most of the fens and swamps are wooded with conifer trees (see Table 2 and Appendix B, Figure B2).

Fens are peatlands with deep organic deposits with greater than 40cm of decayed sedges and brown moss are typically connected to surrounding areas through ground and surface water flow. They receive or provide water and nutrients to other wetlands and uplands depending on conditions such as the amount of precipitation and soil moisture level. Tamarack and lowland/stunted black spruce are the tree species found in wooded fens.

Swamps are a common, diverse group of tree or tall shrub (thicket) dominated wetlands and are often the least understood wetlands in forested environments. Sometimes called lowlands, forested wetlands, treed swamp forests, wooded swamps, or shrub swamps they are often transition areas between upland forest and other wetland types or shoreline areas. Swamp soils are predominantly mineral based, although deep wood-rich peat deposits (>40cm) can occur in some settings (e.g., conifer swamps) technically making these wetlands a peatland. More information about these and other wetland types can be found in Appendix A.

Table 1. The area (hectares, ha) of the 5 major classes of wetlands, uplands, and other/unclassified landforms in the Pembina FMA.

Major Wetland Class	Area (ha)	Percent of total Area
Open Water	13,320.7	1.4
Marsh	997.4	0.1
Fen	150,430.9	15.7
Bog	1,018.4	0.1
Swamp	154,688.9	16.2
Upland	549,159.1	57.5
Other / Unclassified*	85,606.6	9.0
Total Area	955,222.0	100.0

*Other/Unclassified area includes cutblocks, cloud, cloud shadow, burn, and no data

Table 2. The area (hectares, ha) of the 13 wetland forms according to the Alberta Wetland Classification System, uplands, and other/unclassified landforms in the Pembina FMA

Wetland Form	Area (ha)	Percent of total Area
Bare Shallow Open Water	12859.2	1.3
Submersed / Floating Aquatic Vegetation	461.5	0.0
Graminoid Marsh	997.4	0.1
Graminoid Fen	7593.2	0.8
Shrubby Fen	27588.6	2.9
Wooded, Coniferous Fen	115249.1	12.1
Graminoid Bog	0.0	0.0
Shrubby Bog	0.0	0.0%
Wooded, Coniferous Bog	1018.4	0.1%
Shrubby Swamp	9137.3	1.0%
Wooded, Deciduous Swamp	2870.6	0.3%
Wooded, Mixedwood Swamp	11109.9	1.2%
Wooded, Coniferous Swamp	131571.1	13.8%
Upland	549159.1	57.5%
Other / Unclassified*	85606.6	9.0%
Total Area	955222.0	100%

*Other/Unclassified area includes cutblocks, cloud, cloud shadow, burn, and no data

References:

Alberta Environment and Sustainable Resource Development (ESRD). 2015. Alberta Wetland Classification System. Water Policy Branch, Policy Division, Edmonton.

Ducks Unlimited, Inc. 2009. "Weyerhaeuser Project Enhanced Wetlands Classification User's Guide." 70 pp. Ducks Unlimited, Inc., Rancho Cordova, California. Prepared for: Ducks Unlimited Canada; Weyerhaeuser; Government of Alberta; The PEW Charitable Trusts; Encana; U.S. Forest Service; U.S. Fish and Wildlife Service (NAWCA); and the Canadian Boreal Initiative.

Waterfowl

DUC has identified the Western Boreal Forest (WBF) as a conservation priority because this region contains important nesting, rearing, molting, staging, and migration habitat for waterfowl. Twenty three species and nearly 30% of breeding season waterfowl counted in North America are found in the WBF (Slattery et al. 2011). For more information on boreal waterfowl refer to Appendix C.

To predict waterfowl abundances across the boreal landscape DUC developed statistical models that are presented as maps (DUC 2014). These models were used to map predicted waterfowl abundance for total waterfowl and for each of three nesting guilds based on nest placement (*i.e.*, ground, overwater and cavity nesting). Nesting guilds were chosen because of expected similarities of responses and sensitivities to localized disturbance compared to other guild level groupings. Information about how the waterfowl models were developed can be found in Appendix C.

These maps represent *predictions* of relative waterfowl densities based on breeding pair surveys and a suite of environmental variables used to characterize the landscape. Thus these maps are best considered to represent densities over broad areas rather than at fine spatial scales. While some waterfowl species tend to return to the same areas where breeding was successful, inter-and intra-annual variation in abundance of waterfowl at any given wetland does occur.

The predicted total breeding pair abundance for the Pembina FMA is 11,324 (Appendix D: Figure D1). Of the total predicted breeding pairs on the FMA 54% are ground nesters, 39% cavity nesters, and 7% overwater nesters (Table 3; Appendix D: Figure D2).

Table 3. Predicted pair abundances of total waterfowl, ground nesters, cavity nesters, and overwater nesters on the Weyerhaeuser Pembina FMA.

Cavity Nesters	**Cavity Nester%**	**Ground Nesters**	**Ground Nester%**	**Overwater Nesters**	**Overwater Nester%**	**All Guilds**
4,410	39%	6,095	54%	819	7%	11,324

The majority of the Pembina FMA (94%) is predicted to have very low to low pair densities representing 64% of total breeding ducks and 5% of the area is predicted to have medium densities representing 21% of the breeding ducks. The remaining area (1%) is predicted to have high pair densities representing 15% of the total breeding ducks. (Appendix D: Figure D1). Patterns for the three nesting guilds are similar to those seen for total waterfowl; however, cavity nesters appear to be driving the trends in medium and high density classes as both ground and overwater nesters are almost exclusively found in low and very low density areas (Appendix D: Figure D2 and Table D1). Information about cut-offs for density classes can be found in Appendix C: Waterfowl mapping methods and interpretation.

Waterfowl distribution maps have many potential applications to guide conservation planning efforts that seek to conserve areas important for waterbirds and aquatic biodiversity. For example, waterfowl are protected in Canada under the federal Migratory Birds Convention Act (MBCA) and associated Migratory Birds Regulations. Since timber harvesting and associated operations can potentially impact birds protected under the MBCA and other legislation (*e.g.,* federal Species at Risk Act), understanding the density and distribution of waterfowl can help industry reduce risks associated with these acts.

Waterfowl density distribution maps can also be used to identify areas that are the most likely to support large numbers of breeding waterfowl, and can assist with both strategic and operational planning efforts designed to minimize risk of impact to waterfowl and potentially other wetland associated birds (Paszkowski and Tonn 2006).

References:

Ducks Unlimited Canada. 2014. Distribution and abundance of waterfowl in the western boreal forest. Ducks Unlimited Canada, Edmonton, Alberta.

Paszkowski, C.A., and M.T. Tonn. 2006. Foraging guilds of aquatic birds on preductive boreal lakes: environmental relations and concordance patterns. *Hydrobiologia* 567: 19-30.

<u>Wetland Biodiversity Values</u>

Boreal wetlands developed under unique ecological conditions that have resulted in a diverse suite of plant and animal biodiversity. Work undertaken by DUC in 2016 documented as high as 188 bird, 46 mammals, five amphibians and one reptile species in Alberta are associated with wetland ecosystems during all or part of their lifecycle (DUC 2016). Wetlands can provide important wildlife habitat for species at risk, uncommon species, wetland endemic species, and economic or culturally important species. Examples include the rusty blackbird, yellow rail, boreal woodland caribou, moose, waterfowl and various furbearing species.

Although some boreal wetlands may contain lower biodiversity values than other areas (e.g. bogs tend to have low biodiversity), low biodiversity does not necessarily reflect the overall importance of an area. In some instances, areas of low biodiversity may contain habitat of high importance to unique or rare species such as caribou, and therefore can have a high conservation value.

Ensuring healthy wetlands are maintained across the Pembina FMA is an important contribution to biodiversity conservation. By maintaining healthy wetlands helps maintain species richness and supports the protection of keystone species, threatened species, and other species of significance.

Future Work with DUC

<u>Forest Management and Wetland Stewardship Initiative (FMWSI)</u>

The FMWSI is a three year collaborative between DUC and a coalition of forest industry partners, including Weyerhaeuser, and the Forest Products Association of Canada initiated in 2016. Three projects will be completed over these three years that will help to establish wetland stewardship guiding principles and develop wetland and waterfowl BMPs. Each project is designed to ensure direct engagement with forest industry partners to ensure that project outcomes are practical and achievable. The intent of this initiative is to provide information that will be integrated into on-going sustainable forest management planning and operations, and that will support ongoing forest certification programs and efforts to meet the intent of the Alberta Wetland Policy.
Projects currently underway include:

1. Guiding Principles to Conserve Wetlands for Forest Management – Strategic Planning Considerations

This project will present a range of strategic planning considerations for working in and around wetland environments and will include wetland stewardship principles, objectives and considerations to accommodate wetland conservation actions. The goal of this project is to produce a document that will support strategic wetland conservation objectives within the context of forest management planning that will lead to reducing potential impacts on wetland hydrology and ecology.

2. A Guide to Best Management Practices to Reduce the Incidental Take of Waterfowl during Forest Management Activities

This BMP guide will establish a risk assessment tool, outline mitigation strategies and provide guidance on how to reduce the risk of incidental take of migratory birds. The guide specifically targets boreal forest waterfowl with the forest industry as the intended user. The results will promote the proper management, conservation, and protection of migratory birds nesting in the boreal forest and assist industry in meeting their regulatory and voluntary (e.g., forest certification) requirements. This BMP is ideally suited to build on and augment the work currently being undertaken in Alberta on reducing the incidental take of migratory birds that is focused largely on upland forest bird species.

3. Guide to Wetland Best Management Practices for Operational Planning and Operations

This BMP guide will present a range of current operational planning and on-the-ground BMPs designed to reduce the potential impact on wetlands when working in or near wetlands. The final products will be a report outlining recommended practices for operational planning and one or more plain language field oriented handbooks for forest operations staff. These products will link back to the "Guiding Principles" document and provide descriptions regarding implementation of recommended practices.

As the FMWSI projects are completed, Weyerhaeuser is committed to working with DUC to determine how the results of this work can be integrated into their ongoing forest management planning and operations.

<u>Operating Ground Rules</u>

Following the approval of the DFMP, Weyerhaeuser will engage DUC to assist in reviewing and strengthening the existing Operating Ground Rules related to wetland and waterfowl conservation.

Further, as information and practices that enhance wetland stewardship in the boreal forest become available, Weyerhaeuser will work with DUC to develop relevant BMPs to enhance the conservation of wetlands on the FMA. This can include practices that can assist in avoiding/minimizing impacts to wetlands and soils/water resources. These practices can be used to strengthen Weyerhaeuser's environmental performance and to assist Weyerhaeuser in meeting Alberta Wetland Policy and/or Forest Certification requirements.

<u>Wetlands Training</u>

Fundamental to wetland stewardship is to ensure that all planning and operations staff have a comprehensive understanding of boreal wetland types, values, and functions. Wetlands training is an important tool for developing this capacity. Training is also an important complement to DUC's wetland mapping products such as the Enhanced Wetland Classification and hydrologic risk mapping (discussed in the following section). Training helps to ensure that wetland classification and knowledge reaches both the strategic planning and the operational level where on-site decisions are made. Collectively, a wetland inventory and a complementary training program will contribute to a wetland stewardship program, help meet components of SFI forest certification requirements, and help address the intent of the Alberta Wetland Policy.

Weyerhaeuser will work with DUC to determine the best approach to develop a wetland training program that will meet its needs.

<u>Hydrologic Risk Mapping</u>

The wetland mapping completed for the Pembina FMA utilizes DUC's ecologically based Enhanced Wetland Classification (EWC). The EWC can be used to create inferred products such as a hydrologic risk map that classifies the risk of wetlands to hydrologic impairment (refer to Appendix A Table A2). To develop a risk map, wetlands are grouped based on a generalized understanding of how boreal wetlands move water. The classification takes into account vertical vs. lateral movement and stagnant vs. dynamic flow. While this classification can be useful for planning, it is important to recognize other variables may also influence boreal wetland hydrology.

Risk mapping, in combination with an understanding of wetland flow characteristics, can be helpful when planning road networks and associated wetland road crossing construction techniques (refer to Appendix B Figures B3 & B4).

Weyerhaeuser will work with DUC to determine how this mapping product can be used as a tool in combination with other information to reduce the risk of potential impact on hydrologic connectivity.

Preliminary Below-Ground Wetland Carbon Store Estimates

Carbon accounting is becoming important to the forest industry and companies are increasingly interested in understanding how much carbon is stored in the areas they manage. While estimates are often available for managed uplands, carbon estimates for boreal wetlands are lacking or incomplete. Carbon storage is an important ecosystem service provided by wetlands and implementing practices that avoid or minimize impacts on wetlands will help prevent or reduce greenhouse gas emissions associated with disturbance.

In the boreal forest, wetlands store more carbon than uplands. Peatlands (bogs and fens) make up over half of Alberta's wetlands (56%) and are particularly important carbon stores because of their deep peat. A conservative estimate of 11.5-13 billion metric tons of below ground carbon is stored in Alberta's boreal wetlands.

However, good quality estimates of wetland carbon stocks are limited, in part, by availability and access to data (e.g., peat depth, carbon content) required to improve carbon storage models and calculations for wetlands. To help address this information gap, DUC is developing a product that uses available information on peat depth to derive estimated carbon stocks for various wetland classes based on the EWC. These values can then be applied where EWC coverage exists (including the Pembina FMA) to generate broad scale estimates of carbon stocks which can then be mapped. These derived maps that can display the spatial distribution of wetland carbon stores and used to inform land use decisions.

Sustainable forest management practices that conserve wetland carbon storage capacity are an important component of wetland stewardship and will help to avoid or reduce emissions associated with disturbance, maintain wetland value and function, and help to mitigate climate change. As well, these actions will help Weyerhaeuser meet SFI certification requirements and the intent of the Alberta wetland policy.

Weyerhaeuser will work with DUC to determine how this product can be used to assist in determining below-ground wetland carbon store estimates for the Pembina FMA.

Special Management

Approximately 33% of the Pembina FMA is wetland, with the majority being wooded fens and conifer swamps. Bogs, shallow open water, and marshes are relatively rare on the landscape representing approximately 2% of the wetlands on the FMA. Given these wetland types are rare, special management considerations may be required and Weyerhaeuser will work with DUC to jointly develop conservation strategies and practices to help maintain their integrity.

Wetland Biodiversity Tool

Understanding wetland biodiversity can be enhanced with the use of the tool developed by DUC to rank potential vertebrate biodiversity values in boreal wetlands in Alberta using DUC's EWC System. This assessment tool is designed to help identify wetlands of importance for a range of vertebrate species occupying wetlands including those within the Pembina FMA. Such information can help support special management considerations that can be aligned with various government-led policy and planning initiatives such as the Regional Land Use Planning process (including the respective regional biodiversity management framework forming part of the regional land use planning process). In addition, such information can support Weyerhaeuser planning and certification needs relative to identifying wetland ecosystems of high biodiversity potential and associated management strategies to maintain these ecosystems for a variety of species of interest (e.g., species of concern, songbirds affiliated to different wetland types, etc.).

Weyerhaeuser will work with DUC to determine how this tool can be used to assist in determining wetland biodiversity values for the Pembina FMA and how this information can be used to develop potential forest management strategies and practices to conserver these values.

Wetland Stewardship Plan

Wetland stewardship, within the context of this DFMP, is a demonstrated commitment by Weyerhaeuser to implement responsible planning and management of the FMA through the appropriate implementation of sustainable land use practices that conserve wetlands and waterfowl habitat. As the role of boreal wetlands become increasingly recognized, in combination with the implementation of the Alberta Wetland Policy and various land-use planning processes, establishing a commitment to wetland stewardship demonstrates a recognition by Weyerhaeuser of the importance of wetlands as being integral to ecosystem based forest management.

The work undertaken between DUC and Weyerhaeuser since 2006 speaks volumes to the joint interest and commitment to enhanced wetland stewardship and waterfowl conservation on the land base that Weyerhaeuser has management responsibilities. Further, this body of work provides the opportunity to pull this material together in a single document that summarizes how this work will be used by Weyerhaeuser to integrate wetland and waterfowl conservation into their ongoing forest management activities in the Pembina FMA. The preparation of Wetland Stewardship Plan will in turn support future Forest Management and Operational Plans, one-the ground activities and contribute to support SFI certification requirements relative to the conservation of wetlands and biodiversity.

Over the next 18 months Weyerhaeuser will work with DUC to develop a Wetland Stewardship Plan. Details of this plan will need to be developed and could include the drafting of wetland and waterfowl VOITS, the incorporation of DUC conservation tools such as the DUC wetland inventory and waterfowl distribution maps into Weyerhaeuser planning, wetlands training for planners and operators, and implementation of best management practices as described above.

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Appendix A – General Wetland Information

Wetland benefits

At the local and regional scales, wetlands influence rainfall and temperature patterns. At the global scale, Canada's wetlands, especially peatlands, play a key role in the regulating greenhouse gases such as methane and carbon dioxide and buffering the impacts of climate change (Gingras *et al.* 2016). Wetlands store water and slowly release it when conditions warrant. Wetlands therefore help maintain water flow through droughts and floods, can regulate flow during storm-water peaks and thereby reduce the risk of erosion. Because wetlands can slow water movement, they can filter suspended sediments that settle to the wetland floor. Excess nutrients and/or pollutants are often either buried within these sediment or are absorbed by plant roots and microorganisms (Gingras *et al.* 2016).

Wetlands also provide fresh surface water and replenish ground water supplies for industrial (e.g. petroleum extraction) use and to a lesser extent for domestic and agricultural use (Gingras et al. 2016). In addition, some wetland plants and animals offer provisioning benefits such as food (e.g., fish, wild rice, waterfowl, berries, fiddlehead ferns, moose, woodland caribou, and mushrooms) and/ or are sources for timber, fuel, and fur for domestic and commercial use. Wetlands also provide opportunities for recreational activities including canoeing, hunting, hiking, fishing, trapping, and bird watching (Gingras *et al.* 2016).

Wetlands are rich in biodiversity and provide important habitat for hundreds of species of plants and animals, some of which are of conservation concern in Alberta (e.g., woodland caribou). For example, an estimated ~26 million waterfowl representing 35 species and ~7 million shorebirds representing 19 species use Canadian boreal forest wetlands as migratory stop over or breeding habitat (Blancher and Wells 2005).

Recent studies indicate that wetlands influence forest productivity and resiliency. Johnston *et al.* (2010) report that the thick wet soils of peatlands are more resilient to spatial or temporal changes in climate than other forest habitat types. Waddington *et al.* (2015) suggest that there are feedback mechanisms inherent to wetlands that promote water retention and stability. These wetlands can act as stable water sources to adjacent forest. For example, through a combination of field studies and modelling, Devito *et al.* (2012), found that boreal plain uplands and wetlands are hydrologically connected and that water is redistributed through ground water, surface runoff, and root processes. Petrone *et al.* (2016) indicate that following forest harvest in the boreal plains, measures of soil hydraulic lift show that regenerating aspen may use adjacent wetlands as water sources. In addition, Petrone *et al.* (2016) observed "root pipelines", that is, suckering from aspen forest through riparian zones to wetlands.

Wetlands also influence fire patterns and recovery and could buffer the impact of climate change on boreal plan forest lands. Johnston *et al.* (2010) and Schiks *et al. (*2016) indicate that in many undisturbed peatlands, thick wet soils and moss limit wildfire frequency and inhibit deep burning under most fire-weather conditions. Following a fire, regenerating aspen may use adjacent wetlands as water sources. Schneider *et al.* (2016) suggest that if precipitation is maintained as expected in the boreal plains, most peatlands should be very resilient to climate change. They indicate that "because peatlands retain large amounts of water on the landscape and because they are resistant to change, peatlands may play an important role in slowing the rate of forest loss".

Wetland types

Wetlands are defined in Alberta as “land that is saturated with water long enough to promote formation of water altered soils, growth of water tolerant vegetation, and various kinds of biological activity that are adapted to wet environments” (Alberta Environment and Sustainable Resource Development, AESRD 2015). Under this definition, wetlands can have areas of open water or be temporarily dry, they can vary in size and can be treed, shrubby, or open with mosses, sedges or grasses.

Both the Canadian Wetland Classification System (CWSC, National Wetlands Working Group 1997) and the Alberta Wetland Classification System (AWCS, AERSD 2015) note that wetlands can be organic (bogs and fens) or mineral (marshes, shallow open waters, and swamps) based.

Organic wetlands - have a surface layer of living roots and plants and a deep layer of decomposing organic deposits (>40cm) that are slowly accumulating over time due to cool and wet conditions. Organic wetlands are also referred to as peatlands, are commonly called muskeg and are the most prevalent wetlands in Canada’s temperate and boreal forests. Bogs and fens are the two types of organic wetlands found in the boreal.

Bogs - are peatlands with a deep layer of peat made up primarily of decomposed Sphagnum mosses. They are raised or level with the surrounding land and are generally isolated from groundwater and runoff thus, they receive water and most nutrients from precipitation (most bogs are nutrient poor) and considered stagnant systems. There is no open water at the surface of the bog, but the peat below is saturated with water. Bogs, particularly during dry periods, may be important sources of water for adjacent forests. Bogs can be treed (e.g., lowland/stunted black spruce), can have low-lying shrubs, (e.g., Labrador tea) or can be open areas dominated by *Sphagnum* moss.

Fens - are peatlands with deep organic deposits of decayed sedges and brown moss. Unlike bogs, fens are highly connected to surrounding areas through ground and surface water flow making them more nutrient rich than bogs generally making them more productive and biologically diverse than bogs. They receive or provide water and nutrients to other wetlands and uplands depending on conditions such as the amount of precipitation and soil moisture level. Thus, the water table in fens may fluctuate but is generally within a few centimeters above or below the surface of the fen. Fens can be treed with tamarack with a component of lowland/stunted black spruce can have shrubs, (e.g., bog birch or willow) or can be open areas dominated by narrow leaved sedges, buckbean, grasses, and moss

Mineral wetlands – have shallow organic deposits (<40cm) and are characterized by nutrient-rich soils and water. The presence of shallow organic deposits is a result of periodic drying of the wetland allowing for decomposition of the organic layer. They are a diverse group of wetlands with dynamic water regimes. Swamps, marshes, and shallow open water are the three types of mineral wetlands found in Alberta.

Swamps - are a common, diverse group of tree or tall shrub (thicket) dominated wetlands occurring in a variety of landscapes and often the least understood wetlands in forested environments. Sometimes called lowlands, forested wetlands, treed swamp forests, wooded swamps, or shrub swamps are often transition areas between upland forest and other wetland types or shoreline areas. They typically have hummocky ground that may contain pools of water. Swamp soils are predominantly mineral based, although deep wood-rich peat deposits (>40cm) can occur in some settings (e.g., conifer swamps) technically making these wetlands a peatland. They have fluctuating water tables; some of the year the water table can be well below the surface creating an aeration zone in the soil that promotes tree and shrub root development. Swamps support a diversity of trees (typically > than 10 meter in height), shrubs (typically >2 meter in height), and other vegetation.

Marshes – sometimes called reed swamps or sedge meadows, often exist as the transition between open water and upland shorelines. Marshes are highly productive due to a dynamic water regime resulting in periodic drawdown periods that expose the soil resulting significant aeration, the subsequent release of nutrients and the re-establishment of emergent vegetation. Aquatic non-woody emergent vegetation dominates and includes sedges, rushes, reeds, grasses, and cattails. Floating (e.g. pond lily) and submerged (e.g. pondweed) aquatic vegetation is also present where open water exists. Marshes are the least common wetland in forested regions.

Shallow Open Water – have standing water that is generally <2m deep. These wetlands often called, ponds, pools, oxbows, deep marshes, or sloughs are usually flooded but may experience water table fluctuations dependent on yearly and seasonal climatic conditions. Vegetation, if present, is dominated by floating or submerged aquatic plants.

These 5 major types of wetlands can be further classified in various ways. For example DUC has developed an ecologically - based enhanced wetland classification (EWC) system for the Boreal plains ecozone further categorizing the 5 major classes of wetlands into 19 minor classes. The AWCS breaks the 5 major classes into 13 forms (see Table A1).

Table A1. Classification of wetlands according to the AWCS and the EWC.

CWCS/AWCS/ESC Major Class [1, 2, 3]	AWCS Form [2]	EWC Minor Class [3]
National (n = 5)	**Provincial (n = 13)**	**Ecozone (n = 19)**
Shallow Open Water	Submersed and/or Floating Aquatic Vegetation	Aquatic Bed
	Bare Shallow Open Water	Open Water
		Mudflats
Marsh	Graminoid Marsh	Emergent Marsh
		Meadow Marsh
Swamp	Coniferous Wooded Swamp	Tamarack Swamp
		Conifer Swamp
	Wooded, Deciduous Swamp	Hardwood Swamp
	Wooded, Mixedwood Swamp	Mixedwood Swamp
	Shrubby Swamp	Shrub Swamp
Fen	Wooded, Coniferous Fen	Treed Rich Fen
		Treed Poor Fen
	Shrubby Fen	Shrubby Rich Fen
		Shrubby Poor Fen
	Graminoid Fen	Graminoid Rich Fen
		Graminoid Poor Fen
Bog	Wooded, Coniferous Bog	Treed Bog
	Shrubby Bog	Shrubby Bog
	Graminoid Bog	Open Bog

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Table A2. Enhanced Wetland Classification class cross-walk to inferred hydrodynamic classes.

Hydrodynamic Class	Enhanced Wetland Classification Classes
Very Dynamic	Emergent Marsh, Mudflats, Meadow Marsh
Dynamic	Mixedwood Swamp, Hardwood Swamp, Shrub Swamp, Open Water, Aquatic Bed
Moving	Shrubby Rich Fen, Graminoid Rich Fen, Treed Rich Fen
Slow Moving	Treed Poor Fen, Shrubby Poor Fen, Tamarack Swamp, Graminoid Poor Fen
Stagnant	Open Bog, Shrubby Bog, Treed Bog, Conifer Swamp

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Appendix B – Wetland Mapping on Weyerhaeuser's Pembina FMA

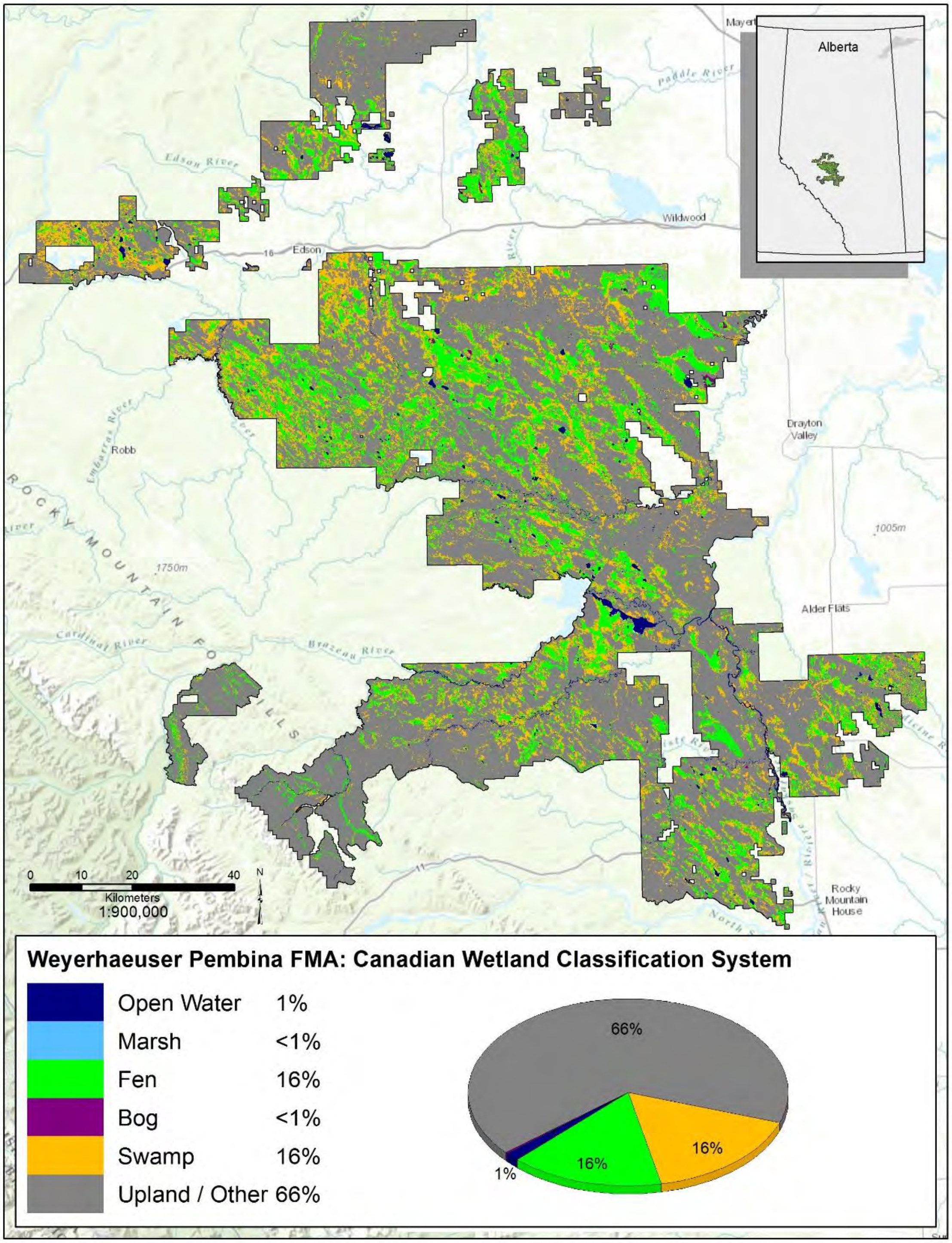

Figure B1. Distribution of the 5 major wetland types within Weyerhaeuser's Pembina FMA based on DUC's wetland inventory.

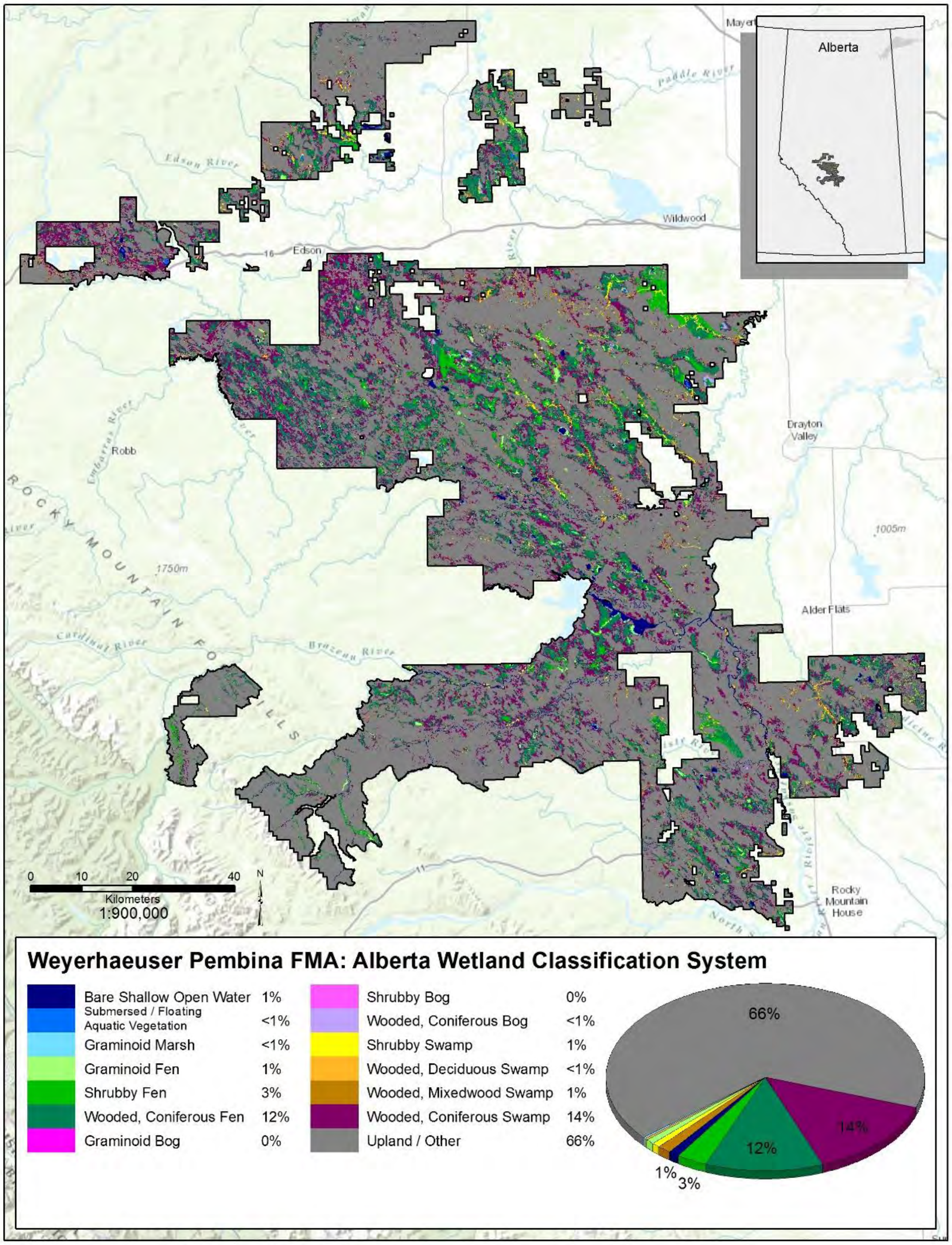

Figure B2. Distribution of the 13 wetland forms according to the Alberta Wetland Classification System within Weyerhaeuser's Pembina FMA based on DUC's wetland inventory.

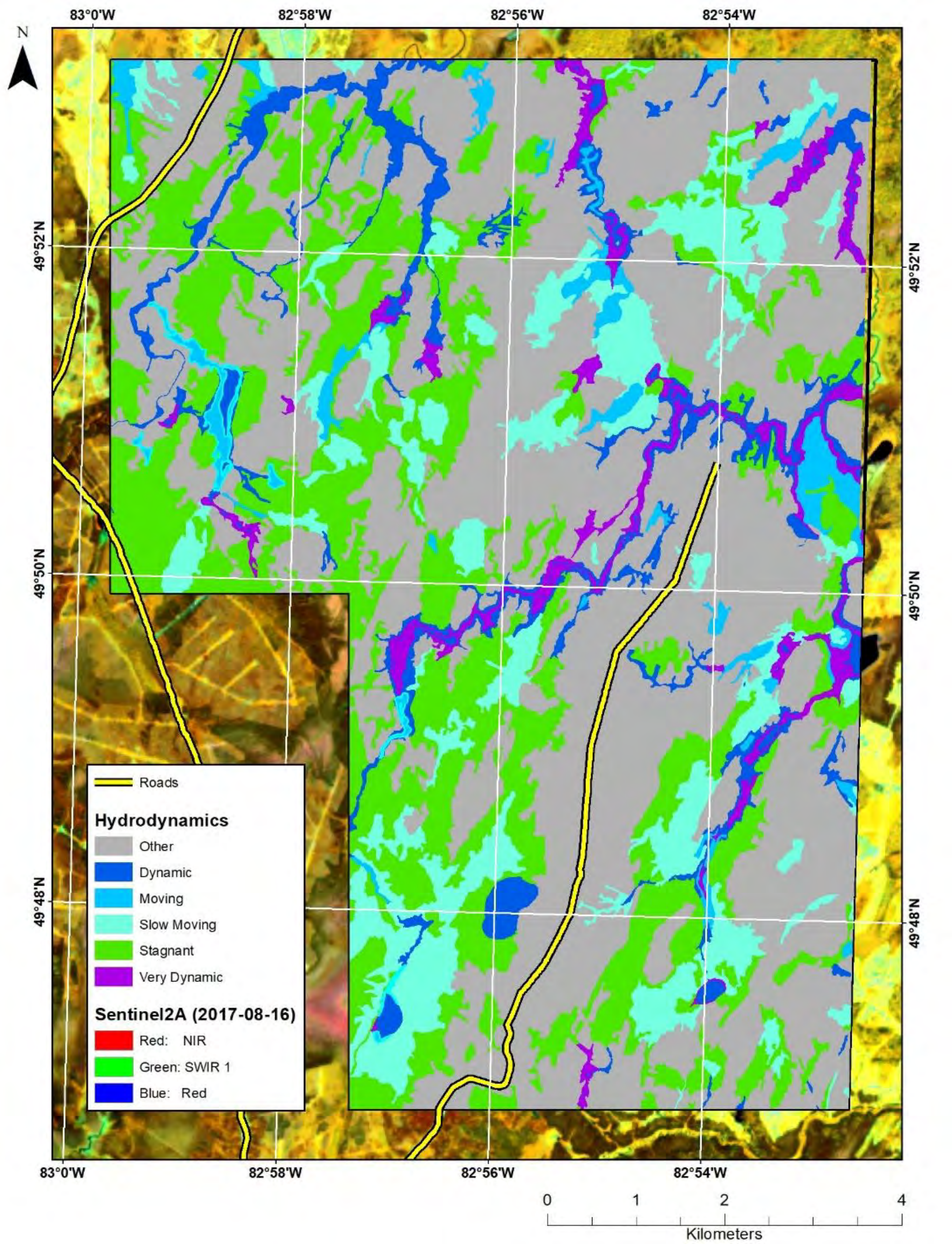

Figure B3. Example of the EWC Hydrodynamic Product

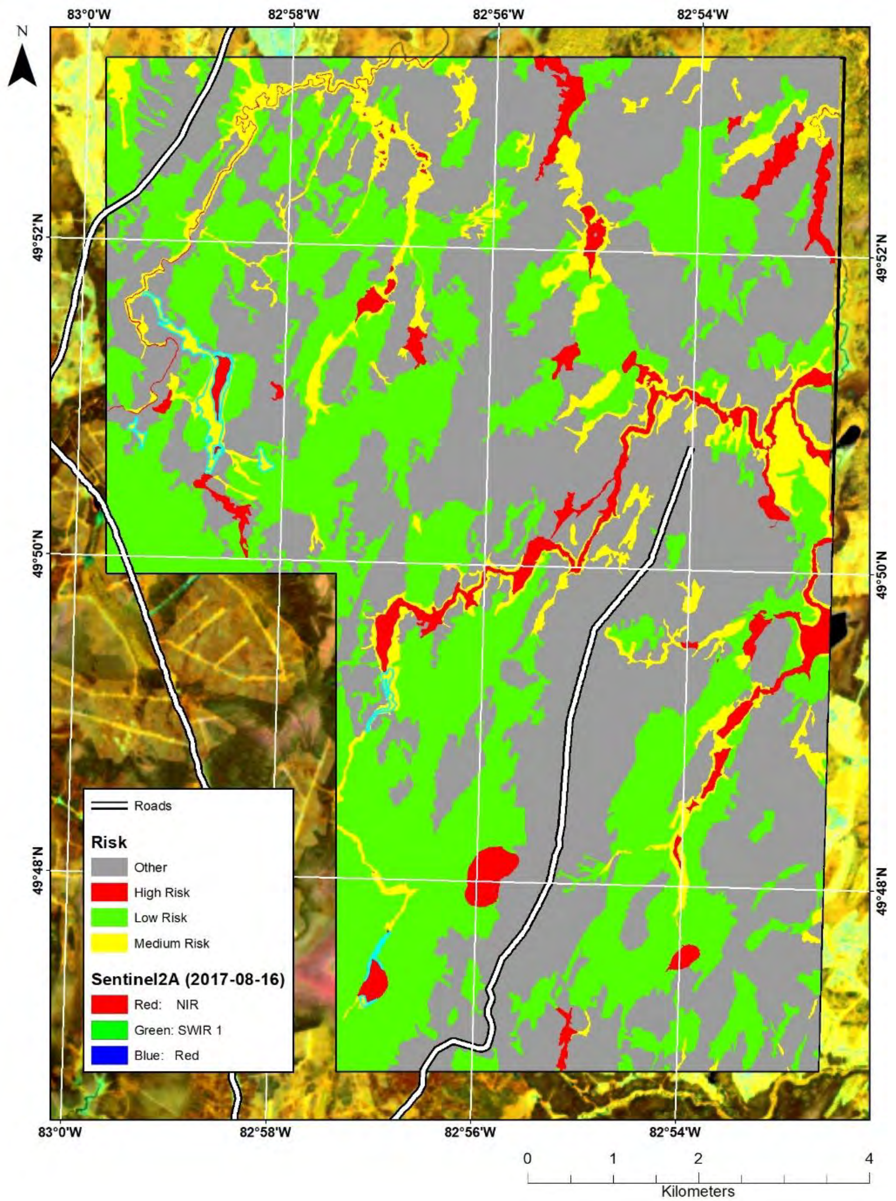

Figure B4. Example of Risk Assessment Map for road building

Appendix C – Waterfowl information and waterfowl modelling methods

Waterfowl of the Boreal

DUC has identified the Western Boreal Forest (WBF) as a conservation priority because this region contains important nesting, rearing, molting, staging, and migration habitat for waterfowl. Twenty three species and nearly 30% of breeding season waterfowl counted in North America are found in the WBF (Slattery et al. 2011). A large percentage of the continent's waterfowl use this region during molting and migration periods, including between 25% and 40% of the world's Tundra and Trumpeter Swans (Ducks Unlimited Canada 2006). While many species of waterfowl in the WBF are considered to have stable or increasing populations, the boreal forest contains the primary breeding grounds for some species whose continental populations are well below population goals including Scaup *spp.*, Scoter *spp.*, American Wigeon, Northern Pintail, Mallard, and Blue-winged Teal (Ducks Unlimited Canada 2006; Fast et al. 2011; Slattery et al. 2011). Currently no western boreal duck is federally listed, however, at the provincial level the white-winged Scoter is listed as a species of special concern in Alberta (Alberta Environment and Sustainable Resource Development 2014). The suitability of the boreal for waterfowl is due, at least in part, to an abundance of wetlands and stable water levels through time (*i.e.,* high proportion of permanent wetlands) relative to other North American regions, such as the prairies and parklands (Slattery et al. 2011).

Waterfowl are considered obligate aquatic species. In other words, all waterfowl breed and feed in and near water and depend on a range of open water areas as essential components of their lifecycle. Water bodies and open water wetlands can provide food sources, refuge from terrestrial predators, molting and staging habitat, and nest sites for some species. Thus, any waterbody or wetland that contains an adequate food supply and areas nearby for nesting is potential waterfowl habitat. In addition, areas containing high wetland density or wetland complexes – areas of connected wetland systems – are generally considered to be of the highest importance to waterfowl.

However, waterfowl also rely on a broad range of vegetation communities such as riparian areas (zones of transition between wetland and upland areas), vegetated wetlands including treed and shrubby wetlands, and upland forests for nesting and security - often located a considerable distance from open water (Slattery et al. 2010). For example, nests for cavity nesting ducks are commonly found up to 500 m away from a water body; and geese spend considerable amounts of time in terrestrial habitats where they graze on grass (Batt et al. 1989). In addition, because wetland ecosystems are embedded within watersheds, changes to upland vegetation, such as through forest fire or harvest, may affect the volume and timing of water flow and potentially nutrient loading into aquatic areas (Steedman et al. 2001; Devito et al. 2005). Boreal forest systems are very dynamic in space and time and waterfowl numbers may increase or decrease in number depending on the nature of these changes.

Waterfowl modelling methods and interpretation

To predict waterfowl abundances across the boreal landscape DUC (2014) developed statistical models (referred to as NFWF models) that are presented as maps. These models are mathematical relationships between the number of waterfowl counted during annual surveys and a suite of environmental variables thought to play a role in determining habitat quality. Waterfowl count data were obtained from surveys conducted over nine years (2001-2009) in seven study sites across the Boreal Plains Ecozone, using helicopters and standardized collection protocols. DUC's final maps display interpolated results of statistical models for particular project areas, such as Weyerhaeuser's Pembina project area and FMA.

The NFWF models were used to map predicted waterfowl abundance for total waterfowl and for each of three nesting guilds based on nest placement (*i.e.*, ground, overwater and cavity nesting). Nesting guilds were chosen because of expected similarities of responses and sensitivities to localized disturbance compared to other guild level groupings.

Table C1. Density classes by nesting guild (# of indicated breeding pairs (IBP) per 2.5km x 2.5km survey grid cell)

	Very Low	Low	Medium	High
Ground	<10	10 - 21.9	22 - 46.9	> 47
Overwater	<2	2 - 3.9	4 - 7.9	> 8
Cavity	<4	4 - 7.9	8 - 15.9	> 16

For each nesting guild, density classes were established based on 25%, 50%, and 75% of total breeding pairs counted across all western boreal project areas. Also, for each guild, survey grid cells (2.5km x 2.5km) with the highest predicted abundances of waterfowl were labelled ‘high density’ until 25% of the predicted pairs were accounted for, the same was repeated for ‘medium’ (50%), ‘low’ (75%), and ‘very low’ (100%) until all predicted pairs were accounted for. These classes were used to develop density distribution maps for each nesting guild. To represent the distribution of total ducks on the landscape, a map was created by combining density distributions for all three guilds, plus a fifth density class, ‘high density all guilds’ to identify areas predicted to have high densities for all three nesting guilds combined. Thus, for the total waterfowl map there are two types of high density areas; those where any one of the three guilds was predicted to occur in high densities and those where all guilds at once were predicted to occur in high densities.

These maps represent *predictions* of waterfowl relative densities based on breeding pair surveys, and a suite of environmental variables used to characterize the landscape. Thus, maps are best considered over broad areas rather than at fine spatial scales. While some waterfowl species tend to return to the same areas if they bred successfully, inter-and intra-annual variation in abundance of waterfowl at any given wetland can be substantial.

Appendix D – Waterfowl distribution on Weyerhaeuser's Pembina FMA

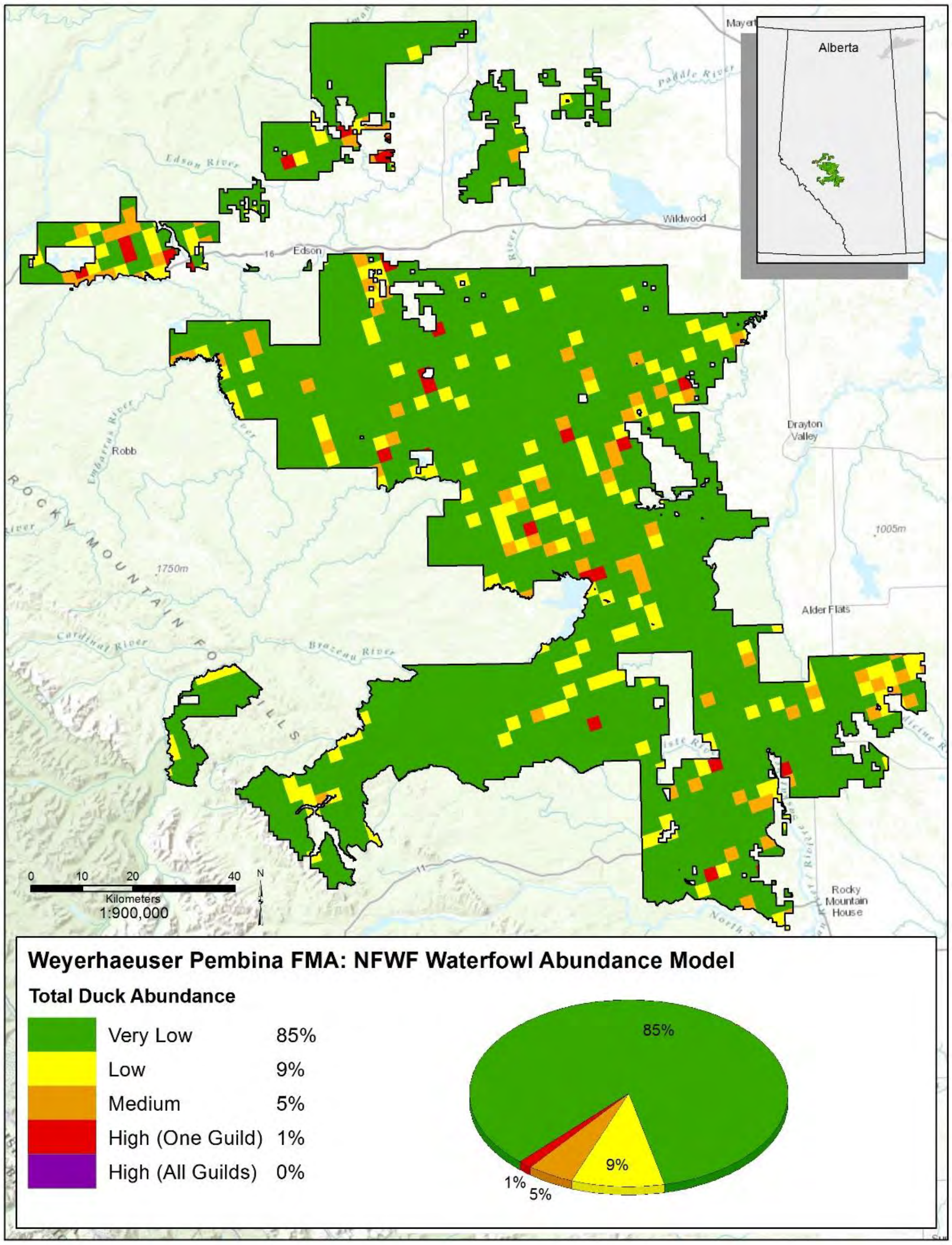

Figure D1. Predicted total waterfowl (all guilds) abundances on the Weyerhaeuser Pembina FMA. Red represents areas of relatively high abundance (relative to other areas in the FMA) and green areas of relatively low abundance.

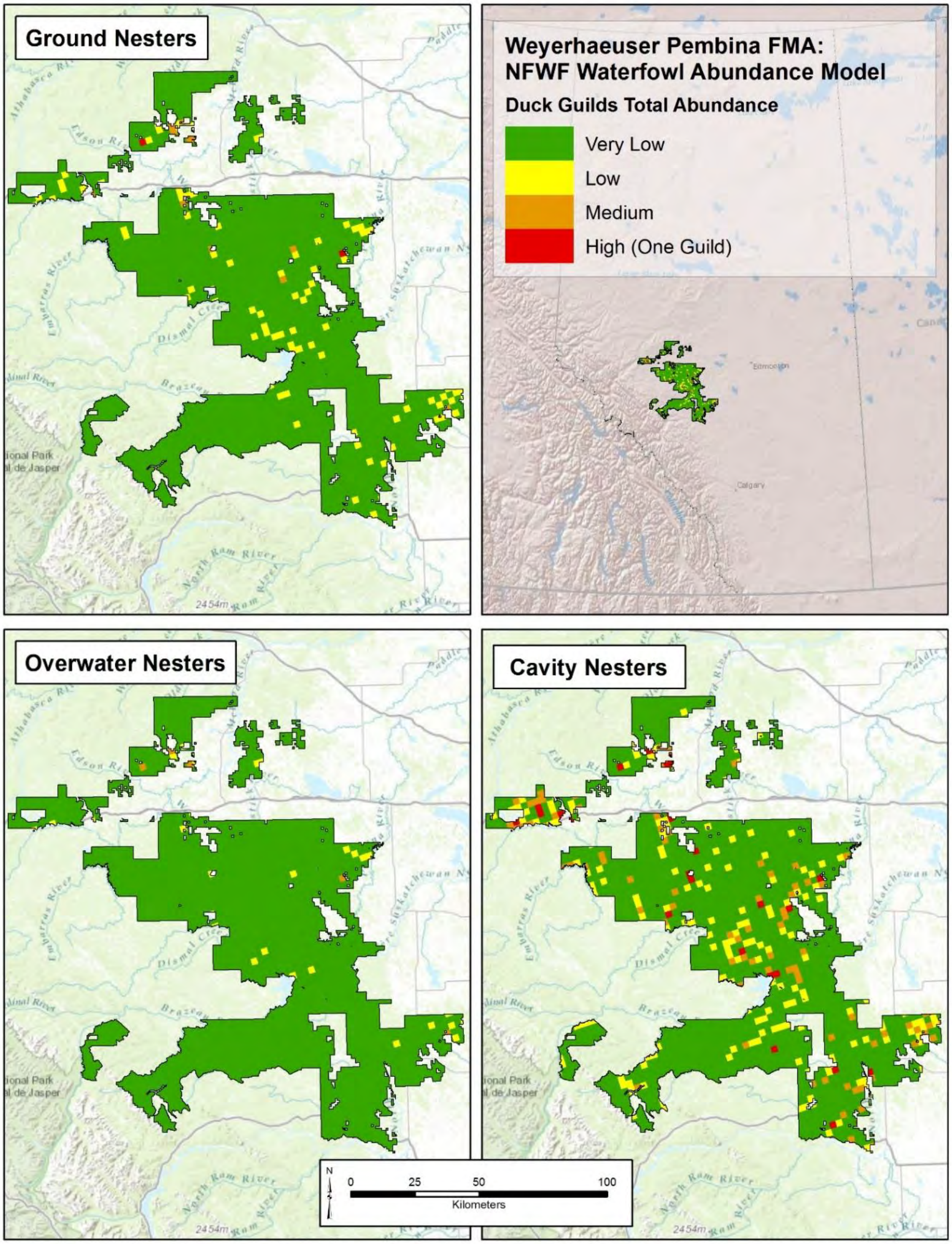

Figure D2. Predicted waterfowl abundances by nesting guild on the Weyerhaeuser Pembina FMA. Red represents areas of relatively high abundance (relative to other areas in the FMA) and green areas of relatively low abundance. From top to bottom: Cavity nesters, ground nesters, and overwater nesters.

Table D1. Predicted breeding pairs (# and %) and % area of density classes for all waterfowl, ground nesters, overwater nesters, and cavity nesters in the Weyerhaeuser Pembina FMA, and the Weyerhaeuser GP overall project area and FMA. Total project area is 9,556KM^2.

	Weyerhaeuser FMA		
	Predicted Pairs	**% Predicted Pairs**	**% Area**
All Ducks			
High (all guilds)	0	0	0
High (any guild)	1,668	15	1
Medium	2,388	21	5
Low	2,639	23	10
Very Low	4,629	41	84
Total	***11,324***	***100***	***100***
Ground			
High	106	2	0
Medium	402	7	0
Low	1,487	24	5
Very Low	4,100	67	95
Total	***6,095***	***100***	***100***
Overwater			
High	0	0	0
Medium	24	3	0
Low	90	11	1
Very Low	705	86	99
Total	***819***	***100***	***100***
Cavity			
High	839	19	1
Medium	1,056	24	5
Low	1,062	24	9
Very Low	1,453	33	85
Total	***4,410***	***100***	***100***

Appendix 7-4 – Issue Document LB_013: Seral Stage and Ecological Unit Definitions

This issue document describes the determination of seral stages and ecological units that will be reported in the FMP Preferred Forest Management Strategy. This document was given Agreement-in-Principle by the PDT on March 19, 2015.

Issue Number: LB-013

Seral Stage and Ecological Unit Definitions

Type: □ Requires Resolution √ Discussion Item

1 Discussion

The VOITS table to be used for the new 2016-2026 Pembina Forest Management Plan (FMP) has a number of VOITs (Values, Objectives, Indicators and Targets) that are directly related to both Seral Stage and Ecological Unit outputs of the preferred forest management scenario (PFMS) as reflected in the Spatial Harvest Sequence (SHS).

2 Current (2005DV/2006ED) Pembina FMP Descriptions

Seral Stages: Seral stages were described in the 2005 and 2006 Pembina Forest Management Plans as follows:

- For conifer dominated C and CD stands
    - Early - defined as stands between establishment and 10 years old representing the period from disturbance to initial crown closure
    - Immature - defined as stands between 11 and 40 years old; in other words when the stands first start to reach merchantability
    - Mature – defined as stands between 41 and 90 years old
    - Late – defined as stands between 91 and 120 years old
    - Very late - defined as stands between 121 and 170 years old
    - Overmature - defined as stands greater than 170 years old
- For deciduous dominated D and DC stands
    - Early - defined as stands between establishment and 10 years old representing the period from disturbance to initial crown closure
    - Immature - defined as stands between 11 and 40 years old; in other words when the stands first start to reach merchantability
    - Mature – defined as stands between 41 and 70 years old
    - Late – defined as stands between 71 and 110 years old
    - Very late - defined as stands between 111 and 170 years old
    - Overmature - defined as stands greater than 170 years old

Ecological Units: Ecological units were described in the 2005 and 2006 Pembina Forest Management Plans as follows:

- For the DFMP - By Broad Cover Group – DX, DC, CD and CX; where DX = pure deciduous, DC – deciduous dominated mixedwood, CD = conifer dominated mixedwoods, and CX = pure conifer
- For VOITs table – By Leading Species Group – DX, MX,PL,SW,PS,CX; where DX = pure deciduous(at least 80% deciduous), MX = mixedwood, PL = pure pine (at least 80% pine), SW = pure white spruce (at least 80% white spruce, PS = first two species are either pine/spruce or spruce/pine where neither exceeds 70% , and CX = remaining pure conifer stands where pine and white spruce are not first two leading species

3 2016 FMP Options

1) The first option is would be to continue with the current plan for both seral stage and ecological unit definitions, as described in section 2 above.
2) The second option would be to migrate to suggest ESRD descriptions of both, as shown in Table 1 below:

Table 1: ESRD seral stage and ecological (strata) unit description

Subregion	Strata	Regeneration	Young	Mature	Early Old growth	Late Old growth
Central Mixedwood	D - Aw leading	0-20	21-60	61-120	121-150	>150
	D - Pb leading	0-25	26-70	71-130	131-160	>160
	DC	0-25	26-80	81-140	141-180	>180
	CD	0-25	26-80	81-150	151-190	>190
	C - Sw leading	0-30	31-90	91-160	161-210	>210
	C - Sb leading	0-40	41-100	101-180	181-250	>250
	C - Pj leading	0-30	31-80	81-140	141-180	>180
Lower Foothills	D - Aw leading	0-20	21-70	71-130	131-160	>160
	D - Pb leading	0-25	26-80	81-140	141-180	>180
	DC - Pl leading	0-25	26-80	81-140	141-180	>180
	DC - Sw leading	0-30	31-90	91-150	151-190	>190
	CD - Pl leading	0-25	26-80	81-140	141-180	>180
	CD - Sw leading	0-30	31-90	91-150	151-190	>190
	C - Sw leading	0-30	31-90	91-180	181-230	>230
	C - Sb leading	0-40	41-100	101-200	201-250	>250
	C - Pl leading	0-30	31-80	81-160	161-210	>210
	C - Pj leading	0-30	31-80	81-140	141-180	>180
Upper Foothills	D	0-25	26-80	81-140	141-180	>180
	DC	0-30	31-90	91-150	151-200	>200
	CD	0-30	31-90	91-160	161-210	>210
	C - Sx leading*	0-30	31-90	91-200	201-250	>250
	C - Sb leading**	0-40	41-100	101-200	201-250	>250

	C - Pl leading	0-30	31-80	81-160	161-210	>210
Subalpine	D	0-25	26-80	81-140	141-180	>180
	DC	0-30	31-90	91-150	151-200	>200
	CD	0-30	31-90	91-160	161-210	>210
	C - Se leading***	0-40	41-100	101-220	220-275	>275
	C - Pl leading	0-30	31-80	81-140	141-180	>181
	C - Pw leading	0-30	31-100	101-200	201-250	>250
	C - La leading	0-50	51-110	111-225	226-300	>300
	C - Sb leading****	0-50	51-120	121-225	226-300	>300

Source: email from John Stadt, December 2014

3) The third option would be to blend options 1 and 2.

4 Recommendation

Option 3, as follows:

Seral Stages:

- For conifer dominated stands where total conifer is equal to or exceeds 50% and the leading species is conifer:
  - Regenerating - defined as stands between disturbance date and 30 years old representing the period from disturbance to initial crown closure
  - Young - defined as stands between 31 and 80 years old; in other words when the stands first start to reach merchantability
  - Mature – defined as stands between 81 and 140 years old
  - Old Forest – defined as stands 141 years and older

- For deciduous dominated stands where total deciduous is equal to or exceeds 50% and the leading species is deciduous:
  - Regenerating - defined as stands between disturbance and 20 years old representing the period from disturbance to initial crown closure
  - Young - defined as stands between 21 and 70 years old; in other words when the stands first start to reach merchantability
  - Mature – defined as stands between 71 and 120 years old
  - Old Forest – defined as stands 121 and older

Ecological Units:

- By Leading Species Group (RSA species composition class):
  - DX(Hw) = pure deciduous(at least 80% deciduous, any species),
  - DC (HwPl, HwSw) = deciduous dominated mixedwood
  - CD (PlHw, SwHw, SbHw) = conifer dominated mixedwood
  - PL (Pl pure or leading) = pure conifer with at least 80% conifer, pine leading
  - SW (Sw pure or leading) = pure conifer with at least 80% conifer, white spruce or balsam fir leading
  - CX (Sb pure or leading) = pure conifer stands leading species is Sb or Lt

5 Resolution

Agreement reached at PDT March 19, 2015

Appendix 7-5 – Industrial Salvage Chargeability Approval Letter

This letter details the approval by AAF for Weyerhaeuser and all Timber Operators to charge salvage against production on the FMA, effective May 1, 2017.

Alberta Agriculture and Forestry

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File: FMA0900046

August 3, 2017

To Distribution List:

Subject: **INDUSTRIAL SALVAGE CHARGEABILITY APPROVAL WITHIN WEYERHAEUSER FMA0900046**

Effective **May 1, 2017**, Quota holders operating within FMA0900046 have agreed to accept Industrial Salvage Chargeability against their quotas based on the Weigh Scale Method as outlined within the *Forest Management Branch Directive Number 2008-03 dated November 1, 2008, Industrial Salvage Chargeability*. Under this agreement, "Companies using this approach will be required to track and report salvage volumes by the individual industrial disposition numbers and identify the source Forest Management Unit (FMU)."

The use of the weigh scale method requires tenure holders within the FMA or FMU to develop and implement a tracking system for the industrial dispositions which includes the disposition number and the FMU. Companies will be required to submit a manual timber return at the end of each timber year summarizing the volume of industrial salvage scaled at their mills. This timber return will be required by May 30th of each timber year

If you have any questions or concerns with this approach please contact Mr. Paul Elliott, Timber Production Audit Coordinator, at (780)422-5167.

Yours truly,

Doug Schultz
Director, Timber Production, Auditing & Revenue, FMB

cc: Paul Elliott, Timber Production Audit Coordinator, FMB
Tracy Parkinson, Senior Forester, Edson Forest Area
Bert Ciesielski, Senior Forester, Rocky Forest Area

Alberta
SUSTAINABLE RESOURCE DEVELOPMENT

Forest Management Branch
Directive

Directive No. 2008-03 **Date** November 1, 2008

Subject

Industrial Timber Salvage Chargeability

Purpose

To outline the options and processes for the accounting of timber volumes associated with industrial dispositions as chargeable production against the annual allowable cuts for forest management agreements and timber quotas.

Policy

In order to ensure the depletion and accounting of timber volumes from the forested landbase is consistent with the protocols applied in defining the net land base and the determination of the annual allowable cuts, timber salvage volumes from industrial dispositions will be assessed as drain for the purpose of cut control.

The strategies for the accounting of salvage volumes will incorporate the following principles :

a. A forest tenure holder has the right to their share of salvage volumes based on their tenure allocation as specified in their tenure documents.
b. A forest tenure holder's share of the salvage volumes will be allocated based on individual forest management units.
c. A forest tenure holder requires timely notification to ensure utilization of timber salvage volumes.
d. Timber volumes from industrial dispositions are considered to be chargeable production against the sustainable allowable cuts.
e. The methods for determining the volume and chargeability will be administratively practical for both the industry and the Department.

Procedure

A. Options for determining timber volumes

One of the following options may be used to determine the volume of timber associated with the industrial disposition to be used as drain for cut control purposes :

1. **Provincial Timber Damage Volume Tables**:

- For the determination of the volume for each industrial disposition, tenure holders will use the table titled "*Average Volume by FMA*" as published by the Alberta Joint Energy/Utility and Forest Industry Management Committee (JMC).
- Volumes will be determined by multiplying the area of the industrial disposition by the volume per hectare to reflect the chargeable production.

2. **FMA/FMU Specific Volume Tables**:

- For the determination of the volume for each industrial disposition, operators will use the FMA or FMU specific volume tables as approved for use in the cut calculation.
- The volume calculations can be assessed using either the stand specific volumes, an average for the net landbase, or an average for the gross landbase.
- Volumes will be determined by multiplying the area of the industrial disposition by the volume per hectare to reflect the chargeable production.

3. **Weigh Scale Method**:

- The volumes for the industrial disposition will be determined based on the volume calculated using the provincially approved weigh scaling methodology on timber delivered and scaled using the mill's weigh scale.
- Companies using this approach will be required to track and report salvage volumes by the individual industrial disposition numbers and FMU identifier.

B. Options for allocating the chargeable volume of timber

One of the following options may be used to allocate salvage volumes amongst tenure holders for cut control purposes (chargeability). All tenure holders in a unit must use the same method for determining chargeability.

1. **Sole Source Chargeability**:

- By mutual agreement with all tenure holders within the FMA or FMU, one tenure holder (preferably the FMA holder) will assume the responsibility for all salvage volume generated from the industrial dispositions and charge the entire volume as chargeable production. The receiving tenure holder must have an allocation to charge the volume against. Where a tenure holder only has the rights to a single species (conifer or deciduous), the other tenure holder may elect to be the sole source receiver of the other species or the volume may be charged using one of the other methods.
- Other tenure holders within the FMA or FMU will not receive any volume of salvage timber from that unit and are not assessed volume as chargeable production against their tenures.

2. **Scaled Chargeability**:

- By mutual agreement with all tenure holders, each tenure holder agrees to accept industrial salvage volumes with the volumes being chargeable production based on the amount of timber delivered and scaled at their mill.

- Only scaled volumes for industrial dispositions within the FMA or FMU in which the tenure holder has timber rights will be assessed as chargeable production.
- Where the tenure holder waives or opts not to accept merchantable timber salvage from within the FMA or FMU in which the tenure holders has timber rights this un-used volume will be chargeable production based on one of the two table approaches.
- The use of this method requires the tenure holders within the FMA or FMU to develop and implement a tracking system for the industrial dispositions which includes the disposition number and FMU.

3. **Proportional Chargeability**:

- By mutual agreement with all tenure holders within the FMA or FMU, each tenure holder agrees to accept a portion of the salvage volume equal to their share of AAC or from within an agreed upon sphere of interest.

Un-accepted and Waived Salvage Volumes

A tenure holder may waive their interest in salvage volume and/or agree to the volume being destroyed or directed to another mill. In such cases, since the tenure holder had opportunity to utilize the wood but opted to not accept the timber this volume will be chargeable production against their tenure using one of the volume calculation methods **other than the scale method**. Part 7 of the Timber Management Regulation are to be followed. Where the salvage volume has been waived by the tenure holder and another timber operator utilizes the volume it will not be charged against the receiving operator's AAC.

Implementation

Within a forest management agreement area, the tenure holders will jointly develop an industrial salvage strategy which includes the method for determining the volume calculation and chargeability option. The method selected for determining the volume and chargeability are to be included in the forest management plan (FMP). The Department **will** participate in the development of the industrial salvage strategy.

Outside a forest management agreement area, the timber quota holders will select a method for determining the volume calculation and chargeability option with the Department. The Department will facilitate discussions amongst operators in each unit to develop mechanisms to provide notification to operators of industrial activities generating salvage volumes.

Where mutual agreement cannot be reached by operators within a FMA or FMU on the salvage strategy, the Department will select one of the methods for determining volume and chargeability for all operators.

On an annual basis, all forest management agreement and quota holders using the weigh scale method for calculating the volume of industrial salvage to be charged as drain against their timber allocation must submit by May 30th to the Department the volume for that timber year. The relevant backup documents supporting this declaration must accompany the submission.

All operators are required to balance their harvest levels with the inclusion of the industrial salvage volumes. Where unforeseen circumstances in the final year of a periodic or quadrant cut cause an operator to exceed their allowable harvest, the Department recognizes that this is outside of the control of the tenure holder and consideration will be given to mitigate this situation.

Authorities

Timber Management Regulation :

Section 147 – The Minister, in his discretion, may relieve an industrial operator from salvaging timber.

Section 153(1) – Where the holder of a forest management agreement or a timber quota neglects or refuses a request from the Minister to salvage timber in a management unit in which he has a forest management agreement or timber quota, the volume of un-salvaged timber may be charged as production against the timber quota or forest management agreement.

Cross Reference

Contacts

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(780) 422-4865

Approved

Original signed
D. (Doug) A. Sklar
Executive Director
Forest Management Branch