MANNING DIVERSIFIED FOREST PRODUCTS LTD.

# Forest Landscape Metrics

**2007 – 2017 Forest Management Plan for FMA 0200041**

**May 31, 2007**

**Prepared by:**
**The Forestry Corp.**

# 2007 – 2017 FMP FOR FMA 0200041

**Forest Landscape Metrics** forms one of 10 sections of the 2007 – 2017 Forest Management Plan for Manning Diversified Forest Products Ltd.'s Forest Management Agreement (FMA) 0200041. The Forest Management Plan (FMP) includes the following sections:

1. **Introduction and Plan Development** – Introduces the companies operating on the FMA and describes the FMP development process, including the public consultation process. Includes the FMP Standards Checklist.
2. **FMA Area** – Describes the physical environment of the FMA Area.
3. **FMA Resources** – Describes the natural resources within the FMA Area.
4. **Values, Objectives, Indicators and Targets** (VOITs) – Details the values, objectives, indicators and targets that were instrumental in selecting the Preferred Forest Management Strategy and in developing forest management strategies for the FMP.
5. **Forest Landscape Metrics** – Presents specific information regarding forest vegetation composition and natural disturbance within the FMA Area and/or northwestern Alberta to address VOIT requirements.
6. **Landbase Netdown** – Provides a detailed description of the landbase netdown process, in preparation for the Timber Supply Analysis.
7. **Yield Curves** – Documents the volume sampling and yield curve development process.
8. **Timber Supply Analysis** – Describes how the Preferred Forest Management Strategy, which was selected to meet Values and Objectives, was incorporated into the Timber Supply Analysis and provides an Annual Allowable Cut for both the coniferous and deciduous landbases.
9. **Implementation** – Describes the forest management strategies and operations that will be used to implement the FMP and help ensure that indicators and targets are met.
10. **Monitoring and Research** – Describes monitoring commitments required to ensure indicators and targets are tracked and describes Manning Diversified's approach to supporting research.

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# 1. Introduction

Forest management activities directly impact the forest landscape within the active (net) portion of the forested landbase. These changes have both a spatial and a temporal component. For example, harvest activities remove mature forest in a given location. However, these harvested areas regenerate and, over time, become mature forest.

Forest Landscape Metrics provides an overview of the current state of the forests within FMU P16 (referenced as P6 and P9) and the historic role of natural disturbance by wildfire in the region and in the FMA in particular.

# 2. Baseline Metrics

Maintenance of many of the Values identified in Manning Diversified's FMP process relies on the understanding and the tracking of forest vegetation characteristics (section 2 in **Values, Objectives, Indicators and Targets**). Both the absolute characteristics of the vegetation component and the relationship between vegetation components are important. Many of the biodiversity targets and indicators are based on these forest landscape metrics. The gross (total) and net (active) landbase are generally addressed independently, since the net landscape is only portion over which management activities are implemented which can result in changes to the landscape metrics. The gross landscape, however, is also important since it represents the total condition across the landscape.

The following section presents a summary of the forest landscape metrics within the FMA Area. These metrics characterize the current state of the forested landscape and represent the starting point for all subsequent forest management activities that might be implemented on the FMA Area. Implementation of the Preferred Forest Management Strategy will impact these metrics over time. Because of this, the Timber Supply Analysis (TSA) models and reports on these metrics (these metrics may or may not actually be directly controlled by the TSA model).

## 2.1 Forest Covertypes

Covertype-based strata are defined for the FMP as part of the Timber Supply Analysis (e.g., section 4.2.6 in **Landbase Netdown**). Manning Diversified's FMP identified nine different covertype strata for the TSA process, based on forest composition.

The baseline (year zero/starting condition/effective date (May 2005)) distribution of the forested covertypes across the FMA Area is summarized in Table 2-1 and Figure 2-1. Approximately one third of the active landbase is comprised of DU-A and DU-BCD covertypes, particularly within FMU P6. P9, which generally has younger forests, has a large proportion of stands with a D covertype. Also of interest is the large amount of SB covertype in the passive landbase, particularly within FMU P9.

**Table 2-1. Baseline (year zero) forest cover-type distribution.**

| Strata | Active Landbase | | | Passive Landbase | | | Gross Landbase | | |
|---|---|---|---|---|---|---|---|---|---|
| | P6 | P9 | FMA | P6 | P9 | FMA | P6 | P9 | FMA |
| | ha | ha | ha | ha | ha | ha | ha | ha | ha |
| D | 11,872 | 59,880 | 71,753 | 7,093 | 24,215 | 31,308 | 18,965 | 84,095 | 103,061 |
| DUA | 45,870 | 11,500 | 57,369 | 1,720 | 1,437 | 3,156 | 47,589 | 12,936 | 60,525 |
| DUBCD | 28,959 | 12,449 | 41,409 | 1,023 | 1,168 | 2,191 | 29,982 | 13,617 | 43,599 |
| DC | 3,833 | 2,614 | 6,447 | 1,223 | 2,552 | 3,775 | 5,056 | 5,167 | 10,222 |
| CD | 8,994 | 2,045 | 11,039 | 2,284 | 3,079 | 5,363 | 11,278 | 5,124 | 16,402 |
| MWU | 14,546 | 6,618 | 21,165 | 516 | 951 | 1,467 | 15,062 | 7,570 | 22,632 |
| PL | 7,684 | 18,726 | 26,411 | 3,108 | 1,341 | 4,448 | 10,792 | 20,067 | 30,859 |
| SB | 2,414 | 1,847 | 4,260 | 51,438 | 99,639 | 151,077 | 53,852 | 101,486 | 155,338 |
| SW | 46,484 | 8,954 | 55,439 | 10,833 | 3,104 | 13,937 | 57,318 | 12,058 | 69,376 |
| Total | 170,657 | 124,634 | 295,291 | 79,237 | 137,486 | 216,723 | 249,894 | 262,120 | 512,014 |
| Non-Forested | 0 | 0 | 0 | 45,857 | 37,806 | 83,663 | 45,857 | 37,806 | 83,663 |
| Grand Total | 170,657 | 124,634 | 295,291 | 125,094 | 175,292 | 300,386 | 295,751 | 299,926 | 595,677 |

# 2.2 Forest Age Classes

The age class structure of the FMA Area varies considerably, by FMU (see Table 2-2 and Figure 2-2). The active landbase in P6 is generally 60 years or older and has an average age of approximately 100 years. The active landbase in FMU P9 however is predominantly between 40 and 60 years old, having originated after a large wildfire swept through the area during the 1950s. The passive landbase has slightly less representation from very young and very old age classes (e.g., less than 40 years and over 100 years), primarily because of the influence of FMU P9 within the passive landbase (i.e., P9 contributes significantly more area to the passive landbase than FMU P6 does.

**Table 2-2. Baseline (year zero) age class distribution.**

| Age Class | Active Landbase | | | Passive Landbase | | | Gross Landbase | | |
|---|---|---|---|---|---|---|---|---|---|
| (years) | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) |
| 1-20 | 10,065 | 24 | 10,089 | 6,563 | 37 | 6,600 | 16,628 | 61 | 16,689 |
| 21-40 | 11,447 | 2,939 | 14,386 | 4,015 | 7,310 | 11,325 | 15,462 | 10,249 | 25,711 |
| 41-60 | 4,836 | 76,280 | 81,116 | 1,548 | 71,570 | 73,118 | 6,384 | 147,850 | 154,234 |
| 61-80 | 37,136 | 32,544 | 69,680 | 18,113 | 42,061 | 60,174 | 55,249 | 74,605 | 129,854 |
| 81-100 | 40,366 | 7,216 | 47,582 | 16,985 | 10,567 | 27,552 | 57,351 | 17,782 | 75,134 |
| 101-120 | 39,243 | 4,163 | 43,406 | 21,654 | 5,077 | 26,731 | 60,897 | 9,240 | 70,137 |
| 121-140 | 14,313 | 762 | 15,076 | 6,300 | 373 | 6,672 | 20,613 | 1,135 | 21,748 |
| 141-160 | 7,708 | 485 | 8,193 | 3,212 | 421 | 3,633 | 10,920 | 906 | 11,826 |
| 160+ | 5,543 | 221 | 5,765 | 846 | 71 | 917 | 6,389 | 292 | 6,682 |
| Total | 170,657 | 124,634 | 295,291 | 79,237 | 137,486 | 216,723 | 249,894 | 262,120 | 512,014 |
| Non-Forested | 0 | 0 | 0 | 45,857 | 37,806 | 83,663 | 45,857 | 37,806 | 83,663 |
| Grand Total | 170,657 | 124,634 | 295,291 | 125,094 | 175,292 | 300,386 | 295,751 | 299,927 | 595,677 |

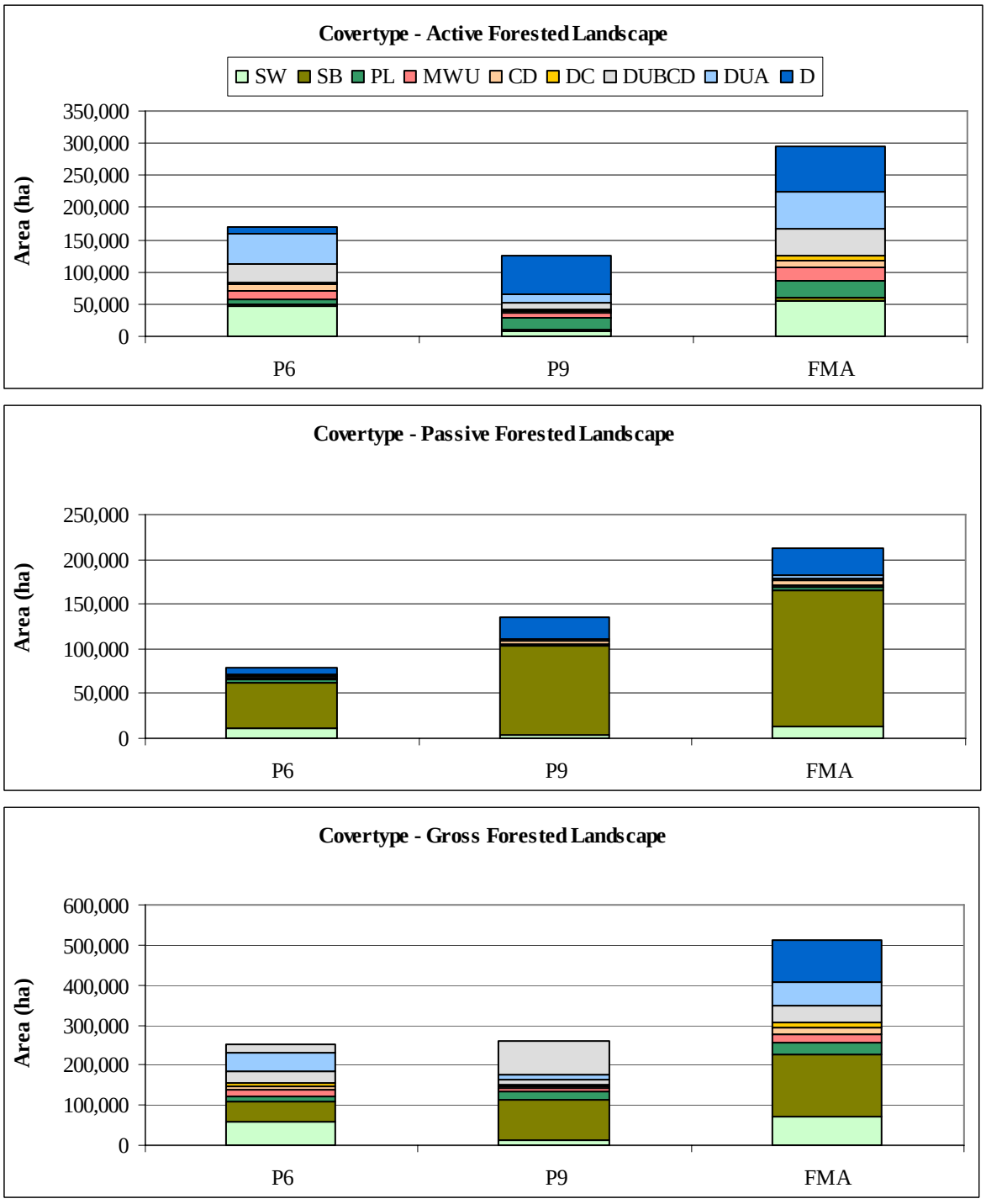


**Figure 2-1. Baseline (year zero) forest cover type distribution.**

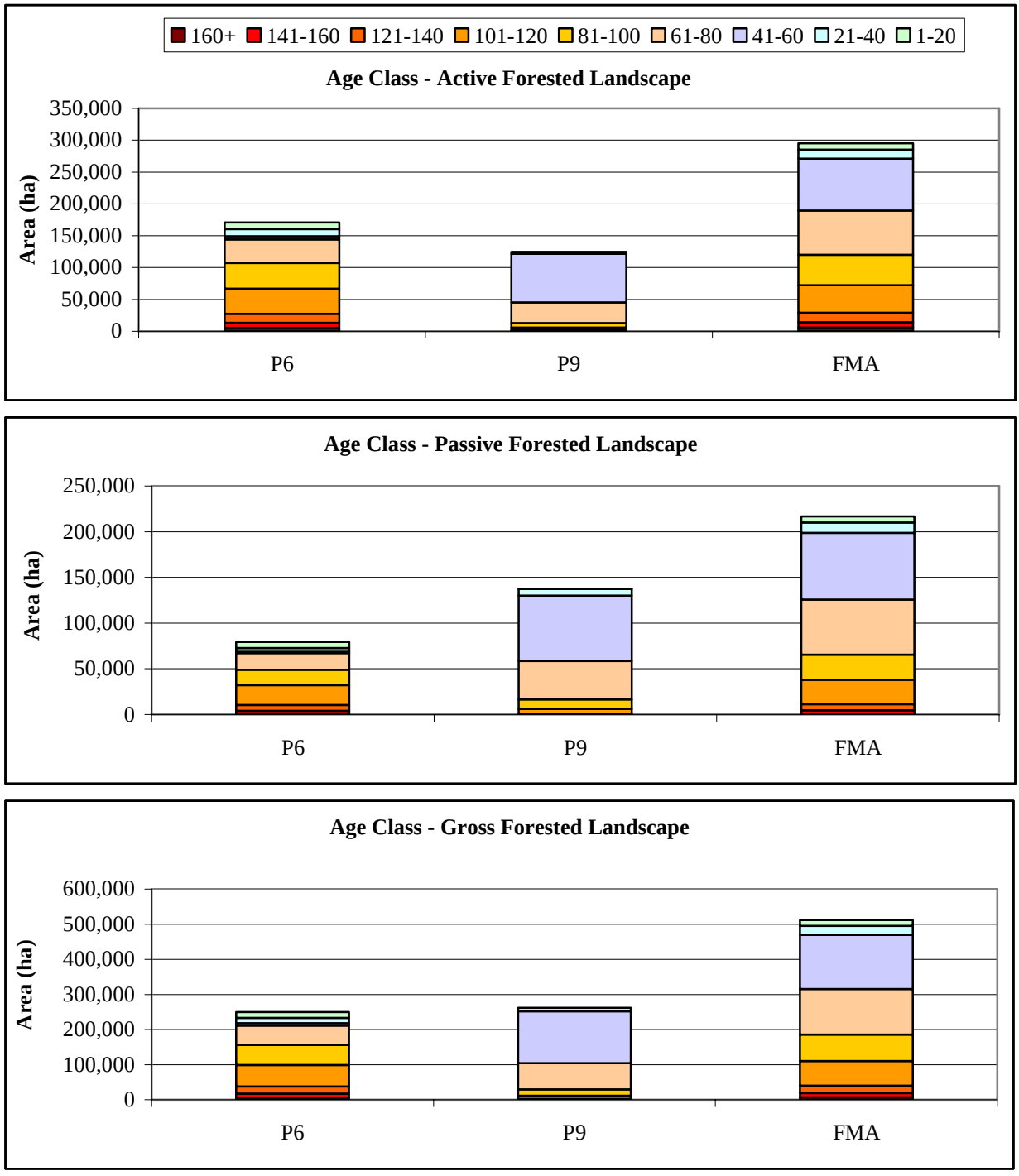


**Figure 2-2. Baseline (year zero) age class distribution.**

# 2.3 Seral Stages

Seral stages refer to stages in forest succession that are characterized by plant community conditions. Although seral stages are related to stand age, they vary with the stand's growth characteristics. For example, white spruce stands tend to be relatively long-lived, while deciduous stands in the boreal tend to reach maturity and senescence relatively quickly. These differences are incorporated into the age criteria used to define the seral stages. Seral stage definitions for the FMA, by strata, are provided in Table 2-3.

Because seral stages were defined on the basis of age and predominant species, the distribution of seral stages is similar to the distribution of age classes within the FMA Area (see Table 2-4 and Figure 2-3). The active landbase in FMU P6 is predominantly in the Mature seral stage, while the active landbase in FMU P9 is almost exclusively in the Young seral stage.

**Table 2-3. Seral stage definitions.**

| | Minimum age for each seral stage | | | |
|---|---|---|---|---|
| Seral Stage | Regen years | Young years | Mature years | Old years |
| D | 0 | 16 | 61 | 101 |
| DUA | 0 | 16 | 61 | 101 |
| DUBCD | 0 | 16 | 61 | 101 |
| DC | 0 | 16 | 71 | 111 |
| CD | 0 | 16 | 71 | 111 |
| MWU | 0 | 16 | 71 | 111 |
| PL | 0 | 16 | 71 | 121 |
| SB | 0 | 16 | 106 | 161 |
| SW | 0 | 16 | 106 | 151 |

**Table 2-4. Baseline (year zero) seral stage distribution.**

| | Active Landbase | | | Passive Landbase | | | Gross Landbase | | |
|---|---|---|---|---|---|---|---|---|---|
| Seral Stage | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) |
| Regen | 9,938 | 24 | 9,962 | 5,920 | 2 | 5,922 | 15,858 | 26 | 15,884 |
| Young | 33,371 | 92,950 | 126,321 | 35,980 | 121,351 | 157,331 | 69,351 | 214,301 | 283,652 |
| Mature | 88,853 | 29,925 | 118,778 | 33,787 | 15,748 | 49,535 | 122,640 | 45,673 | 168,313 |
| Old | 38,495 | 1,735 | 40,230 | 3,550 | 385 | 3,935 | 42,045 | 2,120 | 44,165 |
| Total | 170,657 | 124,634 | 295,291 | 79,237 | 137,486 | 216,723 | 249,894 | 262,120 | 512,014 |
| Non-Forested | 0 | 0 | 0 | 45,857 | 37,806 | 83,663 | 45,857 | 37,806 | 83,663 |
| Grand Total | 170,657 | 124,634 | 295,291 | 125,094 | 175,292 | 300,386 | 295,751 | 299,926 | 595,677 |

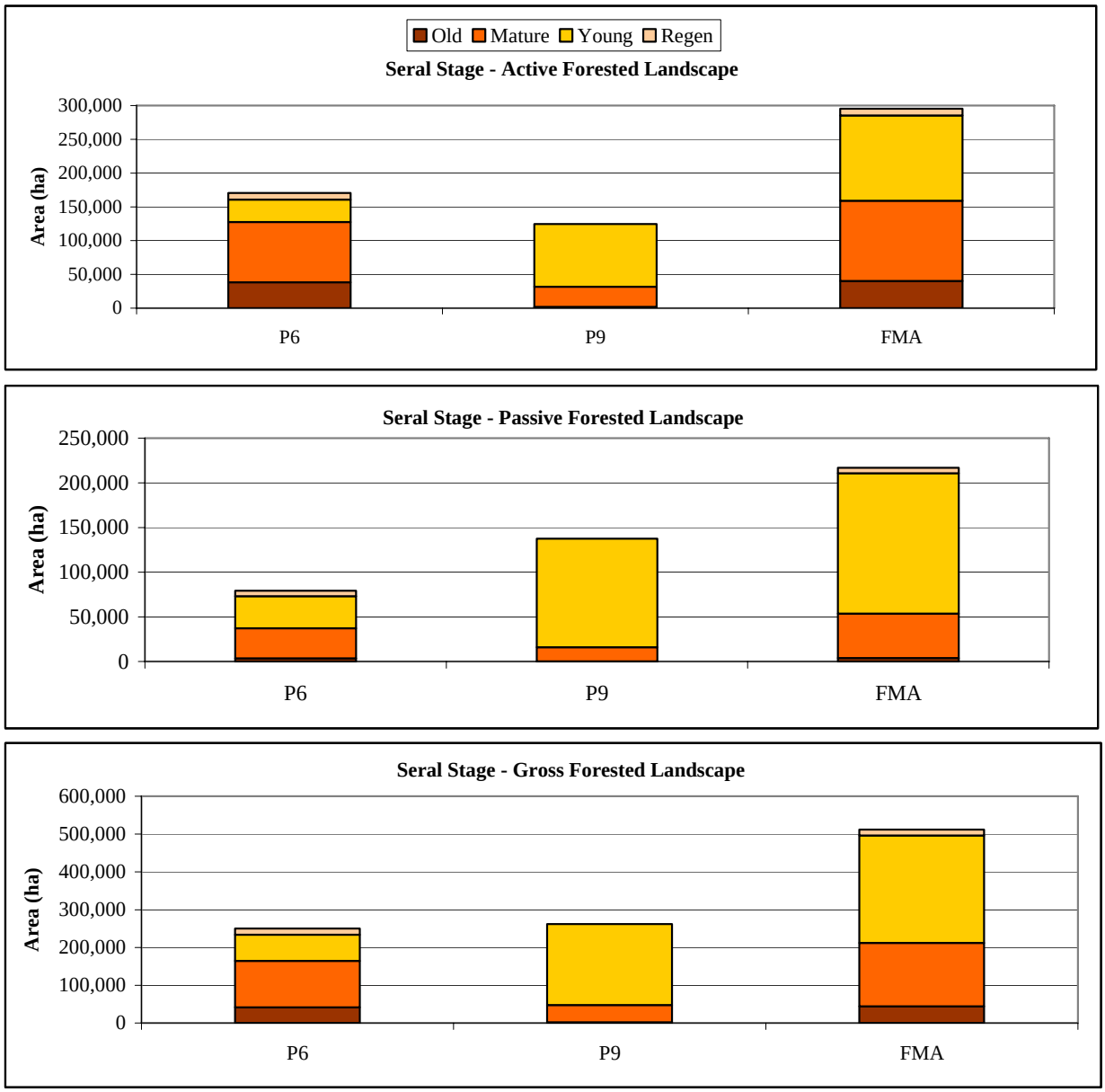


**Figure 2-3. Baseline (year zero) seral stage distribution.**

# 2.4 Harvest Patches

Clear-cut harvesting mimics natural disturbance in terms of creating openings where forests can be regenerated. The harvest patch metric is an important one for forest management consideration, since this metric is related directly to the harvest operations and can, to some extent, be controlled to mimic natural disturbance (see section 3). Management of harvest block sizes can be used to meet various forest management objectives related to biodiversity (e.g., create a range of patch sizes). For the TSA, all forest areas less than 20 years old are considered harvest patches. A harvest patch must be spatially defined (see

section 6.16 in **Timber Supply Analysis**). Harvest patches were only evaluated on the active (net) landbase.

A summary of the distribution of harvest patches, by size class, is provided in Table 2-5 and Figure 2-4. The majority of the harvesting within the FMA Area has occurred in P6, which is reflected in the total hectares in each FMU that are less than 20 years old. Just over 60% of the existing harvest patches in P6 are 7 to 60 hectares in size. Approximately 4% of the patches are greater than 200 hectares.

**Table 2-5. Baseline (year zero) distribution of patch sizes where patches are less than 20 years old.**

| Patch size of Stands < 20 years (ha) | Active Landbase | | | Passive Landbase | | | Gross Landbase | | |
|---|---|---|---|---|---|---|---|---|---|
| | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) |
| 0-7 | 777 | 5 | 782 | - | - | - | 777 | 5 | 782 |
| 7-60 | 6,269 | 18 | 6,287 | - | - | - | 6,269 | 18 | 6,287 |
| 60-200 | 2,650 | - | 2,650 | - | - | - | 2,650 | - | 2,650 |
| 200+ | 389 | - | 389 | - | - | - | 389 | - | 389 |
| Total | 10,085 | 24 | 10,108 | - | - | - | 10,085 | 24 | 10,108 |
| Not a recent block | 160,572 | 124,611 | 285,183 | 125,094 | 175,292 | 300,386 | 285,666 | 299,902 | 585,568 |
| Grand Total | 170,657 | 124,634 | 295,291 | 125,094 | 175,292 | 300,386 | 295,751 | 299,926 | 595,677 |

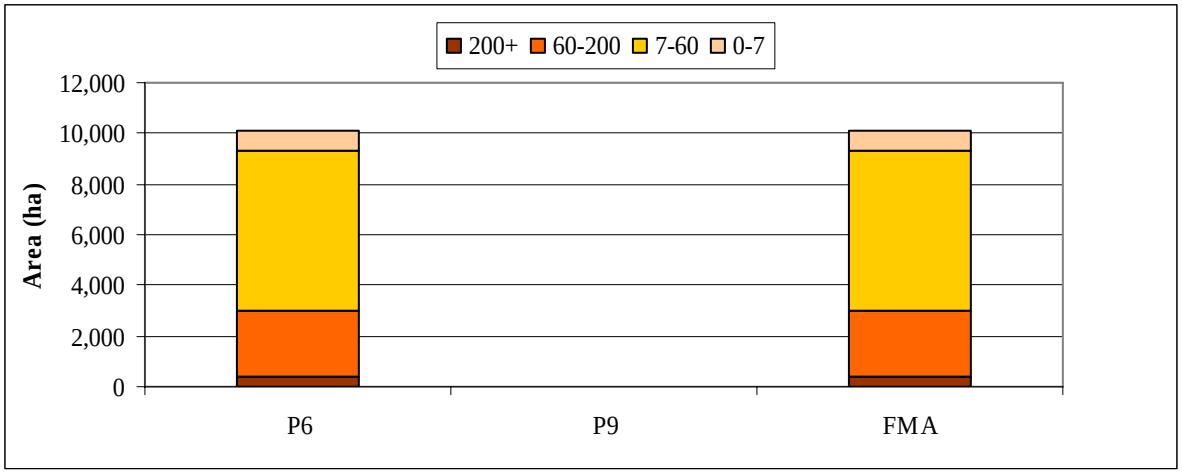


**Figure 2-4. Baseline (year zero) distribution of patch sizes where patches are less than 20 years old.**

# 2.5 Historical Timber Harvesting

A summary of historical timber harvesting within the FMA Area is provided in Table 2-6 and Figure 2-5. The summary includes all harvest activity for which records exist, regardless of the originating company or current regeneration liability. Historically, harvesting has been more intensive in P6 than in P9, due to the relatively young nature of the forests in P9. A considerable amount (i.e., 9,436 hectares) of harvesting has, in the past, taken place in areas which currently are not part of the active landbase (i.e., in areas currently defined as part of the passive landbase). This is a function of changes which have occurred over time to merchantability definitions and to the vegetation inventory; harvesting is not scheduled or undertaken on the passive landbase.

**Table 2-6. Baseline (year zero) historical harvest activity.**

| Harvest Treatment | Active Landbase | | | Passive Landbase | | | Gross Landbase | | |
|---|---|---|---|---|---|---|---|---|---|
| | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) |
| Post-91 Clearcut | 2,416 | 10,033 | 12,449 | 28 | 3,042 | 3,070 | 2,444 | 13,075 | 15,519 |
| Pre-91 Clearcut | - | 250 | 250 | - | 8 | 8 | - | 258 | 258 |
| Understory Protection | - | 5,176 | 5,176 | - | 407 | 407 | - | 5,583 | 5,583 |
| Total | 2,416 | 15,459 | 17,875 | 28 | 3,457 | 3,485 | 2,444 | 18,916 | 21,360 |
| Not Harvested | 122,195 | 269,829 | 392,024 | 167,158 | 389,190 | 556,348 | 289,353 | 659,019 | 948,372 |
| Grand Total | 124,611 | 285,288 | 409,899 | 167,186 | 392,647 | 559,833 | 291,797 | 677,935 | 969,732 |

# 2.6 Old Interior Forest

Fragmentation of the forest and maintenance of older forests have been identified as a concerns in maintenance of biodiversity within areas actively managed for forestry. The Province has defined Interior Forest as forested areas greater than 100 hectares in size, located beyond any edge effect buffer zone along the forest edge (where edge is defined as a linear disruption in forest cover greater than 8 m in width). Unlike seral stages, Old Interior Forest is not differentiated on the basis of covertype. Because of this, a common age definition is used to define 'Old' to prevent breaking up forest patches with a common origin. For the FMA Area, all stands greater than 120 years old were eligible for classification as Old Interior Forest. The Old Interior Forest metric could not be measured directly in the TSA model (it can only be measure by post processing), so a proxy was developed to allow on-going reporting. The proxy for the Old Interior Forest was the area greater than 120 years old and in patches greater than 120 ha in size.

Approximately 4% of the FMA Area is classified as Old Interior Forest (Table 2-7 and Figure 2-6). Half the forested area greater than 120 years old occurs as patches 0 to 120 hectares in size and half in patches greater than 120 hectares. The majority of the Old Interior Forest area is located within P6. Although areas are reported separately for the active and the passive landbases, Old Interior Forest patches did not distinguish between the two landbases when determining patch size (i.e., patches can be a mix of active and passive landbase).

**Table 2-7. Baseline (year zero) distribution of patch sizes of Old Interior Forest proxy.**

| Patch size of Stands > 120 years (ha) | Active Landbase | | | Passive Landbase | | | Gross Landbase | | |
|---|---|---|---|---|---|---|---|---|---|
| | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) | P6 (ha) | P9 (ha) | FMA (ha) |
| 0-120 | 16,371 | 1,005 | 17,376 | 6,513 | 2,108 | 8,620 | 22,884 | 3,113 | 25,997 |
| 120+ | 17,235 | 1,211 | 18,445 | 6,613 | 221 | 6,834 | 23,847 | 1,432 | 25,279 |
| Total | 33,606 | 2,216 | 35,822 | 13,125 | 2,329 | 15,454 | 46,731 | 4,545 | 51,276 |
| Not >120 years old | 137,051 | 122,418 | 259,469 | 111,968 | 172,963 | 284,932 | 249,020 | 295,381 | 544,401 |
| Grand Total | 170,657 | 124,634 | 295,291 | 125,094 | 175,292 | 300,386 | 295,751 | 299,926 | 595,677 |

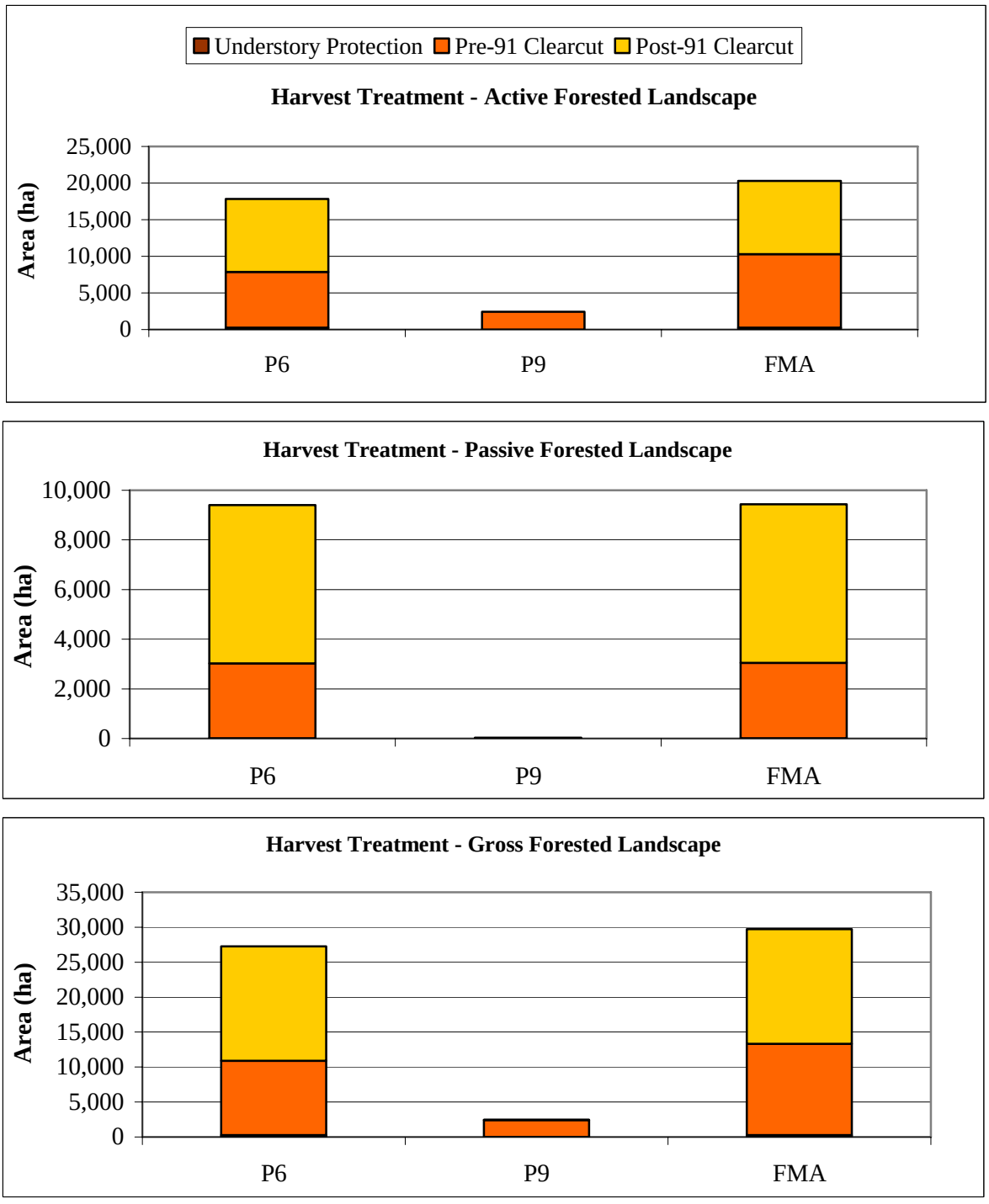


**Figure 2-5. Baseline (year zero) historical harvest activity.**

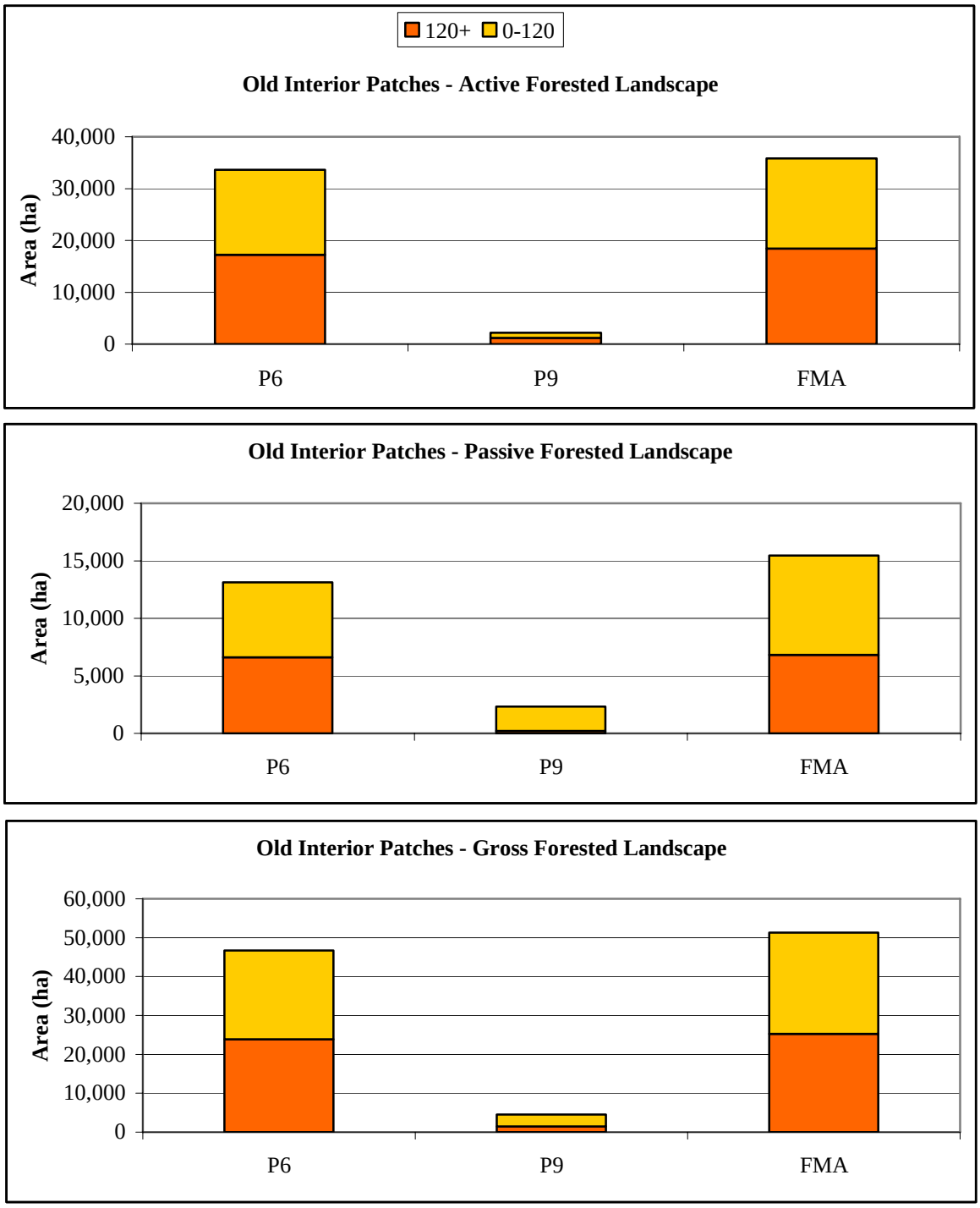


**Figure 2-6. Baseline (year zero) distribution of patch sizes of Old Interior Forest proxy.**

# 3. Natural Disturbance Metrics

Within the FMA Area fire has traditionally been the mechanism by which forests have been created and subsequently destroyed. Two scales of information was utilized to examine natural disturbance regimes associated with the FMA Area. A regional perspective, relevant to Northwestern Alberta was provided by work undertaken by Stelfox and Wynnes for DMI (1999). FMA-specific information was also examined (i.e., vegetation inventory and fire history inventory) to characterize natural disturbance. Both sources were considered relevant because disturbance regimes vary both spatially and temporally.

Natural disturbance metrics are important for forest management planning, since ecologically sound management practices focus on mimicking natural process where possible.

## 3.1 Northwestern Alberta

The following discussion of fire regimes is based, to a large extent, on Chapter 5 of 'A physical, biological and land use synopsis of the boreal forest's Natural Regions of northwestern Alberta' (Stelfox and Wynnes 1999). The data source for the statistics presented by Stelfox and Wynnes is Alberta Sustainable Resource Development's Fire Database. Much of the material highlighted is also presented in section 7 in **FMA Area**.

Within the northwest region identified by DMI (114-120 W longitude, 56-60° N latitude) summary statistics presented by DMI (based ASRD Fire Database for northwestern Alberta for the period from 1961 to 1995) indicate 6,676 fire starts within northwestern Alberta during the 35 year data period (Table 3-1). On average, over a 35 year period, this equates to one fire starts every 2,280 hectares or, annually, one fire starts every 79,809 hectares. These fires were responsible for burning 1,656,729 hectares, averaging 248.2 hectares per fire. The median fire size was 0.4 hectares, indicating there are numerous small fires. The largest fire in the area accounted for 223,991.3 hectares of burn.

**Table 3-1. Summary statistics for fires in northwest Alberta (1961–1995) (from Stelfox and Wynnes 1999; data source: ASRD Fire Database).**

| | |
|---|---|
| Total Number Fires Recorded | 6,676 |
| Total Area Burned | 1,656,729 ha |
| Minimum Fire Size | 0.1 ha |
| Maximum Fire Size | 223,991.3 ha |
| Mean Fire Size | 248.2 ha |
| Standard Error | 54.1 ha |
| Median Fire Size | 0.4 ha |

The majority of the fires are relatively small (Table 3-2). Approximately 88% of all wildfires are 10 hectares or smaller. However, the remaining 12% of fire starts are responsible for virtually all of the area burnt. Fires greater than 1,000 hectares account for only 1% of all fire starts.

**Table 3-2. Proportion of fire count and area burned for each fire size class. (from Stelfox and Wynnes 1999 (revised); data source: ASRD Fire Database).**

| Fire Size Class (ha) | Number of Fires | Percent of Fires | Area Burned (ha) | Percent Area Burned |
|---|---|---|---|---|
| Less than 0.1 ha | 2,632 | 40% | 92.9 | 0% |
| 0.1 to 1.0 ha | 1,780 | 27% | 943.1 | 0% |
| 1 to 10 ha | 1,446 | 21% | 4,833.20 | 0% |
| 10 to 100 ha | 575 | 90% | 18,668.30 | 1% |
| 100 to 1,000 ha | 158 | 20% | 51,257.10 | 3% |
| 1,000 to 10,000 ha | 57 | 10% | 234,875.30 | 14% |
| Greater than 10,000 ha | 28 | 0% | 1,346,061.40 | 81% |
| Total | | 100% | 1,656,731.30 | |

The average size of wildfires within the region varies considerably over time. Annual variations in average fire size are presented in Table 3-3 and Figure 3-1. In some years, the average size is as low as 2 hectares, while in other years it exceeds 1,500 hectares. The relationship between fire frequency and size, by decade, is summarized in Figure 3-2. There is more consistency in trends by decade, however some variability is still apparent. A trend towards fewer larger fires is noticeable, possibly the result of fire suppression efforts.

**Table 3-3. Average annual fire size (ha) in northwest Alberta (1961–1995) (from Stelfox and Wynnes 1999; data source: ASRD Fire Database).**

| 1960's | Area (ha) | 1970's | Area (ha) | 1980's | Area (ha) | 1990's | Area (ha) |
|---|---|---|---|---|---|---|---|
| 60 | -- | 70 | 122 | 80 | 369 | 90 | 11 |
| 61 | 201 | 71 | 182 | 81 | 1,130 | 91 | 8 |
| 62 | 6 | 72 | 39 | 82 | 1,531 | 92 | 4 |
| 63 | 21 | 73 | 9 | 83 | 2 | 93 | 58 |
| 64 | 30 | 74 | 6 | 84 | 193 | 94 | 79 |
| 65 | 271 | 75 | 26 | 85 | 55 | 95 | 666 |
| 66 | 180 | 76 | 6 | 86 | 3 | | |
| 67 | 16 | 77 | 27 | 87 | 59 | | |
| 68 | 24 | 78 | 13 | 88 | 5 | | |
| 69 | 156 | 79 | 34 | 89 | 2 | | |

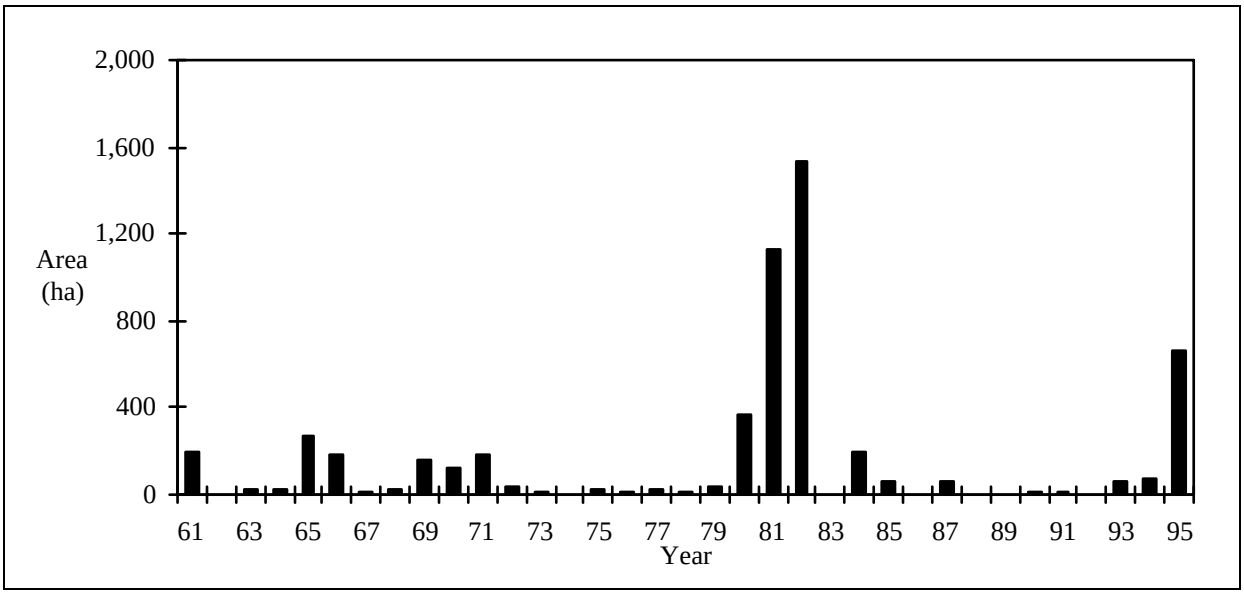


**Figure 3-1. Average annual fire size (ha) in northwest Alberta (1961–1995) (from Stelfox and Wynnes 1999; data source: ASRD Fire Database).**

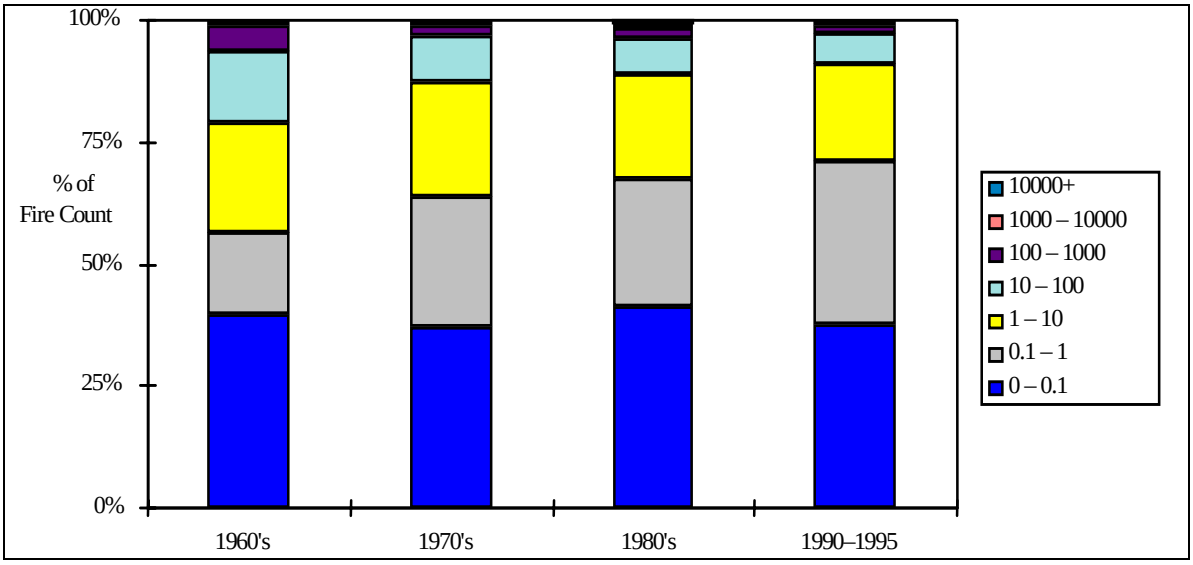


**Figure 3-2. Relationships between fire frequency, fire size class and decade (from Stelfox and Wynnes 1999; data source: ASRD Fire Database).**

# 3.2 FMA Area

Two data sources, the AVI and the ASRD Fire Database, were utilized to examine historic disturbance patterns within the FMA Area.

Two different approaches were used to evaluate natural disturbance patterns using the AVI for the FMA Area. The first approach took advantage of the 'Burn' modifier that is recorded as part of the AVI specification. The 'Burn' modifier is applied whenever there is evidence that a polygon was subject to a

fire incident. Because AVI distinguishes polygons on a number of factors such as species composition which were not relevant to an examination of disturbance, fire 'patches' were defined as contiguous polygons with a 'Burn' modifier and the same 'burn' modifier year (i.e., the fire occurred in the same year) (i.e., Mod='BU' and Mod_Year is the same).

Fifty-six burn patches were identified within the FMA Area using this approach. The resulting distribution of burn patches, by size class, is summarized in Figure 3-3. Half of the burns identified in the AVI were 7 hectares or less in size. Approximately 18% of the burn patches identified were greater than 60 hectares in size. It is important to note that AVI is generally associated with a minimum polygon size of 2 hectares, therefore very small fires (i.e., less than 2 hectares) are likely under-represented.

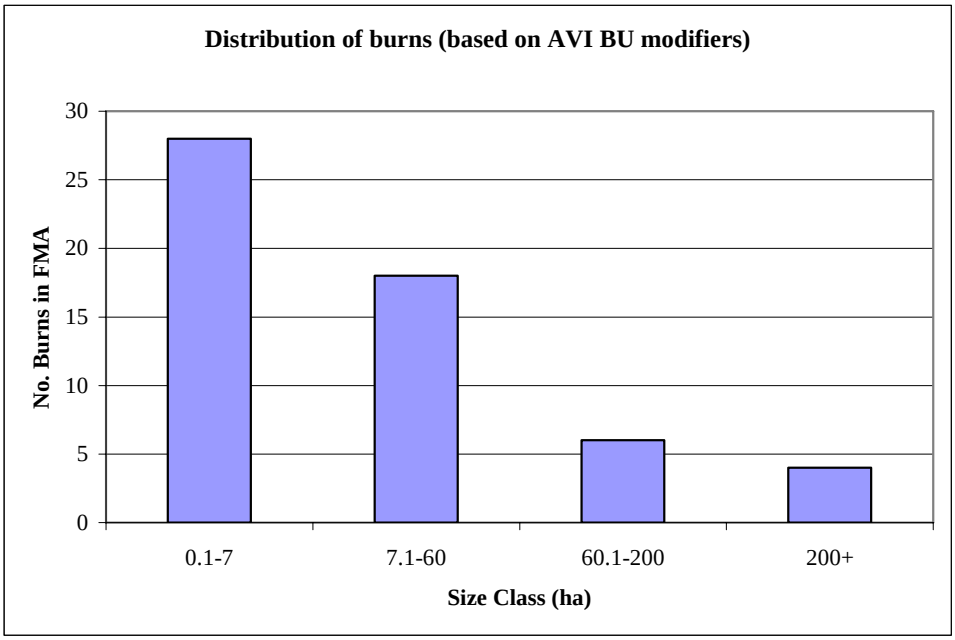


**Figure 3-3. Distribution of burns within the FMA Area, based on contiguous AVI polygons with a Burn modifier with the same Modifier Year (i.e., same burn year).**

The second approach assumed that all adjoining AVI polygons with the same origin (i.e., polygons that are the same age), represent a single fire disturbance patch. This assumptions is not unreasonable, given the dominance of fire as the natural disturbance mechanism within the boreal forest.

The results of this analysis were relatively consistent with those from the Burn modifier analysis (Figure 3-4). Slightly less than 50% of the patches identified were 7 hectares or less in size while relatively few patches were greater than 60 hectares in size.

The ASRD fire history data was also analyzed to provide insight into natural disturbance patterns. All fires that fell within the FMA Area boundary were utilized for the analysis (i.e., many fires fell only partly within the FMA Area). In a few cases, the fire history coverage contained gaps between fire polygons with the same fire year. If these gaps were very narrow (i.e., likely due to a stream or road feature), the polygons were considered 'contiguous' for the analysis.

A total of 46 fire patches in the fire history data were located at least partially within the FMA Area (Figure 3-5). As was the case for the AVI-based analyses, the most frequent fire size class was the 0.1 to

7.0 hectare class. However, almost one-third of the fire disturbance patches derived from the fire database were greater than 200 hectares in size.

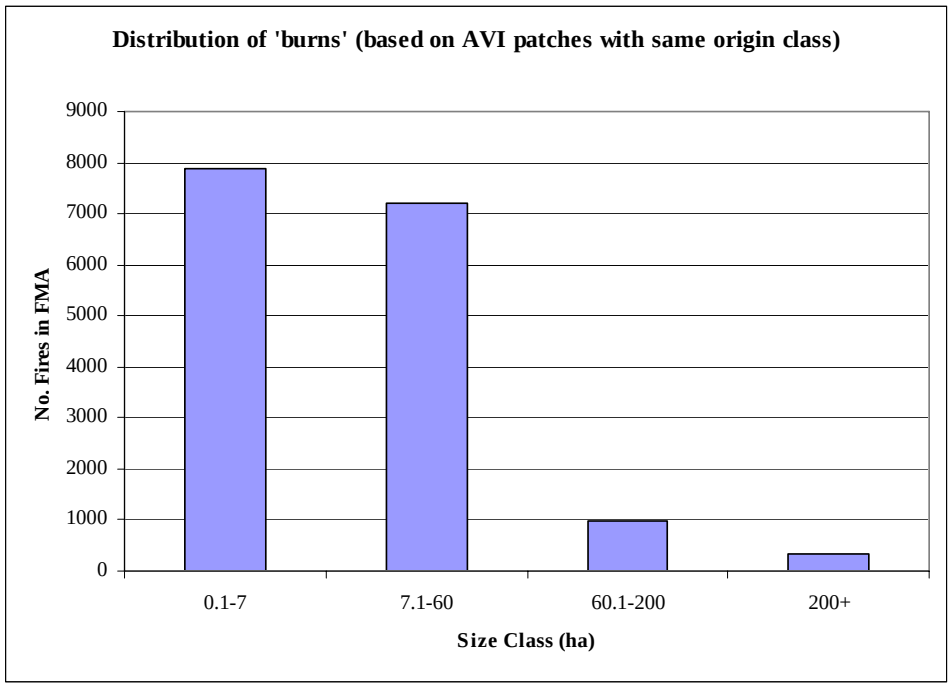


**Figure 3-4. Distribution of burns within the FMA Area, based on contiguous AVI polygons with the same Origin year.**

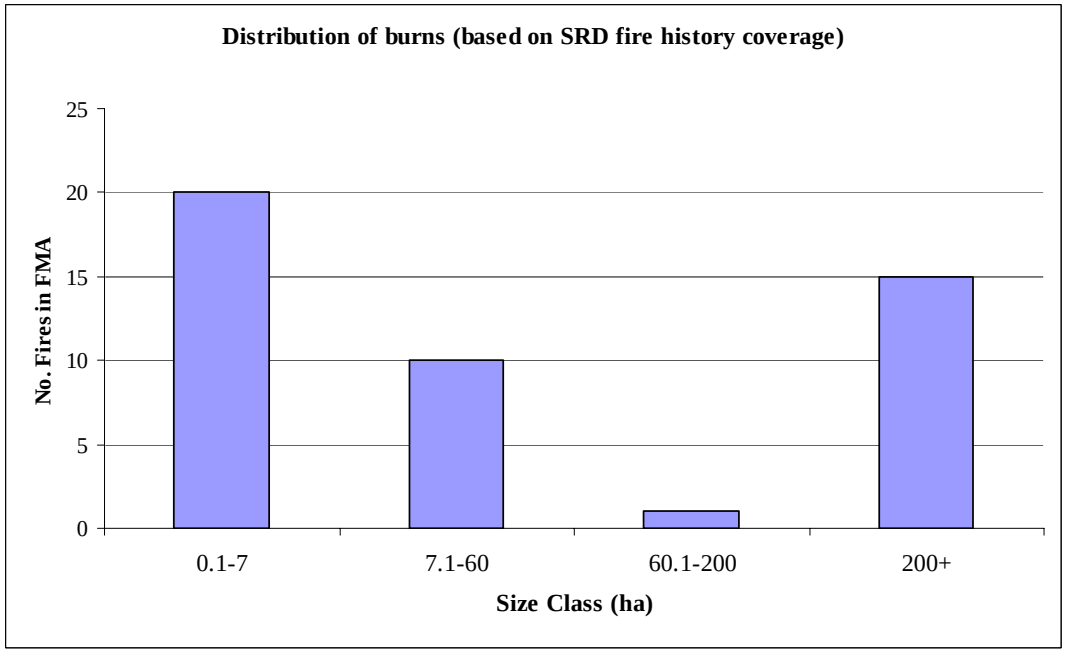


**Figure 3-5. Distribution of burns within the FMA Area, based on the ASRD Fire Database.**

# 3.3 Historic Disturbance Trends

Based on the analyses of ASRD fire history data and the AVI data for the FMA, several conclusions can be drawn regarding the natural range of variability in fire disturbance within the FMA Area. However, the results of the various analyses were not completely consistent, making it difficult to definitively characterize historic disturbance. Because the AVI coverage is generally associated with a minimum polygon size of 2 hectares, ASRD fire history data may be a better source of information for very small fires. However, the AVI analyses are useful because they are FMA-specific and provide information for disturbances that occurred prior to the ASRD fire history dataset.

The following trends in historic fire disturbance were identified:

- The majority of the fires that occur are very small. Fully one-third of the fires, regionally, were less than 0.1 hectare in size and more than half are less than 1.0 hectares in size. At least 75% are 10 hectares or less.
- Large fires occur relatively infrequently, but account for the majority of the burn area. Regionally, the largest single fire within the ASRD fire history database encompassed 223,991 hectares.
- Annual differences in average fire size are extremely large (e.g., 2 versus 1,531).

# 4. References

Stelfox, J. B. and B. Wynnes. 1999. A physical, biological and landuse synopsis of the boreal forest's Natural Regions of Northwestern Alberta. Internal document prepared for Daishowa-Marubeni International Ltd.

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