and was calculated in the same manner as overstorey species group. Understorey species group was classified as non-forested if any type of vegetation was present and no understorey species was assigned to any cutblocks or non-forested stands.

Table 2.18 Entire FMA area summary, by overstorey versus understorey species groups

| Overstorey Species Group | Understorey Species Group | | | | | | |
|---|---|---|---|---|---|---|---|
| | C | CD | DC | D | Non-Forested | No Understorey | Total Area (ha) |
| C | 178,038 | 1,234 | 1,062 | 950 | 8,831 | 114,309 | 304,425 |
| CD | 5,618 | 175 | 381 | 231 | 232 | 5,841 | 12,478 |
| DC | 5,410 | 278 | 532 | 531 | 368 | 5,805 | 12,924 |
| D | 6,016 | 655 | 925 | 5,125 | 654 | 11,707 | 25,082 |
| Non-Forested | 0 | 0 | 0 | 0 | 0 | 18,918 | 18,918 |
| Total Area (ha) | 195,082 | 2,341 | 2,900 | 6,837 | 10,085 | 156,581 | 373,827 |

Table 2.19 The Caribou Zone area summary, by overstorey versus understorey species groups

| Overstorey Species Group | Understorey Species Group | | | | | | |
|---|---|---|---|---|---|---|---|
| | C | CD | DC | D | Non-Forested | No Understorey | Total Area (ha) |
| C | 112,726 | 336 | 390 | 194 | 5,612 | 39,834 | 159,093 |
| CD | 359 | 7 | 45 | 31 | 51 | 952 | 1,445 |
| DC | 296 | 0 | 91 | 85 | 164 | 1,327 | 1,962 |
| D | 929 | 72 | 17 | 41 | 120 | 1,223 | 2,403 |
| Non-Forested | 0 | 0 | 0 | 0 | 0 | 7,116 | 7,116 |
| Total Area (ha) | 114,310 | 415 | 544 | 351 | 5,946 | 50,451 | 172,017 |

#### 2.3.3.6 Non-Commercial Forest

Five percent of the landscape is non-forested; of this, 2% of the ANC FMA area is comprised of anthropogenic lands (e.g., pipelines, well sites, croplands, highways, etc.) while the remaining 3% is made up of natural non-forested lands (i.e., grasslands and shrublands). In addition, 17% of the ANC FMA landbase is comprised of forested areas not sequenced for harvesting.

The current distribution and type of non-commercial forest within the FMA area is depicted on Figure 2.25. The area associated with each of these categories is summarized in Table 2.20.

### 2.3.4 Fragmentation/Connectedness

The fragmentation section is divided into three different sub-sections: patch size analysis, edge/area ratio and linear disturbance.

#### 2.3.4.1. Patch Size Analysis

Patch sizes were determined by dissolving all stand boundaries between adjacent stands assigned the same age class and species group. Patches split by natural sub-region boundaries or the Caribou Zone boundary were kept separate. Age classes were defined as 1-20, 21-40, 41-80 and 80+ years. Horizontal stands were assigned a single species group based on AVI structure value.

Table 2.20 Area summary of non-commercial forest area in ANC's FMA area

| Non-Commercial Forest Classification | Area (ha) | |
|---|---|---|
| | FMA Area | Caribou Zone[1] |
| Non – Forested Area | 18,918 | 7,116 |
| Pipelines | 1,909 | 221 |
| Well sites | 951 | 92 |
| Cropland | 941 | 504 |
| Water reservoirs | 41 | 15 |
| Industrial Sites | 141 | 11 |
| Permanent Highways | 3,154 | 489 |
| Gravel Pits | 51 | 7 |
| Unknown clearings | 61 | 18 |
| Bryophyte | 99 | - |
| Herbaceous Forbs | 539 | 277 |
| Herbaceous Grassland | 2,303 | 1,063 |
| Shrub (Closed) | 1,063 | 163 |
| Shrub (Open) | 4,744 | 3,212 |
| Cutbank | 18 | - |
| Gravel / Sand Bars | 37 | - |
| Sand Dunes | 103 | 44 |
| | | |
| Flooded Lands | 1,156 | 408 |
| Lakes, Ponds | 569 | 102 |
| Rivers | 1,038 | 489 |
| Forest Areas not Sequenced for Harvest | 62,318 | 34,858 |
| Inoperable Areas | 3,714 | 944 |
| TPR = 'U' | 42,718 | 26,045 |
| Black Spruce, Fair Sites | 15,886 | 7,869 |
| Total Area (ha) | 81,236 | 41,973 |

[1] Class E of the Fisheries and Wildlife Landuse Referral Map. The extent of the Caribou Zone analyzed is limited to the portion residing with ANC's FMA area.

The patches were then reported by 50-hectare size classes. Figure 2.26 shows the spatial distribution of the current fragmentation, by age classes. AVI data were used to determine the level of fragmentation.

Summaries were compiled by:

- Species group and age class across the entire FMA area (Tables 2.21-2.24 and Figures 2.27-2.30)
- Natural subregions (Table 2.25 and Figure 2.31)
- The Caribou Region (Class E of the Fisheries and Wildlife Landuse Referral Map) and the entire FMA. The extent of the Caribou area analyzed is limited to the portion residing within ANC's FMA area (Table 2.26 and Figure 2.32)

Rge 5 Rge 4 Rge 3 Rge 2 Rge 1 6th MER Rge 27 Rge 26 Rge 25 Rge 24 Rge 23 Rge 22 Rge 21 Rge 20 Rge 19 Rge 18 Rge 17

Twp 64 Twp 63 Twp 62 Twp 61 Twp 60 Twp 59 Twp 58 Twp 57 Twp 56 Twp 55

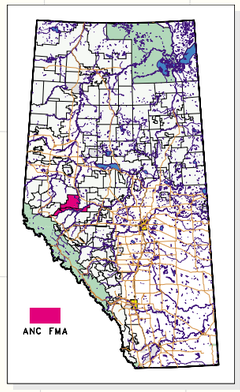
Alberta Newsprint Company

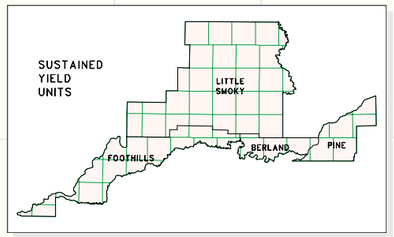
# *ALBERTA NEWSPRINT COMPANY FOREST MANAGEMENT AREA*

**Figure 2.25**

## *NON-COMMERCIAL FOREST*

CARIBOU ZONE




MAP SCALE 1:400 000

### NON-COMMERCIAL FOREST

| ANTHROPOGENIC | | NATURAL | |
|---|---|---|---|
| VEGETATED | NON-VEGETATED | VEGETATED | NON-VEGETATED |
| PIPELINES | WATER RESERVOIRS | BRYOPHYTE | CUTBANK |
| WELL SITES | INDUSTRIAL SITES | HERBACEOUS FORBS | GRAVEL, SAND BARS |
| CROPLAND | PERMANENT HIGHWAYS | HERBACEOUS GRASSLAND | SAND DUNES |
| | GRAVEL PITS | SCRUB (CLOSED) | FLOODED LANDS |
| | | SCRUB (OPEN) | LAKES |
| | | | RIVERS |

OTHER:

UNKNOWN CLEARINGS | TPR = 'U' | BLACK SPRUCE FAIR SITES | INOPERABLE AREAS | CARIBOU ZONE BOUNDARY

Map 5
Map Date: Feb 5, 2001
Map Scale: 1 : 400000
Map Production by Silvacom Ltd.
Silvacom Ref: F-057
Map File:
../f-057/maps/map3/non_treed

SILVACOM LTD Edmonton, Alberta

Alberta Newsprint Company

**Figure 2.26**

*ALBERTA NEWSPRINT COMPANY*
*FOREST MANAGEMENT AGREEMENT AREA*

*SPECIES GROUP FRAGMENTATION BY AGE CLASS (1999)Time:0*

SPECIES AGE BASED ON
AVI OVERSTOREY

Rge 5 Rge 4 Rge 3 Rge 2 Rge 1 6th MER Rge 27 Rge 26 Rge 25 Rge 24 Rge 23 Rge 22 Rge 21 Rge 20 Rge 19 Rge 18 Rge 17

Twp 64 Twp 63 Twp 62 Twp 61 Twp 60 Twp 59 Twp 58 Twp 57 Twp 56 Twp 55

N W E S

Fox Creek

Two Creeks

Muskeg River

CARIBOU ZONE

Provincial Location of FMA

**SPECIES GROUP**

| STAND AGE (YEARS) | CONIFER DOMINANT | MIXEDWOOD CONIFER DOMINANT | MIXEDWOOD DECIDUOUS DOMINANT | DECIDUOUS DOMINANT |
|---|---|---|---|---|
| 81+ | | | | |
| 41-80 | | | | |
| 21-40 | | | | |
| 0-20 | | | | |

CARIBOU ZONE BOUNDARY

ATS grid
Recreation areas

Scale 1:425,000
10 0 10 km

Projection: Universal Transverse Mercator zone 11
NAD83/GRS80
By: mdesilets
GDC project ref: 20-0096
Date: 09/2001

GDC GEOGRAPHIC DYNAMICS CORP.

Table 2.21 Patch size analysis for pure conifer species group for the entire FMA area (ETAR—edge-to-area ratio)

| Patch Size Class (ha) | 0 to 20 years | | | 21 to 40 years | | | 41 to 80 years | | | 80+ years | | | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent |
| 0-50 | 11,676 | 39% | 0.3261 | 1,362 | 40% | 0.0677 | 11,097 | 19% | 1.9080 | 16,213 | 8% | 1.4269 | 40,348 | 13% |
| 50.1-100 | 5,677 | 19% | 0.0094 | 657 | 19% | 0.0141 | 6,438 | 11% | 0.0128 | 7,878 | 4% | 0.0111 | 20,649 | 7% |
| 100.1-150 | 2,785 | 9% | 0.0085 | 609 | 18% | 0.0139 | 4,035 | 7% | 0.0116 | 4,446 | 2% | 0.0092 | 11,875 | 4% |
| 150.1-200 | 1,813 | 6% | 0.0089 | 162 | 5% | 0.0114 | 2,595 | 4% | 0.0110 | 4,413 | 2% | 0.0086 | 8,983 | 3% |
| 200.1-250 | 702 | 2% | 0.0061 | 212 | 6% | 0.0074 | 2,490 | 4% | 0.0104 | 3,410 | 2% | 0.0080 | 6,815 | 2% |
| 250.1-300 | 1,114 | 4% | 0.0076 | 0 | 0% | 0.0000 | 1,902 | 3% | 0.0086 | 2,515 | 1% | 0.0100 | 5,532 | 2% |
| 300.1-350 | 689 | 2% | 0.0061 | 0 | 0% | 0.0000 | 1,632 | 3% | 0.0098 | 1,256 | 1% | 0.0066 | 3,577 | 1% |
| 350.1-400 | 397 | 1% | 0.0041 | 392 | 12% | 0.0050 | 355 | 1% | 0.0107 | 2,216 | 1% | 0.0078 | 3,360 | 1% |
| 400.1-450 | 839 | 3% | 0.0052 | 0 | 0% | 0.0000 | 449 | 1% | 0.0070 | 4,796 | 2% | 0.0071 | 6,084 | 2% |
| 450.1-500 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 1,883 | 3% | 0.0085 | 2,364 | 1% | 0.0067 | 4,247 | 1% |
| 500.1-550 | 510 | 2% | 0.0068 | 0 | 0% | 0.0000 | 507 | 1% | 0.0090 | 2,621 | 1% | 0.0085 | 3,638 | 1% |
| 550.1-600 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 1,745 | 3% | 0.0087 | 2,856 | 1% | 0.0061 | 4,601 | 2% |
| 600.1-650 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 614 | 1% | 0.0070 | 0 | 0% | 0.0000 | 614 | 0% |
| 650.1-700 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 1,339 | 1% | 0.0039 | 1,339 | 0% |
| 700.1-750 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 712 | 1% | 0.0096 | 2,189 | 1% | 0.0062 | 2,901 | 1% |
| 750.1-800 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 2,373 | 1% | 0.0057 | 2,373 | 1% |
| 800.1-850 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 831 | 1% | 0.0072 | 3,283 | 2% | 0.0048 | 4,114 | 1% |
| 850.1-900 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 2,655 | 5% | 0.0071 | 1,733 | 1% | 0.0060 | 4,389 | 1% |
| 900.1-950 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 950.1-1000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 961 | 0% | 0.0027 | 961 | 0% |
| 1000+ | 4,026 | 13% | 0.0048 | 0 | 0% | 0.0000 | 18,214 | 31% | 0.0076 | 145,851 | 69% | 0.0043 | 168,090 | 55% |
| Totals | 30,228 | 100% | | 3,394 | 100% | | 58,155 | 100% | | 212,713 | 100% | | 304,490 | 100% |

Table 2.22 Patch size analysis for conifer leading mixedwood for the entire FMA area (ETAR—edge-to-area ratio).

| Patch Size Class (ha) | 0 to 20 years | | | 21 to 40 years | | | 41 to 80 years | | | 80+ years | | | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent |
| 0-50 | 1 | 100% | 0.0533 | 326 | 86% | 0.0358 | 1,802 | 94% | 0.0990 | 6,827 | 67% | 1.6529 | 8,956 | 72% |
| 50.1-100 | 0 | 0% | 0.0000 | 52 | 14% | 0.0099 | 125 | 6% | 0.0129 | 1,574 | 16% | 0.0124 | 1,750 | 14% |
| 100.1-150 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 461 | 5% | 0.0079 | 461 | 4% |
| 150.1-200 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 991 | 10% | 0.0094 | 991 | 8% |
| 200.1-250 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 250.1-300 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 300.1-350 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 300 | 3% | 0.0071 | 300 | 2% |
| 350.1-400 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 400.1-450 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 450.1-500 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 500.1-550 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 550.1-600 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 600.1-650 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 650.1-700 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 700.1-750 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 750.1-800 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 800.1-850 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 850.1-900 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 900.1-950 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 950.1-1000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 1000+ | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| Totals | 1 | 100% | | 378 | 100% | | 1,927 | 100% | | 10,153 | 100% | | 12,458 | 100% |

Table 2.23 Patch size analysis for pure deciduous for the entire FMA area (ETAR—edge-to-area ratio)

| Patch Size Class (ha) | 0 to 20 years | | | 21 to 40 years | | | 41 to 80 years | | | 80+ years | | | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent |
| 0-50 | 17 | 100% | 0.7444 | 1,553 | 60% | 0.0915 | 4,562 | 43% | 0.1441 | 6,580 | 55% | 0.2774 | 12,712 | 50% |
| 50.1-100 | 0 | 0% | 0.0000 | 459 | 18% | 0.0173 | 1,605 | 15% | 0.0126 | 1,370 | 11% | 0.0122 | 3,434 | 14% |
| 100.1-150 | 0 | 0% | 0.0000 | 128 | 5% | 0.0100 | 969 | 9% | 0.0117 | 995 | 8% | 0.0116 | 2,092 | 8% |
| 150.1-200 | 0 | 0% | 0.0000 | 164 | 6% | 0.0103 | 1,188 | 11% | 0.0114 | 522 | 4% | 0.0100 | 1,875 | 7% |
| 200.1-250 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 443 | 4% | 0.0094 | 869 | 7% | 0.0100 | 1,312 | 5% |
| 250.1-300 | 0 | 0% | 0.0000 | 293 | 11% | 0.0101 | 273 | 3% | 0.0063 | 561 | 5% | 0.0116 | 1,127 | 4% |
| 300.1-350 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 309 | 3% | 0.0105 | 313 | 3% | 0.0064 | 622 | 2% |
| 350.1-400 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 769 | 6% | 0.0085 | 769 | 3% |
| 400.1-450 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 410 | 4% | 0.0054 | 0 | 0% | 0.0000 | 410 | 2% |
| 450.1-500 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 500.1-550 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 550.1-600 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 600.1-650 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 650.1-700 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 700.1-750 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 750.1-800 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 800.1-850 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 850.1-900 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 867 | 8% | 0.0073 | 0 | 0% | 0.0000 | 867 | 3% |
| 900.1-950 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | | 0% |
| 950.1-1000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 1000+ | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| Totals | 17 | 100% | | 2,597 | 100% | | 10,626 | 100% | | 11,980 | 100% | | 25,220 | 100% |

Table 2.24 Patch size analysis for deciduous leading mixedwood for the entire FMA area (ETAR—edge-to-area ratio).

| Patch Size Class (ha) | 0 to 20 years | | | 21 to 40 years | | | 41 to 80 years | | | 80+ years | | | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent | ETAR | ha | Percent |
| 0-50 | 3 | 100% | 0.0408 | 873 | 52% | 0.0383 | 2,273 | 73% | 0.2379 | 5,145 | 63% | 0.2930 | 8,294 | 64% |
| 50.1-100 | 0 | 0% | 0.0000 | 365 | 22% | 0.0096 | 345 | 11% | 0.0159 | 744 | 9% | 0.0115 | 1,455 | 11% |
| 100.1-150 | 0 | 0% | 0.0000 | 261 | 15% | 0.0126 | 209 | 7% | 0.0111 | 662 | 8% | 0.0089 | 1,133 | 9% |
| 150.1-200 | 0 | 0% | 0.0000 | 191 | 11% | 0.0052 | 0 | 0% | 0.0000 | 333 | 4% | 0.0092 | 523 | 4% |
| 200.1-250 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 250.1-300 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 267 | 9% | 0.0080 | 535 | 7% | 0.0104 | 802 | 6% |
| 300.1-350 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 343 | 4% | 0.0065 | 343 | 3% |
| 350.1-400 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 369 | 5% | 0.0082 | 369 | 3% |
| 400.1-450 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 450.1-500 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 500.1-550 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 550.1-600 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 600.1-650 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 650.1-700 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 700.1-750 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 750.1-800 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 800.1-850 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 850.1-900 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 900.1-950 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 950.1-1000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| 1000+ | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% | 0.0000 | 0 | 0% |
| Totals | 3 | 100% | | 1,691 | 100% | | 3,094 | 100% | | 8,131 | 100% | | 12,919 | 100% |

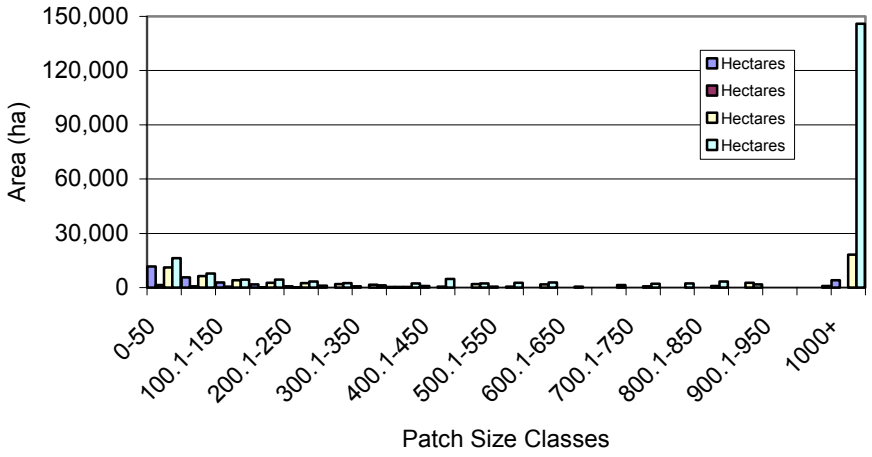



Figure 2.27 Patch Size Analysis for Pure Conifer Species Group (Entire FMA Area)

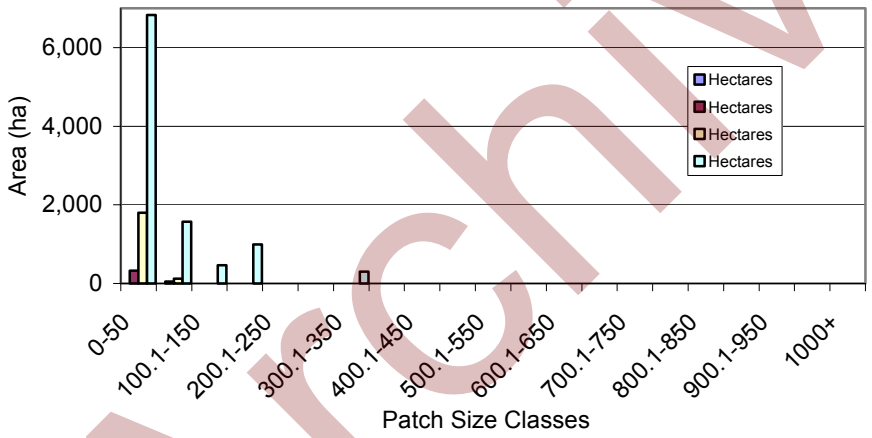



Figure 2.28 Patch Size Analysis for Conifer Leading Mixedwood (Entire FMA Area).

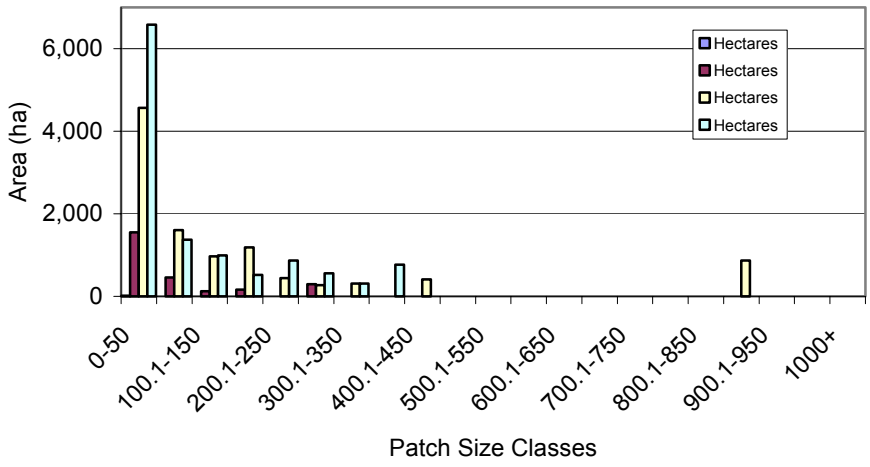



Figure 2.29 Patch Size Analysis for Pure Deciduous Group (Entire FMA Area).

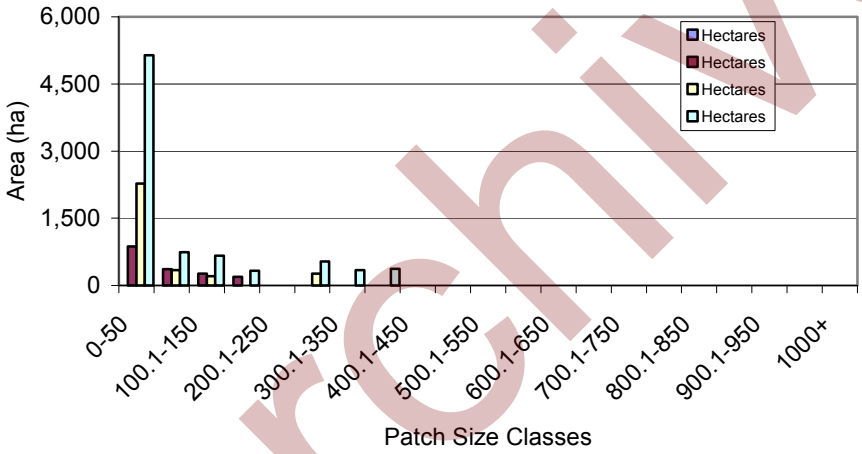



Figure 2.30 Patch Size Analysis for Decidous Leading Species Group (Entire FMA Area)

Table 2.25 Patch size analysis, by natural subregion (entire FMA area)

| Area by Natural Subregion For Each Patch Size Class | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Patch Size (ha) | Central Mixedwood | | Lower Foothills | | Upper Foothills | | Sub-Alpine | | Table Total | |
| | Area (ha) | Percent | Area (ha) | Percent | Area (ha) | Percent | Area (ha) | Percent | Area (ha) | Percent |
| 0-50 | 3,291 | 38% | 55,184 | 32% | 22,008 | 12% | 503 | 3% | 80,986 | 22% |
| 50.1-100 | 858 | 10% | 18,513 | 11% | 10,767 | 6% | 478 | 3% | 30,616 | 8% |
| 100.1-150 | 866 | 10% | 10,834 | 6% | 6,214 | 3% | 130 | 1% | 18,045 | 5% |
| 150.1-200 | 882 | 10% | 8,462 | 5% | 4,441 | 2% | 350 | 2% | 14,135 | 4% |
| 200.1-250 | 240 | 3% | 6,144 | 4% | 3,828 | 2% | 0 | 0% | 10,212 | 3% |
| 250.1-300 | 558 | 6% | 5,489 | 3% | 3,237 | 2% | 0 | 0% | 9,284 | 2% |
| 300.1-350 | 0 | 0% | 2,926 | 2% | 2,310 | 1% | 0 | 0% | 5,236 | 1% |
| 350.1-400 | 1,182 | 13% | 2,901 | 2% | 2,615 | 1% | 0 | 0% | 6,698 | 2% |
| 400.1-450 | 437 | 5% | 3,428 | 2% | 3,006 | 2% | 0 | 0% | 6,871 | 2% |
| 450.1-500 | 452 | 5% | 2,348 | 1% | 1,888 | 1% | 0 | 0% | 4,688 | 1% |
| 500.1-550 | 0 | 0% | 1,550 | 1% | 4,177 | 2% | 0 | 0% | 5,727 | 2% |
| 550.1-600 | 0 | 0% | 3,429 | 2% | 2,303 | 1% | 0 | 0% | 5,732 | 2% |
| 600.1-650 | 0 | 0% | 614 | 0% | 635 | 0% | 0 | 0% | 1,249 | 0% |
| 650.1-700 | 0 | 0% | 1,336 | 1% | 1,366 | 1% | 685 | 5% | 3,386 | 1% |
| 700.1-750 | 0 | 0% | 1,457 | 1% | 2,194 | 1% | 0 | 0% | 3,652 | 1% |
| 750.1-800 | 0 | 0% | 2,373 | 1% | 754 | 0% | 0 | 0% | 3,127 | 1% |
| 800.1-850 | 0 | 0% | 850 | 0% | 3,317 | 2% | 0 | 0% | 4,167 | 1% |
| 850.1-900 | 0 | 0% | 1,734 | 1% | 4,369 | 2% | 0 | 0% | 6,103 | 2% |
| 900.1-950 | 0 | 0% | 0 | 0% | 1,859 | 1% | 0 | 0% | 1,859 | 0% |
| 950.1-1000 | 0 | 0% | 964 | 1% | 961 | 1% | 0 | 0% | 1,925 | 1% |
| 1000 + | 0 | 0% | 40,823 | 24% | 97,049 | 54% | 12,257 | 85% | 150,129 | 40% |
| Total Area (ha) | 8,766 | 100% | 171,359 | 100% | 179,298 | 100% | 14,402 | 100% | 373,826 | 100% |

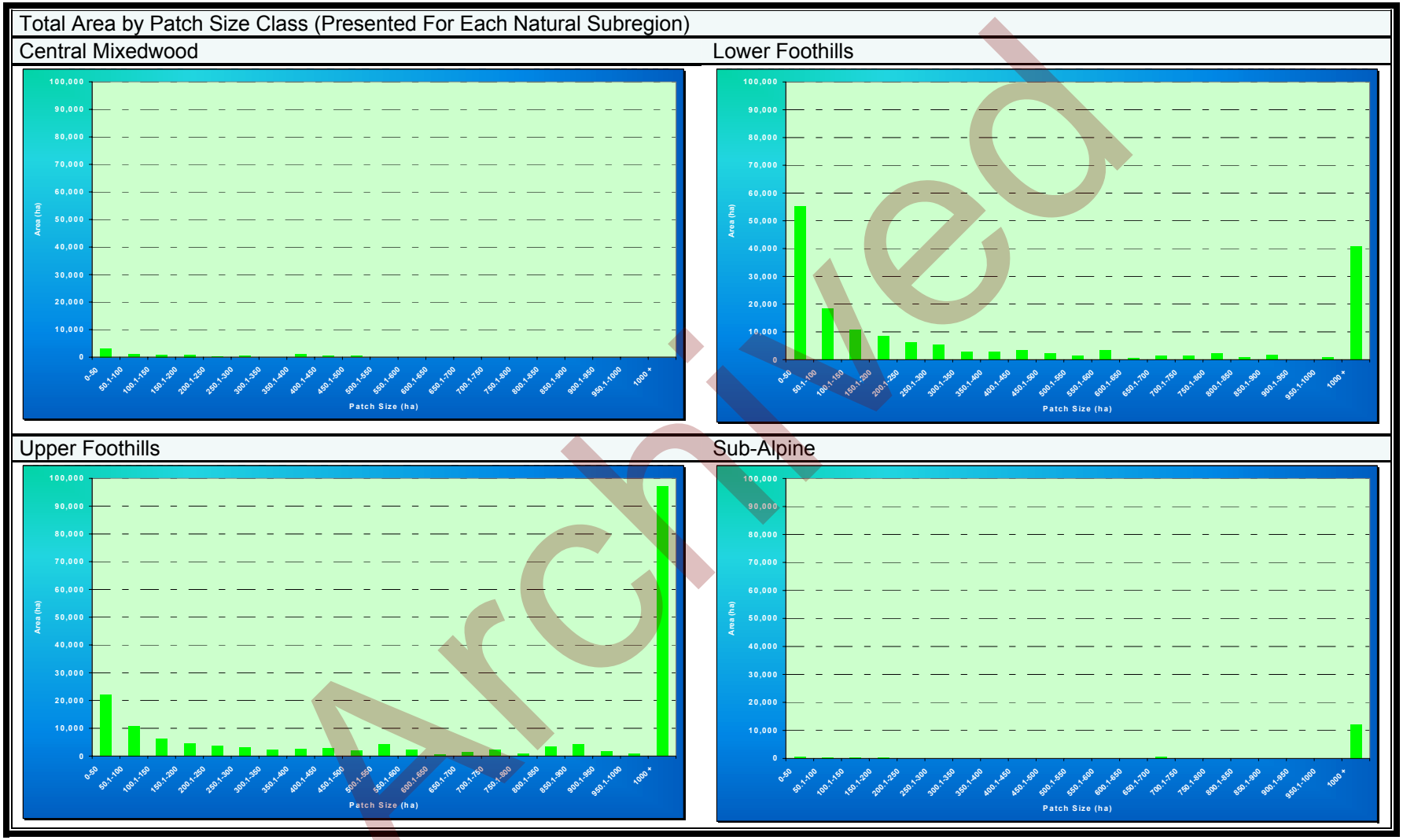



Figure 2.31 Patch Size Analysis, by Natural Subregion (Entire FMA Area)

Table 2.26 Patch size analysis for Caribou Zone and FMA area

| Patch Size (ha) | Caribou Zone | | | | Entire FMA Area | | | |
|---|---|---|---|---|---|---|---|---|
| | Area (ha) | Percent | # of Patches | Percent | Area (ha) | Percent | # of Patches | Percent |
| 0-50 | 21,531 | 13% | 2,872 | 90% | 80,986 | 22% | 11,690 | 93% |
| 50.1-100 | 10,713 | 6% | 154 | 5% | 30,616 | 8% | 447 | 4% |
| 100.1-150 | 6,291 | 4% | 51 | 2% | 18,045 | 5% | 148 | 1% |
| 150.1-200 | 4,488 | 3% | 26 | 1% | 14,135 | 4% | 82 | 1% |
| 200.1-250 | 2,747 | 2% | 12 | 0% | 10,212 | 3% | 45 | 0% |
| 250.1-300 | 3,004 | 2% | 11 | 0% | 9,284 | 2% | 34 | 0% |
| 300.1-350 | 671 | 0% | 2 | 0% | 5,236 | 1% | 16 | 0% |
| 350.1-400 | 2,549 | 1% | 7 | 0% | 6,698 | 2% | 18 | 0% |
| 400.1-450 | 2,152 | 1% | 5 | 0% | 6,871 | 2% | 16 | 0% |
| 450.1-500 | 1,881 | 1% | 4 | 0% | 4,688 | 1% | 10 | 0% |
| 500.1-550 | 3,673 | 2% | 7 | 0% | 5,727 | 2% | 11 | 0% |
| 550.1-600 | 2,265 | 1% | 4 | 0% | 5,732 | 2% | 10 | 0% |
| 600.1-650 | 0 | 0% | 0 | 0% | 1,249 | 0% | 2 | 0% |
| 650.1-700 | 1,359 | 1% | 2 | 0% | 3,386 | 1% | 5 | 0% |
| 700.1-750 | 1,451 | 1% | 2 | 0% | 3,652 | 1% | 5 | 0% |
| 750.1-800 | 754 | 0% | 1 | 0% | 3,127 | 1% | 4 | 0% |
| 800.1-850 | 831 | 0% | 1 | 0% | 4,167 | 1% | 5 | 0% |
| 850.1-900 | 1,775 | 1% | 2 | 0% | 6,103 | 2% | 7 | 0% |
| 900.1-950 | 934 | 1% | 1 | 0% | 1,859 | 0% | 2 | 0% |
| 950.1-1000 | 0 | 0% | 0 | 0% | 1,925 | 1% | 2 | 0% |
| 1000 + | 102,948 | 60% | 19 | 1% | 150,129 | 40% | 39 | 0% |
| Total Area (ha) | 172,017 | 100% | 3,183 | 100% | 373,826 | 100% | 12,598 | 100% |

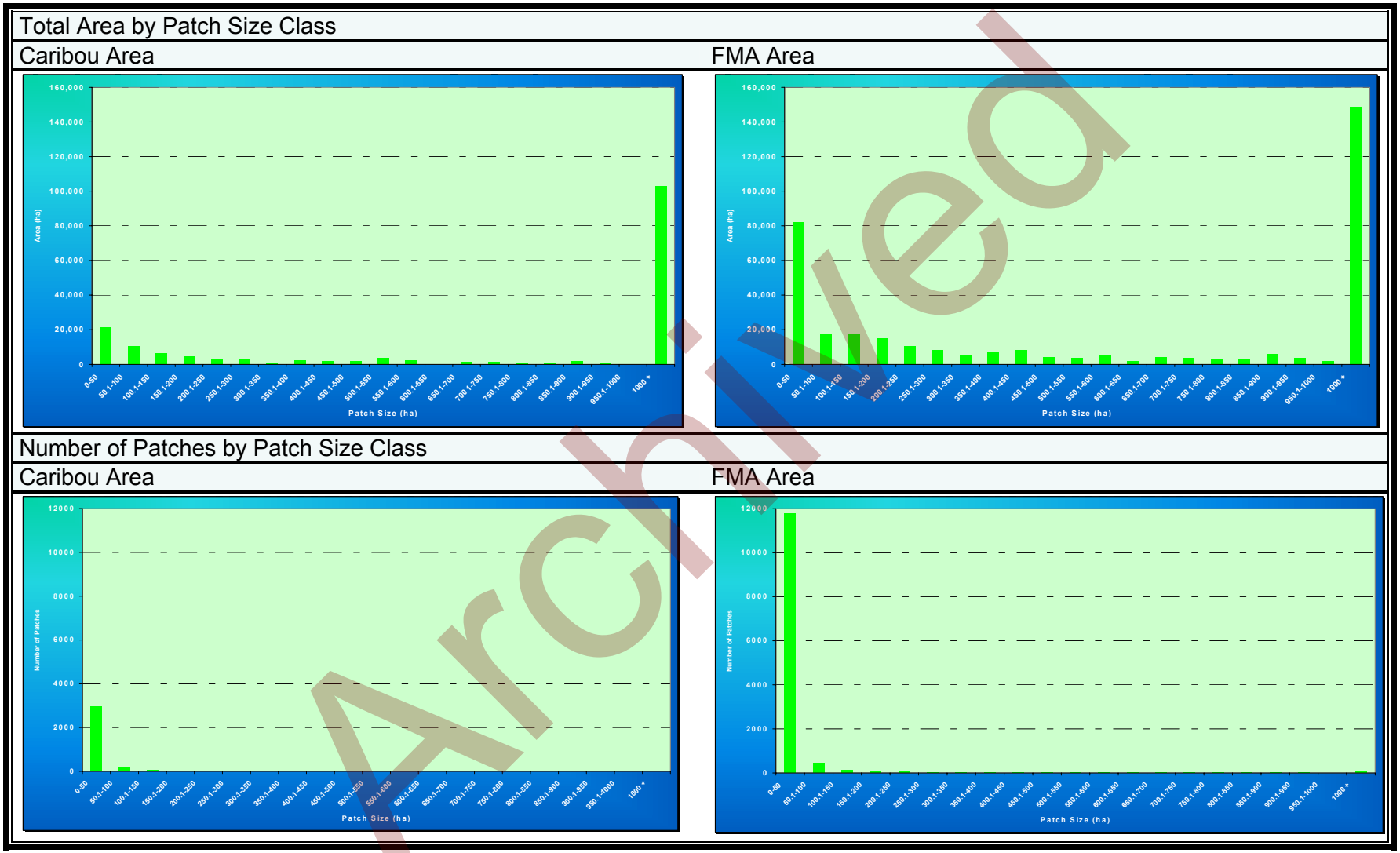



Figure 2.32 Patch Size Analysis for Caribou Region and FMA Area

### 2.3.4.2. Edge-to-area Area Ratio

The edge/area ratio was determined for each individual patch by dividing the perimeter of a patch (in meters) by the area of that patch (in hectares). The mean of these ratios was then determined for each species group/age class and is presented in Table 2.27.

Table 2.27 Mean edge/area ratio (m of edge per ha), by species group and age class[1]

| Mean Edge/Area Ratio (m of edge per ha) by Species Group and Age Class | | | | | |
|---|---|---|---|---|---|
| Species Group | Age Class | | | | |
| | 0 – 20 | 21 – 40 | 41 – 80 | 80+ | No Age |
| C | 183 | 250 | 269 | 278 | 0 |
| CD | 533 | 346 | 271 | 273 | 0 |
| DC | 408 | 283 | 276 | 274 | 0 |
| D | 400 | 321 | 271 | 290 | 0 |
| Non-Forested | 0 | 0 | 0 | 0 | 374 |

[1] Some sliver polygons existed in the data (a result of GIS overlays). All polygons less than 0.5 ha in size were removed from the analysis.

### 2.3.4.3. Linear Disturbance

The length of each disturbance type was determined by summing the length of all linear features present in the base data. The types of linear disturbance were derived from the base data: class 1-3 roads classified as permanent, class 4 and 5 roads classified as temporary roads, railways and pipelines classified as utility corridors and trails classified as seismic lines. The linear density was calculated by dividing the total area in each compartment ($km^2$) by the length of disturbance. Tables 2.28-2.31 list the linear density by compartment.

Table 2.28 Linear disturbance in Berland Sustained Yield Unit (By compartment)

| | | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | | Table Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Compartment | Area ($km^2$) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) |
| E6-1 | 118.4 | 0.29 | 34.7 | 0.19 | 22.0 | 0.01 | 1.2 | 4.33 | 512.5 | 4.82 | 570.4 |
| E6-2 | 36.3 | 0.00 | 0.1 | 0.08 | 2.8 | 0.00 | 0.0 | 4.55 | 165.2 | 4.63 | 168.0 |
| E6-3 | 49.4 | 0.00 | 0.0 | 0.02 | 0.9 | 0.00 | 0.0 | 4.81 | 237.7 | 4.83 | 238.5 |
| E6-4 | 29.2 | 0.50 | 14.6 | 0.27 | 7.8 | 0.00 | 0.0 | 5.38 | 157.0 | 6.15 | 179.4 |
| E6 Total | 233.3 | 0.21 | 49.4 | 0.14 | 33.4 | 0.01 | 1.2 | 4.60 | 1072.3 | 4.96 | 1156.3 |

Table 2.29 Linear Disturbance in Foothills Sustained Yield Unit (By Compartment)

| | | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | | Table Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Compartment | Area ($km^2$) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) |
| E7-1 | 60.8 | 0.29 | 17.6 | 0.01 | 0.5 | 0.10 | 6.3 | 4.24 | 257.9 | 4.64 | 282.3 |
| E7-2 | 69.6 | 0.42 | 29.0 | 0.01 | 0.8 | 0.05 | 3.7 | 3.86 | 268.8 | 4.34 | 302.3 |
| E7-3 | 38.6 | 0.43 | 16.7 | 0.04 | 1.7 | 0.20 | 7.6 | 3.84 | 148.1 | 4.51 | 174.1 |
| E7-4 | 35.9 | 0.24 | 8.5 | 0.13 | 4.8 | 0.00 | 0.0 | 4.51 | 161.6 | 4.88 | 175.0 |
| E7-5 | 35.0 | 0.19 | 6.5 | 0.12 | 4.1 | 0.00 | 0.0 | 2.41 | 84.2 | 2.71 | 94.8 |
| E7-6 | 77.6 | 0.07 | 5.3 | 0.06 | 4.8 | 0.00 | 0.0 | 2.25 | 174.3 | 2.38 | 184.4 |
| E7-7 | 113.1 | 0.07 | 7.6 | 0.08 | 8.6 | 0.03 | 3.9 | 2.52 | 285.3 | 2.70 | 305.4 |
| E7-8 | 102.6 | 0.08 | 8.1 | 0.02 | 2.2 | 0.00 | 0.0 | 2.08 | 213.8 | 2.18 | 224.1 |
| E7-9 | 39.5 | 0.00 | 0.0 | 0.10 | 4.0 | 0.00 | 0.0 | 2.88 | 113.8 | 2.98 | 117.8 |
| E7-10 | 57.3 | 0.00 | 0.0 | 0.10 | 5.9 | 0.00 | 0.0 | 1.42 | 81.3 | 1.52 | 87.2 |
| E7-11 | 58.9 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 1.46 | 86.1 | 1.46 | 86.1 |
| E7-12 | 42.2 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 1.31 | 55.1 | 1.31 | 55.1 |
| E7-13 | 67.0 | 0.00 | 0.0 | 0.00 | 0.2 | 0.00 | 0.0 | 1.36 | 90.9 | 1.36 | 91.0 |
| E7-14 | 64.0 | 0.09 | 5.6 | 0.07 | 4.2 | 0.10 | 6.1 | 1.50 | 96.1 | 1.75 | 111.9 |
| E7 Total | 862.0 | 0.12 | 104.9 | 0.05 | 41.6 | 0.03 | 27.6 | 2.46 | 2117.3 | 2.66 | 2291.5 |

Table 2.30 Linear disturbance in Little Smoky Sustained Yield Unit (By Compartment)

| Compartment | Area ($km^2$) | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | | Table Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) |
| W1-0 | 70.4 | 0.31 | 22.0 | 0.39 | 27.2 | 0.18 | 12.7 | 5.00 | 352.2 | 5.88 | 414.0 |
| W1-1 | 69.7 | 0.24 | 16.6 | 0.20 | 13.7 | 0.13 | 9.2 | 4.40 | 307.1 | 4.87 | 346.6 |
| W1-2 | 126.1 | 0.36 | 45.6 | 0.13 | 16.0 | 0.07 | 9.0 | 6.11 | 770.0 | 6.67 | 840.7 |
| W1-3 | 97.3 | 0.18 | 17.5 | 0.15 | 14.6 | 0.00 | 0.0 | 4.25 | 414.0 | 4.58 | 446.1 |
| W1-4 | 41.1 | 0.03 | 1.0 | 0.29 | 12.0 | 0.00 | 0.0 | 4.90 | 201.2 | 5.22 | 214.2 |
| W1-5 | 206.9 | 0.11 | 23.6 | 0.02 | 3.5 | 0.07 | 14.6 | 3.50 | 723.8 | 3.70 | 765.5 |
| W1-6 | 18.9 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 2.68 | 50.8 | 2.68 | 50.8 |
| W1-7 | 25.2 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 2.49 | 62.7 | 2.49 | 62.7 |
| W1-8 | 69.0 | 0.10 | 6.6 | 0.00 | 0.0 | 0.00 | 0.0 | 2.99 | 206.3 | 3.09 | 212.9 |
| W1-9 | 66.7 | 0.25 | 17.0 | 0.00 | 0.0 | 0.00 | 0.0 | 3.29 | 219.4 | 3.54 | 236.4 |
| W1-10 | 56.4 | 0.00 | 0.0 | 0.06 | 3.5 | 0.04 | 2.2 | 3.62 | 204.0 | 3.72 | 209.7 |
| W1-11 | 15.8 | 0.00 | 0.0 | 0.51 | 8.1 | 0.00 | 0.0 | 1.90 | 30.0 | 2.42 | 38.1 |
| W1-11A | 106.1 | 0.00 | 0.0 | 0.18 | 19.1 | 0.00 | 0.0 | 2.75 | 291.3 | 2.93 | 310.4 |
| W1-12 | 88.4 | 0.00 | 0.3 | 0.21 | 18.3 | 0.00 | 0.0 | 2.99 | 264.4 | 3.20 | 283.0 |
| W1-13 | 43.2 | 0.00 | 0.0 | 0.37 | 16.0 | 0.00 | 0.0 | 1.62 | 70.2 | 1.99 | 86.2 |
| W1-14 | 123.4 | 0.00 | 0.0 | 0.21 | 25.4 | 0.00 | 0.0 | 4.26 | 526.2 | 4.47 | 551.6 |
| W1-15 | 93.3 | 0.00 | 0.0 | 0.14 | 13.2 | 0.00 | 0.0 | 2.60 | 242.4 | 2.74 | 255.6 |
| W1-16 | 98.4 | 0.13 | 12.8 | 0.28 | 27.1 | 0.13 | 12.5 | 3.17 | 312.2 | 3.71 | 364.6 |
| W1-17 | 65.6 | 0.16 | 10.3 | 0.31 | 20.4 | 0.22 | 14.5 | 4.02 | 263.9 | 4.71 | 309.1 |
| W1-18 | 70.1 | 0.00 | 0.0 | 0.33 | 23.3 | 0.03 | 1.9 | 4.49 | 314.3 | 4.81 | 339.6 |
| W1-19 | 38.8 | 0.00 | 0.0 | 0.17 | 6.6 | 0.52 | 20.2 | 3.91 | 151.7 | 4.60 | 178.4 |
| W1-20 | 56.6 | 0.00 | 0.0 | 0.31 | 17.5 | 0.42 | 23.6 | 3.12 | 176.4 | 3.84 | 217.5 |
| W1-22 | 55.4 | 0.14 | 7.8 | 0.60 | 33.0 | 0.25 | 13.6 | 2.23 | 123.7 | 3.22 | 178.2 |
| W1-24 | 70.6 | 0.00 | 0.0 | 0.45 | 31.5 | 0.19 | 13.3 | 3.27 | 231.1 | 3.91 | 275.9 |
| W1-25 | 63.7 | 0.00 | 0.0 | 0.20 | 13.0 | 0.16 | 10.5 | 3.83 | 243.7 | 4.20 | 267.1 |
| W1-26 | 89.7 | 0.00 | 0.0 | 0.35 | 31.0 | 0.05 | 4.3 | 3.01 | 270.3 | 3.41 | 305.6 |
| W1-27 | 115.9 | 0.00 | 0.0 | 0.47 | 54.2 | 0.18 | 21.0 | 2.35 | 271.9 | 3.00 | 347.2 |
| W1-28 | 29.3 | 0.00 | 0.0 | 0.00 | 0.0 | 0.09 | 2.6 | 3.33 | 97.4 | 3.42 | 99.9 |
| W1-29 | 66.7 | 0.03 | 1.7 | 0.16 | 10.5 | 0.16 | 10.7 | 2.58 | 172.0 | 2.92 | 194.9 |
| W1-30 | 55.0 | 0.04 | 2.1 | 0.40 | 21.9 | 0.26 | 14.4 | 2.56 | 140.6 | 3.26 | 179.1 |
| W1-31 | 32.1 | 0.27 | 8.6 | 0.17 | 5.3 | 0.22 | 6.9 | 3.35 | 107.3 | 4.00 | 128.2 |
| W1-32 | 30.9 | 0.07 | 2.1 | 0.07 | 2.2 | 0.13 | 4.1 | 3.15 | 97.4 | 3.43 | 105.8 |
| W1 Total | 2256.4 | 0.08 | 195.7 | 0.22 | 488.2 | 0.10 | 221.7 | 3.51 | 7909.9 | 3.90 | 8815.5 |

Table 2.31 Linear disturbance in Pine Sustained Yield Unit (By Compartment)

| Compartment | Area ($km^2$) | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | | Table Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) | Linear Density ($km/km^2$) | Length (km) |
| W8-1 | 7.8 | 0.00 | 0.0 | 0.00 | 0.0 | 0.72 | 5.6 | 4.68 | 36.5 | 5.40 | 42.1 |
| W8-2 | 32.9 | 0.00 | 0.0 | 0.00 | 0.0 | 0.11 | 3.8 | 4.94 | 162.3 | 5.06 | 166.1 |
| W8-3 | 27.3 | 0.23 | 6.3 | 0.39 | 10.8 | 0.08 | 2.2 | 4.65 | 126.9 | 5.36 | 146.1 |
| W8-4 | 43.1 | 0.15 | 6.3 | 0.03 | 1.5 | 0.32 | 13.7 | 3.24 | 139.6 | 3.74 | 161.1 |
| W8-5 | 36.9 | 0.35 | 13.0 | 0.53 | 19.7 | 0.69 | 25.4 | 2.40 | 88.5 | 3.97 | 146.6 |
| W8-6 | 37.6 | 0.76 | 28.5 | 0.56 | 21.1 | 0.66 | 24.9 | 3.04 | 114.6 | 5.03 | 189.2 |
| W8-7 | 8.4 | 0.03 | 0.2 | 0.48 | 4.0 | 0.41 | 3.4 | 1.00 | 8.4 | 1.91 | 16.0 |
| W8-8 | 11.9 | 0.23 | 2.7 | 0.26 | 3.1 | 0.51 | 6.1 | 1.88 | 22.5 | 2.88 | 34.4 |
| W8-9 | 11.2 | 0.20 | 2.2 | 0.00 | 0.1 | 0.35 | 3.9 | 3.14 | 35.1 | 3.70 | 41.4 |
| W8-10 | 34.0 | 0.38 | 13.0 | 0.36 | 12.1 | 0.16 | 5.5 | 3.18 | 108.1 | 4.09 | 138.8 |
| W8-11 | 21.1 | 0.80 | 16.9 | 0.18 | 3.9 | 0.15 | 3.2 | 3.84 | 81.1 | 4.97 | 105.1 |
| W8-12A | 37.9 | 0.29 | 10.9 | 0.24 | 9.2 | 0.15 | 5.7 | 3.55 | 134.8 | 4.23 | 160.5 |
| W8-12B | 38.5 | 0.23 | 8.8 | 0.42 | 16.0 | 0.45 | 17.2 | 5.29 | 203.5 | 6.38 | 245.6 |
| W8-13 | 14.6 | 0.35 | 5.1 | 0.02 | 0.3 | 0.00 | 0.0 | 2.70 | 39.4 | 3.07 | 44.8 |
| W8-14 | 23.4 | 0.14 | 3.2 | 0.16 | 3.7 | 0.12 | 2.8 | 3.06 | 71.8 | 3.48 | 81.6 |
| W8 Total | 386.6 | 0.30 | 117.2 | 0.27 | 105.4 | 0.32 | 123.3 | 3.55 | 1373.2 | 4.45 | 1719.2 |

Table 2.31 Continued

Berland Sustained Yield Unit Crossing Densities

| Compartment | Area ($km^2$) | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Number | Density (#/km2) | Total Number | Density (#/km2) | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) |
| E6-1 | 118 | 14 | 0.12 | 6 | 0.05 | 0 | 0.00 | 216 | 1.82 |
| E6-2 | 36 | 0 | 0.00 | 1 | 0.03 | 0 | 0.00 | 67 | 1.85 |
| E6-3 | 49 | 0 | 0.00 | 1 | 0.02 | 0 | 0.00 | 70 | 1.42 |
| E6-4 | 29 | 5 | 0.17 | 2 | 0.07 | 0 | 0.00 | 87 | 2.98 |
| Table Total | 233 | 19 | 0.08 | 10 | 0.04 | 0 | 0.00 | 440 | 1.89 |

Foothills Sustained Yield Unit Crossing Densities

| Compartment | Area ($km^2$) | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Number | Density (#/km2) | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) |
| E7-1 | 61 | 6 | 0.10 | 0 | 0.00 | 4 | 0.07 | 238 | 3.91 |
| E7-2 | 70 | 8 | 0.11 | 1 | 0.01 | 1 | 0.01 | 193 | 2.77 |
| E7-3 | 39 | 7 | 0.18 | 2 | 0.05 | 4 | 0.10 | 116 | 3.01 |
| E7-4 | 36 | 7 | 0.20 | 1 | 0.03 | 0 | 0.00 | 107 | 2.98 |
| E7-5 | 35 | 2 | 0.06 | 1 | 0.03 | 0 | 0.00 | 41 | 1.17 |
| E7-6 | 78 | 3 | 0.04 | 3 | 0.04 | 0 | 0.00 | 101 | 1.30 |
| E7-7 | 113 | 3 | 0.03 | 6 | 0.05 | 0 | 0.00 | 107 | 0.95 |
| E7-8 | 103 | 3 | 0.03 | 0 | 0.00 | 0 | 0.00 | 98 | 0.96 |
| E7-9 | 40 | 0 | 0.00 | 1 | 0.03 | 0 | 0.00 | 65 | 1.65 |
| E7-10 | 57 | 0 | 0.00 | 3 | 0.05 | 0 | 0.00 | 74 | 1.29 |
| E7-11 | 59 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 48 | 0.82 |
| E7-12 | 42 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 40 | 0.95 |
| E7-13 | 67 | 2 | 0.03 | 0 | 0.00 | 0 | 0.00 | 87 | 1.30 |
| E7-14 | 64 | 1 | 0.02 | 2 | 0.03 | 1 | 0.02 | 81 | 1.27 |
| Table Total | 862 | 42 | 0.05 | 20 | 0.02 | 10 | 0.01 | 1396 | 1.62 |

Table 2.31 Continued

Little Smoky Sustained Yield Unit Crossing Densities

| Compartment | Area ($km^2$) | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) |
| W1-0 | 70 | 4 | 0.06 | 7 | 0.10 | 7 | 0.10 | 120 | 1.70 |
| W1-1 | 70 | 7 | 0.10 | 1 | 0.01 | 4 | 0.06 | 123 | 1.76 |
| W1-2 | 126 | 10 | 0.08 | 3 | 0.02 | 2 | 0.02 | 290 | 2.30 |
| W1-3 | 97 | 6 | 0.06 | 2 | 0.02 | 0 | 0.00 | 264 | 2.71 |
| W1-4 | 41 | 0 | 0.00 | 4 | 0.10 | 2 | 0.05 | 115 | 2.80 |
| W1-5 | 207 | 8 | 0.04 | 1 | 0.00 | 7 | 0.03 | 263 | 1.27 |
| W1-6 | 19 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 40 | 2.11 |
| W1-7 | 25 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 45 | 1.79 |
| W1-8 | 69 | 4 | 0.06 | 0 | 0.00 | 0 | 0.00 | 89 | 1.29 |
| W1-9 | 67 | 6 | 0.09 | 0 | 0.00 | 0 | 0.00 | 132 | 1.98 |
| W1-10 | 56 | 0 | 0.00 | 0 | 0.00 | 1 | 0.02 | 90 | 1.60 |
| W1-11 | 16 | 0 | 0.00 | 6 | 0.38 | 0 | 0.00 | 21 | 1.33 |
| W1-11A | 106 | 0 | 0.00 | 6 | 0.06 | 0 | 0.00 | 110 | 1.04 |
| W1-12 | 88 | 1 | 0.01 | 13 | 0.15 | 0 | 0.00 | 149 | 1.69 |
| W1-13 | 43 | 0 | 0.00 | 9 | 0.21 | 0 | 0.00 | 55 | 1.27 |
| W1-14 | 123 | 0 | 0.00 | 11 | 0.09 | 0 | 0.00 | 233 | 1.89 |
| W1-15 | 93 | 0 | 0.00 | 9 | 0.10 | 0 | 0.00 | 172 | 1.84 |
| W1-16 | 98 | 3 | 0.03 | 4 | 0.04 | 8 | 0.08 | 129 | 1.31 |
| W1-17 | 66 | 2 | 0.03 | 6 | 0.09 | 2 | 0.03 | 152 | 2.32 |
| W1-18 | 70 | 0 | 0.00 | 5 | 0.07 | 1 | 0.01 | 94 | 1.34 |
| W1-19 | 39 | 1 | 0.03 | 4 | 0.10 | 12 | 0.31 | 43 | 1.11 |
| W1-20 | 57 | 0 | 0.00 | 7 | 0.12 | 7 | 0.12 | 48 | 0.85 |
| W1-22 | 55 | 2 | 0.04 | 9 | 0.16 | 7 | 0.13 | 55 | 0.99 |
| W1-24 | 71 | 0 | 0.00 | 7 | 0.10 | 5 | 0.07 | 76 | 1.08 |
| W1-25 | 64 | 0 | 0.00 | 4 | 0.06 | 4 | 0.06 | 42 | 0.66 |
| W1-26 | 90 | 0 | 0.00 | 8 | 0.09 | 2 | 0.02 | 103 | 1.15 |
| W1-27 | 116 | 0 | 0.00 | 16 | 0.14 | 9 | 0.08 | 101 | 0.87 |
| W1-28 | 29 | 0 | 0.00 | 0 | 0.00 | 1 | 0.03 | 45 | 1.54 |
| W1-29 | 67 | 0 | 0.00 | 4 | 0.06 | 5 | 0.07 | 58 | 0.87 |
| W1-30 | 55 | 0 | 0.00 | 17 | 0.31 | 10 | 0.18 | 82 | 1.49 |
| W1-31 | 32 | 4 | 0.12 | 3 | 0.09 | 4 | 0.12 | 52 | 1.62 |
| W1-32 | 31 | 1 | 0.03 | 0 | 0.00 | 1 | 0.03 | 58 | 1.88 |
| W1 Total | 2,256 | 59 | 0.03 | 166 | 0.07 | 101 | 0.04 | 3449 | 1.53 |

Table 2.31 Continued

Pine Sustained Yield Unit Crossing Densities

| Compartment | Area ($km^2$) | Permanent Roads | | Temporary Roads | | Utility Corridors | | Seismic Lines | |
|---|---|---|---|---|---|---|---|---|---|
| | | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) | Total Number | Density (#/$km^2$) |
| W8-1 | 8 | 0 | 0.00 | 0 | 0.00 | 2 | 0.26 | 13 | 1.67 |
| W8-2 | 33 | 0 | 0.00 | 0 | 0.00 | 1 | 0.03 | 79 | 2.40 |
| W8-3 | 27 | 2 | 0.07 | 1 | 0.04 | 0 | 0.00 | 53 | 1.94 |
| W8-4 | 43 | 4 | 0.09 | 1 | 0.02 | 5 | 0.12 | 52 | 1.21 |
| W8-5 | 37 | 1 | 0.03 | 13 | 0.35 | 18 | 0.49 | 83 | 2.25 |
| W8-6 | 38 | 3 | 0.08 | 10 | 0.27 | 8 | 0.21 | 65 | 1.73 |
| W8-7 | 8 | 1 | 0.12 | 1 | 0.12 | 3 | 0.36 | 8 | 0.96 |
| W8-8 | 12 | 0 | 0.00 | 1 | 0.08 | 7 | 0.59 | 10 | 0.84 |
| W8-9 | 11 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 21 | 1.88 |
| W8-10 | 34 | 6 | 0.18 | 8 | 0.24 | 3 | 0.09 | 88 | 2.59 |
| W8-11 | 21 | 16 | 0.76 | 4 | 0.19 | 4 | 0.19 | 84 | 3.97 |
| W8-12A | 38 | 8 | 0.21 | 2 | 0.05 | 4 | 0.11 | 164 | 4.32 |
| W8-12B | 39 | 0 | 0.00 | 14 | 0.36 | 7 | 0.18 | 176 | 4.57 |
| W8-13 | 15 | 1 | 0.07 | 0 | 0.00 | 0 | 0.00 | 34 | 2.33 |
| W8-14 | 23 | 3 | 0.13 | 6 | 0.26 | 3 | 0.13 | 61 | 2.60 |
| W8 Total | 387 | 45 | 0.12 | 61 | 0.16 | 65 | 0.17 | 991 | 2.56 |

### 2.3.5 Wildlife Species

This section addresses wildlife species that may be sensitive to forest management activities and which may be found within and around the FMA area. Lisa Wilkinson (Endangered Species Biologist, Natural Resources Service, Northern East Slopes region) provided a list of species that might be sensitive to forest management activities and that are known to inhabit this region. From this list we focused primarily on species that are 'At Risk' or 'May Be At Risk' (AE/SRD 2000). These species no longer have the capability to endure the cumulative effects of habitat loss, degradation, isolation, and increased competition and\or high sensitivity to human disturbance. Table 2.32 lists and describes the status categories. Table 2.33 lists the species of concern. Alberta Sustainable Resource Development will be notified upon discovery of any species of concern (defined in Table 2.33) by ANC or their agents. Appendix 3 lists the status ranking for wildlife species in Alberta.

Table 2.32 General status categories and descriptions

| Rank (2000) | Equivalent Previous Rank (1996) | Definition |
|---|---|---|
| At Risk | Red | Any species known to be 'At Risk' after formal detailed status assessment and designation as 'Endangered' or 'Threatened' in Alberta |
| May Be At Risk | Blue | Any species that may be at risk of extinction or extirpation, and is therefore a candidate for detailed risk assessment. |
| Sensitive | Yellow | Any species that is not at risk if extinction or extirpation but that may require special attention or protection to prevent it from becoming at risk. |
| Secure | Green | A species that is not 'At Risk', 'May Be At Risk' or 'Sensitive' |
| Undetermined | Status Undetermined | Any species for which insufficient information, knowledge or data is available to reliably evaluate its general status. |
| Not Assessed | n/a | Any species that has not been examined for the 2000 status report |
| Exotic/Alien | n/a | Any species that has been introduced as a result of human activities |
| Extirpated/Extinct | n/a | Any species that no longer thought to be present in Alberta ('Extirpated' or no longer believed to be present anywhere in the world ('Extinct') |
| Accidental/Vagrant | n/a | Any species occurring infrequently and unpredictably in Alberta i.e. outside of its usual range. (These species may be in Alberta due to unusual weather occurrences, an accident during migration, or an unusual breeding behaviour by a small number of individuals. If a species appears in Alberta with increasing predictability and more frequently, it may eventually be given a different rank.) |

Source: Alberta Environment/Sustainable Resource Development 2000

Table 2.33 Species of concern within the ANC FMA area, listed by status rank

| Rank | Common Name | Scientific Name |
|---|---|---|
| At Risk | Trumpeter Swan | *Cygnus buccinator* |
| | Woodland caribou | *Rangifer tarandus caribou* |
| May Be At Risk | Canadian Toad | *Bufo hemiophrys* |
| | Northern long-eared bat | *Myotis septentrionalis* |
| | Grizzly bear | *Ursus arctos* |
| | Wolverine | *Gulo gulo* |
| Sensitive | Long-toed salamander | *Ambystoma macrodactylum* |
| | Black throated green warbler | *Dendroica virens* |
| | Cape May warbler | *Dendroica tigrina* |

### 2.3.5.1. Amphibians

***May Be At Risk***

Canadian Toad (*Bufo hemiophrys*)

Distribution

The Canadian toad (*Bufo hemiophrys*) is limited, primarily, to the eastern half of Alberta, with isolated populations in Fort McMurray, and as far west as Slave Lake and the Rocky Mountain House area (Hamilton *et al*. 1998). There has been an occurrence of this species within the Athabasca river drainage, which overlaps with the southeastern portion of the FMA area. The Canadian toad is confined to elevations below 1,000 m in elevation (Hamilton *et al*. 1998).

Habitat Requirements

Critical habitat requirements for this species address foraging, escape cover, breeding, and over-wintering. The following lists the requirements and habitat types preferred for each of these life requisites.

Foraging/Escape Cover

The Canadian toad primarily feeds on terrestrial invertebrates including earthworms, beetles, and ants, which can be found in a variety of different habitat types. Predators include raptors such as northern harrier, red-tailed hawk, broad-winged hawk, and Cooper's hawk. However, the Canadian toad is most vulnerable during the tadpole stage when they are preyed upon by almost all carnivorous aquatic species. Egg laying habitat is critical because ephemeral ponds are more susceptible to desiccation, while permanent water bodies have higher competition and predator pressures. Thus, aquatic vegetation must be present to protect eggs and larvae from predation and displacement by water currents.

Breeding/Over-wintering

During the breeding season, the toad spends approximately two months in water or adjacent riparian habitats. Spawning habitats include natural ponds, burrow pits, streams, and lake margins, while permanent wetlands are preferred for breeding. After breeding, toads move to upland sites until the next breeding

season. Thus, suitable hibernacula are required for over-wintering. Suitable hibernacula sites include sandy soils and previously dug excavations (*i.e.*, ground squirrel burrows), and may be several hundred metres away from permanent wetlands. It is essential that the toad burrow to below the frost line in these hibernacula.

Status and Management

The Canadian toad is currently thought to be at risk of declining to population levels too small to be viable. It is designated under the Alberta Wildlife Act as a "non-game animal" and as such, it may not be killed, possessed or sold without a permit (Hamilton *et al*. 1998). There are several forestry–amphibian related research projects occurring in northeastern Alberta (Hamilton *et al*. 1998), which could be adapted for use in a province-wide management program.

***Sensitive***

Long-toed salamander (*Ambystoma macrodactylum*)

Distribution

The majority of long-toed salamander (*Ambystoma macrodactylum*) populations in Alberta are concentrated in mountain passes and associated river valleys (Graham and Powell 1999). Maximum elevations for this species in Alberta range from 2260 m in the south to 1495 m in the north (Powell *et al*. 1997). There are nine distinct populations in Alberta, and these distinct populations are often associated with particular river valleys (Graham and Powell 1999). The southeast corner of the ANC FMA area encompasses portions of the Athabasca river drainage and there are 43 known locations of long-toed salamanders within this drainage, although none have been directly observed or reported within the FMA area.

Habitat Requirements

Critical habitat requirements for this species address foraging, escape cover, breeding, and over-wintering. The following lists the requirements and habitat types preferred for each of these life requisites.

Foraging/Escape Cover

Larvae feed on a variety of prey including insects, crustacean zooplankton, and amphibian larvae (Sheppard 1997). Escape avoidance strategies are primarily related to habitat preferences during the larval stage with eggs usually being laid in shallow lakes void of predatory fish. During the adult stage, cover is usually found under downed woody debris in forested stands adjacent to water bodies.

Breeding/Over-wintering

The long-toed salamander requires both aquatic and terrestrial habitat for breeding (Graham and Powell 1999). Breeding habitat consists of lakes or ponds, and preferred lakes are often large and shallow, with boggy edges and aquatic vegetation (Hamilton *et al*. 1996; Graham 1997). Lakes with little aquatic vegetation may also be used, provided adjoining wetlands can provide the necessary habitat for egg laying (Graham 1997). Larvae are generally not found in ponds with predatory fish such as rainbow trout (*Oncorhychus mykiss*). There

is little information available on the over-wintering behaviour of the long-toed salamander (Graham and Powell 1999). However, there has been one study (Sheppard 1977) that examined a group of salamanders over-wintering in the Bow river valley. These hibernating groups were comprised of 8–14 mostly adult individuals, buried 50–70 cm below the surface in loose gravel (Sheppard 1977). Each group was located near large spruce trees in low, well-wooded areas with relatively high moisture and where snow cover remained until spring (Sheppard 1997).

Status and Management

The long-toed salamander does not appear to be in immediate danger of extirpation in Alberta (Graham and Powell 1999). However, populations of this species are not widespread and there is limited information regarding their natural history and the long-term effects of anthropomorphic habitat alterations on the long-toed salamander population.

### 2.3.5.2. Birds

***At Risk***

Trumpeter Swan (Cygnus buccinator)

Distribution

The trumpeter swan (*Cygnus buccinator*) is the largest native waterfowl species in North America. The population of swans occurring in Alberta is one of three known existing populations belonging to the Rocky Mountain subpopulation (Subcommittee on the Interior Population of Trumpeter Swans 1997). The largest local populations in Alberta are found in the Grande Prairie area within the Peace River Parkland Subregion. However, the swans are also colonizing areas west of Manning, Whitecourt and Edson (James 2000). There have been confirmed observations of trumpeter swans in the ANC FMA area (AE and ACA 2001). Trumpeter swans leave Alberta in early to mid-November and migrate to the United States for over-wintering.

Habitat Requirements

Critical habitat requirements for this species address foraging, cover, and nesting. The following lists the requirements and habitat types preferred for each of these life requisites.

Foraging

The trumpeter swan is primarily a herbivorous species, foraging on seeds, stems, leaves, and roots of submergent vegetation. However, newly hatched chicks feed primarily on insects, mollusks and crustaceans before becoming herbivorous. The swan prefers shallow, stable water with a relatively static level. The lake/pond must be shallow so as not to preclude foraging for lower aquatic plant parts (Pawlina et al. 2000).

Cover

The swan is found in small to medium-sized, shallow, isolated lakes with well-developed, submergent and emergent vegetation. Eggs and young are highly vulnerable to predation although few natural predators will approach the nest when guarded by the parents (Pawlina et al. 2000). The following habitat types serve as cover habitat for the swan: 1.) long, deep, narrow lakes for summering or staging areas, 2.) perched basins and associated terraces; 3.) valley bottom outflow streams that are linked to beaver ponds or perched basins; and 4.) oxbow wetlands associated with major river areas (Pawlina et al. 2000).

Nesting

The swan is a territorial species and will nest in the same lakes considered suitable for cover habitat. There is usually only one breeding pair of swans per lake and non-breeding individuals congregate on lakes not used for breeding. Nests are built on extensive mats of vegetation including, sedges, bulrushes, cattails, rushes, and horsetails. Nests are usually in water around 0.3–1.0 m deep (Pawlina et al. 2000).

Status and Management

Existing trumpeter swan habitat in Alberta is protected. However, there is a critical shortage of key wintering habitat in the United States, which may affect population growth (Anonymous 1996). ANC will adhere to provincial recommendations by maintaining a permanent forest buffer of 500 m around lakes or riparian areas known to have trumpeter swans, particularly in the sensitive time period between May 1 and Sept 30, as an operational timing constraint.

***Sensitive***

Black throated green warbler (*Dendroica virens*)

Distribution

The black-throated green warbler (*Dendroica virens*) arrives in Alberta in late May (FAN 1992) and is commonly observed in southern Alberta during the fall migration between mid-August and mid-September. In Alberta, this species is known to breed in the Boreal Forest Natural Region and portions of the northern Foothills Natural Region (FAN 1992) where it spends the summer months. There have been sightings within and around the ANC FMA area (AE and ACA 2001 and Norton 1999).

Habitat Requirements

Critical habitat requirements for this species address foraging, escape cover, and breeding. The following lists the requirements and habitat types preferred for each of these life requisites.

Forage/Cover

This species feeds primarily on insects, including beetles, flies, moths, spiders, grubs, and larvae. In springtime, the birds seek aspen and poplar trees and willow catkins in order to find their preferred food supply. In general, any habitat that supports an abundant supply of insects will be suitable for foraging habitat. Cover habitat includes forested stands dominated by white spruce, aspen,

lodgepole pine, and balsam poplar on sloping substrates with a mesic moisture regime. These cover habitats tend to be mid-aged, mid-canopy (at least 40% cover) riparian areas. Stands generally contain rose, baneberry, high-bush cranberry, bunchberry, bearberry, mosses, peavine, and American vetch in the understorey (Pawlina *et al*. 2000).

Breeding

This species prefers to nest in mature stands, and the territory of the male is inversely related to density of food supply. Stands dominated by large white spruce trees are the preferred nesting habitats, mature to overmature aspen mixedwood stands with coniferous trees and snags, and mature riparian stands of aspen-and poplar with some spruce are often used (Pawlina et al. 2000). Nests are often located 4.6 to 6.1 m above ground and close to the trunk. Population density tends to be higher in 60–80 year old aspen stands (Pawlina et al. 2000).

Status and Management

There are no specific management activities for this species in Alberta; however, there are several research initiatives in Alberta related to this species, such as Sustainable Forest Management Network (SFMN), Terrestrial and Riparian Organisms, Lakes and Streams (TROLS), Calling Lake project, and Ecosystem Management by Emulating Natural Disturbance (EMEND) (Norton 1999).

Cape May warbler (*Dendroica tigrina*)

Distribution

The Cape May warbler (*Dendroica tigrina*) arrives in May and is sparsely distributed in areas of suitable habitat in a limited range of northern Alberta (FAN 1992). This species is believed to only breed in the central portions of the Boreal Forest Natural Region (FAN 1992). The warbler begins its fall migration in August (to October) to its over-wintering habitat in the West Indies and Central and South America.

Habitat Requirements

Critical habitat requirements for this species address foraging, escape cover, and breeding. The following lists the requirements and habitat types preferred for each of these life requisites.

Forage/Cover

It is believed that this species feeds primarily on spruce budworm. However, it also gleans caterpillars and other insects in the lower canopy and catches flies in the upper canopy. Stands preferred by spruce budworm are also preferred by the warbler. Thus, white spruce dominated forests are the preferred habitat. During periods of unsuitable weather (rain, cold, and windy), the birds will forage amongst willows and berry producing shrubs (e.g., *Prunus* spp.) (Pawlina et al. 2000).

This species is commonly associated with mature and overmature coniferous-dominated forests throughout its range. These preferred stands tend to have closed canopies, richer nutrient levels and a mesic to subhygric moisture regime. Typical understorey species occurring in these stands include willow, cranberry, bunchberry, and palmate-leaved coltsfoot.

Breeding

This species is thought to nest only in the tops of coniferous trees and, therefore, are often subject to predation by red squirrels (Pawlina et al. 2000). These nesting stands are dense mature to overmature white spruce dominated forests. Fir-dominated stands may also be acceptable for nesting sites. Nests are commonly found at 12–15 m above ground, near the trunk in the uppermost dense cluster of branches (Pawlina et al. 2000).

Status and Management

The reliance of this species on mature and overmature white spruce-dominated stands puts this species at risk due to the demand of these types of stands by forestry companies. Confounding the potential risk of loss of breeding habitat is the loss of overwintering habitat in South America.

#### 2.3.5.3 Mammals

***At Risk***

Woodland caribou (*Rangifer tarandus caribou*)

Distribution

The caribou inhabits mixed coniferous forests and alpine regions of west-central Alberta.

Habitat Requirements

Critical habitat requirements for this species address foraging, cover, and calving. The following lists the requirements and habitat types preferred for each of these life requisites.

Forage

The woodland caribou is a mixed feeder, during spring/summer it feeds on forbs, leaves of deciduous shrubs, sedges, lichens, and fungi. During winter, its diet is almost exclusively comprised of terrestrial and arboreal lichens with supplements of sedges. Summer forage is available in most habitat types, while lichens are most abundant in older coniferous stands with less than 50% canopy closure and thin mineral soils.

Cover/Calving

Some herds of woodland caribou in west-central Alberta migrate to satisfy their requirements for different habitat conditions as seasons change. While other herds are thought to choose similar cover types on a year-round basis. In general, cover types must modify temperatures and snow pack conditions. Caribou primarily use mixed coniferous stands (spruce and pine), relatively pure pine stands, and muskeg habitats. Mothers with calves require protection from predators and access to food supplies. Calving habitat is generally associated with muskeg habitat in proximity to plentiful lichens.

Status and Management

There are a variety of research initiatives regarding woodland caribou populations in Alberta. Section 5.1.2.7 contains specific caribou management strategies.

***May Be At Risk***

Northern long-eared bat (*Myotis septentrionalis*)

Distribution

The species distribution of the northern long-eared bat (*Myotis septentrionalis*) is continuous across northern Alberta, north of Cold Lake, Edmonton, and Jasper. There has been one confirmed sighting of the northern long-eared bat in Whitecourt (Caceres and Pybus 1997). Sightings have occurred in Edmonton, Hinton, Edson, Drayton Valley, and Grande Prairie, among others (Caceres and Pybus 1997). Thus, this species appears to have a wide distribution in Alberta and may occur within the ANC FMA area.

Habitat Requirements

Critical habitat requirements for this species address foraging, roosting, and winter hibernacula. The following lists the requirements and habitat types preferred for each of these life requisites.

Forage

This species is an opportunistic insectivore that will hawk prey from the air or glean prey from substrates. The bat prefers a wide variety of insect prey including moths (*Lepidoptera*), true bugs (*Hemiptera*), bees and wasps (*Hymenoptera*), flies (*Diptera*), and leafhoppers and aphids (*Homoptera*). Mature forest stands are important foraging habitat. The bats are most active in forests surrounding water bodies and watercourses, though they may also be found feeding near streetlights and houses (Pawlina et al. 1999).

Roosting/Winter Hibernacula

Peeling bark or cavities in partially decayed trees are common roost sites for northern long-eared bats. Warm roosts are especially important for reproductive females and juveniles. Caves and abandoned mines serve as the most common winter hibernacula. There are only two known hibernation sites in Alberta: Cadomin Cave in the Foothills Natural Region and Wood Buffalo National Park in the Boreal Forest Natural Region (Pawlina et al. 2000).

Status and Management

The narrow and restricted habitat requirements, particularly with regards to suitable roosting habitats, make this species susceptible to habitat loss and human disturbance. The Alberta Wildlife Act protects the hibernacula of the bat; however, bats may be hunted or harvested without a permit (Caceres and Pybus 1997). There are limited management activities for this species in Alberta.

Grizzly bear (*Ursus arctos*)

Distribution

The grizzly bear is the largest carnivore in Alberta with a range covering approximately 25% of the province (Pawlina 1998). The majority of the Alberta grizzly bears occur on the eastern slopes in the Rocky Mountain and Foothills Natural Regions of Alberta. There are two disjunct populations in Alberta occurring in the Swan Hills and northern Foothills outliers (Bentz and Saxena 1994). These areas overlap with the ANC FMA area.

Habitat Requirements

Critical habitat requirements for this species address foraging, cover, travel corridors and winter denning. The following lists the requirements and habitat types preferred for each of these life requisites.

Forage/Cover

Grizzly bears are foraging generalists, being omnivorous and feeding on berries, roots, insects, small mammals, carrion, fish, and ungulates. Linear disturbances such as roads, right-of-ways, seismic lines, well sites, and openings created by fire or logging often provide good forage habitat. Diverse areas with adequate thermal and security habitat are required so that bears can cope with climatic stress, human encounters, and seasonal or annual changes in food supply (Pawlina et al. 2000). A diverse array of habitats is utilized by grizzly bears including grasslands, shrublands, subalpine meadows, river valleys and a variety of coniferous and deciduous forests, with a preference for areas with high interspersion of habitats. Overmature forests are used for thermal cover and security.

Travel Corridor/Denning

Since the grizzly bear prefers areas with a high diversity of habitat types, they require suitable passages or corridors between these habitat types for safe traveling. River valley bottoms and ridge tops are often used as primary corridors for grizzly bears. Openings created by fire or logging may also be used between foraging and denning habitats. Denning habitats consist primarily of openings created by fire or logging, or steep alpine slopes.

Status and Management

Grizzly bears populations are thought to be stable. Due to their large spatial requirements, and the diversity and interspersion of habitat types, their greatest threat is continued loss or degradation of habitat through developmental and recreational activities (Anonymous 1996). Section 5.1.2.8 contains specific grizzly bear management strategies.

Wolverine (*Gulo gulo*)

Distribution

The wolverine (*Gulo gulo*) is the largest member of the weasel family (*Mustelidae*). Its range is limited to the northern half of the province and along the eastern slopes of the Rocky Mountains. Provided suitable habitat is available, the wolverine could potentially be found throughout 61% of the province (Pawlina

1998). There have been wolverines harvested within and around the ANC FMA area (Peterson 1997).

Habitat Requirements

Critical habitat requirements for this species address foraging, cover, and denning. The following lists the requirements and habitat types preferred for each of these life requisites.

Forage/Cover

The wolverine is a predatory scavenger whose hunting or scavenging habits vary with season. During the summer wolverines are found at high elevations in response to food availability. It is also primarily predatory during the summer and will hunt marmots, small mammals, and birds; however, it will also feed on insects, eggs, and berries. The wolverine is primarily a scavenger during the winter months and relies heavily on carrion. It will also kill weakened prey such as caribou, moose, and deer, and will hunt small mammals and porcupines when available. A large ungulate population, and thus winter carrion availability, is critical for winter survival. Foraging habitat use is related to prey habitat suitability.

Golden eagles, mountain lions, grizzly bears and wolves are the wolverine's primary predators. Forested areas serve as escape cover, where the wolverine can climb trees to avoid predators. Kits are particularly vulnerable to predation when born at insecure sites or while being moved between denning areas (Pawlina et al. 2000).

Denning

Females may use denning areas over consecutive years, and they tend to den on sites that receive significant snow cover (e.g., ravines, snow-covered rocky scree, boulder talus, taiga peat bogs with rocky areas or fallen trees, or snow-covered trees near treeline). Den tunnels are long and complex in order to protect kits, which require shelter. Dens are commonly found in alpine, subalpine, taiga or tundra habitat (Peterson 1997). Dens are seldom found in lower elevation forest stands, and are almost always at high elevations (i.e., Alpine) open areas. The critical feature of all wolverine dens is the dependency on deep snow (Pawlina et al. 2000).

Status and Management

Wolverines occur naturally in low densities because they require a large home range. They are most abundant where large ungulates are present and where carrion is available from hunter kills, predation, or natural mortality. Historically, wolverines have declined wherever ungulate populations have declined (Pawlina et al. 2000).

### 2.3.6. Habitat Types

The results of future habitat types are described in detail in Section 4.3. These habitat types are described in Table 2.34, with the modelling assumptions. In order to assess wildlife, ANC used a modelling approach that identifies broad level habitat requirements, termed habitat-type modelling. An exception to this was Grizzly Bears, where a Habitat Suitability Index (H.S.I.) approach was used. The habitat-type approach is NOT a guild

approach whereby groups of species exploiting the same, or very similar, habitat resources are grouped together. With the exception of the Caribou Habitat Types, ANC's habitat types do not consider taxonomy directly, but focuses more on broad level wildlife niches. This is done through the landscape level grouping of stands (polygons) according to niche specific structural, site and/or anthropogenic level requirements and managing them accordingly. Thus, direct links to species or groups of species are not made by the habitat-type approach but implied, indirectly. The selection of habitat types is dependent on the following factors:

- The forestry practices that are expected to be used.
- Easily monitored (i.e., relatively common with entire home range size contained in the FMA area).
- Whether unique habitat elements are required (e.g., species that utilize such unique habitat elements as snags, downed woody debris, and arboreal lichens).
- Landscape composition and structure (e.g., area- or edge-sensitive species).
- Which species are considered valuable to society (e.g., species that are hunted, trapped, or important for viewing or photography).
- Intensively studied (i.e., there is a large amount of information available).

In order to assess current (time 0) habitat conditions for a variety of wildlife species, ANC used a modelling approach that groups species with common habitat requirements and overlapping critical habitat components. Habitat types do not usually consider taxonomy or size of the species, but focus more on suitable ecological niches. The results of future habitat types are described in detail in Section 4.3. These habitat types are described in Table 2.34, with the modelling assumptions

Table 2.34 Summary of habitat types and associated modelling definitions

| Habitat Type # | Habitat Type | Revised Modelling Criteria |
|---|---|---|
| 1 | Deciduous forest community | Primary species is deciduous with greater than or equal to 80% cover (i.e. species group = 'D'). Summarize the current ($t_{+0years}$) area (ha) by 20 yr age classes, with all ages > 160 years equalling one age class, and forecast at $t_{+10y}$ $t_{+20y}$ $t_{+50y}$ $t_{+100y}$ $t_{+180y}$. |
| 2 | Young burnt forest /naturally disturbed communities | All natural forested stands less than 40 years of age. Summarize the current ($t_{+0years}$) area (ha) by 10 yr age classes and 4 species groups D, DC, C, and CD. |
| 3 | Post-rotation forest community | Stands to be included if they are >=10ha with a minimum width of 200 m Summarize the current ($t_{+0years}$) area (ha) by 100-140y and 140+y age-classes and 4 species groups D, DC, C, and CD and forecast at $t_{+20y}$ $t_{+100y}$ $t_{+180y}$. |
| 4 | Riparian communities | Water Buffer zones surrounding all rivers, stream and lakes to 100 meters Summarize the current ($t_{+0years}$) area (ha) by 20 yr age classes and 4 species groups D, DC, C, and CD, with all ages > 160 years equalling one age class, and forecast at $t_{+10y}$ $t_{+20y}$ $t_{+50y}$ $t_{+100y}$ $t_{+180y}$. |

Table 2.34 Continued

| Habitat Type # | Habitat Type | Revised Modelling Criteria |
|---|---|---|
| 5 | Thermal cover | D density (or 70% crown closure) conifer dominated stands (i.e., species group = 'C') with canopy height>=10m(i.e., if moist = 'M' then age must be greater then 40 years, if moist = 'W' then age must be greater then 100 years)*. Stands to be included if they are >=10 ha with a minimum width of 200 m Summarize the current ($t_{+0years}$) area (ha) and forecast at $t_{+10y}$ $t_{+20y}$ $t_{+50y}$ $t_{+100y}$ $t_{+180y}$. |
| 6 | Residual structure | 4 separate sub-habitat types. All AVI stands that have softwood understorey (one height class >= 3m). Use spatial data and summarize by density class A, B, C & D. Relate Black poplar and Birch volume in the TSP data with yield-strata and map the relationship on the AVI by density classes. Relate conifer and deciduous standing dead tree (snags) density in the TSP data with yield-strata and map the relationship on the AVI by density classes. Relate undersize tree (< 13 cm DBH-15 cm stump) density with yield-strata and map the relationship on the AVI by density classes. Summarize the current ($t_{+0years}$) area (ha) by variable classes and map. |
| 7 | Caribou habitat | Stands are in the caribou zone Coniferous dominated forest (pure conifer >=80% composition) and>= 80 years of age Muskeg (open and closed). Muskeg = wet moisture regime, leading species black spruce or non-forested vegetation types: 'mosses and bryophytes', 'grassland (herbaceous)','shrubland (open and closed)'. Stands must have less then 0.3km/km$^2$ road density based on the 9-km$^2$ grid overlay. Stands are greater then or equal to 10 hectares Summarize the current ($t_{+0years}$) area and forecast at $t_{+20y}$ $t_{+50y}$ $t_{+100y}$ $t_{+180y}$. Evaluating current ($t_{+0years}$) caribou habitat with respect fragmentation through patch size and edge to area ratio analysis for current state ($t_{+0y}$) and forecast at $t_{+20y}$ $t_{+50y}$ $t_{+100y}$ $t_{+180y}$. |
| 8 | Fall feeding Grizzly Bear habitat | Open (A –B density) pine dominated forest (pure pine >=80%) Conifer leading mixedwood stands Mature white spruce dominated forest (pure white spruce >=80% cover) >= 80 years of age Riparian areas and treed/shrubby clearings and clear cuts Stands must have less then 0.3km/km$^2$ road density based on the 9-km$^2$ grid overlay. Summarize the current ($t_{+0years}$) area (ha) by 40yr age classes, with all ages > 160 years equalling one age class, and forecast at $t_{+20y}$ $t_{+50y}$ $t_{+100y}$ $t_{+180y}$. |



### 2.3.6.1. Habitat Type 1 – Deciduous Forest Community

The deciduous forest community consists of all stands (including cutblocks) with primary deciduous species greater than or equal to 80% cover (D). The variables used in the age-class structure analysis were stand-level AVI species group ('spgp'). Habitat type 1 is summarized by nine 20-year age-classes with all ages over 160 years equaling one age-class and organized by NSR. Table 2.35 and Figure 2.33 summarize the results for habitat type 1. The data presented here refer to the total landbase before any deletions for the net down landbase estimate.

The deciduous forest community comprises 30,511 ha (9%) of the total forested landbase. It is distributed among three natural subregions—Central Mixedwood (1%), Lower Foothills (7%), and Upper Foothills (1%). There are no deciduous forest areas in the Subalpine NSR.

Almost every age-class younger than 120 years has evenly distributed areas, around 5,000 ha. Exception is the second age-class (21 to 40 years), which has just above 2,300 ha. Stands older than 120 years generally represent deciduous stands that go through breakup and most likely will have declining number of deciduous trees. At this stage of the stand development, conifers could become dominant if they exist in the understorey. There could be a shift in species group composition from previously pure deciduous and deciduous dominant stands to conifer leading mixedwood stands in the AVI inventory. But, over all, current deciduous stand structure indicates a good mix between younger and older stands.

We haven't provided a distribution map for habitat 1 since it is essentially the same information as for the age-class structure.

Table 2.35 Deciduous forest community area summary, by species groups (before deletions)

| | Species Groups | | | |
|---|---|---|---|---|
| Age Class (yrs) | Central Mixedwood | Lower Foothills | Upper Foothills | Subalpine |
| 0-20 | 644 | 4,471 | 105 | - |
| 21-40 | 646 | 1,528 | 126 | - |
| 41-60 | 60 | 4,387 | 574 | - |
| 61-80 | 264 | 4,681 | 881 | - |
| 81-100 | 896 | 3,339 | 280 | - |
| 101-120 | 481 | 5,369 | 400 | - |
| 121-140 | 394 | 700 | 84 | - |
| 141-160 | - | 200 | - | - |
| 161+ | - | - | - | - |
| Total | 3,386 | 24,674 | 2,450 | - |

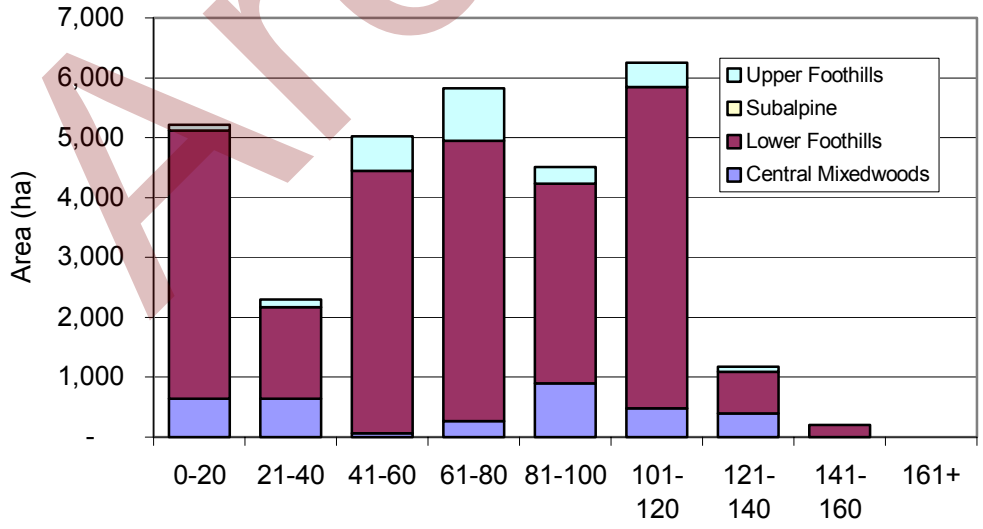



Figure 2.33 Habitat Type 1 - Current Deciduous Community

### 2.3.6.2. Habitat Type 2 – Young Burnt Forest/Naturally Disturbed Communities

The analysis of age-class structure used stand-level AVI species group ('spgp'). Young burnt forest/naturally disturbed communities consist of all naturally forested stands (excluding cutblocks) less than 40 years of age. Habitat type 2 was summarized using four 10-year age-classes aggregated by four AVI canopy species groups. Table 2.36 and Figure 2.34 summarize the results for habitat type 2. Habitat type 2 areas will be decreasing steadily and by the fourth decade only a few of these forests will be left, assuming no natural disturbance occurs.

Table 2.36 The distribution of current young burnt/naturally disturbed forest area, by species groups

| Age Class (yrs) | Species Groups | | | |
|---|---|---|---|---|
| | Pure Deciduous | Deciduous Leading Mixedwood | Pure Conifer | Conifer Leading Mixedwood |
| 0-10 | 0 | 0 | 0 | 0 |
| 11-20 | 2 | 1 | 42 | 0 |
| 21-30 | 407 | 162 | 27 | 1 |
| 31-40 | 1,778 | 1,065 | 3,318 | 256 |
| Total Area (ha) | 2,188 | 1,229 | 3,387 | 258 |

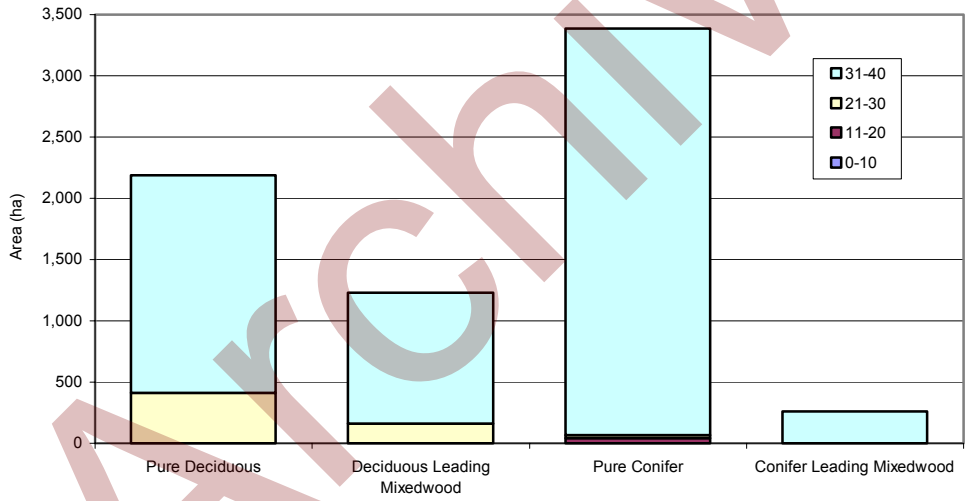



Figure 2.34 Area Summary of Young Burnt/Naturally Disturbed Communities, by Species Groups

Currently, 7,062 ha (1.9%) of the FMA area represent young burnt or naturally disturbed forest areas. Young naturally disturbed areas exist in every species group: deciduous 2,188 ha (31.0% of total habitat type 2 area), deciduous leading mixedwoods—1,229 ha (17.4%), conifer—3,387 ha (48.0%), conifer leading mixedwoods—258 ha (3.6%). The FMA area does not have any areas of habitat type 2 between 0 and 10 years old (i.e., first age-class). The majority of this habitat type is between 30 and 40 years old (6,417 ha).

Figure 2.35 shows the spatial distribution of habitat type 2.

### 2.3.6.3. Habitat Type 3 – Post-rotation Forest Communities

The analysis of age-class structure uses AVI species group ('spgp'). The forest community of post-rotation age includes all stands with an area at least 10 ha and minimum width of 200 m. This habitat type was summarized using two age-classes (100–140 years and 140+ years) and four basic species groups (D, DC, C, and CD). In order to obtain the current forest age-class structure for habitat type 3, the forest GIS polygon cover age was dissolved separately. Table 2.37 and Figures 2.36-2.37 summarize the results of this habitat type.

Table 2.37 Area summaries for post-rotation wildlife habitat

| Age Class (yrs) | Species Groups | | | |
|---|---|---|---|---|
| | Pure Deciduous | Deciduous Leading Mixedwood | Pure Conifer | Conifer Leading Mixedwood |
| 100-140 | 5,512 | 4,568 | 112,878 | 6,143 |
| 140+ | 161 | 17 | 24,526 | 231 |
| Total Area (ha) | 5,673 | 4,586 | 137,404 | 6,373 |

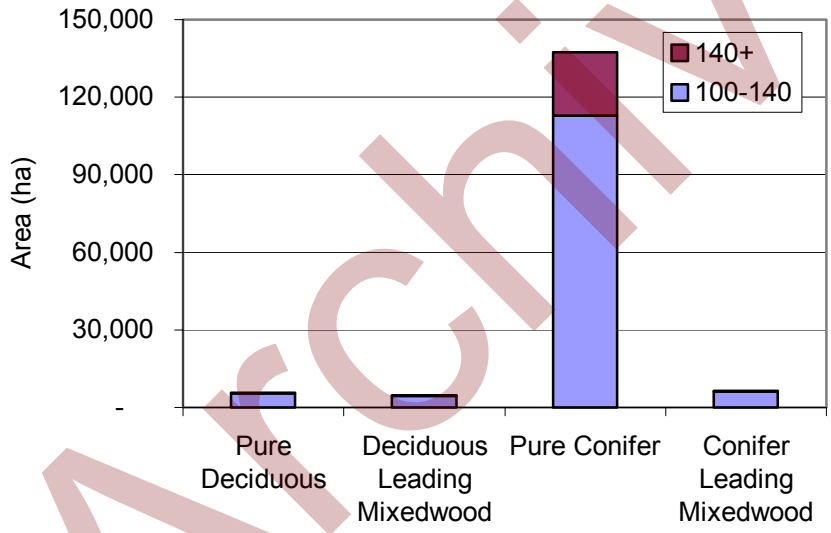



Figure 2.36 Area Summary of Post-Rotation Wildlife Habitat Type

Alberta Newsprint Company

**Figure 2.35**

*ALBERTA NEWSPRINT COMPANY*
*FOREST MANAGEMENT AGREEMENT AREA*

*YOUNG NATURALLY DISTURBED HABITAT Type 2*

*(1999)*

Rge 5 Rge 4 Rge 3 Rge 2 Rge 1 6th MER Rge 27 Rge 26 Rge 25 Rge 24 Rge 23 Rge 22 Rge 21 Rge 20 Rge 19 Rge 18 Rge 17

Twp 64 Twp 63 Twp 62 Twp 61 Twp 60 Twp 59 Twp 58 Twp 57 Twp 56 Twp 55

N W E S

Fox Creek

Two Creeks

Muskeg River

CARIBOU ZONE

Provincial Location of FMA

**Age Classes**

- 010-019
- 020-029
- 030-039

CARIBOU ZONE BOUNDARY

ATS grid

Recreation areas

Scale 1:425,000

10 0 10 km

Projection: Universal Transverse Mercator zone 11
NAD83 CRS 80
By: mdeitels
GDC project ref: 2000096
Date: 08/2001

GDC GEOGRAPHIC DYNAMICS CORP.

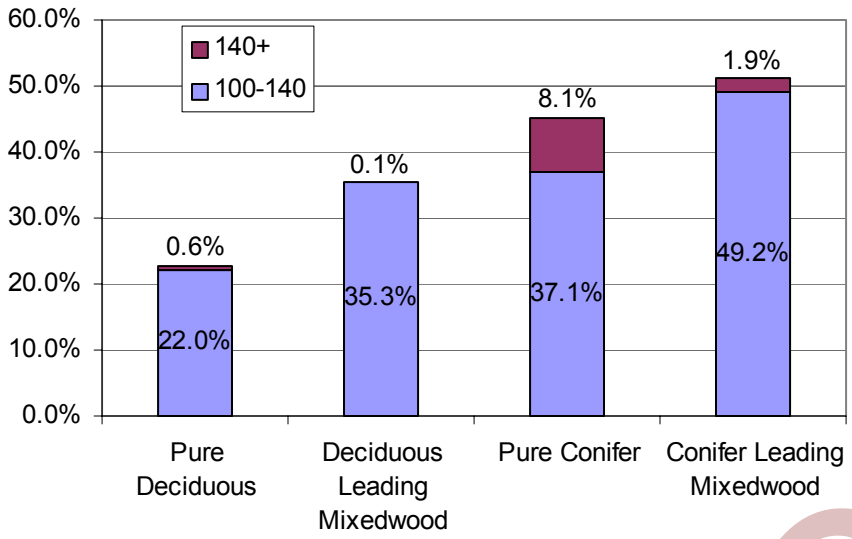



Figure 2.37 Percent of Post-Rotation Habitat Type Relative to the Cover Types Available in the FMA Area

Currently, 154,036 ha (43%) of the FMA area is classified as post-rotation habitat. About 10,259 ha (7%) of habitat type 3 is distributed among deciduous dominant and deciduous leading mixedwoods. About 129,101 ha (83.8%) of this habitat type is between 100 and 140 years old. In relative terms, 22.6% of all pure deciduous forests, 35.4% of all deciduous leading mixedwood, 45.2% of all pure conifer, and 51.1% of all conifer leading mixedwood areas are contributing to the post-rotation forest communities. The largest proportion of forest area that is older than 140 years is comprised of pure conifer species group, which covers 24,526 ha or 98.3% of all forest.

Figure 2.38 shows the spatial distribution of habitat type 3.

#### 2.3.6.4. Habitat Type 4 — Riparian Areas

Riparian areas consist of water buffer zones surrounding all rivers, streams, and lakes to 100 m. The buffer zone to 100 m allows for near riparian forest area to be assessed for future management. It should be noted that the timber supply analysis (Chapter 3) used buffer zones ranging from 20 m to 100 m depending on the type by water body. Age-class distribution is summarized by nine 20-year age-classes and four species groups (D, DC, C, and CD). Stands over 160 years old are assigned to a single oldest age-class ('160+'). Table 2.38 and Figure 2.39 summarize the results for habitat type 4.

Table 2.38 Age-class area summaries for riparian areas

| Age Class | Species Groups | | | |
|---|---|---|---|---|
| | Pure Deciduous | Deciduous Leading Mixedwood | Pure Conifer | Conifer Leading Mixedwood |
| 0-20 | 220 | 68 | 919 | 43 |
| 21-40 | 257 | 97 | 437 | 34 |
| 41-60 | 436 | 245 | 1,045 | 54 |
| 61-80 | 360 | 103 | 4,155 | 85 |
| 81-100 | 408 | 189 | 4,714 | 110 |
| 101-120 | 465 | 417 | 8,842 | 584 |
| 121-140 | 97 | 60 | 3,516 | 153 |
| 141-160 | 19 | - | 1,991 | 17 |
| 160+ | - | - | 1,710 | 0 |
| Total | 2,262 | 1,178 | 27,329 | 1,080 |

There are 31,849 ha in 100 m buffers around rivers, streams and lakes in the FMA area. The age-class distribution indicates wide range of variability and follows rather closely the age-class structure of the entire FMA area. Both age structures have a normal distribution centered on the sixth age-class (101 to 120 years), which in the riparian areas comprises 10,308 ha (32.4%). The oldest age-classes (over 140 years old) are comprised of pure conifer stands.

We do not provide a spatial distribution map of habitat 4 type because the 100 m zone of modeling is too detailed a level to map.

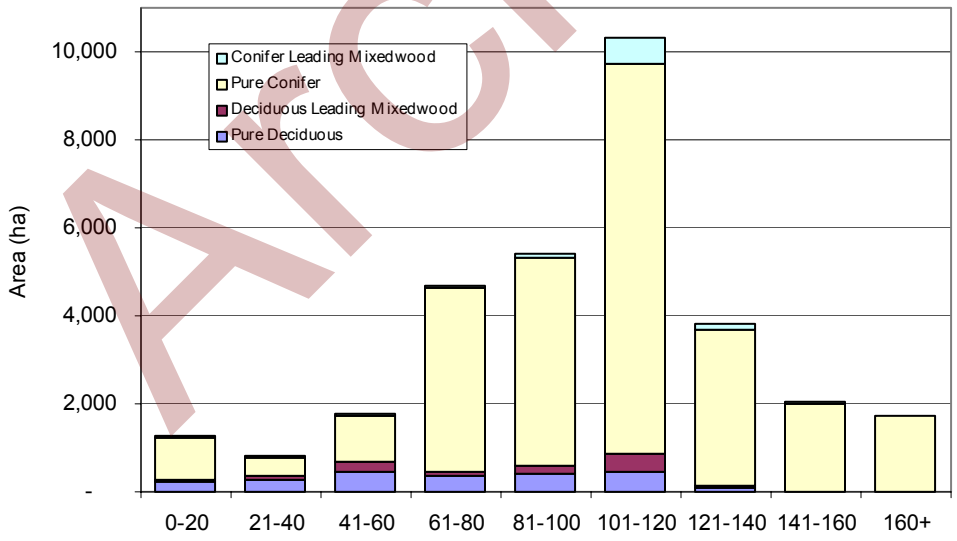



Figure 2.39 Area Summary in Riparian Areas