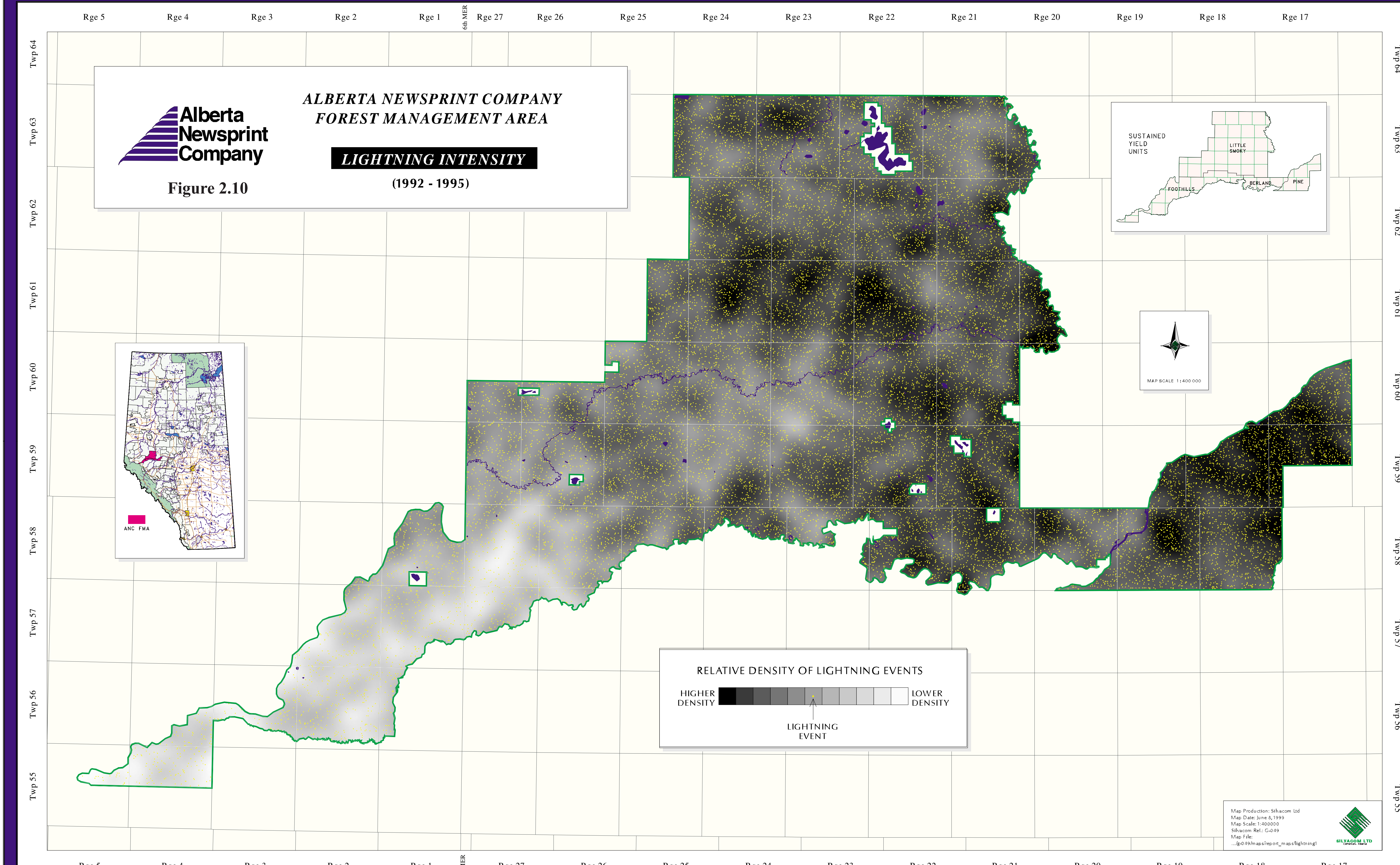
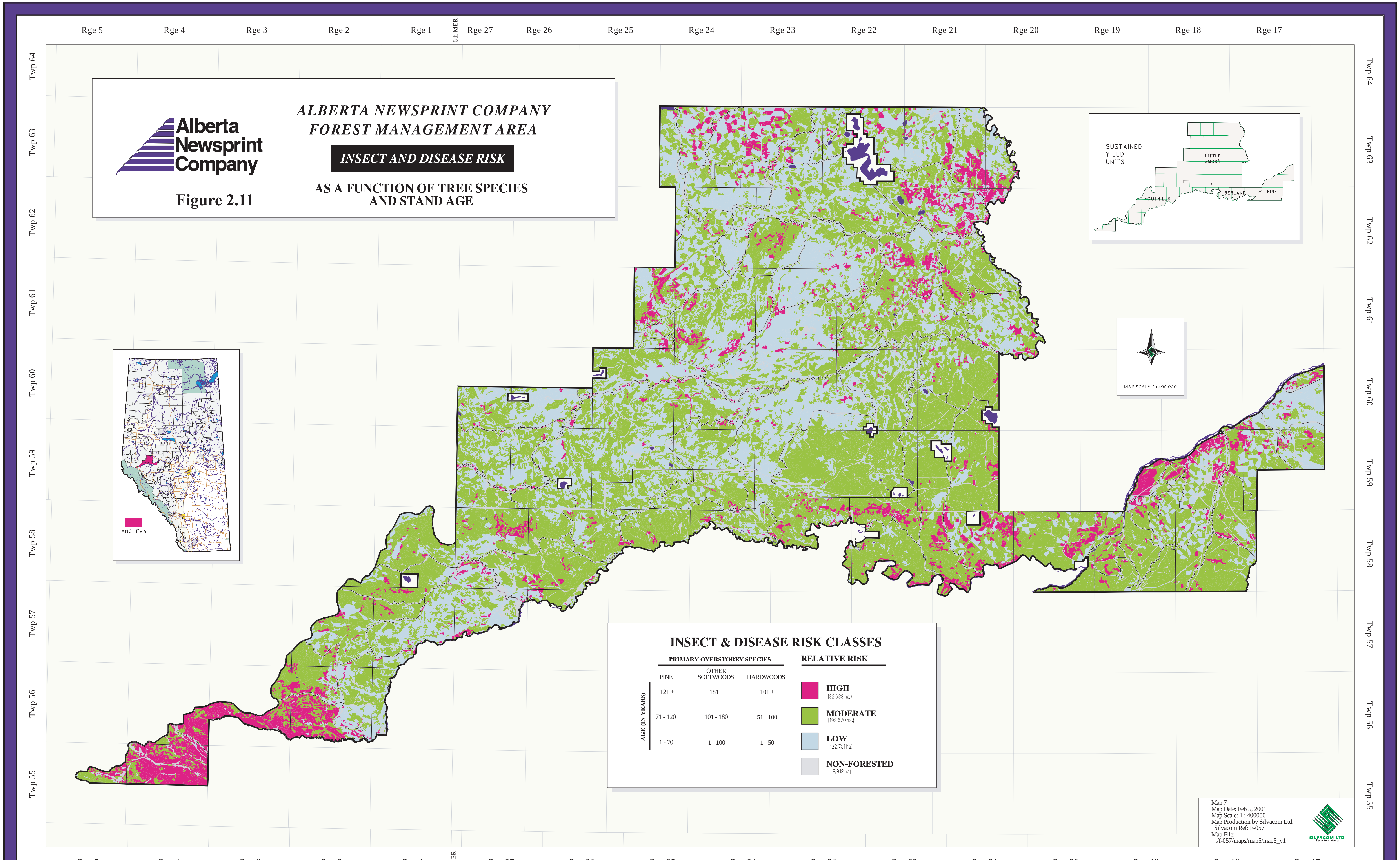

Alberta Newsprint Company
Figure 2.10
ALBERTA NEWSPRINT COMPANY
FOREST MANAGEMENT AREA
LIGHTNING INTENSITY
(1992 - 1995)
Rge 5
Rge 4
Rge 3
Rge 2
Rge 1
6th MER
Rge 27
Rge 26
Rge 25
Rge 24
Rge 23
Rge 22
Rge 21
Rge 20
Rge 19
Rge 18
Rge 17
Twp 64
Twp 63
Twp 62
Twp 61
Twp 60
Twp 59
Twp 58
Twp 57
Twp 56
Twp 55
SUSTAINED
YIELD
UNITS
LITTLE
SMOKY
FOOTHILLS
BERLAND
PINE
ANC FMA
MAP SCALE 1:400 000
RELATIVE DENSITY OF LIGHTNING EVENTS
HIGHER
DENSITY
LOWER
DENSITY
LIGHTNING
EVENT
Map Production: Silvacom Ltd
Map Date: June 8, 1999
Map Scale: 1:400000
Silvacom Ref.: G-049
Map File:
.../g-049/maps/report_maps/lightning1
SILVACOM LTD
Edmonton, Alberta


Alberta Newsprint Company
Figure 2.11
ALBERTA NEWSPRINT COMPANY
FOREST MANAGEMENT AREA
INSECT AND DISEASE RISK
AS A FUNCTION OF TREE SPECIES
AND STAND AGE
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
ANC FMA
SUSTAINED
YIELD
UNITS
LITTLE
SMOKY
FOOTHILLS
BERLAND
PINE
MAP SCALE 1:400 000
INSECT & DISEASE RISK CLASSES
PRIMARY OVERSTOREY SPECIES
PINE
OTHER SOFTWOODS
HARDWOODS
AGE (IN YEARS)
121 + | 181 + | 101 +
71 - 120 | 101 - 180 | 51 - 100
1 - 70 | 1 - 100 | 1 - 50
RELATIVE RISK
HIGH (32,538 ha.)
MODERATE (199,670 ha.)
LOW (122,701 ha)
NON-FORESTED (18,918 ha)
Map 7
Map Date: Feb 5, 2001
Map Scale: 1 : 400000
Map Production by Silvacom Ltd.
Silvacom Ref: F-057
Map File:
../f-057/maps/map5/map5_v1
SILVACOM LTD
Edmonton, Alberta

As part of the commitment ANC made to stakeholders of the Whitecourt area, ANC commissioned an ecological inventory of the FMU. This ANC initiative was carried out in order to fulfill the need for an accurate foundation for long-term planning. Through the application of a spatially explicit GIS-model, complex landscapes can be effectively stratified into ecologically based landscape components. Within Alberta, the most widely accepted ecosystem classification system is the five level Natural Regions hierarchical classification regime (Table 2.12).

Table 2.12 Natural Regions hierarchical classification scheme

Level	Description
Natural Region	Boundary delineations determined primarily by changes in climate.
Natural Subregion	Boundary delineations determined primarily by changes in physiography (i.e., dominant landforms).
Ecosite	Boundary delineations determined primarily by changes in the nutrient and moisture characteristics of the soil in areas with similar environmental influences.
Ecosite Phase	Boundary delineations determined primarily by changes in the dominant species comprising the forest canopy.
Plant Community	Type Boundary delineations determined primarily by changes in the dominant species comprising the understorey.

Source: AEP 1988

The general objective of the inventory is to describe the FMA area land base in terms that relate to ecological processes.

Ecological classification has a number of applications to sustainable forestry practices including:
1. Facilitating the application of ecological information to decisions regarding a wide variety of forest management activities.
2. Facilitating the collection and organization of ecological information to expedite the development of resource management applications and decision support systems.
3. Promoting communication among resources managers and between managers and the public.
4. Providing a common basis for integrated planning.
5. Reducing resource management costs by integrating ecological information into the decision making process.

2.3.1.1 Ecological Stratification

There were three main steps involved in the development of the ecosite map for the FMA area. The first step was to stratify the area into broad- and site-level ecological units. These units were required to help develop an appropriate field sampling strategy, and for modeling purposes. The second step was ecological data collection. The third step was the integration of plot data and GIS layers.

The development of a broad-level stratification of the FMA area was required for two reasons. First, since the FMA area spans several natural subregions and various types of landforms and soils, a broad-level stratification provided the means for an effective ecologically based field sampling strategy. Secondly, since the stratification defines the boundaries of the ecological units, custom ecosite models can be applied on an area-specific basis. The stratification created a total of 13 Landscape Management Units (LMU). These LMUs were developed using data from three sources: (1) ecodistricts of the Fox Creek Knight and Berland areas (Alberta Forestry, Lands and Wildlife 1988; Rayner *et a*l. 1985); (2) parent materials derived from the ecosection coverage of the same areas, and; (3) provincial Natural Subregion boundaries (Alberta Environmental Protection 1994). An LMU is an assemblage of ecosections that share similar climatic regimes and form a distinctive pattern of recurring landforms, soils, and vegetation. Each LMU has been described in terms of the dominant parent materials and ecosites that occur within them (Figure 2.12).

The site-level stratification was developed through a preliminary classification of sites based upon information derived from the Alberta Vegetation Inventory (AVI) and from layers created from the digital elevation model (DEM) (i.e., slope, aspect, curvature, and slope length). Forty-five "site types" were developed from combinations of these variables. The decision rules to create the site types were based on ecological factors associated with the characteristics that define the ecosites of west-central and northern Alberta (Beckingham et al. 1996; Archibald and Beckingham 1996).

Across ANC's FMA area, data was collected on site, soil, vegetation and other environmental and biotic factors. For each site sampled, important site and soil properties, namely moisture and nutrient regime were analyzed. The site's moisture and nutrient regime determine its position on the edatopic grid, and allows the assignment of an ecosite to the plot area. Ecosite phase and plant community type were then assigned based primarily on vegetation data. The Ecological units (ecosite, ecosite phase and plant community type) found within the FMA area included pine dominated, deciduous tree dominated, spruce dominated (white or Engelmann), black spruce/tamarack dominated, and non-forested sites. For each unit described, an associated soil type classification system was developed. The following section gives a brief description of the more common ecosites and phases encountered within the FMA area. A detailed description of the results to this study can be found in GDC 1999.

2.3.1.2 Common Ecosite Types in the FMA Area

The most frequently encountered ecosite for the Central Mixedwood, Lower and Upper Foothills Natural Subregions was the Labrador tea–mesic unit. In total, these units account for 22% of the FMA area. These units represent areas with mesic moisture and poor nutrient conditions. Vegetation associated with these units includes lodgepole pine and black spruce in the canopy, and Labrador tea and blueberry in the shrub layer. The Labrador tea ecosite is found throughout the FMA area. Forest managers must take into account the low to moderate timber productivity of these sites and subsequently adjust their harvesting operations.

Another common ecosite in both the Central Mixedwood and Lower Foothills is the low-bush cranberry unit. These units are almost exclusively located in the eastern half of the FMA area, and cover 9% of the FMA area. Most often associated with upland areas, the low-bush cranberry ecosite tends to develop on level or mid-slope positions. Most stands found in these units are composed of productive aspen, aspen-pine mixtures, or combinations of either species with white spruce. Black spruce, balsam fir, birch, and balsam poplar are less abundant. These units are characterized by a mesic moisture and medium nutrient regime. These ecosite units have moderate timber productivity, moderate soil compaction and rutting hazards, and moderate to high vegetation competition.

The reference or modal ecosite for the Upper Foothills Natural Subregion is the tall bilberry /arnica map unit. This map unit is characterized by a mesic moisture regime and a medium nutrient regime. Coniferous and mixedwood stands consisting of lodgepole pine, aspen, white spruce, and fir are most common. Understorey vegetation commonly consists of a green alder, fir, or tall bilberry dominated shrub layer overlying a conspicuous forb and/or moss layer. This unit occurs in 5% of the FMA area. Sites within the tall bilberry/arnica map unit are predominately located on level or mid-slope landscape positions. The management considerations are similar to those of the low-bush cranberry unit of the Central Mixedwood and Lower Foothills. However, forest planners must be aware of shallow depressions and wetter transitional zones within these units, as these areas are more prone to rutting and compaction hazards.

A map unit that deserves special consideration is the Labrador tea–subhygric unit of the Central Mixedwood and Lower and Upper Foothills Natural Subregions. This is a relatively common map unit throughout ANC's FMA area, with the exception of the Muskeg Foothills. It occupies a total area of 10% of the FMA area. Typical conditions for these map units include a subhygric to hygric moisture regime and a poor nutrient regime. These sites often occur on level topography where soil moisture conditions are strongly influenced by seasonally high water tables. The canopy of these map units are typically co-dominated by black spruce and lodgepole pine. The poor nutrient conditions contribute to moderately low timber productivity, while the thick organic layer and wetter soils make soil compaction and rutting hazards a high probability.

The low-bush cranberry and bracted honeysuckle complex of the Lower Foothills Natural Subregion was among the more common map units encountered in the FMA area (11% of FMA area). This complex is characterized by a mesic to subhygric moisture regime and a medium to rich nutrient regime. Stands of these units may be deciduous, mixedwood, or coniferous and are typically dominated by aspen, white spruce, balsam poplar, or birch. A high diversity of shrub and forb species is encountered in these units. Typical shrubs include alder, dogwood, bracted honeysuckle, currants, rose, willow, balsam fir, and wild red raspberry. Common forbs include wild sarsaparilla, aster, dewberry, and tall lungwort. Topography of this map unit is level to gently rolling. Timber productivity is moderate to high; however, moderately high soil compaction and rutting hazards mean harvesting methods must be carefully selected

The Subalpine Natural Subregion boundary, though covering a relatively small area, represents a region with a distinctively different climate than the other subregions within the FMA area. The rhododendron–mesic unit was the most frequently encountered ecosite. The rhododendron–mesic map unit dominates the upland portions of the Subalpine Subregion. It covers 2% of the FMA area, but it was mapped in over 28% of the Southwest Berland Plateau and 42% of the Muskeg Foothills LMUs. These units have mesic moisture regimes and a poor to medium nutrient regimes. A lodgepole pine overstorey is common, while black spruce, Engelmann spruce, or subalpine fir form the understorey. Typical vegetation includes Labrador tea, tall bilberry, rhododendron, and feather mosses. These map units generally occupy upper or mid-slope landscape positions where soils are either well or moderately well drained.

2.3.2 Rare and Endangered Plants

Biodiversity assessment and conservation has become an integral part of forest planning activities. While there are many facets involved in the assessment and conservation of biodiversity, a key component lies in the protection of rare and endangered plants. The abundance and distribution of rare and endangered plants can be used as indicators of habitat quality and, thus, may reflect the current state of ecological conditions and biodiversity. Tracking rare and endangered plants, and evaluating the communities that harbour them, enables forest planners to protect these species and communities as well as aid in the conservation of biodiversity. Knowing the physical locations and understanding individual species dynamics of rare plants will allow for the development of management activities that are better suited to ensuring the sustainability and diversity of plant communities.

This section provides a working definition of rare and endangered plants based on the characteristics discussed in the following section. It also identifies some of the species known to occur within the FMA area, their location, and their habitat requirements.

2.3.2.1 Characteristics of Rare Plants

The definition of rare species in Alberta follows the definition developed by the United States Natural Heritage Information Centre, and adopted by ANHIC (Alberta Natural Heritage Information Centre). This system is based primarily on the number of occurrences of a given ‘element’ (i.e., taxonomic rank, usually species) within the province and, to a lesser extent, by factors that influence their ability to sustain the population (e.g., life history factors, and responses to disturbances).

A variety of information, including geographic and demographic criteria is used to identify rare plants. However, due to the often limited information available detailing the characteristics of rare plants (including population size), the principal indicator of rarity is its occurrence within a small geographic area (Argus and Pryer 1990). A general characteristic of rare plants is a small population size that is highly restricted to specific habitats and which may be susceptible to anthropogenic changes to the environment (Harms et al. 1992). Plants may also be considered rare when they are at the extremes of their geographic range, as they are often in low numbers in these areas. These are termed pseudo-rarities because they are often common in other parts of their range. Due to the process of genetic drift, they may be genetically distinct from conspecifics (organisms belonging to the same species) in other parts of the range and should, therefore, be considered as important rare plants (Lesica and Allendorf 1995).

Species can be rare due to either natural or anthropogenic factors. Natural factors that contribute to the rarity of a species (from Scholfield 1998) include:

- Very specific environmental site requirements that themselves are uncommon or rare in the landscape
- Presence of invasive species that are able to out-compete native species
- Reproductive inefficiency or a low reproductive output (i.e., a rarity in the required seed dispersal agents such as insect pollinators or limited asexual reproduction)
- Environmental conditions that limit taxonomic expansion (i.e., an inability to speciate)