MANNING DIVERSIFIED FOREST PRODUCTS LTD.

FMA Resources

2007 – 2017 Forest Management Plan for FMA 0200041

May 31, 2007

Prepared by:
The Forestry Corp.

2007 – 2017 FMP FOR FMA 0200041

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

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

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1. Wildlife Resources

Northwestern Alberta and Manning Diversified's FMA Area support a wide variety of wildlife species. The majority of species whose range encompasses the FMA Area, currently have sufficient populations and/or available habitat to ensure their continuation. However, there are some species that are considered vulnerable because of low or declining populations or specific habitat concerns. These species may need additional consideration and/or protection with regard to forest management planning and operations.

Based on lists maintained by Alberta Natural Heritage Information Centre (ANHIC), MDFP compiled a list of tracked species[1] of mammals, birds, reptiles, amphibians, fish and arthropods occurring or thought to occur within their FMA Area. This list is quite extensive and has been included in as Appendix I (from ANHIC 2007).

The following section outlines the sources available to identify wildlife species considered at risk within the FMA Area and identifies species that warrant special consideration within the FMP, as well as in forest management planning and operations. Fish species are addressed in Section 2 and plants and plant communities in Sections 3 and 4.

1.1 Species at Risk

In Canada, both the Federal and Provincial governments are involved in identification and protection of wild species considered to be at risk. Legislated protection falls under two main Acts:

- Federal – Species at Risk Act – The purposes of this Act are to prevent wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened (Section 6, SARA). Responsibility for identifying and recognizing species at risk is vested in the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

[1] Not all tracked species are officially designated 'At Risk'.

- Provincial – Wildlife Act and Wildlife Regulation – This Act and its regulations deal with wildlife, hunting and the identification of endangered or threatened wildlife. Responsibility for identifying and recognizing species at risk is vested in the Endangered Species Conservation Committee.

The assessment of species status is ongoing; new species are added to the list of those considered at risk while some species may be de-listed. These changes may come about as a result of changes to species populations/habitats or with additional scientific information.

1.1.1 Committee on the Status of Endangered Wildlife in Canada

The national status of wild species at risk is assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC was created in 1977 and is recognized nationally as a key source of regarding the status of wild species in Canada. COSEWIC's mandate addresses the following groups of wildlife: mammals, birds, reptiles, amphibians, fish, arthropods, molluscs, vascular plants, mosses and lichens (COSEWIC, 2003a). Within each of these taxonomic groups, COSEWIC classifies wild species (or subspecies, varieties, etc.) into one of the following classes:

- **Extinct** – A species that no longer exists.
- **Extirpated** – A species no longer existing in the wild in Canada but occurring elsewhere.
- **Endangered** – A species facing imminent extirpation or extinction.
- **Threatened** – A species likely to become endangered if limiting factors are not reversed.
- **Special Concern** – A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events (**Vulnerable** from 1990–1999, **Rare** prior to 1990).
- **Not At Risk** – A species that has been evaluated and found to be not at risk (Not in Any Category; No Designation Required).
- **Data Deficient** – A species for which there is insufficient scientific information to support status designation (Indeterminate from 1994-1999, ISIBD (Insufficient Scientific Information on which to Base a Designation) prior to 1994).

Criteria used to evaluate species as Endangered or Threatened include:

- Declining total population
- Small distribution and decline or fluctuation in extent or population
- Small total population size and decline in population
- Very small population or restricted distribution
- Quantitative analysis indicating probability of extinction.

Each of these criteria is associated with specific thresholds that must be met for a species to be considered Endangered or Threatened (e.g., categorized as Endangered if ≥ 70% population decline in the past 10 years or 3 generations, whichever is longer; categorized as Threatened if 50 – 69% population decline over the same time frame) (COSEWIC 2003b). Criteria for listing as a species of Special Concern are less quantitative. COSEWIC will list a species under the Special Concern category if it is likely to become threatened if factors which negatively influence the persistence of the species are not reversed/managed or if the species is close to meeting the criteria for Threatened status.

Appendix II contains a listing of species rated by COSEWIC as Endangered, Threatened or Special Concern that occur or likely occur within Manning Diversified's FMA Area. Key wildlife species that occur within the FMA that appear on this list include woodland caribou, grizzly bear and wolverine.

1.1.2 Provincial Species at Risk Program

Provincially, species that are potentially at risk are initially identified by Fish and Wildlife Division of Alberta Sustainable Resource Division (ASRD). For species that are identified as potentially at risk, Fish and Wildlife, in conjunction with Alberta Conservation Association prepare a provincial status report. The Endangered Species Conservation Committee then assesses the provincial status report along with any relevant COSEWIC ratings/assessments and makes recommendations concerning the designation, management and/or recovery of the species. Provincial designations reflect the status of a species within the Province and may not be consistent with COSEWIC ratings/assessments.

The Wildlife Act and Regulation recognizes both **Endangered** and **Threatened** species. When designating species, the Endangered Species Conservation Committee uses the COSEWIC definitions for these classes. In addition to the species designated Provincially within the Wildlife Regulation, the ASRD also maintains a list of species considered At Risk, May Be At Risk or Sensitive.

Appendix II contains a listing of species identified in the Wildlife by the Province as Endangered or Threatened that occur or likely occur within Manning Diversified's FMA Area. Key wildlife species that occur within the FMA that appear on the Provincial list include woodland caribou and trumpeter swan, both designated Threatened. The Appendix also lists species considered At Risk, May Be At Risk or Sensitive.

1.1.3 Species Considered During FMP Development

Based on the National and Provincial status of the various wildlife species located within the FMA Area and the types of activities/disturbance associated forestry operations, several key species were identified as warranting special consideration within MDFP's FMP. These were:

- Mammals - woodland caribou and grizzly bear
- Birds - trumpeter swan, black-throated green warbler and cape may warbler.

In addition, one fish species and one non-vascular plant were identified as warranting special consideration (see sections 2.2 and 4.1).

1.2 Woodland Caribou (*Rangifer tarandus caribou*)

Caribou occur throughout Canada, across a wide variety of habitat types. Woodland caribou represent a subspecies that occurs in the forested and mountainous regions of Canada, including northern and west-central Alberta. Under COSEWIC, the woodland caribou is considered Threatened (boreal population, since 2000), while Provincially it is designated as Threatened under the Province's Wildlife Act. This status is based on reductions in distribution, declines in regional populations and a threat of further population declines associated with human activities.

As part of the Province's Species at Risk program, an evaluation of the status of the Woodland Caribou was completed in 2001. Unless indicated, the information in this section of is derived from the species status report (Dzus, 2001).

Two ecotypes of woodland caribou are often described, the distinction being based on behavior, habitat use and/or morphology. The mountain ecotype winter in the forested foothills of the Rocky Mountains and migrate in the summer to higher alpine areas. The boreal ecotype spends the entire year in forested habitats, moving extensively throughout the year but not following a predictable migration pattern. The woodland caribou in the vicinity of Manning Diversified's FMA Area belong to the boreal ecotype.

Distribution of woodland caribou is linked to availability of terrestrial lichens, which are a primary food source for both ecotypes. In winter, woodland caribou use mature and old-growth coniferous forests that contain large quantities of terrestrial and arboreal lichens. These forests are generally associated with peatland complexes, marshes, bogs, lakes, and rivers. In summer, the caribou occasionally feed in younger stands, after fire or logging, but generally avoid clear cuts, shrub-rich habitat and hardwood dominated stands.

The rut, or mating period, for caribou usually occurs in late September and the first half of October. Caribou cows begin breeding by the time they are 28 months of age and tend to breed annually. They typically give birth to a single calf the following spring (mid-May to mid-June). Survival rates for calves average between 30% and 50%, but can vary from almost none to 100%. Many factors interact to determine calf survival, including quality and quantity of forage (for pregnant females and in the first year of life), number of predators, and weather.

The males are able to breed at 18 to 20 months of age, but most probably have no opportunity before their third or fourth year because of competition between males for breeding females. During the rut, males engage in frequent and furious sparring battles with their antlers. Females travel to isolated, relatively predator-free areas such as islands in lakes and peatlands to calve.

Woodland Caribou occur at very low densities, with approximately 0.03 to 0.12 caribou per square kilometer (Seip 1992, Stuart-Smith et al. 1997). It is believed that this population pattern helps the species avoid predation.

Predation by wolves is considered the leading cause of natural mortality in caribou herds (Seip 1992, Stuart-Smith et al. 1997). Other predators such as bear (*Ursus* spp.), coyote (*Canis latrans*), wolverine (*Gulo gulo*) and Canada lynx (*Lynx Canadensis*) may also prey on caribou. For young calves, considerable natural mortality may result from starvation, inclement weather and low birth-weights resulting from hard winters.

Anthropogenic limiting factors are primarily associated with habitat loss and fragmentation of habitat. Human disturbance associated with agriculture, forestry and oil and gas activity reduce the availability of older forests, which tend to provide important habitat.

In July 1996 the Province estimated a woodland caribou population of approximately 3600 to 6700 within Alberta. Population estimation is difficult for caribou because of their low densities and the census methods available (aerial surveys are not very effective because of the difficulty seeing caribou under conifer tree cover).

The Province has identified areas which are key habitat for woodland caribou and designated them as Woodland Caribou Management Zones (see Figure 1-1). Two areas in the centre of P6 and a large portion of P9 (along the west) lie within Woodland Caribou Management Zones. Forest management operations within these Zones must consider caribou habitat requirements.

Current research initiatives related to the boreal ecotype of the woodland caribou are spearheaded by the Boreal Caribou Committee, through the Boreal Caribou Research Program. The Committee is composed of representatives of the Provincial government and the forestry and energy sectors. Manning Diversified is an active sponsor of the Committee and Research Program.

In 1997, both the northeast and northwest caribou Standing Committees published interim operating guidelines for use in the Caribou Management Zones. These operating guidelines were developed within the framework of adaptive management and, according to Dzus (2001), as early as 1999 the Boreal Caribou Research Program (1999) concluded that the 'guidelines have been shown to be ineffective at conserving caribou and their habitat'.

1.3 Grizzly Bear (*Ursus arctos*)

The distribution of the grizzly bear (*Ursus arctos horribilis*) is restricted to northwestern North America and the species is generally associated with higher elevation sites. In Alberta, they occur within the Rocky Mountains Natural Region as well as at higher elevations within the Foothills and Boreal Forest Regions. Historically the species was wide ranging throughout western North America, occurring as far south as central Mexico.

The northwestern population was designated of Special Concern by COSEWIC in 2002. Provincially the grizzly bear has not been listed in the Wildlife Regulation and is not Tracked by ANHIC (within the FMA Area).

As part of the Province's Species at Risk program, an evaluation of the status of the grizzly bear was completed in 2002. Unless indicated, the information in this section of is derived from the status report (Kansas, 2002).

The grizzly bear is a subspecies of the brown bear (the other subspecies recognized is *U. a. middendorffi*, the brown bear of the Alaskan islands, often called the Kodiak bear).

Historically, the decline in the grizzly population resulted from agricultural expansion and unrestricted hunting. Agricultural expansion resulted in habitat loss and fragmentation and increased the interaction between grizzly and humans. Currently, the primary factors threatening grizzly populations are still anthropogenic and are generally related to habitat loss and fragmentation, as well as continued interaction between grizzlies and humans. Natural mortality factors include inter-specific competition and disease/parasites (likely minor) as well as malnutrition, which is primarily associated with younger bear.

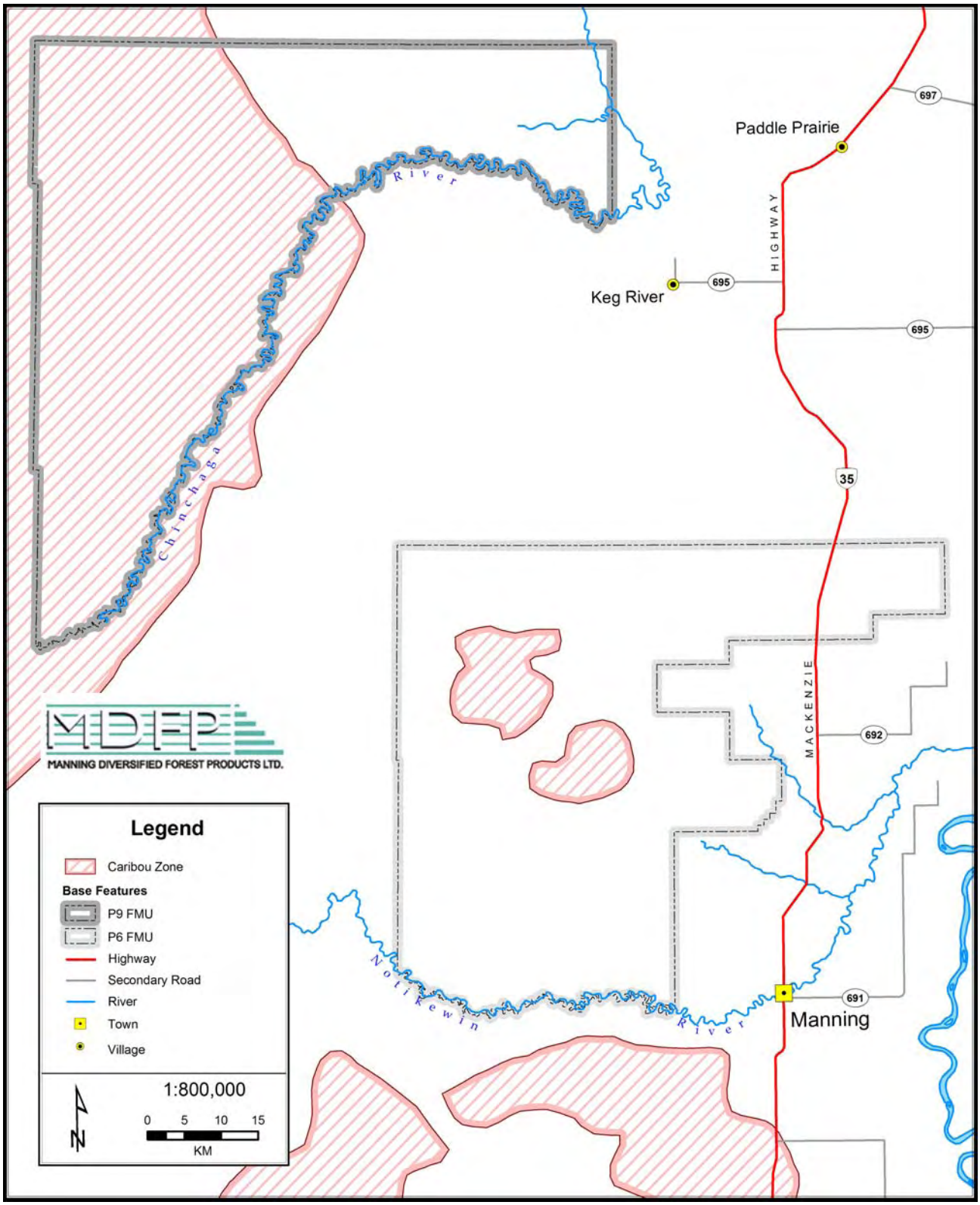

Figure 1-1. Caribou Management Zones within the FMA Area.

Distribution of grizzly bear within their range is related to seasonal availability of high energy food sources. Grizzly are omnivores, taking advantage of a wide variety of available food sources. Grizzly typically feed on graminoids, forbs, berries and seeds, mammals (including ungulates and rodents) and insects (including ants and wasps). In early spring, they generally favour south slopes and lower elevation sites where graminoids first appear. Wetter sites (adjacent to streams and seepage areas) become important in late spring and early summer, along with disturbed sites such as burns and clearcuts which tend to be very productive in terms of forb production. Berries, particularly *Vaccinium spp*. and *Shepherdia canadensis*, are an extremely important food source for grizzly in late summer.

Denning preferences for grizzly bear within the Boreal are not well known.

Bear mortality throughout the Province is closely related to interactions with humans. Proximity to access is strongly correlated with grizzly mortality. Access increases opportunities for poaching and for other contact-related mortality.

Anthropogenic disturbances related to alteration of habitat is generally less of a concern than the increased access associated with the landbase activities. Clear cut harvesting often improves forage habitat for grizzly by increasing the availability of both berry species and ants. Wildfires can also create similar improvements in forage habitat.

To facilitate bear management, in 1990 the Province of Alberta identified Bear Management Areas (BMA). MDFP's FMA Area lies within BMA 1 and BMA 2A (Figure 1-2). Table 1-1 summarizes population estimates for the Province and for BMA 1 and BMA 2A on an annual basis between 1988 and 2000. Both Provincially and within BMA 1, estimated populations are increasing. The population in BMA 2A, which is closer to developed and agricultural lands, has been declining.

In 1990 Alberta developed a comprehensive management plan for grizzly bear within the Province. The grizzly management plan outlined primary strategies to achieve the following goals:

- increase the provincial population to 1000 bears (under review)
- reduce hunting harvest to 2% of a local area's population
- establish an annual monitor of mortalities with particular emphasis on females
- initiate habitat inventory utilizing grizzly habitat-use information.

Secondary strategies included upgrading bear handling procedures while maintaining an effective response to grizzly-human conflicts and assisting viewing and other non-consumptive enjoyment.

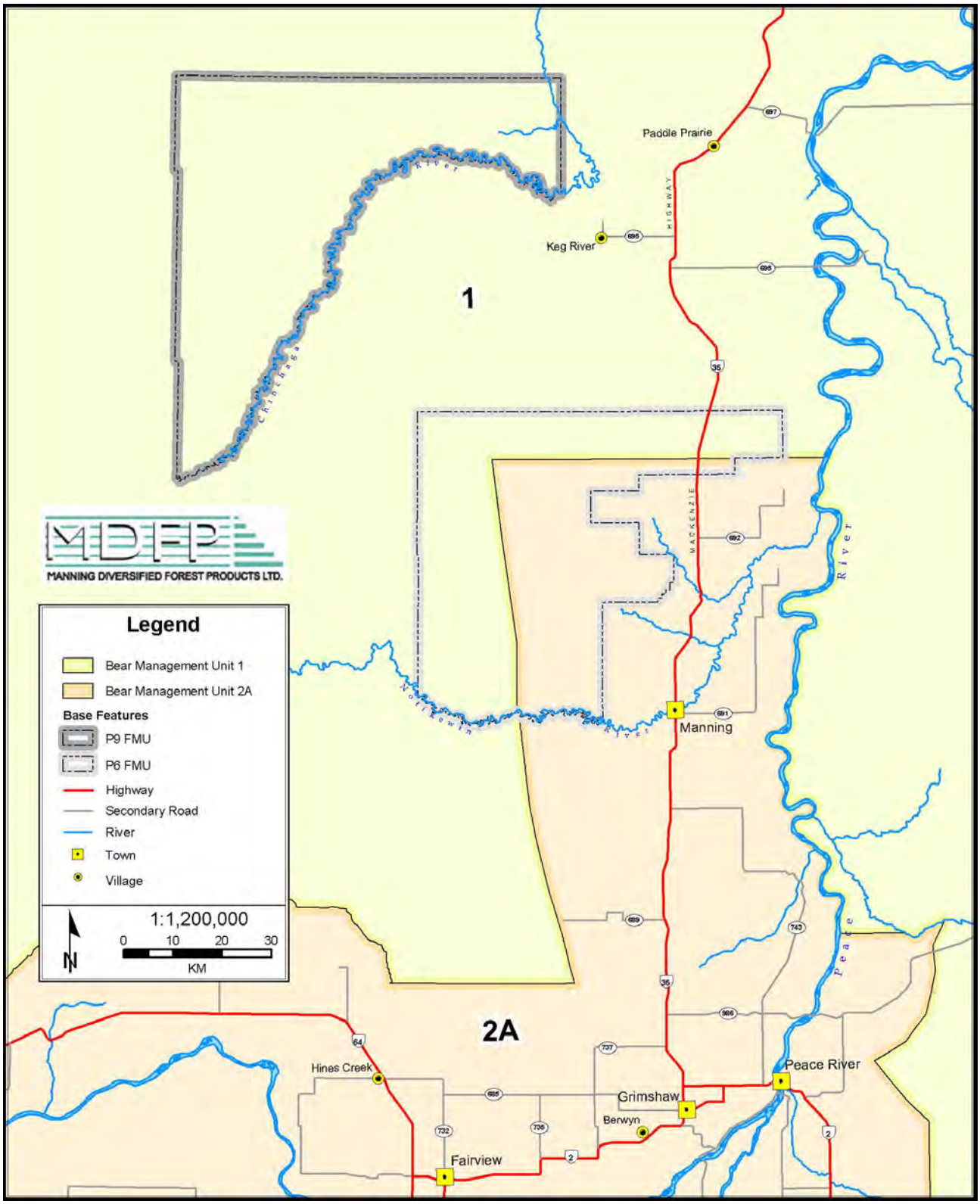

Figure 1-2. Bear management units associated with the FMA Area.

Table 1-1. Estimate of number of grizzly bear in Bear Management Area 1 and in the remainder of Alberta (excluding national parks) for 1988-2000.

Year	BMA 1	BMA 2A	Rest of Province
1988	82	22	471
1989	84	18	434
1990	90	16	441
1991	90	21	527
1992	92	21	556
1993	93	21	572
1994	96	22	582
1995	102	23	610
1996	109	21	635
1997	119	17	640
1998	124	13	670
1999	126	10	697
2000	134	7	700

1.4 Trumpeter Swan (*Cygnus buccinator*)

The trumpeter swan is the largest water fowl native to North America. The trumpeter swan was originally distributed fairly extensively throughout the prairie provinces but was thought to have been extirpated in the early 1900s. A flock was later discovered in the Grande Prairie area and with increased protection from human disturbance, the species has made a comeback. The population of trumpeter swan has increased to the point where, in 1996, they were listed as 'Not At Risk' according to COSEWIC (previously they had been listed 'Vulnerable'). Provincially the species is considered at risk and is classified as 'Threatened' under the Wildlife Regulation. The swan is Tracked by ANHIC in the FMA Area. Trumpeter swans have been recorded in two locations within Manning Diversified's FMA Area, both within FMU P6 (see Figure 1-3).

The following description of the species' habitat and biology is primarily from 'Status of the Trumpeter Swan (*Cygnus buccinator*) in Alberta' (James, 2000)

During the summer breeding months, trumpeter swan inhabit lakes and marshes in the Mixedwood and Boreal Natural Sub-regions. Winter grounds are located in the northwestern United States, in a relatively small area near the borders of Montana, Idaho and Wyoming.

The birds arrive from their wintering grounds in mid-April to early May. They form life long mating pairs and take approximately 5 years to reach breeding age. Generally, a single pair will nest on an appropriate breeding lake or pond and they will return to the same location each year.

Breeding habitat requires the following:

- adequate room to take off (approximately 100 m)
- accessible forage
- shallow stable levels of clean fresh water
- emergent vegetation

- low human disturbance
- structure for a nest site (e.g., muskrat or beaver lodge, small island, etc.).

Nesting pairs will lay 3 to 9 eggs which are incubated for approximately 5 weeks. Resulting brood size is approximately 3 birds, based on data collected from the Grande Prairie area. The young feed on aquatic invertebrates and crustaceans before switching to the adult diet that relies on aquatic plants.

Trumpeter swans begin staging on larger lakes in mid-September, about a month prior to migrating to their wintering grounds. The trumpeter swan population in northwestern Alberta is referred to as the Canadian subpopulation, which migrates to wintering grounds in the Montana-Idaho-Wyoming boundary area.

In 2001, the Province published draft 'Recommended land use guidelines for trumpeter swan habitat' (October 30, 2001 Draft, Fish and Wildlife Division). Guidelines directed at all activities in swan habitat areas include:

- April 1 to Sept. 30, no activity within 800 m of the high water mark of identified lakes or water bodies.
- April 1 to Sept. 30, no direct flights over identified lakes or water bodies.
- No long term development (roads, wells, pipelines, etc.) within 500 m of the high water mark on identified lakes or water bodies.

Guidelines related specifically to timber harvesting include:

- No timber harvesting within 200 m of high water mark for identified lakes or water bodies.
- Establishment of a special management zone for timber harvesting between 200 m and 500 m from high water mark, with a detailed plan required.

1.5 Black-throated Green Warbler (*Dendroica virens*)

The black-throated green warbler is a neotropical migrant that breeds in the boreal forests of Canada and Northeastern United States, while wintering in Mexico and Central America.

Although classified as a 'Species of Special Concern' provincially, the species may be common in some areas of Alberta where suitable habitat exists. The black-throated green warbler is not Tracked by ANHIC within the FMA Area. Nationally, the species is not listed.

The following description of the species' biology and habitat is primarily from 'Status of the Black-throated Green Warbler (*Dendroica virens*) in Alberta' (Norton, 1999).

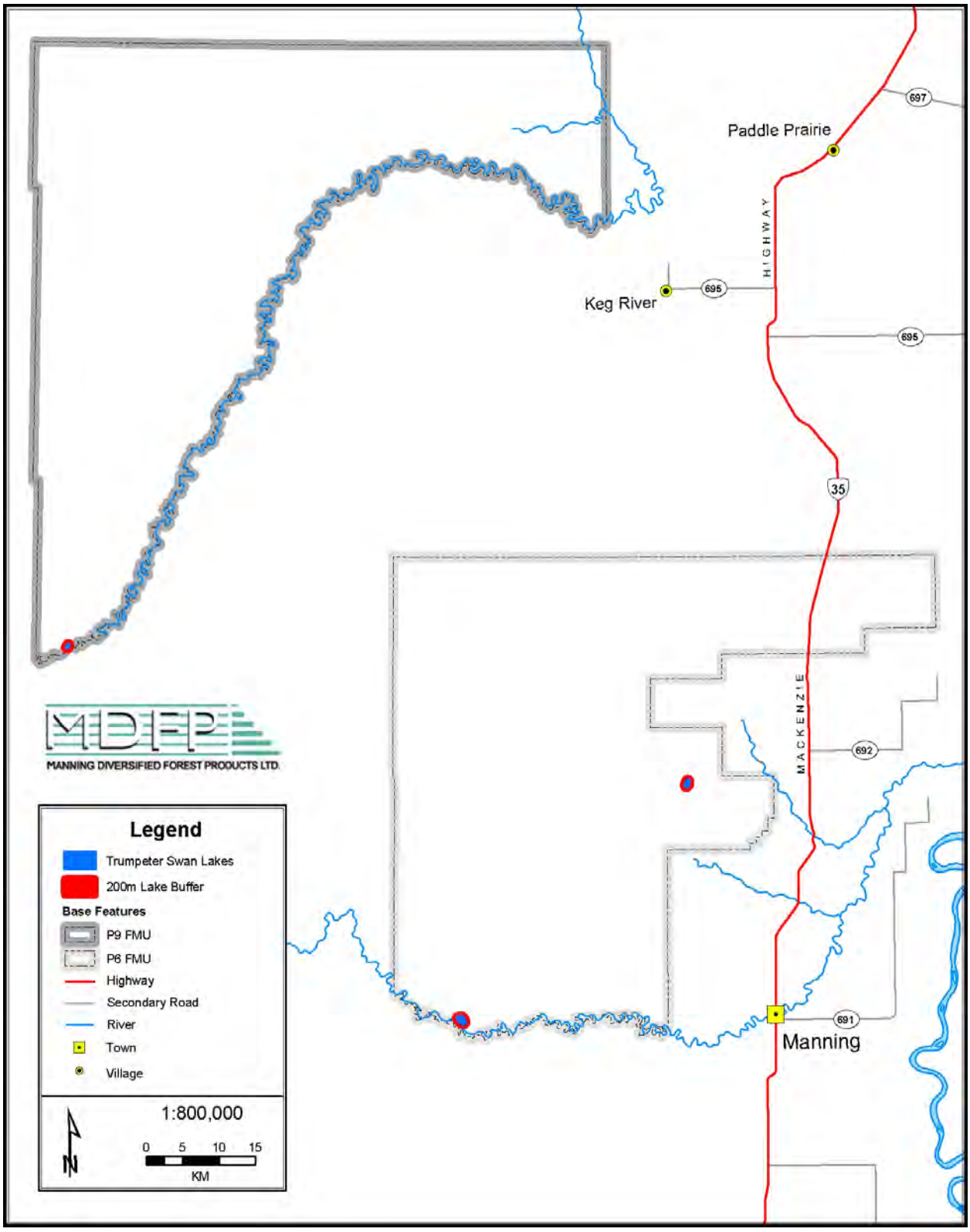

Figure 1-3. Trumpeter swan lakes (including 200 m buffer) within Manning Diversified Forest Products FMA Area.

The black-throated green warbler is a small, foliage-gleaning warbler. Males and females are similar in size (11 to 12 cm and weighing 8 to 11 g) but can be differentiated on the basis of colouring (males are more brightly coloured). Birds are able to reproduce in their first year and can live at least 6 years. The birds feed diurnally, foraging relatively high in the canopy (13 to 15 m). Lepidoptera larvae are an important food source but the species also takes advantage of available beetles, true bugs, wasps, ants, gnats, moths and flies. The bird is not known as a major predator of spruce budworm except when populations reach epidemic levels.

In Alberta it occurs in the boreal forest region and is consistently associated with two habitat types:

- deciduous or coniferous dominated mixedwood, with presence of some mature conifer in the canopy;
- mature/older stands – maybe 80-130 years old, dominated by either aspen or spruce.

Some research indicates the species may be found in old coniferous stands and may prefer birch over other deciduous trees. The species inhabits larger tracts of forest and tends to avoid disturbed or edge habitats. Use of individual spruce trees for singing and foraging increases significantly with increasing tree diameter (correlated to some extent with age of stand).

1.6 Cape May Warbler (*Dendroica tigrina*)

The Cape Mary warbler is a neotropical migrant that breeds in the boreal forests of Canada and Northeastern United States, while wintering in the West Indies and the east coast of Central America.

The species is uncommon in most areas of the Province and there are concerns regarding habitat loss/fragmentation. The Cape May warbler is not currently listed either nationally or Provincially, and is not on the Alberta Natural Heritage Information Centre's Bird Tracking List.

The following description of the species' habitat and biology is primarily from 'Status of the Cape May Warbler (*Dendroica tigrina*) in Alberta' (Norton, 2001). Because the species occurs uncommonly and at low densities, little information is available Provincially regarding its biology, ecology or population status.

The Cape May warbler is a medium-sized warbler that forages diurnally by gleaning insects off leaves and needles near branch tips, relatively high in the canopy. Males and females are approximately 13 cm long and weigh 10 g. Males are more brightly coloured than females. Cape May warblers have been known to survive at least 4 years. Lepidoptera are the primary food source in the summer and the species is considered a major predator of spruce budworm (*Choristoneura fumiferana*) and forest tent caterpillar (*Malacosoma disstria*). There is an indication that Cape May warblers can produce larger clutches when food is abundant and the population may be able to respond relatively quickly to spruce budworm or tent caterpillar outbreaks.

The species is classified as a forest specialist. In Alberta it occurs in the boreal forest and foothills region and is primarily associated with mature to old coniferous forest types, usually spruce or fir dominated stands with relatively open understories. It also is common is spruce-dominated mixedwoods with a component of aspen, poplar and/or birch. There is some indication that the species may also utilize deciduous-dominated stands, black spruce stands and treed fens. Several sources indicate the Cape May warbler may require scattered veteran conifers that extend above the main tree canopy for singing posts. The species tends to be sighted in stands greater than 60 years of age.

Population information for Alberta is, at best, sketchy. Many of the large studies in Alberta have focused on deciduous-dominated forests and may under represent the Cape May Warbler. Statistics from the Canadian Breeding Bird Survey indicate non-significant population trends (caution is suggested given the low numbers of birds detected). Concern has been expressed related to habitat loss/fragmentation that may be associated with increased forest harvesting within Alberta (which may reduce the extent of older spruce stands). In addition, suppression of spruce budworm outbreaks may reduce opportunities for localized population response to a temporarily abundant food source. The extent that these forest management practices are offset by changes in forest composition associated with fire suppression (which would increase the amount of older forest) is not known.

The relative importance of summer breeding ground habitat loss/fragmentation versus loss/fragmentation of wintering grounds is not know, but is thought to be significant.

1.7 Other Ungulates

Although ungulates such as moose, deer and elk are not considered 'At Risk' within Alberta, the Province has identified key Ungulate Zones, which represent important ungulate habitat, particularly winter ranges. These ranges exclude areas already included within the Caribou Zone, since the Caribou Zone designation receives primary consideration. The map in Figure 1-4 shows the location of key ungulate winter range within MDFP's FMA Area.

Winter ranges represent important ungulate habitat within northern Alberta because of the length and severity of winters. Harsh environmental conditions (e.g., cold temperatures, deep snow, etc.), combined with reduced availability of high quality food sources make it difficult for these species to maintain sufficient energy stores to survive through the winter months.

Forest management operations within these Zones consider ungulate populations and their habitat requirements. Within MDFP's FMA Area, the Ungulate Zones are restricted to the valleys associated with major rivers, specifically the Notikewin, Hotchkiss and Meikle Rivers in P6 and the Chinchaga River in P9.

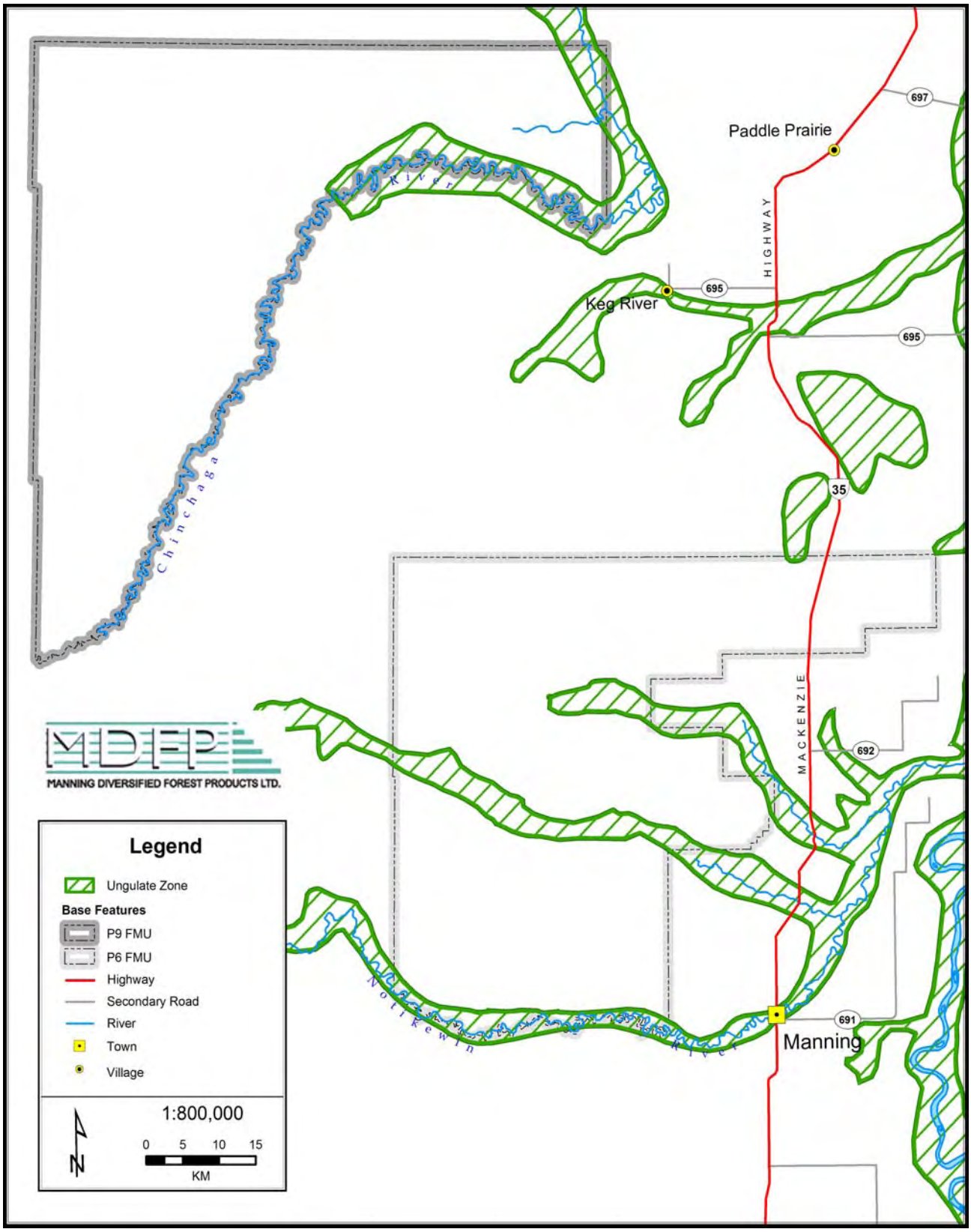

Figure 1-4. Ungulate Zones within the FMA Area.

2. Fisheries Resources

Fish species are located in lakes, rivers and streams throughout the FMA Area (Figure 2-1). In total, the FMA Area contains 84 waterbodies identified in the AVI as lakes (i.e., NWL/WL), accounting for 927 hectares. Most lakes within the FMA Area are relatively small (i.e., only 18 are greater than 10 hectares) The largest lake in the FMA Area is located in the extreme northeast of FMU P6 and is 277 hectares.

Major rivers within the FMA Area are described in section 5.1 in **FMA Area**.

The Province has evaluated the fishery potential of most regions in the Province, including FMU P6 (information for FMU P9 is not available) (Figure 2-2). The major streams and rivers of the Notikewin watershed (including the Botha, Hotchkiss and Meikle Rivers) are classified as having medium to high fisheries potential.

2.1 Fish Species

Fish density in the Notikewin watershed is considered low, according to the findings of the Northern Watershed Project. The Project reported 17 species of fish, representing 8 different families within the Notikewin River basin (Scrimgeour et al. 2003). Game species include Arctic grayling (*Thymallus arcticus* (Pallas)), mountain whitefish (*Prosopium williamsoni* (Girard)), northern pike (*Esox lucius* Linnaeus) and walleye (*Stizostedion vitreum vitreum* (Mitchill)).

A listing of fish species found within Northwestern Alberta can be found in Chapter 3 – Biota and Ecological Communities in Stelfox and Wynnes 1999.

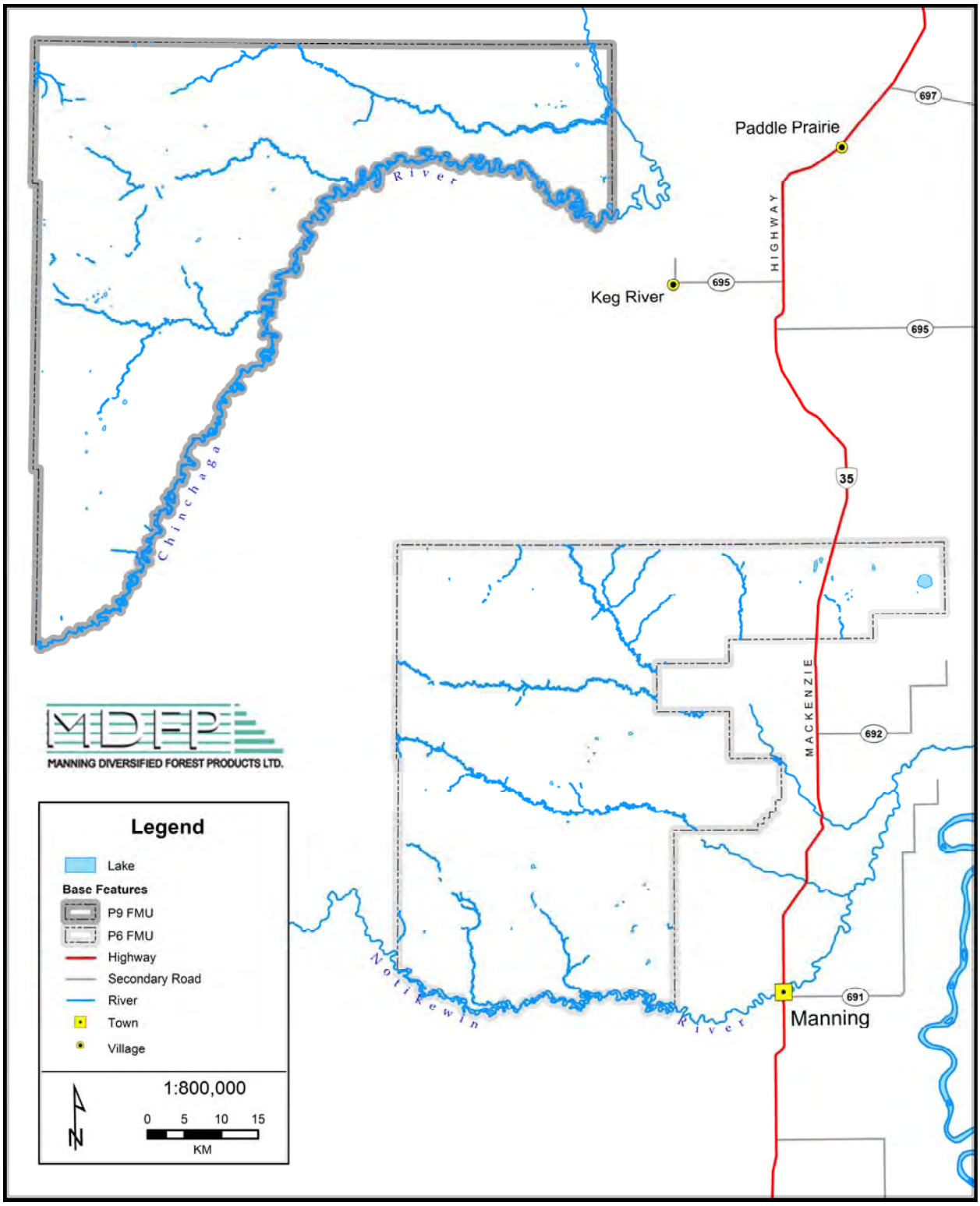

Figure 2-1. Lakes (based on AVI classification of NWL/WL), streams and rivers within the FMA Area.

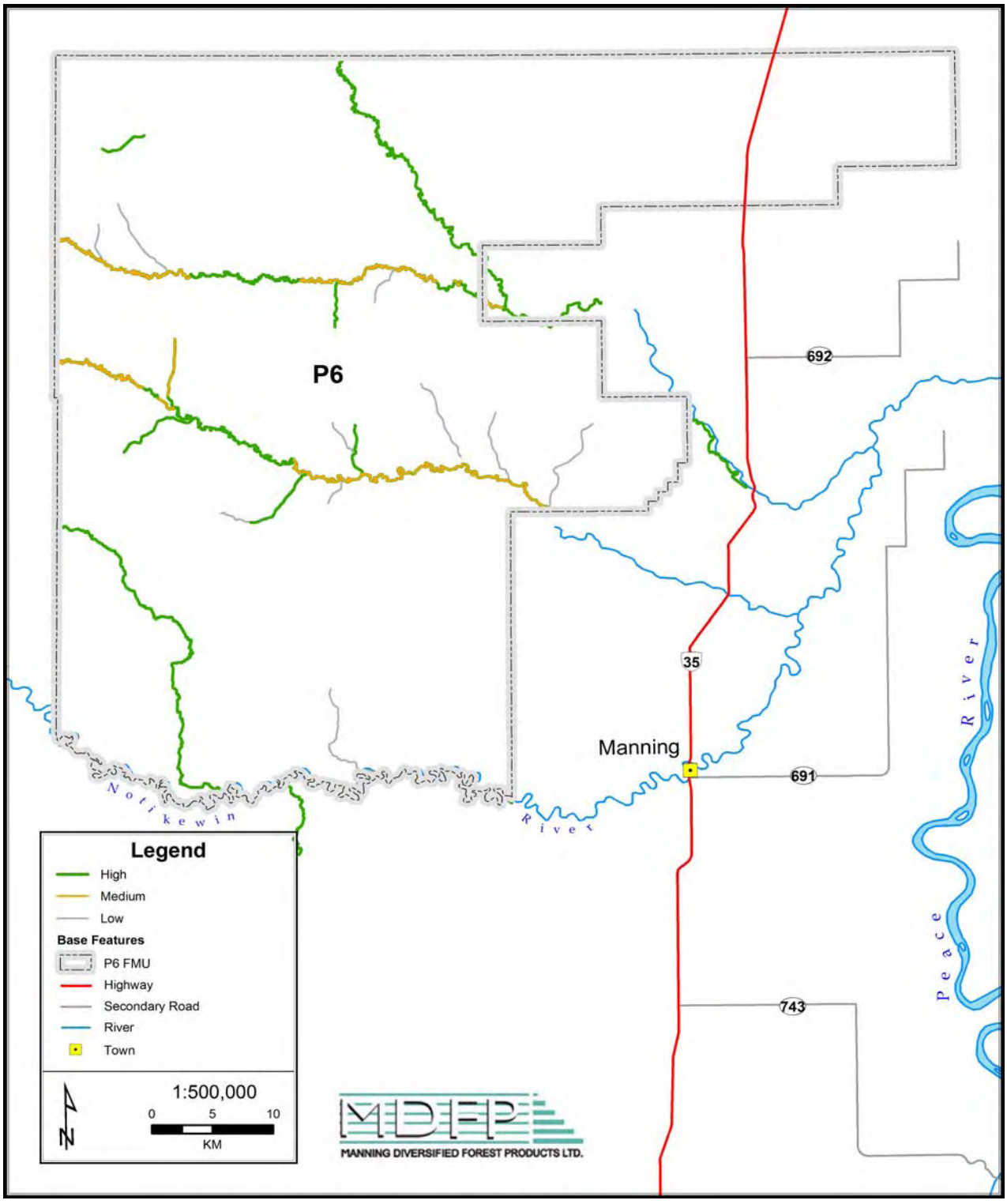

Figure 2-2. Fisheries Potential for FMU P6 (from Provincial Fisheries Information Management database).

2.2 Northern Pikeminnow (*Ptychocheilus oregonensis*)

Northern pikeminnow (*Ptychocheilus oregonensis* (Richardson), also referred to as northern squawfish) has also been recorded in the Notikewin (based on information provided by ANHIC). This species is on Alberta Natural Heritage Information Centre's Tracking List for the Lower Boreal Highlands natural subregion. It is not recognized as Endangered or Threatened either Provincially or Federally.

The following description of the species' habitat and biology is primarily from McPhail (1998).

The northern pikeminnow is native to the pacific slopes from the northwestern United States into British Columbia (Figure 2-3). Its distribution in Alberta is limited, possibly only occurring in the Notikewin River. The species occurs in most of the major BC river systems, including Fraser, Skeena and Columbia. Smaller fish or young adults are also found in smaller streams while large individuals are usually found in interior lakes.

Northern pikeminnow spawn between May and July in shallow water over a gravelly bottom in streams, but will also spawn along lake shores. Females produce from 12,000 to 100,00 eggs, depending on size (average about 40,000) and the eggs take approximately one week to hatch. It takes approximately six years for young pikeminnow to begin reproducing.

Adult northern pikeminnow are dark green or green-brown back, with a white/cream abdomen. The head is relatively long and its tail is distinctly forked. The fins are clear, however males display yellow/orange lower fins during spawning periods. Average size ranges from 30 to 50 cm (weighing 1 to 2 kg).

Northern pikeminnows are considered scavengers. Juveniles feed on a variety of aquatic invertebrates, but fish are the favored prey of larger fish (young salmon and trout other minnows, suckers, etc). During the salmon spawning season, they will also feed on eggs. In some jurisdictions the northern pikeminnow are considered serious pest or predator and efforts have been expended in attempts to eradicate them (i.e., a bounty program in the lower Snake River in Washington).

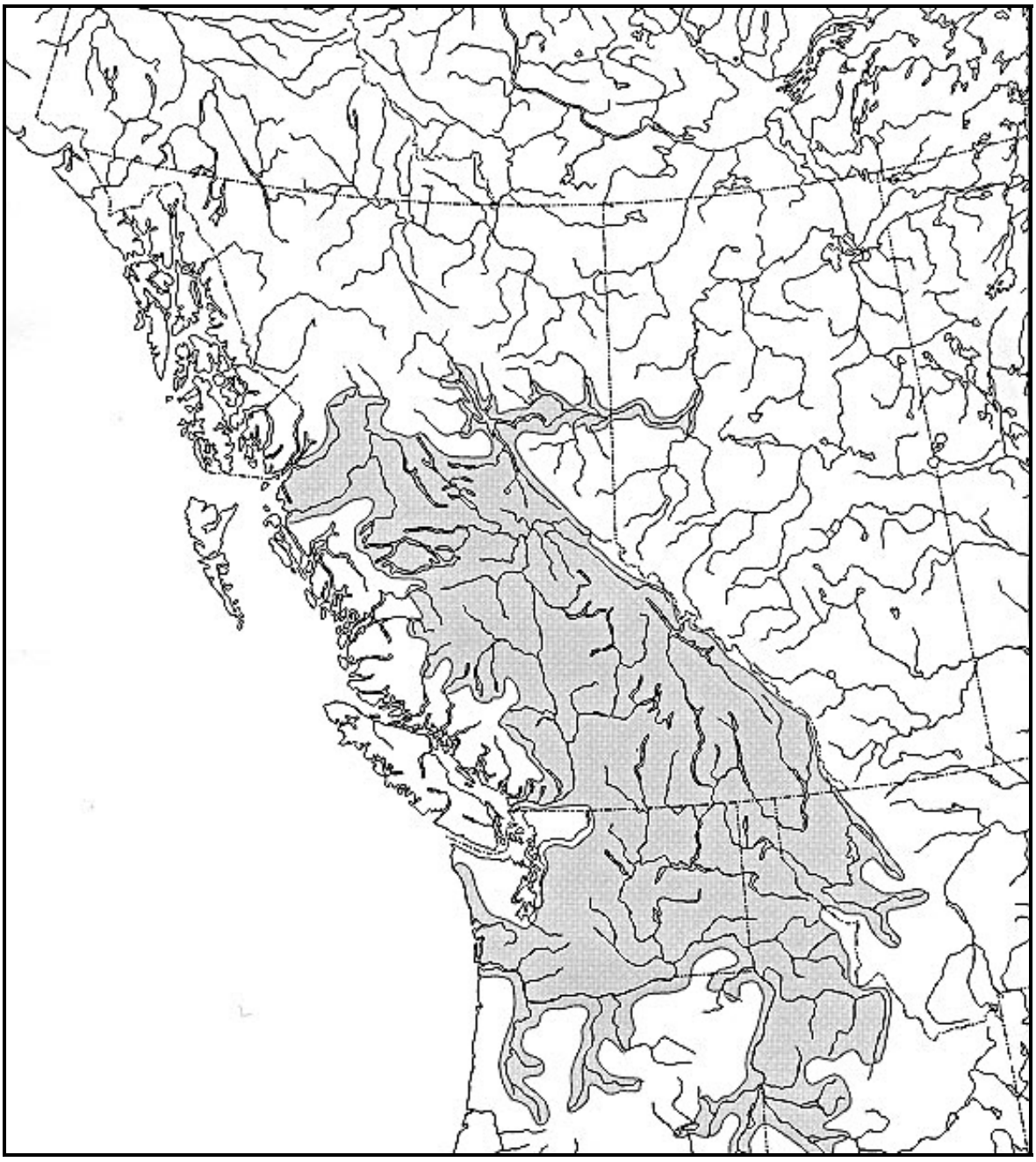

Figure 2-3. Distribution of northern pikeminnow (from http://www.naturewatch.ca/eman/reports/publications/99_montane/fishes/fishesfig03.html (July 15, 2005)).

3. Plant Communities

Because MDFP's FMA Area encompasses three distinct Natural Sub-regions, it is supports a wide range of plant communities. Characteristic forest associations in each of these Natural Sub-regions are described briefly in Section 3 in FMA Area.

Within the FMA Area, forested communities tend to be dominated by white spruce and aspen. These tree species may occur as single species stands, however, they commonly occur as mixes, along with other species such as lodgepole pine, birch and poplar. A more detailed summary of the types of forests found within the FMA Area is provided in section 2.1 and 2.2 in **Forest Landscape Metrics**.

A wide range of non-forested communities also form an important component of the landscape within the FMA Area. These communities include *Carex spp.* dominated riparian areas, *Sphagnum spp*. peatlands, upland shrub communities, etc.

The majority of the forested and non-forested plant communities within the FMA Area are relatively well represented Provincially and regionally. However, ANHIC has compiled a list of Ecological Communities within Alberta which identifies communities which are unusual, uncommon or of limited extent (Allen 2006). The list is considered preliminary because, in some cases, knowledge of the extent or distribution of the communities is quite limited.

A total of 36 tracked communities were identified as possibly occurring within the FMA Area. Of these, Allen indicated that 17 were unlikely to be present within the FMA Area. A further 13 had a low likelihood of being present. Of the communities identified, 12 were considered Forest/Woodland communities and 6 of these had a low to medium likelihood of occurring within the FMA Area (Table 3-1). Based on the habitat characteristics of these six Forest/Woodland communities, two communities were identified which could be impacted by forestry operations within the FMA Area. Abstracts for these two forested plant communities are provided in Appendix III.

Table 3-1. Forest/Woodland Tracked Communities within the Boreal Forest natural region (communities in blue could be impacted by forestry operations).

Code (CEAB#)	Scientific Name	Common Name	Rank[1]	Likelihood	Habitat Notes	Status
40	*Picea glauca / Alnus tenuifolia – Betula neoalaskana / Equisetum pratense / Hylocomium splendens*	white spruce / river alder – Alaska birch / meadow horsetail / stair-step moss	S3	L	Riparian community associated with major river valleys. Restricted to silt-bearing rivers where extensive silt terraces occur. Forest in areas where flooding and channel migration have created wide valleys, on mid and upper silt terraces.	Would not be in active landbase (river breaks and Notikewan Management Zone).
43	*Populus balsamifera / Viburnum opulus / Matteuccia struthiopteris*	balsam poplar / high-bush cranberry / ostrich fern	S1S2	L/M	Moist, nutrient-rich community in seepage areas on hillsides/depressions.	May be in active landbase. Ranking indicates up to 20 occurrences or few remaining hectares.
44	*Populus tremuloides / Rubus parviflorus / Aralia nudicaulis*	aspen / thimbleberry / wild sarsaparilla	S2S3	L	Often associated with seepage areas related to a layer of reduced permeability that restricts drainage and channels seepage.	May be in active landbase. Ranking indicates up to 80 occurrences.
45	*Populus tremuloides / Salix bebbiana –Corylus cornuta / Calamagrostis canadensis – Matteuccia struthiopteris*	aspen / beaked willow – beaked hazelnut / bluejoint – ostrich fern	S1	L/M	Riparian wet meadow (imperfectly drained), with open tree layer.	Would not be in active landbase (river breaks and Notikewan Management Zone).
170	*Populus tremuloides / Rosa acicularis / Apocynum androsaemifolium*	aspen / prickly rose / spreading dogbane	SU	L/M	Found on gently sloping fluvial terraces on moderately to well drained sites on sandy substrates.	Would not be in active landbase (river breaks and Notikewan Management Zone).
175	*Betula neoalaskana / Ledum groenlandicum / Calamagrostis canadensis*	Alaska birch / common Labrador tea / bluejoint	SU	L	Peatland with Alaska birch.	Would not be in active landbase.

Table 3-1. Forest/Woodland Tracked Communities within the Boreal Forest natural region (communities in blue could be impacted by forestry operations). continued.

Code (CEAB#)	Scientific Name	Common Name	Rank	Likelihood	Habitat Notes	Status
38	*Larix laricina / Carex prairea*	tamarack / prairie sedge	S1	U		
188	*Larix laricina - Picea mariana / Cornus stolonifera - Rubus idaeus*	tamarack - black spruce / red-osier dogwood - wild red raspberry	S1S2	U		
41	*Picea glauca / Cetraria islandica*	white spruce / lichen	S1?	U		
189	*Picea mariana / Cornus stolonifera /* feathermoss	black spruce / red-osier dogwood / feathermoss	S1S2	U		
42	*Populus balsamifera / Alnus tenuifolia - Cornus stolonifera*	balsam poplar / river alder - red-osier dogwood / meadow	S3	U		
114	*Populus balsamifera / Rhamnus alnifolia /*	balsam poplar / alder-leaved buckthorn	S1	U		

[1] S1 – Five or fewer occurrences or very few remaining hectares. S2 – Six to 20 occurrences or few remaining hectares. S3 – Twenty-one to 80 occurrences or may be rare and local throughout its range or found locally in a restricted range. SU – Unrankable due to lack of information or conflicting information.

4. Plant Species

Manning Diversified's FMA Area has not been the focus of many intensive floristic surveys. To some extent, both FMUs P6 and P9 (currently designated P16) are difficult to access during the summer months, when these ground surveys need to be completed. In addition, there are very few parks and protected areas in the immediate vicinity of the FMA Area.

A listing of plant species found within Northwestern Alberta can be found in Chapter 3 – Biota and Ecological Communities in Stelfox and Wynnes (1999). Based on lists maintained by Alberta Natural Heritage Information Centre, MDFP compiled a list of tracked species[2] of plants occurring or thought to occur within their FMA Area. Because this list is quite extensive, it has been included in as Appendix IV.

4.1 Twisted Bog Moss (*Sphagnum contortum*)

Twisted bog moss (*Sphagnum contortum* Schultz, sometimes referred to as *Sphagnum subsecundum* var. *contour*) has been reporting from the Twin Lakes Recreation Area (Figure 4-1). This species is on Alberta Natural Heritage Information Centre's Tracking List. It is not recognized as Endangered or Threatened either Provincially or Federally nor is it recognized as At Risk Provincially.

Sphagnum contortum is a moderate to small sized species, usually green/golden to orange in color. It has a weak stem and the branches are somewhat curved with spreading leaves that are ovate to long ovate (ovate-lanceolate) and somewhat turned to one side (subsecund). The leaf tips are blunt and rounded with small teeth (rounded-obtuse and weakly denticulate) (Crum 1983).

Sphagnum contortum is found in base-rich flushes in otherwise more acidic habitats, usually in the open and on very wet sites. The species is known to occur on burned over sedge bogs, sedge meadows and floating mats, often at the edge of water or in the moat surrounding bogs. It often occurs in association with *S. warnstorfii, S. centrale, Campylium stellatum,* and *Calliergonella cuspidata*.

[2] Not all tracked species are officially designated 'At Risk'.

The species is likely distributed across Canada and the United States of America, Mexico, Costa Rica, Europe and Asia. Additional collection/sighting locations within Alberta are shown in Figure 4-2.

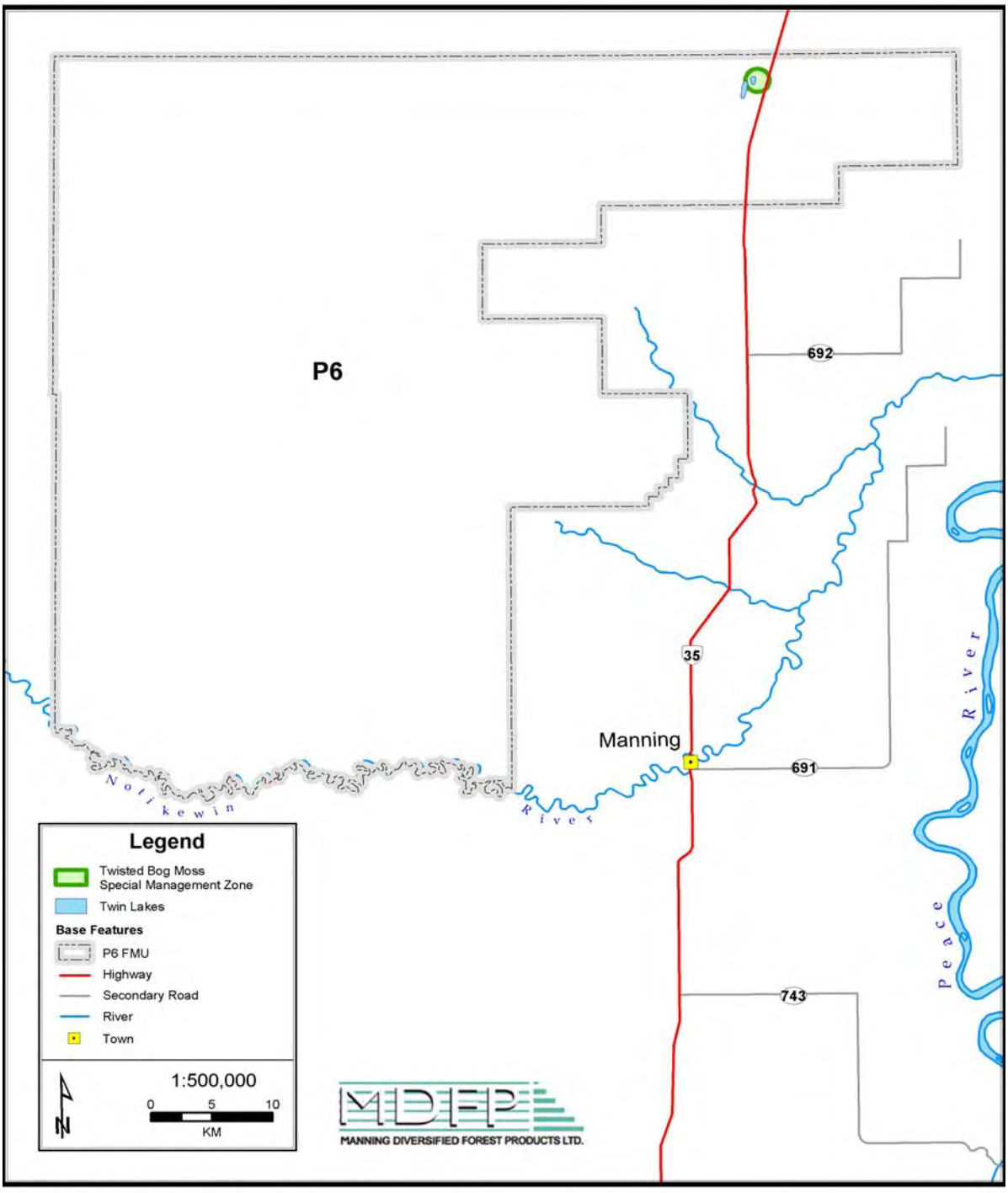

Figure 4-1. Reported location of twisted bog moss, as provided by Alberta Natural Heritage Information Centre.

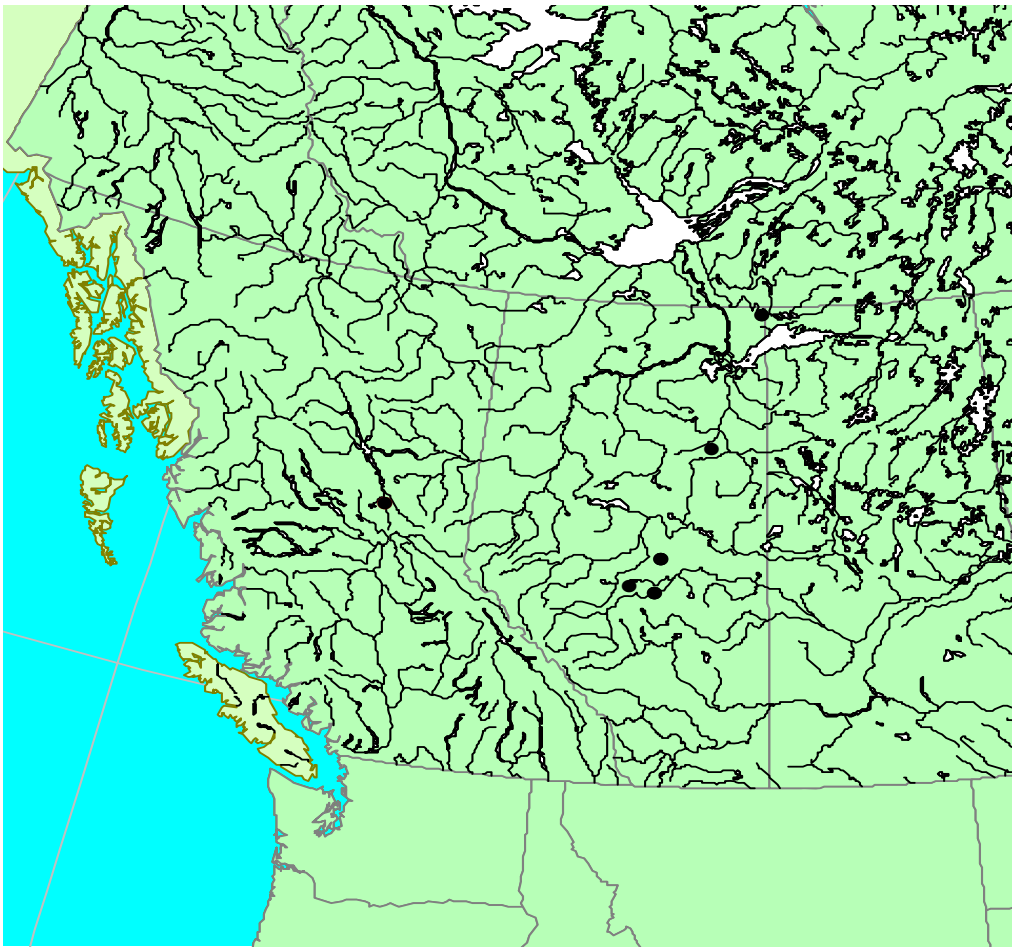

Figure 4-2. Collection/sighting locations for Sphagnum contortum within Alberta (map provided by Rene Belland, University of Alberta and Devonian Botanical Gardens).

5. Forest Pathogens

Until very recently, defoliators were generally considered the primary threat to the forests of northwestern Alberta in terms of potential pathogens. Spruce budworm (*Choristoneura fumiferana* (Clemens)) which prefers white spruce, is the most important conifer defoliator while large aspen tortrix (*Choristoneura conflictana* (Walker)) and forest tent caterpillar (*Malacosoma disstria* (Hubner) are primary aspen defoliators. Defoliators often impact the growth of host species, but generally do not cause high levels of host mortality.

Within the last few years, the threat to northwestern Alberta posed by the mountain pine beetle (*Dendroctonus ponderosae* Hopkins) has steadily increased and this pathogen now has the potential to cause major losses to the region's lodgepole pine forests. Traditionally, mountain pine beetle outbreaks within Alberta were restricted to the southwest and west-central areas of the Province. However, the severe outbreak in British Columbia over the last ten years has created an extremely widespread and dense infestation source and mountain pine beetle is now considered a major threat to pine forests throughout Alberta. Unlike defoliators, bark beetle attacks during epidemics almost always result in host tree mortality.

The following descriptions of the primary forest pathogens were taken primarily from the following website: http://www.srd.gov.ab.ca/forests/health/i_insects.html and http://www.nrcan-rncan.gc.ca/cfs-scf/science/prodserv/pests.

5.1 Mountain Pine Beetle

The mountain pine beetle can be an extremely destructive pest of mature lodgepole pine forests. It is a bark beetle that feeds on the phloem of host trees. The beetle introduces a blue-stain fungus and, between the fungus and the larval feeding, host trees can be killed within one month of attack. Mortality is the result of disruption of the flow of water and nutrients in the phloem.

The mountain pine beetle generally completes its life cycle within one year. Eggs, deposited in vertical galleries under the tree's bark in mid-summer, hatch in late summer. The larvae are white, grub-like and marked with brown heads. Larvae continue to feed in the phloem, creating new horizontal galleries, and

then over-winter under the bark. In spring the larvae resume feeding until they are ready to pupate. Pupation is completed by early summer, when the small adult beetles (4.0 7.5 mm in length) emerge to attack new host trees.

Mountain pine beetle damage is characterized by:

- Cream coloured pitch and pitch tubes on the tree trunk (as the tree tries to repel the beetles)
- Sawdust in bark crevices and around base of the tree (from boring by beetles)
- J- shaped vertical egg galleries under the bark, beginning above the entry holes
- Greyish blue sapwood (caused by the blue-stain fungi)
- Yellowish-green needles over the full crown of the tree, becoming reddish the year after initial attack.

The Province of Alberta has initiated an aggressive strategy to limit the spread of mountain pine beetle within the Province. This strategy involves detection and control efforts, as well as salvage and risk reduction.

Detection and control efforts include:

- Annual aerial surveys to spot infestations (generally from the previous year).
- Ground surveys to detect current-year infestations.
- Use of pheromone bait traps to monitor beetle populations.
- Destroying infested trees prior to beetle emergence, by cutting and burning.

As the number and size of mountain pine beetle infestations within Alberta rise, it becomes increasingly unlikely that all infestations can be controlled by cutting and burning infested trees because of the costs and man-power involved. In these cases, salvage operations will be initiated, to maximize the economic recovery for the infested areas. The Province has already implemented policy measures to provide the forestry industry with the flexibility needed to accommodate beetle salvage operations.

Risk reduction (prevention) is a key component of the Province's beetle strategy (ASRD 2007). Risk reduction in susceptible areas includes targeting pine stands for harvest (over spruce stands) over the next 20 years (section 5.2.5 in **Timber Supply Analysis**).

As the mountain pine beetle outbreak in Alberta evolves, additional strategies and policies will need to be implemented to manage the outbreak and minimize it economic consequences.

In 2006, mountain pine beetle infestations were confirmed to the south and southwest of MDFP's FMA Area (see Figure 5-1). The FMA Area currently lies north of the mountain pine beetle 'Area of Primary Concern' as identified by the Province[3]. It is anticipated that the status and location of infestations will change significantly over the next few years.

[3] http://www.srd.gov.ab.ca/forests/fmd/manuals/pdf/MPB%20Planning%20Interp%20Bulletin_Revised_Sept%202006_Ver%202.6.pdf

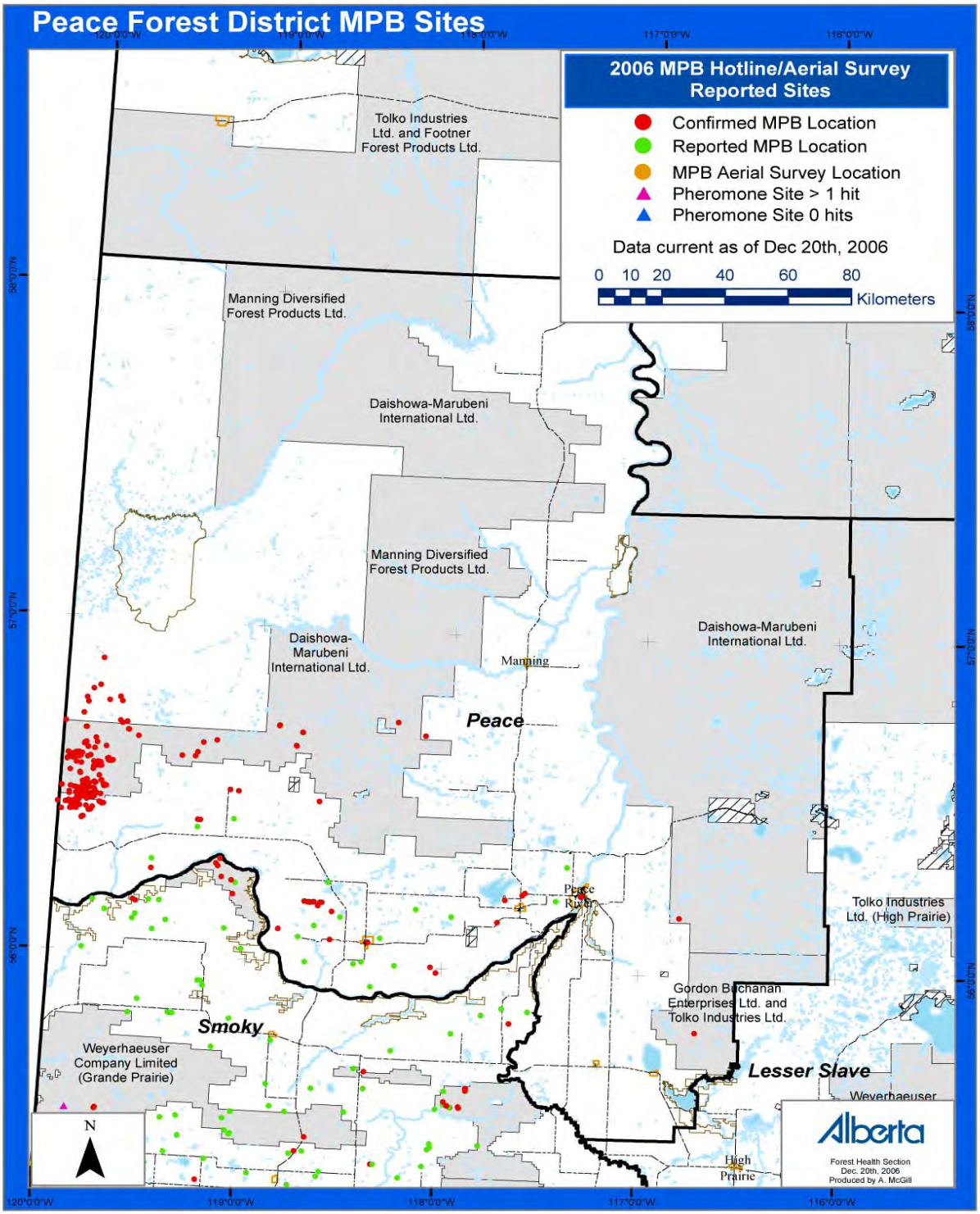

Figure 5-1. Distribution of confirmed and reported mountain pine beetle sites within northwestern Alberta (http://www.srd.gov.ab.ca/forests/health/images/peace_hotline.jpg).

5.2 Spruce Budworm

The spruce budworm is one of the most important defoliators in the boreal forest in terms of its potential economic impact on the forest industry. The spruce budworm feeds predominantly on the current year's buds and needles but may occasionally consume mature needles. The spruce budworm is indigenous, with a widespread distribution nationally and provincially.

The spruce budworm completes its life cycle within a single year. Eggs hatch in the late summer, producing the first larval stage. The second larval stage move, by wind, to new sites under bark scales. The second larval stage overwinters under the bark in cocoons, emerging in the spring to develop into the third larval stage. These either bore into buds or needles or spin webbing around new shoots and feed on the encased needles. Larval stages continue until mid-June and are responsible for most of the defoliation. At this time, the spruce budworm is 18-24 mm in length with a black head and two rows of paired whitish spots down the back. After the final larval stage, the budworm stops feeding, develops into a pupa and then into a mottled brownish moth. The moths mate, producing eggs that will hatch and develop into larvae prior to winter.

Although white spruce is the preferred host, spruce budworm will also feed on balsam fir and tamarack. Pure white spruce stands may be most susceptible, but mixed conifer and mixed conifer-deciduous stands are also susceptible. Outbreaks usually are initiated in overmature stands but quickly spread to younger stands. Outbreaks recur every 20 to 40 years and can last from 7 to 28 years. Outbreaks can lead to reduced tree growth and vigour. Dead tree tops can result after 4 to 5 years of defoliation and mortality can occur after an additional year or two of damage.

Spruce budworm can be detected by:

- Defoliation of the current year's growth.
- New greenish egg masses found in the fall on the underside of needles; old whitish egg masses on older needles.
- Silken webbing seen in May/June around needles and shoots.
- Rusty brown tree crowns in July, caused by the dead brown needles and pupal cases becoming entangled in silken webbing.

The Province of Alberta developed an 'Integrated Spruce Budworm Management Strategy' (2002) to help address the need for widespread, coordinated efforts in controlling spruce budworm populations. The management program consists of:

- Detection and monitoring of spruce budworm populations,
- Assessment of the consequences of epidemic budworm populations on the land management objectives, and
- Implementation of an action plan to mitigate the impact of epidemic budworm populations on land management objectives.
- Increase budworm tolerance of host stands.
- Reduce population levels through the use of biological control agents.

In 2001, 2002 and 2003, Provincial surveys indicated areas of moderate to severe defoliation caused by spruce budworm in the vicinity of Manning Diversified's FMA Area. The outbreaks were primarily north and northeast of the FMA Area.

5.3 Spruce Beetle

The spruce beetle belongs to a group of insects commonly referred to as bark beetles. It is in the same genus as the mountain pine beetle.

Spruce beetle occurs at endemic levels throughout Alberta, with outbreaks related to incidents of blowdown, accumulations of debris (e.g., through logging) and damaged standing timber, including fire damaged stems.

The life cycle of the spruce beetle varies between 1 to 3 years depending on location. Within Alberta, the spruce beetle life cycle is completed over a 2 year period. Mature beetles overwinter in the base of trees. In the spring the adults emerge to attack new hosts in May and June. Female beetles tunnel along the wood grain, creating galleries in which they lay their white eggs in mid-summer. Two to four weeks later, the larvae emerge, tunneling under the bark away from the egg gallery. The larvae are white grubs, 3-7 mm in length, with brown heads. The larvae overwinter and then pupate and become adults beetles in the second summer.

Spruce beetle outbreaks can last 2 to 5 years, damaging large-diameter spruce. Larval feeding within the bark can increase incidence of blue stain and other associated fungi, loosens bark and may stop sap flow. Damage cause by spruce beetles and subsequent control is similar to that caused by mountain pine beetle (Section 5.1).

5.4 Large Aspen Tortrix

The large aspen tortrix occurs across Canada and is one of the most serious pests of trembling aspen. The insect causes the leaves to 'roll' using silk threads, forming a feeding shelter.

Yellowish-green larvae emerge from under bark scales and in bark crevices in the spring and begin feeding on foliage. Mature larvae are 1.5 to 2.1 cm in length, are dark green in colour with two rows of black dots and have a black head. By mid June the larvae form pupae, which are normally located within rolled leaves. Adult moths are brownish-grey, with a 2.5 to 3.5 cm wingspan. They emerge in late June through July and mate. Females lay large clusters of eggs on the top surfaces of leaves in July. The larvae hatch about 10 days later, feeding on foliage until early fall and then forming silk shelters for overwintering in bark crevices.

Aspen is the preferred host but the tortrix will also feed on willow, balsam poplar, white birch and choke cherry. Outbreaks of the insect may last 3 to 4 years. Damage is predominantly caused by the later larval stages which may also feed on buds. Massive defoliation can reduce growth increment but rarely results in tree mortality.

Signs of aspen tortrix infestation include:

- Defoliation of aspen and other deciduous species in early summer (April to June)
- Dark green larvae feeding from within rolled leaves
- Black pupal cases within rolled leaves
- Light green egg clusters on leaf surfaces in July.
- In sever infestations, large amounts of spun silk are visible.

Control measures are not normally taken, since the infestations generally do not last more than 3 or 4 years and tree mortality is not widespread.

From 2001 to 2003 the large aspen tortrix was the predominant aspen defoliator in Alberta. Large portions of northwestern Alberta showed signs of moderate defoliation attributable to this pest in 2001. By 2002, the area affected by this pest continued to increased and in some areas, including the Chinchaga Fire Tower Lookout, the severity increase to 'severe'. Even higher levels of infestation were seen in northwestern Alberta in 2003, although no areas with severe infestations were identified (ASRD 2001, 2002 and 2003).

5.5 Forest Tent Caterpillar

Forest tent caterpillar is generally considered the most serious defoliator of hardwoods in Canada.

The larvae emerge in the spring, as the leaves are emerging. Mature larvae can reach 4.5 to 5.5 cm in length. They are hairy and have very distinctive markings: blue bands, a row of keyhole-shaped white markings and broken orange-brown lines. Larvae continue to feed until mid-June, at which time they form pupae, which are silken cocoons generally formed between two leaves. Adult moths are light brown and have a 3.5 to 4.5 cm wingspan. They emerge in late June through July. Females lay large clusters of eggs in bands around twigs. Young larvae develop inside the eggs before winter but do not hatch until the following spring.

Aspen is the preferred target of tent caterpillar, however, the insect will attack almost any hardwood species during outbreaks. Outbreaks generally last up to 4 years and may reoccur every 10 years. Infestations cause branch dieback and reduce growth increment. Several years of severe defoliation may cause mortality, particularly where trees have additional stress factors.

Signs of forest tent caterpillar infestation include:

- Defoliation of aspen from April to June.
- Egg bands in late summer through early spring
- Hairy, distinctively marked larvae, feeding in large groups (April to June)
- Silken cocoons formed between leaves from late June to early July.

When forest tent caterpillar management outbreaks occur, the following management options exist:

- Aerial surveys of susceptible areas, flown late spring to early summer
- Egg band surveys (fall to spring)
- Application of *Bacillus thuringiensis* var. *kurstake* to control infestations.

In northwestern Alberta, the severity of the large aspen tortrix infestation has overshadowed any damage caused by the forest tent caterpillar (ASRD 2001, 2002 and 2003). Surveys from this period indicate tent caterpillar is present and responsible for some of the damage attributed to the large aspen tortrix (damage caused by the two pests is usually indistinguishable on the basis of aerial surveys). Ground surveys in 2003 indicate the presence of forest tent caterpillar along the Chinchaga River , either in or near MDFP's FMA Area.

6. Parks, Protected Areas and Recreation Sites

Twin Lakes Provincial Recreation Area is the only park, protected area or recreation site located in or immediately adjacent to Manning Diversified's FMA Area. Notikewin Provincial Park is located in the vicinity of the FMA Area, although it is more than 30 km east of the FMA Area. Chinchaga Wildland Park and Hay-Zama Lakes Wildland Park are located within the region, but not in the immediate vicinity of the FMA Area.

Twin Lakes Provincial Recreation Area is located 65 km north of the town of Manning, just west of highway 35 (see section 9.4 in **FMA Area**). It lies within the north east corner of FMU P6. Twin Lakes Provincial Recreation Area encompasses 5 hectares along the east side of first (eastern) of the two lakes. The Recreation Area offers overnight camping and opportunities for canoeing, fishing, swimming and wildlife viewing. A 3 km looped trail allows access to the second (western) of the two lakes.

Notikewin Provincial Park is located approximately 48 km northeast of Manning (37 km north along highway 35, then 30 km east along secondary highway 692). The Park encompasses approximately 9.7 hectares along the north and east banks of the Peace River. The confluence of the Notikewin and Peace Rivers occurs within the Park boundaries. Notikewin Provincial Park offers overnight camping and provides river access for activities such as power boating, canoeing, fishing, swimming and wildlife viewing.

7. Historical Resources

The Alberta Historical Resources Act (2001) requires that FMA holders include historical resource concerns within the management planning process.

Within Alberta, historical resources are divided into three distinct categories:

- Palaeontological – natural features containing evidence of extinct multicellular beings (e.g., fossils and dinosaur bones)
- Archaeological – prehistoric and historic cultural artifacts for which no written record exists
- Historical – remains relating to the period for which historic documents/records exist, commonly highly visible (e.g., buildings, etc.).

In 2002, Manning Diversified retained Altamira Consulting Ltd. to complete a Historical Resources Management Plan for P06. Unless otherwise indicated, the information presented in this section originated from the Historical Resource Management Plan – Forest Management Unit P6 (Altamira, 2002).

7.1 Inventory

The inventory of historical resources in Alberta, particularly palaeontological and archaeological sites, is very incomplete. Like many resources, the location, extent and significance of historic resources are not well defined.

Typically, palaeontological sites are identified by their relationship to geological formations, which have, in many parts of the province, been inventoried at a relatively broad scale.

Archaeological sites are more difficult to inventory because they not restricted to a particular geological or biological feature. However, archaeological sites occur more often in certain environmental conditions, such as along rivers and lakes, in sheltered southern exposures, etc.

Historic sites on the other hand, have the advantage of being documented and generally visible, making inventory relatively straightforward.

Table 7-1 provides a summary of the known palaeontologically sensitive areas within P6, based on the Palaeontolocial Resources Sensitivity Zones Map (Tyrell Museum of Paleontology 1984).

Table 7-1. List of Sensitive Areas for palaeontological resources in P6 (based on Palaeontological Resources Sensitivity Zones Map (Tyrell Museum of Palaeontology 1984)).

Meridian	Township	Range	Sections	Rating
5	91	25	22-23 and 27-29	High
6	91	1	19-22, 25-27 and 30	High
6	91	2	16-17 and 21-25	High
6	91	3	13, 22-24 and 27-32	High
5	96	2	35	Low
5	96	3	36	Low
5	97	2	28-29	Medium

According to the work completed by Altamira, there are no known archaeological sites within FMU P6 and very few known sites in the surrounding region. The lack of regional data makes it difficult to calibrate predictive models that are often used to predict the occurrence of archaeological sites. Instead, Altamira relied on a small number of descriptors that generally have high correlations with archaeological resources (e.g., proximity to water, slope, drainage, proximity to open meadows, etc.). Results of the predictive model indicate archaeological potential is limited in P6 (predictive results are provided in Altimira 2002).

Table 7-2 provides a summary of historic sites identified within FMU P6, based on information from the Provincial Historic Resources database. There are no sites listed within FMU P9 within the database.

Table 7-2. Summary of Historic Sites within FMU P6.

Site Name	Legal Description	Comment
Chinchaga Tower	15-36-93-3-W6M	Lookout
Battle River Tower	17-20-94-23-W5M	Lookout
Twin Lakes Campsite	NE1/4 of 9-29-97-22-W5M	

Use of predictive modeling by Altimira (2002) suggested limited potential conflict between forestry operations and historic resources, since the model suggests only portions of P6 adjacent to major water sources or in elevated geographic situations hold potential for historic resources.

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Appendix I Wildlife Tracked by ANHIC That Potentially Occur Within the FMA Area

Key to Rank

- S1/G1 - Five or fewer occurrences or only a few remaining individuals. May be especially vulnerable to extirpation because of some factor of its biology.
- S2/G2 – Six to 20 or fewer occurrences or with many individuals in fewer locations. May be especially vulnerable to extirpation because of some factor of its biology
- S3/G3 – Twenty-one to 100 occurrences. May be rare and local throughout it's range, or in a restricted range (may be abundant in some locations). May be susceptible to extirpation because of large scale disturbances.
- U - Status uncertain, often because of low search effort or cryptic nature of the element. Possibly in peril. Unrankable. More information needed.

tracked_elements_by_2005subregions_feb2007.xls

Alberta Natural Heritage Information Centre

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NatureServe Canada

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Alberta TOURISM, PARKS, RECREATION AND CULTURE

Tracked Elements listed by Natural Subregion

February 2, 2007.

You can download the 2005 Natural Regions and Subregions of Alberta map from: http://www.cd.gov.ab.ca/preserving/parks/anhic/natural_regions_map.asp

This list was generated by an ArcGIS intersection between Natural Regions and Subregions of Alberta (2005) and Alberta Natural Heritage Information Centre (ANHIC) Element Occurrence data. The data were then summarized to count the number of occurrences for each element by subregion. The list only includes those tracked elements for which ANHIC has processed at least one occurrence (occurrences based on wrong or questionable identification are excluded as are occurrences for landform features). The spreadsheet is meant to be used as a general guideline only. The absence of an element within a Subregion does not necessarily mean that it does not occur in that subregion. The precision of mapping occurrences can vary from a few meters to 8 kilometers; therefore occurrences mapped near a subregion boundary may, in fact, be assigned to the wrong subregion. Please remember that subregion boundaries represent transition zones between subregions rather than an abrupt change between subregions. This file is updated periodically as we process new element occurrences (EOs) or update existing ones.

Element Code: AA-Amphibians,AB-Birds, AF-Fish, AM-Mammals, AR-Reptiles, CE-Plant Community, I-Invertebrates, NB-bryophytes, NL-Lichens, O - Other, P-Vascular Plants

You may use the features of Excel to sort and filter this list by any or multiple fields (e.g. list all vascular plants by Natural Subregion).

ID #	Natural Subregion Name	Element Code	Element Scientific Name (SName)	Element Common Name	Rank		
					SRank	NRank	GRank
1	Central Mixedwood	AAABH01170	*Rana pipiens*	Leopard Frog	S2S3	N5	G5
1	Central Mixedwood	ABNFC01010	*Pelecanus erythrorhynchos*	American White Pelican	S2	N4B	G3
1	Central Mixedwood	ABNJB02030	*Cygnus buccinator*	Trumpeter Swan	S3	N4B,N4N	G4
1	Central Mixedwood	ABNKD06070	*Falco peregrinus*	Peregrine Falcon	S3	N3N,N4B	G4
1	Central Mixedwood	ABNLC10010	*Lagopus lagopus*	Willow Ptarmigan	S1	N5	G5
1	Central Mixedwood	ABNNB03070	*Charadrius melodus*	Piping Plover	S2	N2B	G3
1	Central Mixedwood	AFCAA01020	*Acipenser fulvescens*	Lake Sturgeon	S2	N3N4	G3G4
1	Central Mixedwood	AFCHA03020	*Prosopium coulteri*	Pygmy Whitefish	S1	N5	G5
1	Central Mixedwood	AFCJB16020	*Hybognathus hankinsoni*	Brassy Minnow	S2	N5	G5
1	Central Mixedwood	AFCJC02130	*Catostomus macrocheilus*	Largescale Sucker	S2	N5	G5
1	Central Mixedwood	AFCJC10010	*Moxostoma anisurum*	Silver Redhorse	S2	N4	G5
1	Central Mixedwood	AFCQC04050	*Percina caprodes*	Logperch	S1	N5	G5
1	Central Mixedwood	AMAFF11100	*Microtus xanthognathus*	Taiga Vole	SH	N5	G5
1	Central Mixedwood	AMALC04013	*Rangifer tarandus pop. 1*	Woodland Caribou -- mountain ecotype	S1	N?	G5T2Q
1	Central Mixedwood	AMALC0401E	*Rangifer tarandus pop. 14*	Woodland Caribou -- boreal ecotype	S2	N?	G5TNR
1	Central Mixedwood	AMALE01011	*Bos bison athabascae*	Wood Bison	S1	N?	G4T2Q
1	Central Mixedwood	IILEP73020	*Poanes hobomok*	Hobomok Skipper	S2	N5	G5
1	Central Mixedwood	IILEPA8150	*Colias palaeno*	Palaeno Sulphur	S1S2	N5	G5
1	Central Mixedwood	IILEPM9020	*Enodia anthedon*	Northern Pearly-eye	S1	N5	G5
1	Central Mixedwood	IILEPP1047	*Oeneis chryxus caryi*	Cary's Arctic	S1S2	N?	G5T4
1	Central Mixedwood	IIODO44030	*Leucorrhinia glacialis*	Crimson-ringed Whiteface	S1S3	N5	G5
1	Central Mixedwood	IIODO61030	*Sympetrum corruptum*	Variegated Meadowhawk	S2S3	N5	G5
1	Central Mixedwood	IIODO65010	*Calopteryx aequabilis*	River Jewelwing	S1	N5	G5
1	Central Mixedwood	IMGASM6010	*Helisoma anceps*		S3	N5	G5
2	Dry Mixedwood	AAAAA01080	*Ambystoma macrodactylum*	Long-toed Salamander	S3	N5	G5
2	Dry Mixedwood	AAABH01170	*Rana pipiens*	Leopard Frog	S2S3	N5	G5
2	Dry Mixedwood	ABNFC01010	*Pelecanus erythrorhynchos*	American White Pelican	S2	N4B	G3
2	Dry Mixedwood	ABNJB02030	*Cygnus buccinator*	Trumpeter Swan	S3	N4B,N4N	G4
2	Dry Mixedwood	ABNJB20010	*Lophodytes cucullatus*	Hooded Merganser	S2	N5B	G5
2	Dry Mixedwood	ABNKD06070	*Falco peregrinus*	Peregrine Falcon	S3	N3N,N4B	G4
2	Dry Mixedwood	ABNNB03070	*Charadrius melodus*	Piping Plover	S2	N2B	G3
2	Dry Mixedwood	ABNNM08020	*Sterna caspia*	Caspian Tern	S2	N4B	G5
2	Dry Mixedwood	ABPAE33040	*Empidonax traillii*	Willow Flycatcher	S3	N5B	G5
2	Dry Mixedwood	AFC4E02020	*Cottus asper*	Prickly Sculpin	S1	N4	G5
2	Dry Mixedwood	AFCAA01020	*Acipenser fulvescens*	Lake Sturgeon	S2	N3N4	G3G4
2	Dry Mixedwood	AFCJB28190	*Notropis blennius*	River Shiner	S2	N4	G5
2	Dry Mixedwood	AFCJB35030	*Ptychocheilus oregonensis*	Northern Squawfish	S1	N5	G5
2	Dry Mixedwood	AFCJC02130	*Catostomus macrocheilus*	Largescale Sucker	S2	N5	G5
2	Dry Mixedwood	AFCJC10010	*Moxostoma anisurum*	Silver Redhorse	S2	N4	G5
2	Dry Mixedwood	AMACC01110	*Myotis volans*	Long-legged Bat	S2	N4N5	G5
2	Dry Mixedwood	AMACC01150	*Myotis septentrionalis*	Northern Long-eared Bat	S2S3	N4	G4
2	Dry Mixedwood	AMACC02010	*Lasionycteris noctivagans*	Silver-haired Bat	S3	N5	G5
2	Dry Mixedwood	AMACC05030	*Lasiurus cinereus*	Hoary Bat	S2	N5	G5
2	Dry Mixedwood	AMAFF11140	*Microtus ochrogaster*	Prairie Vole	S2	N4	G5
2	Dry Mixedwood	AMALC0401E	*Rangifer tarandus pop. 14*	Woodland Caribou -- boreal ecotype	S2	N?	G5TNR
2	Dry Mixedwood	AMALE01011	*Bos bison athabascae*	Wood Bison	S1	N?	G4T2Q
2	Dry Mixedwood	IILEP60010	*Thymelicus lineola*	European Skipper	SNA	NE	G5
2	Dry Mixedwood	IILEP73020	*Poanes hobomok*	Hobomok Skipper	S2	N5	G5
2	Dry Mixedwood	IILEP94081	*Papilio machaon pikei*		S1S2	N3	G5T3
2	Dry Mixedwood	IILEPA8150	*Colias palaeno*	Palaeno Sulphur	S1S2	N5	G5
2	Dry Mixedwood	IILEPM9020	*Enodia anthedon*	Northern Pearly-eye	S1	N5	G5
2	Dry Mixedwood	IILEPP1047	*Oeneis chryxus caryi*	Cary's Arctic	S1S2	N?	G5T4
2	Dry Mixedwood	IIODO44050	*Leucorrhinia intacta*	Dot-tailed Whiteface	S2S3	N5	G5
2	Dry Mixedwood	IIODO61030	*Sympetrum corruptum*	Variegated Meadowhawk	S2S3	N5	G5
2	Dry Mixedwood	IIODO72090	*Ischnura damula*	Plains Forktail	S1	N2N3	G5
2	Dry Mixedwood	IMGASK8010	*Acroloxus coloradensis*	Rocky Mountain Capshell	S1	N3	G3
2	Dry Mixedwood	IMGASM6010	*Helisoma anceps*		S3	N5	G5
6	Lower Boreal Highlands	ABNFC01010	*Pelecanus erythrorhynchos*	American White Pelican	S2	N4B	G3
6	Lower Boreal Highlands	ABNJB02030	*Cygnus buccinator*	Trumpeter Swan	S3	N4B,N4N	G4
6	Lower Boreal Highlands	ABPBX94010	*Spizella arborea*	American Tree Sparrow	SNA	N5B,N5N	G5
6	Lower Boreal Highlands	AFCJB16020	*Hybognathus hankinsoni*	Brassy Minnow	S2	N5	G5
6	Lower Boreal Highlands	AFCJB35030	*Ptychocheilus oregonensis*	Northern Squawfish	S1	N5	G5
6	Lower Boreal Highlands	AMALC0401E	*Rangifer tarandus pop. 14*	Woodland Caribou -- boreal ecotype	S2	N?	G5TNR
6	Lower Boreal Highlands	AMALE01011	*Bos bison athabascae*	Wood Bison	S1	N?	G4T2Q
6	Lower Boreal Highlands	IILEPA8150	*Colias palaeno*	Palaeno Sulphur	S1S2	N5	G5
21	Upper Boreal Highlands	ABNFC01010	*Pelecanus erythrorhynchos*	American White Pelican	S2	N4B	G3
21	Upper Boreal Highlands	ABNJB02030	*Cygnus buccinator*	Trumpeter Swan	S3	N4B,N4N	G4
21	Upper Boreal Highlands	ABNNM08020	*Sterna caspia*	Caspian Tern	S2	N4B	G5
21	Upper Boreal Highlands	AMALC0401E	*Rangifer tarandus pop. 14*	Woodland Caribou -- boreal ecotype	S2	N?	G5TNR

Appendix II Wildlife Listed by COSEWIC or Alberta That Potentially Occur Within the FMA Area

Key to ASRD Status

- At Risk – Any species known to be at risk after formal detailed status assessment and designation as Endangered or Threatened in Alberta.
- May Be At Risk – Any species that may be at risk of extinction or extirpation, and is therefore a candidate for detailed risk assessment.
- Sensitive – Any species that is not at risk of extinction or extirpation but may require special attention or protection to prevent it from becoming at risk.

COSEWIC Endangered, Threatened or Special Concern

COSEWIC Status	Common name	Scientific name	Occurrence in FMA Area	ASRD Status
Endangered	No endangered species range into the FMA Area			
Threatened	Woodland Caribou, Boreal pop.	*Rangifer tarandus caribou*	Yes	At risk
Special Concern	Grizzly Bear, northwest population	*Ursus arctos*	Yes	May be at risk
	Wolverine	*Gulo gulo*	Yes	May be at risk
	Western Toad	*Bufo boreas*	Unknown	Sensitive

Species highlited indicate these species were considered during the FMP development.

Provincial (from Schedule 6 of Wildlife Regulation)

Endangered

None within FMA Area

Threatened

Rangifer tarandus caribou (Woodland Caribou) – see COSEWIC list (previous page)

Cygnus buccinator (Trumpeter Swan) – see Provincial list (next page)

Provincial (from Alberta Sustainable Resource Development)

COSEWIC Status	Common name	Scientific name	Occurrence in FMA Area	ASRD Status
Not At Risk or Not Listed	**MAMMALS**			
	Fischer	*Martes pennanti*	Yes	Sensitive
	Lynx	*Lynx canadensis*	Yes	Sensitive
	Northern Myotis Bat	*Myotis septentrionalis*	Unknown	May be at risk
	REPTILES AND AMPHIBIANS			
	None			
	FISH			
	Arctic Grayling	*Thymallus arcticus*	Yes	Sensitive
	Largescale Sucker	*Catostomus macrocheilus*	Unknown	Sensitive
	Northern Pikeminnow	*Ptychcheilus oregonensis*	Yes	Sensitive
	Northern Redbelly Dace	*Phoxinus eos*	Yes	Sensitive
	Spoonhead Sculpin	*Cottus ricei*	Yes	May be at risk
	BUTTERFLIES			
	Old World Swallowtail	*Papilio machaon*	Yes	Sensitive
	PLANTS			
	Alaskan Orchid	*Piperia unalascensis*	Unknown	Sensitive
	Bog Adder's Mouth	*Malaxis paludosa*	Unknown	May be at risk
	Gastony's Cliff-Brake	*Pellaea gastonyi*	Unknown	May be at risk
	Mountain Bladder Fern	*Cystopteris montana*	Unknown	May be at risk
	Northern Beech Fern	*Phegopteris connectilis*	Unknown	May be at risk
	Northern Moonwort	*Botrychium pinnatum*	Unknown	Sensitive
	Slender Rock-Brake	*Cryptogramma stellari*	Unknown	May be at risk
	Smooth Cliff-Brake	*Pellaea glabella*	Unknown	Sensitive
	Smooth Cliff Fern	*Woodsia glabella*	Unknown	May be at risk
	Spotted Coral-Root	*Corallorhiza maculata*	Unknown	Sensitive
	Striped Coral-Root	*Corallorhiza striata*	Unknown	Sensitive
	Yellow Lady's Slipper	*Cypripedium parviflorum*	Unknown	Sensitive
	White Adder's Mouth	*Malaxis brachypoda*	Unknown	May be at risk
	White Bog Orchid	*Platanthera dilatata*	Unknown	Sensitive
	BIRDS			
	American Bittern	*Botaurus lentignosus*	Yes	Sensitive
	Bald Eagle	*Haliaeetus leucocephalus*	Yes	Sensitive
	Barred Owl	*Strix varia*	Unknown	Sensitive
	Bay Breasted Warbler	*Dendroica castanea*	Yes	Sensitive
	Black-backed Woodpecker	*Picoides arcticus*	Unknown	Sensitive
	Blackburnian Warbler	*Dendroica fusca*	Yes	Sensitive
	Black Tern	*Chlidonias niger*	Yes	Sensitive
	Black-throated Green Warbler	*Dendroica virens*	Yes	Sensitive
	Canada Warbler	*Wilsonia canadensis*	Yes	Sensitive
	Cape May Warbler	*Dendroica tigrina*	Yes	Sensitive

COSEWIC Status	Common name	Scientific name	Occurrence in FMA Area	ASRD Status
Not At Risk or Not Listed	**BIRDS (cont.)**			
	Common Nighthawk	*Chordeiles minor*	Yes	Sensitive
	Forster's Tern	*Sterna forsteri*	Unknown	Sensitive
	Golden Eagle	*Aquila chrysaetos*	Yes	Sensitive
	Great Blue Herron	*Ardea herodias*	Unknown	Sensitive
	Great Grey Owl	*Strix nebulosa*	Yes	Sensitive
	Horned Grebe	*Podiceps auritus*	Yes	Sensitive
	Northern Goshawk	*Accipiter gentilis*	Yes	Sensitive
	Northern Pygmy Owl	*Glaucidium gnoma*	Unknown	Sensitive
	Osprey	*Pandion haliaetus*	Yes	Sensitive
	Pied-Billed Grebe	*Podilymbus podiceps*	Yes	Sensitive
	Pileated Woodpecker	*Dryocopus pileatus*	Yes	Sensitive
	Sandhill Crane	*Grus canadensis*	Yes	Sensitive
	Sharp-Tailed Grouse	*Tympanuchus phasianellus*	Yes	Sensitive
	Trumpeter Swan	*Cygnus buccinator*	Yes	At risk
	Western Grebe	*Aechmophorus occidentalis*	Yes	Sensitive
	Western Tanager	*Piranga ludoviciana*	Yes	Sensitive
	White-Winged Scoter	*Melanitta fusca*	Yes	Sensitive

Species highlited indicate these species were considered during the FMP development.

Range within MDFP FMA was determined by using the SRD website, Alberta Bird Atlas, Northern Watershed Project (Report #2), http://www.osrbg.ca/orchid_native.html, http://bna.birds.cornell.edu/BNA/

Note that his table excludes species listed in the COSEWIC table or as Endangered or Threatened under the Wildlife Act/Regulation.

Appendix III Community Characterization Abstracts

Alberta Natural Heritage Information Centre - Community Characterization Abstracts

2006-11-30

CEAB000043
Populus balsamifera / Viburnum opulus / Matteuccia struthiopteris
balsam poplar / high-bush cranberry / ostrich fern

Classification Comments	- type based on brief verbal description (U98ALL01ABCA) but detailed information is lacking. - unclear if Populus balsamifera / Matteuccia struthiopteris with Viburnum opulus should be lumped with stands lacking Viburnum opulus, or if they should be considered separte types. - there may also be a similar birch-dominated type in AB, but it is not well documented.
Natural Region(s)	- Boreal Forest
Natural Subregion(s)	- Dry and Central Mixedwood. - may exend into the Lower Boreal Highlands.
Additional Distribution Comment	- reported from Glory Hills, Beaverhill Lake, also Gregoire L., Battle L., Slave L. area. - also may occur in the Ft. McMurray area.
Landform(s)	- reported on pitted moraine and glaciofluvial outwash. - possibly riparian sites.
Environmental Determinants	- moist, nutrient-rich soils, often associated with seepage areas on hillsides and in depressions.
Summary of Environmental Factors	- seepage areas on hillsides and in depressions with moist, nutrient-rich soils. - on pitted moraine and glaciofluvial outwash. - suitable habitat may also occur in riparian areas.
Vegetation Layers Present	- tree, shrub and herb layers.
Abundant Species per Layer	- Populus balsamifera dominates the tree layer. - Matteuccia struthiopteris is clearly the understory dominant. - due to sketchy information, cover or constancy of Viburnum opulus unclear.
Subtypes Recognized in Province	- Viburnum opulus seems to be missing from the occurrences in the Ft. McMurray area. These may represent a seperate type, found in riparian rather than seepage areas. - similar communities with Betula dominant in the tree canopy, rather than Populus, have also been reported.
Additional Comments	- originally listed as Betula papyrifera / Viburnum opulus / Matteuccia struthiopteris in U98ALL02ABCA but tree species was recorded in error.

Related_Name	Relationship	Reference
Betula papyrifera / Viburnum opulus / Matteuccia struthiopteris	- equivalent	U98ALL02ABCA

Reference Code	Author	Year	Title	Publisher
U98ALL01ABCA	L. Allen	1998	Notes from 1998 Plant Community Tracking List meeting.	On file with ANHIC
U98ALL02ABCA	Allen, Lorna.	1998	Alberta Natural Heritage Information Centre 1998 Preliminary Plant Community Tracking List.	

Alberta Natural Heritage Information Centre - Community Characterization Abstracts

2006-11-30

CEAB000044
Populus tremuloides / Rubus parviflorus / Aralia nudicaulis
aspen / thimbleberry / wild sarsaparilla

Classification Comments	- this community is defined by an open to closed deciduous canopy clearly dominated by Populus tremuloides, a well-developed low shrub layer with Rubus parviflorus clearly dominant and a high cover of Aralia nudicaulis in the forb layer. - other species such as Populus balsamifera, or more infrequently, Betula papyrifera, may be present in the tree layer. - there may be a tall shrub understory of Alnus sp. (different researchers have reported either A. cripsa or A. tenuifolia), but it may also be essentially absent.
Natural Region(s)	- Boreal Forest - Foothills
Natural Subregion(s)	- Central Mixedwood - Lower Foothills
Present and Historic Range	- primarily a community found in the western part of the Central Mixedwood, possibly into the Dry Mixedwood. - does extend into the Lower Foothills.
Additional Distribution Comment	- reported from the slopes of the Smokey River, Whitecourt Mountain, House Mountain. - may occur in Jasper National Park.
Minimum Elevation	- 765 m
Maximum Elevation	- 900 m
Landform(s)	- slopes of variable origin, including glaciofluvial and morainal.
Topographic Position	- likely mid to lower slopes
Range of Slope	- level to moderate - 0 to 5% (N00LAN01ABCA); up to 16% slope (N84ALB01ABCA)
Range of Aspect	- variable (N84ALB01ABCA) but most commonly northerly (N00LAN01ABCA)
Soil Type	- Brunisolic Gray Luvisol, Eluviated Eutric Brunisol
Soil Moisture	- mesic to subhygric. - moderately well to well drained.
Additional Soil Comments	- mesotrophic to permesotrophic nutrient regime. - soils have a moderately fine to coarse textured B horizon.
Hydrologic Influences	- there is often a layer of reduced permeability in the soil profile that restricts drainage and channels seepage. - short duration seepage likely occurs during heavy rainfall.
Environmental Determinants	- level to moderate slopes, often associated with seepage areas. - there is often a layer of reduced permeability in the soil profile that restricts drainage and channels seepage.
Summary of Environmental Factors	- found on level to moderate (up to 16%) slopes of variable aspect, but predominently northerly. - soils are mesic to subhygric moderately well to well drained Brunisolic Gray Luvisols and Eluviated Eutric Brunisols. - this community is often associated with seepage areas related to a layer of reduced permeability in the soil profile that restricts drainage and channels seepage (N84ALB01ABCA). - short duration seepage likely occurs during heavy rainfall.
Vegetation Layers Present	- tree, tall shrub, low shrub, forb, bryoid.
Percent Cover by Layer	- tree 25 to 60%. - tall shrub 0 to 25% - low shrub 30 to 80%. - forb 30 to 70%. - bryoid 0 to 2%

Alberta Natural Heritage Information Centre - Community Characterization Abstracts

2006-11-30

CEAB000044
Populus tremuloides / Rubus parviflorus / Aralia nudicaulis
aspen / thimbleberry / wild sarsaparilla

Abundant Species per Layer	- Populus tremuloides is the dominant tree (15 to 40% cover), but P. balsamifera is a significant component of some stands. - Alnus sp. is the main tall shrub. - Rubus parviflorus with up to 80% cover dominates the well-developed low shrub layer. - Arailia nudicaulis is usually the dominant herb, but Epilobium angustifolium is sometimes co-dominant. . Brachythecium salebrosum is usually present in low cover.
Species Found in Every Occurrence	- Populus tremuloides, Rubus parviflorus, Rosa acicularis, Alnus sp., Viburnum edule, Arailia nudicaulis, Lathyrus ochroleucus (n = 6).
Vegetation Summary	- Populus tremuloides is dominant, but P. balsamifera is a significant component of some stands - Rubus parviflorus dominates the well-developed low shrub layer (from 10 to 60% cover) - Viburnum edule is usually present, often in significant amounts (up to 20% cover) - Rosa acicularis is also usually present - Alnus sp, forms a significant taller shrub layer in some stands (up to 20% cover) - there is a high forb cover of species indicating nutrient-rich conditions, but low cover of grass or moss - Aralia nudicaulis is usually the dominant herb, but Epilobium angustifolium is sometimes co-dominant - Aster conspicuous and Lathyrus ochroleucus are usually present although with low cover
Variability - Species Composition	- Populus balsamifera is a significant component of some stands (up to 5% cover). - Arailia nudicaulis is usually the dominant herb, but Epilobium angustifolium is sometimes co-dominant.
Variability - Structure & Pattern	- there may be a significant taller shrub layer in some stands (up to 20% cover) dominated by Alnus sp., but the tall shrub layer may be absent. - the bryoid layer is always sparse, but may be absent in some stands.
Storage Location of Data Used	- plots in ESIS database
Additional Comments	- studies in northeastern British Columbia concluded that aspen understory composition is "more influenced by climate and nutrient and moisture availabilty than light availability" (J04CHE01ABCA).

Similar_Association	Notes
Populus tremuloides / Amelanchier alnifolia / Heracleum lanatum (C60 in N97ACH01ABCA)	A southern type, separated from CEAB000044 by having more Amelanchier alnifolia and with an understory dominated by Heracleum lanatum.
Populus tremuloides / Rubus parviflorus (CEAB000078)	A southwest AB type with similar dominants, but lacking associated species, such as Viburnum edule & Alnus crispa in the shrub layer or Aralia nudicaulis.
Populus tremuloides / Rubus parviflorus Forest (CEGL000602)	Ranked G2 and noted from ID, UT, WY (Natureserve 2003). Likely more similar to CEAB000078 than this type.

Related_Name	Relationship	Reference
Populus tremuloides / Rubus parviflorus (e13)	- equivalent	N00LAN01ABCA

Alberta Natural Heritage Information Centre - Community Characterization Abstracts

2006-11-30

CEAB000044
Populus tremuloides / Rubus parviflorus / Aralia nudicaulis
aspen / thimbleberry / wild sarsaparilla

Reference Code	Author	Year	Title	Publisher
J04CHE01ABCA	Chen, H.Y.H., S. Legare, and Y. Bergeron	2004	Variation of the understory composition and diversity along a gradient of productivity in Populus tremuloides stands of northern British Columbia, Canada.	Can. J. Bot. 82: 1314-1323 (2004).
N00LAN01ABCA	Lane, C., M. Willoughby and M. Alexander & Rangeland Health Assessment Project..	2000	Range Plant Community Types and Carrying Capacity for the Lower Foothills Subregion, Third Approximation	Alberta Environment and Alberta Agriculture, Food and Rural Development
N84ALB01ABCA	Alberta Energy and Natural Resources.	1984	Integrated Resource Inventory of the Deep Basin Study Area, Vol. II Vegetation Classification	Alberta Energy and Natural Resources. Edmonton, Alberta. 111 pp. + appendices.
N97ACH01ABCA	Achuff, PL, R.L. McNeil, M.L. Coleman	1997	Ecological Land Classification of Waterton Lakes National Park, Alberta. Soil and Vegetation Resources	National Parks Service
NNDNAT01ABCA	NatureServe.		NatureServe Explorer: An online encyclopedia of life [web application] http://www.natureserve.org/explorer. Year accessed included in citation.	Arlington, Virginia

Appendix IV Plant Species Tracked by ANHIC That Potentially Occur Within the FMA Area

Key to Rank

- S1/G1 - Five or fewer occurrences or only a few remaining individuals. May be especially vulnerable to extirpation because of some factor of its biology.
- S2/G2 – Six to 20 or fewer occurrences or with many individuals in fewer locations. May be especially vulnerable to extirpation because of some factor of its biology
- S3/G3 – Twenty-one to 100 occurrences. May be rare and local throughout it's range, or in a restricted range (may be abundant in some locations). May be susceptible to extirpation because of large scale disturbances.
- U - Status uncertain, often because of low search effort or cryptic nature of the element. Possibly in peril. Unrankable. More information needed.

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Alberta Natural Heritage Information Centre

A member of NatureServe Canada and NatureServe - a network connecting science with conservation.

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NatureServe

Alberta Tourism, Parks, Recreation and Culture

Tracked Elements listed by Natural Subregion

February 2, 2007.

You can download the 2005 Natural Regions and Subregions of Alberta map from: http://www.cd.gov.ab.ca/preserving/parks/anhic/natural_regions_map.asp

This list was generated by an ArcGIS intersection between Natural Regions and Subregions of Alberta (2005) and Alberta Natural Heritage Information Centre (ANHIC) Element Occurrence data. The data were then summarized to count the number of occurrences for each element by subregion. The list only includes those tracked elements for which ANHIC has processed at least one occurrence (occurrences based on wrong or questionable identification are excluded as are occurrences for landform features). The spreadsheet is meant to be used as a general guideline only. The absence of an element within a Subregion does not necessarily mean that it does not occur in that subregion. The precision of mapping occurrences can vary from a few meters to 8 kilometers; therefore occurrences mapped near a subregion boundary may, in fact, be assigned to the wrong subregion. Please remember that subregion boundaries represent transition zones between subregions rather than an abrupt change between subregions. This file is updated periodically as we process new element occurrences (EOs) or update existing ones.

Element Code: AA-Amphibians,AB-Birds, AF-Fish, AM-Mammals, AR-Reptiles, CE-Plant Community, I-Invertebrates, NB-bryophytes, NL-Lichens, O - Other, P-Vascular Plants

You may use the features of Excel to sort and filter this list by any or multiple fields (e.g. list all vascular plants by Natural Subregion).

					Rank		
ID #	Natural Subregion Name	Element Code	Element Scientific Name (SName)	Element Common Name	SRank	NRank	GRank
1	Central Mixedwood	NBHEP04030	*Anastrophyllum helleranum*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP0E020	*Barbilophozia attenuata*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP0E090	*Barbilophozia kunzeana*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP0G010	*Blasia pusilla*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP0M070	*Calypogeia suecica*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP0P020	*Cephalozia bicuspidata*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP0P070	*Cephalozia loitlesbergeri*		S1	NNR	G5
1	Central Mixedwood	NBHEP0Q090	*Cephaloziella hampeana*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP0U020	*Chiloscyphus pallescens*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP0U030	*Chiloscyphus polyanthos*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP0Y010	*Conocephalum conicum*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP1D020	*Gymnocolea inflata*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP1Y0E0	*Lophozia guttulata*	liverwort	S2	N?	G4G5
1	Central Mixedwood	NBHEP1Y0F0	*Lophozia heterocolpos*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP1Y0J0	*Lophozia incisa*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP1Y0L0	*Lophozia laxa*	liverwort	S1	N?	G4
1	Central Mixedwood	NBHEP1Y0M0	*Lophozia longidens*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP1Y0N0	*Lophozia obtusa*	liverwort	S1	N?	G4G5
1	Central Mixedwood	NBHEP1Y0U0	*Lophozia rutheana*	liverwort	S1	N?	G4?
1	Central Mixedwood	NBHEP20030	*Mannia pilosa*	liverwort	S1	N?	G4?
1	Central Mixedwood	NBHEP2H010	*Pellia endiviifolia*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP2Y030	*Riccardia latifrons*	liverwort	S2	N?	G4G5
1	Central Mixedwood	NBHEP2Y040	*Riccardia multifida*	liverwort	S2S3	N?	G5
1	Central Mixedwood	NBHEP2Y050	*Riccardia palmata*	liverwort	S1	N?	G5
1	Central Mixedwood	NBHEP2Z0D0	*Riccia fluitans*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP33030	*Scapania apiculata*	liverwort	S1	N?	G5?
1	Central Mixedwood	NBHEP330B0	*Scapania cuspiduligera*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP330D0	*Scapania glaucocephala*	liverwort	S2	N?	G4G5
1	Central Mixedwood	NBHEP330S0	*Scapania paludicola*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP330T0	*Scapania paludosa*	liverwort	S2	N?	G5
1	Central Mixedwood	NBHEP3C060	*Tritomaria scitula*	liverwort	S2S3	N?	G4
1	Central Mixedwood	NBMUS03020	*Aloina brevirostris*	short-beaked rigid screw moss	S2	N?	G3G5
1	Central Mixedwood	NBMUS03040	*Aloina rigida*	aloe-like rigid screw moss	S2	N?	G3G5
1	Central Mixedwood	NBMUS05010	*Amblyodon dealbatus*		S2	N?	G3G5
1	Central Mixedwood	NBMUS0C020	*Anomodon minor*		S1	N?	G5
1	Central Mixedwood	NBMUS0E010	*Aongstroemia longipes*		S2	N?	G3G5
1	Central Mixedwood	NBMUS0V010	*Blindia acuta*	sharp-pointed weissia	S2	N?	G5
1	Central Mixedwood	NBMUS0Z0N0	*Brachythecium reflexum*		S2	N?	G4G5
1	Central Mixedwood	NBMUS0Z0R0	*Brachythecium rutabulum*		S2?	N?	G5
1	Central Mixedwood	NBMUS1A030	*Bryum algovicum*		S2	N?	G4G5
1	Central Mixedwood	NBMUS1A0X0	*Bryum pallens*		S2	N?	G4G5
1	Central Mixedwood	NBMUS1A1B0	*Bryum uliginosum*		S2	N?	G3G5
1	Central Mixedwood	NBMUS1A1G0	*Bryum cyclophyllum*		S2	N?	G4G5
1	Central Mixedwood	NBMUS1C010	*Calliciadium haldanianum*		S1	NNR	G5
1	Central Mixedwood	NBMUS1J070	*Campylium radicale*		S2	N?	G3G5
1	Central Mixedwood	NBMUS1U010	*Conardia compacta*		S2	N?	G3G5
1	Central Mixedwood	NBMUS2B0L0	*Dicranum spadiceum*	cushion moss	S2	N?	G5?
1	Central Mixedwood	NBMUS2B0N0	*Dicranum tauricum*	broken-leaf moss	S1S2	N?	G4
1	Central Mixedwood	NBMUS2J020	*Drepanocladus crassicostatus*	brown moss	S2	N?	G3G5
1	Central Mixedwood	NBMUS2J0A0	*Drepanocladus sendtneri*	brown moss	S1	N?	G5?
1	Central Mixedwood	NBMUS2N040	*Entodon concinnus*		S2	N?	G4G5
1	Central Mixedwood	NBMUS2N100	*Entodon schleicheri*		S1	N?	G3G5
1	Central Mixedwood	NBMUS2X020	*Fontinalis antipyretica*		S1	N?	G5
1	Central Mixedwood	NBMUS2Z010	*Funaria americana*	cord moss	S1	N?	G3?
1	Central Mixedwood	NBMUS3R020	*Hygroamblystegium noterophilum*		SU	N?	G4
1	Central Mixedwood	NBMUS3R030	*Hygroamblystegium tenax*		S2	N?	G5
1	Central Mixedwood	NBMUS3V030	*Hypnum callichroum*		S1	N?	G5?
1	Central Mixedwood	NBMUS3V0D0	*Hypnum pallescens*		S2	N?	G5
1	Central Mixedwood	NBMUS44080	*Leptodictyum humile*		S1	N?	G5
1	Central Mixedwood	NBMUS49010	*Leskeella nervosa*		S2	N?	G5
1	Central Mixedwood	NBMUS4L010	*Meesia longiseta*		S1	N?	G4?
1	Central Mixedwood	NBMUS4S0Y0	*Mnium ambiguum*		S2	N?	G5
1	Central Mixedwood	NBMUS4U030	*Myurella tenerrima*		S2	N?	G3G4
1	Central Mixedwood	NBMUS4W030	*Neckera pennata*		S2S3	N?	G5
1	Central Mixedwood	NBMUS5E030	*Physcomitrium hookeri*	bladder-cap moss	S1	N?	G2G4
1	Central Mixedwood	NBMUS5S020	*Pohlia atropurpurea*		S1	N?	G4G5
1	Central Mixedwood	NBMUS5S030	*Pohlia bulbifera*		S1	N?	G4G5
1	Central Mixedwood	NBMUS5T040	*Polytrichum longisetum*	slender hairy-cap	S1	N?	G5
1	Central Mixedwood	NBMUS60060	*Pseudoleskeella sibirica*		S2	N?	G5?

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1	Central Mixedwood	NBMUS6B0D0	*Racomitrium microcarpon*		S1?	N?	GNRQ	
1	Central Mixedwood	NBMUS6F020	*Rhodobryum ontariense*		S2	N?	G5	
1	Central Mixedwood	NBMUS6X010	*Seligeria calcarea*	chalk brittle moss	S1	N?	G4?	
1	Central Mixedwood	NBMUS6Z040	*Sphagnum balticum*	peat moss	S1	N?	G2G4	
1	Central Mixedwood	NBMUS6Z0A0	*Sphagnum fimbriatum*	fringed bog moss	S2	N?	G5	
1	Central Mixedwood	NBMUS6Z0K0	*Sphagnum lindbergii*	Lindberg's bog moss	S2	N?	G5?	
1	Central Mixedwood	NBMUS6Z1T0	*Sphagnum contortum*	twisted bog moss	S2	N?	G5	
1	Central Mixedwood	NBMUS6Z230	*Sphagnum fallax*	peat moss	S2	N?	G5	
1	Central Mixedwood	NBMUS71010	*Splachnum ampullaceum*	flagon-fruited splachnum	S2	N?	G5	
1	Central Mixedwood	NBMUS71020	*Splachnum luteum*	yellow collar moss	S3	N?	G3	
1	Central Mixedwood	NBMUS71040	*Splachnum rubrum*	red collar moss	S3	N?	G3	
1	Central Mixedwood	NBMUS71050	*Splachnum sphaericum*	globe-fruited splachnum	S2	N?	G3G5	
1	Central Mixedwood	NBMUS71060	*Splachnum vasculosum*	large-fruited splachnum	S2	N?	G3G5	
1	Central Mixedwood	NBMUS79050	*Tayloria serrata*	slender splachnum	S2	N?	G4	
1	Central Mixedwood	NBMUS7F0A0	*Thuidium philibertii*		S1S2	N?	G5	
1	Central Mixedwood	NBMUS7X020	*Weissia controversa*	green-cushioned weissia	S2	N?	G5	
1	Central Mixedwood	NBMUS7Z050	*Zygodon viridissimus*		S1	N?	G5	
1	Central Mixedwood	NBMUS81080	*Plagiomnium rostratum*		S1	N?	G5	
1	Central Mixedwood	NBMUS88070	*Warnstorfia tundrae*	brown moss	S2	N?	GU	
1	Central Mixedwood	NBMUS88080	*Warnstorfia pseudostraminea*	brown moss	S1	N?	G3	
1	Central Mixedwood	NBMUS8F010	*Bryobrittonia longipes*		S2	N3	G3	
1	Central Mixedwood	NBMUS93020	*Limprichtia cossonii*		SU	N?	GU	
1	Central Mixedwood	NBMUS95010	*Schistidium agassizii*	elf bloom moss	S1	N?	G3G5	
1	Central Mixedwood	NBMUS9N010	*Pseudobryum cinclidioides*		S2	N?	G5	
1	Central Mixedwood	NBMUS9Q080	*Rhizomnium magnifolium*		S2	N?	G4G5	
1	Central Mixedwood	NLCAL46120	*Cyphelium tigillare*		S2	N?	G5	
1	Central Mixedwood	NLLEC35010	*Cladina portentosa*		S1	N?	GNR	
1	Central Mixedwood	NLLEC3S100	*Ramalina farinacea*		S2S3	N?	G3G5	
1	Central Mixedwood	NLLEC3S150	*Ramalina intermedia*		S1	N?	G4G5	
1	Central Mixedwood	NLLEC3S210	*Ramalina obtusata*		S2	N?	G5?	
1	Central Mixedwood	NLLEC3S290	*Ramalina sinensis*		SU	NR	G4G5	
1	Central Mixedwood	NLSPH52170	*Dermatocarpon moulinsii*		S2	N?	GNR	
1	Central Mixedwood	NLT0002340	*Arthonia patellulata*		S3?	N?	G5	
1	Central Mixedwood	NLT0003960	*Bacidia bagliettoana*		S2	N?	G5	
1	Central Mixedwood	NLT0004870	*Biatora vernalis*		S2	N?	G5?	
1	Central Mixedwood	NLT0005720	*Calicium trabinellum*		S2	N?	G3G4	
1	Central Mixedwood	NLT0008330	*Cladonia cyanipes*		S2	N?	GNR	
1	Central Mixedwood	NLT0008590	*Cladonia macrophylla*		S2	N?	GNR	
1	Central Mixedwood	NLT0008800	*Cladonia ramulosa*		S1	N?	G5?	
1	Central Mixedwood	NLT0008830	*Cladonia rei*		S2	N?	G3G5	
1	Central Mixedwood	NLT0008910	*Cladonia stricta*		SU	N?	GNR	
1	Central Mixedwood	NLT0009020	*Cladonia umbricola*		S1	N?	G3G5	
1	Central Mixedwood	NLT0010860	*Flavopunctelia soredica*		S2	N?	G3G5	
1	Central Mixedwood	NLT0012210	*Heterodermia speciosa*		S2	N?	G5?	
1	Central Mixedwood	NLT0012340	*Hypocenomyce friesii*		S2	N?	G3G5	
1	Central Mixedwood	NLT0012560	*Imshaugia placorodia*		S2	N?	G3G5	
1	Central Mixedwood	NLT0012890	*Lecania dubitans*		S2	N?	G4?	
1	Central Mixedwood	NLT0013350	*Lecanora cateilea*		S2	N?	GNR	
1	Central Mixedwood	NLT0016420	*Lepraria incana*		S2	N?	GNR	
1	Central Mixedwood	NLT0017840	*Melanelia fuliginosa*		S1	N?	G5	
1	Central Mixedwood	NLT0017890	*Melanelia infumata*		S2S3	N?	GNR	
1	Central Mixedwood	NLT0017900	*Melanelia multispora*		S2?	N?	G5?	
1	Central Mixedwood	NLT0017910	*Melanelia olivacea*		S1	N?	G3G5	
1	Central Mixedwood	NLT0017930	*Melanelia panniformis*		S1	N?	G4G5	
1	Central Mixedwood	NLT0018810	*Mycobilimbia sabuletorum*		S2	N?	G4G5	
1	Central Mixedwood	NLT0018830	*Mycoblastus affinis*		S2	N?	G3G5	
1	Central Mixedwood	NLT0018970	*Mycocalicium subtile*		S2	N?	G3G4	
1	Central Mixedwood	NLT0019520	*Nephroma bellum*		S2	N?	G3G5	
1	Central Mixedwood	NLT0021150	*Peltigera polydactyla*		S1S2	N?	G5?	
1	Central Mixedwood	NLT0022680	*Physconia enteroxantha*		S1?	N?	G3G5	
1	Central Mixedwood	NLT0022930	*Placynthiella uliginosa*		S2	N?	G5	
1	Central Mixedwood	NLT0025200	*Ramalina calicaris*		S1?	N?	GNR	
1	Central Mixedwood	NLT0025270	*Ramalina dilacerata*		S2	N?	G3G5	
1	Central Mixedwood	NLT0025410	*Ramalina roesleri*		S2S3	N?	G3G5	
1	Central Mixedwood	NLT0028030	*Solorina spongiosa*		S2	N?	G3G5	
1	Central Mixedwood	NLT0030290	*Umbilicaria muehlenbergii*		S2	N?	G5	
1	Central Mixedwood	NLT0031930	*Xanthoria fulva*		S1	N?	G5	
1	Central Mixedwood	NLTES10620	*Stereocaulon condensatum*		S1	N?	G4	
1	Central Mixedwood	NLTES10950	*Pannaria conoplea*		SNR	N?	G3G4	
1	Central Mixedwood	NLTES11290	*Phaeophyscia adiastola*		S1	N?	G4?	
1	Central Mixedwood	NLTES11410	*Phaeophyscia nigricans*		S2	N?	G4	
1	Central Mixedwood	NLTES11590	*Physcia dimidiata*		S1	N?	G5?	
1	Central Mixedwood	NLTES11740	*Physcia tenella*		S2	N?	G4	
1	Central Mixedwood	NLTEST5030	*Peltigera collina*		S1	N?	G3G4	
1	Central Mixedwood	NLTEST5070	*Peltigera evansiana*		S2S3	N?	G4	
1	Central Mixedwood	NLTEST5080	*Peltigera horizontalis*		S1S2	N?	G5	
1	Central Mixedwood	NLTEST5380	*Bryoria nadvornikiana*	old man's beard	S2	N?	G3G5	
1	Central Mixedwood	NLTEST5450	*Bryoria simplicior*	old man's beard	S2S3	N?	G3G5	
1	Central Mixedwood	NLTEST5510	*Bryoria trichodes*	old man's beard	SU	N?	G3G5	
1	Central Mixedwood	NLTEST5970	*Cladonia bacilliformis*		S2S3	N?	G4G5	
1	Central Mixedwood	NLTEST5990	*Cladonia bellidiflora*		S2S3	N?	G5	
1	Central Mixedwood	NLTEST6880	*Cladonia squamosa*		S2	N?	G5	
1	Central Mixedwood	NLTEST8170	*Baeomyces rufus*		S2	N?	G5?	
1	Central Mixedwood	PDAST0S1Q0	*Artemisia tilesii*	Herriot's sagewort	S2	N?	G5	
1	Central Mixedwood	PDAST0T5G0	*Aster x maccallae*		S1S2	N?	GNA	
1	Central Mixedwood	PDAST3P140	*Eupatorium maculatum*	spotted Joe-pye weed	S1S2	N5	G5	
1	Central Mixedwood	PDAST5F010	*Lactuca biennis*	tall blue lettuce	S2	N?	G5	
1	Central Mixedwood	PDASTEH020	*Aster umbellatus*	flat-topped white aster	S2	N?	G5	
1	Central Mixedwood	PDBRA05020	*Arabidopsis salsuginea*	mouse-ear cress	S1	N?	G4G5	
1	Central Mixedwood	PDBRA0K0Z0	*Cardamine pratensis*	meadow bitter cress	S2	N5	G5	
1	Central Mixedwood	PDCAM02030	*Campanula aparinoides*	marsh bellflower	S1	N?	G5	
1	Central Mixedwood	PDCAR0W0D0	*Spergularia salina*	salt-marsh sand spurry	S2	N5?	G5	
1	Central Mixedwood	PDCAR0X0B0	*Stellaria crispa*	wavy-leaved chickweed	S2	N?	G5	
1	Central Mixedwood	PDCLU03120	*Hypericum majus*	large Canada St. John's-wort	S2	N?	G5	
1	Central Mixedwood	PDDRO02060	*Drosera linearis*	slender-leaved sundew	S2	N4	G4	
1	Central Mixedwood	PDELT02090	*Elatine triandra*	waterwort	S1	N?	G5	
1	Central Mixedwood	PDFAB0F1C0	*Astragalus bodinii*	Bodin's milk vetch	S1	N?	G4	
1	Central Mixedwood	PDGEN08032	*Gentianopsis detonsa ssp raupii*	northern fringed gentian	S1	N?	G3G5T3T5	

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1	Central Mixedwood	PDGER02070	*Geranium carolinianum*	Carolina wild geranium	S1	N?	G5	
1	Central Mixedwood	PDLAM1G0E0	*Physostegia leding hamii*	false dragonhead	S2	N3?	G3?	
1	Central Mixedwood	PDMON03020	*Monotropa hypopithys*	pinesap	S2	N?	G5	
1	Central Mixedwood	PDNYM050B0	*Nymphaea tetragona*	white water-lily	S1	N5	G5	
1	Central Mixedwood	PDNYM050J0	*Nymphaea leibergii*	pygmy water-lily	S1	N5	G5	
1	Central Mixedwood	PDONA060A0	*Epilobium halleanum*	willowherb	S1	N2?	G5	
1	Central Mixedwood	PDONA060D0	*Epilobium lactiflorum*	willowherb	S2	N?	G5	
1	Central Mixedwood	PDPGL02180	*Polygala paucifolia*	fringed milkwort	S1	N?	G5	
1	Central Mixedwood	PDPLN020U0	*Plantago maritima*	sea-side plantain	S1	N?	G5	
1	Central Mixedwood	PDROS1B110	*Potentilla multifida*	branched cinquefoil	S1	N?	G5	
1	Central Mixedwood	PDRUB1T0E0	*Hedyotis longifolia*	long-leaved bluets	S2	N?	G4G5	
1	Central Mixedwood	PDSAL022T0	*Salix sitchensis*	Sitka willow	S1	N?	G5	
1	Central Mixedwood	PDSAR02070	*Sarracenia purpurea*	pitcher-plant	S2	N5	G5	
1	Central Mixedwood	PDSAX07030	*Chrysosplenium iowense*	golden saxifrage	S3	N3	G3	
1	Central Mixedwood	PDSAX07050	*Chrysosplenium tetrandrum*	green saxifrage	S3	N?	G5	
1	Central Mixedwood	PDVIO04142	*Viola pallens*	Macloskey's violet	S2	N?	G5T5	
1	Central Mixedwood	PMALI040H0	*Sagittaria latifolia*	broad-leaved arrowhead	S1	N?	G5	
1	Central Mixedwood	PMCYP03070	*Carex adusta*	browned sedge	S1	N?	G5	
1	Central Mixedwood	PMCYP030X0	*Carex arcta*	narrow sedge	S1	N?	G5	
1	Central Mixedwood	PMCYP031F0	*Carex backii*	Back's sedge	S2	N?	G4	
1	Central Mixedwood	PMCYP035T0	*Carex heleonastes*	Hudson Bay sedge	S2	N?	G4	
1	Central Mixedwood	PMCYP03690	*Carex houghtoniana*	sand sedge	S2	N?	G5	
1	Central Mixedwood	PMCYP036W0	*Carex lacustris*	lakeshore sedge	S2	N?	G5	
1	Central Mixedwood	PMCYP039Q0	*Carex oligosperma*	few-fruited sedge	S1S2	N?	G5?	
1	Central Mixedwood	PMCYP03AA0	*Carex pedunculata*	stalked sedge	S1	N?	G5	
1	Central Mixedwood	PMCYP03E60	*Carex umbellata*	umbellate sedge	S1	N?	G5	
1	Central Mixedwood	PMCYP03EN0	*Carex vulpinoidea*	fox sedge	S2	N?	G5	
1	Central Mixedwood	PMCYP091S0	*Eleocharis tenuis*	slender spike-rush	SU	N?	G5	
1	Central Mixedwood	PMCYP091S2	*Eleocharis compressa var borealis*	flattened spike-rush	S1	N?	G5T5	
1	Central Mixedwood	PMCYP0N070	*Rhynchospora capillacea*	slender beak-rush	S1	N?	G4	
1	Central Mixedwood	PMCYP0Q0A0	*Trichophorum clintonii*	Clinton's bulrush	S1	N?	G4	
1	Central Mixedwood	PMCYP0Q1C0	*Blysmus rufus*	Red Bulrush	S1	N?	G5	
1	Central Mixedwood	PMHYD03010	*Elodea bifoliata*	two-leaved waterweed	S1	N2	G4G5	
1	Central Mixedwood	PMIRI0D180	*Sisyrinchium septentrionale*	pale blue-eyed grass	S2S3	N3N4	G3G4	
1	Central Mixedwood	PMJUN010G0	*Juncus brevicaudatus*	short-tail rush	S2	N5	G5	
1	Central Mixedwood	PMJUN02010	*Luzula acuminata*	wood-rush	S1	N?	G5	
1	Central Mixedwood	PMJUN020H0	*Luzula rufescens*	reddish wood-rush	S1	N?	G5	
1	Central Mixedwood	PMLEM03030	*Wolffia columbiana*	watermeal	S2	N?	G5	
1	Central Mixedwood	PMLIL1X020	*Streptopus roseus*	rose mandarin	S1	N?	G5	
1	Central Mixedwood	PMNAJ01020	*Najas flexilis*	slender naiad	S1S2	N5	G5	
1	Central Mixedwood	PMORC0Q010	*Cypripedium acaule*	stemless lady's-slipper	S3	N?	G5	
1	Central Mixedwood	PMORC1M040	*Liparis loeselii*	Loesel's Twayblade	S1	NNR	G5	
1	Central Mixedwood	PMORC1R060	*Malaxis monophylla*	white adder's-mouth	S2	N?	G5	
1	Central Mixedwood	PMORC1R070	*Malaxis paludosa*	bog adder's-mouth	S1	N3	G4	
1	Central Mixedwood	PMORC2B0D0	*Spiranthes lacera*	northern slender ladies'-tresses	S1	N?	G5	
1	Central Mixedwood	PMPOA0H011	*Arctagrostis arundinacea*	polar grass	S1	N?	G5T5	
1	Central Mixedwood	PMPOA200A0	*Danthonia spicata*	poverty oat grass	S1S2	N?	G5	
1	Central Mixedwood	PMPOA481D0	*Muhlenbergia racemosa*	marsh muhly	S1	N4N5	G5	
1	Central Mixedwood	PMPOA5S090	*Spartina pectinata*	prairie cord grass	S1	N?	G5	
1	Central Mixedwood	PMPOT030B0	*Potamogeton foliosus*	leafy pondweed	S2	N?	G5	
1	Central Mixedwood	PMPOT030Z0	*Potamogeton robbinsii*	Robbins' pondweed	S1	N?	G5	
1	Central Mixedwood	PMPOT03110	*Potamogeton strictifolius*	linear-leaved pondweed	S2	N?	G5	
1	Central Mixedwood	PMSPA01080	*Sparganium hyperboreum*	northern bur-reed	S1	N?	G5	
1	Central Mixedwood	PPADI0H060	*Pellaea glabella*	smooth cliff brake	S2	N4N5	G5	
1	Central Mixedwood	PPADI0H066	*Pellaea glabella ssp simplex*		S2	N?	G5T4?	
1	Central Mixedwood	PPDRY07050	*Cystopteris montana*	mountain bladder fern	S2	N?	G5	
1	Central Mixedwood	PPDRY0A0B0	*Dryopteris filix-mas*	male fern	S1	N4N5	G5	
1	Central Mixedwood	PPLYC01100	*Diphasiastrum sitchense*	ground-fir	S2	N?	G5	
1	Central Mixedwood	PPLYC02070	*Huperzia selago*	mountain club-moss	S1	N5	G5	
1	Central Mixedwood	PPOPH01070	*Botrychium lanceolatum*	lance-leaved grape fern	S2	N?	G5	
1	Central Mixedwood	PPOPH010R0	*Botrychium minganense*	Mingan grape fern	S2S3	N?	G4	
1	Central Mixedwood	PPOPH010V0	*Botrychium pinnatum*		S1	N?	G4?	
1	Central Mixedwood	PPTHE02010	*Phegopteris connectilis*	northern beech fern	S2	N?	G5	
2	Dry Mixedwood	NBHEP0P020	*Cephalozia bicuspidata*	liverwort	S1	N?	G5	
2	Dry Mixedwood	NBHEP0Y010	*Conocephalum conicum*	liverwort	S2	N?	G5	
2	Dry Mixedwood	NBHEP1Y040	*Lophozia badensis*	liverwort	S1	N?	G5?	
2	Dry Mixedwood	NBHEP1Y0F0	*Lophozia heterocolpos*	liverwort	S2	N?	G5	
2	Dry Mixedwood	NBHEP1Y0Y0	*Lophozia wenzelii*	liverwort	S1	N?	G4G5	
2	Dry Mixedwood	NBHEP20030	*Mannia pilosa*	liverwort	S1	N?	G4?	
2	Dry Mixedwood	NBHEP2H010	*Pellia endiviifolia*	liverwort	S2	N?	G5	
2	Dry Mixedwood	NBHEP2Y030	*Riccardia latifrons*	liverwort	S2	N?	G4G5	
2	Dry Mixedwood	NBHEP2Z0D0	*Riccia fluitans*	liverwort	S2	N?	G5	
2	Dry Mixedwood	NBHEP30010	*Ricciocarpos natans*	liverwort	S2	N?	G5	
2	Dry Mixedwood	NBHEP330S0	*Scapania paludicola*	liverwort	S2	N?	G5	
2	Dry Mixedwood	NBHEP330T0	*Scapania paludosa*	liverwort	S2	N?	G5	
2	Dry Mixedwood	NBHEP3C010	*Tritomaria exsecta*	liverwort	S1	N?	G5	
2	Dry Mixedwood	NBHEP3C060	*Tritomaria scitula*	liverwort	S2S3	N?	G4	
2	Dry Mixedwood	NBMUS03020	*Aloina brevirostris*	short-beaked rigid screw moss	S2	N?	G3G5	
2	Dry Mixedwood	NBMUS03040	*Aloina rigida*	aloe-like rigid screw moss	S2	N?	G3G5	
2	Dry Mixedwood	NBMUS0E010	*Aongstroemia longipes*		S2	N?	G3G5	
2	Dry Mixedwood	NBMUS0M080	*Atrichum undulatum*	undulated crane's bill moss	S1S2	N?	G5	
2	Dry Mixedwood	NBMUS0V010	*Blindia acuta*	sharp-pointed weissia	S2	N?	G5	
2	Dry Mixedwood	NBMUS0Z020	*Brachythecium acutum*		SU	N?	GNRQ	
2	Dry Mixedwood	NBMUS0Z0N0	*Brachythecium reflexum*		S2	N?	G4G5	
2	Dry Mixedwood	NBMUS0Z0R0	*Brachythecium rutabulum*		S2?	N?	G5	
2	Dry Mixedwood	NBMUS1A1B0	*Bryum uliginosum*		S2	N?	G3G5	
2	Dry Mixedwood	NBMUS1A1G0	*Bryum cyclophyllum*		S2	N?	G4G5	
2	Dry Mixedwood	NBMUS1A1Q0	*Bryum flaccidum*		SU	N?	G5	
2	Dry Mixedwood	NBMUS1J070	*Campylium radicale*		S2	N?	G3G5	
2	Dry Mixedwood	NBMUS1U010	*Conardia compacta*		S2	N?	G3G5	
2	Dry Mixedwood	NBMUS25060	*Desmatodon heimii*	long-stalked beardless moss	S2	N?	G5	
2	Dry Mixedwood	NBMUS2B0N0	*Dicranum tauricum*	broken-leaf moss	S1S2	N?	G4	
2	Dry Mixedwood	NBMUS2B0R0	*Dicranum ontariense*	cushion moss	S1	N?	G4G5	
2	Dry Mixedwood	NBMUS2C060	*Didymodon rigidulus*	rigid screw moss	S2	N?	G5	
2	Dry Mixedwood	NBMUS2C0B0	*Didymodon fallax*	fallacious screw moss	S2	N?	G5	
2	Dry Mixedwood	NBMUS2J020	*Drepanocladus crassicostatus*	brown moss	S2	N?	G3G5	
2	Dry Mixedwood	NBMUS2N040	*Entodon concinnus*		S2	N?	G4G5	
2	Dry Mixedwood	NBMUS2N100	*Entodon schleicheri*		S1	N?	G3G5	

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2	Dry Mixedwood	NBMUS3V0D0	*Hypnum pallescens*		S2	N?	G5	
2	Dry Mixedwood	NBMUS44080	*Leptodictyum humile*		S1	N?	G5	
2	Dry Mixedwood	NBMUS4L010	*Meesia longiseta*		S1	N?	G4?	
2	Dry Mixedwood	NBMUS5B010	*Phascum cuspidatum*	cuspidate earth moss	S2	N?	G5	
2	Dry Mixedwood	NBMUS5E070	*Physcomitrium pyriforme*	urn moss	S1	N?	G5	
2	Dry Mixedwood	NBMUS5S020	*Pohlia atropurpurea*		S1	N?	G4G5	
2	Dry Mixedwood	NBMUS5T040	*Polytrichum longisetum*	slender hairy-cap	S1	N?	G5	
2	Dry Mixedwood	NBMUS6F020	*Rhodobryum ontariense*		S2	N?	G5	
2	Dry Mixedwood	NBMUS6Z070	*Sphagnum compactum*	neat bog moss	S2	N?	G5	
2	Dry Mixedwood	NBMUS6Z0A0	*Sphagnum fimbriatum*	fringed bog moss	S2	N?	G5	
2	Dry Mixedwood	NBMUS6Z1T0	*Sphagnum contortum*	twisted bog moss	S2	N?	G5	
2	Dry Mixedwood	NBMUS71010	*Splachnum ampullaceum*	flagon-fruited splachnum	S2	N?	G5	
2	Dry Mixedwood	NBMUS7F0A0	*Thuidium philibertii*		S1S2	N?	G5	
2	Dry Mixedwood	NBMUS7X020	*Weissia controversa*	green-cushioned weissia	S2	N?	G5	
2	Dry Mixedwood	NBMUS81030	*Plagiomnium ciliare*		S2	N?	G5	
2	Dry Mixedwood	NBMUS88070	*Warnstorfia tundrae*	brown moss	S2	N?	GU	
2	Dry Mixedwood	NBMUS8F010	*Bryobrittonia longipes*		S2	N3	G3	
2	Dry Mixedwood	NBMUS93020	*Limprichtia cossonii*		SU	N?	GU	
2	Dry Mixedwood	NBMUS9Q030	*Rhizomnium andrewsianum*		S1	N?	G3G5	
2	Dry Mixedwood	NLCAL46120	*Cyphelium tigillare*		S2	N?	G5	
2	Dry Mixedwood	NLLEC3S210	*Ramalina obtusata*		S2	N?	G5?	
2	Dry Mixedwood	NLLEC3S290	*Ramalina sinensis*		SU	NR	G4G5	
2	Dry Mixedwood	NLT0002340	*Arthonia patellulata*		S3?	N?	G5	
2	Dry Mixedwood	NLT0005720	*Calicium trabinellum*		S2	N?	G3G4	
2	Dry Mixedwood	NLT0008330	*Cladonia cyanipes*		S2	N?	GNR	
2	Dry Mixedwood	NLT0008980	*Cladonia symphycarpa*		S2	N?	G3G5	
2	Dry Mixedwood	NLT0012450	*Hypogymnia rugosa*		S1S2	N?	G2G4	
2	Dry Mixedwood	NLT0012890	*Lecania dubitans*		S2	N?	G4?	
2	Dry Mixedwood	NLT0016420	*Lepraria incana*		S2	N?	GNR	
2	Dry Mixedwood	NLT0016740	*Leptogium furfuraceum*		S2	N?	GNR	
2	Dry Mixedwood	NLT0017910	*Melanelia olivacea*		S1	N?	G3G5	
2	Dry Mixedwood	NLT0017980	*Melanelia subelegantula*		S2	N?	GNR	
2	Dry Mixedwood	NLT0018270	*Micarea denigrata*		SNR	N?	G2G4	
2	Dry Mixedwood	NLT0018810	*Mycobilimbia sabuletorum*		S2	N?	G4G5	
2	Dry Mixedwood	NLT0018910	*Mycocalicium calicioides*		S1	N?	GNR	
2	Dry Mixedwood	NLT0018970	*Mycocalicium subtile*		S2	N?	G3G4	
2	Dry Mixedwood	NLT0021150	*Peltigera polydactyla*		S1S2	N?	G5?	
2	Dry Mixedwood	NLT0022680	*Physconia enteroxantha*		S1?	N?	G3G5	
2	Dry Mixedwood	NLT0022690	*Physconia isidiigera*		S2	N?	G3G4	
2	Dry Mixedwood	NLT0025200	*Ramalina calicaris*		S1?	N?	GNR	
2	Dry Mixedwood	NLT0025270	*Ramalina dilacerata*		S2	N?	G3G5	
2	Dry Mixedwood	NLT0025410	*Ramalina roesleri*		S2S3	N?	G3G5	
2	Dry Mixedwood	NLT0026470	*Rinodina archaea*		S2	N?	G4G5	
2	Dry Mixedwood	NLT0027880	*Scoliciosporum chlorococcum*		S2	N?	G4G5	
2	Dry Mixedwood	NLT0028160	*Sphinctrina turbinata*		S1	N?	G3G5	
2	Dry Mixedwood	NLT0029890	*Trapeliopsis flexuosa*		S1	N?	G5	
2	Dry Mixedwood	NLT0031940	*Xanthoria hasseana*		S1	N?	G5	
2	Dry Mixedwood	NLTES11300	*Phaeophyscia cernohorskyi*		S1	N?	G4G5	
2	Dry Mixedwood	NLTES11360	*Phaeophyscia hirsuta*		S1	N?	G3	
2	Dry Mixedwood	NLTES11590	*Physcia dimidiata*		S1	N?	G5?	
2	Dry Mixedwood	NLTEST5030	*Peltigera collina*		S1	N?	G3G4	
2	Dry Mixedwood	NLTEST5080	*Peltigera horizontalis*		S1S2	N?	G5	
2	Dry Mixedwood	NLTEST5510	*Bryoria trichodes*	old man's beard	SU	N?	G3G5	
2	Dry Mixedwood	NLTEST5970	*Cladonia bacilliformis*		S2S3	N?	G4G5	
2	Dry Mixedwood	NLTEST6470	*Cladonia macilenta*		S2?	N?	G5	
2	Dry Mixedwood	NLTEST6880	*Cladonia squamosa*		S2	N?	G5	
2	Dry Mixedwood	NLTEST7190	*Cladina stygia*		S1	N?	G5	
2	Dry Mixedwood	NLTEST9030	*Anaptychia setifera*		S2	N?	G3G4	
2	Dry Mixedwood	PDAST0S1Q0	*Artemisia tilesii*	Herriot's sagewort	S2	N?	G5	
2	Dry Mixedwood	PDAST3P140	*Eupatorium maculatum*	spotted Joe-pye weed	S1S2	N5	G5	
2	Dry Mixedwood	PDAST5F010	*Lactuca biennis*	tall blue lettuce	S2	N?	G5	
2	Dry Mixedwood	PDASTEH020	*Aster umbellatus*	flat-topped white aster	S2	N?	G5	
2	Dry Mixedwood	PDBRA0K0V0	*Cardamine parviflora*	small bitter cress	S1	N?	G5	
2	Dry Mixedwood	PDBRA0K0Z0	*Cardamine pratensis*	meadow bitter cress	S2	N5	G5	
2	Dry Mixedwood	PDCAR0X0B0	*Stellaria crispa*	wavy-leaved chickweed	S2	N?	G5	
2	Dry Mixedwood	PDCLU03120	*Hypericum majus*	large Canada St. John's-wort	S2	N?	G5	
2	Dry Mixedwood	PDDRO02060	*Drosera linearis*	slender-leaved sundew	S2	N4	G4	
2	Dry Mixedwood	PDGEN0C010	*Lomatogonium rotatum*	marsh felwort	S2S3	N5?	G5	
2	Dry Mixedwood	PDGER02070	*Geranium carolinianum*	Carolina wild geranium	S1	N?	G5	
2	Dry Mixedwood	PDLAM1G0E0	*Physostegia leidinghamii*	false dragonhead	S2	N3?	G3?	
2	Dry Mixedwood	PDNYM050J0	*Nymphaea leibergii*	pygmy water-lily	S1	N5	G5	
2	Dry Mixedwood	PDPGL02180	*Polygala paucifolia*	fringed milkwort	S1	N?	G5	
2	Dry Mixedwood	PDROS1K900	*Rubus x paracaulis*	hybrid dwarf raspberry	S1	N?	GNA	
2	Dry Mixedwood	PDRUB1T0E0	*Hedyotis longifolia*	long-leaved bluets	S2	N?	G4G5	
2	Dry Mixedwood	PDSAR02070	*Sarracenia purpurea*	pitcher-plant	S2	N5	G5	
2	Dry Mixedwood	PDSAX07030	*Chrysosplenium iowense*	golden saxifrage	S3	N3	G3	
2	Dry Mixedwood	PDVIO04142	*Viola pallens*	Macloskey's violet	S2	N?	G5T5	
2	Dry Mixedwood	PMALI040H0	*Sagittaria latifolia*	broad-leaved arrowhead	S1	N?	G5	
2	Dry Mixedwood	PMCYP031F0	*Carex backii*	Back's sedge	S2	N?	G4	
2	Dry Mixedwood	PMCYP035T0	*Carex heleonastes*	Hudson Bay sedge	S2	N?	G4	
2	Dry Mixedwood	PMCYP03690	*Carex houghtoniana*	sand sedge	S2	N?	G5	
2	Dry Mixedwood	PMCYP036D0	*Carex hystericina*	porcupine sedge	S1	N?	G5	
2	Dry Mixedwood	PMCYP036W0	*Carex lacustris*	lakeshore sedge	S2	N?	G5	
2	Dry Mixedwood	PMCYP038E0	*Carex mertensii*	purple sedge	S1	N?	G5	
2	Dry Mixedwood	PMCYP03AA0	*Carex pedunculata*	stalked sedge	S1	N?	G5	
2	Dry Mixedwood	PMCYP03EN0	*Carex vulpinoidea*	fox sedge	S2	N?	G5	
2	Dry Mixedwood	PMCYP091S0	*Eleocharis tenuis*	slender spike-rush	SU	N?	G5	
2	Dry Mixedwood	PMCYP0N070	*Rhynchospora capillacea*	slender beak-rush	S1	N?	G4	
2	Dry Mixedwood	PMCYP0Q0A0	*Trichophorum clintonii*	Clinton's bulrush	S1	N?	G4	
2	Dry Mixedwood	PMCYP0Q0P0	*Bolboschoenus fluviatilis*	river bulrush	S1	N5	G5	
2	Dry Mixedwood	PMCYP0Q140	*Scirpus pallidus*	pale bulrush	S1	N?	G5	
2	Dry Mixedwood	PMHYD03010	*Elodea bifoliata*	two-leaved waterweed	S1	N2	G4G5	
2	Dry Mixedwood	PMIRI0D180	*Sisyrinchium septentrionale*	pale blue-eyed grass	S2S3	N3N4	G3G4	
2	Dry Mixedwood	PMJUN010G0	*Juncus brevicaudatus*	short-tail rush	S2	N5	G5	
2	Dry Mixedwood	PMJUN012N1	*Juncus stygius var americanus*	marsh rush	S2	N?	G5T5	
2	Dry Mixedwood	PMJUN02010	*Luzula acuminata*	wood-rush	S1	N?	G5	
2	Dry Mixedwood	PMJUN020H0	*Luzula rufescens*	reddish wood-rush	S1	N?	G5	
2	Dry Mixedwood	PMLEM03030	*Wolffia columbiana*	watermeal	S2	N?	G5	

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2	Dry Mixedwood	PMNAJ01020	*Najas flexilis*	slender naiad	S1S2	N5	G5	
2	Dry Mixedwood	PMORC1R060	*Malaxis monophylla*	white adder's-mouth	S2	N?	G5	
2	Dry Mixedwood	PMORC1R070	*Malaxis paludosa*	bog adder's-mouth	S1	N3	G4	
2	Dry Mixedwood	PMPOA200A0	*Danthonia spicata*	poverty oat grass	S1S2	N?	G5	
2	Dry Mixedwood	PMPOA240K0	*Panicum leibergii*	Leiberg's millet	S1	N?	G5	
2	Dry Mixedwood	PMPOA2Y060	*Glyceria elata*	tufted tall manna grass	S2	N?	G4G5	
2	Dry Mixedwood	PMPOA481D0	*Muhlenbergia racemosa*	marsh muhly	S1	N4N5	G5	
2	Dry Mixedwood	PMPOA4J030	*Oryzopsis canadensis*	Canadian rice grass	S1	N4N5	G5	
2	Dry Mixedwood	PMPOA4J070	*Oryzopsis micrantha*	little-seed rice grass	S2	N?	G5	
2	Dry Mixedwood	PMPOT030B0	*Potamogeton foliosus*	leafy pondweed	S2	N?	G5	
2	Dry Mixedwood	PMPOT030R0	*Potamogeton obtusifolius*	blunt-leaved pondweed	S2	N?	G5	
2	Dry Mixedwood	PMPOT030Z0	*Potamogeton robbinsii*	Robbins' pondweed	S1	N?	G5	
2	Dry Mixedwood	PMPOT03110	*Potamogeton strictifolius*	linear-leaved pondweed	S2	N?	G5	
2	Dry Mixedwood	PMRUP01020	*Ruppia cirrhosa*	widgeon-grass	S1S2	NR	G5	
2	Dry Mixedwood	PMSPA01070	*Sparganium glomeratum*	bur-reed	S1	N1	G4?	
2	Dry Mixedwood	PPDRY0A090	*Dryopteris cristata*	crested shield fern	S1	N?	G5	
2	Dry Mixedwood	PPDRY0D020	*Gymnocarpium disjunctum*		S1	N?	G4	
2	Dry Mixedwood	PPOPH01070	*Botrychium lanceolatum*	lance-leaved grape fern	S2	N?	G5	
2	Dry Mixedwood	PPOPH010E0	*Botrychium simplex*	dwarf grape fern	S2	N?	G5	
2	Dry Mixedwood	PPOPH010R0	*Botrychium minganense*	Mingan grape fern	S2S3	N?	G4	
2	Dry Mixedwood	PPOPH010S0	*Botrychium ascendens*	ascending grape fern	S1	N2N3	G2G3	
2	Dry Mixedwood	PPOPH010V0	*Botrychium pinnatum*		S1	N?	G4?	
2	Dry Mixedwood	PPOPH01130	*Botrychium pallidum*		S1	N1	G3	
2	Dry Mixedwood	PPOPH01200	*Botrychium michiganense*		SU	N?	G1	
6	Lower Boreal Highlands	NBHEP04030	*Anastrophyllum helleranum*	liverwort	S2	N?	G5	
6	Lower Boreal Highlands	NBHEP0U020	*Chiloscyphus pallescens*	liverwort	S1	N?	G5	
6	Lower Boreal Highlands	NBHEP1Y0U0	*Lophozia rutheana*	liverwort	S1	N?	G4?	
6	Lower Boreal Highlands	NBHEP2Y030	*Riccardia latifrons*	liverwort	S2	N?	G4G5	
6	Lower Boreal Highlands	NBHEP2Y040	*Riccardia multifida*	liverwort	S2S3	N?	G5	
6	Lower Boreal Highlands	NBHEP2Z080	*Riccia cavernosa*	liverwort	S1	N?	G5	
6	Lower Boreal Highlands	NBHEP330S0	*Scapania paludicola*	liverwort	S2	N?	G5	
6	Lower Boreal Highlands	NBMUS1A1G0	*Bryum cyclophyllum*		S2	N?	G4G5	
6	Lower Boreal Highlands	NBMUS2J0A0	*Drepanocladus sendtneri*	brown moss	S1	N?	G5?	
6	Lower Boreal Highlands	NBMUS6P010	*Schistostega pennata*	luminous moss	S1S2	N?	G3G4	
6	Lower Boreal Highlands	NBMUS6Z0A0	*Sphagnum fimbriatum*	fringed bog moss	S2	N?	G5	
6	Lower Boreal Highlands	NBMUS6Z1T0	*Sphagnum contortum*	twisted bog moss	S2	N?	G5	
6	Lower Boreal Highlands	NBMUS6Z230	*Sphagnum fallax*	peat moss	S2	N?	G5	
6	Lower Boreal Highlands	NBMUS71040	*Splachnum rubrum*	red collar moss	S3	N?	G3	
6	Lower Boreal Highlands	NBMUS79050	*Tayloria serrata*	slender splachnum	S2	N?	G4	
6	Lower Boreal Highlands	NBMUS88070	*Warnstorfia tundrae*	brown moss	S2	N?	GU	
6	Lower Boreal Highlands	NBMUS9N010	*Pseudobryum cinclidioides*		S2	N?	G5	
6	Lower Boreal Highlands	NBMUS9Q080	*Rhizomnium magnifolium*		S2	N?	G4G5	
6	Lower Boreal Highlands	NLCAL46120	*Cyphelium tigillare*		S2	N?	G5	
6	Lower Boreal Highlands	NLT0012560	*Imshaugia placorodia*		S2	N?	G3G5	
6	Lower Boreal Highlands	NLT0013350	*Lecanora cateilea*		S2	N?	GNR	
6	Lower Boreal Highlands	NLT0019520	*Nephroma bellum*		S2	N?	G3G5	
6	Lower Boreal Highlands	NLTEST7190	*Cladina stygia*		S1	N?	G5	
6	Lower Boreal Highlands	PDBRA0K0Z0	*Cardamine pratensis*	meadow bitter cress	S2	N5	G5	
6	Lower Boreal Highlands	PDFAB0F1C0	*Astragalus bodinii*	Bodin's milk vetch	S1	N?	G4	
6	Lower Boreal Highlands	PDLNT01080	*Pinguicula villosa*	small butterwort	S1	N?	G4	
6	Lower Boreal Highlands	PDORO01020	*Boschniakia rossica*	ground-cone	S1	N?	G5	
6	Lower Boreal Highlands	PDSAR02070	*Sarracenia purpurea*	pitcher-plant	S2	N5	G5	
6	Lower Boreal Highlands	PDSAX07030	*Chrysosplenium iowense*	golden saxifrage	S3	N3	G3	
6	Lower Boreal Highlands	PMCYP035T0	*Carex heleonastes*	Hudson Bay sedge	S2	N?	G4	
6	Lower Boreal Highlands	PMCYP03690	*Carex houghtoniana*	sand sedge	S2	N?	G5	
6	Lower Boreal Highlands	PMCYP039Q0	*Carex oligosperma*	few-fruited sedge	S1S2	N?	G5?	
6	Lower Boreal Highlands	PMCYP0Q140	*Scirpus pallidus*	pale bulrush	S1	N?	G5	
6	Lower Boreal Highlands	PMJUN012N1	*Juncus stygius var americanus*	marsh rush	S2	N?	G5T5	
6	Lower Boreal Highlands	PMPOA0H011	*Arctagrostis arundinacea*	polar grass	S1	N?	G5T5	
6	Lower Boreal Highlands	PMPOA170N0	*Calamagrostis lapponica*	Lapland reed grass	S1	N?	G5	
6	Lower Boreal Highlands	PMPOT030R0	*Potamogeton obtusifolius*	blunt-leaved pondweed	S2	N?	G5	
6	Lower Boreal Highlands	PPISO01040	*Isoetes echinospora*	northern quillwort	S1	N?	G5?	
6	Lower Boreal Highlands	PPLYC01100	*Diphasiastrum sitchense*	ground-fir	S2	N?	G5	
6	Lower Boreal Highlands	PPOPH01070	*Botrychium lanceolatum*	lance-leaved grape fern	S2	N?	G5	
6	Lower Boreal Highlands	PPOPH010V0	*Botrychium pinnatum*		S1	N?	G4?	
21	Upper Boreal Highlands	NBMUS6Z0A0	*Sphagnum fimbriatum*	fringed bog moss	S2	N?	G5	
21	Upper Boreal Highlands	NLT0008330	*Cladonia cyanipes*		S2	N?	GNR	

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