Early Winter Habitat

Caribou in the Owl Lake region, Manitoba, selected mature jack pine stands and avoided early successional stands and mixed softwood stands (Martinez 1998).

Winter Habitat

In north-western Ontario, caribou selected mature, sparsely-stocked coniferous stands (Armstrong et al. 2000). Caribou selected areas with a greater proportion of lakes 5 – 100 ha and with greater perimeter and fractal dimension than the relative distribution of available lakes, presumably to reduce detection by predators and increase the probability of escape (Ferguson and Elkie 2005). Caribou foraged in areas with significantly more lichen (mean 39% lichen ground cover) and fewer shrubs in jack pine and black spruce stands with low tree densities (mean 1552 trees/ha)), low basal areas (mean 14.1 m^2/ha), and short heights (12 m or less; Antoniak and Cumming 1998). Caribou in the northwestern recovery zone, Ontario, selected mature dense conifer stands, sparse upland conifer with available terrestrial lichens (Pearce and Eccles 2004). Caribou and moose in northwestern Ontario showed habitat partitioning during winter, but moose and wolves (*Canis lupus*) did not. Habitat partitioning provided spatial refugia for caribou from wolves, presumably reducing risk of predation (Cumming et al. 1996). In the Whitefeather forest, caribou were associated with mature conifer stands with abundant terrestrial lichens (*Cladina spp*. but especially *C. ragiferina*) and black spruce stands on poorly drained lowlands with abundant arboreal lichens (*Bryoria spp*.; O'Flaherty et al. 2007). In the Lake Nipigon area, caribou selected habitat with sandy soil, islands, and black spruce, spruce-larch, and jack pine-spruce forests (Cumming and Beange 1998). Caribou were displaced from winter habitat during an experimental log hauling operation (Cumming and Hyer 1998). Collared adult caribou moved 8-60 km away after logging activities began, and the authors suggested that chronic exposure to disturbance may cause caribou to abandon traditional wintering areas, even if the habitat itself is not disturbed by forest harvest or roads. Across northern Ontario, lichen species identified as winter forage for boreal caribou include *Cladina spp., Cladonia spp.*, and *Usnea spp*. (Antoniak and Cumming 1998, Cumming and Hyer 1998).

Caribou in the former Aikens Lake, Manitoba population selected bogs more often during winter, coincident with a change in diet (Darby and Pruitt 1984). Caribou made heavy use of bogs in the winter, and feeding sites were typically in open bogs and jack pine habitat with easy access to lichens (Schaefer 1988). Mixed conifers and areas with windfallen trees were avoided (Schaefer and Pruitt 1991). Caribou selected glacial erratics, arboreal lichens, terrestrial lichens, sedges, and ericaceous species. Caribou continued to use areas immediately post fire, but use dropped off gradually (Schaefer and Pruitt 1991). Caribou used frozen lakes for travel, escape habitat and craters for drinking overflow water (Darby and Pruitt 1984). Caribou in southeastern Manitoba selected open tamarack or black spruce bogs, intermediate to mature jack pine rock ridges, and lakes during winter (Stardom 1975). Caribou avoided vesicular ice, snow depths greater than 65 cm and snow crusts with hardness greater than 400g/cm^2 throughout the winter (Stardom 1975). Caribou in the

Owl Lake population used habitat within 1 km of a winter haul road less than expected and crossed the road less than expected (Schindler et al. 2007).

Late Winter Habitat

In mid-February, when snow hardness and depth restricted foraging in bogs, caribou in the Aikens Lake, Manitoba population moved to jack pine-rock ridges in mature coniferous stands, where they fed on *Cladonia sp. and Vaccinium myrtilloides* (Darby and Pruitt 1984). Caribou used lakes for loafing in late winter. Caribou in the Owl Lake, Manitoba population used jack pine-dominated stands, sparsely-treed rock and mature conifer-dominated uplands more often than young seral-stage conifer, mixed softwood and all hardwood stands (Martinez 1998; O'Brien et al. 2006). In March, caribou in southeastern Manitoba selected habitat along lake edges and on south or southeast facing slopes of rocky lakeshores (Stardom 1975).

Travel Season Habitat

During migration to and from wintering areas in northwestern Ontario, caribou were more likely to avoid open water, disturbed and open areas, while utilizing mainly coniferous forests (Ferguson and Elkie 2004a). In early spring, before the break-up of ice, caribou in the Lake Nipigon area migrated to 31 islands in Lake Nipigon (Bergerud et al. 1990, Cumming and Beange 1987). Spring movements were not confined to specific travel routes (Cumming and Beange 1987). Large lakes were also used during early spring by caribou in the Whitefeather forest while migrating from winter feeding grounds to calving areas (O'Flaherty et al. 2007). Caribou in the Atikaki-Berens population, Manitoba used the same migration trails during fall and spring (V. Crichton pers. comm.).

BOREAL SHIELD WEST

Athabasca Plain, Churchill River Upland, Hayes River Upland, Big Trout Lake, Ecoregions (87, 88, 89, 95)

This region extends from Lake Athabasca in northwestern Saskatchewan, southeast to the northern edge of Lake Winnipeg and east to the Hudson Plains Ecozone (Figure 4). The landscape of this region is dominated by jack pine and black spruce forests with ericaceous shrubs, mosses, and lichens (ESWG 1995). White birch, white spruce, balsam fir and trembling aspen occur in south-facing slopes. Lichen covered bedrock outcroppings are common. Black spruce and sphagnum moss occur in abundant peatlands and wetlands are extensive in the western portion of the region. Many lakes occur throughout the region. Mean annual precipitation is lower in the western portion (350 – 600 mm) than in the eastern portion of the region (550 – 775 mm; ESWG 1995). Mean annual area burned by forest fire is 1.00% (NRCAN 2002).

Local Caribou Populations

Twelve local boreal caribou populations occurring within the Boreal Shield West region are described in the literature. The extent of occurrence of some of these local populations overlaps with the Boreal Plains Ecozone. The following local populations are reported in the habitat use literature: *SK: Davy Athabaska, Highrock-Key, Steephill-Foster, Smoothstone-Wapaweka, Suggi-Amisk, MB: Sisipuk-Kamuchawie, Kississing, Naosap, Reed, Wabowden, Wapisu, Island Lake, and Gunisao-Hudwin Lakes,* and the continuous population in north-western Ontario.

Broad Scale Caribou Habitat

Boreal caribou habitat in this region is characterized by conifer/tamarack-dominated peatland complexes, and upland moderate to dense conifer forests with abundant lichens (Arsenault 2003, O'Brien et al. 2006, Hillis et al. 1998) Caribou in this region use sparsely-treed rock and mature conifer-dominated uplands (O'Brien et al. 2006) and prefer open forest that support lichens (Malasiuk 1999). Caribou generally avoid shrub-rich habitats, disturbed/fragmented areas, and hardwood-dominated stands that may support higher moose and deer (O*docoileus spp.*) populations and, consequently, higher predator populations (Rettie 1998, Arsenault 2003, Hillis et al. 1998).

Seasonal Habitat and Forage

Year Round Habitat

Caribou in the Smoothstone-Wapaweka region of Saskatchewan selected open and treed peatlands, lowland black spruce and upland black spruce/pine stands relative to other habitat types (Rettie 1998). In the Weyakwin Lake area, Saskatchewan, caribou selected jack pine, white spruce stands, upland and lowland black spruce, and open peatland and avoided burned areas (Rettie and Messier 2000). On the Naosap range in Manitoba, caribou were positively associated with arboreal lichen, spruce trees, and large diameter trees, and negatively associated with trembling aspen and higher deadfall density (Metsaranta 2007). Caribou in the Kississing, Naosap, and Reed populations selected mature coniferous stands and avoided disturbance across multiple scales (Lander 2006). Caribou in the Wabowden and Gormley area used large open and treed peatland complexes during winter and summer (Brown et al. 2000).

Calving Habitat

Caribou in the Smoothstone-Wapaweka region of Saskatchewan used peatlands and black spruce-dominated stands for calving and post-calving (Rettie 1998). In the Wabowden area of central Manitoba, caribou selected lowland black spruce, peatland with forested islands and treed muskeg for calving habitat and avoided other conifer species and deciduous cover (Hirai 1998). In the Reed Lake area of Manitoba, caribou used islands during calving

(Shoesmith and Storey 1977). Females with neonate calves were sedentary near shoreline of islands. In Northwestern Ontario, caribou selected treed bogs/ peatlands with forested Islands (Hillis et al. 1998, Armstrong et al. 2000) as well as islands and lakeshores during calving season (Armstrong et al. 2000). Caribou avoided deciduous forest, shrub-rich fens and wetlands during calving season (Hillis et al. 1998).

Post-calving Habitat

On the Naosap range, Manitoba, caribou used wooded lakeshores, upland conifer-spruce and treed muskeg and avoided hardwood forests during summer (Metsaranta and Mallory 2007, Malasiuk 1999). On the Reed Lake range, Manitoba, caribou used islands, lakeshores, and sparsely treed rock during summer (Shoesmith and Storey 1977). Caribou in the Kississing and Naosap and Reed populations selected sites with greater arboreal lichen cover during summer (Lander 2006). In the northwestern recovery zone, Ontario, caribou used islands, large contiguous patches of dense mature conifer forest (Pearce and Eccles 2004). In Northwestern Ontario, caribou used treed bog/peatland with forested islands (Hillis et al. 1998, Armstrong et al. 2000), dense conifer and mixed forest and avoided recent burns, shrub-rich fens, and dense deciduous forest or shrub during summer (Hillis et al. 1998).

Rutting Habitat

In North-western Ontario, caribou used dense conifer, sparse conifer, and mixed forests and avoided recent burns, shrub-rich fens, and dense deciduous forest or shrub during rutting season (Hillis et al. 1998). On the Atikaki-Berens range, Manitoba, rutting caribou used open riparian habitat, and bulls were recorded moving long distances (>100 km) within a short time period during rutting season (V. Crichton, pers. comm.).

Winter Habitat

On the Naosap range, Manitoba, caribou selected mature upland spruce and pine stands and treed muskeg and avoided deciduous forests during winter (Metsaranta and Mallory 2007, Malasiuk 1999). On the Kississing range, Manitoba, caribou used jack pine dominated forests during winter (O'Brien et al. 2006). Caribou in the Kississing, Naosap and Reed populations selected areas with greater visibility and further from forest edge during winter (Lander 2006). In the northwestern recovery zone, Ontario, caribou used large contiguous patches of dense mature conifer forest and sparse upland conifer during winter (Pearce and Eccles 2004). In northwestern Ontario, caribou used sparse coniferous forest (Hillis et al. 1998, Armstrong et al. 2000), dense conifer, mixed forest, treed bogs, and avoided recent burns, shrub-rich fens, and dense deciduous forest or shrub during winter (Hillis et al. 1998). Caribou in the Wabowden and Gormley area exhibited post-rut and pre-calving aggregations, where the majority of caribou congregated in mixed-sex groups in a specific area of their range (Brown et al. 2000).

Travel Seasons

Caribou in the Wabowden and Gormley area used traditional travel routes between summer and winter ranges within large peatland complexes (Brown et al. 200).

BOREAL PLAINS ECOZONE

Slave River Lowland, Clear Hills Upland, Peace Lowland, Mid-boreal uplands, Wabasca Lowlands, Western Alberta Upland, Mid-boreal lowland, Interlake Plain Ecoregions (136, 137, 138, 139 (140, 141, 144, 147, 150, 151, 152, 153, 154) 142, 145, 148, 155)

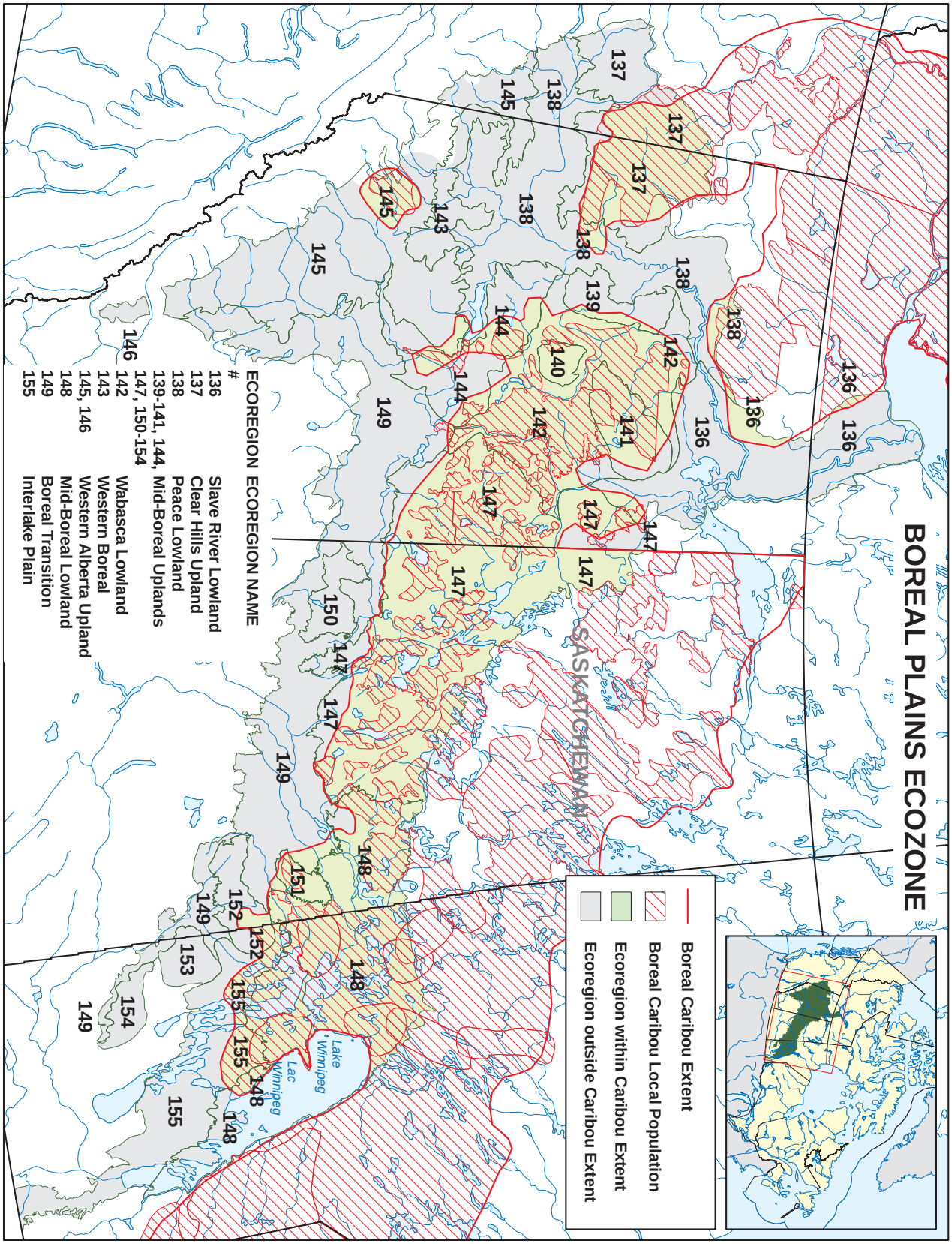
The Boreal Plains Ecozone extends from northeastern British Columbia and southern Northwest Territories to southeastern Manitoba (Figure 5), has few lakes or bedrock outcroppings and is level to gently rolling. Peatlands and wetlands are numerous throughout the Ecozone and white and black spruce, jack pine and tamarack are the dominant conifers (ESWG 1995). Black spruce and tamarack increase in dominance in the northerly sections of the Ecozone and deciduous species including white birch, trembling aspen, and balsam poplar are dominant in the transition zone adjacent to the Prairie Ecozone. Mean annual precipitation ranges from 300 to 625 mm (ESWG 1995). Mean annual area burned by forest fire is 0.44% (NRCAN 2002).

Local Caribou Populations

Twenty local boreal caribou populations occurring within the Boreal Plains are described in the literature. The extent of occurrence of some of these local populations overlaps with the Boreal Shield or Taiga Plains Ecozones. The following local populations are reported in the habitat use literature: *BC: Chinchaga, AB: Chinchaga, Hotchkiss, Deadwood, Little Smoky, Slave Lake, Cold Lake, East Side Athabaska River (ESAR), West Side Athabaska River (WSAR), Red Earth, Richardson, Caribou Mountain, SK: Primrose, Smoothstone-Wapaweka, Pasquia-Porcupine, Suggi-Amisk, MB: The Bog, North Interlake, William Lake, Naosap-Reed, Wabowden*

Broad Scale Caribou Habitat

Boreal caribou in the Boreal Plains of Alberta are associated with late seral-stage (>50 years old) coniferous forest and treed peatlands, and avoid matrix-type habitat such as diverse habitat types and edges (Stuart-Smith et al. 1997, Smith 2004, Neufeld 2006). Black spruce and tamarack are typical of poorly-drained peatland complexes in caribou ranges (Edmonds 1988, James 1999, Smith et al. 2000, McLoughlin et al. 2003, Dalerum et al. 2007) and are the primary source of lichens, including *Cladonia spp., Cladina spp. and Peltigera spp*. that are important caribou forage. Boreal caribou may use peatlands as a refuge from higher predator densities associated with abundant moose and deer populations in deciduous and mixed-wood uplands (Bradshaw 1994, McLoughlin et al. 2005, McCutchen 2007). Woodland caribou in northeastern Alberta are restricted to local populations within peatland complexes (Bradshaw et al. 1995, Stuart-Smith et al. 1997).



Appendix 6.3 - Figure 5. Boreal caribou distribution within the Boreal Plains Ecozone.

Boreal caribou habitat in the Boreal Plains Ecozone of Saskatchewan is characterized by conifer-dominated peatland complexes, and upland conifer forests with abundant lichens (Arsenault 2003). Similar to Alberta, caribou in Saskatchewan generally avoid shrub-rich habitats, disturbed/fragmented areas, and hardwood-dominated stands that may support higher alternate prey populations, and consequently, higher predator populations (Rettie 1998, Arsenault 2003).

Boreal caribou habitat in the Boreal Plains Ecozone of Manitoba is characterized by conifer-dominated peatlands with abundant arboreal lichens, primarily *Alectoria spp., Evernia spp*., *Parmelia spp., Ramalina spp.* and *Usnea spp*., and uplands dominated by late seral stage conifers with dense cover of ground lichens, mainly *Cladonia spp*. and *Cladina spp.* (Darby and Pruitt 1984, Schaefer 1988, Metsaranta et al. 2003, O'Brien et al. 2006).

Seasonal Habitat and Forage

Year Round Habitat

Caribou in northeastern Alberta selected open fens, wooded fens, and wooded bogs year round (Brown et al. 2000). Caribou selected peatlands over uplands and edge habitat (Schneider et al. 2000, McLaughlin et al. 2005). Within peatlands, bogs were selected over fen and bogs were selected if proportion of bog to non-peatland habitat was >30% (Schneider et al. 2000). Non-peatlands were avoided in landscapes where the proportion of non-peatland was >50% and use of non-peatland diminished with distance from peatlands (Schneider et al. 2000). Caribou in the Naosap-Reed population selected mature coniferous stands and avoided disturbance across multiple scales (Lander 2006).

One local population, in the foothills of west-central Alberta, frequently uses dry, upland lodgepole pine (*Pinus contorta*) and mixed pine/black spruce stands (Smith 2004, Neufeld 2006) unlike other boreal caribou populations in Alberta that exhibit a year-round preference for treed peatlands (Stuart-Smith et al. 1997). Increased lichen biomass is associated with open, mature (>80 years old) pine-dominated forests (Szkorupa 2002). Although upland habitat within the ranges of boreal caribou in Alberta is comprised mainly of jack pine and white spruce with high lichen availability (Edmonds 1988, Stuart-Smith et al. 1997, Dyer 1999, James 1999, Smith 2004, McLoughlin et al. 2003, Dalerum et al. 2007), the risk of predation is greater in upland than peatland habitat (McLoughlin et al. 2005).

Recent research in Alberta suggests that landscape disturbance and the ensuing changes in predator-prey interactions affects boreal caribou habitat use. Caribou in northeastern Alberta reduced their use of suitable habitat in close proximity to seismic lines, roads and well sites; caribou avoided roads and well sites by approximately 230 m and 1 km, respectively (Dyer 1999). The rate of caribou crossing roads was less than expected in all seasons except calving (Dyer et al. 2002). Because of this avoidance, roads may act as semi-permeable barriers to caribou movement, potentially restricting caribou use of otherwise suitable areas (Dyer 1999, Dyer et al. 2002, Smith 2004). Linear corridors such as roads and seismic lines

may also facilitate wolf travel and hunting behaviour within caribou range (Dyer 1999, James 1999, McCutchen 2007).

Caribou in five subpopulations of the Smoothstone-Wapaweka region of Saskatchewan selected open and treed peatlands, lowland black spruce and upland black spruce/pine stands relative to other habitat types year round (Rettie 1998).

In the Kississing-Naosap region of Manitoba, caribou were associated with spruce trees, relatively abundant arboreal lichens, and avoided trembling aspen and deadfall (Metsaranta et al. 2003). The authors proposed that deadfall, which is abundant several years post fire, impedes travel for caribou but also for alternative prey, thus suggesting an important mechanism of fire to prevent a faunal shift in the ungulate community thus preventing increased predation risk for caribou.

Calving Habitat

Caribou in north eastern Alberta selected bogs and avoided uplands and fen/upland boundaries during calving season (James 1999). Caribou avoided habitat near seismic lines, roads, and well sites in open coniferous and closed coniferous wetlands during spring (Dyer et al. 2001). Avoidance effects (areas of reduced use) were demonstrated up to 500 m away from developments. Caribou in west-central Alberta used mature forest for calving habitat and avoided young forest, areas with high density of cut blocks, seismic lines, aspen-dominated stands, and large rivers (Neufeld 2006).

Caribou in the Smoothstone-Wapaweka region selected peatlands and black spruce-dominated stands for calving (Rettie 1998). In the Wabowden area of north central Manitoba, caribou selected lowland black spruce stands within muskeg (treed muskeg) during calving season. Caribou did not use islands for calving, and avoided deciduous forests, immature stands, and non-black spruce conifer stands (Hirai 1998).

Post-calving Habitat

In the Caribou Mountains of northwestern Alberta, caribou used forest stands older than 50 years and avoided forest stands <10 years old during summer (Dalerium et al. 2007). Caribou in northeastern Alberta avoided habitat near seismic lines, roads, and well sites in open coniferous and closed coniferous wetlands during summer (Dyer et al. 2001). Caribou in west-central Alberta used mature forest during summer and avoided stands dominated by white spruce and aspen, areas with a high density of cut blocks, seismic lines, aspen dominated stands and large rivers (Neufeld 2006). In the Smoothone-Wapaweka region of Saskatchewan, caribou selected upland black spruce/jack pine forests, lowland black spruce, young jack pine, open and treed peatlands during the post-calving season (Rettie 1998, Rettie and Messier 2000). In the Naosap region of Manitoba, caribou selected upland spruce and pine stands and treed muskeg and avoided deciduous forests during summer (Metsaranta and Mallory 2007). Caribou in the Naosap-Reed populations also selected sites with greater arboreal lichen cover during summer (Lander 2006).

Rutting Habitat

Caribou in north eastern Alberta, caribou selected and avoided fen/upland boundaries during fall (James 1999). Caribou in northeastern Alberta avoided habitat near seismic lines, roads, and well sites in open coniferous and closed coniferous wetlands during fall (Dyer et al. 2001). Caribou in west-central Alberta used mature forest during fall and avoided stands dominated by white spruce and aspen, areas with a high density of cut blocks, seismic lines, aspen dominated stands, and large rivers (Neufeld 2006).

In the Smoothone-Wapaweka region of Saskatchewan, caribou selected upland black spruce/ jack pine forests, lowland black spruce, and open and treed peatlands and avoided clear cuts and burned areas during the rutting season (Rettie 1998, Rettie and Messier 2000).

Winter Habitat

In northeastern Alberta, caribou selected treed peatlands during winter (Anderson 1999). Caribou selected open fen complexes of >50% peatland coverage and forested bogs of >85% peatland and avoided uplands and non-patterned open fens (Bradshaw et al. 1995) Caribou selected seral stages > 50 years old during winter (Dalerum et al. 2007)

In west-central Alberta, caribou used mature forest during winter and avoided stands dominated by white spruce and aspen and areas with a high density of cut blocks, seismic lines, and large rivers (Neufeld 2006). In the Smoothone-Wapaweka region of Saskatchewan, caribou selected upland black spruce/jack pine forests, lowland black spruce, and open and treed peatlands and avoided clear cuts and burned areas during winter (Rettie 1998, Rettie and Messier 2000). In the Naosap region of Manitoba, caribou selected mature upland spruce and pine stands and treed muskeg and avoided deciduous forests during winter (Metsaranta and Mallory 2007). Caribou in the Naosap-Reed population also selected areas with greater visibility and further from forest edge during winter (Lander 2006).

Late Winter

In northeastern Alberta, late winter habitat consisted of treed bog, treed fen, and treed peatland (Anderson et al. 2000). Caribou feeding sites occurred in areas of high *Cladina spp.* abundance. The greatest barrier effect of roads was evident in late winter, when caribou crossed roads with moderate traffic volume six times less frequently than simulated road networks (Dyer et al. 2002).

MONTANE CORDILLERA ECOZONE

Eastern Continental Ranges (207)

The Montane Cordillera Ecozone occurs throughout much of British Columbia and a portion of southwestern Alberta (ESWG 1995). The extent of occurrence of boreal caribou overlaps with a small portion of the Eastern Continental Ranges Ecoregion in southwestern Alberta. The topography is rugged and mountainous to rolling (foothills) with intervening river valleys. Boreal caribou occur in the well forested foothill region. Dry sites are dominated by stands of lodgepole pine or lodgepole pine and black spruce. Higher elevations are dominated by mixed fir, spruce and lodgepole pine forests. Willow (*Salix spp.*) and dwarf birch meadows and grassy benches occur along river drainages. Aspen occurs throughout the foothills region on southfacing slopes (Edmonds and Bloomfield 1984). Mean annual precipitation is 600 - 800 mm in the Eastern Continental Ecoregion (ESWG 1995). Mean annual area burned by forest fire is 0.03% (NRCAN 2002).

Local Caribou Populations

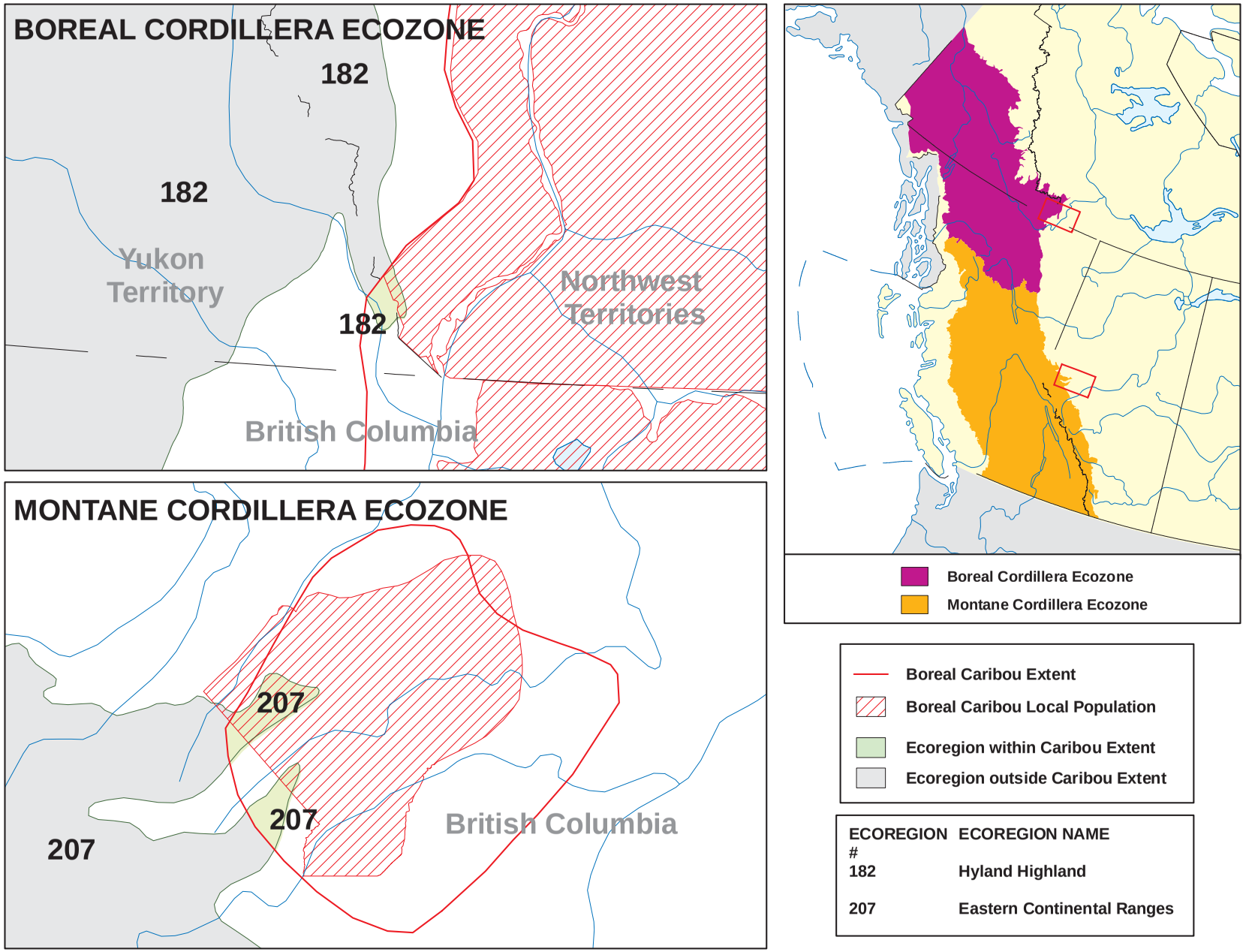
One local boreal caribou population occurs within the Montane Cordillera Ecozone, the Little Smoky, and its extent of occurrence overlaps with the Boreal Plains Ecozone.

Broad Scale Caribou Habitat

The Little Smoky population spends the entire year in the subalpine and upper foothill regions (Edmonds 1988). In west-central Alberta, boreal caribou are associated with open, pine-dominated forests greater than 80 years of age (Thomas et al. 1996, Szkorupa 2002). In west-central Alberta, terrestrial lichens are most abundant in older semi-open lodgepole pine stands (Szkorupa 2002).

Year Round Habitat

Radio-collared caribou in the Little Smoky River area were predominantly in dry, upland lodgepole pine, mixed conifer lodgepole pine/ black spruce and treed muskeg (Johnson 1980, Edmonds1993). Year round, caribou avoided areas with a large proportion of cutblock at the 1-km scale (Neufled 2006). White spruce and large rivers were negatively selected at all scales during all seasons. Terrestrial lichens are negatively associated with white spruce (Saher 2005) and rivers and white spruce provide good habitat for wolves (Neufled 2006). Caribou also strongly avoided aspen dominated stands in all seasons, presumably because aspen stands support other alternate ungulate prey species and have very low lichen availability (Neufeld 2006).



Appendix 6.3 - Figure 6. Boreal caribou distribution within the Montance Cordillera Ecozone.

Calving Habitat

Caribou in the Little Smoky population avoided areas closer to seismic lines, and showed the strongest response to seismic lines during non-winter (Neufeld 2006). During the spring and summaer, caribou selected areas habitat closer to cutblocks. The proportion larch within 1-km^2 was a significant predictor of caribou occurrence during winter and spring (Neufeld 2006).

Post-calving Habitat

During summer, caribou avoided areas with larger proportions of dominant conifer stands (increasing homogeneity; Neufled 2006).

Winter Habitat

The proportion larch within 1-km^2 was a significant predictor of caribou occurrence during winter (Neufled 2006). Caribou selected locations with a greater proportion of pine forests at the 1-km^2 scale during the winter (Neufled 2006).

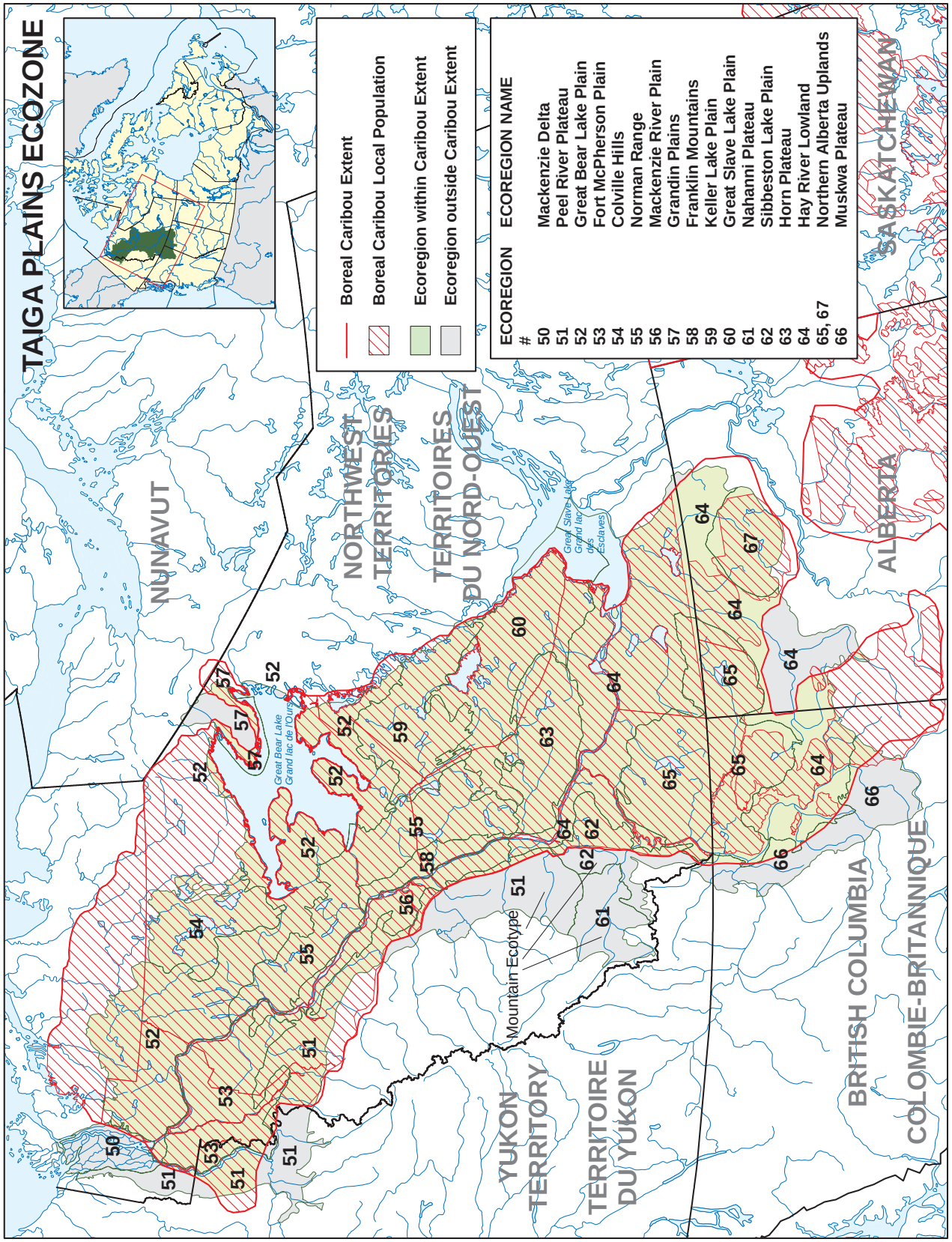
TAIGA PLAINS ECOZONE

Mackenzie Delta, Peel River Plateau, Great Bear Lake Plain, Fort McPherson Plain, Colville Hills, Norman Range, Mackenzie River Plain, Grandin Plains, Franklin Mountains, Keller Lake Plain, Great Slave Lake Plain, Sibbeston Lake Plain, Horn Plateau, Hay River Lowland, Northern Alberta Uplands, Muskwa Plateau (50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 62, 63, 64, 65, 66, 67).

The Taiga Plains Ecozone occurs in southwestern Northwest Territories, northeastern British Columbia, and northern Alberta (Figure 7). This Ecozone is bordered by Great Bear and Great Slave Lakes and is dominated by the Mackenzie River and its tributaries. The topography is generally flat to gently rolling. The landscape is dominated by peatlands, interspersed with coniferous, mixed-wood and deciduous uplands and riparian habitat. Black spruce forests with an understory of bearberry, mosses and sedges dominate the Ecozone. Uplands consist of mixedwood forests of white and black spruce, lodgepole pine, tamarack, white birch, trembling aspen, and balsam poplar (ESWG 1995). Shrub communities are numerous, consisting of dwarf birch, Labrador tea (*Rhododendron groenlandicum*) and willow. Small lakes under 1 ha are numerous throughout the landscape. Mean annual precipitation ranges from 200 – 500 mm (ESWG 1995). Mean annual area burned by forest fire is 0.44% (NRCAN 2002).

Local Caribou Populations

Six local boreal caribou populations occurring within the Taiga Plains are described in the literature. The extent of occurrence of some of these local populations overlaps with the Boreal



Appendix 6.3 - Figure 7. Boreal caribou distribution within the Taiga Plains Ecozone.

Plains Ecozone. The following local populations are reported in the habitat use literature: Bistcho, Maxhamish, Calendar, Snake-Sahtahneh, Steen River, and Caribou Mountains.

Broad-Scale Caribou Habitat

Caribou habitat in the Taiga Plains is described as large patches of spruce peatland (Culling et al. 2006) and lowland black spruce forests with abundant lichens (Gunn et al. 2002). Gunn et al. (2004) compared a Deh Cho First Nations database of harvest kill sites in living memory with caribou sightings from an aerial survey in March 2002 to determine that boreal caribou occupation did not change at the regional level. Boreal caribou were strongly associated with black spruce and lichen on uplands and in lowlands.

Seasonal Habitat and Forage

Year Round Habitat

In the Caribou Mountains of northeastern Alberta, caribou selected peatlands over uplands and edge habitat (McLaughlin et al. 2005). Within peatlands, bogs were selected over fen and bogs were selected if proportion of bog to non-peatland habitat was >30% (Schneider et al. 2000). Non-peatlands were avoided in landscapes where the proportion of non-peatland was >50% and use of non-peatland diminished with distance from peatlands (Schneider et al. 2000).

Calving Habitat

In the Trout Lake area of Northwest Territories (NT), female caribou were widely dispersed during the calving season and were typically found in groups of one to two animals (Larter and Allaire 2006). Larter and Allaire (2006) found high fidelity to calving area among years. In the lower Mackenzie River Valley, NT, caribou selected open conifer forests, tussock tundra, low shrub, riparian, recent burns, and south and west aspects (Nagy et al. 2006). Caribou avoided closed mixed forests, water, and north and east aspects. In the Snake-Sahtaneh watershed, BC, caribou were observed in small islands of mature black spruce or mixed wood within peatlands, in old burns at the edge of wetlands, in alder thickets with abundant standing water, and on lakeshores (Culling et al. 2006). Caribou showed high fidelity to calving sites (within 14.5 km) among years (Culling et al. 2006).

Post-calving Habitat

In the lower Mackenzie River Valley, NT, caribou selected open coniferous forests with abundant lichens, low shrub, riparian, tussock tundra, sparsely vegetated habitat, recent burns and west aspects and avoided closed deciduous and mixed forests (Nagy et al. 2006). Caribou in the Snake-Sahtaneh watershed, BC, used old burns and remnant unburned forest patches within the perimeter of old burns during late spring and early summer (Culling et al. 2006). In the Caribou Mountains of northwestern Alberta, caribou avoided forest stands <10 years old during summer (Dalerum et al. 2007).

Rutting Habitat

In the Trout Lake area of Northwest Territories, caribou group size and daily movement rates increased during rutting season (Larter and Allaire 2006). In the lower Mackenzie River Valley, NT, caribou selected open coniferous and mixedwood forests, low shrub, riparian, tussock tundra, recent burns and west aspects and avoided closed deciduous and avoided mixed forests, water, and north and west aspects (Nagy et al. 2006). In the Snake-Sahtaneh watershed, BC, caribou used open conifer, regenerated burns and sparsely vegetated areas during the rutting season (Culling et al. 2006). Rutting was distributed within core habitats throughout the study area, and fidelity to particular rutting areas was strong for some but not all caribou.

Winter Habitat

In the Trout Lake area of Northwest Territories, group size and movement rate was largest during winter; typical group size was 10 – 15 animals (Larter and Allaire 2006).

Early Winter Habitat

During early winter, caribou in the lower Mackenzie River Valley, NT selected open coniferous and mixedwood forests, low shrub, riparian, water and avoided closed spruce, closed deciduous and mixed forests, tall shrub north, west, and east aspects (Nagy et al. 2006). In the Snake-Sahtaneh watershed, BC, caribou were commonly observed on lakes and along lakeshores as well in fens (Culling et al. 2006).

Mid Winter Habitat

During mid winter, caribou in the lower Mackenzie River Valley, NT selected open coniferous forests with abundant lichens and riparian habitat and avoided closed spruce, open conifer forest without abundant lichens, closed deciduous and mixed wood, open mixed forest, low shrub, tall shrub, dwarf shrub, riparian, tussock tundra, water, sparsely vegetated habitat and east aspect (Nagy et al. 2006).

Late Winter Habitat

During late winter, caribou in the lower Mackenzie River Valley, NT selected open coniferous and mixed forests, riparian habitat and water and avoided closed deciduous and mixed forest, tall shrub, dwarf shrub, sparsely vegetated habitat and recent burns (Nagy et al. 2006). In the Deh Cho region, NT, caribou selected black spruce-lichen forest, fire regenerated, sparsely vegetated habitat, sphagnum moss with scattered spruce, herbaceous and tall shrub habitat (Gunn et al. 2004).

BOREAL CORDILLERA ECOZONE

Hyland Highland ecoregion (182)

The Boreal Cordillera Ecozone spans northern British Columbia and southern Yukon (Figure 1). The extent of occurrence of boreal caribou overlaps with a small portion of the Hyland Highland Ecoregion bordering British Columbia and the Yukon (Figure 6). The topography is rugged to rolling with flat-topped summits and wide valleys. Dry sites are dominated by stands of white spruce and lodgepole pine, white birch and aspen. Wetter sites are dominated by open stands of black spruce and white spruce with an understory of lichen and moss. Bogs, fens, and shrub meadows occur throughout the ecoregion. Annual precipitation is 300 – 600 mm (ESWG 1995). Mean annual area burned by forest fire is 0.41% (NRCAN 2002).

Local Caribou Populations

One local boreal caribou population occurs within the Boreal Cordillera Ecozone, the *Deh Cho*, and its extent of occurrence overlaps with the Taiga Plains Ecozone.

Broad-Scale Caribou Habitat

Caribou habitat in the Boreal Cordillera is described as large patches of spruce peatland (Culling et al. 2006) and lowland black spruce forests with abundant lichens (Gunn et al. 2002). Gunn et al. (2004) compared a Deh Cho First Nations database of harvest kill sites in living memory with caribou sightings from an aerial survey in March 2002 to determine that boreal caribou occupation did not change at the regional level. Boreal caribou were strongly associated with black spruce and lichen on uplands and in lowlands.

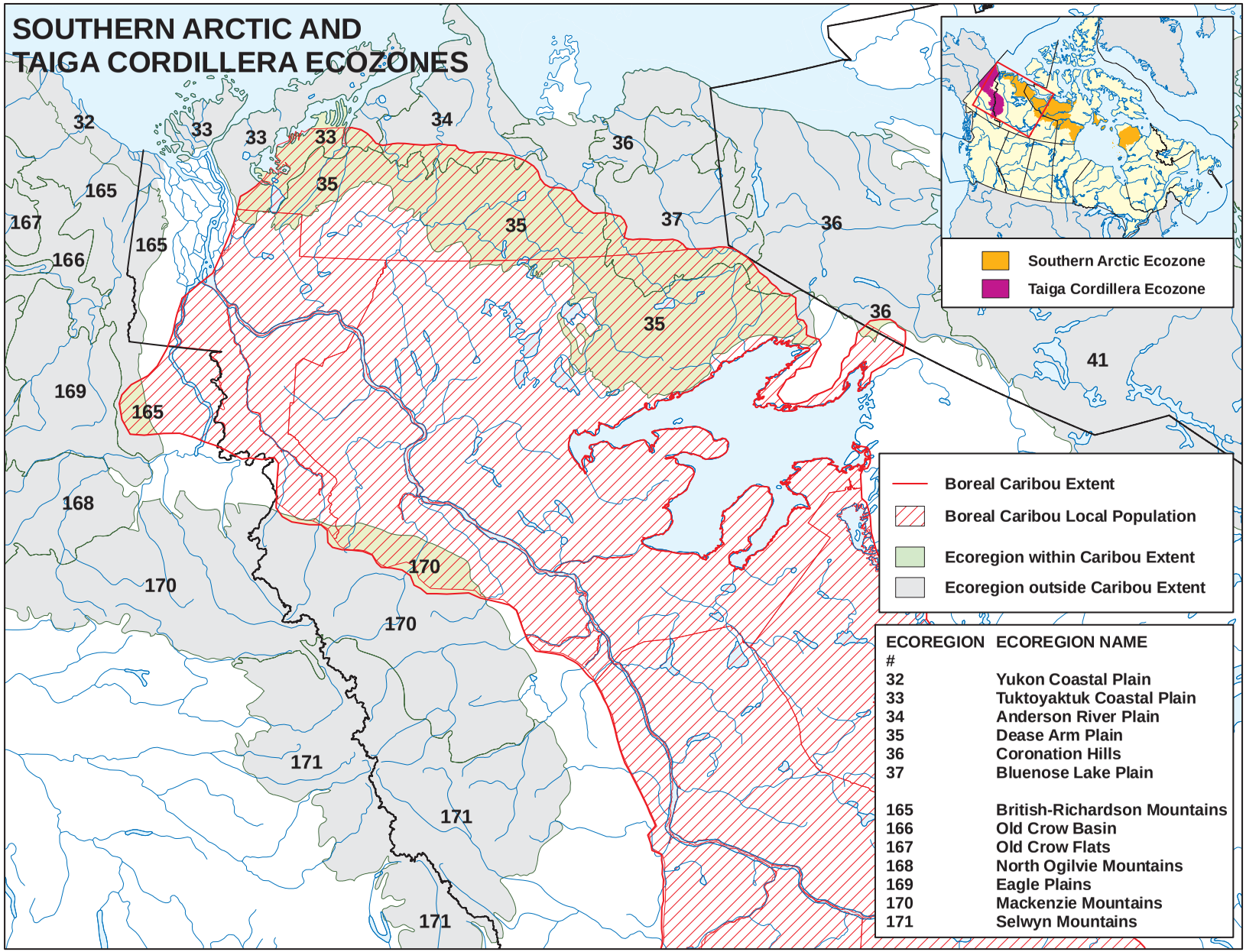
Seasonal Habitat and Forage

Year Round Habitat

Year round, the Deh Cho caribou selected open coniferous forest with abundant lichesn and avoided deciduous or mixed forest (Nagy et al. 2006). Gunn et al. (2004) found a strong relationship between caribou probability of occurrence and proportion of black-spruce/lichen within 10 X 10 km cells. Relatively strong relationships were found between the probability of caribou occurrence and the proportion of sphagnum moss, the proportion of tall shrub and herbaceous habitat, and lower proportions of fire-regeneration habitat. Presence of bison and moose reduced the probability of boreal caribou presence (Gunn et al. 2004)..

Calving Habitat

Deh Cho caribou selected open conifer forests, tussock tundra, low shrub, riparian, recent burns, and south and west aspects (Nagy et al. 2006). Caribou avoided closed mixed forests, water, and north and east aspects.



Appendix 6.3 - Figure 8. Boreal caribou distribution within the Southern Arctic and Taiga Cordillera Ecozones.

Post-calving Habitat

Deh Cho caribou selected open coniferous forests with abundant lichens, low shrub, riparian, tussock tundra, sparsely-vegetated habitat, recent burns and west aspects and avoided closed deciduous and mixed forests (Nagy et al. 2006).

Rutting Habitat

Deh Cho caribou selected open coniferous and mixedwood forests, low shrub, riparian, tussock tundra, recent burns and west aspects and avoided closed deciduous and avoided mixed forests, water, and north and west aspects (Nagy et al. 2006).

Early Winter Habitat

During early winter, *Deh Cho* caribou selected open coniferous and mixedwood forests, low shrub, riparian, water and avoided closed spruce, closed deciduous and mixed forests, tall shrub and north, west, and east aspects (Nagy et al. 2006).

Mid Winter Habitat

During mid winter, *Deh Cho* caribou selected open coniferous forests with abundant lichens and riparian habitat and avoided closed spruce, open conifer forest without abundant lichens, closed deciduous and mixedwood, open mixed forest, low shrub, tall shrub, dwarf shrub, riparian, tussock tundra, water, sparsely-vegetated habitat and east aspect (Nagy et al. 2006).

Late Winter Habitat

During late winter, *Deh Cho* caribou selected open coniferous and mixed forests, riparian habitat and water and avoided closed deciduous and mixed forest, tall shrub, dwarf shrub, sparsely-vegetated habitat and recent burns (Nagy et al. 2006). Caribou selected black spruce-lichen forest, fire-regenerated, sparsely-vegetated habitat, sphagnum moss with scattered spruce, herbaceous and tall shrub habitat (Gunn et al. 2004).

SOUTHERN ARCTIC ECOZONE

Tuktoyaktuk Coastal Plain, Anderson River Plain, Dease Arm Plain, Coronation Hills, and Bluenose Lake Plain Ecoregions (33, 34, 35, 36, 37)

The Southern Arctic Ecozone occurs in the northern region of Northwest Territories (Figure 8). Although this Ecozone covers land on either side of Hudson Bay, only the extreme western portion of the Ecozone overlaps with boreal caribou extent of occurrence (Figure 1). The topography is rolling uplands and lowlands, interspersed with many lakes, ponds and wetlands. This Ecozone is a transition from taiga and arctic tundra vegetation. Major river

valleys can support clumps of stunted spruce trees, and shrub communities throughout the Ecozone consist of dwarf birch, willow, and heath species. Wetlands support sedge-moss communities. Mean annual precipitation is approximately 200 mm in the northwest (ESWG 1995). Mean annual area burned by forest fire is 0.03% (NRCAN 2002).

Local Caribou Populations

No local boreal caribou populations occurring within the Southern Arctic Ecozone are described in the literature. Further research is needed to describe boreal caribou habitat use in this Ecozone.

TAIGA CORDILLERA ECOZONE

British Richardson Mountains and Mackenzie Mountains Ecoregions (165, 170)

The Taiga Cordillera Ecozone occurs along the northernmost extent of the Rocky Mountains, and covers most of the northern portion of the Yukon and the northwestern portion of Northwest Territories (Figure 8). Steep mountainous topography, foothills and basins dominate throughout the Ecozone. Wetlands and peatlands dominate the landscape. Vegetation ranges from low shrubs, mosses and lichen of the arctic tundra, to dwarf shrubs, lichens and saxifrages of alpine tundra, and white spruce and white birch of taiga woodland. Annual precipitation ranges from 300 – 700 mm (ESWG 1995). Mean annual area burned by forest fire is 0.06% (NRCAN 2002).

Local Caribou Populations

No local boreal caribou populations occurring within the Taiga Cordillera Ecozone are described in the literature. Further research is needed to describe boreal caribou habitat use in this Ecozone.

SUMMARY

Throughout their distribution in Canada, boreal caribou are associated with mature and late seral-stage upland and lowland conifer forests and peatland complexes. Terrestrial lichens are common winter forage for boreal caribou, and lichens are most abundant in open- to mid-density mature conifer stands and peatlands. During snow-free seasons caribou forage on a much broader array of plants including grasses, sedges, herbaceous plants and lichens.

The primary anti-predator strategy that boreal caribou employ is spacing out from predators and spatially separating themselves from alternative prey (Bergerud 1996). Consequently, boreal caribou require large, contiguous tracts of habitat to maintain low population densities across their range. The use of muskeg habitat and mature conifer forests allow caribou to spatially separate themselves from the other common boreal and sub-boreal ungulates, moose and white-tailed deer (*Odocoileus virginianus*).

During the calving and post-calving season, cows are sparsely distributed on the landscape and are usually found alone with a calf. Fidelity to calving sites seems to vary among individual caribou; some caribou return to the same site in consecutive years, some have calving locations separated by several hundred kilometers in subsequent years, and many return to a general area within their range (e.g. within 10 km). Females will travel several hundred kilometers to these general areas, and they constitute a small portion of the overall range.

Across their distribution, cows select treed muskegs with open water. The presence of open water is hypothesized to reduce predation risk by affording a quick escape through water (Bergerud 1996). In the Boreal Shield Ecozone, caribou cows also select mature open conifer on shorelines and peninsulas of large lakes and shorelines of Islands in large lakes for calving habitat.

During the rutting season, boreal caribou congregate in small groups in open peatlands or open mature or young conifer forests. In winter, caribou forage in mature open conifer forests and treed peatlands. Where large lakes occur, caribou forage along the shoreline and use the frozen lakes to escape from predators. In severe winters, caribou may select dense old-growth conifer forests where snow depths are lower than in open conifer forests. In regions where snow conditions are severe, such as the Taiga Shield, caribou form groups to crater for terrestrial lichens, graminoids or equisetum. Where snow depth and hardness exceed the ability of caribou to crater through the snow, caribou seek glacial erratics or windswept areas to find lichens.

Caribou generally avoid shrub-rich habitats, disturbed or fragmented areas, hardwood-dominated or mixed stands and edge habitat that may support higher alternative prey populations, and consequently, higher predator populations.

Boreal caribou evolved an adaptation to dynamic forest ecosystem conditions in which forest fire is the dominant cause of habitat disturbance and renewal. Forest fires vary in frequency

and magnitude throughout the boreal forest of Canada, and boreal caribou populations shift their range over time in response to fire-induced changes in habitat quality. Consequently, boreal caribou require relatively large ranges to compensate for portions of the range in early seral stages.

Boreal caribou require habitat conditions that allow them to meet their life history requirements, such as adequate forage quality and quantity to allow breeding and recruitment of calves and large enough tracts of preferred habitat to allow spatial separation from predators and alternative prey throughout the year. Travel corridors linking seasonal habitats fulfill a potentially critical function in reducing risk of predation for boreal caribou during times of increased movement and travel corridors between population ranges may allow for demographic rescue of small populations by providing a source of immigrants.

Although caribou may select certain habitat types within their range to meet specific seasonal requirements, habitat conditions over their entire range impact the viability of boreal caribou populations. The habitat conditions within the matrix habitat beyond the core caribou habitat may have significant impacts on the risk of predation to boreal caribou. Consequently, although special management practices may be required to protect or perpetuate seasonal foraging habitats, calving habitats, and migration corridors, it is also important to manage the surrounding habitats to reduce the risk of predation, even if the caribou rarely or never "use" those habitats.

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