INTERIM OIL AND GAS INDUSTRY GUIDELINES FOR BOREAL CARIBOU RANGES IN NORTHEASTERN BRITISH COLUMBIA

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EXECUTIVE SUMMARY

On June 1, 2004, all sections of the *Species at Risk Act* (SARA 2002) came into force, providing legal protection for critical habitats for SARA-listed species, including boreal ecotype woodland caribou (*Rangifer tarandus caribou*). Little is currently known of the provincial distribution and status of boreal caribou. An ongoing GPS telemetry study in the Snake-Sahtaneh watersheds, east of Fort Nelson, represents the first effort to document boreal caribou habitat use and ecology in British Columbia. The study was initiated in 1999 as a joint project between BC Environment and Slocan Forest Products Ltd. (Canfor) – Fort Nelson. Since 2003, partial funding has been contributed by the Oil and Gas Commission (OGC) Science and Community Environmental Knowledge Fund (SCEK). Preliminary results of the Snake-Sahtaneh study and a second boreal caribou research project, initiated in 2004 by the BC Ministry of Water, Land and Air Protection (MWLAP), indicate habitat use and demographics are comparable to populations in northern Alberta.

Development of a range map, identifying potential areas of critical boreal caribou habitat within British Columbia was undertaken in cooperation with MWLAP. Thirteen *core habitats* were defined within 4 *ranges*; an additional 2 core habitats were identified but are not currently associated with any range.

Interim oil and gas industry best practices were developed for the OGC based on initial results of the Snake-Sahtaneh study, as well as research and management guidelines from adjacent jurisdictions. The best practices apply to identified boreal caribou ranges and core habitats within northeastern BC. The primary focus of these guidelines is to reduce the direct and indirect industrial footprint in occupied caribou habitat by avoiding disturbance wherever possible. While the best practices are specific to the oil and gas sector, many concepts, such as access coordination and timing of activities to be least disruptive to boreal caribou, are applicable to other resource users.

The interim boreal caribou guidelines are designed to be compatible with the OGC's application review process. This approach relies on the interim guidelines – along with input of qualified independent specialists when required – to provide clear guidance to proponents, and to allow OGC reviewers to focus their efforts on applications where boreal caribou concerns cannot be readily addressed using best practices.

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INTRODUCTION

In May 2002, the *Committee on the Status of Endangered Wildlife in Canada* (COSEWIC) confirmed the ranking of the Boreal population of woodland caribou (*Rangifer tarandus caribou;* hereafter boreal caribou) as *threatened* (COSEWIC 2002). This designation is assigned to species likely to become endangered if limiting factors are not reversed. Within British Columbia, boreal caribou are restricted to the Boreal Plains and Taiga Plains ecoprovinces, in the northeastern corner of the province. Provincially these caribou are defined as *boreal ecotype* and are blue-listed by the Conservation Data Centre (CDC 2002). As of June 1, 2004, all sections of the federal Species at Risk Act (SARA 2002) came into force, providing legal protection for critical habitats of SARA-listed species, including boreal caribou. The intent of SARA is to "protect critical habitat as much as possible through voluntary actions and stewardship measures" (SARA Public Registry 2003), thus presenting resource users with occasion to examine and refine current practices to minimize potential impacts.

In response to intensive oil and gas industry activity occurring in boreal caribou habitat in British Columbia, the Oil and Gas Commission (OGC) requested the development of interim oil and gas industry operating guidelines. Little is currently known about the distribution and status of individual populations of boreal caribou in BC, therefore it was necessary to create a range map identifying potential areas of critical caribou habitat to which the guidelines should apply. This task was accomplished in cooperation with the BC Ministry of Water, Land and Air Protection (MWLAP).

Following delineation of boreal caribou *ranges* (i.e., areas of occupied habitat) and *core habitats* within ranges, best practices guidelines for operating within these areas were established. The primary focus of the guidelines is to reduce the industrial footprint in occupied caribou habitat by avoiding disturbance wherever possible. While the guidelines are specific to the oil and gas sector, many concepts, such as access coordination and timing of activities to be least disruptive to caribou, are applicable to other resource users.

The best practices recommended were drawn from a variety of sources, including the Fort Nelson and Fort St John Land and Resource Management Plans (LRMP), documents produced by the OGC, and guidelines developed for adjacent jurisdictions. As boreal caribou in British Columbia are contiguous in their distribution with northern Alberta populations, particular emphasis was given to strategies and guidelines produced by Alberta's Boreal Caribou Committee (BCC 2001) and research conducted by the associated Boreal Caribou Research Program (BCRP). The BCC is represented by government and industry and has been working cooperatively to address land-use issues in boreal caribou habitat for several years. Numerous petroleum companies have operations based in both jurisdictions, therefore the objectives of many of the proposed best practices for British Columbia will be familiar.

British Columbia has recently struck a Boreal Caribou Technical Advisory Committee (BCTAC), charged with the task of developing a *Boreal Caribou Recovery Strategy* in accordance with SARA. The conservation approach and principles of the draft Recovery Strategy (BCTAC 2004) were considered during both the identification of ranges and development of best practices guidelines.

A further source of information used to generate best practices guidelines was boreal caribou research both within British Columbia and in adjacent jurisdictions. An ongoing boreal caribou habitat use and ecology study in the Snake and Sahtaneh watersheds, east of Fort Nelson, was initiated in 1999 as a joint project between BC Environment and Slocan Forest Products Ltd. Since 2003, the project has received partial funding from the OGC Science and Community Environmental Knowledge Fund (SCEK). This GPS telemetry study represents the first effort to document boreal caribou ecology in British Columbia. Preliminary results of caribou habitat use

and demographics suggest research from northern Alberta has broad applicability to BC populations. A second project, initiated in late winter 2004 by MWLAP, with funding contributed by the BC Ministry of Energy and Mines (MEM), fitted GPS collars on 12 boreal caribou within the newly-defined Chinchaga Range.

Innovative best practices have the potential to significantly reduce the direct and indirect industrial footprint within boreal caribou habitat. The Canadian Association of Petroleum Producers (CAPP) notes a reduction in seismic line width from an average of 6-8 metres in the 1980's to less than 3 metres today (CAPP 2003; McManus *et al*. 2004). As approximately 70 percent of the oil and gas industry footprint in Canada is attributable to geophysical seismic exploration (CAPP 2003), such footprint reductions are encouraging. However, concurrent with these advances in techniques and procedures is the acceleration and expansion of petroleum development within boreal caribou habitat in British Columbia. Dunford (2003) notes that mitigation measures, such as reclamation of past disturbances and implementation of best practices, may be "overwhelmed" by the magnitude and duration of development in caribou habitat. The challenge for government and industry is to find a balance that permits resource development opportunities while maintaining viable boreal caribou populations.

These best practices guidelines are interim in nature, and will require refinement as resource development technologies evolve and more information is obtained on the distribution and population status of British Columbia's boreal caribou. In contrast to woodland caribou ecotypes that inhabit mountainous regions and are readily observed by surveying alpine complexes in late winter, boreal caribou population monitoring requires the use of radio-telemetry. Available telemetry data is currently limited to the Snake-Sahtaneh area, therefore a conservative approach was adopted to delineate other ranges. As knowledge gaps are addressed through telemetry studies, boundaries of some ranges and core habitats may be reduced.

Section 2.2.2.2 of the Fort Nelson Land and Resource Management Plan (LRMP), drafted in 1997, describes the Etsho Resource Management Zone (RMZ) as having "healthy" populations of large carnivores and ungulates. A 2004 perspective indicates this is not the case for boreal caribou. The Etsho RMZ encompasses a large portion of boreal caribou distribution within British Columbia and is assigned to the *Enhanced Resource Development* category, which "gives direction to manage land for the oil and gas, mineral and timber resources" (Fort Nelson LRMP 1997). While both the Fort St. John and Fort Nelson LRMPs were consulted in the development of these guidelines, directives for land use in highly industrialized RMZs must be balanced with the conservation requirements of a species at risk.

The interim boreal caribou guidelines are designed to be compatible with the OGC's application review process, and with the cumulative effects screener currently being developed for OGC reviewers. These interim guidelines – along with input of qualified independent specialists as required – are designed to provide clear guidance to proponents, and to allow OGC reviewers to focus their efforts on applications where boreal caribou concerns cannot be readily addressed using best practices.

Document Format

The document is divided into two sections. Part I provides background information on boreal caribou in British Columbia, summarizes preliminary results of the Snake-Sahtaneh study, and describes the range delineation process. Part II presents recommended best practices and the screener review process.

PART I

BOREAL CARIBOU
IN
BRITISH COLUMBIA

PART 1: BOREAL CARIBOU IN BRITISH COLUMBIA

STATUS OF BOREAL CARIBOU IN BRITISH COLUMBIA

Boreal caribou populations are listed as threatened throughout their range in the Boreal National Ecological Area (NEA; COSEWIC 2002). Recent boreal caribou investigations conducted in northern Alberta indicate that most monitored herds are declining, with predation recognized as the proximate cause (Dunford *et al*. 2003; McLoughlin 2003). Bergerud (1996) describes *ultimate* factors as those that "drive survival in an evolutionary sense," in contrast to *proximate* factors, which are "behaviour and physiological influences that modify ultimate factors." As boreal caribou have evolved within a complex predator-prey system, the ultimate cause of decline has been attributed to habitat alteration that disrupts anti-predator strategies. Therefore, the likelihood of decline appears to increase as the amount of clearings, linear corridors, and burned areas in caribou range increases.

British Columbia's boreal caribou are dispersed at low densities throughout the large peatlands or "muskeg" complexes of the northeast. The remoteness of this vast area, coupled with inherent difficulties in censusing boreal caribou (Thomas 1998, Stuart-Smith *et al.* 1997), has contributed to the lack of information on the ecotype's distribution, population status, and habitat use. While ungulate inventories have been conducted within occupied boreal caribou habitat in British Columbia in the past (Stewart 1975, Backmeyer 1990), low numbers of caribou were reported, presumably due to sightability problems mentioned. A previous population estimate of 725 animals (Heard and Vagt 1996) was based on a best guess by regional experts. In February 2004, the Environmental Stewardship division of MWLAP conducted an aerial inventory of Management Units 7-55 and 7-56 to estimate moose (*Alces alces*) and caribou populations and determine population composition, assess the extent of boreal caribou habitat, and identify areas of concentrated caribou use (Backmeyer 2004). Based on results of this inventory, the estimate of the provincial boreal caribou population has been revised to approximately 1,500 animals. Given the low confidence levels of such estimates, the current focus of boreal caribou management is ongoing monitoring of radio-collared animals to track demographic indices such as population structure, pregnancy rates, calf survival and recruitment, and adult mortality, and to document caribou response to mitigation and management measures (D. Hervieux pers. comm., Thomas 1998).

SNAKE-SAHTANEH BOREAL CARIBOU HABITAT USE AND ECOLOGY STUDY

The *Snake-Sahtaneh Boreal Caribou Habitat Use and Ecology Study* has employed global positioning system (GPS) telemetry to monitor habitat use, movements, and demographics of a total of 57 individual adult female caribou from 1999 to the present. In 2003, the study objectives were expanded to investigate movements and habitat use of grey wolves (*Canis lupus*) and black bears (*Ursus americanus*) during the caribou calving and post-natal period. The project's field component is scheduled for completion in November 2004, with final reporting to be delivered in March 2005. For the purposes of this document, discussion of preliminary findings of the study will be restricted to presenting information of direct relevance to the development of the interim guidelines.

Initial results from the Snake-Sahtaneh study confirm that boreal caribou research findings from northern Alberta are directly applicable to northeastern British Columbia, including high pregnancy rates and calf production and low recruitment (McLoughlin *et al.* 2003); use of treed peatlands (Anderson 1999) and burned areas (Dunford 2003), and potential impacts to predator-prey dynamics in highly industrialized landscapes (Dyer 1999, James 1999, Dzus 2002). In the annual review of the BCRP findings, McLoughlin (2003) states that most of Alberta's boreal caribou

populations are declining at “disconcerting” rates. Demographic data from the Snake-Sahtaneh study suggests that long-term decline of these caribou is also likely.

Results of the Snake-Sahtaneh study indicate the peak of calving occurs approximately May 17. Back-calculation based on a 228-day gestation period (Shackleton 1999) places the peak of the rut at October 2, with the second oestrous cycle occurring during the third week of October. This is consistent with dates recorded throughout boreal caribou range (Rettie and Messier 2000, Arsenault 2003, Mahoney and Virgl 2003). The majority of caribou were still congregated in rutting groups in the last week of October during the 2002 and 2003 fall calf survival surveys.

The Snake-Sahtaneh caribou exhibit high pregnancy rates (average 95.5% between 2002-2004; *n* = 45), but very low post-natal calf survival and recruitment to 12 months. Results of spring calf survival surveys, conducted in late June 2002 and 2003, revealed an average of less than 20 calves per 100 cows by 45 days post-calving. Survival continued to decline through fall and winter to 5.4 and 8.9 calves per 100 cows by March 2003 and 2004, respectively (Table I-1). In most Alberta boreal caribou ranges, calf recruitment to March averages roughly 20 calves per 100 cows (McLoughlin 2003).

Table I-1. Summary of boreal caribou calf survival for the Snake-Sahtaneh study area, 2002 to 2004.

Date	Calves Per 100 Cows		
	2002	2003	2004
May 25 (10 days after estimated peak of calving)	n/a	n/a	82*
June 04 (20 days after estimated peak of calving)	n/a	n/a	54
June 12 (28 days after estimated peak of calving)	n/a	n/a	45
June 30 (45 days after estimated peak of calving)	21	16	30**
Fall (October)	12	13	n/a
Late Winter (March)	5.4	8.9	n/a

* Adjusted to include only pregnant females and all calves estimated to have survived to 5 days of age.
** 2004 results are subject to adjustment based on future confirmation of calf status for 2 collared females not found during the June 30th survey.

To determine whether calves were being born alive and gain insight into post-natal mortality factors, a series of 4 calf survival surveys were conducted between May 25 and June 30, 2004. Calf survival declined steadily to 30 calves per 100 cows by June 30, which is consistent with reports of highest calf mortality occurring early in the first month (Bergerud and Elliott 1986, Stuart-Smith *et al.* 1997). While the June 30, 2004 spring calf survey showed higher survival than in June 2002 and 2003, inter-annual variation is expected. The winter of 2003-2004 was mild, with green-up in early May. Decreased winter severity results in improved maternal condition during late pregnancy, and corresponding higher birth weights and increased calf survival (Arsenault 2003).

Adult survival appears to be high for the Snake-Sahtaneh population, which is consistent with research from northern Alberta (Stuart-Smith *et al.* 1997, McLoughlin *et al.* 2003). Of 57 individual females collared between 2000 and 2004, only 4 mortalities have occurred, including 1 case of confirmed wolf predation, 1 case of suspected black bear predation, and 2 of unknown cause. While this apparent high adult survival is positive from a short-term perspective, collapse of an aging population is inevitable in the absence of sufficient juvenile survival and recruitment. Therefore, the current demographics of the Snake-Sahtaneh caribou are unsustainable over the long-term.

While the reason for high adult survival but low calf survival in Snake-Sahtaneh caribou is undetermined, it may be the result of seasonal selection of prey species by wolves. Wolves are

more likely to hunt alone throughout spring and early summer (Bergerud *et al.* 1984, Culling and Culling, pers. obs.). Unlike moose, female caribou do not defend their calves (Bergerud *et al.* 1984, Seip 1991), so when a calf is selected in an attack by a lone wolf, the cow often escapes. Following the first 4 to 6 weeks post-calving, calf numbers drop to levels that make hunting inefficient and wolves shift to a more plentiful source of prey. Historically high beaver (*Castor canadensis*) populations in the Boreal Plains and Taiga Plains ecoprovinces provide an abundant, readily available food source for wolves during the spring and summer denning period. Wolf predation of beaver has been previously noted (James 1999, R. Woods pers. comm.) and preliminary results of the Snake-Sahtaneh study indicate wolves den adjacent to, and are closely associated with, beaver impoundments throughout summer and fall. In winter, caribou predation is often incidental, with wolves concentrating on their primary prey, moose. The abundance of alternate prey species in northeastern British Columbia allows wolf populations to remain high despite declines in individual prey species. Thus, wolf predation could result in localized extirpation of caribou populations, without a corresponding decline (i.e., numerical response) in wolf numbers (Seip 1991).

Historical information on predators and alternate prey species is limited, however beaver populations appear to have been high throughout northeastern BC. An ungulate survey conducted in February 1974 reported "very large numbers of beaver dams and lodges [observed] on nearly all creeks and lakes" in the Petitot River area (mapsheet 94P), with beaver dams and lodges abundant in the vicinity of Maxhamish Lake (mapsheet (94O). Wolves were not seen and little evidence of wolf activity was noted in either survey area. Forty-nine moose and 6 caribou and 101 moose and 5 caribou were recorded for mapsheets 94P and 94O, respectively (Stewart 1975). Wolf numbers appear to have increased considerably since the early 1970's, when wolf control measures were still being actively applied throughout the north. During the 2004 inventory of MU 7-55 and 7-56, 20 wolves were spotted and abundant sign noted throughout the survey area (MWLAP unpubl. data). Monitoring of radio-collared wolves in the Snake-Sahtaneh study area in 2003-04 revealed approximately 60 wolves in 6 packs. Based on preliminary monitoring data, a rough density estimate of 6.0 wolves per 1000 km² was calculated for the combined territories. Bergerud and Elliott (1986) suggest wolf densities in excess of 6.5 per 1000 km² can result in caribou declines.

Boreal caribou calves are preyed upon by other predators, including black bears and lynx (*Lynx canadensis*). Black bears are currently abundant in the Taiga Plains and Boreal Plains ecoprovinces. Initial GPS data from 9 collared black bears in the Snake-Sahtaneh study area indicates that while bears generally use riparian and upland habitats, they are also found in peatlands.

The Snake-Sahtaneh caribou move between areas of core habitat throughout the year. Seven core habitats, totalling 3,746 km², have been identified within the 11,980 km² Snake-Sahtaneh Range[1]. While GPS telemetry indicates that no seasonal migration occurs, caribou make frequent movements within and between areas of core habitat. The high degree of overlap of seasonal ranges exhibited by the Snake-Sahtaneh caribou has been reported for other boreal caribou populations (Darby 1979, Stuart-Smith *et al.* 1997). Effective caribou conservation requires measures to retain habitat quality within ranges, both within and between core habitats, and to allow free movement between areas. Roads may act as semi-permeable barriers to caribou movements, with effects possibly greater at the edge of peatland complexes (Dyer *et al*. 2002); therefore, access development within ranges is undesirable.

[1] The Snake-Sahtaneh study area has been estimated at 7,170 km^2 based on composite home ranges of collared caribou, to date. The broader *Snake-Sahtaneh Range*, defined on the basis of available habitat, is approximately 11,980 km² .

Snake-Sahtaneh caribou have been observed using remnant unburned areas within the perimeter of older wildfires on numerous occasions in late spring and early summer. During the February 2004 MWLAP inventory, caribou were sighted within the boundaries of the Midwinter Fire, which burned 40,000 hectares in the extreme northeast of the province in the summer of 2003 (Backmeyer unpubl. data). Boreal caribou use of burned areas has been previously reported (Darby and Pruitt 1991, Dunford 2003, Nagy *et al*. 2003).

Caribou use of water features is well documented, including use of lakes and wetlands in winter, and shorelines, islands and peninsulas during ice-free periods (Stardom 1977, Bergerud *et al*. 1984, Bergerud 1996, Cumming and Hyer 1998, Hillis *et al.* 1998, Arsenault 2003). Caribou use these features for refuge from predation throughout the calving and post-natal period. During spring calving surveys (2002-2004), Snake-Sahtaneh caribou were frequently located along lakeshores, including both larger bodies such as Clarke and Kotcho lakes, and small, scattered lake complexes. Distances measured from sighted caribou to the high-water mark typically ranged between 100 to 400 m. Groups of smaller lakes may provide more escape opportunities for caribou as well as increasing search time for wolves (Carruthers *et al*. 1986 *in* Bergerud 1996).

Throughout the course of the Snake-Sahtaneh study, numerous observations have been made of winter cratering along margins of small lakes and wetlands. Caribou frequently supplement their winter diet of lichens with "winter-green" vascular plants, which supply higher concentrations of protein, nitrogen, and phosphorus (Klein 1982). Nagy *et al.* (2003) report boreal caribou in the Lower Mackenzie Valley cratered through hard-crusted snow to forage on cured stalks of horsetail (*Equisetum* spp.) on lake margins and walked out onto frozen lakes to lick small mounds of mineral soil. The authors suggest that the latter sites were used as mineral licks. Waterbodies and shorelines also provide caribou with relief from insects (Darby and Duquette 1986). Extreme insect harassment can negatively affect energy expenditure and summer weight gain of both neonate calves and cows, which in turn, can influence future reproductive performance (Walsh *et al*. 1992).

As water features serve a variety of functions important to boreal caribou throughout the year, retention of their habitat values is important. Best practices are recommended to buffer lakes from development and prevent induced access for predators, as described in Part II.

Casual observation in northeastern British Columbia might suggest a close association of boreal caribou to linear corridors, particularly when artificially seeded ROWs or road salt provide attractants. Throughout the Snake-Sahtaneh study area and other northern oil and gas fields, caribou are frequently seen along conventional seismic lines, pipeline and utility corridors, and on leases (Culling and Culling, pers. obs.; Wynes 2001). James (1999) reported a general trend of caribou avoidance of linear corridors, but noted considerable variation among individuals. There are implications for caribou regardless of whether linear features are used or avoided. Avoidance results in a functional loss of habitat that exceeds the physical footprint of the feature, while use can increase vulnerability. Caribou that frequent areas in close proximity to linear corridors are subject to higher mortality, including predation by wolves and vehicle collisions. In northeastern Alberta, James (1999) found wolf locations within caribou range were closer to linear corridors than random, wolves moved 2.8 times faster along corridors than in forested areas, and locations of wolf-killed caribou were closer to corridors than those of live animals. During spring calf surveys in the Snake-Sahtaneh study area, lone wolves were seen in undisturbed peatlands on 2 occasions, with one animal found on a freshly killed caribou calf carcass. Wolves were also seen traveling along cutlines. As well, several black bears were observed within intact peatlands and on cutlines connecting upland and lowland habitats. It appears that predators have traditionally made forays into peatlands, but the presence of corridors may allow them to move more quickly and penetrate more deeply into these areas.

Industrial activity affects boreal caribou through habitat alteration that results in increased human access, increased predation pressure, impacts to habitat supply, and sensory disturbance. Given the low boreal caribou densities and abundance of peatland habitats in the Snake-Sahtaneh study area, and throughout northeastern British Columbia, reduction in forage availability is not likely to be directly limiting at present. However, if habitat alteration results in caribou foraging heavily on increasingly restricted areas, depletion of lichen resources may occur locally. This may ultimately result in decreased body condition, reproductive success, and calf survival (Vistnes and Nellemann 2001). As well, caribou may be at greater risk of predation when concentrated at higher densities (Vistnes and Nellemann 2001).

BOREAL CARIBOU RANGE DELINEATION PROCESS

Potential boreal caribou habitat includes all areas north and east of the Alaska Highway, excluding the Agriculture/Settlement Resource Management Zone defined in the Fort St. John LRMP. A small pocket of boreal caribou habitat on the west side of the highway, in the Parker Lake area, was also included. Range delineation was based on information derived from MWLAP inventory and historical data, preliminary results of the Snake-Sahtaneh study, telemetry data and reports from Alberta and the Northwest Territories, and local knowledge. Following compilation of this information, 2 reconnaissance fixed-wing flights were made in April and May 2004 to verify potential ranges by noting the presence of appropriate habitat and indications of caribou occupancy, such as incised trail networks. Finally, Ducks Unlimited Earth Cover mapping, derived from Landsat TM 7 imagery (DU 2003), was used to further refine polygons based on the distribution of treed peatland vegetation communities.

In the absence of more precise information, large river corridors were used as boundaries between ranges. In examining genetic diversity within 6 boreal caribou ranges in Alberta and BC, McLoughlin *et al.* (2004) reported a “region of relatively low gene flow corresponding with the valley of the Peace River.” While the Petitot, Fort Nelson, and Fontas river valleys would not be expected to present the same barriers as the Peace, higher populations of moose and wolves within their riparian corridors could conceivably limit caribou movements. If future telemetry indicates routine movements between these areas, range boundaries may need to be redefined.

The task of delineating boreal caribou range is consistent with direction provided by the Fort St. John and Fort Nelson LRMPs to identify and map medium and high capability caribou habitat. The area of potential distribution of boreal caribou within British Columbia was classified spatially into one of 3 categories, as follows:

- **RANGE (occupied habitat):**
  Broad areas of known historical or assumed current use that supply resources necessary to support local populations of boreal caribou. Relevant habitat characteristics of boreal caribou range include the availability of a lichen forage base, typically found within expanses of treed peatlands, and to a lesser extent, upland pine sites, with sufficient space to disperse at low densities over large areas. Ranges provide *critical habitat*, which is defined by SARA as "the habitat that is necessary for the survival or recovery of a listed species..." (SARA 2002). Ranges encompass adequate space to allow for periodic shifts in areas of activity due to local depletion of forage resources, disturbance, or stochastic events such as wildfire. Ranges also provide for movement between core habitats.

- **CORE HABITAT:**
  Areas of high current capability and suitability based on general habitat requirements (treed peatlands, terrestrial and arboreal lichen forage base) and documented occurrence. Areas with

suitable habitat and caribou observations are defaulted to core habitat; results of future radio-telemetry studies may result in amendments to the status or boundaries of some polygons.

- **TRACE OCCURRENCE:**
  Areas of low capability habitat but within the extent of potential boreal caribou distribution. Caribou may be present occasionally, but for management purposes these areas are considered unoccupied.

Figure I-1 illustrates the extent of boreal caribou distribution in British Columbia, including ranges and core habitats. Thirteen core habitats were defined within 4 ranges (Table I-2). Two additional core habitats, Prophet and Parker, were identified based on historical occupancy and suitable habitat, but are not currently associated with a range. A pocket of potential habitat, centred in the Stanolind Creek area northwest of Fort Nelson, was identified as an area of interest, but with current *status unknown*. These sites may be amalgamated into one of the current ranges as more information is obtained on the movements of local caribou herds.

While treed peatlands represent classic boreal caribou habitat, upland-dominated mosaics with pockets of treed peatlands are also used (Anderson 1999). The Calendar Range is representative of the former, with the entire range defaulted to core habitat due to the homogeneity of suitable habitat. The Maxhamish Range is more typical of the second type. To a lesser extent, boreal caribou also select upland pine sites for foraging in winter (Dzus 2001). Within the Chinchaga Range, winter use has been documented in large patches of lodgepole pine along the south slope of the Milligan Hills (MWLAP unpubl. data).

Density estimates for individual ranges were provided by MWLAP, based on results of the 2004 winter ungulate inventory of Management Units 7-55 and 7-56 (Backmeyer 2004). An overall average density of 3.1 caribou/100 km² (80% C.I.) was multiplied by the total range area to get a lower limit. An upper limit was calculated by stratifying core habitat areas (8.64 caribou/100 km²) and range areas outside of cores (0.44 caribou/100 km²). Population estimates represent the average of upper and lower limits for each range.

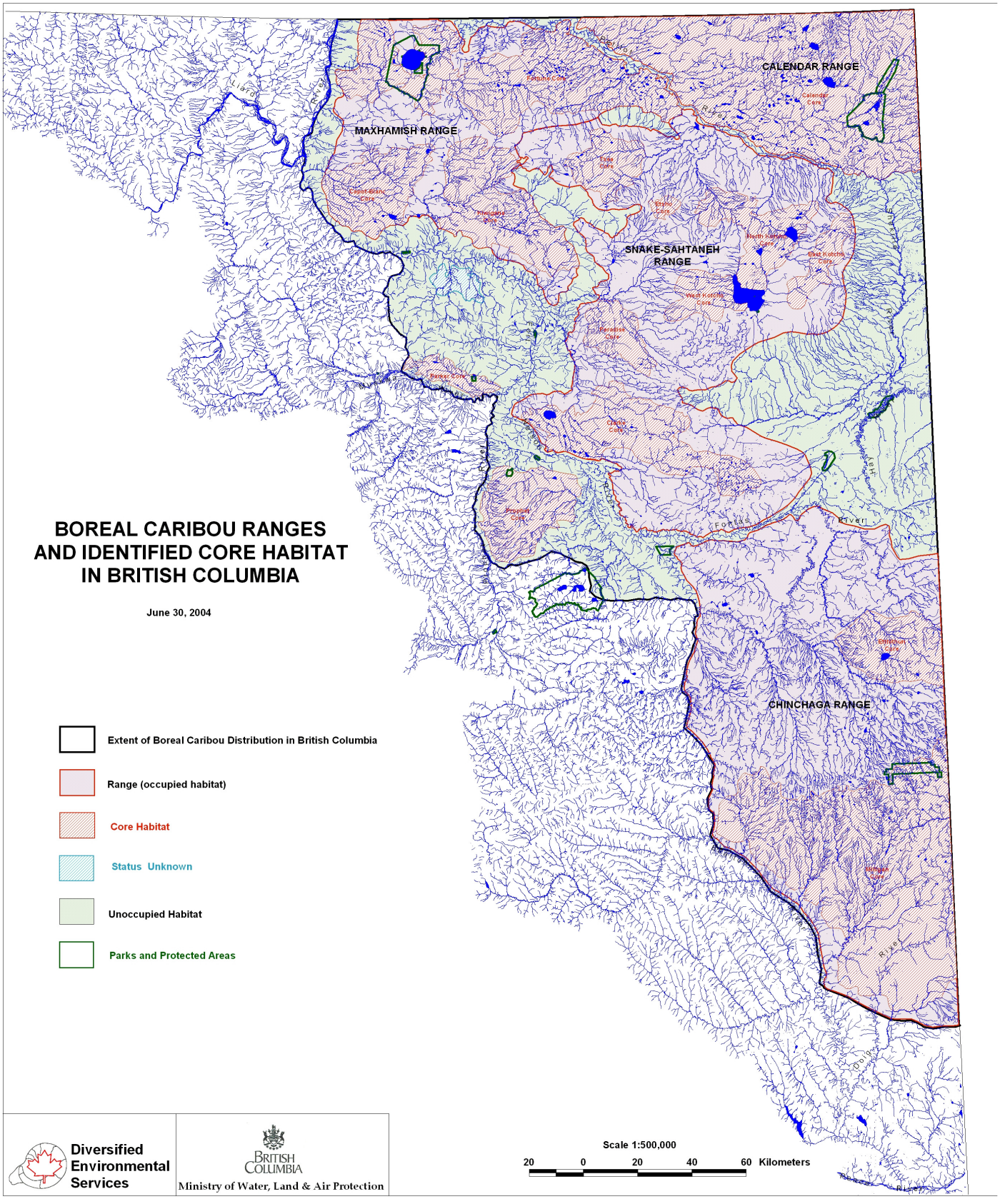

Figure I-1. Identified boreal caribou ranges and core habitats in northeastern British Columbia (reduced 70% from original).

Table I-2. Description of boreal caribou ranges and core habitats within northeastern British Columbia.

Range	Total Area of Range	Population Estimate for Range[1]	Core Habitat	Total Area of Core Habitat	Range Description
Chinchaga Range	13,979 km^2	483 (433-533)	Milligan Core	4,929 km^2	**Fort St. John LRMP:** Conroy RMZ (General Mgmt. Zone); Chinchaga RMZ (General Mgmt. Zone) - includes Milligan Hills Protected Area (7,226 ha) and Chinchaga Lakes Protected Area (1,389 ha); Osborne RMZ (General Mgmt. Zone); Jedney RMZ (Enhanced Resource Development Zone). **Rationale:** Ranges and core habitats based on data from Alberta telemetry, MWLAP inventory (Feb. 2004), Ring Border inventory (Jan. 1990), MWLAP GPS telemetry (2004), reconnaissance flight (April 2004), and frequent observations; contiguous with Alberta's "Chinchaga Range" (Dzus 2001). Range currently encompasses areas that may ultimately be excluded as more caribou distribution and habitat suitability information becomes available.
			Etthithun Core	822 km^2	
Snake-Sahtaneh Range	11,980 km^2	365 (359-371)	Clarke Core	1,381 km^2	**Fort Nelson LRMP:** Etsho RMZ (Enhanced Resource Development Zone) - includes Kotcho Lake Protected Area (64.4 ha total representing 3 polygons). **Rationale:** Ranges and core habitats based on results of Snake-Sahtaneh study and DU mapping.
			Paradise Core	403 km^2	
			West Kotcho Core	362 km^2	
			North Kotcho Core	748 km^2	
			East Kotcho Core	318 km^2	
			Etsho Core	62 km^2	
			Tsea Core	472 km^2	

Table I-2 cont'd. Description of boreal caribou ranges and core habitats within northeastern British Columbia.

Range	Total Area of Range	Population Estimate for Range[1]	Core Habitat	Total Area of Core Habitat	Range Description
Maxhamish Range	7,095 km^2	306 (220-392)	Fortune Core	2,662 km^2	**Fort Nelson LRMP:** Etsho RMZ (Enhanced Resource Development) - includes Maxhamish Lake Park (604 ha) and Protected Area Addition (26,889 ha). **Rationale:** Range and core habitat based on MWLAP inventory (Feb. 2004), 1975 ungulate inventory (Stewart 1975), reconnaissance flight (May 2004), and DU mapping.
			Kiwigana Core	1,301 km^2	
			Capot-Blanc Core	876 km^2	
Calendar Range	4,962 km^2	291 (154-429)	Calendar Core	4,962 km^2	**Fort Nelson LRMP:** Etsho RMZ (Enhanced Resource Development Zone) - includes Thinahtea South Protected Area (16,705 ha) and Thinahtea North Protected Area (3,674 ha). **Rationale:** Range and core habitat based on MWLAP inventory (Feb. 2004), 1975 ungulate inventory (Stewart 1975), reconnaissance flight (May 2004), DU mapping, and information from adjacent jurisdictions (AB and NT); contiguous with range of Alberta's "Bistcho" herd (Dzus 2001).
Undifferentiated Range	unknown	54[2] (28-79)	Prophet Core	915 km^2	**Fort Nelson LRMP:** Klua RMZ (Enhanced Resource Development Zone) - includes Goguka Creek Protected Area (434 ha). **Rationale:** range status unknown; core habitat based on DU mapping and numerous sightings.

Table I-2 cont. Description of boreal caribou ranges and core habitats within northeastern British Columbia.

Range	Total Area of Range	Population Estimate for Range[1]	Core Habitat	Total Area of Core Habitat	Range Description
Undifferentiated Range	unknown	13[2] (7-19)	Parker Core	224 km^2	**Fort Nelson LRMP:** Fort Nelson RMZ (Enhanced Resource Development Zone) includes Parker Lake Protected Area (214 ha). **Rationale:** range status unknown; core habitat based on DU mapping and numerous sightings (K. Kuhn and Z. Dancevik, pers. comm.).
Total Area of Ranges	39,155 km^2				
Total Area of Core Habitats Within Ranges	20,437 km^2				
Extent of BC Distribution	53,171 km^2				
Total Estimated Population for BC	1512 (1214-1809)				

[1] estimates calculated by MWLAP, based on 2004 late winter ungulate inventory of MU 7-55 and 7-56.
[2] population estimate based on core habitat.

PART II

BEST PRACTICES IN BOREAL CARIBOU RANGES IN BRITISH COLUMBIA

PART II: BEST PRACTICES IN BOREAL CARIBOU RANGES IN BRITISH COLUMBIA

Management of boreal caribou habitat to maintain viable populations over time requires both minimizing the impact of future development on caribou and recovery of the existing industrial footprint (BCRP 2001). The primary focus of the following recommendations is to reduce the direct and indirect industrial footprint in occupied caribou habitat by avoiding disturbance wherever possible. Best practices will be applied for both existing and proposed activities. Minimum operating standards and procedures will apply within identified boreal caribou ranges, with enhanced measures applicable to core habitats. Best practices for boreal caribou ranges and core habitats address the following aspects of oil and gas exploration and development: planning (higher level, timing), linear corridor development, clearings (wellsites and facilities), and special habitat features (Table II-1). Additional details on specific recommendations are provided below.

PLANNING - HIGHER LEVEL:

- **Boreal Caribou Range Management Plans:** Develop a range-specific management plan for all identified boreal caribou ranges in British Columbia. Management plans should define objectives, strategies and time lines required to address information gaps. Management plans should address, but not be limited to, the following:
    - collection of baseline data on caribou populations and critical habitats using radio-telemetry,
    - long-term monitoring of caribou population parameters and predator populations,
    - long-term habitat supply assessment, considering potential confounding factors such as wildfire and climate change,
    - caribou conservation measures applicable to ranges and core habitats, including long-term access requirements and land-use thresholds, and
    - plans for vegetation recovery within core habitats.

- **GIS Database:** Develop and maintain a geographic information system (GIS) database of industrial activity, including the oil and gas and forest industries, to accurately map cumulative impacts, facilitate integrated access development, and provide a platform to map important local habitat features (e.g., mineral licks). Develop a GIS layer for wildfires to track burned areas at the landscape level. Develop methods and standards for submission of petroleum land use information in a consistent digital format. Information provided for individual projects should include, at a minimum, accurate geo-referencing of project start and end points and routing, total area disturbed, disturbance by habitat type, and important habitat features encountered. The following points should be considered in the development of the GIS database:
    - the database should provide a single, government-owned, reference source with access available to both the OGC and government ministries. Consideration should be given to issues of confidentiality within the highly competitive oil and gas industry,
    - ongoing database management is required to track cumulative effects of anthropogenic and natural changes within boreal caribou ranges, including industrial footprint and wildfire,
    - a standard digital format must be designed to accurately document information on land use and habitat alteration. The format must accommodate information received at various stages, including proposed surface land use applications, which will allow

an assessment of potential cumulative impacts between activities, through to the final reporting stage that describes "as built" conditions upon project completion.

- **Re-vegetation Protocol for Multi-user Corridors**: Infrastructure should be concentrated spatially to reduce habitat fragmentation. In the case of pipelines, this will result in multiple ROWs within a common corridor. To support re-vegetation initiatives while providing consistency and coordination among operators, a protocol should be developed to address long-term requirements. During the application review process for the initial line, a corridor re-vegetation plan will be designed through consultation with the proponent and appropriate regulators (OGC, NEB). Plans will detail requirements for use or deferral of artifical seeding, layout of shrub bands and line-of sight barriers, etc. As successive pipelines are added to the corridor, new operators will conform to the existing plan.

- **Range Disturbance Thresholds:** Develop and implement habitat and land use thresholds for boreal caribou ranges in British Columbia. Experience in western and northern Canada demonstrates that the most practical approach to assess and minimize cumulative effects is to adopt a management framework that focuses on habitat or land use indicators linked to pre-defined "thresholds" or "limits of acceptable change." Thresholds for British Columbia should be based on results of the Snake-Sahtaneh cumulative effects study (Salmo Consulting, *in prep.*) and other initiatives designed to derive management thresholds for boreal caribou in western and northern Canada (Environment Canada Northern Ecosystem Initiatives Integrated Cumulative Effect Thresholds project; S. Boutin pers. comm.).

- **Boreal Caribou Range Recovery Program:** Develop and implement a cost-effective program to reduce recovery time for disturbed habitats. Efforts should be directed to core habitats within ranges. The program should draw on expertise from outside sources, including Alberta's Caribou Range Recovery Project (CRRP; Szkorupa 2002), the forest industry, and other relevant projects. The following suggestions are based on preliminary results of re-vegetation trials along Canadian Natural Resources Ltd.'s (CNRL) Ladyfern Sales pipeline (DES 2004):
  - if vegetation and root zone disturbance is minimized during the development phase, re-vegetation of linear corridors is often best achieved by allowing natural regeneration to occur. On sites where soil stabilization is not a concern (i.e., low gradient, high moisture, and low erosion potential), avoid artificial seeding of grass- and legume-based mixes that create competition for naturally regenerating native shrub species.
  - the most effective mitigative technique for expediting the development of visual barriers is to concentrate efforts on productive upland habitats crossed by linear disturbances. Coniferous seedling survival and growth appears to be most successful for nursery-stock seedlings grown from seed sources typed to biogeoclimatic zone, latitude, and elevation. While recolonization by coniferous species provides the best visual barrier, more immediate benefits are derived from encouraging deciduous woody species. Willow staking is an effective technique to quickly establish deciduous shrub growth.

  Focussing re-vegetation efforts on upland ridges within broader peatland complexes offers the following benefits:
  - the oil and gas industry can draw on the silvicultural expertise of the forest industry,
  - predators are more closely associated with upland and riparian habitats, therefore accelerating visual screening of these areas may discourage induced access of predators into adjacent peatlands,
  - mitigative measures designed to retain peatland habitat quality for boreal caribou results in development being directed to more well-drained areas, where species reliant on

upland habitat types will be affected. Directing re-vegetation efforts to upland sites may partially offset impacts to non-target species, and

- requirements to reforest productive upland sites after timber removal will result in a more equitable regulatory process between the oil and gas and forest industries.

Selected lowland sites may also have high priority for remedial re-vegetation, including areas where several linear corridors intersect. Speeding the re-growth of vegetation at the hub of such intersections may have important long-term consequences to predator movements. Transplanting of nursery-stock grown from native black spruce and tamarack seed sources, typed to biogeoclimatic zone, latitude, and elevation, is recommended.

PLANNING – TIMING:

❖ To reduce disturbance to caribou during the physiologically stressful late winter/late pregnancy period, adopt the principle of *early start-early completion*, as recommended by Alberta's BCC (BCC 2001), for industrial activity within British Columbia's boreal caribou ranges.

❖ The *OGC Fish and Wildlife Timing Windows for Oil and Gas Exploration and Development in Northeast British Columbia* (OGC 2003) specify a *critical* period between May 15 and July 15 to coincide with caribou calving; a *cautionary* period from October 15 to November 15 to coincide with the rut, and a *cautionary* late winter period from January 15 to April 15. It is recommended that existing restrictions be adjusted to better reflect timing of boreal caribou calving and rutting periods, as follows:

- Rut: shift the *cautionary* fall rut period to September 15-October 15 within identified boreal caribou ranges, and September 15 to October 30 within core habitats.

  The Snake-Sahtaneh study results indicate the peak of rutting activity occurs during the first week of October, before the start of the existing cautionary period. Shifting this period forward would provide caribou greater protection from disturbance during the rut. An extended cautionary period within core habitats will reduce potential impacts to caribou during the second estrous cycle, in late October, while allowing development activities to re-commence outside core habitats with relatively little risk.

- Calving: shift the *critical* calving period to April 15-June 30 to reduce stress on caribou during late pregnancy, parturition, and the neo-natal period.

  The energetic implications of shielding cows from disturbance for the final month of pregnancy may offer greater benefits for calf survival than extending the period into mid-July. The existing timing window applies to both northern and boreal caribou although there are distinct differences in seasonal habitat use between the ecotypes. In contrast to northern caribou, boreal caribou cows are more widely dispersed during the post-calving period. Caribou calves are precocious and are capable of following their mothers within hours of birth; with the peak of calving in mid May, calf mobility is not likely to limit maternal movements by the end of June. Finally, predation risk is typically highest during the first month post-partum; an earlier *critical* period will protect calves born prior to the mid-May peak and will likely not have a significant impact on calves alive at 6 weeks post-calving. Requests for variances for early re-commencement of industrial activities, prior to July 1, should not be granted.

- Late Winter: amend the existing *cautionary* window to read January 15 to April 14.

LINEAR CORRIDORS - SEISMIC, ROADS, PIPELINE AND UTILITY CORRIDOR ROUTING AND CONSTRUCTION:

Linear disturbance associated with access development and seismic exploration is the most significant industrial footprint in boreal caribou range (D. Hervieux pers. comm.). The objective of these recommendations is to avoid facilitating human and predator movements throughout boreal caribou ranges and, thereby reduce direct and indirect mortality of caribou.

- **Access:** The Fort St. John LRMP provides direction on access development through the following strategies:
  - require winter access unless the need for all-season access can be conclusively demonstrated through lower level planning (p 196),
  - plan and develop new access routes that avoid direct disturbance within, or in close proximity to, high capability ungulate wintering habitat (p 199).

  The extent and standard of access within boreal caribou ranges should be minimized, giving consideration to safety issues where necessary (i.e., all-weather access to sour gas wells). No new permanent access development should occur within core habitats; exploration and development activities will use temporary frozen ground access only.

  While access control is best addressed by minimizing access created, additional mitigative measures may be required to avoid disturbance and direct mortality of boreal caribou. The aesthetic values in classic boreal caribou habitat (i.e., treed peatlands) are much lower than in nearby areas to the south and west, so a large influx of recreational users following access development is not anticipated. Nevertheless, the need for access control measures should be evaluated on a site-specific basis.

- **Seismic:** The extent and duration of the seismic line footprint should be minimized by reducing line width and sight lines, encouraging rapid revegetation, and employing mitigative methods to discourage induced access for both humans and predators. Current low-impact seismic (LIS) techniques should be considered standard practice, including meandering and hand cut lines, groundcover protection (mulchers, etc.), narrow line width (<2.5 m), heli-portable and heli-assist operations, and blocking of roads and lines to prevent access.

SPECIAL HABITAT FEATURES:

The intent of these best practices is to retain the function and quality of special habitat features to support the physiological requirements of caribou (i.e., access to forage and minerals) and avoid disruption of evolved anti-predator strategies, such as use of water features. Variable setbacks are recommended to buffer large and small lakes and lake complexes. Protection of small lakes will also address the Fort Nelson LRMP strategy to “conserve trumpeter swan nesting habitat by providing visual screening and minimizing disturbance” (p29). Avoidance of features such as “terrestrial islands” (i.e., small patches of timber within peatlands), mineral licks, and unburned areas within wildfire perimeters is recommended.

Table II-1. Best practices for oil and gas activity within identified boreal caribou ranges and core habitats.

Boreal Caribou Management Strategies and Best Practices	Range	Core Habitat
PLANNING: HIGHER LEVEL		
Implement Fort St. John and Fort Nelson LRMP objectives relevant to caribou. Specific LRMP recommendations include: incorporating the maintenance of high capability ungulate wintering habitat into landscape level plans, planning and developing new access routes that avoid direct disturbance within high capability ungulate wintering habitats, encouraging winter access for resource development, and deactivating access.	**X**	**X**
Develop a *range management plan* for all boreal caribou ranges, including: strategies to identify and address baseline data deficiencies (i.e., current status of caribou populations and habitat, limiting factors), requirements for long-term trend monitoring of caribou populations, and options to mitigate oil and gas industry impacts to boreal caribou. Individual range management plans should include a range-specific access plan, consisting of an inventory of existing and proposed access, potential central access corridors (coordinated both within and between ranges), least-risk options for access development, and a review process to ensure existing access is downgraded or reclaimed as requirements change.	**X**	**X**
Create and maintain a GIS database to track oil and gas activities. Information compiled should include: feature description (e.g., LIS or conventional seismic line, all weather road, winter trail, etc.), start-end points, width, and alignment of all linear corridors (proposed and "as-built"), total area disturbed, and disturbance by habitat type. Important habitat features, such as mineral licks, should be catalogued and georeferenced.	**X**	**X**
Develop and implement habitat or land use thresholds for activities within boreal caribou ranges and core habitats.	**X**	**X**
Encourage communication and cooperation between and within industries to reduce the industrial footprint within boreal caribou ranges and core habitats. Explore opportunities to share facilities and workspaces, and participate in funding of projects (caribou research, range recovery, public education).	**X**	**X**
Establish and implement a revegetation protocol for multi-user pipeline corridors. First operator in will develop plan in consultation with regulators (OGC and NEB) and subsequent operators will comply with plan. Plan should assess potential requirements for artificial seeding, and layout and establishment of line of sight barriers (rises, bends, shrub bands, bores, etc.).	**X**	**X**
Develop and implement a boreal caribou *range recovery program* to accelerate revegetation of existing disturbances within core habitats.	**n/a**	**X**
Communicate and promote innovative technologies and strategies within the oil and gas industry.	**X**	**X**
Incorporate boreal caribou mitigation measures in General Development Permits (GDP).	**X**	**X**
In the event that a project does not conform to best practices, a C*aribou Impact Assessment and Protection Plan* must be prepared by a qualified biologist or technician experienced in wildlife management and habitat protection.	**X**	**X**
Communicate information on minimizing impacts to caribou to all staff and contractors working in boreal caribou habitat. Information may be delivered as a component of standard project orientation programs.	**X**	**X**

Table II-1 cont. Best practices for oil and gas activity within identified boreal caribou ranges and core habitats.

Boreal Caribou Management Strategies and Best Practices	Range	Core Habitat
PLANNING: TIMING		
Default to winter exploration operations (i.e., frozen ground access). If summer exploration operations are to occur, activity should be concentrated in areas of existing all-weather access. Lease sites within 100 m of existing all-weather roads should be reached by low-standard, dry ground access. Note that this recommendation should not be construed as encouragement to create additional all-weather access.	**X**	**X**
Adopt an "early in-early out" policy to reduce late-winter disturbance to boreal caribou, with winter operations commenced immediately following freeze-up and completed as early as possible.	**X**	**X**
Adopt a sequential development strategy to minimize time and area disturbed. For activities, such as multiple-well drilling programs, complete work that requires furthest access first, then proceed toward the most proximate well sites, systematically closing down activity and access. Reduce the extent of ploughed ROW wherever possible.	**X**	**X**
TIMING WINDOWS: Refine existing OGC timing windows to better reflect critical periods for boreal caribou:		
CALVING: Minimize activities within ranges during the critical calving period (April 15-June 30); activities subject to review process.	**X**	**n/a**
CALVING: No activity within core habitats during the *critical* calving period (April 15-June 30).	**n/a**	**X**
RUT: Minimize activities within ranges during the *cautionary* rut period (September 15-October 15); activities subject to review process.	**X**	**n/a**
RUT: Minimize activities within core habitats during the *cautionary* rut period (September 15-October 30); activities subject to review process.	**n/a**	**X**
LATE WINTER: Minimize activities within ranges and core habitats during the *cautionary* late winter period (January 15-April 14); activities subject to review process. Adhere to early in-early out policy.	**X**	**X**
LINEAR CORRIDORS: SEISMIC		
Plan layout and line clearing to minimize impacts to boreal caribou habitat.	**X**	**X**
Use low impact seismic (LIS) techniques only, including hand cut lines, avoidance cut and meandering lines, mulchers, < 2.5 m width, and blockage of lines and roads (e.g., fallen trees or berms to prevent access).	**X**	**X**
Conduct seismic on existing lines wherever possible; protect regeneration on existing lines by superimposing LIS over previous disturbance and use avoidance cuts to retain tall shrubs and trees.	**X**	**X**

Table II-1 cont. Best practices for oil and gas activity within identified boreal caribou ranges and core habitats.

Boreal Caribou Management Strategies and Best Practices	Range	Core Habitat
LINEAR CORRIDORS: SEISMIC cont.		
Minimize ground disturbance by restricting operations to frozen ground and avoiding disturbance to duff and root mat.	**X**	**X**
Use doglegs to break sight-lines at intersections of seismic lines and access corridors.	**X**	**X**
LINEAR CORRIDORS: ROADS		
Consider local hydrology during access design and layout. Avoid altering peatland drainage patterns (water level and flow patterns), which may affect terrestrial lichen survival. Restore natural water flow by removing sections of existing all-weather roads through peatland areas following abandonment.	**X**	**X**
Minimize quantity and standard of new access within caribou ranges: minimize widths, use pullouts and shared workspace to reduce width requirements. Justification is required to support application for approval of higher standard access.	**X**	**n/a**
No new permanent access development within core habitats; frozen ground access only.	**n/a**	**X**
If new all-weather access is required within ranges (e.g., central access corridor), align route outside of high-capability caribou habitat wherever possible.	**X**	**n/a**
Parallel existing linear disturbances (pipeline or utility corridors, open seismic lines, existing trails, etc.) when routing new temporary or permanent access within ranges. Exceptions can be made if greater mitigation of impacts to boreal caribou habitat can be achieved by following a new alignment; supporting rationale must be provided.	**X**	**n/a**
Parallel existing linear disturbances (pipeline or utility corridors, open seismic lines, existing trails, etc.) when routing temporary frozen ground access within core habitats. Variances can be made if greater mitigation of impacts to boreal caribou habitat can be achieved by following a new alignment. In such cases, variances from recommended practice should be designed to 1) avoid high quality caribou habitat, 2) reduce habitat fragmentation, 3) avoid disturbance to unique habitat features, and 4) avoid detrimental impacts to non-target species.	**n/a**	**X**
Target ROW widths within ranges: 8 metres for frozen ground access; 15 metres for low-grade access; 20 metres for all-weather access. Incorporate variable widths (as required by terrain conditions), pullouts, and shared workspaces to minimize ROW width.	**X**	**n/a**
Target ROW width of 8 metres for temporary frozen ground access within core habitats. Incorporate variable widths, pullouts, and shared workspaces to minimize ROW width.	**n/a**	**X**
To avoid creating barriers to caribou movement, design new all-weather access to provide clear sight lines across the width of the ROW (i.e., elevated roadbed). Note: research suggests that caribou may be reluctant to cross roads where suitable habitat is not visible on the far side of the ROW.	**X**	**n/a**

Table II-1 cont. Best practices for oil and gas activity within identified boreal caribou ranges and core habitats.

Boreal Caribou Management Strategies and Best Practices	Range	Core Habitat
LINEAR CORRIDORS: ROADS cont.		
If frost conditions are not adequate during the winter work window, supplementary measures may be applied to address access requirements, including the use of padding, matting, geo-textile, and corduroy on short segments of route.	X	X
Avoid attracting caribou to access corridors; do not apply legume-based seed mixes for ROW revegetation.	X	X
Implement speed zones and provide signage in areas of potential caribou-vehicle collisions.	X	X
Minimize snow removal to reduce predator travel along ROWs; create breaks at 500 m intervals in snow berms (windrows) on ploughed roads to permit caribou movements.	X	X
Periodically review requirements for existing all-weather access and downgrade road standards as soon as possible. Promptly abandon and reclaim access when no longer required. Render inactive access impassable to motorized vehicles. Consider realignment options on portions of existing all-weather access that bisect core habitat.	X	X
Assess and review requirements for access control. Implement measures on a site-specific basis, if warranted. Measures may include manned access control points, temporary rollback of earth or snow berms, blocking ROWs with felled timber, removal of bridges, and barriers at junctions.	X	X
LINEAR CORRIDORS: PIPELINE AND UTILITY CORRIDOR ROUTING AND CONSTRUCTION		
To avoid unnecessary re-entry, consider future volume requirements when determining pipe diameter.	X	X
Consolidate multiple pipeline ROWs in one corridor, with shared workspace.	X	X
Minimize new cut by following existing linear disturbances (roads and trails, seismic lines, utility corridors) when routing pipelines. Variances can be made if greater mitigation of impacts to boreal caribou habitat can be achieved by following a new alignment. In such cases, variances from recommended practice should be designed to: 1) avoid high quality caribou habitat, 2) reduce habitat fragmentation, 3) avoid disturbance to unique habitat features, and 4) avoid detrimental impacts to non-target species.	X	X
Reduce sight-lines through the use of doglegs, horizontal directional drill and boring techniques, and creation of shrub bands (native tree and tall shrub species). Retain undisturbed riparian vegetation communities at stream crossings using HDD or bores.	X	X
Prevent barriers to boreal caribou movements during the construction phase. If construction delays result in welded pipes remaining on the ground for more than 3 days, provide intermittent gaps to allow wildlife passage (10 m gaps every 500 m for pipes higher than .75 m above ground). Insure the open trench does not impede caribou movements.	X	X
Prevent induced human and predator access by partial rollback of trees and debris (earth or snow berms) onto new ROWs; insure caribou movements are not impeded.	X	X

Table II-1 cont. Best practices for oil and gas activity within identified boreal caribou ranges and core habitats.

Boreal Caribou Management Strategies and Best Practices	Range	Core Habitat
LINEAR CORRIDORS: PIPELINE AND UTILITY CORRIDOR ROUTING AND CONSTRUCTION cont.		
Apply mitigative techniques to speed re-vegetation of linear disturbances, including minimizing duff and root mat disturbance. Consider natural regeneration for sites where gradient, substrate, and moisture regime afford low potential for erosion.	X	X
Reclaim or temporarily block unused or unnecessary pipeline or utility line corridors.	X	X
CLEARINGS: WELLSITES AND FACILITIES		
Centralize surface facilities within ranges, including camps, compressor stations, processing facilities, water storage and transport, and staging areas. In remote areas, locate camps close to construction sites. Wherever possible, use mass transit to transport workers between facilities to reduce traffic volumes.	X	n/a
No new surface facilities within core habitats, including permanent or temporary camps, compression or dehydration facilities, water storage and transport, and staging areas. When feasible, use mass transit to transport workers to and from existing facilities to reduce traffic volumes.	n/a	X
Explore options to minimize total surface area required for individual facilities. Restore and reclaim additional workspace clearing following the construction phase.	X	n/a
Within ranges, situate facilities and wellsites in areas of lowest boreal caribou habitat-capability possible, close to existing access routes. Avoid large patches of treed peatlands or mature lodgepole pine stands. Screen features with vegetation buffers, wherever possible.	X	n/a
Within core habitats, situate drilling locations in areas of lowest boreal caribou habitat-capability possible, close to existing access routes. Avoid large patches of treed peatlands or mature lodgepole pine stands. Screen features with vegetation buffers, wherever possible.	n/a	X
To reduce habitat fragmentation, concentrate activities temporarily and spatially (e.g., adopt a sequential development strategy; situate well sites and facilities within 100 m of existing access).	X	X
Remotely operate new wells and gas production facilities using telemetry (SCADA) with aerial support; use frozen ground access for service and supply requirements.	X	X
Develop drilling leases using minimum disturbance techniques (e.g., mulchers to retain intact surface vegetation mat, pad matting, etc.); upgrade lease if well is proven.	X	X
Maximize number of wells drilled per pad.	X	X
Avoid attracting caribou to lease sites; do not apply legume-based seed mixes.	X	X
Apply mitigative techniques to speed re-vegetation upon well suspension/abandonment, or removal of existing facilities; initiate reclamation and restoration activities within one year of well or facility abandonment.	X	X

Table II-1 cont. Best practices for oil and gas activity within identified boreal caribou ranges and core habitats.

Boreal Caribou Management Strategies and Best Practices	Range	Core Habitat
SPECIAL HABITAT FEATURES		
Identify and avoid key habitat features, including mineral licks; comply with 100 m minimum construction setback on mineral licks as per MDRC guidelines; screen features to avoid induced access for predators. Provide coordinates of all mineral licks encountered to OGC to be incorporated into a GIS database.	X	X
Wildfires: retain unburned patches within the perimeter of major wildfire areas by siting disturbances on burned areas.	X	X
Avoid fragmenting "terrestrial islands" (e.g., small patches of dense coniferous cover within peatland or wetland complexes); route linear disturbances away from these features (recommended minimum setback of 100 m).	X	X
When possible, avoid locating disturbances within mature to old lodgepole pine stands.	X	X
LAKES:		
Do not create new access to lakes for water removal purposes.	X	X
Lakes ≥ 750 hectares within range: no new linear disturbance within 250 m of high-water mark; hand cut seismic only.	X	n/a
Lakes ≥ 750 hectares within core habitats: no new linear disturbance within 500 m of high-water mark; hand cut seismic only.	n/a	X
Lakes < 750 hectares: no new linear disturbance within 250 m of high-water mark; hand cut seismic only.	X	X
Small Lake Complexes: avoid routing linear disturbances between lakes within small lake complexes. Buffer perimeter of complex by 250 m.	X	X
OTHER		
Maintain a minimum ferry altitude of 300 m agl for helicopter and fixed-wing traffic to avoid sensory disturbance to boreal caribou.	X	X
Whenever possible, plan human activities to occur in a predictable fashion to reduce sensory disturbance to boreal caribou.	X	X
Avoid disturbance to designated Wildlife Habitat Areas (WHA) and Ungulate Winter Range (UWR) designed to protect boreal caribou habitat (note that these areas will always fall within core habitats).	n/a	X

Application Review Process

The interim boreal caribou guidelines are designed to be compatible with the OGC's application review process as shown in Figure II-1. This approach relies on the interim guidelines – along with input of qualified independent specialists when required – to provide clear guidance to proponents. It also allows OGC reviewers to focus their efforts on the infrequent applications where boreal caribou concerns cannot be readily addressed using best practices.

The application review process reflects differences between proposals located in designated caribou *range*, *core habitat*, and areas of *trace occurrence*.

- best practices will be applied within identified boreal caribou ranges. The primary management objectives in these areas are to minimize new development, reduce activity during high risk periods, and progressively reduce the direct and indirect footprint over time.
- as core habitats represent the most sensitive areas within the identified ranges, enhanced best practices will be applied. The primary management objectives in these areas are to avoid new development, restrict activity to least-risk periods, and actively reduce the direct and indirect footprint.

A *Caribou Impact Assessment and Protection Plan*, prepared by a qualified biologist or technician, will be required in instances where caribou range or core habitat best practices cannot be practically applied. This document will describe the proposed project, the design and mitigation alternatives considered, the amount and quality of habitat to be affected, the mitigation and range restoration to be applied, the residual impacts predicted, and the monitoring to be undertaken to confirm mitigation success and impact predictions.

No caribou-specific mitigation is identified for areas of *trace occurrence*; proposals located in these areas follow the normal application review process.

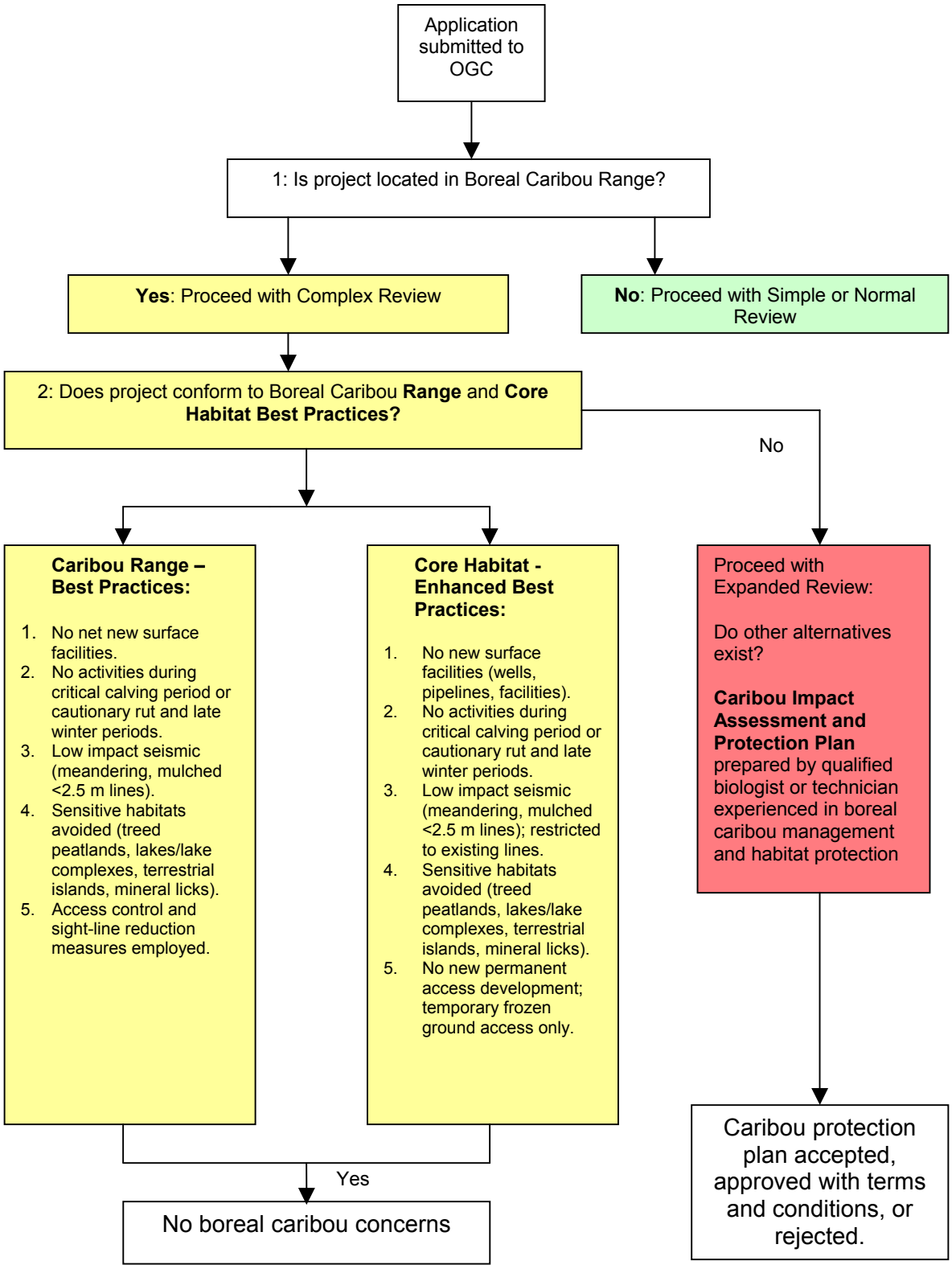

Figure II-1. Application review process for activities within boreal caribou ranges.

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*** Includes both references cited and reference materials used.**

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ATTACHMENTS:

BOREAL CARIBOU RANGE MAP
(June 30, 2004)