Research Studies Related to Snowmobiling Impacts

WILDLIFE – Birds, Bears and Caribou

Birds / Eagles

1. **Effects of Winter Recreation on Bald Eagles.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 103-111. http://www.nps.gov/yell/parkmgmt/upload/wildlifewint.pdf

Potential Effects: Vehicular activities along prescribed routes or within strict spatial limits and at relatively predictable frequencies are least disturbing to bald eagles (McGarigal et al. 1991, Stangl 1994, GYBEWG 1996). However, slow-moving motor vehicles can disrupt eagle activities more than fast-moving motor vehicles (McGarigal et al. 1991). Snowmobiles may be especially disturbing, probably due to associated random movement, loud noise, and operators who are generally exposed (Walter and Garret 1981). A review of literature revealed that research has not been completed to assess the effects of snowmobile or other winter recreational activities on bald eagle wintering or breeding habitat, but some documents referenced potential effects of snowmobile activities (Shea 1973, Alt 1980, Harmata and Oakleaf 1992, Stangl 1994).

Management Guidelines: Establish buffer zones of 1,300 feet around high-use foraging areas with temporal restrictions from sunset to 10:00 a.m. in areas of high human use. If diurnal perching areas are separate, buffer zones of 650 to 1,300 feet around concentrated or high-use perches should be imposed, dependant on existing vegetative screening. Closures for autumn roosts should extend from 1 October to 1 January, for winter roosts from 15 October to 1 April, for vernal roosts from 1 March to 15 April, or as determined by actual residency patterns of local eagles.

2. **Responses of breeding bald eagles, Haliateetus Leucocephalis, to human activities in North central Michigan.** Grubb, T. G., Bowerman, W.W., Giesy, G.P., & Dawson, G. A. (1992) Canadian Field Naturalist, 106, 443-453.

Abstract: To characterize disturbance and analyze eagle response, we recorded 714 events of potentially disturbing human activity near six pairs of Bald Eagles breeding in north central Michigan in 1990. Vehicles and pedestrians elicited the highest response frequencies, but aircraft and aquatic activities were the most common. Magnitude of response was inversely proportional to median distance-to-disturbance. Seventy-five percent of all alert and flight responses occurred when activity was within 500m and 200m, respectively. Adults responded more frequently than nestlings, and at greater distances to disturbance when perched away from nests. May was the peak month for human activity, most of which occurred on weekends and after noon. Classification tree models are used to assess disturbance-specific response frequencies and to formulate management considerations.

3. **Behavioral responses of wintering bald eagles to human activity on the Skagit River, Washington**. Skagen, S. K. (1980) Paper presented at the Proceedings of the Washington Bald Eagle Symposium.

Abstract: Eagles were found to be more sensitive to disturbance while feeding on gravel bars than while perching, and to approaches by humans on foot and concealed than by people in vehicles. A significant decrease in the proportion of eagles feeding was observed when human activity was present within 200m of the feeding area in the previous 30 minutes. A significant between-season variation occurred in the use of feeding areas relative to human presence, which correlated with food availability. Eagles appeared more tolerant to human activity in the season of low food availability.

4. **Effects of human disturbance on nesting of bald eagles.** Mathisen, E. (1976) The Journal of Wildlife Management, 32(1), l-6.

Abstract: Known nests of bald eagles were divided into three groups reflecting degrees of isolation. The eagle nests under consideration were occupied 182 times from 1963-66. The rate of occupancy was essentially the same for each group. Nesting activity varied from 54% to 48% for the three groups. None of these differences are statistically significant, indicating that human activity is not an important source of disturbance and has no measurable effect on nesting success or nest occupancy.

Birds / Pheasants

1. **Effects of snowmobile activity on wintering pheasants and wetland vegetation in Northern Iowa marshes.** Sodja, R. J. (1978) M.S. Thesis. Iowa State University, Ames, IA: 67pp.

Abstract: Effects of dispersed snowmobile use on ring-necked pheasants and marsh vegetation were studied in Iowa. No effects of snowmobiling on pheasant movements or behavior were found. Observed vegetation changes did not appear to seriously alter wildlife.

Birds / Trumpeter Swans

1. **Effects of Winter Recreation on Trumpeter Swans.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 113-116. http://www.nps.gov/yell/parkmgmt/upload/wildlifewint.pdf

Potential Effects: Aune (1981) found that swans appeared to become habituated to moving snowmobiles, but that they fly or swim away upon approach by foot or ski or when a snowmobiler stopped. Aune noted that, in general, animals function best in a predictable environment. Groomed routes, both for snowmobilers and skiers, create a more predictable environment.

Management Guidelines: Designating snowmobile and ski trails away from open waters used as winter habitat by swans can mitigate winter recreational impacts on the birds. Special restrictions may need to be implemented on open-water snowmobiling in areas that swans routinely use for feeding. Some concern has been raised about the effects of snowmobile noise on swans; however, at this time no information is available on this subject.

Mammals / Bear, Black

1. **Winter recreation and hibernating black bears-Ursus Americanus.** Goodrich, J. M., & Berger, J. (1994). Biological Conservation, 67: 107-110.

Abstract: Denning ecology of hibernating black bears was studied for 3 winters in the Sierra Nevada and Sweetwater Mountains in Nevada and California. Researchers did not document den abandonment due to recreational disturbance; bears at both sites abandoned dens and cubs in response to researchers approaching den sites, and all but one bear remained active after abandonment. The researchers concluded that the high overlap between bear den sites and potential winter recreation areas indicated a high potential for den abandonment due to human disturbance.

Mammals / Bears, Grizzly

1. **Effects of Winter Recreation on Grizzly Bears.** (1999) Effects of Winter Recreation on Wildlife of the Greater Yellowstone Area: A Literature Review and Assessment. Olliff, T., Legg, K. & Kaeding, B. Greater Yellowstone Coordinating Committee, Yellowstone National Park. pp. 37-47. http://www.nps.gov/yell/parkmgmt/upload/wildlifewint.pdf

Potential Effects: Snowmobile traffic alone on highly and moderately groomed routes does not present a significant impact to bears during most of the winter months. This is because of the predictability of defined snowmobile corridors and because most snowmobile use occurs during the time that bears are in hibernation. Conflict could occur when snowmobile use coincides with spring bear emergence and foraging. Most use of ungroomed snowmobile areas should not conflict with bear activity because it coincides with bear hibernation. Moreover, areas

of ungroomed snowmobile use typically occur at elevations above spring bear habitats. An exception is when over-wintered whitebark pine crops are available, and bear forage at high elevations in the spring. Another possible effect may occur because most backcountry snowmobile use occurs at higher elevations, where most bear denning is found. The potential for conflicts between bears and recreational users does exist when dispersed use occurs after bear emergence (between March 1 and March 15).

Management Guidelines: Grooming and use of snowmobile roads and trails should end by March 15 in areas where post-denning bear activity is high. Where winter use occurs in ungulate wintering areas, activity should end by March 15. In areas with whitebark pine forests, a primary issue is the displacement of bears. Because the presence of over-wintered pine nut crops is not consistent, this is an episodic and not an annual concern. Therefore travel restrictions should be addressed based on yearly monitoring rather than as a continuous restriction.

Mammals / Caribou, Mountain

1. **Snowmobiling and Mountain Caribou: A Literature Review of Stewardship Practices.** Mitchell, Selina and Hamilton, D. (2007) Nanuq Consulting Ltd., Nelson, BC http://www.socio-ecologicalsolutions.com/storage/SPOR_Snowmobile_Caribou_V4Final_Dec2007.pdf

Objective: The objective of this project was to compile a compendium of stewardship practices for the Caribou/Snowmobiling Activity-Habitat Pair as outlined in the "Information for Outdoor Recreation and Tourism Proposed Signatory Document" (Fletcher and Geisler 2006). This document is intended to support the Stewardship Practices for Outdoor Recreation partnership initiative to improve dissemination of information pertaining to backcountry recreation stewardship throughout recreational organizations and small businesses in British Columbia.

Suggested Stewardship Practices for Snowmobiling in Caribou Habitat
Two basic premises accompany the stewardship practices presented in this document:

1) snowmobiling activity in caribou habitat is assumed, excluding those areas where closures are already established; and
2) it is the responsibility of the individual (or group) to be informed and become knowledgeable in the practices required to operate a snowmobile(s) in caribou habitat.

SNOWMOBILER RESPSONSIBILITIES

1. *Become well-informed about the area you plan to snowmobile in.* Any individual who is snowmobiling in BC should contact the local snowmobile club in the area of planned activities to determine where wintering mountain caribou may reside and become familiar with all restrictions and regulations pertaining to mountain caribou conservation in these areas. Local club representatives are knowledgeable about the regulations and the management plans that have been implemented to protect caribou in their area. Some examples of this basic knowledge include
   - caribou ecology (winter seasonal use patterns and distribution);
   - local or population level caribou/snowmobile access plans and snowmobiling restrictions;
   - basic stewardship practices required to mitigate conflicts between caribou and snowmobiles; and,
   - implications and potential conflicts created when snowmobiling in caribou habitat (i.e., how the actions of the few reflect on the many).

Under snowmobile management agreements, both provincial and local snowmobile clubs have assumed various levels of responsibility to educate both their members and non-affiliated snowmobilers about snowmobiling in areas occupied by caribou. Potential contact sources are listed in the table below. A recently issued government brochure entitled "Snowmobiling and Caribou in British Columbia" and the document "Snowmobiling in the Columbia and Rocky Mountains of British Columbia" has been widely distributed throughout BC and outline proper etiquette when snowmobiling in caribou habitat.

2. *Be vigilant for posted regulations and restrictions*. Be aware of closures and regulations within your snowmobiling area. Not only are there potential adverse implications to the endangered mountain caribou, there are also personal legal ramifications and penalties and implications to the snowmobile community-at-large for the actions of individuals. The misguided adventures of one or more individuals can reflect and

have negative consequences on the majority of responsible snowmobilers and the snowmobiling community. To access information on snowmobile closures areas, consult the BC Hunting and Trapping Synopsis, available at local government offices and on the web: http://www.env.gov.bc.ca/fw/wildlife/hunting/regulations/

3. *While snowmobiling follow best stewardship practices to reduce your impact on caribou:*
   - If caribou tracks are observed do not follow the tracks.
   - If you see caribou, do not approach.
     - Approaching caribou, either by snowmobile or foot, may disturb caribou or cause them to retreat into areas of lesser quality habitat, where greater energy may need to be expended to meet daily requirements for survival.
   - Make every effort to minimize disturbance.
     - If caribou are close, turn off your snowmobile and allow the animals to calmly move away.
     - The effects of snowmobiles on caribou are reduced by maintaining a sufficient distance from the animals. Caribou may cease to withdraw if a snowmobile approach is halted. A separation of at least 500 m from caribou is recommended.
   - Take precautions to stay away from caribou when encountered.
     - If by random chance you encounter caribou, leave the area. After encountering mountain caribou and taking the precautionary steps to reduce their response to your presence (see above), it is recommended that snowmobilers leave the area. Apparently, "strong and lasting" effects on caribou may not be noted when snowmobiles are no longer present within high-use snowmobile areas (Powell 2004).
     - Do not make caribou run from your snowmobile. Horejski (1981) suggests that snowmobile speed is a factor in caribou disturbance (limiting speed may limit the "looming" effect that caribou supposedly experience in the presence of an approaching snowmobile). It is suggested that one of the best ways to minimize disturbance is to prevent the caribou from running in response to the snowmobile (Powell 2004). Along with energy expenditures, the amount of time that it takes caribou to recover from disturbance and return to predisturbance activities increases when caribou run.

4. *Diminish your impact on caribou by adjusting/refitting your snowmobile*. Noise may be a factor in caribou disturbance. Although noise may not be the primary cause of disturbance (human scent appears to have a much greater effect on caribou), various technologies exist that can minimize snowmobile noise. Therefore, this type of disturbance can be mitigated. Try and diminish the amount of noise that your snowmobile produces:
   - Use 4-stroke engines
   - Use mufflers designed to decrease the amount of noise produced by your machine
   - Ensure that equipment is properly maintained

5. *Report any infractions of snowmobile regulations*. Observe Record and Report: One of the easiest ways to do this is through the Report All Poachers and Polluters (RAPP) program. This BC Government program offers a 24 hour hotline for contacting Conservation Officers. Phone: 1-877-952-7277. Cellular Dial #7277.

PROACTIVE GUIDANCE BY SNOWMOBILE CLUBS

6. *Teach snowmobilers about caribou and best stewardship practices for your areas*. Under numerous snowmobile management agreements, snowmobile clubs have the responsibility to educate both their members and non-affiliated snowmobilers regarding caribou.

7. *Gather information on caribou in your region and participate in caribou management planning*.
   - Contact the Species at Risk Coordination Office (SARCO)
   - Contact caribou experts and regional/local government officials
   - Invite caribou experts to engage in club meetings and activities
   - Participate in strategic planning activities around managing snowmobile areas
   - Critique and develop caribou management plans within collaborative meetings involving various stakeholders

8. *Disseminate information to as many snowmobilers as possible*. Some preliminary studies suggest that individuals riding in managed snowmobile areas within BC may not understand the rules and regulations governing these riding areas. In some regions of BC, the majority of snowmobilers are out-of-province riders. BC clubs must educate these riders if management areas are to be successful.
    - Network with out-of-province clubs
    - Place information signs regarding snowmobile zones at the beginning of access roads and throughout snowmobile areas
    - Place brochures regarding mountain caribou with snowmobile clubs and at various locations throughout communities, including tourist information centres, snowmobile shops, restaurants, and accommodations
    - Increase public media announcements regarding caribou habitat and snowmobile best practices

2. **A Strategy for the Recovery of Mountain Caribou in British Columbia.** The Mountain Caribou Technical Advisory Committee (2002) British Columbia Ministry of Water, Land and Air Protection http://www.env.gov.bc.ca/wld/documents/mtcaribou_rcvrystrat02.pdf

Executive Summary: The Strategy for Recovery of Mountain Caribou is a document for planning recovery actions for the Mountain Caribou, an arboreal lichen–winter feeding ecotype of the Woodland Caribou (*Rangifer tarandus caribou*) found primarily in southeastern British Columbia. It is intended to support a National Recovery Strategy for Woodland Caribou. The national strategy will include, but is not limited to, Mountain Caribou. The national strategy is the first part of a two-part National Recovery Plan for Woodland Caribou; the local population-specific Recovery Action Plans is the second part.

Section I provides the introduction and background information. The British Columbia Conservation Data Centre (CDC) placed the Mountain Caribou on the provincial Red List in 2000. The CDC Red List includes species that are candidates for legal status as provincially Threatened or Endangered. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated caribou in the Southern Mountains National Ecological Area (SMNEA), including all Mountain Caribou, on their Threatened list in May 2000 and reaffirmed this designation in May 2002. The COSEWIC designation includes species that are candidates for formal national Threatened status under the new federal *Species at Risk Act* (SARA). A small, trans-boundary population of Mountain Caribou in the South Selkirks was officially designated as Endangered in the United States in 1984. Thus, BC has provincial, national and international responsibilities for maintaining Mountain Caribou.

Section II, Evaluation of Conservation Status, first identifies factors contributing to vulnerability and Threatened status, then examines the role of Mountain Caribou in the ecosystem and interactions with humans. Historically, Mountain Caribou were apparently more widely distributed and abundant than today. One estimate is that Mountain Caribou have been extirpated from 43% of their historic BC range. British Columbia currently has an estimated 1900 Mountain Caribou distributed in 13 local populations that collectively form a metapopulation. Widespread habitat alteration, past over-hunting and increased predation are believed to have contributed to the disappearance of Mountain Caribou from portions of their historic range in BC. Today, the primary threat to Mountain Caribou appears to be fragmentation of their habitat. Associated with this fragmentation are potential reductions in available winter food supply, increased human access and associated disturbance, and alteration of predator-prey relationships. For these reasons, forest practices are currently considered to be the greatest habitat management concern. Increasing interest in mechanized backcountry recreation poses a more recent potential threat to caribou.

General considerations for recovery under Section II outlines a conservation ranking for local populations and presents a conservation approach that employs the metapopulation concept, the precautionary principle, adaptive management and ecosystem management principles. The most effective means to satisfactorily resolve conflicts between management of habitat for Mountain Caribou and competing land uses is to use existing information and conservation principles over the short term, employ adaptive management over the longer term and ensure full participation of all relevant stakeholders in the decision-making process.

Recovery Goals and Objectives under Section III identifies three goals and associated objectives to advance the recovery of Mountain Caribou: Recovery goals include: (1) a metapopulation of 2500-3000 caribou distributed throughout their current range in BC; (2) enhancement of identified local populations; and (3) public support for the

recovery of Mountain Caribou and their habitats. Goal 3 recognizes that integrated resource management and public interest and involvement are key to recovery.

In Section III, Provincial Approaches for Recovery, 20 recovery approaches and associated recovery actions are identified. For each approach, the status, the recovery actions proposed and some possible concerns with implementing the actions are identified.

Section IV, Recovery Strategy Implementation, identifies three general principles for realizing the recovery goals and objectives. These include ensuring that recovery actions will be science-based, that recovery will be based on shared stewardship and that recovery will be based on financial capacity. It is recognized that maintaining Mountain Caribou and their habitat in perpetuity throughout their range will require the cooperation of government agencies, the forest industry, commercial recreation operators, local communities, First Nations and non-government organizations (NGOs). An implementation schedule (Table 12) is provided which identifies the priority for recovery approaches, possible co-operators, target date for completion and required funding. The schedule should be used in the regular monitoring of all provincial recovery actions and as a basis for the funding of recovery measures. The schedule should also be reviewed on an annual basis to evaluate progress and to update activities according to changing circumstances.

A major purpose of the Strategy for Recovery of Mountain Caribou is to outline a strategy that will lead to down-listing of Woodland Caribou from their Threatened status under COSEWIC for the SMNEA. Implementing the provincial approaches for recovery will require an estimated $3.5 million over five years. The recovery strategy should be updated as new information becomes available, and revised every five years until down-listing has been achieved.

3. **Impacts of Backcountry Recreation Activities on Mountain Caribou: Management Concerns, Interim Management Guidelines and Research Needs.** Simpson, K. and Terry, E. (2000) British Columbia Ministry of Environment, Lands and Parks – Wildlife Branch, Victoria, BC
http://www.env.gov.bc.ca/wld/documents/techpub/wr99.pdf

Abstract: Mountain caribou are currently red-listed in British Columbia, and have been the focus of forestry-related conflicts for many years. Due to an increase in winter backcountry activities, however, there are growing concerns about the impact of these activities on caribou winter habitat use. This report addresses the potential impacts of four winter backcountry recreation activities on Mountain Caribou, including snowmobiling; heli-skiing; snow-cat skiing and backcountry skiing. Relative to other winter backcountry recreation activities, snowmobiling has the greatest perceived threat to mountain caribou. Management concerns for each Mountain Caribou subpopulation are reviewed, and the probable degree of threat associated with each recreational activity is identified. Interim management guidelines that are either currently in place, or could be considered as options to reduce potential impacts, are outlined. A research approach is suggested to objectively assess risks and answer key questions regarding backcountry recreation impact on caribou.

Potential Impacts of Backcountry Recreation Activities on Mountain Caribou – Snowmobiling: Although the effects of snowmobiling on various North American ungulate species have been reported (Dorrance et al. 1975; Richens and Lavigne 1978; McLaren and Green 1985; Freddy et al. 1986), overall, the scientific literature available on the impacts of snowmobile activity and human disturbance on Caribou remains somewhat limited. The published research on Caribou has primarily focused on Barren Ground Caribou (*Rangifer tarandus granti*) and Reindeer (*Rangifer tarandus platyrhyncus*) that live in open arctic environments (Smith 1988; Tyler 1991). The effects of human disturbance (noise, blasting) on Woodland Caribou (*Rangifer tarandus caribou*) has also been reported (Bradshaw et al. 1997), however, only one study has specifically addressed the impacts of snowmobile activity on the Mountain Caribou ecotype (Simpson 1987).

Overall, these studies suggest the relative impacts of snowmobile activity on ungulates vary with each species, the frequency of snowmobile traffic, noise levels, rate of travel (i.e., snowmobile speed), human scent, visibility and terrain type (open vs. forested).

Relative to other winter backcountry recreation activities, snowmobiling has the greatest perceived threat to Mountain Caribou primarily because high capability snowmobile terrain tends to overlap with high capability Caribou winter range, and snowmobiles can easily access and potentially affect extensive areas of subalpine winter range (Simpson 1987; Webster 1997). Subalpine and alpine ridges not only provide ideal terrain and viewscapes for snowmobilers, but also provide preferred late winter range (Jan–Apr) for all Mountain Caribou sub-populations in British Columbia (Simpson et al. 1997). Therefore, the primary concern is related to habitat displacement from preferred late winter foraging areas, which can result in a decline in physical body condition due to reduced forage intake and increased energy expenditure. Habitat displacement could also result in increased mortality risks by forcing Caribou into steeper terrain that is more susceptible to avalanches. Another concern related to snowmobile activity is the hard-packed trails they provide for predators (e.g., wolves and Cougars). Hard-packed trails allow easy access for predators to reach subalpine foraging areas, which are typically not available to them because of the deeper snow conditions at these elevations compared to lower elevation valley bottom habitats (Bergerud 1996). Although predation (primarily summer) has been shown to limit some Caribou populations (Seip 1992), it is unclear to what extent winter predation contributes to Caribou mortality and population dynamics.

Although the primary concern is related to disturbance of late winter ranges (i.e., alpine/subalpine snowmobiling), Caribou may also be disturbed while on their early winter ranges which include mid- and lower elevation forests (i.e., mid elevation ESSF and ICH habitat types). Snowmobiling in these forested areas may occur as part of commercial trail-based operations (groomed trails) or when high country snowmobilers access alpine areas.

The relative magnitude of potential impacts from snowmobiling is partly related to accessibility. Snowmobile areas that are occupied by Caribou and can be easily accessed from major highways and/or logging/mine roads are most vulnerable to disturbance due to potentially greater use. Therefore, because road access is expected to continue to increase over time (logging/mining), the potential for snowmobiles to reach remote areas will also increase. In addition, there is growing demand for fresh powder snowmobiling, which has resulted in some transportation of snowmobiles by helicopter to alpine areas. This activity could have potential cumulative effects from both helicopter and snowmobile disturbance as well as from the hard-packed trails.

Interim Management Guidelines: To address the potential negative effects of backcountry recreation activities on mountain Caribou, the following section briefly outlines interim management guidelines that are either in place or could be considered as options to reduce potential impacts. Because there is a clear need to conduct research studies that examine how Caribou are affected by backcountry recreation activities and to evaluate the effectiveness of management guidelines, these measures should be viewed as 'working hypotheses'. Moreover, because there is inherent uncertainty regarding the specific responses of individual Caribou and even more uncertainty regarding population or demographic consequences these interim measures reflect the *precautionary principle*. Some of these management guidelines have been taken from the Draft Recreation and Wildlife Policy report currently being prepared by the Wildlife Branch.

In areas where there is both high capability snowmobile terrain and/or heli-skiing as well as high capability Caribou winter range, the following recommendations are suggested:

- Preclude snowmobile use within high sensitivity areas. These areas typically include late-winter subalpine parkland foraging areas but may also include mid- and low-elevation early-winter habitats.
- Regulate snowmobile activity through zoning and timing restrictions in areas with existing snowmobile use that are occupied by Caribou.
- Prohibit trail expansion into new areas occupied by Caribou.
- Focus trail expansion and encourage use in areas that already receive extensive snowmobile use and where Caribou are rarely present (e.g., Yanks Peak, George Mountain, Boulder Ridge).
- Consider designating new trails in areas which snowmobilers wish to access but are used less by Caribou (e.g., glaciers). Ideally these would occur in areas that do not conflict with heli- or backcountry ski touring.
- Promote responsible snowmobile club policies such as off-trail restrictions, code of conduct and self-policing, similar to management guidelines developed for the Revelstoke area.
- Limit helicopter flight altitudes to above 300 m in areas of high capability Caribou habitats.
- Avoid known high suitability winter range areas with designated (approved) flight paths.
- Examine the feasibility and cost-effectiveness of using Conservation Officers/Park Wardens to conduct periodic monitoring of high use snowmobile areas.

- Develop an education program (extension materials) designed to inform the public about Caribou and risks of disturbance.

4. **Selkirk Mountains Woodland Caribou Herd Augmentation in Washington: A Cooperative Interagency Plan.** Audet, S. and Allen, H. (1996) Washington Department of Fish and Wildlife; U.S. Fish and Wildlife Service; U.S. Forest Service; British Columbia Ministry of Environment, Lands and Parks, and Idaho Department of Fish and Game http://wdfw.wa.gov/publications/00448/wdfw00448.pdf

Executive Summary: The Selkirk Mountain woodland caribou (*Rangifer tarandus caribou*) is listed by the U.S. Fish and Wildlife Service as an endangered species in the United States. It is also designated as an endangered species in Washington by the Washington Department of Fish and Wildlife. The recovery plan for the caribou (USFWS, original 1985; revised 1994) includes a task to establish caribou in the western portion of the Selkirk Ecosystem in Washington. Transplants to the western portion of the ecosystem are needed to achieve better distribution, greater abundance, and to enhance the probability of caribou recovery.

The augmentation project entails capturing caribou in separate, but genetically similar subpopulations in British Columbia, transporting the animals to Washington, releasing them into the wild, and monitoring the results. Previous herd augmentation efforts for the southern Selkirk caribou population involved transplanting caribou from healthy populations in British Columbia to the Ball Creek area of Idaho. A total of 60 caribou were transplanted: 24 in 1987; 24 in 1988; and 12 in 1990. Information and experience gained in the Idaho effort will be used to increase the chances for success of the Washington project.

Three potential sources for transplant animals in British Columbia will be considered: Revelstoke, Blue River/Wells Gray Park, and Prince George. British Columbia officials will determine the number and sources of transplant animals. The target number of animals for the first year will be 20-24 animals, with a sex ratio of 1 male: 4-5 females. Preferred age composition is males 3 years or younger, calves, yearlings, and adult females. Old-aged females or animals in poor condition will be excluded. Methods will follow those used in the Idaho augmentation effort, which experienced very low mortality rates. Animals will be captured in March, using net guns from helicopters. They will be held for tuberculosis and brucellosis testing and then transported to the release site in Washington.

Four potential release sites on the Sullivan Lake Ranger District of the Colville National Forest were evaluated. One site, Molybdenite Ridge was eliminated from consideration. Potential release sites, in order of preference are: Pass Creek, Mankato Mountain, and upper Sullivan Creek. All are within the Caribou Habitat Area, are currently managed as caribou habitat under the Colville National Forest Plan (U.S. Forest Service 1988), and will require no change in management to accommodate the augmentation effort. The final site selection will depend upon weather conditions and road access at the time of release.

Preliminary work (administrative, habitat mapping, caribou feeding trials) has been conducted during 1995 to facilitate the augmentation project. Pending funding approval, the first transplant will take place in March 1996. Caribou recovery is an interagency and international effort requiring public support and involvement. Law enforcement needs are identified in the augmentation plan and will emphasize prevention of accidental or intentional shooting. Information/Education needs are also addressed in the plan. Some of the information/ education efforts used during the Idaho augmentation effort, such as the "Adopt a Caribou" program, will be used in the Washington project.