



**A Review of South Jasper National Park Caribou Action Plan
for Caribou Recovery Phase 1, 2005**

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Introduction

Forest-dwelling woodland caribou are threatened across Canada. Alberta's woodland caribou have been in decline since the 1970s and a recent University of Alberta study warned that woodland caribou may disappear from the province in less than 40 years if current trends continue. Caribou in Jasper National Park belong to the Southern Mountain population designated as threatened under the federal *Species at Risk Act* (SARA). The South Jasper herd consists of roughly 100 animals, a decline in population from historic levels of over 400.

SARA requires that a recovery plan be prepared for each species (such as woodland caribou) listed as endangered or threatened. The object of recovery plans is to restore species to healthy, self-sustaining, viable populations. For the first 376 species listed under SARA, recovery plans must be completed and approved by the Minister of Environment for endangered species by June 2006, and for threatened species by June 2007.

In February 2004, Parks Canada assembled a recovery team whose role was to help Parks Canada develop a recovery program to improve the likelihood of woodland caribou persistence in South Jasper National Park. The draft *South Jasper National Park Caribou Action Plan for Caribou Recovery*, based on advice from the recovery team, reviews caribou ecology and conservation issues, threats to caribou in South Jasper, and creates and ranks recovery actions.

The following report reviews the strengths and weaknesses of the Action Plan according to six questions developed by Sierra Club of Canada:

1. Does the recovery plan identify the significant threats to the species?
2. Does the plan propose adequate and timely measures to halt and potentially reverse the decline?
3. Are socio-economic concerns barriers to the implementation of key strategies for recovery?
4. Is the plan appropriately linked to other jurisdictions and other recovery efforts?
5. Will the recovery actions be satisfactorily monitored and re-evaluated?
6. What are the main strengths and weaknesses of the plan?

These questions were answered by Dr. James Schaefer, a professor of conservation biology who has studied caribou for over 20 years. His answers are included in full in this report; the conclusion is that of the Sierra Club of Canada.

The Sierra Club of Canada is committed to the protection of healthy ecosystems for wildlife populations. To this end, we have commissioned the evaluation of recovery plans to assess the degree to which they adequately address and plan to mitigate the main causes of species decline. This is the first review of a draft recovery plan for a population located entirely within a federal protected area and under federal jurisdiction.

Overview of Status of South Jasper Caribou Herd

In the early 1960s approximately 450 woodland caribou existed in south Jasper National Park. By 1992, this number had declined to approximately 220, and today there are perhaps no more than 100, almost evenly split into two herds, one in the east side of the park and one in the west.

The causes for the decline are difficult to pinpoint but may involve a combination of the following factors:

- Wolf predation is a recognized factor which may be facilitated by plowed roads and trackset ski trails;
- The eastern herd is now virtually isolated from other woodland caribou herds, although the western herd moves back and forth into British Columbia and thus may have a chance of mixing with other caribou;
- Human disturbance of summer habitat may be stressing cows and calves, leading to lower calf recruitment and may be distancing caribou from important feeding areas;
- Road kills of caribou is a factor—eleven kills of eastern herd animals were recorded in ten years on the Icefields Highway.

As mentioned, the South Jasper herd is the only herd in Alberta that stays in protected lands year round. As such, its survival is critical to the survival of the species in the Alberta Rockies, given the tremendous pressure that resource extraction is putting on forested ecosystems outside of protected areas.

Questions/Responses

Below are the answers from Dr. James Schaefer.

1. *Does the recovery plan identify the significant threats to the species?*

[Accurately diagnosing a species decline means correctly identifying the factors of population limitation. The focus of this Recovery Plan is largely on the disturbance of caribou, with its](#)

potential implications for energetics and productivity. For instance, four of the five most highly ranked options in the Plan (p.11) are directed towards reducing the disturbance of caribou by humans or dogs (pp.12-15).

This focus, in my view, is not sufficient. While it is acknowledged in the literature that infrastructure and human activities may lead to energetic compromises for caribou (e.g., Cameron et al. 2005), these nutritional and reproductive mechanisms pertain to migratory herds where the main limiting factor is summer food (Messier et al. 1988, Mahoney & Schaefer 2002).

The situation is different for caribou in the West – the ‘mountain’ and ‘northern’ caribou ecotypes. Studies, including those in South Jasper (Brown et al. 1994), have consistently identified predation as the primary limiting factor (Seip & Cichowski 1996, Wittmer et al. 2005). Indeed, these caribou tend to exhibit body condition indices that are satisfactory (or better) as well as parturition rates that remain high and resilient, even for populations in decline. These circumstances are recapitulated in South Jasper. Brown et al. (1994) concluded that the general physical condition of these animals was “moderate to excellent” (p.3-10) and, given a parturition rate of 81%, that “inadequate productivity was not a factor limiting population growth” (p.3-27). Although the reasons for the population decline are not entirely clear and mortality may be exacerbated by severe winter conditions (Brown et al. 1994), the patterns do not generally point to energetics and nutrition as limiting.

The key to persistence of caribou is the survival of adult females, whose fate largely dictates the tempo and direction of population growth. The Recovery Plan, in my view, has generally failed to acknowledge the seriousness of adult female mortality in South Jasper and the two principal threats that contribute to it: (1) predation and (2) collisions with vehicles. For instance:

- During 1989-1991, nine of twelve mortalities of known cause in this population were attributable to predation (Brown et al. 1994). The mortality rate of adult females (31%) was exceedingly high – indeed, one of the highest anywhere (Wittmer et al. 2005). Mortalities tended to occur during winter and at lower elevations (Brown et al. 1994).

- In 10 years, 11 mortalities have occurred from vehicle collisions on the Icefields Parkway (p.6).

Both these mortality agents are known to be exacerbated by roads and trails that dissect and open up caribou range (Brown et al. 1994, Mercer et al. 2004, Alberta Woodland Caribou Recovery Team 2004). Recent events in South Jasper underscore, furthermore, that neither threat has abated. In 2002-03, three animals died in vehicle collisions (p.6); in April 2005, two animals were reported to be killed by wolves (Gill 2005).

2. *Does the plan propose adequate and timely measures to halt and potentially reverse the decline?*

Success in conservation is enhanced when recovery actions are taken earlier, rather than later. As indicated in the Plan, caribou in South Jasper have been declining since the mid-1960's – a situation that has been apparent to Park managers for at least 20 years. The tempo of this decline is clear from the intermittent population estimates. From them, the exponential rate of population growth, r , in South Jasper was computed as $r = -0.040$ (Figure 1). This translates to a population diminishing at 3.9% per year. Caribou abundance is being reduced by half approximately every 17 years. The circumstances for Maligne Valley are more acute. Based on minimum counts, these caribou appear to be declining at $r = -0.116$ or 11% per year (Figure 1); this population appears to be halved every 6 years. These statistics underscore the urgency for identifying and applying remedial measures that will arrest and eventually reverse these trends.

Apart from disturbance, the Plan does propose some positive measures to reduce encounters between caribou and their mortality agents (i.e., wolves and vehicles): reduction and better enforcement of speed limits, elimination of road salt, prevention of new trails in caribou habitat, inhibition of trail use by wolves, and the elimination of snowmobile use by Parks Canada. These measures are likely to have some benefits for caribou survival. The central question, however, is whether these proposed actions are sufficient.

In biological terms, the management of wolf predation in the Park concerns only on the functional response (the encounter rate with caribou), not the numerical response (the number of wolves). Indeed, wolf control would represent a “half-way technology” (Frazer 1992), the treatment of the symptoms of, rather than the cause of, caribou decline. Modifying the extent and ease of travel by wolves into caribou range – in other words, the number of trails and their substrate – becomes the most obvious mitigation measure. For vehicle collisions, the number of options is greater. In both instances, the closure of roads and trails (especially during winter) would clearly be most effective, but this is not part of the Plan.

The seasonal closure of trails is discounted. In the Plan, it is stated that the benefit will be accomplished indirectly by providing other options for skiers (p.22), a measure which is entirely voluntary. At the same time, it is acknowledged (p.21) that packed trails are likely to facilitate travel by wolves during winter, the time of greatest caribou mortality.

Closing the Maligne Road is also dismissed. The rationale for this is worthy of closer scrutiny. In addition to the three conservation benefits for caribou (p.20), the Plan cites three ecological disadvantages to this action:

- that a closed road may invite greater frequency of travel by wolves because of reduced disturbance from traffic;
- that wolves in the Maligne Valley also travel frequently off-road;
- that recreational activities might shift to other areas and disturb wildlife there.

The first point is plausible, but the effect may be counterbalanced (and then some) by snow plowing which encourages wolf travel. The second is immaterial; it is the travel facilitated by the road that is pertinent. The third represents entirely a management decision.

On the other hand, there is some circumstantial evidence in South Jasper (and elsewhere; Alberta Woodland Caribou Recovery Team 2004) that links the density of roads to caribou persistence. Indeed, results showed that the more precipitous decline in the Maligne Valley (Figure 1) is associated with a road density that is approximately 6-fold higher when compared to the

neighbouring Tonquin Valley (Table 1) where caribou are also declining, but less abruptly (Mercer et al. 2004). The difference in circumstances between these two populations may be worthy of some greater consideration in the recovery effort.

Despite the evidence, closing the Maligne Road (and presumably, the Icefields Parkway, too) will not even be considered until 2008, and only if recommended by the Recovery Team (p.24). By that time, given the current population trajectory, we could expect a remnant population in the Maligne of just 17 animals. This population will have approached – or perhaps have entered – an extinction vortex, a threshold such as in North Banff (4 animals) where caribou are considered “functionally extirpated” (Mercer et al. 2004). At that point, persistence of caribou in the Maligne would be in jeopardy, perhaps even unresponsive to recovery actions.

In sum, I believe that the Recovery Plan – with its focus on disturbance rather than mortality agents – fails to prescribe measures that would genuinely fulfil the main objective, “to improve the likelihood of caribou persistence in South Jasper” (p.3). The primary focus of the Plan has not taken full account of the limiting factors for these caribou. This is also a long-lived species. As such, the success or failure of these actions (as reflected in the population trajectory) will not be wholly apparent for several years. As a precautionary measure, at minimum, more needs to be done, particularly with respect to reducing mortality of caribou in the Park.

3. *Are socio-economic concerns barriers to the implementation of key strategies for recovery?*

The Recovery Team considered whether each action should be a priority by explicitly noting the ecological and socio-economic drawbacks and benefits. This weighting system, however, appears to have been influenced at least as much by socio-economic palatability as by the biological potential for improving caribou persistence. To illustrate this, the ranked list of recovery actions (p.11) was compared to a socio-economic score (the number of positive socio-economic advantages minus the number of socio-economic disadvantages; pp.12-25).

There is a clear relationship between the two (Figure 2). Actions that ranked highly overall tended to score highly on the socio-economic ledger. (The same is true using an equivalent ecological

score.) When the socio-economic and ecological scores were combined in the analysis (using partial correlation), the relationship remained: the socio-economic score was positively related to the overall ranking of the recovery actions.

So, the Plan appears to be “realistic” (p.3). In some instances, however, realism appears to have trumped ecology. Consider the case of whether or not to close trails seasonally (p.21). There were no ecological disadvantages identified with this action (and indeed, there are several perceived benefits to caribou); the socio-economic balance was tilted only slightly the other way. On this basis, the option was dismissed.

4. *Is the plan appropriately linked to other jurisdictions and other recovery efforts?*

Caribou are mobile animals that don't respect political boundaries. Recovery of this species, therefore, may often involve multiple jurisdictions. Such is the case in South Jasper where animals from the Tonquin Valley regularly travel to Mount Robson Provincial Park in British Columbia (Mercer et al. 2004). While some collaboration with other recovery groups in Alberta is cited (pp.8,23), there is no mention of any communication or joint recovery efforts with B.C., even though there are obvious cross-boundary repercussions of any recovery action (or inaction).

Nor does this plan cite the Alberta Recovery Plan. Indeed, the provincial plan (Alberta Woodland Caribou Recovery Team 2004: 38) highlights landscape changes (from the primary highway and access roads) as explicit threats to caribou in South Jasper.

Finally, the importance of habitat change and caribou movements beyond the Park boundary is unclear. It is noted in the provincial plan (Alberta Woodland Caribou Recovery Team 2004: 38) that caribou winter range, outside Jasper National Park, “has been dramatically altered by human activities”, but there is only passing mention in the South Jasper document (p.8) of this historic, eastward seasonal migration.

5. *Will the recovery actions be satisfactorily monitored and re-evaluated?*

Because we are uncertain of the efficacy of any recovery measure, it is crucial that such actions be regarded as experiments. In particular, the mechanisms of decline of South Jasper caribou and the outcome of recovery actions in this Plan represent hypotheses to be tested. This requires research. The study design is particularly important because, with a threatened species, researchers are faced with a small (and diminishing) sample size. In these circumstances, mistaken exoneration or the failure to detect a real decline (a Type II statistical error) loom large.

Unfortunately, many aspects of the monitoring plan are not adequately described. Some examples:

- Although radiotelemetry monitoring of caribou and wolves will be sustained for another 2 years (p.3), there is no mention of sample sizes. Indeed, radiotelemetry represents an effective tool for tracking the adult survival and population growth of caribou, but a minimum sample size of approximately 20 animals is often recommended to attain a precise estimate.
- It would be highly advantageous to continue monitoring recruitment (the other component of population growth) but there is no mention of this in the Plan.
- While volunteers are valuable to augment observations in a carefully designed study, it is not clear (in the study of trail use by wolves; p.21) whether such data will be collected rigorously or just haphazardly and anecdotally.
- The Plan indicates that one key piece of information – to determine whether or not to recommend closure of the Maligne road – is to understand whether wolves are likely to use the road with or without snow plowing (p.25). Unless this information is to be gleaned from elsewhere, it is not clear how such an assessment can be made without an experiment – that is, actually discontinuing plowing of the road.

Overall, two years of study will be insufficient to satisfy many of these information needs, particularly in a system that is constrained by small sample sizes and exhibits appreciate year-to-year variation (Mercer et al. 2004). A long-term commitment to research and monitoring is essential.

6. *What are the main strengths and weaknesses of the plan?*

The strengths of the plan include:

- Explicit listing of the advantages and disadvantages of each recovery action. While the ecological rationale for the ranking of some recovery actions is dubious (e.g., “hikers lose their habitat”; p.23), the Recovery Plan does invite independent appraisal of the basis for each recovery measure.
- A commitment to communication. There are several items in the Plan that are geared toward conveying the importance of caribou and caribou recovery to a broader audience. Development of the Plan itself appears to have been an open process; membership on the Recovery Team by any committed and interested party was welcomed.
- Recovery actions that are likely to lessen the disturbance of caribou. Nevertheless, while these measures may be necessary for the recovery of South Jasper caribou, it is unlikely that they are sufficient to stem this decline, which appears rooted in the high mortality of adult caribou.

Its main weaknesses are:

- Lack of any strong linkage to the provincial recovery plan and to its counterpart in British Columbia.
- Inadequate description (and perhaps inadequate study design) of proposed and ongoing efforts for research and monitoring, with no clear long-term commitment.

- Overall, a rather timid set of recovery actions. While the consequences of the recovery actions for caribou disturbance are likely to be positive, the impact on caribou population growth (the true gauge of recovery success) is less certain. Given (1) the clear and negative population trajectory of South Jasper caribou, (2) the importance of adult mortality in the decline of these caribou, and (3) the inescapable delay between a recovery action and the realization of its success or failure, precautionary (rather than cautious) measures are warranted. There remains an appreciable risk that the decline of caribou in South Jasper will continue. Addressing the sources of direct mortality on these caribou will be key to stemming their long-term decline.

Conclusion

Across Canada, the national challenge of restoring caribou population is compounded by land-use pressures from industrial operations that degrade caribou habitat, such as industrial logging and seismic exploration. As the South Jasper herd's range falls entirely within a federal protected area, it offers a unique opportunity to ensure that management options make the protection of ecological integrity the priority. Maintenance or restoration of ecological integrity, through the protection of natural resources and processes, is the first priority of the Minister when considering all aspects of the management of parks. (National Parks of Canada Act, 2000, section 8 (2)).

Sierra Club of Canada recognizes that planning for caribou recovery is challenging—there are many variables and, despite significant research, gaps still exist in data. The result is that the landscape of recovery is, at present, experimental. It is too soon to tell if specific recovery models can ensure successful recovery.

Amidst the uncertainty, and in light of the fact that the caribou numbers in Jasper have declined dramatically within the park and are threatened with extirpation, it seems clear that recovery efforts should be assertive and abide by a precautionary principle. There is too much at stake to move incrementally, making changes after the failure of timid approaches and then implementing more aggressive mitigation strategies down the road.

Despite the gaps in scientific data, the plan's literature review clearly outlines that roads are a significant factor in caribou decline, whether because of increased contact with humans, increased access for predators (wolves), or both. Thus, it seems clear that road closures within the park are the most effective strategy to facilitate the recovery of South Jasper's caribou population.

Although there are some good steps towards caribou recovery in the draft plan, the fact that road closures are not recommended indicates that the federal government is not employing the tools at its disposal to implement the strongest course of action for caribou recovery. As it now stands, even if the actions in the draft plan are adopted, there remains an appreciable risk that the decline of this herd will continue, leading to extirpation. If the federal government does not have the political will to implement aggressive recovery measures to restore caribou populations within its own jurisdiction, it sets a grim precedent for federal involvement in caribou recovery across the rest of Canada.

Appendices

Table 1. Road density on Tonquin and Maligne caribou ranges. (Information gleaned from Mercer et al. [2004:31]).

Range	Area* (km ²)	Total length of roads (km)	Density of roads (km/km ²)
Tonquin	1,109	7.8	0.007
Maligne	1,454	62.0	0.043

* Based on a 2-km buffer around the minimum convex polygon of all caribou GPS locations.

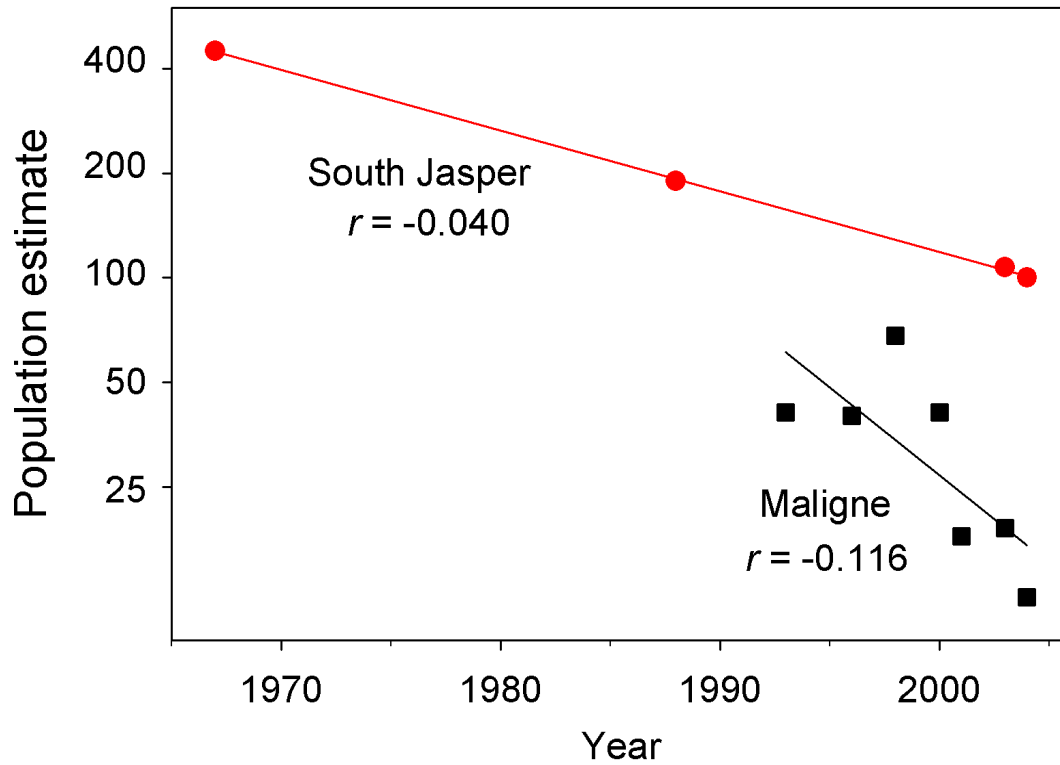


Figure 1. Population size of South Jasper caribou, 1967-2004, and minimum counts of Maligne Valley caribou, 1993-2004 (data from Brown et al. 1994, Mercer et al. 2004, Whittington et al. 2005). Population growth rates (r), from the slopes of the regressions, are indicated. Note the logarithmic scale on the Y-axis.

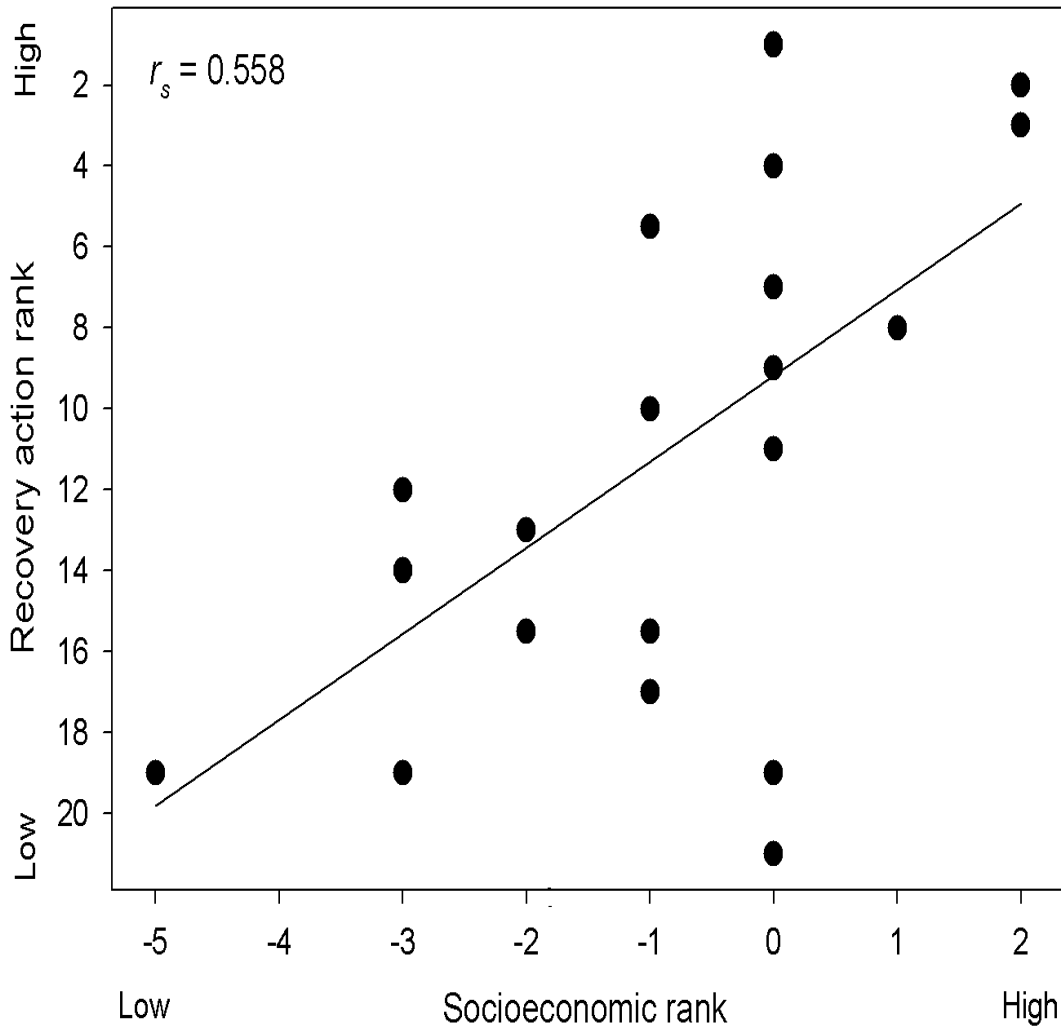


Figure 2. Rank of recovery actions for South Jasper caribou (from Table 2 of the Recovery Plan) in relation to socio-economic score of each action (i.e., number of positive attributes minus number of negative attributes, as listed in the Recovery Plan). The Spearman correlation coefficient (r_s) is indicated.

Biographies of Researcher

James Schaefer is Associate Professor of Biology at Trent University in Peterborough, Ontario. He has interests in the demography and conservation of large northern mammals, with a focus on their spatial ecology. He has intensively studied the behaviour and habitat selection of muskoxen, and the movements and population dynamics of woodland caribou.

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