Fire Management Recommendations for Forested Range of the Beverly and Qamanirjuaq Herds of Caribou



the BEVERLY and QAMANIRJUAQ CARIBOU MANAGEMENT BOARD

MANAGEMENT REPORT 1



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The opinions expressed in this report are those of the author and do not necessarily reflect the views of individual members of the Beverly Qamanirjua Caribou Management Board. All data contained herein is current to 1989.

1 Introduction

This brief **management report** contains a summary of information in a detailed fire management technical report (Beverly and Qamanirjuaq Caribou Management Board, 1994a). It contains seven recommendations to attain fire management goals. It also provides an overview for aboriginal people, wildlife managers, land-use planners, and fire managers.

The *need* for fire management within traditional hunting areas is supported by the economic, cultural, and social values of the two herds numbering 400-600 thousand caribou. These herds are used by 12,000-15,000 people in 19 settlements (A1). The annual kill is 14,000-18,000 caribou but 26,000-33,000 caribou would be used if the herds were fully accessible to all communities in any one year. Future needs for caribou will increase because populations in user communities are doubling in 16-20 years. Roads into the range potentially will expose the herds to more hunters.

The herds have great **economic value**. In Manitoba, the *average harvest* is worth \$1.9-2.4 million annually in replacement value of red meat and the *potential harvest* (accessible caribou) is valued at \$5.5-6.8 million. Corresponding numbers for Saskatchewan are \$2.5-3.1 million and \$6.5-8.1 million; for the NWT \$7.6-9.5 million and \$10.2-12.9 million. This resource is sustainable with effective caribou and land management. Other economic and cultural activities such as trapping and fishing are closely linked to caribou hunting. Earlier economic evaluations of \$13.5 million annually were reported for the two herds (Beverly and Kaminuriak Caribou Management Board, 1986 & 1987).

The **cultural and social value** of the caribou in the two herds cannot be calculated but it is immense. Fire managers are asked to place great weight on these values. The herds also have **intrinsic value** to all Canadians and others.

The **objectives**, **goals**, **and principles** of fire management are spelled out in the detailed technical report. They include greater participation by local resource users at all stages of fire management. They also reflect the realization that fire is necessary to sustain the existing ecosystem. In the long term, fire can only be modified slightly by human inter-



Post-calving aggregations are a spectacular sight with up to 30,000 caribou in one compact group.







Managing fires with cultural and ecological factors in mind will go far toward improving productive caribou range.

vention in remote, "fire-driven" or fire-dependent forests. A system of priorities is necessary to focus fire management activities.

These **recommendations for fire management** apply only in priority zones established by hunters in the aboriginal communities (Dantouze 1991 & 1992). Their zone selection was based on traditional use and recent hunting success.

No action is required now to safeguard winter range for the **conservation** (preservation and wise use) of the herds. That could change if the amount of winter range shrinks or the herds are intensively managed to supply a higher sustained yield of caribou.

The Snowdrift River Valley above Siltaza Lake is designated a **Special Fire Management Area** because of intensive use by caribou as a travel and feeding corridor. The abundant white spruce in the valley bottom is an additional feature.

2Fire Management **2**Recommendations

Recommendation 1. That fire management agencies in each jurisdiction attempt to meet goals for productive caribou range within community priority zones. **Community priority zones** for caribou hunting were established by caribou users in each community (see technical report). The maps for 13 communities were simplified to one map (A2) by removing overlapping zones; deleting A, B, and C letters from numbers; and accepting the highest rating for any area.

The occurrence of burns varies greatly across the forested winter ranges of the two herds. Consequently, **fire cycles** of three lengths were mapped (A3) to take these differences into account. The fire cycles or intervals between fires are viewed as average, long-term (centuries) ecological changes and cannot be interpreted with recent burn data.

Fire management goals were established for each priority rating (A4). These goals are proportions of *productive range for caribou feeding* herein shortened to **"productive caribou range"** and defined as forests older than 50 years. The goals for priority rank 3 within fire management zones were pegged at the estimated natural proportions of forests older than 50 years in each fire cycle zone. Then goals were increased by 5% for priority rank 2 and 10% for priority rank 1.

The composite map of priority areas of the communities (A2) was modified into **fire management zones** with the following steps: (1) adding fire cycle boundaries (A3); (2) adding jurisdictional boundaries; (3) including only areas within the limit of continuous forest or "forest limit" (*not* the limit of trees or "tree line"); (4) two large priority zones were divided into subzones (NWT A & B and NWT C & G); (5) small zones were grouped into larger zones and the priorities averaged; and (6) small zones created by changes in the fire cycle were removed and included in the adjacent larger area (A5).

Thus, the fire management goals are culturally and ecologically based. The reason for ecosystem-related fire management is the view that any attempt to greatly modify fire cycles would be prohibitively expensive and perhaps counter productive.

The forest limit was based on a smooth line joining the approximate outer limits of continuous forest as shown on revised (metric) 1:250 000 topographic maps and modified slightly by LANDSAT black and white scenes in November, February, and March; by the line showing the 1:1 ratio of forest to tundra in Timoney et al. (1992); by maps in Dredge (1992) and Dredge and Nixon (1992); and by field observations.

Decisions on whether fires should be suppressed depends on the present (P) proportion of productive caribou range relative to fire management goals (G) for a particular priority zone. These proportions, as percentages (A6), are placed within each priority zone on the simplified priority map (A5). For example, the notation "30P/70G" in a fire management zone means that 30% of the range was productive foraging habitat for caribou in 1989 and the goal was 70%. In theory, all fires would be suppressed in that zone. A notation of 80P/70G means that goals are exceeded and no action is required. The fire management zones, the crude calculations of the proportion of productive caribou range as of late 1989, and the fire management goals are on the burn map (A7).

The proportion of productive caribou habitat in 1989 is a first approximation. (Only burns up to 1989 are included in the calculations.) The Board is attempting to complete the burn history and to update it. This task is necessary before the proportions of productive caribou range can be calculated for some of the fire management areas in Manitoba. Calculated range proportions do not include large (>10 km²) lakes. Accurate calculations should be made using a Geographical Information System (GIS).

The calculations of areas occupied by burns is based on burn periphery mapping and are not adjusted for small lakes and unburned patches (inclusions) within burns. Inclusions are estimated to average 10% of burned areas. Such inclusions are little used by large groups of caribou but they can support small bands of mature bulls. Mature bulls tend to winter around the western and southern periphery of the main aggregations of cows, calves and young bulls.

Recommendation 2. That fire management agencies attempt to meet goals within caribou habitat priority zones, beyond those defined by the communities, if new data indicates the need.

In future, the Board may recommend a widening of fire management beyond the community priority zones as: (1) herd size increases naturally or is actively increased through reduced predation or hunting; or (2) new data indicates overuse of winter range by caribou. The priority zones are mapped in the technical report. The goals for productive caribou habitat within each priority rating are the same as for the community priority zones (A4).

A simplified fire suppression priority map was made by classifying the deviations of productive caribou habitat from the goals for such habitat (AB)

Recommendation 3. That fire management agencies develop jurisdictional structures that will permit cooperative and cross jurisdictional fire management operations.

Agreements should be established between and among jurisdictions such that detection and suppression operations are shared. For example, reciprocal agreements could mean that suppression costs by one jurisdiction in another would be repaid in kind at another time. Any support programs funded by the federal government should be, as much as possible, jurisdictional free.





Recommendation 4. That fire management agencies enhance resource user participation in fire management.

Greater participation by caribou users is requested for all stages of fire management within the caribou range. Enhanced roles include the setting of priority areas, other planning, suppression strategies, training of crews, and management. Experienced crews trained in initial attack should be available in each large community. Such crews should be able to action fires within hours of their detection.

Recommendation 5. That fire management agencies obtain burn maps annually and that the fire history be updated periodically in the Geographic Information System in the central depository for the Board, the NWT Centre for Remote Sensing, Yellowknife.

The updating interval for fire history will depend on discussion and negotiation among the fire management agencies. The updating of present proportions of productive caribou range could range from one to 10 years. Fire mapping and adjustment of fire management areas at decade intervals has merit. The exact year of past burns would not matter if decade classes were used and the workload would be reduced. LANDSAT or other suitable imagery would be obtained in years 2000, 2010, etc. and all burns since the previous review would be mapped and placed in the previous decade. If NOAA "Geocomp" data are used, the composite imagery must be obtained every two or three years.

Jurisdictions are encouraged to map all fires >1000 ha visually or photographically using aircraft. All burns >1000 ha should be logged on "master" sets of maps at scales of 1:250 000 and 1:1 million. The Board may request summary maps from the jurisdictions from time to time. An update of the rate of burning should be available from analysis of areas burned annually within each jurisdiction.

A uniform format and method of electronic data storage of burn characteristics and statistics should be adopted with reference systems that include the 1:250 000 map sheet, a UTM, and a latitude-longitude.

Recommendation 6. That field checks be made to establish ages of all burns of unknown age that are mapped or recognizable on LANDSAT imagery and that attempts be made to classify mature (51-100 yr), old (101-200), and ancient (>200 yr) forests.

Additional burn mapping must be done in Manitoba north of 58°N and by year 2000 it should be extended south to 57°N or the Churchill River in Saskatchewan and Manitoba. Age verification is needed for many mapped burns (Beverly and Qamanirjuaq Caribou Management Board, 1994: 1:1 million &

> 1:250 000 burn maps) in Saskatchewan and Manitoba and for some in the NWT. Burns in the past 50 years can be detected using LANDSAT imagery or by aerial reconnaissance. The ages of forests older than 50 years can be estimated into the three categories from the appearance of the oldest trees in the stand, excluding survivors from an earlier burn. This can be done from aircraft after observer training.



Caribou hunters and biologists, here working together to learn more about the Beverly caribou herd.

Recommendation 7. That for all large fires (>10 000 ha), data be obtained on: (1) percentage of burn in unburned inclusions (upland and lowland); (2) age distribution of forest that burned; (3) percentage of upland and lowland that burned; (4) average fire severity indices; (5) forest characteristics at point of fire origin; (6) rate of spread; and (7) fuel-weather-fire relationships.

Such data are needed for caribou and fire management, e.g., to determine fire susceptibility with age of forest stand and other characteristics, to test fire models, and to learn more about fire behavior in the transitionalforest ecosystem.

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Appendix 1. Ranges of the Beverly and Qamanirjuaq herds of caribou and caribouusing communities.





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Appendix 3. Zones of short (<81 years), medium (81-140 years), and long (>140 years) fire cycles on the winter range of the Beverly and Qamanirjuaq herds of caribou.

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Appendix 4. Goals for the proportion of the forest older than 50 years since fire (productive caribou range), by priority zone for caribou hunting and by length of the fire cycle.

Community priority zone	F	Proportion of forest >50 years (%	%)
	Short fire cycle (<81 years)	Medium fire cycle (81-140 years)	Long fire cycle (>140 years)
1	35	60	85
2	30	55	80
3	25	50	75

Note: based on total area excluding large lakes and on areas within burn peripheries.

Note: "<" is symbol for "less than" and ">" is symbol for "more than".

Note: these proportions are actually for forests older than 70 years based on recent calculations of the negative exponential distribution (revised Table 3 of the Technical Report). Goals are subject to change in the next revision and will relate to forests older than 50 years.



Lichen (above) are the staple food supply of caribou in winter. Once destroyed by fire, lichens preferred by caribou take at least 50 years to grow back.





Appendix 6. Crude estimates of areas of large lakes and forests younger and older than 50 years in 1989, the present (1989) proportion of productive caribou range within fire management zones (grouped community priority zones), and the goals for productive caribou habitat in those zones.

		General		Area (k	m²)			
Zone code/		location	Large	burns	forests	Propor	tion (%) >!	50 yr ^b
Priority	FCL ^a	(map sheet)	lakes	<50 yr	>50 years ^a	Total	Present	Goal
NWT A (1)	L	Whold/Kasba ^d	4 027	1 680	9 480	15 187	85	85
NWT B (1)	L	Abitau/Rennie ^d	1 920	2 013	13 187	17 120	87	85
NWT C (1)	М	Hill Island ^d	387	3 253	2 440	6 080	43	60
NWT D (2)	L	Hill/McCann	467	600	2 400	3 467	80	80
NWT E (3)	L	McCann/Rennie	373	413	2 827	3 613	87	75
NWT F (1)	L	McCann/Reliance	1 107	960	5 160	7 227	84	85
NWT G (1)	М	Nonacho ^d	2 173	4 133	11 347	17 653	73	60
NWT H (2)	М	Hill Island	187	920	1 760	2 867	66	55
NWTI (2)	S	Fort Smith	667	4 667	760	6 093	14	30
NWT J (1)	S	Taltson Lake	680	3 307	1 627	5 614	33	35
NWT K (2)	S	Resolution	187	400	533	1 120	57	30
NWT L (3)	М	Snowdrift	1 680	307	1 853	3 840	86	50
NWT M (3)	L	Walmsley	133	240	800	1 173	77	75
NWT N (1)	L	Ennadai Lake	387	1 067	1 067	2 520	50	85
NWT O (2)	L	Ennadai/Nueltin			Incomplete b	ourn data		
Sask A (1)	М	Phelps Lake	1 160	2 667	5 187	9 013	66	60
Sask B (3)	М	Wollaston Lake	1 840	2 827	2 080	6 747	42	50
Sask C (2)	М	Stony Rapids	1 280	4 080	3 853	9 213	49	55
Sask D (2)	S	Pasfield Lake	1 280	11 880	3 093	16 307	21	30
Sask E (1)	М	Fond du Lac	693	1 493	2 280	4 467	60	60
Sask F (3)	М	Fond du Lac ^e	40	1 293	360	1 693	22	50
Sask G (1)	М	Tazin Lake	733	2 267	2 467	5 467	52	60
Sask H (2)	S	Livingstone ^f	253	6 987	2 280	9 520	25	30
Man A (1)	М	South Kasmere Lake	427	1 600	2 773	4 800	63	60
Man B (1)	L	North Kasmere Lake	347	1 387	1 173	2 907	46	85
Man C (2)	М	Whiskey Jack Lake		Ir	ncomplete bui	rn data		55
Man D (2)	L	Munroe Lake			ditto			80
Man E (3)	М	Tadoule Lake			ditto			50
Man F (1)	М	Tadoule Lake			ditto			60
Man G (1)	L	Tadoule Lake			ditto			85
Man H (2)	L	Nejanilini Lake			ditto			80
Man I (2)	L	Shethanei Lake			ditto			85



^aFCL = fire cycle length: L = long, M = medium, and S = short (A3).

^bForests >50 years are considered to be usable for feeding by caribou.

^cProportion = Area forests >50 yr/(area forests >50 yr + area forests <50 yr). Large lakes are excluded from the calculation.

^dLarge Priority Zone 1 areas were divided into NWT A & B and NWT C & G.

^eThree small zones were combined into one zone (Sask F).

^fSask. zones H-J were combined and given an average priority rating of 2.