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THE ROLE OF THE B.C. PROVINCIAL PARK SYSTEM IN GRIZZLY BEAR PRESERVATION

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Abstract: The role of the large provincial park system in British Columbia (B.C.) in protecting grizzly bear (*Ursus arctos*) populations, range and ecological variation was examined in a provincial, national and international context. Varying degrees of protection of grizzly bears are provided by the 53 larger parks over 1,000 ha each and 89 smaller parks under 1,000 ha each. Trophy hunting is still allowed in 20 parks. Grizzly bears are extirpated in 12 larger parks and severely reduced in another 7. These 19 parks represent about 10% of the total range of 4,402,600 ha protected by provincial parks. B.C. parks support about 6% of the provincial grizzly population, contribute 5.6% of grizzly range, and represent about 1/3 of the 45 distinct landscapes in grizzly range, thus protecting ecological diversity. Nationally, B.C. provincial parks contribute about 27.5% of the total area of Canada's protected grizzly range and about 39% of the protected population. Internationally, B.C. provincial parks preserve grizzly bears in 2 unique global biogeographical provinces and contribute to 2 important Canadian-U.S. protected grizzly regions. Preliminary minimum viable population analysis showed that no B.C. provincial park is large enough to support the number of grizzly bears (393) considered necessary for long-term survival of genetic in-breeding and catastrophes should park populations become further isolated. Preservation of B.C.'s valuable grizzly bear resource therefore depends on sound management of large ecological systems that include large cores of protected wilderness and adjoining multiple-use lands. A comprehensive management program is recommended.

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The value of protecting large tracts of wilderness as a long-term strategy for the conservation of large mammal species such as the grizzly bear has long been recognized (Cowan 1972). Survival of remnant grizzly bear populations in the 6 isolated ecological systems identified by Servheen (1984) in the contiguous western United States appears to depend on the existence of protected wilderness. In British Columbia, the grizzly management plan (B.C. Wildlife Branch 1979:11) states: "To assure desired population levels, it is necessary to maintain large tracts of wilderness where human access and developments are restricted. This may be done by assigning nature conservancy, ecological reserve, wildlife management area or park status to selected lands or by attempting to control development through interagency resource planning. Critical areas of grizzly habitat, such as salmon spawning rivers, migration routes or denning sites, will be identified and protected by legislation where possible."

The difficulty in protecting grizzly bears in sanctuaries has been well documented. Martinka (1982a,b) pointed out that high losses in habitats peripheral to Glacier National Park, Montana, in combination with park management losses, could jeopardize future security of the park grizzly population. In Yellowstone National Park, over-development of recreational facilities in some critical grizzly habitat such as at Fishing Bridge is considered a serious threat to the park grizzly population (U.S. National Park Service 1984). Insularity of the gene pool of this island population is another concern (Suchy et al. 1985). Pearson (1977) concluded

that preserves are not, by themselves, sufficient to protect the grizzly bear in Canada citing the problems of mortality of bears that wander out of reserve areas and grizzly-man conflicts within reserves.

This paper reviews the role and effectiveness of the large B.C. provincial park system in the preservation of the grizzly bear in a provincial, national and international context. A future management strategy is presented.

In 1987, the B.C. Ministry of Parks (B.C. Parks) managed 53 larger parks (each over 1,000 ha) and 89 smaller parks (each under 1,000 ha) within the known range of the grizzly bear. This park system, incomplete and evolving, is administered under the B.C. Park Act with the dual mandate of protecting representative natural areas in perpetuity and providing for a variety of outdoor recreation opportunities. Under a 1984 wildlife management policy, B.C. Parks must protect examples of wildlife populations, habitats and associated ecological processes in B.C.'s 52 terrestrial landscapes and 7 marine environments.

The degree of protection provided by provincial parks varies. Under class A status, some visitor facilities are allowed but resource developments such as logging and mining and hydroelectric development are not. Under recreation area status, some resource development may be permitted. Trophy hunting of grizzly bears is allowed in 20 larger parks. B.C. Parks also manages 1 wilderness conservancy.

This paper is based on a background consultant report on the preservation and management of the grizzly bear in B.C. provincial parks (McCrory and Herrero 1987).

METHODS

Ideally such a review should be based on a thorough knowledge of grizzly bear diet, habitat, ecological association and ecotype, home range, population and mortality, and other factors in each of the major provincial parks. Unfortunately, such data are generally lacking. Therefore, for background information, we interviewed 40 B.C. Parks staff members and referred to 2 provincial park bear studies (McCrary and Mallam 1985, McCrary et al. 1986). The preliminary status of grizzly populations in each provincial park area and other protective designations such as national parks was extrapolated from province-wide distribution and abundance data (B.C. Wildlife Branch 1979). However, density data were preliminary and somewhat outdated. The method to calculate the minimum viable population of grizzly bears in B.C. provincial parks differed from the one used for Yellowstone National Park (Shaffer 1981, Suchy et al. 1985). We applied the genetic principles of Reed et al. (1986) to life table data of approximately 3,000 grizzly bear hunter kills recorded by the B.C. Wildlife Branch.

The methods to evaluate protected representation of ecological diversity varied. At the provincial level, we evaluated the distribution and abundance of grizzly bears in provincial parks in relation to the 52 regional landscapes and 7 marine environments. These were defined in a B.C. Parks study (1982) on the basis of general patterns of landforms, water and biota that are environmentally homogenous. At the national level, we used the Parks Canada (1976) terrestrial and marine natural regions and, at the international level, we used the world biogeographical provinces (Udvardy 1975).

RESULTS

Provincial Significance

Population.—Provincial parks collectively support approximately 390 grizzly bears or about 6% of the 6,600 estimated (B.C. Wildlife Branch 1979) in B.C. Crude population estimates for 6 (Fig. 1) of the 53 larger park areas are, in descending order: Tweedsmuir-76, Spatsizi-Tatlatui-59, Atlin-45, Wells Gray-41, Purcell Conservancy-25 and Mount Robson-17 (McCrary and Herrero 1987). An accurate population census for these and other parks has not been done.

In provincial parks adjacent to areas where range shrinkage and overhunting continue (Tompa 1984), park grizzly populations may be declining. In southwestern B.C., populations have been reduced to extremely low densities in 7 larger parks and extirpated in 12 (Table 1). Recovery of remnant populations may still be possible in

some of the more remote, larger park areas (Garibaldi, Skagit, Mount Judge Howay, Manning, Cathedral, and Golden Ears) because they are part of large contiguous complexes of protected lands.

Minimum Viable Population.—Relic island populations already exist in some southern park areas (Skagit, Manning and Cathedral). Continuing range shrinkage and population declines in the province may eventually cause further genetic isolation of park populations. Confinement of once interacting grizzly bear populations into isolated mountain enclaves could have significant negative impacts on the species. For example, the effect of inbreeding could lead to genetically mediated problems. The high incidence of hemophilia in the 19th century British Royal family was due to inbreeding (Lehmer and Libby 1976). Recent studies show that inbreeding depression clearly occurs in populations of wild animals kept in zoos and mated to relatives (Ralls and Ballou 1983). No studies have been done on the effects of inbreeding in bears but it would be reasonable to assume that it could prove harmful.

Smaller isolated populations are also more prone to natural and unnatural disasters over time such as excessively high, but temporary, man-induced mortality. The storm that killed about half of the next to last population

Table 1. Approximate grizzly bear range protected under different categories in B.C., 1987. Only protected areas over 1,000 hectares are considered.

	<i>n</i>	Total area (ha)	% of total area of B.C.	% of occupied grizzly range
B.C.		93,049,668		
Occupied grizzly range		78,287,500	84.1	
Moderate-high grizzly densities ^a		52,865,200	56.8	
Low grizzly densities		25,422,300	27.3	
Provincial Parks				
With grizzly bears	41	4,352,177	4.7	5.6
Moderate-high grizzly densities	34	3,954,652	4.3	5.0
Low grizzly densities	7	397,525	0.5	0.6
Grizzlies extirpated	12	50,523	0.1	0.1
National Parks				
With grizzly bears	4	433,175	0.5	0.6
Ecological reserves				
With grizzly bears	9	65,122	0.1	0.1
National wildlife areas				
With grizzly bears	0	0	0	0

^a Approximate densities are: low-1 grizzly bear/518 km², moderate-1 grizzly bear/129 km², and high-1 grizzly/52 km² (B.C. Wildlife Branch 1979).

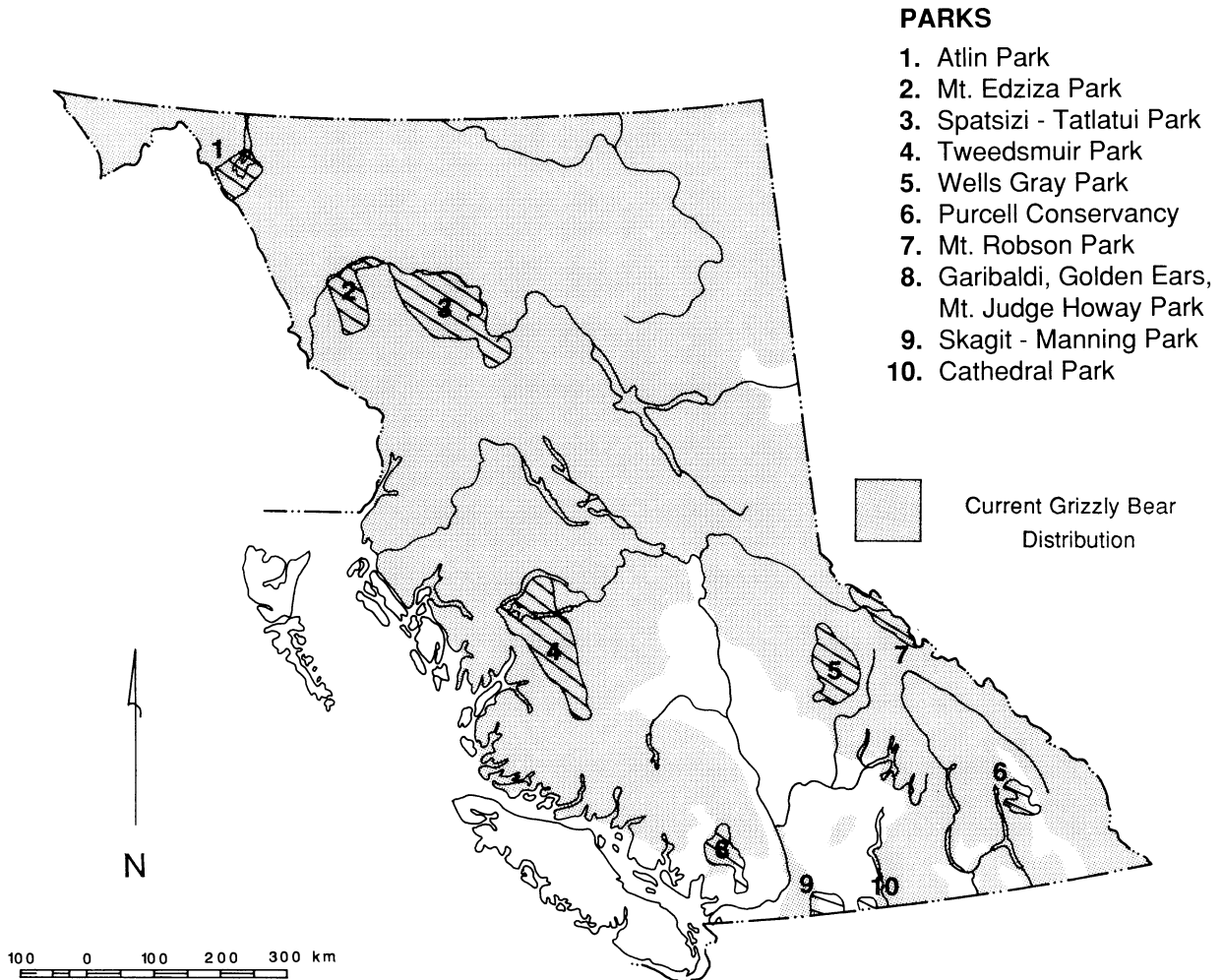


Fig. 1. Larger B.C. provincial parks in the present range of the grizzly bear (B.C. Wildlife Branch 1979).

of whooping cranes (Allen 1952) illustrates the vulnerability of reduced populations to natural catastrophes. Are B.C. provincial parks large enough to sustain, in isolation, minimum viable populations of grizzly bears that can maintain themselves for 1,000 years?

A recent simulation study (Suchy et al. 1985) for the Yellowstone grizzly population estimated the minimum viable population to be 40 to 125 bears. Neither this nor a previous study (Shaffer 1978) allowed for natural catastrophes or the possible negative effects of genetic inbreeding. Our analysis (McCrory and Herrero 1987) indicates that a total population of 393 grizzlies in any one area would be necessary to prevent levels of inbreeding shown to have negative health effects in other animal populations (Franklin 1980). Two reasons for such a large population are that a relatively small number of

breeding male grizzlies makes a large genetic contribution, and females have a low reproductive rate. Assuming that genetic inbreeding would have negative effects on bear populations, and given that no B.C. provincial park has an estimated population that exceeds 80-100 bears, it is obvious that parks may not ensure the long-term survival of grizzly bears should populations become isolated.

Distribution.—Grizzly bears occupy about 84% of the province (Table 1). Provincial parks protect about 5.6% of B.C.'s grizzly range, far more than other protective designations such as national parks (0.6%) and ecological reserves (0.2%). Grizzly bears have never inhabited the B.C. Pacific Coast islands as have black bears (Cowan and Guiget 1975) and thus they do not occur in provincial parks there.

Ecological diversity.—British Columbia is one of the most ecologically diverse grizzly bear regions remaining in North America. Variations range from grizzly bear populations in coastal rain forests with salmon runs to dry interior grasslands to northern boreal forests. Although not examined in detail, the B.C. Parks' (1982) regional landscapes and marine environments seem to incorporate satisfactorily the broader and more subtle ecological differences in B.C. grizzly populations. It is noteworthy that of the 45 landscapes/environments in grizzly bear range, about 1/3 have extirpated or near extirpated populations.

Of the 3 main protective systems (provincial parks, national parks and ecological reserves), the provincial park system provides by far the greatest representation of grizzly bear ecological diversity (Table 2). About 17 or roughly 1/3 of the regional landscapes/marine environments that still have moderate-high grizzly bear densities are considered to be adequately protected in provincial parks. National parks contribute to provincial representation in 3 regional landscapes; ecological reserves were considered too small.

Nineteen regional landscapes/marine environments in known grizzly bear range have inadequate park representation. It is significant that 9 regional landscapes considered by B.C. Parks to have near adequate or satisfactory representation have extirpated or near extirpated grizzly bear populations. In other words, although habitats may be well represented, the bears that use them are not.

National Significance

Population.—The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) does not consider

Table 2. Protection of grizzly bear ecological diversity in B.C. by provincial parks, national parks and ecological reserves. Diversity is loosely based on B.C. Parks (1982) distinct regional landscapes and marine environments.

Protective type and status in grizzly range	Regional landscapes/marine environments	
	Near-adequate to satisfactory protection	Zero to partial protection
Provincial Park		
Never occurred	4	5
Status unclear	1	4
Density moderate to high	17	13
Extirpated or near extirpated	9	6
National Parks		
Never occurred	3	
Density moderate to high	3	
Ecological reserves	1	

the grizzly bear endangered or threatened as a whole (Macey 1979). It was estimated that about 20,000 grizzlies remain in Canada, with about 5% in protected areas. This means that the 390 grizzlies estimated in B.C. provincial parks contribute significantly (39%) to the 1,000 grizzlies estimated in Canadian protected areas. In addition, grizzly bear numbers in 5 B.C. provincial parks contribute to the overall population in the large complex of protected lands that centres on Jasper National Park. Density data from Russell et al. (1979) suggested that this complex has about 287-343 grizzlies and is therefore the only protected land in southern Canada that approximates minimum viable population requirements.

Distribution.—Nationally, B.C. provincial parks account for a large portion (27.5%) of protected grizzly range in Canada, second only to national parks (36.9%) as shown in Table 3. Of additional importance are the 5 provincial parks that contribute 10% of the total protected area of the large complex of Rocky Mountains, mentioned above, and the small Akamina-Kishenina Recreation Area that acts as a buffer for Waterton National Park.

Ecological diversity.—Although only 1 grizzly bear subspecies is recognized in Canada, more subtle variation in the form of ecotypes has been documented. Pearson (1977:33) defined an ecotype as "a population or populations of grizzly bears displaying similar ecological characteristics such as home range size, food habits,

Table 3. Grizzly bear range represented by protective designations in Canada, 1987.

Protective category	Area (ha)	Percent of total grizzly bear range
British Columbia		
Provincial parks (over 1,000 ha each)	4,402,700	27.5
National parks	433,048	2.7
Alberta		
Provincial parks & other	611,300	3.8
National parks	1,804,460	11.2
Yukon		
Kluane & Northern Yukon national parks, Kluane & McArthur game sanctuaries	3,810,178	23.7
Northwest Territories		
Nahanni national park, Norah Willis terr. park, Peel River and Thelon game sanctuaries	4,932,599	31.0
Total in Canada	16,046,412	
Total in national parks	5,932,573	36.9

physical stature, activity, and habitat selection". For our analysis, we used the units of Parks Canada's (1976) terrestrial and marine natural regions. These correspond loosely to the 9 preliminary ecotypes defined by Pearson (1977).

British Columbia is the most diverse grizzly area in Canada. Eight of the 14 natural regions and 2 of the 3 marine environments in Canada's grizzly range occur in B.C. (Table 4). As well, 4 terrestrial regions are represented in provincial parks, which also represent more regions than other designations such as national parks.

International Significance

With no baseline information on grizzly bears in many other protected areas of the world, only a superficial review was possible. It is expected, however, that the B.C. Parks system would compare well with other countries in the international protection of the grizzly.

Shared populations with the U.S.—The survival of the grizzly in at least 4 of the 6 ecological systems in the lower 48 states depends on shared management between Canadian and U.S. agencies (Servheen 1984). In southern B.C., 3 provincial park areas (Cathedral, Manning

and Skagit) contribute 14% of the total area of protected international wilderness in the North Cascade ecological system. Here, a recovery program is being considered for the grizzly on the U.S. side. In southeastern B.C., the Akamina-Kishenina Recreation Area in the Northern Continental Divide ecological system provides a small, but important buffer to a large area of internationally protected grizzly range.

Ecological diversity.—B.C. provincial parks provide important representation of 2 of the 8 globally distinct biogeographical provinces (Udvardy 1975) that encompass Canada's grizzly bear range.

DISCUSSION

The limitations of this review are considerable, mainly because of the lack of reliable information on grizzly bear populations, habitats and ecological diversity in provincial parks and many other areas. However, we have been able to demonstrate that the B.C. provincial park system, although incomplete, is one of the most significant assemblages of protected lands in Canada for the preservation of the grizzly bear. Even in such a large system, many natural landscapes are not protected and, where they are, some grizzly populations have been extirpated or almost extirpated. As well, our minimum viable population analysis indicates that no provincial park is large enough to provide long-term genetic stability and survival of catastrophes should park populations become isolated over time. This merely points out the danger of a bear conservation strategy that depends mainly on sanctuaries.

History has shown that formerly homogeneous grizzly bear populations are prone to a process of range fragmentation. Such a process continues today in B.C. It is clear that maintaining the largest non-fragmented populations both in and around protected wilderness cores offers the greatest chance for the long-term survival of the grizzly bear.

A comprehensive management strategy has been recommended for B.C. Parks (McCrory and Herrero 1987) that includes:

1. Ecological system management of grizzly bears in and around parks in co-operation with adjacent jurisdictions.
2. Improved monitoring of population trends, mortalities and bear-visitor conflicts.
3. Reduction of potential bear-human conflicts by careful management and by planning of facilities including evaluation of the bear hazard before development of park facilities.
4. Accommodation of grizzly bear preservation

Table 4. Representation provided by B.C. protected areas of Canada's terrestrial and marine natural regions (Parks Canada 1976) in grizzly bear range.

Natural region	Status of grizzly population	Representation
Pacific Coast Mountains	Moderate-high extirpated in south	7 prov. parks over 1,000 ha each
Strait of Georgia Lowlands	Extirpated	None
Interior Dry Plateau	Extirpated in most areas	3 prov. parks over 1,000 ha each
Rocky Mountains	Moderate-high	Well represented by prov. and natl. parks
North Coast Mountains	Moderate-high	1 prov. park
Northern Interior Dry Plateau and Mountains	Moderate	3 prov. parks over 1,000 ha each
Mackenzie Mountains	Moderate	None
Southern Boreal Plains and Plateau	Low	None
Vancouver Island Inland Sea Marine	May be high in some areas, extirpated in others	1 prov. marine park, no grizzlies
Queen Charlotte Sound Marine	Up to plentiful densities	None

values and associated biological requirements in park additions and boundary or status revisions.

5. Consideration of recovery programs for some southwestern parks.

6. Examination of the closure of trophy hunting on a park-by-park basis.

LITERATURE CITED

- ALLEN, R.P. 1952. The Whooping Crane. Res. Rep. No. 3. Natl. Audubon Soc., New York. 246pp.
- B.C. PARKS. 1982. Natural regions and regional landscapes for British Columbia's provincial park system. Ministry of Lands, Parks and Housing, Victoria, B.C. 127pp.
- B.C. WILDLIFE BRANCH. 1979. Preliminary grizzly bear management plan for British Columbia. Ministry of Environ., Victoria, B.C. 25pp.
- COWAN, I. 1972. The status and conservation of bears (Ursidae) of the world - 1970. Int. Conf. Bear Res. and Manage. 2:343-367.
- _____, AND C.J. GUIGET. 1975. The mammals of British Columbia. B.C. Prov. Mus. Publ. 11, Victoria. 414pp.
- FRANKLIN, I.R. 1980. Evolutionary change in small populations. Pages 135-150 in M.E. Soule and B.A. Wilcox, eds. Conservation biology. Sinauer Assoc. Inc., Sunderland, Mass.
- LEHRNER, M.I., AND W.J. LIBBY. 1976. Heredity, evolution and society. W.H. Freeman and Co., San Francisco. 431pp.
- MACEY, A. 1979. Status report on endangered wildlife in Canada. (Grizzly bear) COSEWIC. 54pp.
- MARTINKA, C.J. 1982a. Rationale and options for management of grizzly bear sanctuaries. Trans. North Am. Wildl. and Nat. Resour. Conf. 47:470-475.
- _____. 1982b. Effects of conterminous land use on grizzly bears in Glacier National Park. Presented at Am. Assoc. for Advancement of Science Symp. on External Threats to Ecosystems of National Parks, 3-8 Jan 1982, Washington, D.C.
- MCCRORY, W.P., AND E.D. MALLAM. 1985. An assessment of grizzly and black bear habitat in Hamber Provincial Park., B.C., with recommendations to reduce bear-human conflicts. Report to B.C. Parks, Kamloops. 56pp.
- _____, S.M. HERRERO, AND P. WHITFIELD. 1986. Using grizzly bear habitat information to reduce human-grizzly bear conflicts in Kokanee, Glacier and Valhalla Provincial Parks, B.C. Pages 24-30 in G.P. Contreras and K.E. Evans, compilers. Proc.-grizzly bear habitat symposium. U.S. For. Serv. Gen. Tech. Rep. INT-207.
- _____, AND _____. 1987. Preservation and management of the grizzly bear in B.C. provincial parks. Report to B.C. Parks, Victoria. 186pp.
- PARKS CANADA. 1976. National Parks system planning manual. Natl. and Historic Parks Branch, Ottawa. 119pp.
- PEARSON, A.M. 1977. Habitat, management and the future of Canada's grizzly bear. Pages 33-40 in T. Mosquin and C. Suchal, eds. Proc. Symp. on Canada's threatened species and habitats. Can. Nat. Fed., Ottawa.
- RALLS, K., AND J. BALLOU. 1983. Extinction: lessons from zoos. Pages 164-188 in C.M. Schonewald et al., eds. Genetics and conservation. A reference for managing wild animal and plant populations. Benjamin - Cummings Publ. Co. Inc., Menlo Park, Calif.
- REED, M.J., P.D. DOERR, AND J.R. WALTERS. 1986. Determining minimum viable population sizes for birds and mammals. Wildl. Soc. Bull. 14(3):255-261.
- RUSSELL, R.H., J.W. NOLAN, N.A. WOODY, AND G. ANDERSON. 1979. A study of the grizzly bear in Jasper National Park, 1975-1978. Rep. to Can. Wildl. Serv., Edmonton, Alta. 136pp.
- SERVHEEN, C. 1984. The status of the grizzly bear and the interagency grizzly bear recovery effort. West. Assoc. of Fish and Game Comm. Meeting, Victoria, B.C.
- SHAFFER, M.L. 1978. Determining minimum viable population sizes: a case study of the grizzly bear (*Ursus arctos* L.). Ph.D. Thesis. Duke Univ., Durham, N.C.
- _____. 1981. Minimum viable population sizes for species conservation. Bioscience 31(2):131-134.
- SUCHY, W.J., L.M. McDONALD, M.D. STRICKLAND, AND S.H. ANDERSON. 1985. New estimates of minimum viable population size for grizzly bears of the Yellowstone ecosystem. Wildl. Soc. Bull. 13:223-228.
- TOMPA, F. 1984. Grizzly bears in British Columbia - harvest must be reduced. Paper presented at Annual Conf. of the West. Assoc. Fish and Wildl. Agencies, Victoria, B.C. 9pp.
- UDVARDY, M. 1975. A classification of the biogeographical provinces of the world. IUCN Occas. Pap. No. 18.
- U.S. NATIONAL PARK SERVICE. 1984. Fishing Bridge and the Yellowstone ecosystem. 151pp.