Preliminary Wolf Management Plan for British Columbia

Province of British Columbia
Ministry of Environment

PRELIMINARY

WOLF MANAGEMENT PLAN

FOR

BRITISH COLUMBIA

Fish and Wildlife Branch
Ministry of Environment
October 1979

PREFACE

Some of the information contained in this plan was selected from material prepared in 1972 by staff of the Fish and Wildlife Branch and in 1977 and 1979 by F.S. Tompa. Many field and headquarters personnel of the Fish and Wildlife Branch provided constructive criticism on earlier drafts. P.S. Petticrew drafted and W.T. Munro edited the plan. The typing of all drafts was cheerfully and ably done by Lynne Foxall and Lynda Adams, Fish and Wildlife Branch.

SUMMARY

There is a long history of conflict between wolf and man. Even today, public views on wolves are polarized more than on any other species in British Columbia; people appear to either "love" or "hate" them. The wolf is an efficient predator of other wildlife and sometimes livestock. Wolves occur throughout much of B.C. and the population is estimated to be about 6,000 $\pm$ 25% animals. The reproductive rate of wolves is high but appears directly related to prey availability and is seldom realized.

OBJECTIVES

1. Maintain viable populations of wolves in wilderness areas.
2. Provide opportunities for people to listen to and have a chance to view wolves in their natural habitat.
3. Control wolves on a site-specific, reactive basis in established livestock management areas to reduce livestock losses.
4. Control wolves in local areas where the main objective is to maintain another wildlife (prey) population at a desired level (ie. prevent elimination or serious depletion of a prey species).
5. Provide for the hunting and trapping use of wolves.

POLICY

Wolves will be managed as an integral part of wild ecosystems and as a game animal and a furbearer, generally being allowed to fluctuate naturally. Problem wolves will be removed locally where they cause losses or harass livestock in established agricultural areas. Control of wolves may be effected in local areas where it is proven that wolves are seriously depressing other wildlife populations below levels needed to meet management objectives. Wide-scale wolf control will not be practised. Population control by government personnel will be conducted only by trained, licenced persons in a manner and with methods which minimize stress and are the least harmful to non-target species. Some populations will be managed primarily for observation.

MANAGEMENT PRESCRIPTIONS

1. Designate areas where large predators, including wolves, should be protected against intrusion of grazing which historically has led to the extirpation of wolves over much of North America.
2. Maintain wolf populations by providing adequate populations and habitat of prey species (deer, moose, caribou, beaver) in wilderness areas.

3. Control wolves where necessary on a site-specific, reactive basis.
4. Set aside certain wilderness areas for use as benchmarks against which to compare management in other areas.
5. Provide information on wolves to the public so as to increase their awareness and understanding of this species and to reduce wolf/human conflicts in livestock management areas through the application of sound animal husbandry practices.

PROBLEMS

1. Public views on wolves are polarized and any management programme will offend many people.
2. Inventory of wolf packs is incomplete, particularly in wilderness areas.
3. The effects of wolf predation on native wildlife populations are unclear.
4. Wolves can and occasionally do cause serious local livestock losses in some areas; expanding livestock production is increasing wolf/man conflicts in central and northern areas of the Province.
5. Control of problem wolves is often difficult.

TABLE OF CONTENTS

INTRODUCTION

This plan is one in a series of draft management documents being prepared by the Fish and Wildlife Branch on individual species or groups of species. Comments from interested individuals are welcome within three months of the release of this plan and will aid in its revision. After revision, the plan will guide wolf management in British Columbia for the next five years consistent with management goals.

The goals of wildlife management in B.C. are:

1. *To maintain the diversity of species representative of the major biophysical zones of the Province; and*
2. *To ensure that within the constraints of land capability and biological limits of each species, wildlife is available in sufficient abundance to meet the recreational and economic needs of society.*

To meet these goals; objectives, policies and managment prescriptions have been developed. This plan describes how and why they were derived for the wolf. In addition it confirms and provides guidelines for the development of Regional Wildlife Management Plans which will present in greater detail regional objectives for numbers and distribution of wolves, uses to be made of wolves, and the cost of meeting those objectives. It also provides the reader with general information on which the management of wolves in B.C. is based.

THE RESOURCE AND ITS HABITAT

TAXONOMY AND DESCRIPTION

The wolf is the largest wild canid (dog family) native to British Columbia and is closely related to the wolves of Europe and Asia. In B.C. three subspecies are recognized: Canis lupus columbianus inhabits the central and northern areas of the Province; C. l. fuscus presumably inhabits the coastal mainland but may be extinct or have interbred with C. l. columbianus; and C. l. crassodon inhabits Vancouver Island (Nowak, 1974; Pisano, 1977). Further taxonomic studies to assess geographical variations are necessary in order to settle the question of subspecies.

The wolf is similar in appearance to a large German shepherd or a husky sled dog. However, it is a lankier and has longer legs, larger feet and a narrower chest. The long, heavy coat varies in texture and ranges in colour from black to white depending on the individual and geographical location. Male wolves are larger than females and usually weigh about 36-51 kg (80-112 lb.) while females weigh about 31-45 kg (69-99 lb.) although larger individuals have been recorded (Cowan and Guiguet, 1973).

DISTRIBUTION AND NUMBERS

The wolf formerly ranged throughout North America from the Mexican Plateau to northeast Greenland in almost all habitats and terrain; it did not inhabit much of California, the deserts of the southwestern United States nor the Queen Charlotte Islands in British Columbia. Wolves are presently found in wilderness areas in much of Canada, in Alaska, in parts of the northcentral United States and in reduced numbers in northcentral Mexico. It was exterminated from much of the southern portion of its range because of conflicts with man, especially livestock producers.

The range of the wolf in British Columbia is known from limited biological surveys and from indirect sources such as livestock depredation complaints, reports from guides, trappers, hunters and the general public, and hunting and trapping harvest records. The wolf is common in the central interior, northern B.C. and on northern Vancouver Island. Its distribution is partially governed by the abundance and availability of prey species. In much of the Kootenay and parts of the Thompson-Okanagan, and in the urban portion of the Lower Mainland Resource Management Regions, it has been extirpated.

Populations of wolves do not necessarily inhabit a single management unit nor stay within provincial, national or park boundaries. Thus some populations are shared with the province of Alberta (and Parks Canada), the Yukon and Northwest Territories and the states of Alaska and Washington.

The current population estimates by Resource Management Region are given in Table 1. The regional wolf estimates are based on prey and habitat distribution, subjective knowledge of regional staff and preliminary research findings. Figure 1 shows the current distribution and relative abundance of the wolf in British Columbia. The provincial population is estimated to be about 6,000 animals.

In spite of the bounty system operating until 1955, wolf numbers probably fluctuated with the prey species throughout most of B.C. Wolf numbers were reduced to their lowest levels in the late nineteen fifties as a result of a concerted control programme including the widespread use of poisons. After this programme ended in wilderness areas in 1961, wolves began to increase in numbers over most of their former range. By the late sixties wolves were once again abundant in central and northern B.C. Fluctuations appear to have occurred and recently wolves are reported to be increasing in some areas. It should be noted that population inventories have been inadequate to clearly document fluctuations in wolf numbers.

In the next few years some wolf populations will inevitably decline along with prey species as a result of habitat destruction or alienation due to man's activities. Other populations may be increased through the preservation of wilderness and habitat management for prey species.

BIOLOGY

Wolves are social animals and function in packs that are based on family units (Mech, 1970; Banfield, 1974). The average pack has 5 to 8 members (Mech, 1970; 1974) and is held together by strong affectional ties. The pack normally includes a dominant breeding pair, their pups of the year, their yearlings and sometimes other related adults (more than one mature female). If there is more than one pair of adults or more than one adult female in the pack normally only the dominant pair breeds. Breeding generally occurs in late February through to mid-March depending on the latitude and winter conditions. Gestation is approximately 63 days and an average of 6 to 7 pups (range 1 - 14) are born blind and helpless in late May and June (Mech, 1970; Banfield, 1974). The mother, who is fed by pack members, stays near the pups until they are weaned at about 8 weeks; at about the same time the pups are moved from the first or natal den to a summer den which is usually near a "rendezvous site". After weaning the pups are fed by the adult pack members who regurgitate food or carry it back from kills. By fall the pups join the pack in their travels and all pack members assist in their education and protection.

Figure 1. Current Distribution and Relative Abundance Map of Wolves in British Columbia.

TABLE 1. Population Estimates for Wolf

Resource Management Region	Estimated No. of Wolves	Estimated Outside Limits	% of Total Estimate
1. Vancouver Island[+]	400	(200-1500)	6%
2. Lower Mainland	80	(40-300)	1%
3. Thompson-Okanagan	70	(35-110)	1%
4. Kootenays	20	(10-40)	1%
5. Cariboo	200	(100-300)	3%
6. Skeena	2500	(1000-4,000)	40%
7. Omineca-Peace	3000	(1100-5,000)	48%
Total all Regions	6300	(2500-11,000)	100%

+ Includes the mainland portion of this region as well.

Large packs may form for a relatively short time depending on social and mortality factors. Presumably, large packs indicate high populations and relatively favourable abundance of prey species. Pack cohesion is greatest during the fall and early winter; it is at a minimum in the late winter during the breeding season (Stephenson, 1978b). Single animals may be young or old but are usually animals which are "low ranking" (Stephenson, 1978b) and have left the pack. The pack social structure is maintained by a dominance hierarchy with the adult male dominant over the female (mate) and pups, the female dominant over the pups and finally the pups in order of strength. In larger packs a male order and a female order develops among the adult members.

During most of the year, packs occupy exclusive territories or home ranges. Some overlap may occur in winter, and generally summer ranges are smaller than winter ranges. Daily travels within a home range may vary from a few to many kilometers per day depending on a variety of factors including prey availability and season. Lone animals may cover areas which are larger than pack territories. Home range size, daily movements and pack seasonal movements are not known for wolves in British Columbia. However, some examples of home range and wolf densities as found in Alaska (Stephenson, 1978b) and Minnesota (Mech, 1977b) are presented in Table 2. In parts of the Skeena and Omineca-Peace Resource Management Regions, preliminary wolf densities were compiled by A.T. Bergerud (1978) and are outlined in Table 3.

Wolves are carnivorous; in various areas and at different times of the year, moose, deer, caribou, mountain sheep and goat are important prey species. Smaller mammals (especially beaver during the summer), birds and other predators may also be utilized; wolves are scavengers or carrion feeders when necessary. In coastal areas wolves may feed on intertidal organisms and fish. In B.C. wolves may prey on domestic animals. Wolves are efficient livestock predators and this has led to the destruction of wolves wherever livestock grazing is a dominant land use. The kill and success rates of wolves are highly variable and are influenced by a variety of factors including prey size, prey availability and vulnerability, weather conditions (e.g. snow crusting), pack size and behaviour and food preferences.

It has been shown that wolves are generally selective and tend to prey on animals that are young, old, diseased or otherwise inferior. Mech and Karns (1978) found that during a deer decline, adult males and female fawns were particularly vulnerable to wolf predation. Wolves may or may not have a regulating influence on ungulate populations as shown by a variety of studies (reviewed by Connolly, 1978). However, in some cases it appears that predation on ungulates can modify the recruitment of young into a population (e.g. caribou (Bergerud, 1978); deer (Mech and Karns, 1978)). Factors

TABLE 2. Home Ranges or Territories of Wolf Packs in Alaska and Minnesota.

LOCATION	Alaska	Minnesota
AUTHOR	Stephenson, 1978b	Mech, 1977b
TIME SPAN	1 year	4 years
TERRITORY SIZE VARIATIONS:		
Year-Round	279.7 km^2 to 3076.9 km^2 (108 mi^2 to 1188 mi^2 for 9 packs)	
Average	1170.7 km^2 (452 mi^2)	
Summer	308.2 km^2 to 979 km^2 (119 mi^2 to 378 mi^2 for 4 breeding packs)	117.3 km^2 to 131.6 km^2 (45.1 mi^2 to 50.6 mi^2 for 1 pack 3 summers)
Summer (Aug. 4 years)		165.6 km^2 (63.7 mi^2)
Winter		122.7 km^2 to 183 km^2 (47.2 mi^2 to 70.4 mi^2 for 1 pack over 4 winters)
Winter (Aug. 4 years)		222.8 km^2 (85.7 mi^2)
DENSITY		
Average	1 wolf/226 km^2 (1 wolf/87 mi^2-Spring)	
Range	1 wolf/56 km^2 to 1 wolf/233 km^2 (1 wolf/21.6 mi^2 to 1wolf/90 mi^2)	

TABLE 3. Range and density of wolves in selected areas of B.C.*

Area	Pack Sizes	Area		Density	
		In km^2	In mi^2	Wolf/km^2	Wolf/mi^2
Toad River Hot Spring	14, 9, 13, 12	4144	1600	1/85	1/33
Muskwa-Prophet	14, 12	3885	1500	1/150	1/58
Tuchodi River	9, 5, 12, 15	2849	1100	1/70	1/27
Sikanni Chief	13, 1, 5	3108	1200	1/163	1/63
Lower Prophet	12	2072	800	1/171	1/66
Spatsizi Park	60-75 total	8288	3200	1/109-137	1/42-53

* Adapted from Bergerud, 1978 (p. 85).

affecting the impact of predation would include the relative densities of predator and prey, density of alternate prey species, the prey's size, behaviour and reproductive potential as well as habitat and weather conditions and hunting pressure. Hoskinson and Mech (1976) found that wolves did not prey heavily on deer around their territory edge except as a last resort (during deer decline). Deer in those areas were found to concentrate along territory edges in winter thus forming a resorvoir from which to re-populate. In British Columbia wolves are thought to be suppressing caribou numbers in some areas and this relationship is currently under study (D. Eastman, pers. comm.)

Wolf population declines are generally the direct result of a decrease in prey. Malnutrition, starvation, parasites, diseases and intraspecific strife (fighting, cannibalism) are important contributors to natural wolf mortality during periods of prey scarcity. Mech (1977a) found that the first symptom of population problems was malnutrition in pups. When prey is scarce, intraspecific strife may be a primary natural mortality factor among adult wolves (Mech, 1977a); as territory size increases, trespassing on other pack territories in search of food occurs thereby increasing contacts (fighting) between packs.

Parasites of wolves include tapeworms, flukes, roundworms, lice, ticks, fleas, tongue worm and range mite (Mech, 1970). Rabies and distemper are important diseases. Injuries from prey and accidents (falling) are also known to occur.

Mech (1970) calculated from the available literature the survival rates for unexploited wolf populations to be: 6-43% for pups from birth to the first winter, 55% from the first to second winter and 80% annually for adults. These figures are estimates and may be higher or lower for populations and social classes depending on a variety of conditions. Winter food consumption may be considered critical to the number and viability of the pups produced; a reasonable summer food supply may also make the difference in pup survival. Mech (1977a) suggests that more than 3.2 kg (8 lb.) of food per wolf per day is required for successful reproduction; less than this amount during winter results in low pup production and survival.

Legal and illegal hunting and trapping, prey habitat alteration and destruction and control by poisoning (legal and illegal) are important man-caused mortality factors for some wolf populations. Illegal hunting, trapping and poisoning sometimes occur in marginal livestock grazing areas where government predator control programmes are limited. Some harassment probably occurs during winter by people in aircraft or on snowmobiles.

Although female wolves may become sexually mature at 2 years of age and males at about 3 years of age, environmental and social factors (as outlined previously) may

prevent breeding. The high reproductive potential of wolves is thus seldom realized because of the changing food supply combined with the aforementioned mortality factors. Under some conditions, wolf populations may compensate for human exploitation of their numbers by increasing production and by higher pup survival (Mech, 1977a; Stephenson, 1978a). Under conditions such as reduced populations because of reduced prey populations, human exploitation may further reduce wolf numbers if this type of mortality surpasses recruitment.

HABITAT

The preservation, maintenance or enhancement of a species is directly related to the condition and extent of its habitat. In the case of a predatory animal such as the wolf, any habitat that is to be used must have an abundance of prey species.

Wolves occupy almost all habitat types in British Columbia from the coastal forest through boreal forests to sub-alpine and alpine areas, wherever prey are found. Although wolves may follow sheep and goats to high elevations, they do not occupy precipitous, mountainous areas or glaciers. Habitat components for the wolf include: summer and larger winter range or territory; natal den, rendezvous site with a trail system, bedding and shelter areas, activity center and water source; travel routes, resting areas, scent posts; ungulate calving grounds, kill sites; and other prey sources and peripheral area or buffer zone in which the pack does not usually hunt.

The existing amount of wolf habitat will decrease in the next few years corresponding to a decrease in the available habitat for prey species. Mineral extraction operations and associated activities, transportation corridor construction and power developments (water, coal and oil) as well as rural and urban expansion in some areas of B.C. will have an adverse impact on prey and wolf habitat and on the wolf directly. The main problem in maintaining wolves is the inability of wolves and livestock to occupy the same range. However, the provincial wolf population is not believed threatened on a short-term basis.

USES

Wolves, like other wildlife, have played an important role in the cultural history of man. In British Columbia native Indians hunted and trapped the wolf mainly for its fur and developed ceremonies and mythology centered on the wolf.

Throughout North America, the wolf was persecuted and extirpated from agricultural areas and human settlements as European Man dispersed across the

continent. Although the earliest regulations are obscure, it appears that the situation was no different in British Columbia. A bounty on wolves was introduced sometime prior to 1907 and until 1962 the emphasis was on controlling wolves and other predators wherever they were in conflict with man. The history of regulations for wolves is outlined in Appendix A; bounties paid (1906 - 1955) are in Appendix B. The management of the wolf did not really begin until 1966 when it was designated a big game animal and closed seasons, bag limits and other hunting method restrictions were instituted. From 1966 to 1976 the trapping of wolves was disallowed; currently trapping with killing traps only is allowed in the 3 northern Resource Management Regions. Harvest and fur sale figures are in Appendices C and D.

The non-hunting use of the wolf cannot yet be measured. Although wolves are difficult to observe, they are thought by many to generally increase the attractiveness of B.C. as a wilderness area. Organized non-hunting use of this species is low but having an encounter with wolves is an exciting experience for any outdoor recreationist. Excursions to hear wolves howling have proved popular in other parts of Canada and in the United States.

CONFLICTS

The management of wolves is a controversial subject due to conflicting human interests. The three main areas of conflict centre on resource use and control versus complete protection, predation on livestock and influence on wildlife populations.

The first conflict is over the use and control of the wolf resource versus complete protection. Many extremists call for the total protection of this species while disregarding livestock depredations and the use of a renewable wildlife resource by hunters and trappers. Others wish to eliminate wolves from the province. Protection is given to the wolf in parts of the Province where their numbers are low but complete protection of the wolf throughout British Columbia is neither warranted nor desirable.

The wolf's selection of prey (livestock and game animals) is also a source of conflict. Wolves, in some areas of B.C., can be a threat to the local livestock industry as are other predators. In marginal grazing areas, cattle and sheep may occupy or be adjacent to prime game ranges which also support wolf populations. Given circumstances which reduce the availability of wild prey or through chance encounters with livestock, wolves may switch to domestic animals (see Appendix E). This leads to a cry for wolf control and sometimes illegal shooting, trapping and poisoning of wolves.

Wolves in combination with other factors may also reduce or hamper the recovery of local wildlife populations. This can also result in a call for wolf control accompanied

by illegal killing. This leads to the questions of whether wolves should be controlled in order to prevent the elimination of a prey species or to permit its recovery to previous population levels. The Fish and Wildlife Branch will control wolves for the protection of other wildlife only on a local basis where it is proven that wolves are preventing the realization of management objectives for other species.

The last conflict centres around the increasing human use of wildlife habitat; it has many implications and is difficult to resolve. Habitat for prey species is decreasing due to habitat alienation or destruction by land use practices such as coal mining and other mineral extraction operations and associated activities, extensive livestock grazing and other agricultural development, transportation corridor construction, power developments and urban/rural expansion. The loss of habitat affects prey species as well as predators and can result in population declines. In addition, increasing numbers of people using wilderness areas may affect wildlife populations, including wolves. Through harassment, an animal's natural behaviour may be modified.

MANAGEMENT

Management is directed towards maintaining a resource within prescribed limits and regulating its use for the benefit of man. Management programmes must recognize the role wolves play in ecosystems, the livestock losses wolves can cause and the priorities for use of this and other wildlife species.

OBJECTIVES

Five objectives have been identified for wolf managment in British Columbia.

The first objective is to maintain viable populations of wolves in wilderness areas. Until more information is available on the wolf-ungulate and wolf-livestock relationships and on population dynamics of the wolf in British Columbia it is not known whether it is advisable or feasible to maintain the wolf at the current provincial estimate. However, the Fish and Wildlife Branch will take action to prevent this species from being extirpated or otherwise becoming endangered in B.C. through the actions of man. Wolf populations will be allowed to fluctuate naturally in wilderness areas with modest hunting and trapping seasons unless evidence shows they should be reduced or increased.

The second objective is to provide opportunities for people to listen to and observe wolves in their natural habitat. This is the result of public demand for the non-hunting use of this resource. The Fish and Wildife Branch will promote this use wherever it is possible. Listening or viewing may be in wilderness areas such as parks, ecological reserves, nature conservancies or wildlife management areas.

The third objective is to control wolves in well established livestock management areas to reduce livestock losses. Wolves and livestock are often not compatible; wolves can and occasionally do cause serious local livestock losses. Acceptable levels of livestock losses will depend on the location of the ranch and livestock husbandry practices (see Appendix E).

The fourth objective is to control wolves on a site specific basis where the main objective is to maintain another wildlife (prey) population at a desired level. High wolf numbers may threaten the existence or prevent the recovery of isolated populations of prey species, especially if habitat and weather conditions are poor or wolf numbers are high. Control may be undertaken in such circumstances if investigations indicate it is necessary in order for a prey population to begin to recover.

The fifth objective is to provide for the hunting and trapping use of wolves. Based on information for the last two years, approximately 600 wolves are taken annually by hunters and trappers in B.C. (see Appendices C and D). Specific numbers for this use will be derived when more accurate information is available on population dynamics, distribution, predator-prey relationships and harvest and control data.

POLICIES

Wolves will be managed as an integral part of wild ecosystems and as a big game species and furbearer. Populations will generally be allowed to fluctuate naturally. The hunting and trapping of wolves have been traditional activities in British Columbia and they do not greatly influence wolf numbers. They are compatible in most areas with non-hunting use. Although specific harvest levels have not yet been established, the Fish and Wildlife Branch will generally set conservative regulations which regionally consider wolf population fluctuations, livestock depredations, prey numbers and other pertinent factors. The Branch will, however, restrict the taking of wolves where their numbers are low (close areas to hunting and trapping) and will encourage the harvest of wolves where their numbers are high, livestock losses are significant or prey populations are exceedingly low.

Problem wolves will be removed locally where they cause losses or harass livestock in established agricultural areas. Control on a site-specific, reactive basis will only be undertaken in response to reported and confirmed livestock losses. Where livestock losses or other forms of property damage are the direct result of negligence or poor livestock husbandry practices, wolf control will not be carried out.

The control of wolves may be effected on a site specific basis where it is proven that wolves are preventing the attainment of management objectives for other species. In addition, the control of wolves on a site specific basis may be undertaken if research (scientific use) on the effects of predation on a prey population is required. Thorough investigations will be carried out prior to the implementation of control measures. It should be noted that programmes will be planned not only to hasten the recovery of local prey populations but also to ensure that wolves will not be eradicated from the area in question. At no time will widespread wolf control be practised.

Population control by government personnel will be conducted only by trained, licenced persons in a manner and with methods which act fast, minimize stress and are the least harmful to non-target species. Shooting, trapping and, in some cases, poisoning will be required. In addition, more liberal hunting seasons, bag limits, and trapping may also be used to assist in reducing wolf problems.

Some wilderness areas will be managed primarily for non-hunting recreation (listening and observing). Where wolf packs inhabit areas frequented by people in pursuit of outdoor activities, such areas will be considered for designation for this use and provisions made for interpretative material.

MANAGEMENT PRESCRIPTIONS

During the past ten years, public attitudes towards predators, and wolves in particular, have changed but views remain polarized. This polarization has hindered the Fish and Wildlife Branch in its attempts to work out a comprehensive wolf management programme that is responsive to the public needs and ensures the maintenance of the wolf resource. In 1977 the Branch reviewed its survey programmes for wolf, caribou, moose and deer. It thus became apparent that survey information was inadequate to clearly document changes in wolf numbers or any reduction in ungulate herds due to excessive wolf predation. In addition it was obvious that the programmes did not meet the needs for present or future management and that new and standardized inventory techniques were required. Although improvements have been made and studies initiated, information is still lacking. Wolf population inventory is incomplete and detailed information on the wolf-wildlife and wolf-livestock relationships is necessary. The Fish and Wildlife Branch will encourage research on wolves in order to improve wolf and other wildlife management through a better understanding of the factors affecting this relationship and to gain an understanding the wolf-livestock interactions and ways and means of reducing conflicts.

In order to ensure the maintenance of wolf populations in wilderness areas, adequate prey populations and prey habitat must be maintained. It should be noted that the cost of maintaining wilderness will be high. Public assistance will be needed in deciding the worth of maintaining wilderness areas in light of the pressure of developments. In protecting other wildlife species and in carrying out management prescriptions for them, the long-term survival of the wolf should be ensured. To this end the Fish and Wildlife Branch will continue to cooperate with other agencies and neighbouring jurisdictions which are responsible for the management of the wolf in order to ensure the maintenance of this resource and to improve the management of this species in British Columbia.

In many areas of British Columbia, human land uses have priority over wildlife. In established livestock grazing areas the Fish and Wildlife Branch is committed to resolving wolf-livestock conflicts through a management programme that will differentially consider local, social, ecological, economic and other factors. Consideration must also be given to limiting livestock grazing on marginal agricultural lands, especially if the wildlife capability or value is high. To this end, the Fish and Wildlife Branch will designate areas where wolves should have priority over livestock and therefore where livestock must be excluded in the best interest of the wolf as a species. History has shown that wolves cannot survive over the long term where grazing is a

continuing land use. The Provinical and Regional Problem Wildlife Advisory Committees, which also include representatives for producer and conservationist groups will continue to assist the Branch and the Ministry of Agriculture in solving man-wildlife conflicts or problems. Livestock producers will be encouraged to practise good livestock husbandry and to work closely with experienced local trappers. The prevention of damage is a key factor in reducing predator problems.

The public must be informed of the need for sound, comprehensive wolf management including programmes which will consider all aspects of the predator-prey relationship and the welfare and management objectives for each species. The Fish and Wildlife Branch will provide information to the public on wolf biology as well as the results of studies on wolf-game and wolf-livestock interactions. Such information will increase the public's awareness, appreciation and understanding of this species and will assist the Branch in considering public demands and interests, to set management objectives for ungulates and wolves. Information programmes (especially those designed for livestock producers and trappers) will help reduce wolf-livestock and other wildlife damage problems as well as reduce the illegal killing of wolves and other problem wildlife.

To accommodate the increasing non-hunting recreation use of the wolf resource, the Fish and Wildlife Branch will designate and manage certain wilderness populations primarily for this type of use. Observation of this species will be limited as the wolf is elusive. However, in many wolf territories, opportunities exist seasonally for people to hear wolves howling or to observe them. At such locations the Branch will identify and provide or encourage other agencies to provide interpretative material.

Harvest (hunting and trapping) will be consistent with the biology of the species, the maintenance of suitable population levels, the management objectives for various prey populations, the consideration of livestock losses and pelt primeness. The wolf is a difficult animal to hunt and its harvest through hunting is incidental to the taking of other species. The Branch will restrict the taking of wolves in areas of low population numbers and will encourage the hunting and trapping of wolves where their numbers are high, livestock losses significant and prey populations low.

Regional Wildlife Management Plans are being prepared which will provide detailed objectives for wolves by Resource Management Region. Special attention will be paid to available prey populations, habitat, and to human land uses (especially agriculture) which alienate or destroy habitat or which have priority over wildlife.

In summary, the management of the wolf must be comprehensive in order to accommodate conflicting public interests and to increase the effectiveness of

management programmes in response to natural circumstances. The present uses of and priorities for the wolf resource, while they may not be those of the future, will maintain the resource so that most options for management and use in the future will be available. The Branch will consider and evaluate public demands in formulating future management plans and objectives.

BIBLIOGRAPHY

Banfield, A.W.F. 1974. The Mammals of Canada. Univ. of Toronto Press for National Museum of Natural Sciences and the National Museums of Canada, Toronto, Canada. pp. 289-295.

Bergerud, A.T. 1978. The Status and Management of Caribou in British Columbia. B.C. Fish and Wildl. Br. Ministry of Rec. and Cons. Victoria. 150pp.

Connolly, G.E. 1978. Predators and predator control. In: Big Game of North America: Ecology and Management. J.L. Schmidt and D.L. Gilbert, eds. Stackpole Books, Harrisburg, Pa. pp. 369-394.

Cowan, I. McT. 1947. The timber wolf in the Rocky Mountain National Parks of Canada. Can. J. Res. 25: 139-174.

_____ and G.J. Guiget. 1973. The Mammals of British Columbia. B.C. Prov. Mus. Handbook No. 11 (5th Ed.), Queen's Printer, Victoria, B.C. 414pp.

Hoskinson, R.L. and L.D. Mech. 1976. White-tailed deer migrations and its role in wolf predation. J. Wildl. Manage. 40(3): 429-441.

Joslin, P.W.B. 1967. Movements and homesites of timber wolves in Algonquin Park. Amer. Zool. 7: 279-288.

Mech, L.D. 1970. The Wolf. American Museum of Natural History. The Natural History Press, Garden City, New York. 384 pp.

_____ 1973. Wolf numbers in the Superior National Forest of Minnesota. USDA For. Serv. Res. Pap. NC-97. Nor. Cen. For. Exp. Stn., St. Paul, Minnesota. 10pp.

_____ 1974. Canis lupus. Mammalian Species No. 37: 1-6.

_____ 1977a. Productivity, mortality and population trends of wolves in northeastern Minnesota. J. Mammal. 58(4): 559-574.

_____ 1977b. Population trend and winter deer consumption in a Minnesota wolf pack. In: Proceedings of the 1975 Predator Symposium. R.L. Phillips and C. Jonkel, eds. Montana For. and Cons. Exp. Stn., Univ. Montana, Missoula. pp. 55-83.

_____ and L.D. Frenzel, Jr. Eds. 1971. Ecological Studies of the Timber Wolf in northeastern Minnesota. USDA For. Serv. Res. Pap. NC-52. Nor. cen. For. Exp. Stn., St. Paul, Minnesota. 62pp.

_____ and P.D. Karns. 1978. Role of the wolf in a deer decline in the Superior National Forest. USDA For. Serv. Res. Pap. NC-148. Nor. Cen. For. Exp. Stn., St. Paul, Minnesotta. 23pp.

Nowak, R.M. 1974. The gray wolf in North America: A preliminary report. Manuscript submitted to the New York Zoological Society and the U.S. Bureau of Sport Fisheries and Wildlife. pp. 52-65.

Pisano, R. 1977. The Status of the Wolf in North America. Internat. Soc. for Protection of Animal Science Ser. No. 2. 15pp.

Singer, F.J. 1975. The history and status of wolves in northern Glacier National Park, Montana. Glacier Nat. Park Scien. Pap. No. 1. 55pp.

Stephenson, R.O. 1978a. Characteristics of Exploited Wolf Populations. Alaska Fed. Aid Wildl. Rest. Prog. Rep. Proj. W-17-3 through W-17-8. Vol. 1. Juneau. 21pp.

_____ 1978b. Unit 13 Wolf Studies. Alaska Fed. Aid Wildl. Rest. Prog. Rep. Proj. W-17-8. Juneau. 75pp.

APPENDIX A

History of Regulations for Wolves

Wolves were considered vermin from about 1906 to 1955. During this period, regulations governed the payment of bounties on wolf pelts and from 1920 to 1930 the payment of royalties for pelts sold as fur. Until the late sixties, wolves were not protected through the use of seasons, bag limits and hunting method restrictions. Trapping was disallowed from 1966 to 1976. Outlined below is a brief history of wolf management in British Columbia:

1907 The bounty on wolf was introduced at an earlier but unknown date and was increased from $2.50 to $5; the hunting and trapping of wolves was unrestricted.

1910 Wolf bounty increased to $10. Young animals worth half the adult bounty.

1918 Verification of pelt identity required prior to payment of bounty; other restrictions imposed under the bounty regulations. Evidence presented to the Game Board concluded that the bounty system would not exterminate predators.

1919 Wolf bounty increased to $15.

1920 Royalty on wolf pelts was introduced ($0.25). It is unclear whether or not the royalty was repealed in 1922 but the wolf continued to be listed in the Annual Report table on fur royalties until 1939.

1928 Bounty on <u>all</u> wolves: $15.

1932 Payment of bounties suspended.

1938 Bounty increased to $10.

1939 Royalty on wolf pelts discontinued.

1947 Bounty on wolves increased from $10 to $25

Predator Control Branch formed under the Provincial Game Commission, 5 Predatory animal hunters hired.

1948 Bounty on wolves increased to $40 in the Kamloops, Lillooet and Cariboo Electoral Districts.

1949 Experimentation with poisons (cyanide, strychnine, 1080).

1950 Sodium fluoroacetate (1080) introduced for wolf and coyote control, a few baiting stations established.

1952 The use of the baiting stations expanded.

1955 Bounty system terminated for the wolf.

1961 Poisoning in wilderness areas ceased. Baiting continued in livestock raising areas and in some heavily hunted areas.

1963 Predator Control Division disbanded.

1964-1973 Predator control administered regionally.

1966 The wolf designated a "big game" animal with the harvest limited by seasons, bag limits and hunting methods restrictions. Trapping disallowed.

1968 A Committee on Predator Control Policy established.

First closed seasons for wolves on Vancouver Island and in the Kootenays. Efforts being made to manage as a game animal.

1969 Bag limit of 1 introduced for wolves hunted in 7 management areas; bag limit of 3 animals for 4 management areas; 15 management areas had no bag limit. Further reductions in bag limits were introduced in 1970, 1971 and 1974.

1970 Non-resident trophy fee introduced for wolves: $40.

1974 A Provincial and 9 Regional Predator Management Advisory Committees established to advise and assist the Fish and Wildlife Branch in the administration of the predator management policy. The role of these committees was expanded in 1977 to cover all problem wildlife (including ungulates).

Animal Control Officers (now Wildlife Control) designated in each Resource Management Region and subregion.

Non-resident licence for wolf increased to $75.

Bag limit reduced to 3 wolves except for 4 management areas where the bag limit was already 1 animal.

1975 Change to 7 Resource Management Regions and 218 management units to allow for more refined management; more varied seasons and closed areas.

Use of poisons (sodium fluoroacetate (1080), strychnine and cyanide) under strict operational guidelines only for control of specific problem wolves and other wildlife.

1976 The wolf given fur-bearer status: trapping allowed in 6 and 7 Resource Management Regions with killing traps only; royalty on wolf pelts; hunters selling wolf pelts must pay the current royalty. No limit on the number of wolves trappers may take.

1977 First open (hunting) season for wolves on Vancouver Island since 1968.

1979 Trapping allowed in Region 5 only

Temporary moratorium on the use of poisons imposed; then application made to Pesticide Control Branch for limited use.

Preliminary wolf management plan prepared.

APPENDIX B

Number of Wolves Taken For Fur (1921-1938), Bounty (1909-1955) and for Control (1934-1955)

Outlined in Table 1 is the number of wolf pelts sold for fur from 1919 to 1945. Table 2 outlines the number of wolves taken for bounty from 1909 to 1955 and the number of wolves taken by Branch personnel for control purposes from 1934-1955. See Appendix D for the number of wolf pelts on which royalties were paid from 1976-1977.

TABLE 1. Number of Wolves Sold for Fur, 1919-1945.

Year	No. of Pelts sold for Fur*
1919	178
1920	188
1921	306
1922	642
1923	364
1924	486
1925	215
1926	537
1927	454
1928	422
1928	329
1930	363
1931	310
1932	85
1933	446
1934	841
1935	837
1936	828
1937	915
1938	1311
1939	1349
1940	167
1941	169
1942	943
1943	1280
1944	1157
1945	71

* Statistics Canada Figures. Unavailable from 1946 to 1961.

TABLE 2. Numbers of Wolves Taken for Bounty (1909-1955) and Control (1934-1955).[o]

Year	No. Bounties Paid On	Year	No. Bounties Paid On	No. Taken by Branch in Control*
1909	655	1934	222	1
1910	581	1935	561	14
1911	467	1936	837	10
1913	277	1937	828	13
1914	382	1938	915	2
1915	299	1939	1159	
1916	210	1940	1659	25
1917	No Report	1941	1002	30
1918		1942	1039	8
1919	124	1943	1017	21
1920	84	1944	1321	27
1921		1945	1202	26
1922	303	1946	932	26
1923	162	1947	1102	52 x
1924	195	1948	1156	66
1925	291	1949	1180	92
1926	336	1950	991	211
1927	344	1951	753	107
1928	452	1952	728	216 ✓
1929	411	1953	544	207
1930	312	1954	415	113
1931	310	1955	202	60
1932-1933	Bounty Suspended			

o Taken from the 1955 Annual Report. In the mid 1970's about 200 animals were taken annually in control programmes.

* No figures given from 1909-1933.

x Predatory-animal hunters hired for the Predator Control Branch which was formed this year.

✓ The use of baiting stations expanded.

APPENDIX C

Non-Resident Wolf Harvest, 1974-1977

Table 1 indicates non-resident wolf licence sales, harvest and success from 1974 to 1977 inclusive. Similar information is not available for resident hunters. However, it has been estimated that the number of wolves taken by hunters (100-200) and trappers (400) is approximately 600 animals; Branch personnel kill about 200 for a yearly total of about 800 wolves (F. S. Tompa, pers. comm.).

TABLE 1. Non-Resident Wolf Harvest, 1974-1977.

	Non-Resident Wolf Licence $75			
	1974	1975	1976	1977
# of Non-Resident Wolf Licences Sold	242	224	296	373
Non-Resident Harvest	27	46	37	39
Non-Resident Success %	11	21	13	10

APPENDIX D

The Economic Value of the Wolf as a
Big Game Animal and as a Furbearer

Table 1 outlines the provincial revenue gained through the collection of wolf trophy fees and from the sale of wolf licences to non-resident hunters. A special wolf licence is not required for resident hunters. Table 2 outlines the number and value of wolf pelts for 1965-1977. It should be noted that hunters selling their wolf pelts must pay the current royalty.

TABLE 1. Provincial Revenue Gained Through Wolf Trophy Fees and Wolf Licence Sales for Non-Residents*.

Non-Resident Trophy Fee $40			Non-Resident Wolf Licence $75		
Year	Trophy Fees Paid	Provincial Revenue	Year	Licences Sold	Provincial Revenue
1970/71	35	$1,400	1974/75	242	$18,002
1971/72	68	$2,720	1975/76	224	$16,840
1972/73	100	$4,000	1976/77	296	$22,200
1973/74	98	$3,920	1977/78	373	$27,975

* Species licences only; does not include a portion of the general hunting licence.

TABLE 2. Wolf Fur Harvest: Numbers and Value, 1965-1977.

Year	No. of Pelts Sold for Fur*	Average Pelt Value $	Total Value $
1965	94	24.00	2,256
1966	102	16.98	1,732
1967	25	24.80	620
1968	54	41.83	2,259
1969	91	49.50	4,505
1970	39	49.55	1,932
1971	91	50.66	4,610
1972	265	57.26	15,174
1973	156	82.56	12,879
1974	117	84.88	9,931
1975	190	90.55	17,205
1976✓	151	116.45	17,584
1977	443	105.41	46,697

* Statistics Canada Figures (based on fur year, July 1-June 30).

✓ Royalties for 1976 and 1977 were $2.25 and $1.40, respectively. ~~Total royalties paid cannot be determined for wolf pelts.~~ Counts ↑ royalties only began to be kept for in 1976.

APPENDIX E

Problem Wolves

In order to put the controversy of wolf depredations into perspective, information on the following aspects has been included in this appendix: 1) the 1978 provincial distribution of complaints regarding problem wildlife, 2) the provincial distribution of predator related livestock losses (killed or mauled), and 3) the current market value of livestock. This information was provided by F. S. Tompa, i/c Carnivore Management, Fish and Wildlife Branch.

Table 1 outlines the provincial distribution of complaints regarding problem wildlife which the Fish and Wildlife Branch received during the first 11 months of 1978.

TABLE 1. The Provincial Distribution of Problem Wildlife Complaints for 1978.*

Resource Management Region	Type of Damage or Complaint				
	Human Safety	Property Damage	Livestock Losses	Nuisance Reports	Total Complaint Forms
1. Vancouver Island	154	44	18	52	240
2. Lower Mainland	759	379	378	290	1,402
3. Thompson-Okanagan	34	7	12	6	48
4. Kootenays	187	120	40	98	293
5. Cariboo	73	44	71	19	152
6. Skeena	2	1	39	0	41
7. Omineca	79	48	59	27	169
Peace	17	4	33	3	53
Totals	1,295	647	650	495**	2,398***

* The absence of late 1978 reports and records on unclosed cases is not expected to bias this summary significantly.

** Most minor complaints where investigation and action by Branch personnel was not required are not included in the summary.

*** One particular Complaint Form may include <u>one or more</u> major problem categories.

The distribution of complaints reflects social, economic, ecological, and other differences throughout British Columbia. Most complaints come from densely populated areas. Human safety and nuisance animal complaints are thus reported primarily from the Lower Mainland and the Kootenay Regions. An analysis of 1426 major complaints in 1976 revealed that over 60% of those complaints (human safety, property damage and nuisance animal) were related to bear (mainly black bear). More wildlife/livestock problems were similarly reported from the central and northern Resource Management Regions. In 1978, about 27% of the total complaints were related to livestock losses or harassment by predators.

The provincial distribution of predator related livestock losses (killed or mauled) in 1978 is outlined in Table 2. The mauling of livestock can seriously depreciate the value of individual animals and often mauled animals must be destroyed. This table shows that the heaviest livestock losses were reported from the Skeena and Omineca-Peace Resource Management Regions.

Information in Tables 1 and 2 includes only complaints recorded, investigated and confirmed by Fish and Wildlife Branch personnel. The Ministry of Agriculture records and those of the various producer organizations indicate that the actual volume of predator related livestock losses may be considerably higher annually. As it is often difficult for ranchers to report predator attacks, problems may be solved by destroying the animal(s) involved. It can be seen from Table 2 that coyotes cause approximately 45% of all livestock losses and that they are responsible for most of the lamb and sheep losses in the Lower Mainland, Cariboo and Omineca-Peace Regions. In comparison, wolves cause approximately 28% of all livestock losses and in financial terms are responsible for the heaviest losses of calves, cattle and horses in the Cariboo, Skeena and Omineca-Peace Regions.

Table 3 outlines the current (1978) market value of the four most affected livestock classes. These values are based on the average market price for commercial stock in 1978 and on reported and confirmed kills or maulings. Losses to individual ranchers may be financially significant, especially if special breeds are involved. However, the total amount of damage (livestock losses) caused by carnivores is small when compared to the damage to agricultural crops caused by other problem wildlife (deer, elk, small mammals, and birds).

TABLE 2. The Provincial Distribution of Predator Related Livestock Losses Reported and Confirmed Mauled or Killed in 1978 outlined by Resource Management Region.

Resource Management Region	Livestock Categories: dairy calf	dairy cow	beef calf	beef cow	bull	colt	horse	lamb	sheep	goat	pig	piglet	dog	Total	%
1. Vancouver Island															
black b.	---	---	---	4	---	---	---	---	1	1	---	---	---	6	29
grizzly b.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
cougar	---	---	---	1	---	---	---	---	7	2	---	---	5	15	71
wolf	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Totals	---	---	---	5	---	---	---	---	8	3	---	---	5	21	100
2. Lower Mainland															
black b.	---	---	1	---	---	---	---	---	---	---	---	---	---	1	1
grizzly b.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
cougar	---	---	---	---	---	---	---	---	---	1	---	---	---	1	1
coyotes	8	1	---	---	---	1	---	47	24	---	---	---	---	81	98
Totals	8	1	1	---	---	1	---	47	24	1	---	---	---	83	100
3. Thompson-Okanagan															
black b.	---	---	1	---	---	---	---	---	---	---	---	---	---	1	4
grizzly b.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
cougar	---	---	---	---	---	3	2	3	---	4	---	---	6	18	69
wolf	---	1	2	---	---	---	---	---	---	---	---	---	---	3	12
coyotes	2	---	---	---	---	---	---	---	---	---	---	---	2	4	15
Totals	2	1	3	---	---	3	2	3	---	4	---	---	8	26	100
4. Kootenays															
black b.	---	---	2	1	---	---	---	---	---	5	1	1	1	11	50
grizzly b.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
cougar	---	---	---	---	---	1	---	---	---	2	---	---	6	9	41
coyotes	---	---	1	---	---	---	---	---	1	---	---	---	---	2	9
Totals	---	---	3	1	---	1	---	---	1	7	1	1	7	22	100

5. Cariboo															
black b.	---	---	40	3	---	1	---	---	1	1	---	1	2	49	35
grizzly b.	---	---	1	1	---	---	---	---	---	---	---	---	---	2	1
cougar	---	---	1	---	---	---	1	---	1	---	---	---	2	5	4
wolves	---	---	33	13	---	---	---	---	---	---	---	---	---	46	32
coyotes	---	---	8	---	---	---	---	9	22	1	---	---	---	40	28
Totals	---	---	83	17	---	1	1	9	24	2	---	1	4	142	100
6. Skeena															
black b.	---	---	1	---	---	---	---	---	---	---	---	---	---	1	4
grizzly b.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
cougar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
wolves	---	---	21	1	---	---	---	---	1	---	---	---	---	23	85
coyotes	---	---	3	---	---	---	---	---	---	---	---	---	---	3	11
Totals	---	---	25	1	---	---	---	---	1	---	---	---	---	27	100
7. Omineca															
black b.	---	---	3	---	---	---	3	---	---	---	1	---	1	8	7
grizzly b.	---	---	1	---	---	---	---	---	---	1	---	---	---	2	2
cougar	---	---	1	---	---	---	1	---	2	---	---	---	---	4	3
wolves	---	---	11	13	---	---	2	4	7	4	---	---	---	41	33
coyotes	---	---	1	1	---	---	3	41	22	---	---	---	---	68	55
Totals	---	---	17	14	---	---	9	45	31	5	1	---	1	123	100
7. Peace															
black b.	---	---	---	---	---	---	---	---	---	2	---	1	---	3	3
grizzly b.	---	---	8	2	---	---	---	---	---	---	---	---	---	10	10
wolves	---	---	10	4	4	1	9	---	14	---	---	---	---	42	41
coyotes	---	---	1	---	---	---	---	7	38	1	---	---	---	47	46
Totals	---	---	19	6	4	1	9	7	52	3	---	1	---	102	100
Province															
black b.	---	---	48	8	---	1	3	---	2	9	2	3	4	80	15
grizzly b.	---	---	10	3	---	---	---	---	---	1	---	---	---	14	3
cougar	---	---	2	1	---	4	4	3	10	9	---	---	19	52	10
wolves	---	1	77	31	4	1	11	4	22	4	---	---	---	155	28
coyotes	10	1	14	1	---	1	3	104	107	2	---	---	2	245	45
Totals	10	2	151	44	4	7	21	111	141	25	2	3	25	546	100

TABLE 3. The Current Market Value of Livestock Losses in 1978.

Livestock Class	Mauled or Killed by Predators	Current Market Value*	Loss to Producers
beef calves & yearlings	151	$ 80	$12,080
beef, cows	44	$700	$30,080
lambs	111	$ 40	$ 4,440
sheep	141	$ 72	$10,152
Totals			$56,752**

* Figures were received from Ministry of Agriculture (Farm Insurance & Livestock Branches) and from the B.C. Cattlemen's Association and reflect high end of the year prices for 1978.

** Actual loss to producers caused by predators is approximately 10% lower than marked above - subtract savings of transport to market.

BRITISH COLUMBIA

WILDLIFE DISTRIBUTION MAPPING
GENERALIZED BIG GAME SERIES

WOLF

DISTRIBUTION AND RELATIVE ABUNDANCE

- NOT PRESENT
- FEW/VERY FEW
- MODERATE/PLENTIFUL
- PROVINCIAL BOUNDARY (LIMIT OF MAPPING)

Compiled by B.C. Fish and Wildlife Branch
and B.C. Resource Analysis Branch, 1978.
Drafting by B.C. Surveys and Mapping Branch

Scale
40 30 20 10 0 40 80 120 160 MILES

MARCH, 1978.

Drawn and Produced by the Map Production Division, Surveys and Mapping Branch, Victoria, British Columbia

MAP NO. 15