PRESENT STATUS AND POSSIBLE FUTURE MANAGEMENT OF WOLF POPULATIONS IN INTERIOR AND ARCTIC ALASKA [1]

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I can think of no other animal that evokes so much heat in the form of emotion when discussed by sportsmen or professionals. Unfortunately, there is little light generated by all this heat. In Alaska of all our major species perhaps the wolf is the least understood. From Biblical times to the present the animal has been condemned and although we desire to change the public's attitude regarding this important carnivore it would be naive to assume that this change will take place rapidly or peacefully. I only hope that the attitudes may be changed in time to preserve a portion of the wolf populations in Alaska. The history of the wolves in the lower 48 States and other areas of the world, until the past few years, has been primarily one of "exterminate them as quickly as possible." Until recently this has been the attitude of many people in Alaska. The reasons for this attitude seem to stem from the fact that wolves appear to be efficient competitors for big game. Wolves eat moose, caribou, sheep and deer. Population abundance of these game animals are known to have fluctuated in the past, hence to many individuals there must be a tangible reason for these fluctuations. Man being the prideful creature that he is could not possibly credit himself with having adversely affected a valuable wildlife population, no matter how much he may have contributed directly and indirectly to habitat destruction through harboring antiquated wildlife management philosophies. Thus, in many instances the wolf has become the symbolic destroyer of wildlife (the one tangible demon other than the biologist upon which the public may vent their frustrations). On the other hand the ungulate populations being wholly ignorant of their own plight as well as that of the wolves have continued to populate their habitat at varying rates with little regard, or indeed, realization of the necessity for balancing production of progeny with the available food supply. The problems attendant to over population and recognizing when ungulate populations have exceeded the carrying capacity of their environment are complex and it is not my intention to explore this interesting subject of population dynamics in this discussion.

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There have been several major attempts to control wolf populations in Alaska. In 1915 the first Territorial Legislature passed a bill directing that a bounty be paid for each wolf taken. There has been a bounty system in effect since that time. The amount paid for each wolf has varied from $15. to the present $50. Lensink (1958, Annual Report of the Alaska Department of Fish and Game) analysed the results of the bounty system in Alaska. The ineffectiveness of the bounty system as a control mechanism in Alaska is similar to what other states and other workers have found throughout the United States. In addition control efforts have been made by the U.S. Fish and Wildlife Service and to a lesser extent the Alaska Department of Fish and Game. The Fish and Wildlife Service intensified control efforts after 1948 and demonstrated an ability to reduce wolf populations in certain areas and under certain conditions. Perhaps the classic example is that of the Nelchina area, commonly known as Game Management Unit 13, in South-central Alaska. In this area the wolf population was greatly reduced by 1955 through a combination of predator control techniques including aerial shooting, poisons and aerial bounty hunting. In 1957 the area was closed to the taking of wolves and has remained closed since then. Concurrent with the closure a study of the wolf population was started by the U.S. Fish and Wildlife Service. This study yielded significant results regarding movements and behavior of wolves, and was reported by Burkholder (1959 J. Wildl. Mgmt. 23:1-11).

With few exceptions one major element absent in all of the control efforts conducted in Alaska, whether by bounty system or other systems, is the lack of knowledge concerning the interrelationships between the predator and prey. Also lacking is an adequate knowledge of the natural factors that tend to limit wolf numbers--that is, decimating factors other than physical control by humans. Wolves are known to fluctuate in numbers as do the various ungulates such as moose and caribou and also not necessarily in a rythmic or predictable manner. The reported fluctuations, however, have not been recorded in a quantitative way and are known only generally. We know that wolves (R. L. Rausch, 1958, J. Wildl. Mgmt. 22:246-260) are subject to various diseases including rabies and distemper, and no doubt numbers of them do die from diseases from time to time. The age composition of populations, the rate of production, and survival of young are just a few essential items not known at this time. In fact, relatively little published material regarding population dynamics of wolves in subarctic and arctic areas is available. I think that in order to formulate a policy for wolf management that we must have a more thorough knowledge of the animal. In addition we also require a knowledge of the relationship of the wolf to the various prey

species. Without these background data it will be difficult to formulate and sell a workable program to the public.

Since January 1, 1960, when the State assumed authority to manage the wildlife resources in Alaska, there has been no formal control of wolves in Interior and Arctic Alaska--in fact, the only control has been by the U.S. Fish and Wildlife Service on the reindeer ranges in the Seward Peninsula-Kotzebue area. The bounty system has, however, continued and some 300 to 400 wolves have been bountied annually.

Many people feel that there is no need for concern for the wolf populations in Alaska today and in some areas I certainly agree. In Central Alaska where vegetation is dense and aerial hunting is not practical wolves are not harvested. However, it has been demonstrated in the lower Susitna Valley, in the Nelchina Basin and to some extent along the Arctic coastal area, roughly from Barter Island to Kotzebue and across the Brooks Range, that wolf numbers can be reduced either through organized control efforts or through aerial bounty hunting. The latter areas are generally beyond the tree line and tracking and lighting conditions can be excellent. The airplane is used in locating the animals and they are shot from the plane. In the case of the southcentral area, an abundance of human beings who shoot wolves every time they see one has made rather serious inroads in populations of the lower Susitna Valley and illegal hunting has probably contributed to the continued depressed population in the Nelchina area. Briefly then, our success or failure in salvaging the wolf, in my opinion, hinges upon how quickly we can assemble the facts relating to the impact that wolves have upon other desirable and in some cases, more desirable, game species, and then to utilize these facts in arriving at a satisfactory program for managing the species.

It is my opinion that the wolf is a highly desirable game animal and I believe this opinion is born out in part by the recent increase in interest by the non-resident hunters who come to Alaska for the purpose of hunting wolves, or a combination polar bear-wolf hunt. This utilization has a tremendous import in raising the value of the wolf in the eyes of the "sporting public." Wolves have trophy value. It would seem unwise to me then, for control to be implimented either by a bounty system or a predator control system unless utilization of game species by the wolves is significantly interfering with a similar utilization by humans. No examples of such competition are available today.

I have indicated that we need to know more about dynamics of wolf populations. Some of the elements that we need are as follows: the age composition of populations, age of sexual maturity, number

of young produced, the survival of these young, and factors that tend to inflict mortality to wolf populations other than human causes. We have inaugurated a long range research program with these objectives in mind. At present the program is just started but some of the preliminary results are worthy of discussion. First, we hope to be able to determine age of individual wolves from some part of the carcass. To achieve this we have collected specimens from 557 wolves and have a tentative age determination technique which will separate young-of-the-year from older animals. This technique is based upon the growth characteristics of long bones, principally the radius and the ulna. Oddly enough, it has been the bounty system which has provided us with these specimens. In Alaska in order to bounty a wolf the claimant must present the scalp or pelt with the left foreleg attached. The radius and ulna are removed at the time of bountying and we have used these bones in the age determination study.

The character we are using is the junction between the epiphysis and the diaphysis where growth, that is the lengthening of the long bone, actually takes place. The technique was first described for fox by Sullivan (1956, J. Wildl. Mgmt., Vol. 20:210-217) and centers around the fact that it is in this area that the growth takes place and during the period that the animal is growing rapidly the junction is cartilaginous. As the animal approaches skeletal maturity growth slows and the junction ossifies, ultimately the junction is no longer discernable. In wolves the rate of growth is quite rapid and it would appear from our initial work that they mature skeletally at about one year. Schlotthauer and Jones (1952, Amer. J. Vet. Res. 13:90) found that in some domestic canines the junction disappears at ten months. The epiphysis, based upon the study of some 557 wolf radii and ulnae, indicates that young-of-the-year are clearly discernable on the basis of the junction between epiphysis and diaphysis being open or closed through the first year. That is, from May to May, or June to June, as the case may be. The radius seems to be the best bone to work with, and the junction near its articulation with the foot remains open for the greatest period of time. The technique is simple, easy to use, and does not necessitate cleaning of the leg bones. The age of the wolf can be determined merely by examining the skinned leg bones. I have not used X-ray as did Schlotthauer and Sullivan.

The technique, of course, has limitations. At the age of one year, or shortly thereafter, the epiphysis has completely fused and will no longer separate when macerated or boiled and the surface of the bone appears to be completely smooth; whereas formerly it was porous and sponge-like in appearance. Thus the technique will determine the age of wolves only through the first year of life. It remains to be tested against other techniques and in conjunction with this, although not analysed at this time, we have collected

entire carcasses including skulls, lenses, and reproductive tracts for use in developing age determination criteria. It is hoped that the use of cranial characteristics, the sectioning of teeth using both cementum deposition and the deposition of dentine, the weight of dried lenses as reported by Lord (1959, J. Wildl. Mgmt. 23:358-360), the inspection of reproductive tracts, particularly the development of the os penis and the testes, and the development of the ovaries and the uterus will also be useful in testing the validity of the present technique as well as to aid in developing criteria for age determination beyond one year. Unfortunately, relatively few known-age specimens are available at this time and those that are available are from pen-reared animals which may or may not correspond to animals raised in the wild.

Using the degree of ossification of the epiphysis as a key to separate wolves 12 months and younger from other animals, the sample of the wolves bountied from the Interior and Arctic Alaska for the years 1959-60 and 1960-61 have been partially analysed. This sample, which comprises 557 wolf legs, shows that approximately 52 per cent of these populations were young-of-the-year (Table 1.). It is necessary to further delineate these wolf populations for comparison and I have arbitrarily selected the south slopes of the Brooks Range at approximately tree line as the southern boundary for the Arctic region and the remainder of the Interior north of the Alaska Range as the Interior region. The two regions differ in that one is an area, with local exceptions, of forested country where wolves are difficult to hunt and the other, again with local exceptions, is a tundra-treeless region where wolves are easier to hunt.

Analysis for age composition shows that the wolf populations of the two regions are amazingly similar except for apparent low production of pups in the Arctic region in 1960-61. The proportion of pups in this population is significantly different at the .05 level when compared to the 1959-60 data. The reasons for the reduced production of pups are not known. As the techniques used to kill the wolves were constant (aerial shooting primarily), biological factors are suspected. Rabies were positively identified in two specimens from the arctic region. The significance of this disease to wolf populations is not known.

Tables 2 and 3 represent theoretical production and survival of wolf pups. The calculations are based on the assumption that wolves are not harvested selectively by age or sex and that all females breed. Table 2 is based upon the additional assumption that wolf females breed at 10 months-of-age. Since there is evidence that this is not correct, the production-per-female figures are unnecessarily conservative. A more realistic evaluation of pup production per female is presented in Table 3. Here

it is assumed that 50 per cent of the females are pups and non-breeders (Table 1) and that the remaining females all produce litters. The figures indicate relative high production of young except for the Arctic area in 1960-61.

Eventually these estimates will be checked against in utero fetus counts and average number of pups per litter of those taken from dens. Some techniques used in killing wolves may be selective for particular age classes or sexes and analysis by method of capture will be made at a later time. Even if bias for pups exists the present information will provide a basis for indices to population changes if the methods of take are known. An example of such an index is provided by the Arctic data where most wolves are taken by aerial shooting. The proportion of pups decreased significantly in 1960-61 when compared to 1959-60. Thus, even if a bias for pups is operating, it should be constant and reduced production is evident.

TABLE I.

	ARCTIC		INTERIOR	
	PUPS %	ADULTS %	PUPS %	ADULTS %
1959 - 60	102 (56)	80 (44)	22 (59)	15 (41)
1960 - 61	76 (43)	103 (57)	91 (57)	68 (43)
TOTALS	178 (49)	183 (51)	113 (58)	83 (42)

Combined Totals:

PUPS %	ADULTS %
291 (52)	266 (48)

TABLE 2.

PUPS PER FEMALE

Assuming 50: 50 sex ratio and all females remaining in population producing pups.

	ARCTIC	INTERIOR
1959-60	2.6	2.9
1960-61	1.5	2.7

TABLE 3.

PUPS PER FEMALE

Assuming one-half of remaining females are less than one year old and are non-breeders.

	ARCTIC	INTERIOR
1959-60	5.2	5.8
1960-61	2.9	5.4