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Fuller, W.A.

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ANALYSIS OF PREDATOR CONTROL PROGRAMS IN WESTERN CANADA

W. A. FULLER
CANADIAN WILDLIFE SERVICE
FORT SMITH, N.W.T.

Introduction

One of the topics stressed at a Caribou Committee meeting at Ottawa in June, 1953, was predator control. It was brought out that Manitoba, Saskatchewan and the Northwest Territories were all carrying on control operations in parts of the caribou ranges, and that there was practically no correlation of effort and rather poor circulation of results. It was suggested that the Canadian Wildlife Service take preliminary steps to co-ordinate the effort in 1953-54. This was done to the extent that data sheets were drawn up on which to record certain pertinent information about each dead wolf examined. While the form used in Manitoba differed in detail from the one used in Saskatchewan and the Northwest Territories, it included all the essential information. Originals, or copies, of the data sheets were sent to the writer for analysis. The following report presents the results of this analysis. The co-operation of Saskatchewan and Manitoba personnel is gratefully acknowledged.

Theory

The theory on which the arguments to be presented in this report are based, is a simple one. It is coming to be widely recognized in the field of wildlife management that when a virgin population is exploited there will be changes in the age and/or sex composition of the population. Conversely, a shift in the age and/or sex composition indicates a disturbance in the dynamics of the population under study.

In the case of wolves, we are unable to take a census at regular intervals. Therefore, we are unable to evaluate directly the

effect of a poisoning campaign. The best means available seems to be a study of the age composition in our kills.

It is axiomatic that an undisturbed population produces more young than can survive, and therefore, juvenile mortality is high in most, if not all, free-living animal populations. When an undisturbed population is subject to some external form of mortality such as disease, severe winter or heavy exploitation (poisoning), the proportion of adults is lowered, and some of the surplus juveniles survive to replace the adults which were lost. Thus, the first response of the population to a mortality factor is an increased survival of juveniles.

Should the mortality factor cease to operate, after one year, the population would readjust itself very rapidly by this means. However, if the exploitation continues for several years, there should be continued reduction in juvenile mortality until the absolute minimum is reached. At the same time, the very old animals in the population will be removed faster than they can be replaced, therefore, the proportion of very old animals will decline.

A population which is stabilized at a high level will have a lower proportion of juveniles and a higher proportion of very old animals when compared with a population which has been reduced in total numbers and is striving to regain its former high level.

Table 1 contains data accumulated over three seasons on a closely controlled experimental area near Fort Smith. The observed results fit very nicely the theory outlined above. The total population declined each year, roughly in proportion to the catch. Concomitantly, the proportion of young increased, and the proportion of aged animals decreased. The first year the population declined only a little, probably because the survival of juveniles nearly made up for the loss to poisoning. The second year, however, a rabies expidemic probably added its

toll to the force of the poison campaign, and the two together vastly overreached the recuperative powers of the population.

Frequent reference will be made to the data in Table 1, and the interpretation as set out above. This information should be thought of as a base line, and the accompanying interpretation as a guide, to our understanding of the ratios obtained in other poison campaigns in other areas.

Results of Poison Campaigns

In Tables 2 and 3, the results of poison campaigns in three areas are summarized. Table 2 presents data for timber wolves (Canis lupus occidentalis) and Table 3 for tundra wolves (Canis lupus hudsonicus).

Interpretation of Results

Timber Wolves - Comparison of Tables 1 and 2 immediately discloses several points of similarity. The figures for 1953-54 consistently show a high proportion of juveniles (35% - 55%) and practically no aged animals (0% - 4%). Considering the tremendous extent of the territory involved and the small size of the subsamples, this similarity is all the more striking, and strongly suggests that the timber wolf population over the entire area has been depressed. In Manitoba and part of the buffer zone, poison campaigns have been in operation for several seasons and may legitimately claim a large share of the credit. In the Northwest Territories, however, 1953-54 was the first year in which control measures were adopted. This suggests that a natural mortality factor (or factors), probably rabies, had brought about the reduction. Rabies also probably rendered valuable assistance in Saskatchewan and Manitoba.

Tundra Wolves - The tundra wolves follow no such pattern. In the Northwest Territories-Saskatchewan buffer zone, where the wolves have been subjected to two years of poisoning (more on the Saskatchewan side), the

ratios are still typical of an unexploited population. The total kill in this area has been light, and probably has been insufficient to upset the population equilibrium. The tundra wolves further north in the Northwest Territories have not been previously subjected to a poison program, yet they show ratios typical of a depressed population. There seems to be only one possible explanation for this discrepancy, i.e., some form of natural mortality affected the tundra wolves in the region of Great Slave Lake, but did not affect those wintering in the Athabasca region. An outbreak of rabies in the former population and not in the latter, could account for the observed differences in the composition of the respective populations.

The Manitoba figures are intermediate and show particularly a reduction in aged animals, but with only a moderate increase in juvenile survival. The suggested explanation here is that more prolonged and more intensive control measures, acting without the assistance of a specific increase in natural mortality, have affected a measure of reduction in the original population and stimulated some shift in the age composition.

In summary, it would appear that the timber wolves, which are year-round residents, have been reduced in numbers over the entire area where control measures have been instituted. However, since the age ratios are about the same in each area, regardless of the fact that poisoning has been going on for some years in Manitoba, whereas this was the first year in the Great Slave Lake country , there is a strong suggestion that some severe form of natural mortality was operative and may have been more important than the poison campaign. A widespread outbreak of rabies is known to have passed through most of the area under consideration, and could very well be the factor responsible.

The tundra wolves enter the control area in winter in association with the caribou. They den and spend the summer outside the

control area. The available evidence indicates that the tundra wolves of the Northwest Territories-Saskatchewan buffer zone escaped the rabies epidemic and have been practically uninfluenced by the poison campaign to date. The Manitoba tundra wolves, likewise probably escaped the rabies, but have been brought partially under control by the poison campaign which has been in effect for a longer period there. The Northwest Territories tundra wolves show evidence of having been depressed. Since this was the first year of poisoning, some natural factor must have brought about the reduction.

Sources of Error

Age determination is based almost entirely on the amount of wear on the teeth, for which no truly objective criterion has been developed. There is, therefore, a certain amount of subjective judgment required on the part of the investigators who examine the wolves. Inasmuch as many of the individuals concerned are unknown to each other, except through correspondence, it would be surprising indeed if there was complete agreement in aging methods. If the program is to continue, and if maximum benefit is to be derived from it, it is essential that the individual investigators have an opportunity to get together and develop a uniform set of standards. On the other side of the ledger, however, are certain mitigating factors. All the data pertaining to the Northwest Territories and the buffer zone used in this report were gathered personally by the writer, and the same standards were applied throughout. As evidence that great care was exercised by the Manitoba crews, 16% of the timber wolves and 20% of the tundra wolves were shown as of unknown age. This would indicate that ages were assigned only where the examiners felt quite sure of themselves.

Another factor worthy of mention is a possible sexual difference in wear on the dentition. The Manitoba figures illustrate this

clearly, although the same thing appears in the Northwest Territories data. The Manitoba figures are shown in Table 4. It is apparent that there were many more females recorded as young of the year than there were males. Does the much smaller size of the females bias the observer into a greater readiness to list them as young? Or do the males take a more active part in hunting and thereby produce worn areas on their teeth at an earlier age? Or is the sex ratio at birth actually biased in favour of females? (Adult sex ratios in all cases do not differ significantly from the expected 1:1). It should be pointed out that this does not apply to the experimental area near Fort Smith where hunting is confined to the autumn period and the weights of all animals are recorded. At this time the weights of young and adult wolves do not overlap.

Conclusion

The foregoing analysis has been undertaken to show how the post mortem examination of carcasses and collection of uniform statistics may be used to apprise the wolf control program. Statistical treatment has not been attempted in this preliminary study, and probably should not be attempted until the sources of error listed have been investigated more fully, and controlled if possible. The first step in this direction would be personal contact between investigators with a chance to study specimens together.

The theory outlined in this report is largely untested. Only the continued collection of data, and interpretation and reinterpretation in the light of new knowledge will result in its eventual confirmation or rejection. It is likely, however, to produce a more delicate indicator than any attempt to take a direct census of the wolf population, or to follow changes in prey populations.

Table 1 - Total catch and age composition of timber wolves taken by poison on an experimental area near Fort Smith, 1951-52 to 1953-54.

Year	Total Catch	Percent Young	Percent Aged
1951-52	45	20%	18%
1952-53	40	35	20
1953-54	9	55	0

Table 2 - Proportion of young and aged animals in timber wolf populations.

	1952-53		1953-54	
	Young	Aged	Young	Aged
Buffer Zone	40%	14%	41%	4%
N.W.T.	--	--	43	3
Manitoba	--	--	35	3

Table 3 - Proportion of young and aged animals in tundra wolf populations.

	1952-53		1953-54	
	Young	Aged	Young	Aged
Buffer Zone	16%	19%	21%	21%
N.W.T.	--	--	37	4
Manitoba	--	--	26	5

Table 4 - Sexual differences in the proportion of juvenile wolves in samples from Manitoba, 1953-54.

Kind of Wolf	No. of Males	Proportion Juvenile Males	No. of Females	Proportion Juvenile Females
Timber	33	24%	33	45%
Tundra	27	15	23	39
Total	60	20	56	43

W. O. Pruitt

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