

FOODS OF TRAPPED NORTH DAKOTA PREDATORY ANIMALS

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This is a report on a food habit study covering seven predatory species trapped or shot during the regular North Dakota season, November 1, 1946 to February 28, 1947. Since the actual numbers shot is unknown, except for coyotes, it is assumed that the bulk of these animals were trapped. They were collected through the cooperation of the N. D. Agricultural College, many North Dakota fur buyers, individual trappers, the U. S. Fish and Wildlife Service, and the North Dakota Game and Fish Department personnel. Relatively little work has been done in the State especially concerning the mink family, coyotes and raccoons.

This study is aimed at revealing the importance of the predators to our upland game species. To answer this question well, a careful study of the prey population is also needed. Secondly, we seek information which will help us in the better management of the fur resource in North Dakota. Knowledge of food habits is basic.

This study covers all of North Dakota. Though predatory birds and other species are to be included later, our first concern has been with the red fox, coyote, raccoon, skunk, mink, weasel, badger and bobcat.

Composition of Digestive Tract Contents

In the laboratory analysis of the digestive tract, material from both stomach and colon of an animal was considered as one meal and so analyzed. It was felt that in a great many trapped animals the last meal would be in the intestinal tract. Yet to analyse only colons would have been to lose many valuable stomachs. It will be shown later that a majority of the specimens had food in both stomach and colon. After washing and separation of the food, a direct visual estimation of volumetric percentages of the items was made as the food items lay in piles on blotting paper. Wherever possible, a record was taken of the number of individual items constituting a meal, as 2 mice, 6 grasshoppers, etc. Results of the calculations by volume will be next discussed.

A Look Inside Some 585 Trapped Predatory Animals

Five hundred and eighty-five stomachs of trapped predators have been analyzed. Of this number, three hundred and thirty-one were full enough to be used in figuring volumetric percentages. Two hundred and fifty-four were empty or not considered representative. Of the three hundred and thirty-one "useful" digestive tracts, ninety-four were stomachs only, eighty-five were colons only, and one hundred and fifty-two were entire tracts. The usable digestive tracts included: 93 mink, 103 skunks, 72 red fox, 11 badgers, 25 weasels, 14 raccoons, and 11 coyotes.

It is probable that only skunk, mink, red fox and possibly weasel are represented in sufficient numbers to be reliable. Among the others, coyotes are a special case since nine of the eleven animals were shot from an airplane over DesLacs and Lower Souris Refuges in February. They were exceptionally good stomachs and deserve comment.

As to the degree of fullness of the "useful" stomachs and colons notes were recorded by quarters, that is $\frac{1}{4}$ full, $\frac{1}{2}$ full, etc. It was found that well over three-fourths of all stomachs and colons were at least one-half full or more. There were no differences among the seven species in this respect. Hence, it does seem possible to get worthwhile data from trapped animals if the material ingested incidentally can be screened out.

The Non-Food Items Eaten

A great variety and volume of foreign material appeared. It included dirt, dry grass and woody stems, hair and feet of the species trapped, paper, and pieces of rubber. In many cases this was in greater volume than the food items. Foxes, badgers, and skunks seemed to have proportionately more of it. Such material was separated from the food and notes made of its occurrence and volume where possible. It is remarkable what a quantity of pure dirt passes through a predatory animal, apparently with no bad

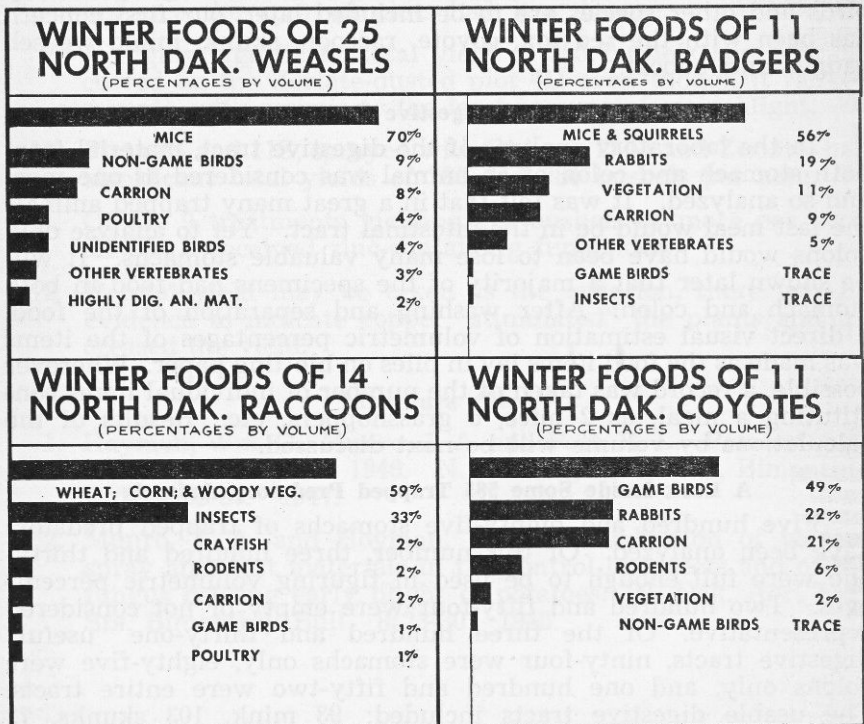
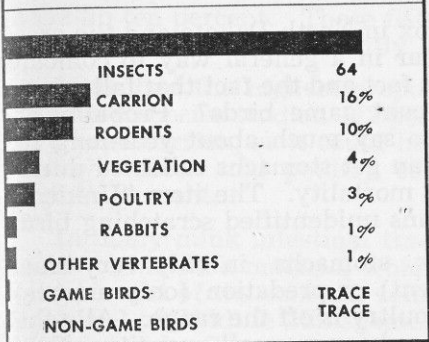


Figure 1.—Winter Foods of Four Species of Predatory Animals.

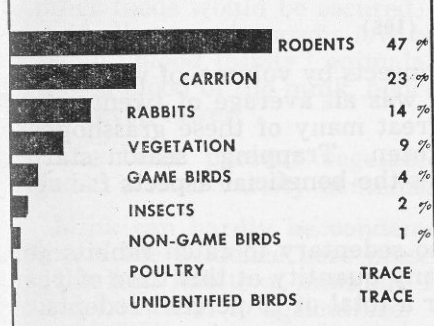
WINTER FOODS OF 105 NORTH DAKOTA SKUNK

(PERCENTAGES BY VOLUME)



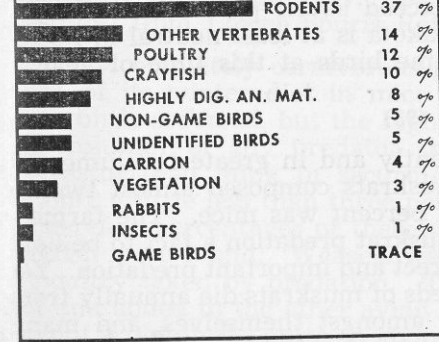
WINTER FOODS OF 72 NORTH DAK. RED FOXES

(PERCENTAGES BY VOLUME)



WINTER FOODS OF 93 NORTH DAKOTA MINK

(PERCENTAGES BY VOLUME)



effects. Considerable quantities (1 cc or more) of dirt occurred in 63% of the foxes, in 35% of the skunks, in 55% of the badgers, in 29% of the raccoons, in 18% of the coyotes, in 12% of the weasels, and in 32% of the mink. This quantity of dirt is no doubt not entirely normal, for trapped animals always consume dirt in their biting and struggling to escape.

Animal Foods—General

Only one of the seven species here considered showed less than ninety percent animal foods. This was the raccoon with 41 percent. See figures 1 and 2.

Vegetable Foods—General

Raccoons had sixty percent vegetation and the next highest was badger with eleven percent. Foxes showed nine percent for the highest of the group with reliable stomach numbers. All of these figures run higher than had been expected but not unreasonably so in comparison to reports of other workers, especially for fox in the eastern part of United States. There, fruits rather than cereals predominate—probably a difference in availability as much as preference.

Red Fox (72 Stomachs)

North Dakota red foxes stuck to tradition by consuming rodents up to forty-seven percent of the total winter diet. This figure does not include a fourteen percent in rabbits. That

Figure 2.—Winter foods of three species of predatory animals.

red foxes are great scavengers is indicated in the twenty-three percent carrion item shown in Figure 2. Carrion items included sheep, hogs, cows, chickens, deer and skunks. The last item was a surprise indeed.

The present range of the red fox in North Dakota and the areas of greatest pheasant scarcity appear in a general way to coincide. What relation is there between this fact and the fact that fall-winter trapped foxes contained four percent game birds? Probably not a great deal. We won't be able to say much about year-long fox destruction of game birds till we can get stomachs collected during the time of high egg and juvenile mortality. The item "Unidentified Birds" in Figures 1 and 2 means unidentified scratching birds.

Poultry appeared in these fox stomachs in only very small amounts either as carrion (1 percent) or predation (only a trace). At the time of these studies most poultry is off the range. All other forms of animal food showed up in only very small quantity. From Figure 2 and this discussion, it appears reasonable that red fox fall-winter diet is not out of line with the game bird population. Agriculture stands to benefit from the red foxes presence during this period.

Skunks (105)

Skunks ate sixty-four percent insects by volume, of which sixty percent was grasshoppers. There was an average of twenty-eight grasshoppers in each skunk. A great many of these grasshoppers would have been previously frozen. Trapping season started November 1. This partly equalizes the beneficial aspects for agriculture.

The skunks were evidently too sedentary to catch rabbits (0.9 volume) and game birds (0.2) in any quantity at this time of year. Three species of mice occurred for a total of 10 percent rodents.

Carrion in seven different varieties and totaling sixteen percent (volume) was the second most important food. It was particularly difficult to distinguish carrion from true kills among poultry. In any event, the total of this item from both carrion and fresh-killed poultry would not exceed seven percent. It is concluded that the skunk in North Dakota is at least neutral in its relation to both agriculture and game birds at this time of year.

Mink (93)

Mink ate rodents most frequently and in greatest volume (37 percent). Among the rodents, muskrats composed almost twenty percent. The remaining eighteen percent was mice. The farmer-trapper will likely consider this muskrat predation a fact to be held against the mink. Much of it is direct and important predation. Yet it is to be remembered that hundreds of muskrats die annually from exposure due to drouth, fighting amongst themselves, and many other causes. They die in this spectacular fashion in areas where there are no mink. In other areas where the mink population was

known to be high, the net depressant effect of their predation on muskrats there was still not too great.

Water inhabiting animals such as fish, frogs, salamanders, and snakes composed fourteen percent of the mink diet. Of these, fish made up ten percent. These fish were minnows not exceeding two inches in length and evidently of "rough" fish type.

Mink had the highest proportionate volume of poultry of any predatory species studied (12 percent). Again, a part of this could have been carrion, or it could have been bait. The combination of poultry carrion and poultry considered taken by predation was thirteen percent.

In many mink intestinal tracts were amorphous masses of yellowish to blackish material which were estimated to occupy nearly eight percent of the content, volumetrically. Sealander (Vol. 7 No. 4, Journal of Wildlife Management) has recorded this as waste protein material. Since it was not recognized in any other predator digestive tracts, including weasels, it is listed separately.

An attempt was made to record the occurrence and volume of clotted blood. It was not expected that a true volumetric relation to other foods would be secured. Its occurrence in only three percent of all stomachs seems low considering the reputation of mink, as being "blood thirsty" animals. This amount may include hemorrhaged blood of the mink, hence the actual occurrence of blood of prey is even lower.

The three percent vegetable material seems unusual. This included a wide variety of items, each in very small quantity.

Mink can hardly be condemned by North Dakota game managers on the evidence here presented. Likewise, except for poultry, the food habits of mink are here found more nearly beneficial than detrimental to agriculture.

Weasel (25)

The twenty-five weasel stomachs present a special case because their distribution involves only four counties in the northern part of the state—Ward, McHenry, Bottineau, and Rolette. Twelve of these are from Lower Souris Refuge.

This completely carnivorous group took seventy percent (volume) of its winter diet in mice of three species. No rabbits or game birds occurred, but the highest percentage of non-game birds (8.8 volume) of any predator showed up. Weasels seemed less successful than mink in securing fish, amphibians, and reptiles, for only a little less than three percent of the diet was so occupied. Occurrence percentages of these animals was not high either. No crayfish were found. Weasels were second to mink in the amount of poultry taken by predation. This made up four percent of the diet and added to the other avian foods a total of almost seventeen percent is obtained—quite an appreciable figure. Part of the poultry could have been bait.

Badger (11)

Not much can be concluded concerning the badger foods since the eleven stomachs obtained were very widely scattered throughout the state. The specimens obtained were good ones, being full of food and from healthy individuals. Judging by the contents of these stomachs, the badger deserves the protection he receives in North Dakota. There was scarcely a trace of evidence that anything had been eaten which would be detrimental to man. The ninety percent animal food diet was composed of seventy-five percent rabbits and rodents (including incidentally sixteen percent of the currently rare ground squirrels). Salamanders, probably dug out from hibernation, occupied an abnormally high five percent. One badger was half full of them. Ten percent wheat as food may seem questionable. Some careful field observations, especially around granaries, might shed some light on this point.

Raccoon (14)

Many more raccoons must be collected before conclusions are drawn. The fourteen specimens examined came from widely separate localities. The proportion of vegetable matter seems unusually high (60 percent by volume) and all animal foods were lower than expected, except perhaps insects (33 percent). The water-inhabiting vertebrates were very noticeably absent.

Coyote (11)

Eleven good coyote stomachs deserve mention. Nine of these were shot by the Federal Predator Control Division personnel from airplanes. They are all from DesLacs and Lower Souris Refuge. In them an important forty-nine percent game birds was found (35 percent pheasant and 14 percent grouse). Reasoning that a predator eats what is available, this is not too surprising. This is far more game birds than would normally be expected in North Dakota¹. Rabbits occupied twenty-two percent of the diet and carrion twenty-one. These coyotes were all killed in February, 1947. One adult female had eaten a large amount of venison. There was no way of proving that this was or was not carrion. It is listed as carrion (9 percent).

Individual Items Per Meal

A separate record was kept of individual prey animals of some species occurring in full predator stomachs. Only full stomachs are here included because the objective was to determine the approximate capacity of the predators.

Fox: Among forty-three full red fox stomachs containing mice, there was an average of two mice per stomach. Numbers of mice ranged from one to eight. There were also other items in most of the stomachs. Among eleven red foxes containing rabbits, no more than one rabbit was identified in any stomach. Similarly, pheasants, ducks, and grouse averaged only one in a sample of five full red fox stomachs.

¹Information just received from the above refuges indicate that a very large part of these game birds had been killed by a severe blizzard; hence their occurrence in stomachs of the coyotes, collected shortly thereafter, should be listed as largely carrion.

Mink: In no case was more than one individual rodent of any kind found in a mink, hence all averages were one. There was however, an average of seven fish per mink in a sample of four full stomachs containing fish. Numbers of fish ranged from one to twenty-two. Crayfish in full mink were never more than one per stomach. Even insect forms did not exceed two per mink. One mink contained two muskrat tails and a lot of flesh, but no hair, indicating that the muskrats were carrion.

Skunks: Thirty-three skunk stomachs containing grasshoppers were full. There was an average of twenty-eight grasshoppers in these. They varied from one to over one hundred in number. Neither mice nor rabbits exceeded an average number of one per full skunk stomach. All other food items likewise averaged one or less individual per stomach.

Weasel: Though rodents occupied a high place volumetrically (70 percent) in the weasel diet, no single weasel was found to contain more than one individual mouse. Many had only a part of one. Similarly other foods, including non-game birds, never exceeded one individual.

Badger: Nine of the eleven badgers included in this analysis had good full stomachs. These nine averaged one mouse per meal. The three badgers containing ground squirrels in no case exceeded one per meal. Not more than one rabbit was found in two badgers containing this item.

Raccoon. There were only seven raccoons which had completely full stomachs. In these, grasshoppers averaged thirty-two per stomach—a higher average than skunks. The small sample here should be considered. Kernels of corn and grains of wheat were not counted since these items do not seem of great importance, economically, even though raccoons do eat a lot of them.

Coyotes: Nine out of eleven coyote stomachs were completely full. They were excellent specimens and represent a small but valuable record for the locality from which taken—DesLacs and Lower Souris Refuges. Mice averaged one individual per full stomach; so did cottontails; and so did pheasants and grouse. Those stomachs with game birds or rabbits in them had very little of anything else. This was not so for the mice. In other words, one pheasant or a rabbit seemed to make a full meal for the coyotes examined.

Summary

1. Herein presented are results of a laboratory analysis of stomach and intestinal tracts of seven common species of North Dakota predatory animals trapped or shot during the 1946-47 trapping season.

2. Of 585 stomachs examined, 331 were full enough to be representative. These included: mink 93, skunk 105, red fox 72, weasel 25, raccoon 14, badger 11, coyote 11.

3. In spite of great quantities of debris of all kinds which had to be patiently and carefully weeded out, in such stomachs the results correspond very closely to those reported by numerous other investigators.

4. The occurrence of game birds was almost negligible with the possible exception of the coyotes taken from two wildlife refuges.

5. Fish, tentatively identified as of "roughfish" type, occupied ten percent of the mink diet. Muskrats were more important with nineteen percent by volume. This type of study ignores entirely the question of abundance and vulnerability of wild prey species, but evidence here collected points to only moderate predation by mink on muskrat, and very light predation on all other game.

6. The only farm animal taken as prey by any of the predators was poultry and the only predator found using it to any extent was mink with 12 percent (by volume and occurrence).

7. Rodents (excluding muskrats) were found to be conspicuously the most common and abundant food of weasels, badgers, mink, and foxes. They were also important in skunk and coyote stomachs.

8. The only predators using rabbits to any extent were: foxes (14%), coyotes (22%), and badgers (20%). The current rabbit scarcity is undoubtedly a reason for its low incidence throughout all stomachs.

9. Carrion of many kinds appeared in stomachs of all species, but was most important in foxes (23%), coyotes (21%), skunks (16%), and badger (10%).

10. A wide variety of non-game birds, and other vertebrates, was found, especially in the mink family, but with it all never in great volume.

11. Skunks and raccoons showed a definite preference for insects to other animal foods, having eaten by volume sixty-four and thirty-three percent respectively.

12. All these fur-bearers contained a surprising amount of wheat and corn kernels, by occurrence.

Conclusions

At the present state of maturity of this study, it is reasonably certain that the fall-winter foods of North Dakota skunks, foxes, and weasel are in no appreciable manner detrimental to either game species or common farm animals. Mink appeared to be somewhat harmful in their predation on muskrats and poultry. All other species examined are in insufficient number to permit conclusions. A better sampling of skunks, fox, mink, and weasel is needed, as well as a greater number of badgers, raccoons, and coyotes.

The fact that these animals were trapped does not upset the results, for with large numbers of stomachs and judicious sifting out of debris from true foods, good results are possible.