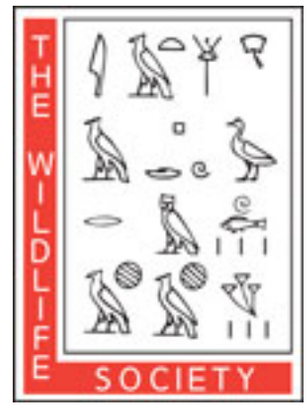




# FOOD HABITS OF IOWA SKUNKS IN THE FALL OF 1936[1]

*Lyle F. Selko*

An investigation of the food habits of the striped skunk (*Mephitis mesomelas avia* (Bangs)) and spotted skunk (*Spilogale interrupta* (Rafinesque)) in Iowa was undertaken by the writer during the fall of 1936 as a part of the studies in the ecology and management of these animals. Between September 15 and December 1 a collection of scats was made chiefly in the vicinity of Ames in Story County, but eight were collected from the vicinity of Eagle Lake and 21 from Garner, both in Hancock County, and 60 at Dewey's Pasture, Clay County, an ungrazed state preserve reverting to prairie, near Ruthven, Iowa.

The scats, 210 in number, were found principally near skunk dens and in pathways along fence rows. The number of spotted skunk scats collected was, six in September, 13 in October, and 40 in November; and of the striped skunk, two in September, 31 in October, and 118 in November.

The research was under the supervision of Dr. George O. Hendrickson, Assistant Professor in Wildlife Management, Iowa State College, and Dr. Logan J. Bennett, Associate Biologist, U. S. Bureau of Biological Survey.

When the analyses were begun the weight method was used, but it was soon abandoned for the quicker, and more satisfactory volumetric system. Hence the frequency indices (Table 1) include records from scats analyzed under both methods, whereas the volumetric indices include only those studied by the volumetric process. Volume analyses were carried on by means of two cylinders, one graduated in cubic centimeters up to 100, and the other in fifths of a cubic centimeter up to 10. To increase accuracy, readings were made of the volume of the various foods under pressure of a glass plunger weighing 177 grams.

In determining the numbers of insects in a scat, counts of the parts highly resistant to digestion were most helpful. The presence of crickets (*Gryllus* spp.), white grubs (*Phyllophaga* spp.), and ground beetles (Carabidae) was indicated by the mandibles. The hind legs were the best proof of grasshopper (*Melanoplus* spp.) occurrence, and the head capsules were practically all that remained of various larvae (Coleoptera, Lepidoptera, and Diptera).

In comparing the proportions of different foods determined by scat analyses it should be remembered that the ratio between the quantities of these remains is not the same as that between the bulks of the original substances before consumption. The analyses are supplemented by the numbers of individuals eaten, however, and these help to make the method indicative and accurate enough for all practical purposes.

[1] Jour. paper No. J480 of the Iowa Agricultural Experiment Station. Project No. 549.

Iowa State College, in cooperation with the U. S. Biological Survey, the American Wildlife Institute, and the Iowa Conservation Commission.

TABLE 1

A SUMMARY OF THE FOODS OF STRIPED AND SPOTTED SKUNKS

| | CLASS FREQUENCY INDICES Based on 149 Mephitis and 59 Spilogale Scats | | VOLUMETRIC INDICES Based on 143 Mephitis and 49 Spilogale Scats | | | |
|---|---|---|---|---|---|---|
| | Mephitis | Spilogale | Mephitis | Spilogale | Mephitis | Spilogale |
| Type of Food | Percentage of identifications | Percentage of identifications | Average volume per containing scat | Average volume per containing scat | Percentage of total food material | Percentage of total food material |
| Arthropod | 92 | 44 | 20.06 | 8.11 | 64.06 | 30.78 |
| Mammal | 21 | 47 | 10.07 | 7.36 | 7.36 | 30.66 |
| Bird | 13 | 27 | 14.53 | 8.31 | 6.37 | 25.14 |
| Vegetable | 56 | 27 | 2.3 | 1.99 | 4.31 | 1.59 |
| Inert | 91 | 56 | 5.69 | .67 | 17.88 | 11.83 |

## ARTHROPODS

### *Striped Skunk*

Insects were apparently the most important food during the fall months as they comprised 64.06 per cent of the total food remains, 33.02 per cent of the insects being grasshoppers. In fact grasshoppers constituted 21.15 per cent of the total of all food. In 134 scats there were found remains of 1,696 grasshoppers, all except two representing the genus Melanoplus. These two exceptions were Carolina locusts (*Dissosteira carolina*). The smaller species taken, of which *M. femur-rubrum* was the most common, outnumbered the larger grasshopper, *M. differentialis*, approximately three to one. The greatest number of grasshoppers represented in a single scat was 94 of a small species of Melanoplus and next 57 of *M. differentialis*.

White grubs (*Phyllophaga* spp.) were the next most important food item, constituting 30.77 per cent of the arthropod matter and 19.71 per cent of the total food. They appeared in 59 feces with 71 grubs in one scat as the largest number taken at one time. The percentage of grubs is probably above average because of the abundance of these larvae in Dewey's Pasture where many scats were picked up. The scats collected in more highly cultivated areas near Ames had a low percentage of these grubs.

TABLE 2

A COMPARISON OF THE NINE MOST IMPORTANT FOOD ITEMS OF THE STRIPED AND SPOTTED SKUNKS

| MEPHITIS | | SPILOGALE | |
|---|---|---|---|
| Food item | Percentage of total food material | Food item | Percentage of total food material |
| Grasshoppers | 21.15 | Meadow mice | 20.54 |
| White grubs | 19.71 | Blue-winged teal | 15.18 |
| Crickets | 11.24 | White grubs | 11.71 |
| Meadow mice | 4.18 | Grasshoppers | 7.94 |
| Chickens | 4.16 | Crickets | 7.42 |
| Ground cherries | 2.94 | Mallards | 4.96 |
| Bee larvae and wax | 2.53 | Cottontails | 4.72 |
| Ground beetles | 2.46 | Deer mice | 2.62 |
| Cottontails | 1.37 | Red-wings | 2.18 |

The cricket (*Gryllus assimilis*) was the third most important food item, composing 17.52 per cent of the arthropod matter and 11.24 per cent of the total food. There were 1,787 crickets taken by 51 skunks with 164 as the largest number to appear in any one scat.

Ground beetles (Carabidae) ranked second in number of appearances, but in volume made up only 3.85 per cent

of the arthropod matter and 2.46 per cent of the total food. There were remains of 635 carabids found in 62 scats of which 57 of the genus Harpalus was the greatest number to appear in any one scat. Approximately two-thirds of the ground beetles taken belonged to this genus and the rest comprised a variety of the smaller carabids.

Beeswax and the remains of bee larvae appeared seven times and composed all of the scats in which they were contained. They constituted 3.94 per cent of the arthropod matter and 2.53 per cent of the total food. These feces were traced to two skunks that had rifled a bee tree; as a rule the comb of bees probably does not form a prominent part of the skunk's diet.

Other insects found which comprised less than half of one per cent of the arthropod matter were adult May beetles (*Phyllophaga* spp.), weevils (Curculionidae), bumble-bees ( (*Bombus* spp.), unidentified larvae, and honey bees (*Apis mellifera*). Several cocoons also were found.

Millepedes numbered 18; in no case did a large number appear, but only a trace in each containing scat. The remains of only one spider were detected.

Insect debris, further unidentified, made up 9.82 per cent of the arthropod matter and 6.29 per cent of the total diet. In this allocation was placed all insect material that was extremely difficult to separate and which if not separated would alter the final results to no appreciable degree.

*Spotted Skunk*

Insects share first place with mammals in the fall food of the spotted skunk. They were found in 26 per cent of the feces, averaged[2] 8.11 cc. per containing scat, and constituted 30.78 per cent of the total food. White grubs ranked first in bulk among the insects eaten, as was the case with the striped skunk also, due to inclusion of material taken from Dewey's Pasture. Despite the fact that they appeared in only five scats white grubs made up 38.04 per cent of the arthropod matter and 11.71 per cent of the total food. The average was 30.2 grubs per scat containing them with 44 the greatest number in a single scat.

Grasshoppers ranked second in insect food taken with crickets a close third. With 25 appearances the grasshoppers made up 25.79 per cent of the arthropod matter and 7.94 per cent of the total food. The smaller species of Melanoplus appeared 21 times with an average of 2.67 individuals per appearance and the greatest number in a single scat was 38. The larger *M. differentialis* was found in five scats with an average of 7.6 per appearance; 16 was the greatest number in any one scat.

Ground beetles in fourth rank composed 4.32 per cent of the arthropod matter and 1.34 per cent of the total food remains. None were taken in abundance and they appeared in only 13 feces. One scat contained remains of 32 medium-sized carabids.

Unidentified larvae composed 2.45 per cent of the arthropod matter and .75 per cent of the total food. Traces of stink bugs (Pentatomidae) and honey bees also appeared.

Insect debris, further unidentified,

[2] Average volume per containing scat refers to the arithmetic mean of the volumes of a particular food item in the scats in which it appeared.

made up 5.09 per cent of the arthropod matter and 1.57 per cent of the total food volume.

### MAMMALS

*Striped Skunk*

Mammals ranked second in importance among the classes of food, but constituted only 7.36 per cent of the total dietary remnants. They appeared in 21 per cent of the feces with an average volume of 10.07 cc. per containing scat.

Meadow mice (*Microtus* spp.) comprised 56.8 per cent of the mammals and 4.18 per cent of the total volume of food. They appeared in 16 scats and 3 mice was the largest number represented in a single scat.

Cottontail (*Sylvilagus floridanus mearnsi*) fur, found in seven scats, made up 18.54 per cent of the mammal matter and 1.37 per cent of the total volume of food remnants.

Muskrat (*Ondatra zibethica*) fur was found in three scats but constituted only .73 per cent of the total food bulk. One shrew (*Sorex* sp.), one deer mouse (*Peromyscus* sp.), and one striped ground squirrel (*Citellus tridecemlineatus*) had also been taken. Skunk (*Mephitis mesomelas avia*) fur and bones were found in one scat.

*Spotted Skunk*

Mammals appeared in 47 per cent of the scats with an average volume per containing scat of 7.36 cc. Mammals composed 30.66 per cent of the total volume of food.

Meadow mice, appearing in 14 scats, made up 66.99 per cent of the mammal matter and 20.54 per cent of the total food remains.

Cottontail fur, appearing in three scats, composed 15.4 per cent of the mammal matter and 4.72 per cent of the total dietary remnants.

Deer mouse remains, found in three feces, comprised 8.54 per cent of the mammal matter and 2.62 per cent of the total food remnants.

Fox squirrel (*Sciurus niger rufiventer*) fur and mole (*Scalopus* spp.) remains each appeared in three scats. The former item was 5.18 per cent of the total mammal matter and 1.59 per cent of the total food, and the latter 3.24 per cent of the mammal matter and .99 per cent of the total food remnants.

Skunk (*Spilogale interrupta*) fur and long pig bristles with pieces of pig bone each appeared in one scat.

### BIRDS

*Striped Skunk*

Of the bird remains comprising only 6.37 per cent of the total food those of chickens predominated. Birds appeared in 13 per cent of the scats with an average volume of 14.53 cc. per containing scat. It was impossible to determine whether the chicken remains were carrion or fresh kills but it is highly probable that they were the former because on numerous occasions the writer found dead chickens in fields where they had been scattered with barnyard manure. Chicken remains appeared 10 times and composed 65.2 per cent of the bird, and 4.16 per cent of the total, food remnants. The average volume of the chicken remains was 18.94 cc. per containing scat.

In the case of all of the other birds eaten each bird made up less than 1 per cent of the total dietary remnants. The following were identified: Eastern Tree

Sparrow (*Spizella arborea arborea*), one; English Sparrow (*Passer domesticus domesticus*), one; Mallard (*Anas platyrhynchos platyrhynchos*), one; Bronzed Grackle (*Quiscalus quiscula aeneus*), one; Northern Flicker (*Colapter auratus luteus*), one; Red-wing (*Agelaius phoeniceus*), one; there were also remains of three unrecognized birds.

*Spotted Skunk*

Bird remains appeared in 16 scats or 27 per cent of the total, their average volume was 8.31 cc. per containing scat, and they comprised 25.14 per cent of the total food matter. Blue-winged teal made up the largest part with 60.47 per cent of all bird remains and 15.18 per cent of the total food. This percentage is due to the appearance of teal in nine scats from the den of a skunk near Eagle Lake. It is quite improbable that a skunk could catch a live duck on or near a lake, but since at the time of collection of the scats the hunting season had been open for 15 days, it is likely that the skunk fed upon a dead or crippled duck.

Mallard feathers found in three scats, formed 19.73 per cent of the bird matter and 4.96 per cent of the total dietary remnants. These scats were collected at Dewey's Pasture on the opening day of the duck season. They were also all traced definitely to one skunk, which may have found a dead duck and made several meals from it.

Other birds eaten were: Eastern Robin (*Turdus migratorius migratorius*), one; Red-wing, one; Eastern Tree Sparrow, one; and unidentified bird, one.

VEGETABLE MATTER

*Striped Skunk*

Vegetable matter appeared in 56 per cent of the scats but composed only 4.31 per cent of the total volume of food. This result differs markedly from that obtained in analyses by Hamilton (1936) who found fruit to be the most important food in New York State, and by Dearborn (1932) who found fruit to rank second in importance, next to insects, in the skunk's fall food in the state of Michigan. Fruit-bearing vegetation in Iowa is not nearly as plentiful as in the states mentioned above and fruit, therefore, is not so readily available a food for skunks.

Ground cherries (*Physalis heterophylla*) ranked second to grass in the number of occurrences with 23, but in volume were first, composing 68.19 per cent of the vegetable matter eaten and 2.94 per cent of the total food.

Although grasses (Gramineae) appeared 75 times and made up 20.45 per cent of the vegetable matter, they were in such minute quantities that they composed only .88 per cent of the total dietary remnants.

Redhaws (*Crataegus* spp.) appeared three times to constitute 6.44 per cent of the vegetable matter, but only .28 per cent of the total food remains.

Other forms of vegetation represented in very small quantities and number of appearances were: oat kernels (*Avena sativa*), eight; horsenettle berries (*Solanum carolinense*), two; barnyard grass seeds (*Echinochloa crus-galli*), two; muskmelon seed (*Cucumis melo*), one; and unidentified seed, one.

*Spotted Skunk*

Vegetable matter appeared 16 times and made up .159 per cent of the total food, even less than for the striped skunk.

Grass leaves were noted 13 times, and found to comprise 35 per cent of the total vegetable matter and .56 per cent of all the food remnants. They were followed closely by wheat kernels (*Triticum vulgare*), which made up 25 per cent of the total vegetable matter and .4 per cent of the total food remains. Horsenettle berries were third with two records and constituted 16.25 per cent of the vegetable matter and .26 per cent of the total food.

Other forms of vegetation identified, and the number of occurrences were: oat kernel, one; acorn (*Quercus* sp.), one; apple seed (*Pyrus malus*), one; corn kernels (*Zea mays*), two.

## INERT MATTER

Inert matter was composed of sand, dirt, and any material too finely ground to be recognized as organic. In the striped skunk's food the inert matter constituted 17.88 per cent of the total, while in the spotted skunk's food it comprised 11.83 per cent of the total bulk of the scats. It appeared in 91 per cent of the striped skunk's scats and in 56 per cent of those of the spotted skunk. When white grubs were consumed the inert matter was very high; when adult insects were eaten it was still high, but when mammals were the source of food there was none present.

## SUMMARY

The fall food habits of the striped and spotted skunks differ considerably. Data shown in Tables 1 and 2 indicate that the striped skunk was the greater insect feeder of the two; in fact it ate twice as many insects. Of the separable arthropod remains grasshoppers, crickets, and white grubs constituted 52 per cent of the total food of Mephitis, but only 27 per cent of that of Spilogale.

According to the bulk percentage of mammal remains in the scats the spotted skunk ate four times as much of this class of food as the striped skunk. In both cases meadow mice made up the majority of the mammals eaten; 56.8 per cent in the striped skunk and 66.99 per cent in the spotted skunk. In bulk percentages the spotted skunk ate about five times as many meadow mice as did the striped skunk. The spotted skunk ate cottontails to the extent of 5 per cent of the total food remains; the striped skunk only 1.37 per cent.

Bird consumption by skunks is the usual grounds for characterizing the animals as undesirable by the layman, whose chance observation of a destructive skunk has resulted in the conclusion that all skunks are detrimental. In fact the data given in Table 1 on first sight may seem to support that idea, but due consideration must be given to modifying factors. The spotted skunk is shown to have taken approximately four times as much bird matter as the striped skunk, namely to the extent of 25 per cent of its food. The main items, concerned, however, blue-winged teal and mallard, were all consumed by two skunks, which probably ate the ducks as carrion, thus in reality conferring a benefit by serving as scavengers. Of the 6.37 per cent bird

matter eaten by the striped skunk, 4.16 per cent was chicken remains also believed to have been carrion.

Vegetable matter was eaten to a greater extent by the striped skunk than by the spotted, but in both cases the amount was less than 5 per cent of the total food remains.

There is some indication that the skunk's choice of food is governed to a certain extent by food availability. On Dewey's Pasture in northwestern Iowa white grubs and meadow mice were very abundant and constituted practically all of the food of the skunks there.

## LITERATURE CITED

DEARBORN, NED.
1932. Foods of Some Predatory Fur-bearing Animals in Michigan. Univ. of Michigan, School of Forestry and Conservation, Bul. no. 1, pp. 38–42.

HAMILTON, W. J., JR.
1936. Seasonal Food of Skunks in New York. Jour. Mamm., vol. 17, pp. 240–246.

Lyle F. Selko
Iowa State College
Ames, Iowa