SEASONAL FOOD OF SKUNKS IN NEW YORK

By W. J. Hamilton, Jr.

The food of New York fur-bearers has been studied by the writer during the past 9 years. Commencing in 1927, viscera of these animals were collected from trappers and fur buyers, while feces were secured and examined as opportunity permitted. Numbers of skunks found dead on the highways also were examined. About 3000 analyses have been made, more than half of which pertained to the eastern skunk (*Mephitis nigra*).

Owing to the widespread abundance of the striped skunk, its value as a fur-bearer and its reputed damage to game, poultry, and bees, the feeding habits of this animal have been studied by numerous investigators. Previous papers include those of Lintner (1888), Pellett (1913), Lantz (1914), Criddle (1914), Davis (1919), Dixon (1925), Shaw (1928), Hamilton (1929, 1931, 1935), and Dearborn (1932). All appear to be essentially in agreement in finding the skunk an asset to any farm community.

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For the fall and winter records (October–March) about 1500 viscera were examined. Frequently a trapped skunk had eaten nothing but dirt and parts of the trap stake, together with its own claws, flesh, and fur, which had been ingested in its struggles to escape. Animals trapped after a prolonged spell in dens invariably had empty stomachs. Accordingly, only 1067 animals contained sufficient food to rate a satisfactory determination. Spring and summer records (April–September) include about 570 fecal and 30 stomach analyses. Roundworms (*Physaloptera maxillaris*) were found in 96 per cent of the stomachs examined.

FALL AND WINTER FOOD

Table 1 gives the fall and winter food of 1067 skunks, indicating the proportions and apparent importance of the various items eaten. Availability apparently determines the nature of the food. A few typical stomach contents are listed to indicate the wide choice of food exhibited by skunks. During a warm night in mid-November, 5 skunks were shot by hunters and the stomachs given to me. One had eaten the remains of a schoolboy's lunch, another part of a water snake, a toad, several cutworms, pigeon grapes, dry grass, and a few chips of wood, while a third had eaten half a pint of grasshoppers and crickets. Still another had eaten a small piece of an inner tube, while a fifth had dined freely on the fallen fruit of wild cherry and also several tipulid larvae.

Fruit.—Fruit is the most important food, both in number of times taken and amount eaten. Practically a third of the animals contained this item. Apple was found in 139 skunks, occurring in 13 per cent of all fall and winter animals. Wild grapes and Virginia creeper berries were eaten by 106 skunks, wild cherries by 71 individuals, the fruit of horse nettle (*Solanum carolinense*) was taken by 24 animals, and ground cherry (*Physalis*) occurred 17 times. A few had eaten partridge berries, nanny berries (*Viburnum lentago*), various species of *Cornus*, and miscellaneous drupes.

Mammals.—Slightly less than a fourth (22.5 per cent) of the skunks contained mammals. Of the 240 with mammalian remains, 103 had eaten *Microtus*, which were found in 9.57 per cent of all fall and winter stomachs. On 4 occasions, 3 meadow mice were found in a single stomach. Rabbits had been eaten by 44 skunks, or 4.1 per cent of the winter total. It is difficult to ascertain whether this last element represents a natural catch on the part of the skunk, or bait used by the trapper. Certainly some portion represented carrion. I know, however, that upon occasion skunks do overcome cottontails. On March 14, 1931, while hunting rabbits near Ithaca, New York, with Robert Rightmyer, we heard the prolonged squealing of a cottontail. Upon reaching the scene, we found a skunk backed into a hole and securely grasping a dying rabbit, which was torn from the skunk with some effort. *Peromyscus* occurred in 17 individuals, or 1.6 per cent of the skunks examined. Shrews (10 *Blarina*, 1 *Cryptotis*) had been eaten by 1.03 per cent, and rats (*Rattus*) by .84 per cent of all the skunks. Seven skunks had eaten

TABLE 1

FALL AND WINTER FOOD OF 1067 SKUNKS FROM NEW YORK

(*October to March, 1927 to 1934*)

FOOD	INSTANCES	PERCENTAGE BY BULK IN ALL STOMACHS
Fruit	341	26.7
Mammals	261	19.6
Insects	276	6.8
Grasses, leaves, buds	228	10.8
Carrion	152	13.5
Grains, nuts	123	11.3
Garbage	48	6.8
Earthworms	43	0.9
Birds	24	1.9
Reptiles, amphibians	21	1.4
Crustaceans	7	0.3
Mollusks	5	trace

red squirrels, but again it is problematical whether the squirrels had been used for bait or were caught by the skunk. Inasmuch as red squirrels frequently enter rabbit holes, it is obvious that some may have been captured by skunks invading such retreats. Other mammals eaten by skunks were *Tamias* (4), *Condylura* (3), *Mus* (2), *Napaeozapus* (1), *Clethrionomys* (1), and *Glaucomys* (1).

Insects.—Insect remains occurred in one-fourth of the fall and winter material examined; they were eaten largely prior to severe freezes, although grasshoppers were consumed throughout the winter. The rare warm spells of winter sometimes occasion a thaw. At and during these periods lepidopterous larvae, beetles and Orthoptera are caught. More than 60 per cent of all the insects eaten by skunks during this period consisted of grasshoppers (chiefly *Melanoplus femur-rubrum*) and crickets (*Gryllus assimilis*). An occasional Carolina locust (*Dissosteira carolina*) was taken by a skunk. Orthoptera are among the most important food items of the skunk during October. Beetles (principally carabids, wireworms, and the larvae of borers) occurred in 48 stomachs and comprised 19.1 per cent of the bulk of all insects that were eaten. The alfalfa snout weevil (*Brachyrhinus ligustici*) threatens the existence of the rich alfalfa belt of northern New York, and the skunk is the most persistent vertebrate enemy of this pest.

Skunk feces from weevil infested fields show great numbers of the larval head capsules of this beetle. One scat, hardly an inch long, contained the remains of 69 grubs. Another, taken in mid-November, contained in excess of 100 larvae. The skunks dig to a depth of from 2 to 4 inches in search of these grubs. Cutworms were present in 38 stomachs, comprising 19.7 per cent of the bulk. Hemiptera were found in 16 animals and formed 2.6 per cent of the bulk of all insects ingested.

Bees occurred in 6 of the 15 skunks that had eaten Hymenoptera. Apiarists have charged the skunk with much mischief, asserting that entire hives are destroyed by the activities of this animal. While the present investigation does not indicate widespread damage from this source, serious losses do occur upon occasion. The 6 bee-eaters all were caught during late November. They comprise only .56 per cent of the 1067 skunks examined, and they had eaten a total of 312 bees, all of which may have been dead when consumed. Bees are active during warm spells of the late fall. A sudden change in temperature frequently numbs the bees as they return to the hive, and as a consequence, large numbers often are found about the hive entrances. This may be the exception rather than the rule, but frequently, during the early winter, I have seen large numbers of dead bees about the hive entrances of poorly managed apiaries. Skunk injury to bees recently has been pointed out by Storer and Vansell (1935), who suggest fencing to minimize the damage. The cost of fencing in New York would be prohibitive. The practice of moving the hives sometimes 3 or 4 times in a season, and placing individual hives in strategic positions, as in orchards, would make fencing impracticable. Claw marks of skunks on the front of a hive indicate the presence of a bee-eater. As in the west, skunks will resort nightly to the same hive until the brood is destroyed completely. The bees that are not eaten frequently lose their sting, and as a consequence soon die. The only practical remedy is trapping the skunk before severe damage has resulted. If the owner be apprised of the damage early it is not difficult to control the animals with steel traps. Skunks destroy large numbers of deer-mice, which in turn frequently take up winter quarters in the hives, eating the comb and at times destroying the bees.

A few ants were found in 2 stomachs, yellow-jackets in 1, while what appeared to be sawfly larvae were found sparingly in a third. Diptera were represented chiefly by maggots of blow-flies, the skunks readily finding these when feeding upon carrion. The larvae of crane flies (Tipulidae) are procured well into the winter. Millipeds and centipeds are grouped with insects for convenience. They occurred in 1.68 per cent of the stomachs but constituted only a trace of the food.

Grasses, Buds and Leaves.—These items were found in 21.3 per cent of the animals examined, and totalled 10.8 per cent of the volume of all food. Upon the approach of severe weather other food becomes scarce, and the leaves of *Ranunculus*, *Trifolium*, *Solanum*, and various mosses are eaten. Rose hips were taken by one individual. On rare occasions a skunk will eat large numbers of the terminal buds of low growing shrubs or trees. As in the case of the red fox, green grasses, such as winter wheat, form an important addition to the winter diet, and are taken individually in sufficient quantity to refute the theory of self-medication.

Carrion.—It is difficult fully to decide what the skunk finds as carrion and what it captures as legitimate prey. Probably 80 per cent of the trapped animals are taken in den sets, where bait seldom is used. When bait sets are employed, rabbit is a favorite lure; yet we know that the skunk is capable of catching cottontails when these animals enter a den harboring *Mephitis*. During the winter months, dead poultry is thrown with manure into the fields and when found by a skunk is eaten with avidity. Dead horses, cows, and sheep attract skunks, and a large carcass acts as a lure to many animals, which take up residence close to such a commissary.

Grains and Nuts.—Corn, buckwheat, and other grains that have escaped the harvest, are eaten. Individuals have been known to consume horse manure for the undigested

oats it contains. Beechnuts apparently are seldom eaten, only one animal having this material in its stomach.

Garbage.—The frequent appearance during late fall of skunks about villages may be attributed in part to the ever-present supply of garbage, furnishing a wide assortment of food. Repeatedly I have found, in weighing skunks, that individuals taken in towns are consistently heavier than those from farming country. I attribute this to the abundance of food (garbage) in towns.

Earthworms.—Worms were eaten by 4.03 per cent of the animals. During the rare periods of mid-winter rains and thaws, worms are active and are easy prey for skunks. It is not unusual to find in a single stomach a handful of nightcrawlers, bitten through in several places.

Birds.—Birds occurred in 2.25 per cent of the stomachs. Small species (3 starlings, 2 song sparrows, 1 downy woodpecker, 1 bluejay, 1 house sparrow, and several undetermined fringillids) were eaten by 13 animals. Crows had been eaten by 7 individuals, but these probably were killed by hunters and later found by the skunks. Cock pheasants were eaten by 4 animals. These were taken directly after the trapping season opened (November 10) and well may have been wounded birds that had escaped the hunter. Apparently the remains of one had been taken from a garbage pile.

TABLE 2

SPRING AND SUMMER FOOD OF THE SKUNK

(*570 fecal and 30 stomach analyses*)

FOOD	INSTANCES	FREQUENCY PERCENTAGE
Insects	347	43.06
Fruits	221	27.56
Mammals	131	16.25
Grains	70	8.69
Carrion	17	1.76
Birds	11	1.46
Reptiles, amphibians	9	1.14

Reptiles and amphibians.—Of 13 skunks that had eaten reptiles, 7 contained remains of garter snakes, 3 held water snakes, and 1 had captured a small milk snake. Eight animals had dined upon Amphibia. *Rana pipiens* and *Bufo americanus* each had been eaten 3 times, while a small *Plethodon* and a large spotted salamander, *Ambystoma maculatum* (in February) constituted the remainder.

Crustaceans.—Sowbugs frequently are eaten, but their ingestion may be fortuitous, as when skunks are digging for grubs in and about punky logs. Crayfish were eaten twice.

Mollusks.—Snails (*Polygyra*) were eaten by 2 animals.

SPRING AND SUMMER FOOD

The period from mid-April to late September is represented by fecal analyses. Feces readily are obtained about skunk dens, along *Prunus* hedgerows, in open ground in orchards, and along pathways bordering woods. The ideal situation in which to find droppings is in blackberry thickets during late August and September. While an unduly large proportion of berry remains appear in the droppings at this season, enough food items of other sorts are encountered to make a fair analysis. Thirty dead animals found on the highways were examined.

During the early spring, when berries, fruits and insects are scarce, field mice form a major share of the food. Skunks dig through clumps of fallen weeds and hay with great industry, and burrow to a depth of a foot to capture the mice. With the advent of warmer weather and increasing activity of insects, attention is turned to the latter easily-procured food. By June almost every scat contains some insect remains. These constitute the major food-item of mid-summer until raspberries are available. From then until early fall wild cherries and other berries, together with grasshoppers and crickets, serve to prepare the skunks for winter.

Table 2 indicates the food of skunks in New York during the warmer months. The specimens came from widely different areas, the greater number having been collected in west-central New York. The Hudson Valley is represented by a goodly share, while some feces from the Adirondack and Catskill regions also were studied.

Fecal analysis does not offer as complete a picture of an animal's food as does stomach analysis, for in the former the undigested residue alone is present. If a skunk should acquire the egg eating habit, and not ingest fragments of the shell, no indication of this trait would be available in the feces. An undue proportion of a certain food indubitably occurs (as chitin of insects and stones from fleshy drupes), while earthworms and flesh, such as offal, do not register in the scats. Furthermore, particularly resistant stuff, such as the calamus of feathers, usually is slow to pass through the gut, and thus may occur in the droppings throughout several days, although representing but part of a single meal.

The contents of the 30 summer stomachs were much the same as in the 570 droppings. I feel convinced that the data thus are representative and may be taken as a general index to the spring and summer food of the skunk in New York.

DISCUSSION OF SPRING AND SUMMER FOOD

Insects.—Exact identifications of the various insect remains often were not possible. Sufficient determinations were made, however, to evaluate the general percentages of the various orders. The head capsules of larvae, fragments of wings and legs, offer a good clue to the forms eaten. Orthoptera are eaten in greatest numbers, but during early summer Coleoptera rival these in number. The skunk's most valid claim to protection, other than its fur value, is in the enormous number of white grubs (*Lachnosterna*) eaten.

Fruits.—Fruits constitute the most important fall and winter food, and during the spring and summer are second only to insects. Perhaps the most important of these are the fruits of various wild *Prunus*, yet wild raspberries, blackberries, and currants form a very prominent share of the mid-summer food. Strawberries are eaten avidly, and feces collected in late June carry abundant evidence of *Fragaria*. Skunks frequent the swamps for blueberries and grow fat on this fruit. In the Adirondack region, the animals resort to the berries of wild sarsaparilla (*Aralia*) and service berries (*Amelanchier*). Apples are eaten extensively in late summer. The fruits of dogwood and viburnum are taken less frequently.

Mammals.—Among mammal remains positively identified were *Microtus*, *Peromyscus*, *Blarina*, *Tamias*, *Sylvilagus*, *Rattus*, *Condylura*, *Zapus*, *Sciurus hudsonicus*, and *Cryptotis*. They are given in the order of their apparent frequency in the feces and stomachs examined. Meadow mice comprise more than 80 per cent of all mammals taken, and they appear to be the chief food of the skunk during April and May. In the 100-acre Cornell University orchard, during the springs of 1933 and 1934, there were estimated to have been approximately 8 or 10 skunks. During these years there was unusual opportunity to study mouse predation by the skunk. In a young orchard of 20 acres the trees were heavily mulched with hay. Under this cover the mice nested in consid-

erable numbers. Skunks, either by a keen sense of smell or by hearing, routed out more than 70 nests in one night. Seldom did an evening pass but that 20 or 30 nests were destroyed and the occupants captured or routed. Skunk droppings in the orchard at this time were composed chiefly of mouse fur.

Grains.—When corn is in the milk the skunk resorts to this easily-procured food. This fault, together with an occasional raid on the poultry house or apiary, appears to be the only damage that can be laid to skunks. Rats, woodchucks and raccoons frequently are more destructive to corn than the skunk, and during the 1935 season gray squirrels destroyed more standing corn than all other mammals combined. Wheat and oats seem to be little if at all molested by skunks.

Carrion.—During periods of stress much of the skunk's food is composed of carrion. In early spring skunks on Long Island repair to the beaches, where dead fish and other sea food has been washed ashore. During late April, when hunting has accounted for many woodchucks, the fur of these animals not infrequently is found in skunk feces.

TABLE 3

SEASONAL OCCURRENCE OF FOOD BASED ON 1667 STOMACH AND FECAL ANALYSES

(*The numbers indicate the frequency of occurrence in per cent*)

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
No. of Analyses.....	132	91	26	65	57	81	122	153	124	139	384	293
Fruit.....	21.6	23.1	38.4	32.3	10.6	14.8	79.4	68.2	86.3	61.4	34.1	21.2
Insects.....	19.4	8.7	15.4	13.9	54.3	89.0	71.3	47.7	61.4	82.6	30.9	27.6
Mammals.....	54.4	34.0	69.2	72.1	77.0	32.7	7.3	11.9	1.6	9.4	23.7	31.0
Grains.....	16.4	46.6	39.0	1.5	—	—	5.8	18.6	29.1	11.3	13.8	10.4
Grasses.....	31.3	47.2	7.7	3.0	—	—	—	1.3	—	6.5	23.2	34.9
Carrion.....	22.7	40.6	34.6	6.1	—	—	—	—	—	—	14.2	18.3
Garbage.....	10.6	18.1	—	—	—	—	—	—	—	—	4.5	7.6
Earthworms.....	—	—	—	—	—	—	—	—	—	—	6.1	4.8
Birds.....	—	—	—	—	7.0	3.7	8.2	—	2.4	—	5.2	1.3
Reptiles, amphibians.....	—	1.1	—	—	—	—	—	2.0	0.8	—	3.9	1.3

Occasionally wool occurs in a scat, and this, palpably, has been taken from a dead sheep. Rarely scales of suckers are recognizable in spring droppings. It is assumed that these are from fish discarded by the fishermen, for it is unlikely that skunks are able to capture a large sucker.

Birds.—Feathers were recovered from 1.66 per cent of the feces examined, their relative frequency in respect to all other items being but 1.46 per cent. Of the 11 feces with remains of birds, 6 contained poultry feathers, while the remainder held small passerine species. During the spring of 1930 I had under observation 3 dens, each of which contained a skunk family. Ovenbirds, veerys, towhees, song and field sparrows nested within 70 paces of the dens, but none were disturbed by skunks.

In the suburbs east of Ithaca, New York, there is a small family burial plot with 6 graves. The plot is on a knoll surrounded by fields and ditches. The gravestones long since have fallen, and under these and on the sides of the knoll are a number of skunk dens. Each spring for the past 4 years, and possibly longer, skunks have raised their young in these retreats. I have watched them closely, and collected many feces about the knoll. Within a stone's throw, and bordering the trails of the animals, pheas-

ants, meadowlarks, killdeers, vesper, song and field sparrows nest each spring. The nests have been located and watched each season. I have yet to obtain any evidence of skunk predation on the occupants of these nests. Insects, fruits, and mice easily are secured, and at this season, these appear to serve the needs of the skunks.

Reptiles and Amphibians.—Snakes are captured with ease. At night, particularly in cool weather, snakes resort to the shelter of stones, and the skunk, flipping over such cover in its search for food, finds the sluggish reptiles. Snake scales were found in 2 feces, while skeletal remains of frogs were recovered twice from droppings. I never have found turtle eggs in the stomach or feces of skunks, although these mammals are recognized as the chief predator of snapping turtles, often digging up and eating the eggs.

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