

Winter Foods of Mink In Southern Illinois

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ABSTRACT

A total of 319 mink carcasses was collected from 7 counties in southwestern Illinois during the 1974-75 and 1975-76 trapping seasons. Food items were recorded in 280 digestive tracks with mammals (71%) the most frequently recorded. Other foods of importance included fish (23%), amphibians (21%), and crayfish (14%); no vegetative matter was observed. The occurrence of mammals increased from November to January while fishes decreased over the same period. Amphibians and crayfish showed noteworthy increases November to December and slight decreases December to January. Females consumed more small mammals (74%) than males (46%), while larger mammals were more prominent in males (22%) than in females (10%). Fish appeared more often in males (27%) than in females (11%) whereas amphibians and crayfishes were similar in occurrence.

INTRODUCTION

Mink (*Mustela vison*) food habit investigations in California (Grinnell et al. 1937), New York (Hamilton 1936, 1940, 1959), Missouri (Korschgen 1958), Michigan (Sealander 1943), North Carolina (Wilson 1954), and northcentral United States (Errington 1943, 1954) demonstrate a highly variable carnivorous diet. A significant dietary adaptability for various ecological situations has been demonstrated also for the feral mink in Europe (Akande 1972, Day and Linn 1972, Erlinge 1972, Gerell 1967, 1968).

Because there has not been study of the mink in Illinois, and previous investigations in the midwest were conducted 15 or more years ago, it seemed appropriate to evaluate and report this mammal's diet when the opportunity occurred. This research effort included determination of food habits in southern Illinois late November through early January 1974-75 and 1975-76, and assessment of variation in diet according to sex.

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STUDY AREA

Carcasses of minks were available from furbuyers and trappers representing a 7-county area in southwestern Illinois (Figure 1). St. Clair, Randolph, Washington, and Perry counties are representative of the Till Plains Section of the Central Lowland physiographic division (Leighton et al. 1948) which reflects low relief with streams of low gradation. These river bottomlands, once heavily forested, are now largely in agriculture with only 15-20 percent of the area in forest. Jackson, Union, and Johnson counties of the Shawnee Hills Section of the Interior Low Plateau physiographic division reflect moderate relief with many bluffs and rock outcrops. Streams are mostly fast and clear with rocky substrata (Smith 1961). Habitats exhibit the influence of southern species of flora and fauna (Vestal 1931, Smith 1961). About 30 percent is now forested and agriculture reflects livestock grazing and cash grain farming.

METHODS

The digestive tracts of mink carcasses representing the 1974-75 and 1975-76 furbearer trapping seasons were collected from furbuyers and trappers. The analyses of these tracts to determine food habits generally followed procedures described by Korschgen (1969). Identification of food items emphasized bones, teeth, hair, scales, and feathers and was aided by Mayer (1952), Lagler (1947), Smith (1961), and reference collections of the Cooperative Wildlife Research Laboratory.

Stomach and large intestine contents were analyzed separately for carcasses collected in 1974-75. However, the procedure was terminated when separate meals could not be distinguished; subsequently, each digestive tract was evaluated as a single sample. Analyses were based on percent frequency of occurrence as volume measurements were considered unreliable (Scott 1941 and Mohr 1935). It was Mohr's (1935) opinion that predation should be measured by number of occurrences, not bulk.

RESULTS AND DISCUSSION

Of 319 digestive tracts examined, 162 and 157 represented 1974-75 and 1975-76, respectively. Food items occurred in 280 tracts. Vegetative materials (leaves, bits of twigs, grass, or wood) commonly encountered were not considered food items as these were believed ingested accidentally while feeding or struggling in traps (Errington 1943, Sealander 1943, Hamilton 1959). Most samples contained evidence of mink which probably represented self-ingestion when in the trap or when preening; also, contamination probably occurred during pelt removal. Those samples containing only mink evidence were considered empty.

Mammals represented the most frequently occurring food item, appearing in 71% of the samples (Table 1). Other prominent foods were fishes (23% of samples), amphibians (21%), and crayfish (14%). Similar results were recorded by Korschgen (1958) in Missouri and Hamilton (1936, 1940) in New York. Other studies (Grinnell et al. 1937, Wilson 1954, Hamilton 1959, Gerrell 1967, 1968, Akande 1972) ranked fishes the most prevalent food item with mammals, birds, crayfishes, and amphibians of varying importance.

Small mammals occurred in 48% of samples and represented over two-thirds of

the frequency of occurrence of this group. Deer mice, rabbits, prairie vole, and house mouse, taken most frequently, are abundant in southern Illinois (Hoffmeister and Mohr 1957). The pine vole and the muskrat appeared in 5% of the samples and occurrence of the latter agrees with findings of Hamilton (1959), Korschgen (1958), and Wilson (1954). Errington (1943) recorded heavy predation when muskrats were made vulnerable by habitat deterioration. Evidence that mink may devour occupants of an entire nest was occasionally encountered; 1 stomach contained 2 adult and about 7 young deer mice.

Fish, the second most important food, were represented primarily by sunfishes and minnows. Most occurrences of the latter included many specimens 2-4 cm in length; suckers and shad were documented frequently. In late autumn and early winter throughout southern Illinois, shad populations commonly experience a winter die-off (pers. commun., R.C. Heidinger, Cooperative Fisheries Research Laboratory, Southern Illinois University, Carbondale.) Such a die-off probably occurred during this study as these fish prefer limnetic waters (Lagler et al. 1962) that make them normally unavailable to mink. Some fish ingestions may have been that discarded by fishermen as sunfish and suckers are commonly left along shorelines.

Many occurrences of amphibians were bone fragments and detailed identification was not often possible. *Rana* and *Acris*, the only genera positively identified, were the major contributors. Egg masses were occasionally encountered along with *Rana*, and on a few occasions a stomach was completely filled with eggs. Day and Linn (1972) documented mink consumption of frog spawn in England. Hamilton (1959) reported amphibians important in the winter diet of mink and concluded mink sought torpid individuals from pond bottoms and stream beds.

Crayfish contributed substantially to the mink diet; a finding similar to that of Hamilton (1936, 1959), Sealander (1943), Wilson (1954), Korschgen (1958), and Gerell (1968). Korschgen (1958) believed mink predation on crayfish was enhanced by increased vulnerability at times of low water levels.

Birds occurred only occasionally with most being small passerines; one sample containing a sparrow was believed carrion as maggots were present. Korschgen (1958), Hamilton (1940, 1959), and Sealander (1943) considered birds of minor importance while Wilson (1954), Gerell (1968), Akande (1972), and Day and Linn (1972) recorded birds a major contribution to the mink diet.

Insects, which occurred as occasional food items, were represented largely as single individuals; they were probably of little importance during the fall-winter period. Some insects were believed incidental ingestions; 1 occurrence of fly larvae was associated with carrion, and 2 others were single soldier flies (*Stratiomyidae*). Grasshoppers and crickets occurred most frequently; some forms were considered secondary ingestions. Large spiders which occurred in 4 tracts suggested they were occasional food items. Snakes were recorded in 2 digestive tracts.

MONTHLY DIETARY TRENDS

Comparison of diets for November, December, and January did not reveal trends between late autumn and winter; however, changes in occurrence of some important food items were noted (Figure 2). Mammals increased from 69% in November to 79% in January, largely due to rabbit which changed in occurrence

from 11% in November to 18% in January. Hunting pressure on rabbit may have increased in late December and January and a greater number of dead and crippled rabbits may have become available. The fact that habitat use of mink and cotton-tail tends to overlap in bottomlands during winter (Scott and Klimstra 1955) supports this theory.

The occurrence of fish decreased proportional to the increase of mammals, an observation coinciding with that of Gerell (1967, 1968) and Akande (1972). The former hypothesized fish experienced increased vulnerability when there was metabolic slowdown during cold water temperatures resulting in decreased activity.

Amphibians and crayfish increased substantially in December but declined in January; change in the latter was significant ($X^2 = 4.15, P < .05$). In contrast Gerell (1968) and Day and Linn (1972) reported the consumption of crayfish decreased during winter months. Gerell (1968) believed a decrease in crayfish activity was responsible. Seemingly, a decrease in their activity would increase vulnerability as crayfish burrow in the benthic zone of ponds and streams rendering themselves easy prey. Because amphibians lie dormant in the benthic zone during winter (Hamilton 1959), they may also become more vulnerable to mink predation. Such findings support Wilson (1954) who recorded a substantial occurrence of amphibians in winter. In contrast, Hamilton (1940) observed large numbers of frogs in summer but recorded few in the diet of mink.

COMPARISON OF MALES AND FEMALES

A comparison of diets by sex (Table 2) showed that females consumed more small mammals (74%) than males (46%) ($X^2 = 7.57, P < .01$); occurrence of larger mammals (muskrat and rabbit) was the reverse (22% for males and 10% for females) ($X^2 = 3.56, P < .10$). These results agree with Sealander (1943) although he did not observe differences in the occurrence of rabbit. Hamilton (1959), who found muskrat and rabbit noticeably more frequent in males, contributed this to the larger size and greater mobility of male mink. Sealander (1943) proposed that females take smaller prey because they are easier to capture while larger males can handle larger prey.

Overall occurrence of fish was greater in diets of males ($X^2 = 4.93, P < .05$), a contradiction of Sealander (1943). The presence of minnows was equal for both sexes. Generally, other fish were larger and may have been more difficult to catch. Females apparently tend to feed on smaller prey items, supporting Sealander's (1943) proposal that size of mink may influence size of prey.

CONCLUSIONS

Mink appear to be opportunistic feeders. However, unlike most other predators, they are strictly carnivorous and highly adapted for food gathering in both terrestrial and aquatic habitats. This and other studies suggest that mink do not favor either habitat because terrestrial and aquatic food items are equally prevalent. None of the five major food groups (mammals, fishes, amphibians, birds, and crayfishes) predominated, each varying in importance with season, locality, and year. This flexibility in diet suggests that mink management practices should address diversity; specific management for specific foods does not seem necessary. Korschgen (1958) believed that sound soil and water conservation practices which

maintain terrestrial and aquatic habitat diversity and quality provide optimum populations of prey species used by mink.

Alteration of wetlands influences their utility as mink habitat and channelization of streams destroys shallow, detritus rich sloughs associated with meandering streams. This elimination of diverse habitats invariably reduces populations of prey species such as crayfish, amphibians, birds, and small mammals. Channelized streams with straight, monotypic banks do not hold flood waters and result in a sharp and minimal transition between aquatic and terrestrial habitats. The impact of impoundment of streams for water storage, flood control, and recreational purposes is widespread; the effect of this activity on mink habitat varies. On streams with low gradation and vast floodplains, an impoundment replaces areas of shallow, highly productive wetlands with deeper water. Only the lake shore remains as an edge between terrestrial and aquatic habitats, resulting in a loss of mink habitat. However, impoundment of streams may yield an increase in shallow water areas by increasing backwaters and flooding timber and meadows. This may enhance mink habitat as the amount of edge between aquatic and terrestrial habitats is increased, creating more desirable areas for production of prey species.

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LITERATURE CITED

- Akande, M. 1972. The food of feral mink (*Mustela vison*) in Scotland. J. Zool. Proc. Zool. Soc. London 167:475-479.
- Day, M.G., and I. Linn. 1972. Notes on the food of feral mink (*Mustela vison*) in England and Wales. J. Zool. Proc. Zool. Soc. London 167:463-473.
- Erlinge, S. 1972. Interspecific relations between otter *Lutra lutra* and mink *Mustela vison* in Sweden. Oikos 23:327-335.
- Errington, P.L. 1943. An analysis of mink predation upon muskrats in north-central United States. Iowa Agric. Exp. Stn. Res. Bull. 320:797-924.
- _____. 1954. The special responsiveness of minks to epizootics in muskrat populations. Ecol. Monogr. 24:377-393.
- Gerell, R. 1967. Food selection in relation to habitat in mink (*Mustela Vison* Schreber) in Sweden. Oikos 18:233-246.
- _____. 1968. Food habits of the mink *Mustela vison* Schreb., in Sweden. Viltrevy 5:120-211.
- Grinnell, J., J.S. Dixon, and J.M. Linsdale. 1937. *Furbearing mammals of California*. Vol. 1. Univ. California Press, Berkeley. 375pp.
- Hamilton, W.J. 1936. Food habits of the mink in New York. J. Mammal. 17:169.
- _____. 1940. The summer food of minks and raccoons on the Montezuma Marsh, New York. J. Wildl. Manage. 4:80-84.
- _____. 1959. Foods of mink in New York. N.Y. Fish Game J. 6:77-85.
- Hoffmeister, D.F., and C.O. Mohr. 1957. Fieldbook of Illinois mammals. Illinois Nat. Hist. Surv. Div., Urbana, Manual 4. 233pp.
- Korschgen, L.J. 1958. December food habits of mink in Missouri. J. Mammal. 39:521-527.
- _____. 1969. Procedures for food-habits analyses. Pages 233-250 in R.H. Giles, Jr., ed. 1969. Wildlife management techniques. The Wildlife Society, Washington, D.C. 623pp.
- Lagler, K.F. 1947. Lepidological studies. 1. Scale characteristics of the families of Great Lakes fishes. Amer. Microscop. Soc. Trans. 66:149-171.

- Leighton, M.M., C.E. Ekblaw, and I. Horberg. 1948. Physiographic divisions of Illinois. *J. Geol.* 56:16-33.
- Mayer, W.V. 1952. The hair of California mammals with keys to the dorsal guard hairs of California mammals. *Am. Midl. Nat.* 48:480-512.
- Mohr, C.O. 1935. Value of prey-individual analysis of stomach contents of predatory mammals. *J. Mammal.* 16:323-324.
- Scott, T.C. 1941. Methods and computations in fecal analysis with reference to the red fox. *Iowa State Coll. J. Sci.* 15:279-285.
- and W.D. Klimstra. 1955. Red foxes and a declining prey population. *Southern Illinois Univ. Monogr. Ser.*, No. 1. 123pp.
- Sealander, J.A. 1943. Winter food habits of mink in southern Michigan. *J. Wildl. Manage.* 7:411-417.
- Smith, P.W. 1961. The amphibians and reptiles of Illinois. *Illinois Nat. Hist. Surv. Bull.* 28:1-298.
- Vestal, A.G. 1931. A preliminary vegetation map of Illinois. *Trans. Illinois State Acad. Sci.* 23:204-217.
- Wilson, K.A. 1954. The role of mink and otter as muskrat predators in northeastern North Carolina. *J. Wildl. Manag.* 18:199-207.

Table 1. Food items found in digestive tracts of mink collected in southern Illinois during winters of 1974-75 and 1975-76.

Food Item	Number of Occurrences N = 280	Percent Frequency
Mammals	200	71
Rodentia	135	48
<i>Peromyscus</i> spp. (Deer mice)	41	15
<i>Microtus ochrogaster</i> (Prairie vole)	28	10
<i>Mus musculus</i> (House mouse)	20	7
<i>Pitymys pinetorum</i> (Pine vole)	14	5
<i>Ondatra zibethicus</i> (Muskrat)	13	5
<i>Rattus norvegicus</i> (Norway rat)	5	2
<i>Synaptomys cooperi</i> (Bog lemming)	4	1
<i>Oryzomys palustris</i> (Rice rat)	2	1
<i>Zapus hudsonius</i> (Jumping mouse)	2	1
Undetermined rodent	14	5
Lagomorpha		
<i>Sylvilagus</i> spp. (Rabbits)	41	15
Insectivora	7	3
<i>Blarina brevicauda</i> (Short-tailed shrew)	5	2
<i>Cryptotis parva</i> (Least shrew)	1	trace
Undetermined insectivore	1	trace
Undetermined mammal	30	11
Fishes	64	23
Centrarchidae (Sunfish)	19	7
Cyprinidae (Minnows)	16	6
Clupeidae, <i>Dorosoma</i> spp. (Shad)	13	5
Catostomidae (Suckers)	10	4
Sciaenidae, <i>Aplodinotus grunniens</i> (Drum)	2	1
Undetermined fish	12	4
Amphibians	59	21
Anura (Frogs)	25	9
<i>Rana</i> spp. (True frogs)	11	4
<i>Acris</i> spp. (Cricket frogs)	5	2
Undetermined frog	9	3
Amphibian egg masses	5	2
Undetermined amphibian	33	12

Table 1. Continued

Food Item	Number of Occurrences N = 280	Percent Frequency
Crustaceans		
Cambaridae (Crayfish)	39	14
Birds	19	7
Passeriformes	10	4
Icteridae (Blackbirds)	4	1
<i>Pipilo erythrophthalmus</i> (Towhee)	1	trace
<i>Melospiza</i> spp. (Sparrows)	1	trace
Undetermined passerine	4	1
Charadriiformes		
<i>Capella gallinago</i> (Common snipe)	1	trace
Galliformes		
<i>Colinus virginianus</i> (Bobwhite quail)	1	trace
Undetermined bird	7	3
Insects	19	7
Orthoptera (Grasshoppers and crickets)	4	1
Diptera (Fly larvae)	3	1
Hemiptera (True bugs)	1	trace
Hymenoptera (Ants)	1	trace
Coleoptera (Beetles)	1	trace
Megaloptera (Hellgrammites)	1	trace
Undetermined insect	8	3
Spiders	4	1
Reptiles	2	1
<i>Virginia valerae</i> (Earth snake)	1	trace
Undetermined snake	1	trace
Mollusks		
Sphaeriidae (Fingernail clams)	1	trace
Undetermined animal	6	2

Table 2. Comparison of food items found in digestive tracts of male and female mink collected in southern Illinois during winters of 1974-75 and 1975-76.

Food Item	Male		Female	
	No. of Occ. N = 210	Pct. Freq.	No. of Occ. N = 70	Pct. Freq.
Mammals	143	68	59	84
Rodentia	90	43	47	67
<i>Peromyscus</i> spp.	26	12	15	21
<i>Microtus ochrogaster</i>	16	8	12	17
<i>Mus musculus</i>	13	6	7	10
<i>Pitymys pinetorum</i>	10	5	4	6
<i>Ondatra zibethicus</i>	12	6	1	1
<i>Rattus norvegicus</i>	3	1	2	3
<i>Synaptomys cooperi</i>	3	1	1	1
<i>Oryzomys palustris</i>	1	trace	1	1
<i>Zapus hudsonius</i>	1	trace	1	1
Undetermined rodent	11	5	4	6
Lagomorpha				
<i>Sylvilagus</i> spp.	35	17	6	9
Insectivora	4	2	3	4
<i>Blarina brevicauda</i>	3	1	2	3
<i>Cryptotis parva</i>	0	0	1	1
Undetermined insectivore	1	trace	0	0
Undetermined mammal	22	10	7	10
Fishes	57	27	8	11
Centrarchidae	17	8	2	3
Cyprinidae	12	6	4	6
Clupeidae, <i>Dorosoma</i> spp.	13	6	0	0
Catostomidae	9	4	1	1
Sciaenidae, <i>Aplodinotus</i> sp.	1	trace	1	1
Undetermined fish	11	5	1	1
Amphibians	45	21	13	19
Anura	20	10	5	7
<i>Rana</i> spp.	8	4	3	4
<i>Acris</i> spp.	4	2	1	1
Undetermined frog	8	4	1	1
Amphibian egg masses	5	2	0	0
Undetermined amphibian	25	12	8	11

Table 2. Continued

Food Item	Male		Female	
	No. of Occ. N = 210	Pct. Freq.	No. of Occ. N = 70	Pct. Freq.
Crustaceans				
Cambaridae	29	14	10	14
Birds				
Passeriformes	6	3	4	6
Icteridae	3	1	1	1
<i>Pipilo erythrophthalmus</i>	0	0	1	1
<i>Melospiza</i> spp.	1	trace	0	0
Undetermined passerine	2	1	2	3
Charadriiformes				
<i>Capella gallinago</i>	1	trace	0	0
Galliformes				
<i>Colinus virginianus</i>	1	trace	0	0
Undetermined bird	6	3	1	1
Insects				
Orthoptera	3	1	1	1
Diptera	2	1	1	1
Hemiptera	0	0	1	1
Hymenoptera	1	trace	0	0
Coleoptera	0	0	1	1
Megaloptera	1	trace	0	0
Undetermined insect	6	3	2	3
Spiders	2	1	2	3
Reptiles				
<i>Virginia valerae</i>	1	trace	0	0
Mollusks				
Sphaeriidae	0	0	1	1
Undetermined animal	6	3	0	0

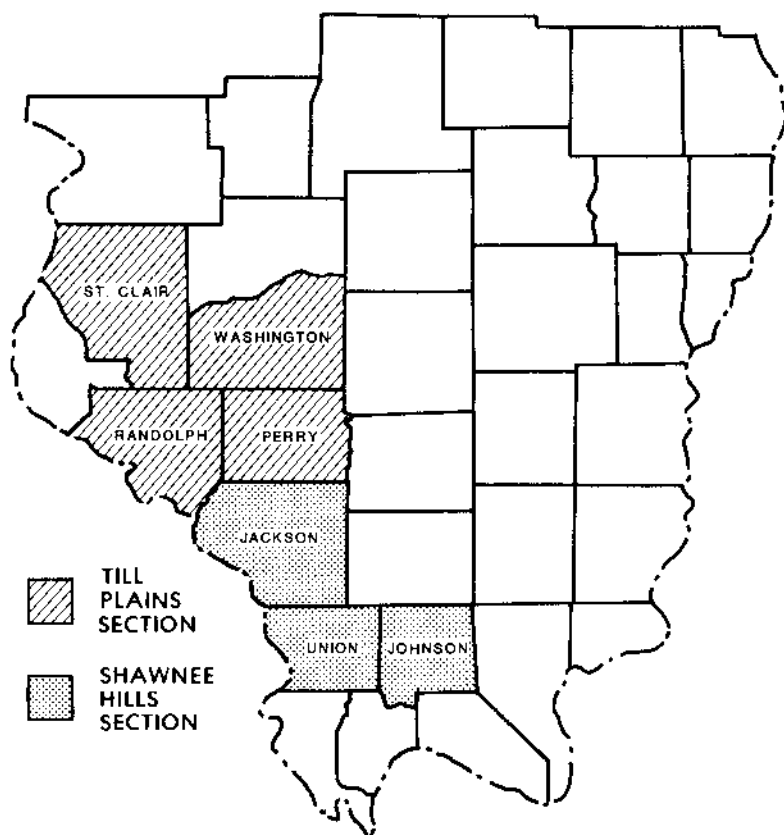


Fig. 1. The study area in southwestern Illinois reflecting the counties where furbuyers and trappers were located and from whom mink carcasses were obtained.

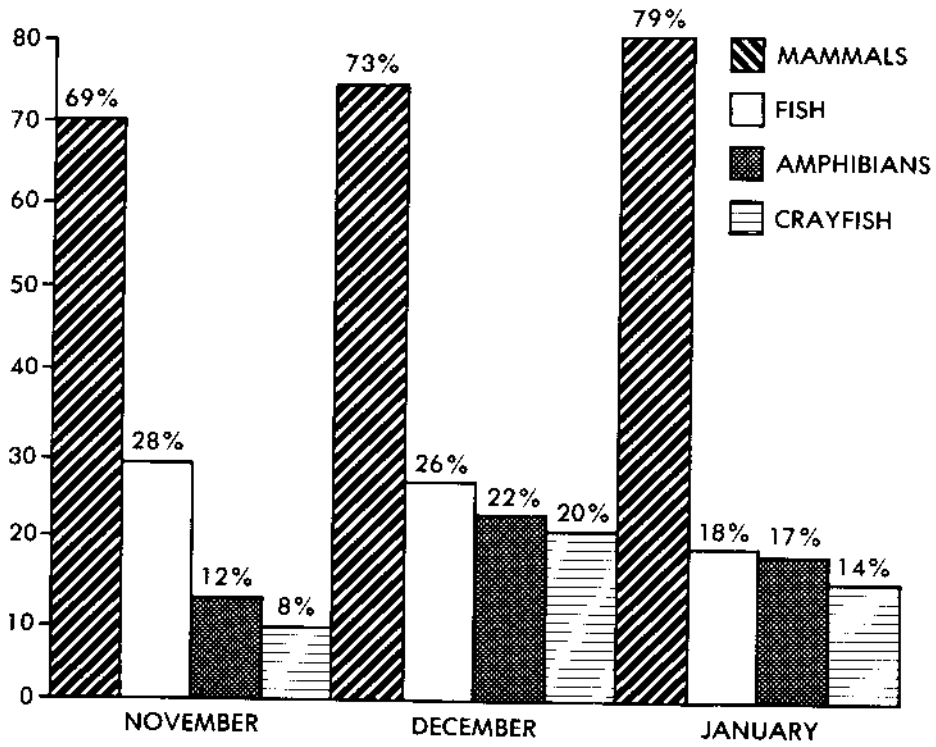


Fig. 2. Monthly trends in percent frequency of occurrence for major food items of 250 minks, southern Illinois, 1974-75 and 1975-76.