Transactions of the Illinois State Academy of Science
(1993), Volume 86, 3 and 4, pp. 145 - 152

Summer Food Habits of Coyotes at Union County Conservation Area, Illinois

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ABSTRACT

Summer food item use by coyotes (*Canis latrans*) was investigated at Union County Conservation Area (UCCA), Illinois, during 1984-86 to determine if item use differed among years and months, and to determine whether coyote food habits in this bottomland habitat differed from those in nearby upland habitats. Item use differed among years ($P < 0.01$) and months ($P < 0.01$). Small rodents (primarily microtines), birds, June beetles (*Phyllophaga* spp.), white-tailed deer fawns (*Odocoileus virginianus*), and rabbits (*Sylvilagus* spp.) were the most frequently occurring items in coyote scats. Use of rabbits and fleshy fruits was relatively low and consumption of birds and muskrats (*Ondatra zibethecus*) was high compared to nearby upland habitats. Patterns of food item use by coyotes likely reflect annual, monthly, and habitat-specific item availability.

INTRODUCTION

Coyote foraging patterns exhibit high plasticity and can vary by location, season, and year (Cypher 1991). Because the availability of potential food items varies among habitat types, use of food items by coyotes also should vary among types. In Illinois, food habits of coyotes in upland habitats have been well documented (Phillips and Hubert 1980, Westmoreland and Woolf 1981, Jones 1982, Priest 1986, Cypher 1991). Summer food habits of coyotes in a bottomland habitat were investigated at UCCA in conjunction with a study of white-tailed deer fawn mortality (Yancy 1991). Our objectives were to (1) identify food items consumed by coyotes in a bottomland habitat, (2) determine whether

food item use varied among months and years, and (3) compare coyote food item use in a bottomland habitat to that reported for upland habitats.

STUDY AREA

Summer food habits of coyotes were investigated at the 2,466-ha UCCA in southwestern Illinois. UCCA was established in 1947 and is managed primarily as a wintering area for Canada geese (*Branta canadensis*). UCCA is located on the floodplain of the Mississippi River. Topography is low relief, and soils vary from very-poorly drained to well drained (Miles et al. 1979). Climate is characterized by cool winters, wet springs, and hot, humid summers (Page 1949).

The native plant community is bottomland hardwood forest. Dominant species include sweetgum (*Liquidambar styraciflua*), pecan (*Carya illinoensis*), and pin oak (*Quercus palustris*) on drier sites, and green ash (*Fraxinus pennsylvanicus*), black willow (*Salix nigra*), and cottonwood (*Populus deltoides*) on wetter sites. Most land with well-drained soil at UCCA has been converted to agriculture. Crops are grown primarily to provide food for wintering Canada geese and include corn, milo, winter wheat, clover, and alfalfa.

METHODS

Use of food items by coyotes was determined by analyzing scat samples. During 1984-86, coyote scats were collected from along unpaved roads within UCCA during April-August. Scats were oven-dried at 60°C for 24 hr to facilitate handling.

Mammalian remains in scats were identified from teeth and bone fragments (Glass 1981, Roest 1986) and guard hair characteristics (Stains 1958, Adorjan and Kolenosky 1969, Moore et al. 1974). Avian remains were identified based on feather, bill, and foot characteristics. Seeds of fleshy fruits were identified by comparison to known specimens (U.S. Department of Agriculture 1974).

Frequency of occurrence of items in scats was compared among years and months using two-way contingency table analyses and Chi-square tests. Those items occurring in $\geq$ 10% of scats in $\geq$ 2 years or $\geq$ 2 months were used in statistical analyses. All other items were combined into an "other" category for statistical purposes. P-values ≤ 0.05 were considered significant.

RESULTS

Annual Item Use

For all years combined, small rodents were the most frequently occurring item in summer coyote scats at UCCA (Table 1) followed by birds, June beetles, fawns, rabbits (*Sylvilagus* spp.), muskrats, adult deer, and squirrels (*Sciurus* spp.). Items occurring in < 10% of scats included raccoons (*Procyon lotor*), woodchucks (*Marmota monax*), corn, persimmons (*Diospyros virginiana*), and blackberries (*Rubus* spp.).

Summer food item use by coyotes differed significantly between all years (1984 and 1985: $X^2 = 43.2$, 8 df, $P < 0.01$; 1985 and 1986: $X^2 = 55.3$, 8 df, $P < 0.01$; 1984 and 1986:

$\underline{X}^2$ = 37.3, 8 df, $\underline{P}$ < 0.01). Small rodents, primarily microtines (prairie voles [*Microtus ochrogaster*] and southern bog lemmings [*Synaptomys cooperi*]), were the most frequently occurring item in all years combined, 1984, and 1986, with the highest frequency occurring in 1986 (56.4%). Birds were the most frequently occurring item in 1985. In 1984, rabbits, birds, and June beetles were tied as the second most frequently occurring item, and were followed by fawns and squirrels. In 1985, small rodents were the second most frequently occurring item followed by fawns, rabbits, adult deer, and June beetles. In 1986, birds were the second most frequently occurring item followed by June beetles, muskrats, squirrels, and fawns.

Monthly Item Use

Frequency of occurrence of items consumed by coyotes varied among months ($\underline{X}^2$ = 341.9, 36 df, $\underline{P}$ < 0.01). Small rodents were the most frequently occurring item in all months except June when fawns were the most common item (Table 2). Other frequently occurring items (≥ 10% of scats) in each month included: April - birds and rabbits; May - birds, June beetles, and rabbits; June - birds, small rodents, and June beetles; July - fawns; and August - corn, adult deer, and muskrats.

DISCUSSION

Annual Item Use

Small rodents, particular microtines, appear to be a staple summer food item for coyotes at UCCA. Microtine rodents also were important food items in summer for coyotes inhabiting upland habitats at Crab Orchard National Wildlife Refuge (CONWR) in nearby Williamson County (Westmoreland and Woolf 1981, Cypher 1991) and at Dixon Springs Agricultural Center in Pope County (Priest 1986). The peak occurrence of small rodents in 1986 is consistent with data from CONWR (Cypher 1991). Microtine rodent populations can be cyclic and may have peaked regionally in 1986. When abundant, microtines may constitute an efficient item upon which to forage, and may reduce predation on other prey species (Cypher 1991). At UCCA, occurrence of fawns, and adult deer and rabbits in coyote scats was lowest in 1986.

Rabbits typically are a staple food item for coyotes in upland habitats but appeared to be less important at UCCA. Rabbit was the most frequently occurring summer food item at CONWR (Cypher 1991) and in west-central Illinois (Jones 1982), and also was important at Land Between the Lakes (LBL) in Kentucky (Blanton 1985). Whether the reduced importance of rabbits at UCCA was a function of lower rabbit abundance in bottomland habitats or higher availability of other items is unknown.

White-tailed deer fawns were another important food item in summer for coyotes at UCCA. Fawns were the first and third most frequently occurring item in coyote scats from LBL (Blanton 1985) and CONWR (Cypher 1991), respectively. Overall, fawns were ranked fourth in frequency of occurrence at UCCA. However, use of fawns may have been high relative to availability. Of 25 fawns radiocollared during 1984-86 and dying of natural causes, 76% apparently were killed by coyotes (Yancy 1991). Neonatal fawns at UCCA were concentrated in narrow strips of cover between agricultural fields and flooded woodlands. These strips probably are heavily used foraging habitat for coyotes resulting in the observed high predation rate on fawns. Additionally, coyotes may

continue to prey on fawns in early summer even when other food items are abundant because fawns are a relatively large prey item and may constitute a more efficient prey item for coyotes transporting food to young (Harrison and Harrison 1984, Cypher 1993).

Among other mammalian prey items, muskrats occurred in coyote scats in all years, and were the fourth-ranked item in 1986. Muskrat availability is higher in bottomland habitats, such as UCCA. Muskrats also commonly occurred in coyote scats at CONWR where lakes, ponds, and other wetlands provided abundant habitat for this semi-aquatic rodent. Adult deer in coyote scats was probably consumed as carrion because coyotes are not efficient predators of adult deer (Berg and Chesness 1978, Parker 1986).

Use of birds by coyotes was high at UCCA compared to upland habitats. Occurrence of birds in coyote scats at CONWR was 17.1% overall (mostly attributable to consumption of Canada goose in winter) and 6.5% in summer (Cypher 1991). Whether the frequent occurrence of bird in UCCA scats reflects higher availability of this food resource in bottomland habitats is unclear. Most avian remains consisted of small, non-descript feathers and were unidentifiable. Among identifiable remains, most were Canada goose with occasional passerines. Canada goose consumed by coyotes between April and August likely was carrion from winter and harvest-related mortality, or debilitated birds unable to migrate. Although Canada goose was a secondary food item for coyotes in summer at UCCA, geese likely are an important dietary constituent in winter and spring. Each winter, over 100,000 Canada geese may winter at UCCA (Tacha 1989). Canada geese were an important component of coyote diets at CONWR where up to 150,000 geese overwinter each year (Cypher 1991).

June beetles were the third most frequently used item by coyotes at UCCA. This ranking likely overestimates the importance of June beetles as a food resource because many beetle occurrences consisted of one or two individuals in scats composed mostly of other items. Regardless, insects can be important components of coyote diets, particularly coleopterans such as June beetles and orthopterans such as grasshoppers. At CONWR, June beetles occurred frequently in coyote scats in late spring and early summer (Cypher 1991), and insects in general are an important summer food item (Westmoreland and Woolf 1981, Cypher 1991).

Use of fleshy fruit by coyotes was relatively low at UCCA compared to upland habitats. Persimmons occurred frequently in late summer scats and use of this item likely increased in fall, as observed in many local upland habitats (Jones 1982, Priest 1985, Cypher 1991). However, use of other summer fruits was conspicuously low. Limited use of blackberries (*Rubus* spp.) was observed. Summer fruits used by coyotes in nearby upland habitats include wild plum (*Prunus americana*) (Cypher 1991), black cherry (*Prunus serotina*) (Blanton 1985, Cypher 1991), and mulberry (*Morus* spp.) (Jones 1982). Differences in fruit use between bottomland and upland habitats likely reflects availability. Corn occurred frequently in coyote scats as has been reported from many other locations. Corn is grown at UCCA to provide food for overwintering Canada geese.

Miscellaneous items (< 5 occurrences in coyote scats at UCCA) included livestock (cows and pigs), opossums (*Didelphis virginiana*), tupelo fruits (*Nyssa sylvatica*), turtle eggs, fish, deer mice (*Peromyscus* spp.), crayfish (Decapoda), and refuse. These items likely

reflect opportunistic foraging by coyotes. Coyote predation on cows and pigs is infrequent (Phillips and Hubert 1980, Jones 1982) and livestock were not present on UCCA. Thus, livestock in coyotes scats was likely carrion consumed off-refuge.

Monthly Item Use

Variation in coyote food item use among months likely reflects item availability. The high occurrence of small rodents in scats in all months further indicates that this item is a staple food for coyotes at UCCA. Small rodents were the most frequently occurring item in all months except June when fawns were the most frequently occurring item. Fawn parturition peaks in early June (Yancy 1991) and neonates are extremely vulnerable to coyote predation from approximately 2-10 weeks of age (Garner et al. 1976, Nelson 1984). Fawn occurrence in scats ranked second in July and was only slightly less than small rodent occurrence. As stated previously, predation pressure on fawns may be high because reproducing coyotes may specifically search for fawns to feed weaned and rapidly growing young.

The relatively high occurrence of adult deer in August scat samples may be misleading. Coyotes are not efficient predators of healthy adult deer, and the "adult" deer consumed in August likely were fawns that had begun to molt juvenile pelage.

Occurrence of rabbits in scats was relatively high in April and May, but relatively low in other months. This probably does not reflect a decline in rabbit availability as much as an increase in availability of preferred or easier items (e.g., fruit). Birds, mostly Canada goose, also occurred relatively frequently in April, most likely due to the availability of goose carrion and cripples, as discussed previously. Use of June beetles in May and June reflects peak availability of this item. The increased occurrence of corn in July and August scats coincides with the highly palatable "milk stage" of this crop. Persimmon use in August coincided with fruit ripening.

CONCLUSIONS

Summer food item use by coyotes at UCCA varied annually and monthly. The items used were similar among periods but proportional use of these items differed, probably due to variable item availability. Item use in this bottomland habitat was similar to that in nearby upland habitats with some exceptions. Use of rabbits and fruit was relatively low and use of birds and muskrats was relatively high compared to results from upland habitats. These differences likely reflect habitat-specific item availability.

ACKNOWLEDGEMENTS

Funding for this project was provided by Illinois Federal Aid Wildlife Restoration Projects W-63-R(SI)-26 through 29, and the Cooperative Wildlife Research Laboratory, Graduate School, and Department of Zoology at Southern Illinois University-Carbondale. Mark Maffi and Steve Fender assisted with scat collections. We thank J. Scrivner and three anonymous reviewers for providing comments to improve the manuscript.

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Table 1. Annual comparison of summer food itemuse by coyotes at Union County Conservation Area, Illinois, 1984-86.

	Frequency of Occurrence (%)			
Item[a]	1984 n=114	1985 n=187	1986 n=195	Total n=496
VERTEBRATES				
Adult deer	10.5	21.4	7.7	13.5
Fawn deer	21.9	22.5	15.4	19.6
Rabbit	28.9	21.4	6.7	17.3
Small rodent	40.4	34.8	56.4	44.8
Squirrel	16.7	4.3	15.9	11.7
Woodchuck	0.0	7.0	2.1	3.4
Muskrat	7.0	15.5	17.4	14.3
Raccoon	4.4	4.8	4.6	4.6
Bird	28.9	37.4	30.8	32.9
INVERTEBRATES				
June beetle	28.9	16.6	22.1	21.6
Other	1.8	3.2	9.2	5.2
FRUIT				
Corn	2.6	10.2	7.7	7.5
Persimmon	0.0	1.1	5.6	2.6
Blackberry	0.9	5.3	1.5	2.8

[a]Items occurring in ≥ 10 scat samples.

Table 2. Monthly food item use by coyotes during summer at Union County Conservation Area, Illinois, 1984-86.

	Frequency of Occurrence (%)				
Item[a]	Apr. n=98	May n=142	June n=119	July n=66	Aug. n=71
VERTEBRATES					
Adult deer	19.4	6.3	9.2	10.6	29.6
Fawn deer	1.0	4.9	46.2	39.4	11.3
Rabbit	29.6	21.8	13.4	10.6	4.2
Small rodent	59.2	56.3	26.1	40.9	43.7
Squirrel	10.2	16.2	15.1	4.5	5.6
Woodchuck	1.0	6.3	2.5	4.5	1.4
Muskrat	18.4	12.0	7.6	15.2	23.9
Raccoon	11.2	7.0	0.8	0.0	1.4
Bird	48.0	41.5	30.3	10.6	19.7
INVERTEBRATES					
June beetle	12.2	38.7	25.2	12.1	4.2
Other	1.0	4.2	1.7	1.5	0.0
FRUIT					
Corn	0.0	0.0	0.0	15.2	38.0
Persimmon	0.0	0.0	0.0	0.0	18.3
Blackberry	0.0	3.5	6.7	1.5	0.0

[a]Items occurring in ≥ 10 scat samples.