IMPACTS OF SMALL PREDATORS ON DEER

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Abstract: Predator size influences the type of prey taken. Generally, smaller predators rely on rabbits, rodents, birds, fruits, or insects. Food habit studies of several small predators indicate the presence of deer in the diet. Percentages of deer in the diet were larger in the north and northeast where variety of prey was lower. Studies conducted in the south and southeast generally found lower percentages of deer in the diets. Studies in the south indicate fawns were the age class of choice. Although food habit studies indicate the presence of deer in the diet, this does not show these predators have an impact on deer populations.

The bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), red fox(*Vulpes vulpes*), and golden eagle *(Aquila chrysaetos*) are several of the smaller predators that have the potential to take deer (*Odocoileus* spp.) or a certain age class of deer. Much of the research conducted on the impacts of small predators on deer relate to the presence or amount found in the diet. Research has identified major prey items for each of these predators in different regions of the United States. However, presence in the diet does not necessarily indicate these predators have a negative impact on deer populations. Generally these smaller predators rely on smaller prey items.

Prey abundance is a major factor in determining the foods selected by a predator. Types of prey vary by region and may change during the year as prey abundance fluctuates. The bobcat relies on a high protein diet and therefore the diet is made up almost exclusively of meat. However, the fox includes fruits and insects when they are present. Eagles also rely on a variety of small mammals. The purpose of this paper is to review the current knowledge on the presence of deer in the diet of the smaller predators listed above and the impact they may have on a deer population or a particular age class of deer.

BOBCAT

A compilation of bobcat food habit studies indicate rabbits (*Lepus* spp., *Sylvilagus* spp.) were the primary prey taken throughout their range. Deer were an important prey item in the northeast and northwest where winter snow increased the vulnerability to predation. As a result the highest consumption of deer was usually found in winter (Anderson 1987). A study in Maine found deer in 40% of the scat collected in the winter compared to 19% in the summer (Major and Sherburne 1987). Snowshoe hares (*Lepus americanus*) were considered the major food item in Maine where they comprised 50% to 92% of the diet (Litvaitis and Harrison 1989). Frequency of occurrence of white-tailed deer in bobcat scat was 22% during the winter months in New Hampshire (Litvaitis et al. 1984). Witmer and DeCalesta (1986) reported black-tailed deer (*Odocoileus hemionus columbianus*) were found in 5.3% (summer) to 22.2% (winter) of the scat in

Oregon. Some have suggested a majority of the deer eaten in winter was carrion. However, bobcats have been reported to kill deer and other ungulates (Anderson 1987).

Studies conducted in the southeast indicate bobcat diets consist of medium to small sized prey with different species of rabbit as the major food item. Wassmer et al. (1988) reported no deer in the diet of bobcats during a study in central Florida. A study conducted in Alabama (Miller and Speake 1978) and another in Florida (Maehr and Brady 1986) found deer in 2% of the scats. In central Florida the primary prey were rabbits (*Sylvilagus* spp.) 75% and cotton rats (*Sigmodon hispidis*) 49% (Wassmer et al. 1988). Cotton rats (65%) and cottontail rabbits (38%) occurred in the greatest frequency in an Alabama study (Miller and Speake 1978).

Deer were found in 29.6% of the scat from a study conducted in Utah. Deer were considered abundant at the study site and during the time period of the study. Gashwiler et al. (1960) suggested winter mortality and hunting may have been a source of carcasses for bobcat feeding. Other studies conducted in western states indicate deer were found in less than 10% of the scat (Anderson 1987).

Studies conducted in the Big Bend region of Texas indicate desert mule deer (*Odocoileus hemionus crooki*) were found in 24% of bobcat scat from 1972-74. A decline in deer populations and an increase in rabbit populations resulted in a decline to 3% for deer and an increase of rabbit in the scat from 51% to 78% (Leopold and Krausman 1986). Beasom and Moore (1977) recorded white-tailed deer in 6% of stomachs examined in south Texas during 1971. However, no deer were recorded the following year. Cotton rats and cottontails increased in abundance during the second year. Beasom and Moore (1977) suggested bobcats concentrated food gathering efforts on the more abundant cotton rats and cottontails.

Research conducted on the Welder Wildlife Foundation from 1993-1998 indicate deer were found in bobcat scat from May through August. Deer were found in 5%, 32%, 24%, and 4% of bobcat scat collected in May, June, July, and August, respectively (Blankenship 2000). This corresponds to the fawn drop on the Welder Wildlife Foundation. Data show the birth period begins in May with the majority born in June (Blankenship et al. 1994). Larger mammals such as javelina (*Tayassu tajacu*) and feral hog (*Sus scrofa*) were found in the bobcat diet but many of these were also young animals.

These studies indicate deer are found in the diet of bobcats. However, it does not answer the question how is the deer population impacted by bobcat predation? There are no studies that I know of that answer this question directly. However, there are several studies that consider the loss of fawns to predators. Cook et al. (1971) radio-collared 58 fawns and determined the causes of mortality. They identified 2 fawns killed by bobcats or 3% of the collared fawns. This is very small compared to 79% that were considered coyote or probable coyote predation.

Epstein et al. (1983) placed radio collars on 47 white-tailed deer fawns on 2 islands off of South Carolina. Bobcats accounted for 12 of the 41 (29%) fawn mortalities. Coyotes were not present on the

2 islands and rabbit abundance was low. A study in Oklahoma monitored 35 radio-collared white-tailed deer fawns to determine causes of mortality. Twenty-eight fawn mortalities were attributed to predation and 5 (15.2%) were identified as bobcat kills (Garner et al. 1976). Bobcats were the cause of 4% of the fawn mortality for 78 white-tailed deer fawns monitored in New Brunswick (Ballard et al. 1999). Bobcats were a source of mortality only up through the first 180 days of life (Ballard et al. 1999). Studies have shown the removal of predators increases the survival of fawns and this results in an increase in deer numbers (Beasom 1974, Kie 1977). Coyotes were the dominate predator removed (7 coyotes:1 bobcat) in each of the above studies.

FOX

The gray fox and red fox ate a wide variety of plant and animal matter and were more omnivorous than bobcats. Mammalian prey such as rabbits, small rodents, and mice comprise a large portion of the diet year round, although grasshoppers, crickets, fruits, and berries may predominate during summer (Fritzell 1987, Voigt 1987). Major and Sherburne (1987) reported a low occurrence of deer in winter diets. They suggested this was related to the inability of foxes to capture deer and interference by coyotes preventing use of carcasses. Red fox winter diets contained snowshoe hare (61%), small mammals (32%), birds (17%), and deer (15%). In comparison, the frequency of occurrence of deer in coyote and bobcat winter diets were 58% and 40%, respectively (Major and Sherburne 1987). Red and gray fox accounted for 10% of fawn mortalities in South Carolina (Epstein et al. 1983). Deer in the diet of foxes was attributed mainly to scavenging (Fritzell 1987). Gray fox stomach contents examined in Texas indicate the winter diets consisted of small mammal (cottontails, cotton rats), 56%; insects (mostly grasshoppers), 23%, and birds, 21 %. Summer diets contained more fruit (persimmons and acorns), 30%; insects, 26%; small mammals, 16%; birds, 14%; and crayfish, 14% (Davis 1974).

EAGLES

Rabbits or ground squirrels (*Spermophilus* spp.) were important small mammals in the golden eagle diet. Larger mammals (e.g. deer) may be important in the diet as carrion. Young fawns are more likely targets if they are hunted as prey (Orta 1994). The remains of young deer were found in 4 of 41 golden eagle nests from west Texas and New Mexico and comprised 0.4% of the food items identified. The major food items in the golden eagle diet were rabbits (69%) and squirrels (11%)(Mollhagen et al. 1972).

ALLIGATORS

Land areas with marshes or wetlands may also encounter alligator predation on fawn and adult deer. Epstein et al. (1983) reported alligators were responsible for at least 2 fawn deaths or 5% of fawn mortalities. Alligators are also responsible for the loss of some adult deer. Although I did not actually see the capture, I did see an alligator with an adult doe in the middle of the Aransas River. Captures by alligators are probably a result of deer attempting to get a drink from a water source or feeding in a wetland area (Blankenship unpublished data).

SUMMARY

Food habit studies conducted on bobcat, red and gray fox, golden eagles, and alligators generally rely on scat and stomach samples. Rabbits and rodents make up a large portion of the diet. Deer were a seasonal component of the diet or were found in small quantities. However, the amount of deer found in scat or stomachs does not indicate a significant impact on deer populations. Scavenging may be a source for some or all of the deer found in the diet of small predators. Data does indicate fawns are the most vulnerable to predation by smaller predators. Changes in rabbit and rodent abundance are a probable cause for the increase in deer in the diet of both bobcats and fox (Beasom and Moore 1977, Espstein et al. 1983). Determining the impacts of smaller predators on deer populations is difficult because there are many interacting variables. The number of rabbits and rodents may influence the potential impacts of predators on deer numbers. Controlling all predators does not allow the researcher to determine which predator impacts the population. Controlling larger predators (e.g. coyotes) does not indicate if smaller predators impact deer populations.

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