Bobcat Diet on an Area Managed for Northern Bobwhite

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Abstract: We quantified bobcat *(Lynx rufus)* diet on a longleaf pine *(Pinus palustris)* dominated area managed for northern bobwhite *(Colinus virginianus),* hereafter quail. We sorted prey items to species when possible, but for analysis we categorized them into 1 of 5 classes: rodent, bird, deer, rabbit, and other species. Bobcat diet did not differ seasonally ($X^2 = 17.82$, $P = 0.1213$). Most scats (91%) contained rodent, 14% contained bird, 9% contained deer *(Odocoileus virginianus),* 6% contained rabbit (*Sylvilagus* sp.), and 12% contained other. Quail remains were detected in only 2 of 135 bobcat scats examined. Because of low occurrence of quail (approximately 1.4%) in bobcat scats we suggest that bobcats are not a serious predator of quail.

Key Words: bobcat, diet, Georgia, *Lynx rufus*

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Bobcats are opportunistic in their feeding habits, and their diet often reflects prey availability (Latham 1951). In the Southeast, bobcats prey most heavily on small mammals such as rabbits and cotton rats (Davis 1955, Beasom and Moore 1977, Miller and Speake 1978, Maehr and Brady 1986, Baker et al. 2001). In some regions, bobcats also consume deer. Deer consumption is often highest during fall-winter when there is the possibility for hunter-wounded deer to be consumed and during spring-summer when fawns are available as prey (Buttrey 1979, Story et al. 1982). Bobcat food habits on lands managed for quail have only been addressed in one study (Miller and Speake 1978). Food habits of bobcats in a longleaf-wiregrass *(Aristida beyrichiana)* ecosystem have not previously been reported.

Many wildlife managers consider bobcats to be a major predator of quail, and the interaction between bobcats and quail is important to quail managers. Therefore, the objectives of this study were to quantify bobcat diet on a longleaf pine-dominated area managed for quail and to test for seasonal differences in bobcat diet.

Study Area

The study was conducted on Ichauway, the 11,700-ha outdoor laboratory facility of the Joseph W. Jones Ecological Research Center, located in Baker County, Georgia. Longleaf pine woodlands dominated the landscape. Slash pine *(Pinus elliottii)* flatwoods, natural loblolly pine *(P. taeda)* stands, mixed pine-hardwood stands, creek swamps, and agricultural fields were distributed throughout the area. Old field grasses (e.g., *Andropogon* spp.) and wiregrass dominated the understory (Goebel et al. 1997). However, more than 1,000 vascular plant species existed on the property (Drew et al. 1998). There are 724 km of primary, secondary, and tertiary roads on Ichauway and 980 km of firebreaks and food plot edges.

Ichauway employed dormant and growing season burns in a two-year rotation on approximately 4,000–6,000 ha annually. To keep areas productive for quail, fields were disked to increase food and cover. Discing removed thicker vegetation and allowed seeding of plants such as ragweed *(Ambrosia artemisifolia)* and partridge pea *(Chamaecrista fasciculata)* (Landers and Mueller 1986). Widely scattered wildlife food plots consisting of grain sorghum *(Sorghum vulgare),* Egyptian wheat (*Sorghum* spp.), brown top millet *(Brachiaria ramose),* cowpea (*Vigna* spp.), corn *(Zea mays),* and winter wheat *(Triticum aestivum)* occupied 20% of the property. Corn, grain sorghum, soybeans *(Glycine max),* and sunflower (*Helianthus* spp.) seed was spread throughout the areas managed for quail during November–May.

There was a wide variety of potential prey for bobcats on Ichauway. White-tailed deer occurred at a relatively low density (approximately 4/km^2). There were four species of squirrel: eastern chipmunk *(Tamias striatus),* southern flying squirrel *(Glaucomys volans),* eastern gray squirrel *(Sciurus carolinensis),* and fox squirrel *(S. niger);* and two species of rabbit: eastern cottontail *(Sylvilagus floridanus)* and marsh rabbit *(S. palustris).* Small mammals on Ichauway included mice (e.g., harvest mice [*Reithrodontomys humulis*] and old field mice [*Peromyscus polionotus*]), rats (e.g., cotton rats *[Sigmodon hispidus]* and wood rats [*Neotome floridana*]), and insectivorous mammals (e.g., southern short-tailed shrew [*Blarina carolinensis*] and least shrew [*Cryptotis parva*]). Ground and shrub-nesting birds and herpetofauna also were present.

Methods

Scat Collection and Analysis

We searched for scat on 30 sections of secondary or tertiary roads, each 1 km in length, and we checked each section monthly (21 June 2001–24 June 2002). We also picked up scat opportunistically. Scats were placed in brown paper bags, labeled with date and location, and placed in a freezer at –15 C. We collected approximately 30 scats each calendar season.

Prior to analysis, we removed scats from the freezer and allowed them to thaw for 24 hours (Griffin 2001). We oven-dried the scats at 60 C for ≥72 hours (Baker et al. 1993), then weighed dried scats and separated them with forceps. We used hair

characteristics (Stains 1958), bone, and teeth to identify prey remains. We identified prey to species when possible, but we grouped prey into 5 categories (deer, rodent, rabbit, bird and other) for analysis.

We calculated percent occurrence for each prey category divided by the total number of scats, seasonally. We used a chi-squared test (Dowdy and Wearden 1991) to determine if diet was independent of season. Statistical significance was assumed at $P \leq 0.05$.

Results

We collected 135 scats between 21 June 2001 and 24 June 2002. Diet did not vary seasonally ($X^2 = 17.82$, $P = 0.1213$). Most scats (91%) contained rodent, 14% contained bird, 9% contained deer, 6% contained rabbit, and 12% contained other (Fig. 1). Although birds were the second most common prey, they contributed little to the overall diet relative to rodents, occurring in only 19 of the 135 scats. Quail occurred in only 2 of the 135 scats collected, and made up only 10% of the bird remains. We identified most rodent remains (70%) as cotton rat, 20% were mouse, and 10% were other rodent. Of the 12% categorized as "other" 12% were armadillo *(Dasypus novemcinctus),* 12% were oppossum *(Didelphis virginiana),* 18% were snake, 6% were raccoon *(Procyon lotor),* 6% were skunk *(Mephitis mephitis),* 6% were bobcat (presumably grooming as no bones were present), and 40% was vegetation.

Discussion

Bobcat diets have been studied extensively in the Southeast. Most of these studies found that rabbits were the most common prey item (Davis 1955, Progulske 1955, Fitts and Sealander 1978, Kitchings and Story 1979, Story et al. 1982, Maehr and Brady 1986, Nelms 1999, Baker et al. 2001). However, a few studies found that smaller mammals were the most common prey item (Beasom and Moore 1977, Miller and Speake 1978, Buttrey 1979, Griffin 2001), and one study found white-tailed deer to be the most common prey (Fox and Fox 1982). Nine of these 13 studies found that the top three prey items were rabbit, rodent, and deer.

Rodents were overwhelmingly the most commonly consumed prey on Ichauway. Rodents often respond favorably to many quail management practices. For example, Boutin (1990) found that supplemental feeding increased small mammal populations. Further, cotton rats were eight times more abundant and house mice were five times more abundant in fed than in unfed experimental plots on Ichauway (L. M. Conner, unpublished data). Moreover, prescribed fire increases herbaceous cover (Landers and Mueller 1986). Prey, such as cotton rats and other small rodents, are most abundant in areas with herbaceous cover (Golley et al. 1965). Finally, small mammals often are abundant along agricultural edges (Cummings and Vessey 1994) and food plots associated with game management. We suggest that habitat management and supplemental feeding on our study area resulted in dense rodent populations and bobcats merely foraged on the most readily available prey.

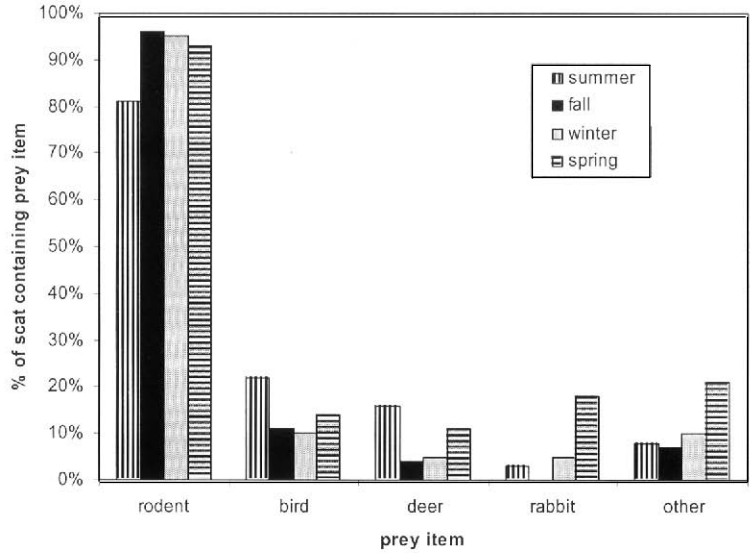

Figure 1. Prey items identified from bobcat scats ($N = 135$) found at the Joseph W. Jones Ecological Research Center, Baker County, Georgia, from 21 June 2001 to 24 June 2002. Seasonal variation was not noted ($X^2 = 17.82$, $P = 0.1213$).

The low frequency of bird remains, especially quail, found in scats was particularly interesting because quail management was a major objective for the site. Only one other study was conducted on land managed for quail (Miller and Speake 1978). They found birds to be the third most common prey with cotton rat being most common. Interestingly, they also observed bobcat consumption of quail to be very low (2 of 511 samples).

Management Implications

Although bobcats are considered by managers to be predators of quail, we found very little predation on quail. Similarly, Miller and Speake (1978) and Maehr and Brady (1986) found bobcats seldom preyed on quail (0.9% and 1% occurrence, respectively). Therefore, based on work and the work of Miller and Speake (1978) and Maehr and Brady (1986), bobcats appear to be nondetrimental to quail populations.

Simpson (1976) noticed dense cotton rat populations on quail plantations, and suggested that cotton rats could be detrimental to quail populations. Cotton rats compete with quail, eating or damaging plants that are beneficial to quail, and can destroy quail nests and eggs (Stoddard 1931, Staller 2001). Further, dense rodent populations attract other predators that may be efficient predators of quail and quail nests, such as snakes and birds of prey. Because bobcats prey heavily on rodents, they may benefit quail by helping keep rodent populations in check.

Apex predators have a stabilizing effect on the ecosystem because they suppress mesopredator populations, allowing for more faunal diversity (Palomares et al. 1995, Rogers and Caro 1998, Courchamp et al. 1999). Bobcats are an apex predator in the Southeast, and thus may serve to suppress other, more damaging predators.

Further research should examine the role of predators within southern ecosystems using a robust experimental approach. Predator removal or exclusion experiments could provide insight into the regulatory and/or suppressive nature of predator populations. Such experiments should examine a suite of response variables to ensure ecological tradeoffs are examined as thoroughly as possible. Moreover, these studies should be long-term, as environmental perturbations (e.g., drought, fire, etc.) and prey population dynamics may serve ecological mechanisms influencing the role of predators at any given "snapshot" in time. Without a long-term perspective, any one snapshot may provide an incorrect conclusion as to the overall role of predators in the system.

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