

Observations of Bobcats, *Lynx rufus*, Hunting Black-Tailed Prairie Dogs, *Cynomys ludovicianus*, in Western South Dakota

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There is a paucity of scientific literature describing Bobcat (*Lynx rufus*) hunting strategies. I document 13 observations of Bobcats hunting Black-tailed Prairie Dogs (*Cynomys ludovicianus*) in western South Dakota. In all cases the Bobcats stationed themselves next to a prairie dog mound in an attempt to ambush prairie dogs emerging from their burrows. In eight cases the Bobcats successfully captured a prairie dog emerging from the burrow, in one case the Bobcat turned and captured a prairie dog that had walked up behind it, and in the other cases the Bobcats lunged at the burrow openings, but did not capture a prairie dog. There were two variations of the tactic: in some cases Bobcats entered a colony prior to prairie dog emergence and stationed themselves next to a mound, whereas in other cases Bobcats stationed themselves next to a burrow that a prairie dog had just escaped to. One Bobcat appeared to have waited next to the same mound for at least 7.5 hr. Prairie dogs may comprise a large portion of a Bobcat's winter diet in landscapes where prairie dog colonies exist in close proximity to badlands or woody cover.

Key Words: Black-tailed Prairie Dog, *Cynomys ludovicianus*, Bobcat, *Lynx rufus*, hunting, predation, tactic, South Dakota.

Information and detailed observations of Bobcat (*Lynx rufus*) hunting methods and predation events are rare in the scientific literature, likely due in part to its relatively low density and secretive nature. Anderson and Lovallo (2003) reviewed Bobcat ecology and suggested that Bobcats primarily hunt by stalking and springing, or by ambushing. Jacques and Jenks (2008) observed a Bobcat using a stalking and springing approach to kill a female Pronghorn Antelope (*Antilocapra americana*). Biggins and Biggins (2006) observed a Bobcat using a stalking and springing approach to kill a cottontail rabbit (*Sylvilagus* sp.). However, Johnsgard (2005) stated that a stalking and springing approach would be difficult to employ in capturing Black-tailed Prairie Dogs (*Cynomys ludovicianus*) because of the lack of concealing cover in most prairie dog colonies and the communal defense strategy of the species (see Hoogland 1995). Hoogland (1995) did observe Bobcats preying on prairie dogs on a 6.6 ha colony at Wind Cave National Park (NP) that was bordered by forest. In those instances, Bobcats rushed in from the forest edge to capture prairie dogs (John Hoogland, personal communication). However, most Black-tailed Prairie Dog colonies are located in open grasslands and Bobcats generally avoid large open areas (Anderson and Lovallo 2003). Therefore, the Bobcat's reluctance to use open areas, the lack of concealing cover in most Black-tailed Prairie Dog colonies, and the prey species communal defense strategy suggest that Bobcats may rarely hunt Black-tailed Prairie Dogs and would have difficulty in capturing them. Hoogland (1995: 69) reported that on his way to his study site he observed Bobcats sitting motionless next to prairie dog mounds using what he termed a "sit-

and-wait tactic"; however, he did not describe those incidents in detail or the outcomes. In this paper I describe observations of Bobcats hunting Black-tailed Prairie Dogs in western South Dakota.

Methods

In the winter of 2008-09, I and others made several incidental observations of Bobcats hunting Black-tailed Prairie Dogs at Badlands and Wind Cave National Parks in western South Dakota. In the winter of 2009-10, I made a deliberate attempt to observe and document more events in an effort to better understand and describe the Bobcat hunting methods. At both Badlands and Wind Cave National Parks I drove park roads that provided a view of prairie dog colonies in close proximity to Bobcat cover such as broken badlands topography (Badlands NP) or forests (Wind Cave National Park). Once a Bobcat was observed I watched the animal from the vehicle. The animals showed little alarm to the vehicle, perhaps due to the regular presence of vehicles and the prohibition against hunting in the parks. However, some animals did abandon hunts, possibly due to observer presence. Therefore, I only present data from incidents where the Bobcat made a lunge to capture a prairie dog. The Bobcats were not marked and thus positive identification of individual hunting methods was not possible. I did not record information on observer effort (e.g., miles driven, number of observation days) or on Bobcat observations that did not include a lunge at a prairie dog. Several of the observations were videotaped allowing for more detailed and precise description of the events. Distances were determined from remote imagery and GIS software.

TABLE 1. Observations of Bobcats Pouncing at Prairie Dogs.

Site	Date	Start Time of Observation of Bobcat	Time of Bobcat Lunge	Result	Size of Colony (ha)	Distance from Colony Edge (m)	Distance from Forest or Badlands (m)
Wind Cave NP	3/25/09	Crouched at mound at 0822	0936	miss	195	70	130
Badlands NP	3/09	First observed about 0630	About 1400	kill	2.7	25	150
Badlands NP	10/23/09	First observed at 0825	0857	miss	38.8	50	120
Badlands NP	1/16/10	Crouched at mound at about 1150	1159	kill	2.7	30	210
Badlands NP	1/17/10	First observed about 1330	1351	kill	10.9	85	270
Badlands NP	1/30/10	Crouched at mound about 0820	0849	kill	2.7	40	210
Badlands NP	1/30/10	First observed about 1230	1301	miss	5.4	70	100
Badlands NP	2/3/10	Crouched at mound at 0825	0928	kill	38.8	105	140
Badlands NP	2/19/10	Crouched at mound at 1320	1321	kill	5.4	50	130
Badlands NP	2/26/10	First observed at 0920	0920	kill	0.2	15	105
Badlands NP	3/2/10	First observed at 0923	0937	miss	0.1	15	70
Badlands NP	3/4/10	Crouched at mound at 1055	1105	kill	38.8	70	110
Badlands NP	3/13/10	First observed at 0705	0755	kill	0.9	15	30

Results

I recorded 13 observations of Bobcats attempting to ambush prairie dogs as they emerged from their burrow (Table 1). Many other incidents of Bobcats crouching next to prairie dog burrow-mounds were observed, but they did not culminate in a lunge at a prairie dog. All but one of the recorded incidents consisted of a Bobcat pouncing at a prairie dog while the latter was still in the burrow. In the remaining case a Bobcat was crouched next to a prairie dog mound, but pounced at and captured a prairie dog that had walked up behind it. Of the 12 cases in which a Bobcat pounced at a prairie dog in a burrow, eight were successful. In the 13 events reported here the Bobcats were stationed at a prairie dog mounds an average of 49 m (range 15-105) from the edge of the prairie dog colony and 136 m (range 30-270) from badlands topography or forest cover. The 12 events at Badlands National Park occurred on six unique prairie dog colonies, with the farthest distance between events being 7.95 km. Nine of the events were clustered within a 54.1 ha minimum convex polygon. The next closest event was 1.75 km to the east of the polygon and was made by a female Bobcat with kittens. The other two events at Badlands National Park were 2.9 and 4.2 km to the east of that and were likely made by another animal as no kittens were observed with it. Many of the other characteristics of the events are not suitable for quantitative analysis and summary; therefore, I qualitatively describe some of the more noteworthy incidents in chronological order.

At 0822 on 25 March 2009, I observed a Bobcat at Wind Cave NP in southwestern South Dakota. Temperature was 0°C with wind speed about 8 kph. Small patches of drifted snow covered about 10 percent of the colony. No prairie dogs were observed or heard. The Bobcat was walking through the colony when it stopped to inspect a prairie dog mound about 70 m

within the colony. The Bobcat then laid down facing the mound. Thirteen minutes later the Bobcat got up and moved to the leeward (north) side of the mound. The Bobcat laid motionless for the next 57 minutes, except for occasionally turning its head to look around. During that period I observed prairie dogs emerging from other burrows in the colony. At 0936 a prairie dog poked its head above the rim of the mound the Bobcat was stationed at. The Bobcat, which had been lying prone on the ground with its head below the top of the mound, sprung for it. When I later analyzed the videotape of the incident I could see the Bobcat react within 0.37 s (+/- 0.017) of the prairie dog poking its head out of the burrow-mound. Within 0.17 s (+/- 0.017) of the first movement by the Bobcat it had one paw in the burrow entrance. The Bobcat's momentum carried its hindquarters over the mound, but it kept a paw in the burrow entrance. After looking into the burrow for three seconds the Bobcat quickly pulled its paw out of the burrow and walked back to the forest without having captured the prairie dog.

In late March 2009, around 0630, a Bobcat was observed laying near a prairie dog mound at Badlands NP (Lloyd Griswold, Badlands National Park, personal observation). When the observer returned around 0830 he again saw a Bobcat crouched at the mound. No prairie dogs were observed. When the observer returned to the site at about 1300 he again saw a Bobcat crouched at the same mound, presumably the same individual. The observer noted that prairie dogs had begun emerging from other burrows in the colony. The Bobcat remained crouched at the mound, but its attention focused on several prairie dogs about 15 m away. At the same time another prairie dog approached the Bobcat from behind, evidently unaware of the Bobcat's presence. When the prairie dog was about a meter from the Bobcat the latter turned and saw the prairie dog. The Bobcat sprung and cap-

tured the prairie dog and then held it for about three minutes before carrying it off to some rugged badlands topography. Time of the kill was around 1400. Assuming it was the same Bobcat observed at 0630, and it hadn't moved in the interim, the animal had remained crouched at the mound for at least 7.5 hr.

At 0825 on 23 October 2009, I observed a Bobcat laying next to a prairie dog mound at Badlands National Park. Temperature was 3°C and average wind speed was 17 kph from the WNW. At 0857 the Bobcat lunged toward the burrow and inserted a paw into the burrow entrance, but it did not capture a prairie dog. The Bobcat walked around the mound for a few seconds and then crouched back down at the same mound. At 0909 the Bobcat again prepared to spring at the burrow, but it soon relaxed. At 0954 something spooked the Bobcat and it quickly left the prairie dog colony. I subsequently determined that the azimuth of the burrow opening was 30° from true north and the Bobcat had a bearing of 330° at the time it lunged toward the burrow. In other words, the direction the Bobcat was facing prior to the lunge and the direction the prairie dog was facing (assuming it was walking up the burrow) made a 120° obtuse angle.

Around 0900 on 16 January 2010, I observed a Bobcat laying next to a prairie dog mound at Badlands National Park. Temperature was 3° C and average wind speed was 19 kph from the SW. No prairie dogs were observed in the colony. About one hour later about 12 prairie dogs emerged approximately 40 m from the crouching Bobcat. At about 1100 the Bobcat made a run toward the emerged prairie dogs, but they escaped down their burrows. The run did not appear to be a full speed attempt to catch a prairie dog, but rather, a testing flush or pursuit. The Bobcat inspected the burrow-mounds and then walked about 20 m to a mound at the edge of the colony where it again crouched down. Approximately 15 minutes later five prairie dogs re-emerged from burrows they had escaped to when the Bobcat charged them earlier. The Bobcat remained crouched at the mound watching the prairie dogs for about 30 minutes at which time it made another unsuccessful rush toward the prairie dogs at less than full speed. The Bobcat again inspected the burrows in the vicinity of where the prairie dogs had been. The Bobcat stopped at one mound and peered over the rim of the mound into the burrow. Within a minute of positioning itself at the mound the Bobcat sprung from a standing position and reached into the burrow with its left paw. The Bobcat stuck its head into the burrow entrance and emerged with a prairie dog in its mouth. The Bobcat then carried the prairie dog into the taller vegetation outside the prairie dog colony where it ate the prairie dog. Through the vegetation I could see the Bobcat cover the remains of the prairie dog with snow. I subsequently determined that the direction the Bobcat was facing at the time of the lunge and the direction of the burrow opening (i.e.,



FIGURE 1a. Bobcat waiting next to a Prairie Dog burrow-mound.



FIGURE 1b. Bobcat inspecting a Prairie Dog burrow-mound, perhaps in response to hearing an emerging Prairie Dog.

the direction the prairie dog was likely facing) made a 130° horizontal obtuse angle.

At 0820 on 30 January 2010 I observed a Bobcat walking through a prairie dog colony. Temperature was -11°C and average wind speed was 13 kph from the WNW. After inspecting several mounds the Bobcat laid down next to a mound with its head facing the mound (Figure 1a). No prairie dogs were observed. At 0849 the Bobcat stood up and looked into the burrow opening in apparent preparation for a lunge (Figure 1b). I did not observe a prairie dog stick its head above the mound rim nor does it seem that the Bobcat saw a prairie dog based on the height of the mound and the height of the Bobcat's head while it was lying down. Presumably, the Bobcat was responding to either sound or odor. The Bobcat then crouched in a springing position (Figure 1c). At 0850 the Bobcat pounced toward the burrow entrance and pulled out a prairie dog (Figures 1d, 1e). The Bobcat carried the prairie dog to some taller vegetation outside the colony perimeter where it ate the prairie dog. No other prairie dogs were yet

observed in the 2.7 ha colony. I subsequently determined that the direction the Bobcat was facing at the time of the lunge and the direction of the burrow opening made a 140° horizontal obtuse angle.

At 0825 on 3 February 2010 I observed a Bobcat walking through a prairie dog colony. The Bobcat inspected a mound and then crouched down next to it. A short time later the Bobcat sat up and watched a Coyote (*Canis latrans*) walk past about 100 m away. Shortly after the Coyote passed by the Bobcat crouched back down. At 0928 the Bobcat raised up on its front legs and then sprang forward and captured a prairie dog.

At 0843 on 19 February 2010, I observed a Bobcat lying prone next to a prairie dog mound at Badlands National Park. No prairie dogs were observed. About 30 minutes later a prairie dog gave the alarm call from a mound about 15 m from the Bobcat (I had not seen the prairie dog emerge). The Bobcat got up, stretched, and then walked over to the mound where the prairie dog had called from. The Bobcat hunched next to the burrow-mound the prairie dog had escaped down. I observed the Bobcat from 0843 to 1321 except for a break of approximately 1 hour; I observed the Bobcat move to and crouch down next to at least 9 different mounds, all apparently in response to seeing a prairie dog escape down a burrow. At 1320 the Bobcat hurriedly left the mound it was stationed at and moved to a mound about 5 m away. The Bobcat did not lie down next to the mound, but rather, it stood next to the mound in preparation for a lunge. Approximately, one minute after arriving at the mound the Bobcat pounced and retrieved a prairie dog from the burrow.

At 0730 on 26 February 2010, I observed a Bobcat lying prone next to a prairie dog mound at Badlands NP. Temperature was -1°C and average wind speed was 16 kph from the W. No prairie dogs were observed. About 1 hour later a prairie dog called out from a mound about 15 m away. The Bobcat abandoned the mound it was at and walked over to the mound which the prairie dog had escaped to. The Bobcat position itself at that mound. The Bobcat subsequently moved to three other mounds; the moves appeared to be in response to calling prairie dogs. At 0920 the Bobcat pounced at the mound and captured a prairie dog. I subsequently determined that the direction the Bobcat was facing prior to the lunge and the direction of the emerging prairie dog made a 150° obtuse angle.

At 0705 on 13 March 2010, I observed a Bobcat lying prone next to a prairie dog mound at Badlands NP. No prairie dogs were observed; however, a Cottontail Rabbit was observed at a burrow entrance about 30 m from the Bobcat. About 0730 a prairie dog emerged from a burrow about 25 m from the Bobcat, but it retreated back down the burrow a few minutes later. At 0755 the Bobcat sprang from the prone position and captured a prairie dog from the



FIGURE 1c. Bobcat in lunging position.

burrow-mound it was stationed at. In contrast to all of the other kills reported here, that Bobcat stayed at the mound with the captured prairie dog for about 10 minutes. During that time the Bobcat looked around attentively, including looking at the observer parked in a car about 50 m away. It then carried the prey off to some badlands topography.

Discussion

The lack of concealing cover in Black-tailed Prairie Dog colonies, and the communal defense strategy of the species, would seem to make Bobcat predation of prairie dogs a rare event. However, some Bobcats use an ambush strategy to capture prairie dogs emerging from their burrows. In some cases the Bobcats positioned themselves in a colony prior to prairie dog emergence; in other cases Bobcats positioned themselves next to a burrow a prairie dog had just escaped down. The fact that I observed both methods on the same prairie dog colony suggests that individual Bobcats may use both methods depending on conditions. The Bobcats position themselves at an acute oblique angle to the emerging prairie dog, i.e., they attack from the front and to the side of the emerging prairie dog. Bobcats appear to use sound to prepare themselves for the lunge, but it is unknown whether they lunge in response to sound or sight.

I have observed Bobcats crouched next to prairie dog mounds at Badlands and Wind Cave National Parks on numerous, but unrecorded occasions in addition to the observations reported here, but in those incidents the Bobcats gave up on the mounds, were spooked by the observer, or abandoned the mound for unknown reasons, hence I do not present information on those events. Also, individual Bobcats were not identifiable, so I cannot describe the frequency that individual Bobcats visited the prairie dog colonies nor can I attribute hunting strategies to different animals. However, based on seeing Bobcats at the same colonies on almost every trip to Badlands National Park in the winter of 2009-10, it appears that some



FIGURE 1d. Bobcat lunging at Prairie Dog.



FIGURE 1e. Bobcat with Prairie Dog.

Bobcats were making almost daily hunting forays into the prairie dog colonies and had become quite proficient at capturing prairie dogs. The cluster of nine events within a 54.1 ha polygon suggests that one individual was responsible for all the events. One of the other events was made by a female Bobcat that brought the kill to her young. There is some evidence that young Bobcats may learn this tactic from their mother. On 30 December 2008, around sunrise, four Bobcats (likely an adult female and three kittens based on the size) were observed in a prairie dog colony at Badlands National Park (Joshua Delger, Badlands National Park, personal observations). All four were within 100 m of each other and three were crouched at separate mounds while the fourth was sitting near the edge of the colony.

The observations reported here occurred in late-fall and winter. On only one occasion have I observed a Bobcat crouched next to a prairie dog mound at Badlands and Wind Cave National Parks in spring, summer, or early fall. Similarly, law enforcement rangers at Badlands National Park conduct daily patrols of the sites where the Bobcat observations reported here were made and they rarely observe Bobcats outside of winter (Lloyd Griswold, personal communication). In spring, summer, and early fall there is more prey available to Bobcats, including young and naïve individuals. Thus, Bobcats may hunt more vulnerable prey during those periods. Perhaps just as importantly, Bobcats may also switch to habitats with more cover to reduce their risk of predation or interference by Coyotes (Fedriani et al. 2000). However, another possibility is that there is much less vehicle traffic in the winter and therefore the Bobcats may be more willing to hunt the prairie dog colonies along the road.

In several of the cases reported here, and in numerous other cases that did not culminate in a pounce, I observed Bobcats entering a prairie dog colony prior to prairie dog emergence. The Bobcats would typically inspect several mounds before crouching down next to a mound in a waiting position. The number of Black-tailed Prairie Dog burrow entrances in a colony

may be eight times greater than the number of prairie dogs, and prairie dogs share burrows overnight (see Hoogland 1995). Therefore, if a Bobcat randomly selected a mound to crouch next to, the odds would be against it selecting an occupied burrow. The Bobcats I observed clearly inspected burrow-mounds prior to crouching next to the mound. In one case the Bobcat captured a prairie dog when no other animals had yet emerged for the day and in another case the Bobcat captured a prairie dog when only one other animal had emerged in the colony, suggesting that Bobcats may be able to select a burrow with prairie dogs in it. Licht (2009) observed a Badger that inspected several prairie dog burrow entrances before excavating a burrow that had a prairie dog in it. However, in other cases prairie dogs did emerge from other burrows in the colony while the Bobcat waited unsuccessfully at the mound it was crouched next to. I cannot say whether the burrows that unsuccessful Bobcats were crouched next to were vacant, whether the prairie dogs suspected the Bobcat was near the entrance, or whether those prairie dogs simply did not emerge during the observation period.

The Bobcat is a widely distributed species that occupies many habitats and feeds on a variety of prey (Anderson and Lovallo 2003). Throughout the Bobcat's range the prairie dog is unlikely to comprise a large component of the diet. Anderson and Lovallo (2003) and Hansen (2007) reviewed and summarized the Bobcat's diet and did not mention prairie dogs. However, almost all of the studies they cited were from areas that do not contain prairie dogs. Young (1958) reported that prairie dog remains constituted only 0.6% of the 3990 remains found in Bobcat stomachs from animals collected in 1918-1922; however, those results also appear to be biased towards regions without prairie dogs. Gashwiler et al. (1960) found White-tailed Prairie Dog (*C. leucurus*) remains in 1 of the 53 Bobcat stomachs they analyzed in Utah and Nevada, but they did not document the availability of prairie dogs in the region. Nomsen (1982) found Black-tailed Prairie Dog

remains in 1% of male Bobcats and 3% of female Bobcats collected in western South Dakota ($n = 230$); however, much of that region is devoid of prairie dogs. Based on my observations in western South Dakota at sites with broken terrain or woody cover in close proximity to prairie dog colonies, prairie dogs may represent a comparatively large portion of the winter diet of Bobcats.

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