Chapter 11

Lynx Home Range and Movements in Montana and Wyoming: Preliminary Results

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Abstract—Preliminary telemetry data suggest that lynx in Montana and Wyoming have large home ranges; this result supports the Koehler and Aubry (1994) contention that lynx from southern lynx populations have large spatial-use areas. Annual home ranges of males were larger than females. Straight-line, daily travel distance averaged 2 to 4 km, which is similar to northern populations. Four males in Montana, and the male and female in Wyoming, made exploratory movements of 20 to 30 km. The extent of these movements may be underestimated because we could not locate all lynx that traveled extensively. We do not know if these movements were exploratory or if the home ranges of these animals include widely dispersed use-areas. The female in Wyoming denned in a mature subalpine fir forest with high horizontal cover from coarse woody debris.

Introduction

Our knowledge of lynx ecology for southern populations is limited to only seven studies (Koehler et al. 1979; Mech 1980; Smith 1984; Brainerd 1985; Brittell et al. 1989; Koehler 1990; Chapter 12), two of which focused primarily on bobcats (Smith 1984; Brainerd 1985). Thus, land managers are in the difficult position of having to manage lynx habitat based on little data. In this chapter, we present preliminary data from ongoing studies in western Montana and northwestern Wyoming. Research objectives for the Montana study are to determine habitat use of lynx at multiple spatial scales, to describe dispersal and movements, to investigate population vital rates to the extent possible given a limited sample size, and to document seasonal food habits.

In Wyoming, the initial research goal was to determine the distribution of lynx in the state. Surveys confirmed earlier reports that lynx were present in the Wyoming Range located in western Wyoming; trappers, in 1971-1972, harvested 18 lynx in a small portion of the Wyoming Range (B. Neely and J. Welch, personal communication). In 1996, the Wyoming Game and Fish Department intensified its research efforts to address the following objectives: to quantify hare population trends from 1997 to 2001, to describe lynx movements in the Wyoming Range, and to obtain genetic and demographic data to the extent possible, given the small populations. Understanding the ecology of lynx in Wyoming is critical to conservation planning because these animals represent the southernmost known population.

In this chapter, we describe the spatial-use patterns of lynx based on preliminary data. We acknowledge that home range sizes, by themselves, are difficult to interpret and have limited utility (White and Garrott 1990). However, these data facilitate conservation planning in at least two ways. First, monitoring southern populations of lynx requires a basic understanding of spatial-use patterns. For example, the number and placement of monitoring stations within landscapes depend on the spatial-use patterns of lynx. Second, given the lack of existing data, any additional information that describes the movements of lynx from southern populations may help identify ecological differences between northern and southern populations. Understanding the ecology of southern lynx populations is especially important, given the species' proposed listing under the Endangered Species Act (Federal Register vol. 63:36994-37013).

Study Areas

The study area in Montana is located in the Clearwater River drainage, near the town of Seeley Lake. This area is about 1,800 km^2, extending east to west from the Swan Range to the Mission Mountains, and north to south from Lindbergh Lake to Salmon Lake. Lynx harvests (1977-1994) and track surveys suggest this area may support the highest density of lynx in Montana (Brian Giddings, personal communication). The study area includes state, federal, and private lands that support intensive commercial forestry. An extensive road network associated with timber harvest, and a high snow pack, attract private and commercial snowmobile operators. The Bob Marshall and Mission Mountain Wilderness areas flank the east and west sides of the study area, respectively. Elevations on the Seeley Lake study area are about 1,200 to 2,100 m.

The warm and dry forests at lower elevations are dominated by Douglas-fir, western larch, lodgepole pine, and ponderosa pine on south to west aspects—usually as mixed forests—although Douglas-fir may form pure stands (U.S. Forest Service 1997). Low-elevation forests are open or park-like, but dense stands occur where fire has been absent. Frequent, low-intensity fire is the primary natural disturbance (average = 42 years, Fischer and Bradley 1987). Fires eliminate small-diameter trees, producing a park-like structure. Based on 1930 photos, forest patches with moderately open overstories were several hundred to thousands of hectares in size (U.S. Forest Service 1997). Timber harvest and fire suppression have shifted the open mature forests that were once most prevalent on low-elevation sites to forests of small-diameter, densely stocked stands. Low-elevation sites are usually less than 35% slope.

Mid-elevations support primarily cool and moist to dry conifer forests. Dominant tree species include seral Douglas-fir, western larch, and lodgepole pine in mixed to single-species forest stands. Low frequency, stand-replacing fires create even-aged stands that form a mosaic of early seral to old-growth forests (Fischer and Bradley 1987). Slopes at mid-elevations are often greater than 35%.

Upper elevation forests are mostly subalpine fir, whitebark pine, and Engelmann spruce with lesser components of lodgepole pine, Douglas-fir, and western larch. Subalpine forests are multi-storied and multi-aged, often with a dense shrub understory. Fire disturbances are infrequent and vary from small spot to large stand-replacement fires depending on climatic conditions. Riparian vegetation varies from riparian grasses and sedges to communities composed of dogwood, willow, alder, and mixed conifer forests. Forested riparian areas are primarily subalpine fir, Engelmann spruce, Douglas-fir and black cottonwood.

In Wyoming, the study area is located in the Wyoming Range, near Big Piney. Topography is steep to rolling and elevations are about 2,400 to 3,100 m. Forest cover on drier sites is primarily homogeneous stands of lodgepole pine. Spruce-fir forests are generally restricted to north aspects and compose 19% of vegetative cover. About 9% of forests are aspen, which are declining from encroachment by conifers. Vegetation on south slopes is mainly sagebrush and wheatgrasses with patches of aspen and conifer; the area is about 20% non-forest and 8% riparian. During the late 19th century, forests in the Wyoming Range were harvested for railroad ties. Road densities are high; the density of roads open to public travel is about 0.3 km/km^2.

Methods

In Montana, lynx were captured using Victor™ #3 soft-catch traps and Fremont snares placed near tracks. Sets were baited with carrion or one of several scent compounds (beaver castor, Pacific Call™, Cat Passion™). Most "cubby" sets were constructed from small branches so that trapped lynx could knock them down without injury (G. Mowat, personal communication). Some traps were placed in large, permanent "cubbies" that were large enough to prevent trapped animals from entangling the trap on the sides of the set. We checked traps daily and stopped trapping in mid-April to avoid capturing pregnant females. In Wyoming, lynx were captured using Walker hounds that pursued and treed lynx after being released on tracks.

In Montana, immobilization drugs (10 mg/kg body wt. Ketaset®, concentration 100mg/mL; and Xylazine, 1mg/kg body wt., concentration 100mg/mL) were administered from pressurized syringe-darts using either a Telinject™ CO_2-powered blow tube or syringe pole. This dose produced predictable immobilization periods (20-30 minutes) and stable vital signs. Animals were weighed, sexed, ear tagged, and fitted with Lotek™ radio collars (175 g). After processing, we placed lynx inside a large, hard-sided box to recover fully from drug effects before release. Treed lynx, in Wyoming, were immobilized (5 mg/kg Telazol®, Fort Dodge Labs, Poole et al. 1993) using a pressurized syringe-dart fired from an air rifle (Dan-Inject™, Denmark). Drugged lynx were then either caught as they fell from the tree with a large net held by two or three people (T. Bailey, personal communication), or lowered with a rope. Lynx were fitted with transmitters (Telonics™, Mesa, AZ), were weighed, were measured, and had blood and hair samples taken.

We monitored the movements of radio-collared lynx in Montana using both aerial and ground telemetry. Aerial locations were taken weekly using a Cessna 185 with wing-mounted "H" antennas. Aerial locations were determined using a non-differentially correctable GPS on board the aircraft. In addition, two two-person teams located up to four lynx per day to augment aerial locations. A "priority" lynx was selected for each monitoring day to reduce variation across animals. Transmitters were equipped with activity switches so that observers could monitor the animal's behavior to minimize disturbance. Ground tracking was coordinated using hand-held radios to ensure bearings crossed at about 90°. Antenna locations were determined using a differentially correctable GPS (Trimble Corporation®). Relocations were taken from 5:00 to 22:00 to ensure that locations were taken throughout the day; lynx were not tracked at night. We used aerial telemetry to track two males that moved to the Bob Marshall Wilderness Area; these animals received less monitoring effort compared to lynx that remained on the study area. During May, females were located almost daily to check for denning activity. In Wyoming, radio-collared lynx were located one or two times weekly, mostly from the ground with limited use of aircraft.

On the Seeley Lake study area, hare abundance during summer (May to August) was estimated on two trap grids established in four general cover types. These types included: (1) open young, <50% canopy closure, tree dbh <23 cm; (2) open older, <50% canopy closure, dbh >23 cm; (3) closed young, >50% canopy closure, dbh <23 cm; and (4) closed older, >50% canopy closure, dbh >23 cm. Each grid consisted of 50 traps (24 x 24 x 66 cm, Tomahawk™) in a 10 x 5 array with 50-m spacing. Traps were baited with apple and alfalfa pellets. Hare density was estimated using mark-recapture methods (Pollock 1982; Pollock et al. 1990). In Wyoming, hare abundance was estimated from fecal counts on five 600-m transects located within lynx home ranges (Krebs et al. 1987). As a comparison to the Wyoming Range, hare abundance was also estimated near Dubois, WY (four, 750-m transects) and in the Beartooth Mountains (four, 700-m transects) in areas believed suitable for lynx. Quadrats (5.08 x 305 cm, $n = 300$ total) were spaced at 30-m intervals. All quadrats were cleared of hare feces when transects were established and then were counted and cleared once per year in June.

For both study areas, we used the computer program Ranges V (Kenward and Hodder 1996) to estimate home range using 95%, 90% and 50% minimum convex polygons (MCP, Hayne 1949). We used MCP home ranges because this method was most appropriate given the limited number of lynx relocations and for comparability with the literature. However, home range estimates using minimum convex polygons are sensitive to sample size (White and Garrott 1990:148). Incremental-area plots suggest the area of most (five of six lynx >30 relocations) home ranges was asymptotic when estimated with greater than 30 locations; Poole (1994) found >20 points were adequate for lynx in Northwest Territories, Canada. Core-use areas within home-ranges were defined as the 50% MCP (Ackerman et al. 1989). Home range overlap was calculated according to Poole (1995). We calculated straight-line travel distances for animals located on consecutive days as an index to hunting effort for comparison with other populations (Brand et al. 1976; Ward and Krebs 1985; Poole 1994).

Results

Trapping Success

In Montana, we captured 13 lynx (four females, nine males) from January through April 1998; trap success averaged 0.5 lynx/100 trap nights. Two additional lynx escaped from traps. From 15 December 1998 to 15 March 1999, we captured five additional lynx (two males, one female, one male kitten) and recaptured three from the previous winter. Trap success was 0.6 lynx/100 trap nights for all captures and 0.4 captures/100 trap nights, for new captures. The only non-target forest carnivore we captured was a female wolverine; a second wolverine escaped from the trap.

In Wyoming, one male and one female lynx were captured on 7 December 1996 and 15 March 1997, respectively. The female was recaptured on 19 November 1997 to replace the collar and the male was recaptured on 20 December 1997 but was injured in the process. This animal received veterinary care until 4 February 1998, when it was released.

Daily Movements

In Montana, the mean daily straight-line distance traveled by male lynx averaged 2.8 km (SD = 0.4, range = 2.5-3.3 km, *n* = 4, Table 11.1) during summer (mid-May to August 1998). The mean of two females without young during the same period averaged 3.2 km per day (SD = 1.0, range = 2.5-3.9 km, Table 11.1). In Wyoming, the mean daily-travel distance of the male averaged 4.1 km during summer (range = 1.3-7.2 km, *n* = nine consecutive travel days, Table 11.2) compared to 2.7 km during winter (SD = 1.9, range = 0.7-9.5 km, *n* = 22). The daily travel distance of the Wyoming female was similar during both summer (mean = 2.4 km, SD = 1.9, range = 0.3-5.2 km, *n* = 8) and winter (mean = 2.2 km, SD = 1.4, range = 0.2-3.8 km, *n* = 7).

Table 11.1—Straight-line daily travel distances of lynx during the summer (May-August, 1998); n = number of days consecutive locations were obtained.

Lynx ID	Average distance	SD	Range
	km		km
Male 4 (n = 9)	3.3	1.2	1.5-5.7
Male 6 (n = 13)	2.5	2.0	0.8-7.0
Male 26 (n = 13)	2.7	1.5	0.2-5.5
Male 28 (n = 8)	2.6	1.4	0.9-4.4
Average male (n = 4 males)	2.8	0.4	2.5-3.3
Female 10 (n = 11)	3.9	2.2	1.2-7.7
Female 14 (n = 25)	2.5	1.7	0.1-6.5
Average female (n = 2 females)	3.2	1.0	2.5, 3.9

Table 11.2—Straight-line daily travel distances of a single male and female lynx in western Wyoming during summer (May-August) and winter (December-April); n = number of days consecutive locations were obtained.

Lynx ID	Average distance	SD	Range
	km		km
Male (summer, n = 9)	4.1	1.9	1.3-7.2
Male (winter, n = 22)	2.7	1.9	0.7-9.5
Female (summer, n = 8)	2.4	1.9	0.3-5.2
Female (winter, n = 7)	2.2	1.4	0.2-3.8

Home Ranges

In Montana, annual home ranges (90% convex polygon) averaged 220 km^2 (SE = 95, *n* = 4) for males and 90 km^2 (SE = 32, *n* = 2) for females (Table 11.3). Seasonal ranges of males were 127 km^2 (SE = 54, *n* = 4) during winter and 125 km^2 (SE = 42, *n* = 6) during summer (Table 11.3). Seasonal ranges of females were approximately half the size of males; home ranges of females averaged 51 km^2 (SE = 22, *n* = 4) during winter and 42 km^2 (SE = 9, *n* = 2) during summer.

In Wyoming, the male's 90% MCP home range from December 1996 to May 1999 was 116 km^2 (*n* = 279 relocations) compared to 105 km^2 (*n* = 149) for the female from March 1997 to May 1999 (Table 11.4). During winter, the male's 90% MCP home range averaged 63 km^2 (*n* = three winters) compared to 50 km^2 for the female (*n* = two winters). During summer, the male's 90% MCP home range averaged 81 km^2 (*n* = two summers) compared to 57 km^2 for the female (*n* = 2 summers).

In Montana, seasonal home ranges (90% MCP) of females overlapped 62% (SE = 26, *n* = 2) between winter and summer and males overlapped 56% (SE = 6, *n* = 4, Table 11.5). Core-use areas of females as delineated by 50% MCP overlapped extensively (68%, SE = 1, *n* = 2) between winter and summer, but males shifted their core-use areas between seasons with little overlap (17%, SE = 5, *n* = 4). In Wyoming, the female's annual home range (1997-1998) overlapped the male's by about 88%; the degree of overlap varied from 85% in winter to 43% in summer.

Exploratory Movements

In Montana, four males engaged in exploratory movements outside their established home ranges, mostly during mid-summer. Male 4 (four to six years old based on tooth wear and staining) left its home range on

Table 11.3—Seasonal home range size of lynx, Seeley Lake, March 1998 to March 1999.

Lynx ID	Number of relocations	Minimum convex polygon (km^2) 95%	90%	50%
		Winter, female		
F01	15	15	15	2
F10	27	56	52	19
F14	27	129	114	16
F18	23	26	23	8
Average (SE)		57 (26)	51 (22)	11 (4)
		Winter, male[a]		
M02	28	190	137	80
M04	27	84	67	24
M06	29	283	275	36
M26	23	33	30	12
Average (SE)		148 (56)	127 (54)	38 (15)
		Summer, female		
F10	40	53	50	17
F14	54	52	33	12
Average (SE)		53 (1)	42 (9)	15 (3)
		Summer, male		
M02	23	318	189	53
M04	38	66	64	33
M06	40	178	173	117
M20	18	534	274	41
M26	41	20	19	11
M28	36	38	32	10
Average (SE)		192 (82)	125 (42)	44 (16)
		Annual, female[b]		
F10	67	65	58	24
F14	81	164	121	16
Average (SE)		115 (50)	90 (32)	20 (4)
		Annual, male[c]		
M02	51	483	448	114
M04	65	132	102	33
M06	69	303	299	157
M26	64	32	29	11
Average (SE)		238 (99)	220 (95)	79 (34)

[a] M20 excluded, <10 relocations.
[b] F09 excluded, <10 relocations.
[c] M03, M05, M07, M08, M12, M16, and M22 excluded, <10 relocations.

Table 11.4—Seasonal home ranges of a single male and female lynx in western Wyoming.

Lynx ID	Number of relocations	Minimum convex polygon (km^2) 95%	90%	50%
Winter				
Male (10/1996-3/1997)	39	71	64	17
Male (10/1997-3/1998)	20	66	64	19
Male (10/1998-3/1999)	26	134	60	11
Female (10/1997-3/1998)	23	66	38	6
Female (10/1998-3/1999)	30	66	62	29
Summer				
Male (4/1996-9/1996)	40	88	68	17
Male (4/1997-9/1997)	15	94	94	21
Female (4/1997-9/1997)	41	69	68	11
Female (4/1998-9/1998)	22	67	45	16
Annual				
Male (12/1996-5/1999)	279	137	116	54
Female (3/1997-5/1999)	149	114	105	59

Table 11.5—Percent overlap between winter (October 1998 to March 1999) and summer (April 1998 to September 1998) home ranges.

	Minimum convex polygon:		
	95%	**90%**	**50%**
		Female overlap	
F10	84	88	67
F14	35	36	68
Average (SE)	60 (25)	62 (26)	68(1)
		Male overlap	
M02	40	48	6
M04	39	42	14
M06	71	70	15
M26	69	63	31
Average (SE)	55 (9)	56 (6)	17 (5)

21 July and traveled 28 km southwest. After about four days, it returned to its home range on 28 July. Male 6 (two to four years old) left its home range on 29 July and traveled south for 24 km and remained on the new area for the summer. The daily travel speed of this male while traveling averaged 5.8 km/day (n = three travel days). Male 20 (one to two years old) moved extensively throughout the spring and summer. On 18 March, this male traveled west 22 km and was back near the center of its activity area by 2 April. On 21 July, Male 20 was located in the Bob Marshall Wilderness. By 28 July, this male had traveled a straight-line distance of 39 km to a site near Ovando, MT. He had to cross a two-lane highway and the Blackfoot River (about 30-40 m wide) during the movement. Male 20 remained near Ovando for two days before it moved again and could no longer be located from an aircraft. On 12 August, we relocated Male 20 47 km north of Ovando and by 20 August the animal moved 17 km back to the center of its home range. Male 28 (three to five years old) left its home range on about 6 July and was not relocated, even with extensive aerial searching. He returned to his home range on 3 August where he remained throughout the summer.

In Wyoming, both the male and female made exploratory movements during summer 1998. The male left his home range on about 19 June and remained away until 4 September when he was relocated back on his home range. The female left her home range on about 4 July and returned on about 10 August. Neither animal was located during an extensive aerial search, so their exploratory movements remain unknown. Between 15 May and 15 June 1999, the male made two exploratory movements to the same general area about 30 km northeast of his home range; he returned to his home range in late June.

Hare Density

In Montana, preliminary estimates of summer snowshoe hare density averaged 0.9 hares/ha in closed old forests, 1.9/ha in closed young forests, 0.6/ha in open old forests, and 0.7/ha in open-young forests (S. Mills and C. Henderson, personal communication). Hare densities in the Wyoming Range were 0.8 hares/ha in 1997 and 1.4/ha in 1998. This compared to 0.9 (1997) and 1.0/ha (1998) near Dubois, WY, and 0.6/ha in the Beartooth Mountains (1998).

Mortality

In Montana, we documented six deaths (necropsies conducted by Montana Department of Fish, Wildlife, and Parks); three animals died of starvation, two were killed by mountain lions, and one died of unknown causes.

Denning

In Montana, two females failed to centralize their activities with home ranges during May 1998, suggesting they did not give birth. We were unable to relocate a third female from when she was captured during the winter until 22 September when we located her near the original trap site. This female had two kittens but we do not know whether the radio failed temporarily or she moved off the study area to den. During May 1999, three of four females centralized their movements within home ranges. Two females produced two kittens each that we ear-tagged at four weeks of age. The third female selected a den, but she failed to give birth or her kittens died before we visited the site when the kittens would have been one month old. The female that produced kittens the year before failed to den in 1999.

In Wyoming, the female produced a litter of four kittens (two males, two females) on about 27 May 1998; all kittens were alive on 14 June 1998 when they were ear-tagged. However, based on snow tracking, the kittens were not with the female in November and presumably had died. In May 1999 the same female produced two additional kittens.

The natal den in Wyoming was located in a mature subalpine fir forest with co-dominant lodgepole pine. The den site was on a moderately steep slope (36%) with a west aspect (282°). The den was located in a cave-like tree well 1.5 m wide, 2.5 m long and 0.5 m deep. Three downed logs crisscrossed above the opening to 1.5 m in height. Trees surrounding the den ($n = 4$) averaged 32 cm dbh and 22 m in height. Canopy closure was 48%. Coarse woody debris (downed logs) was abundant around the den, covering 28% of the forest floor. Sapling subalpine firs (<7.5 cm dbh) were abundant (sapling <1.4 m in height = 2,800 stems/ha; saplings >1.4 m = 800/ha). The abundant woody debris and high sapling density provided high horizontal cover, averaging (four cover-board readings at 10 m) 78% between 0-1.5 m. Shrubs were sparse on the site.

Immediately after the kittens were marked in mid-June, the female moved her litter to a maternal den located approximately 200 m from the natal den. This den was located in a depression (0.5 m x 0.5 m wide, 0.3 m deep) beside a fallen tree. Trees surrounding the den ($n = 3$) averaged 50 cm dbh and 30 m in height. Canopy closure was 54%. Coarse woody debris (logs) also was high, covering 13% of the forest floor. Sapling (<7.5 cm dbh) density was high, averaging 5,800 stems/ha (sapling <1.4 m in height = 5,000/ha; saplings >1.4 m = 780/ha). Horizontal cover was also high at this den averaging 86% cover between 0-1.5 m.

We have not rigorously quantified the habitat characteristics of dens ($n = 4$) located in 1999. However, we can say that all dens were associated with coarse woody debris.

Discussion

Our findings generally support Koehler and Aubry's (1994:93) contention that lynx living at the southern extent of the species' range have large home ranges. In Montana, annual 95% MCP home ranges of males averaged 238 km^2 (SE = 99, $n = 4$) and 115 km^2 (SE = 50, $n = 2$) for females; the sizes of these home ranges are similar to those of males (277 km^2, SD = 71, $n = 3$) and females (135 km^2, SD = 124, $n = 3$) in the southern Canadian Rocky Mountains (Chapter 12). Similarly, the annual home ranges of the male (110 km^2) and female (90 km^2) lynx in Wyoming were also large compared to northern populations (Chapter 13). The home range sizes we report are probably underestimates given that we could not locate some animals during a portion of the summer. As with most populations (Brainerd 1985; Koehler 1990; Poole 1994; Slough and Mowat 1996), males in Montana and Wyoming tend to have much larger home ranges than females.

Parker et al. (1983) found that daily activity and travel patterns of lynx are primarily a function of hunting succes. Given that lynx in Montana and Wyoming have relatively large home ranges, daily movement patterns of lynx in Montana and Wyoming should be large relative to northern populations, especially since hare densities are low. However, daily-travel distances of lynx in Montana and Wyoming (about 2-4 km/day) were generally similar to those in Alaska (Kesterson 1988) and southwest Yukon (about 2-4 km) when hare density was above 0.5 hares/ha (Ward and Krebs 1985), but appear greater than lynx in Washington (about 1 km, Brittell et al. 1989). Although travel distances (i.e., foraging effort) are partially a function of prey density, daily movements tend to be insensitive to changing prey abundance as long as hare densities remain above 1.0 hares/ha (Ward and Krebs 1985). For example, in southwest Yukon, daily-travel distances of lynx were similar whether hares were abundant (at 15 hares/ha, daily travel of lynx = 2.7 km, 95% CI 1.8-3.7) or relatively scarce (at 1.0 hares/ha, daily travel of lynx = 2.4 km, 95% CI 2.0-2.9; Ward and Krebs 1985). However, when hare densities declined to 0.5 hares/ha daily, travel distance increased to 3.3 km (95% CI 2.8-3.7); at 0.2 hares/ha lynx traveled 5.4 km (95% CI 3.9-7.0) per day. Thus, if southern and northern populations are comparable, daily movements of lynx in Wyoming and Montana suggest that prey are above the threshold where movements greatly expand.

Lynx in Montana and Wyoming engaged in exploratory movements of 20 to 30 km; exploratory distances are probably underestimated given our inability to locate all lynx that traveled extensively. We do not know if these movements were truly exploratory or if the home ranges of these individuals include use-areas that are very widely dispersed. It is interesting that all four lynx in Montana that engaged in exploratory movements did so at about the same time; all animals moved in late July. In Wyoming, the male initiated its exploratory movement on about 19 June and the female on 4 July. Lynx in northern populations become nomadic when prey are scarce (Ward and Krebs 1985; Slough and Mowat 1996). This explanation seems unlikely during the summer in Montana and Wyoming, given the seasonal abundance of young hares and ground squirrels.

The natal den in Wyoming was located in a mature subalpine fir forest with high horizontal cover from coarse woody debris and saplings. In Washington, Koehler (1990) described the habitat associated with four dens (of two females) as mature (≥250 years) forests of Engelmann spruce, subalpine fir, and lodgepole pine. These dens were in sites with high woody debris (40 downfall logs/50 m) that the kittens were using as escape cover. The structural components—mature forests and high woody debris—associated with the natal den in Wyoming were similar to those associated with dens in Washington.

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