

**HABITAT MAPPING AND FIELD SURVEYS FOR LYNX (*Lynx canadensis*) ON LANDS ADMINISTERED BY THE USDI -
BUREAU OF LAND MANAGEMENT IN WYOMING**

**Dr. Gary P. Beauvais, Director
Douglas Keinath, Zoologist
Jonathan Ratner, Research Zoologist**

**Wyoming Natural Diversity Database - University of Wyoming, P.O. Box 3381, Laramie,
Wyoming, 82070. PHONE: (307) 766-3023. FAX: (307) 766-3026. EMAIL:
wndd@uwyo.edu.**

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INTRODUCTION

In North America, the lynx (*Lynx canadensis*; common and Latin names of all species mentioned in this report are listed in Table 1) inhabits boreal and subalpine forests from Alaska to the Atlantic coast of Canada, extending southward into northern New England, the Great Lakes region, and the Central and Southern Rocky Mountains (Tumilson 1999, McKelvey et al. 2000a). Lynx range has contracted over the past several decades, especially along its southern periphery (Ruggiero et al. 2000). This contraction, along with density declines in many occupied portions of lynx range, culminated in the listing of the lynx as Threatened under the U.S. Endangered Species Act in March 2000. This has made the species a priority for natural resource managers and agencies throughout western North America.

Currently, the southern extent of lynx range in the Rocky Mountains corresponds to the Overthrust Belt/ Wyoming Range in southwestern Wyoming (McKelvey et al. 2000a; Utah Conservation Data Center, Utah Division of Wildlife Resources, unpublished data). This excludes an ongoing reintroduction effort in southern Colorado, the success of which is still in question. The status of lynx populations in the Central Rocky Mountains is rather tenuous (Aubry et al. 2000, McKelvey et al. 2000b), and there is very little scientific information specific to lynx ecology here. Thorough analyses of the limited body of existing studies suggest that lynx life history in this area is substantially different from that of lynx to the north. Among other characteristics, southern lynx appear to have larger home ranges, wider habitat breadths, greater reliance on alternative prey (especially red squirrels), more competition from generalist carnivores, and stronger dependence on late-seral conifer stands relative to their northern counterparts (Ruggiero et al. 2000).

Because of the involvement of the Endangered Species Act, lynx management is now focused on recovery of the taxon to levels that will justify de-listing. As the southernmost area of persistent lynx occupation, western Wyoming can play an important role in lynx recovery. However, achieving any specific management goal requires more basic information on lynx distribution and habitat use in this under-studied area.

OBJECTIVES

This study had 2 main objectives: (1) produce a reliable map of habitat suitability for lynx covering the entire state of Wyoming; and (2) survey for lynx on lands administered by the USDI Bureau of Land Management, using the above map to position surveys in areas of potential lynx occurrence in western Wyoming.

This document was prepared as the final report to Cooperative Agreement #KAA990027 between the Wyoming Natural Diversity Database-University of Wyoming and the USDI Bureau of Land Management-Wyoming State Office (BLM). A companion report titled "Boreal mammals on isolated mountain ranges managed by the USDI Bureau of Land Management in Wyoming" outlines the results of another study designated by this agreement.

METHODS

Habitat suitability mapping

To better understand lynx distribution in Wyoming in general, and to identify study sites on Wyoming BLM holdings that are most likely to support lynx, we produced 2 digital maps: (1) a statewide map of habitat suitability, regardless of surface ownership, and (2) a statewide map of habitat suitability on lands administered by the Wyoming BLM. Both maps are based on the

statewide land cover map produced by the Wyoming Gap Analysis Project. The BLM-specific map also incorporates information from the land ownership map produced by the same effort (Merrill et al. 1996). All map manipulations described below were performed within the ArcView geographic information system (version 3.1; Environmental Systems Research Institute, Redlands, California).

The land cover map of Merrill et al. (1996) delineates polygons of unique primary and secondary land cover types across the entire state, and estimates the percent coverage of each type in each polygon, based on satellite imagery and computer classification. For some polygons, the percent coverage of primary and secondary types does not sum to 100, and an "other" (tertiary) cover type is also identified. To produce the statewide map of lynx habitat suitability, we calculated an index of habitat suitability for each polygon by first scoring the cover types 0 - 6 (worst - best) according to their suitability as lynx habitat (Table 2). These scores were assigned following a literature review of habitat associations of lynx in North America (e.g., Koehler and Aubry 1994, Ruggiero et al. 2000) and consultation with experts on Wyoming vegetation (W. Fertig and G. Jones, Wyoming Natural Diversity Database / University of Wyoming, personal communications). The habitat suitability index for each polygon was then calculated as:

$$\text{Index} = (\text{Primary cover type score} * [\% \text{ coverage of primary type} / 100]) + (\text{Secondary cover type score} * [\% \text{ coverage of secondary type} / 100]) + (\text{Tertiary cover type score} * [\% \text{ coverage of tertiary type} / 100]) \quad (1)$$

The third term was not necessary for some polygons because the percent cover of the primary and secondary types summed to 100. The habitat suitability indices were attributed to the records for each polygon in the GIS data table to allow the polygons to be color-coded by index value when visually displayed.

The BLM-specific map was produced by first overlaying the statewide land cover map and the statewide land ownership map, then retaining only those polygons under BLM administration. Again, this map was visually displayed using the habitat suitability index to color-code each polygon.

To evaluate the degree to which the habitat suitability index reflected actual lynx habitat use, we compared the index values at 196 documented lynx locations in Wyoming (Biological and Conservation Database, Wyoming Natural Diversity Database / University of Wyoming) to the index values at 3 sets of randomly-placed points: (1) points located randomly throughout the state, (2) points located randomly throughout 4 areas defined by clusters of known lynx locations, and (3) points located randomly within the area currently occupied by lynx in Wyoming.

Field surveys

We examined the maps of lynx habitat suitability, described above, to identify areas on which to perform field surveys during winter 1999-2000 and 2000-2001. A survey site had to meet 3 general criteria: (1) it must be administered by the Wyoming BLM; (2) it must have a large and contiguous land surface with habitat index >5; and (3) it must be contiguous with a large, non-BLM land surface with habitat index >5. This last criteria was based on the fact that most suitable lynx habitat in Wyoming occurs at relatively high elevations on lands administered

by the USDA Forest Service, and thus the probability of lynx occurrence on BLM administered lands is higher in those areas abutting suitable Forest Service holdings.

At each selected site, we performed 2 snow-tracking surveys separated by about 25 days. Each survey involved at least 1 person-day of snow-tracking, with a survey route of at least 10km. All tracks intercepted on the survey routes were identified to species and recorded on standardized data forms. Tracks of suspected lynx, wolverine, and fisher were located using a global positioning system, photographed, and measured. Potential lynx trails were categorized as either “probable” or “possible”. Probable lynx trails had stride, straddle, print dimensions, and general characteristics that matched those described for lynx by Murie (1974), Halfpenny (1986), and Forrest (1988). Possible lynx trails either (1) didn’t exactly match published dimensions, but did have general characteristics and supporting evidence suggesting lynx, or (2) matched published dimensions in stride and straddle but were too old for accurate print measurements. Observations of the abundance and distribution of both prey and competitor species were documented along each survey route, with particular attention to snowshoe hare and red squirrel occurrences.

One baited remote camera (Wildlife Pro; Forestry Suppliers Inc., Jackson, Mississippi) was placed on each site during the first snow-tracking stint and retrieved during the second. Cameras were designed to take exposures at any time of day in response to motion and infrared radiation. Each camera was secured about 75cm above the snow surface on a live tree in suitable lynx habitat, and was aimed directly at a scent pad secured at a similar height on another live tree no more than 10m away. A punctured can of tuna was placed about 2m high near this scent pad, and another scent pad was suspended from a branch about 2m high in the immediate vicinity of the camera. Scent attractant was a mixture of beaver castorum and catnip oil suspended in glycerin and propylene glycol, as described in McDaniel et al. (2000). Finally, a visual attractant consisting of a bent aluminum pie plate was suspended with monofilament line about 1m over the snow surface near the camera.

RESULTS

Habitat suitability mapping

The statewide and BLM-specific maps of habitat suitability for lynx are shown in Figures 1a and 1b, respectively, and are provided as ArcView shapefiles STATELYNX and BLMLYNX on the compact disc accompanying this report.

The value of the habitat suitability index at documented lynx locations was consistently higher than the index value at randomly placed points (Figure 2). As the placement of random points was progressively constrained to areas of historical or current lynx occupation, the index values at those points became more similar to the values at the lynx locations. This suggests that the index described in Equation 1 adequately reflects habitat suitability for lynx, and that the maps shown in Figure 1 are sufficient for guiding field surveys for lynx presence.

Field surveys

Nine areas met the criteria for study site selection (Figure 3), and field surveys were performed at each area during either winter 1999-2000 or 2000-2001. Major results of the field surveys are summarized below; more detailed discussions of each site, including photographs and maps of survey routes, are included in Appendices A - I.

Survey dates: Three sites (Pine Creek, Water Canyon, and Rock Creek) were surveyed during winter 1999-2000. Because tracking conditions were extremely poor due to low snow accumulation and infrequent fresh snowfall, we postponed surveying the majority of sites until winter 2000-2001 when we hoped conditions would be better. The remaining 6 sites were surveyed during winter 2000-2001; however, tracking conditions were as bad if not worse than during the previous year.

Survey conditions: All surveys during this project were hampered by low snow accumulation, infrequent fresh snowfall, and poor snow texture. Snow pack on most survey sites during both winters was only 50-65% of the most recent 20-year average. During each winter, much of the snow fell early in the season and was followed by a long cold spell. The temperature differential between the warm ground and cold air often created depth hoar out of the entire snow pack. Such a pack would barely support any weight (e.g., a person on skis would sink to the ground through a meter of snow), and was extremely poor at retaining details of mammal prints.

Open ridges and south-to-west facing slopes were often snow-free, especially at the lowest elevations, allowing ungulates to range across many sites and trample the tracking substrate. Wind disturbance was heavy on all sites.

Low snow cover hampered site access as well as tracking. Snow cover was often too thin and patchy to support a snow machine, but drifts prevented truck access. Sites were commonly accessed via a combination of truck, snow machine, all-terrain vehicle, and foot travel. The Grass Creek, Water Canyon, and Rock Creek sites supported especially poor survey conditions. The second tracking stint at Rock Creek was abandoned and the effort committed to other sites with higher tracking potential. Surveys on the Water Canyon site were shifted north to USDA Forest Service (Bridger-Teton National Forest) lands adjacent to the site where access and tracking conditions were better.

Observations of lynx: The camera station on the Ham's Fork site (Appendix G) captured one photo (Photo G-1, G-2) of an individual *Lynx* spp. on 21 March 2001. The coat of this animal appears to be distinctly spotted, and the ear tufts are not prominent; both of these characters suggest bobcat rather than lynx. The facial ruff is rather heavy, as is expected on lynx, but it is reasonable to expect bobcat in winter pelage to show a heavier-than-normal ruff. We concluded that this photo is most likely of a bobcat, which is supported by the fact that we documented several bobcat trails at this site during the snow-tracking portion of this study.

We recorded 2 probable and 3 possible lynx trails during this study; no wolverine or fisher trails were documented.

Location: One possible lynx trail was documented on the Big Sandy site, and 1 probable lynx trail was documented just north of this site on USDA Forest Service (Bridger-Teton National Forest) land (Appendix D). Also, 1 possible lynx trail was documented on the Pine Creek site (Appendix H), and 1 possible and 1 probable lynx trail were documented just north of the Water Canyon site (Appendix I).

Description: All trails matched published dimensions of lynx stride and straddle except the possible lynx trail on the Big Sandy site. This stride and straddle of this trail were rather large, suggesting possibly a mountain lion. However, print characteristics and

behavioral observations indicated that this animal was definitely lynx-sized in both height and weight (Appendix D). The 2 other possible lynx trails were observed after snowfalls, so print measurements were impossible to make.

Habitat observations:

General: As expected, all sites were on the flanks of major mountain ranges and typically sloped upward towards USDA Forest Service lands at higher elevations. Topography was rather variable, ranging from extremely rugged (e.g., Grass Creek, Pine Creek) to gently rolling (e.g., Blucher Creek, Big Sandy).

On all sites forest cover was naturally fragmented by sagebrush-grasslands, and forest contiguity tended to increase with elevation. Sites had received varying degrees of timber extraction; in general, recent clearcuts were common and accentuated natural forest fragmentation. Lodgepole pine was the dominant forest type, and commonly formed thick “doghair” stands with a high density of small-diameter trees and very little foliage in the mid and understories. Mixed stands of Engelmann spruce and subalpine fir were encountered on all sites, but were common on only a few (e.g., Scab Creek, Ham’s Fork). Structurally diverse, late-seral stands of conifers were rare. Aspen stands occurred occasionally, and large streams usually supported willow communities.

Because precipitation strongly influences vegetation composition and structure, and because most precipitation is received in winter as snow, the effects of large-scale geomorphology were rather apparent during this study. Rain-shadow sites such as Grass Creek, Lander, and possibly Rock Creek clearly received less snow than windward sites at similar elevations.

Prey species: The two primary species of lynx prey, snowshoe hare and red squirrel, were documented on every survey site. The distribution of each of these species closely matched the distribution of conifers, with snowshoe hares occasionally ranging beyond conifer stands into willow and aspen communities. Based on frequency of track encounters, each species reached its highest abundances in structurally diverse, late-seral stands of conifers. Such stands usually included a significant component of Engelmann spruce and subalpine fir. Doghair stands of lodgepole pine supported the lowest prey densities.

An initial goal of this study was to establish prey abundance monitoring routes in each survey site. This goal was abandoned for several reasons. Snow-tracking conditions were very poor during this study; furthermore, conditions were extremely variable on a 1 - 100m scale. This precluded collecting consistent and accurate estimates of track encounters on any given transect. Also, snowfall events were light, patchy, and infrequent, making it difficult to discern if tracks were made prior to or after the most recent snowfall. Such data is needed in order to convert track encounters into an index of abundance. We recommend using other methods that do not rely on snow-tracking to monitor lynx prey species. Standard call surveys would probably work best for red squirrels, and the Krebs pellet plot technique is a time-tested method to judge snowshoe hare abundance in boreal and montane forests, especially in relation to lynx.

Alternative prey species such as blue grouse, desert cottontail, and white-tailed jackrabbit were documented only infrequently, but were assumed to be present on most sites. Large herds of ungulates typically wintered on or in close proximity to the survey

sites and probably serve as a reliable source of carrion. Note that the probable lynx encountered in Water Canyon (Appendix I) was scavenging an elk carcass.

Competitors: Trails of coyote, bobcat, and mountain lion were recorded on almost all sites, and all 3 species likely occupy all sites during at least part of the year. Red fox probably occupy the lower elevations of some sites even in winter. Occurrence of domestic dogs in winter likely varies directly with the amount of recreational use of any site.

Trails of generalist carnivores (especially coyotes) were common on and near roads and snow machine trails, and often followed these features for several hundred meters at a time. Off-trail excursions usually looped back to packed trails after only short distances. Packed trails almost certainly extend the range of lynx competitors in the winter and allow them to access formerly snowbound areas. Snow-free slopes and ridges may serve a similar function, but may be absent during years of more normal snowfall.

Other species: Trails of several common and expected species were recorded on the survey sites, but aside from the lynx observations discussed above we made no observations of special or unusual interest. Wolverine and fisher were not recorded during this study. American marten were recorded on 4 sites. Curiously, marten were not recorded on any of the 4 sites (Rock Creek, Ham's Fork, Pine Creek, Water Canyon) on the southern end of the Overthrust Belt/ Wyoming Range, despite the apparent abundance of suitable habitat.

Other: Timber harvesting appeared to be almost absent on the Scab Creek site, and present only in low amounts on the Rock Creek and Water Canyon sites. Recent clearcuts were a common feature on all other sites (e.g., Photo G-4). Aspen stands on all sites appeared to be composed mainly of mature individuals with very few seedlings/ saplings; additionally, many aspen stands were converting to conifer overstories. Heavy browsing of mountain shrub species, presumably by ungulates, has occurred on the Rock Creek and Ham's Fork sites and has resulted in many dead and dying shrubs (Photo G-6). The primary recreational use of the sites was snow machine travel, the intensity of which generally varied with public accessibility and snow pack. Recreational use was rather high at the Pine Creek, Blucher Creek, and Big Sandy sites, but only moderate at the Ham's Fork site and low at all others.

DISCUSSION

Habitat suitability mapping

Our results (Figure 2) indicate that the habitat suitability map (Figure 1) is sufficient to guide the placement of surveys for lynx in Wyoming, and also to summarize potential lynx distribution at spatial scales ranging from the entire state to about the county/ BLM Field Office. It is important to note that this map pertains to *potential* lynx distribution, and should not be interpreted as a definitive statement on the *actual* distribution of lynx in the state. Rather, its value lies in guiding field surveys and generating hypotheses regarding habitat quality and distribution.

We suspect the accuracy of this map becomes increasingly poor at finer scales, because the land cover map on which it is based (Merrill et al. 1996) used a 100ha minimum mapping unit. Statewide maps of land cover utilizing smaller mapping units (0.1ha) are currently planned,

and applying the techniques described here to those maps would probably yield lynx habitat layers that are more accurate at finer scales. However, because lynx are highly mobile (see Ruggiero et al. 2000), such detailed maps may not be substantially more informative than the one presented here. The presence and persistence of vagile mammalian carnivores in a given landscape is probably more related to coarse-scale rather than fine-scale habitat characteristics. Changes in vegetation or prey abundance in a 1ha area probably won't substantially affect the probability of lynx presence in the surrounding landscape, because lynx respond to habitat features at a coarser scale. However, changes within a 100ha area, whether resulting from a single large action or the cumulative effects of multiple smaller actions, will likely affect the probability of lynx presence because that area more closely matches the spatial scale at which lynx use the landscape.

Future efforts at mapping habitat suitability for lynx may gain more by including geomorphologic and stand structure variables rather than increasing the spatial resolution of underlying land cover data. For example, studies of lynx habitat use suggest a preference for flat topography (Apps 2000, McKelvey et al. 2000c). Thus, incorporating a layer of topographic roughness in the mapping procedure may produce more accurate maps of habitat suitability. Also, spatial layers relating to the structural stage of conifer stands may add accuracy to a map of habitat suitability. As discussed below, lynx may prefer the relatively high densities of snowshoe hares found in the brushy environments of both early and late-seral conifer stands in the Central Rocky Mountains (Aubry et al. 2000, Buskirk et al. 2000a, Hodges 2000). Furthermore, lynx depend on the large coarse woody debris found in late-seral stands for denning (Aubry et al. 2000, Squires and Laurion 2000). Thus, good lynx habitat in this area may consist of a mosaic of early- and late-seral stands. If so, and if the proper proportions and juxtapositions of stand types can be estimated, digital maps of stand structural stage could be used to further refine the habitat suitability map produced here.

Habitat observations

Although all sites supported land cover generally suitable for lynx occupation, the sites varied quite a bit in topography, snow accumulation, and degree of recreational usage. These factors are known to affect habitat quality for lynx. Lynx may prefer gentle topography over more rugged terrain (Apps 2000, McKelvey et al. 2000c). Of the 3 sites where lynx were documented during this study, 2 (Big Sandy and Water Canyon) were characterized by relatively gentle topography. The relationship with snow depth may be somewhat more complex. Extremely deep snow may be avoided due to the high energetic cost of traveling through such a medium (Apps 2000). However, because such costs are higher for generalist carnivores such as coyotes than for lynx, lynx may seek out relatively deep snow to minimize competition (Aubry et al. 2000, Buskirk et al. 2000b). Because of the consistently low snow pack encountered during this project, we cannot draw any conclusions relative to snow depth preferences from our field work.

Recreational use further complicates the relationship between lynx, other carnivores, and snow depth. Packed roads and trails are used as travel corridors by generalist carnivores, allowing them to range into formerly snowbound areas (Aubry et al. 2000, Buskirk et al. 2000b). We repeatedly observed the tracks of generalist carnivores following snow machine trails. Some carnivores traveled for several hundred meters along packed trails before exiting, and others would exit only for short (<30m) forays before returning to the packed trail. Tracks of generalist carnivores were encountered much less frequently on survey segments extending over untracked

snow. Snow machine trails almost certainly extend the winter ranges of generalist carnivores in this region, probably to the detriment of lynx in the area.

Conifer forest exhibited some degree of natural fragmentation at all sites. Because natural fragmentation is an issue of vegetation *type*, as opposed to *succession*, it is more difficult to affect via management action. In contrast, forest fragmentation resulting from clearcutting was also observed on most sites, and because it is an issue of succession it is more tractable to management. Clearcutting generally does not lead to a type conversion, but rather re-sets succession in a given stand. The dense and brushy vegetation of a vigorously regenerating, early-seral conifer stand is good habitat for snowshoe hares (and hence lynx). However, although brushy early regeneration is common in the wetter forests of Canada, Montana, and Washington, it is somewhat rare in the drier forests of Wyoming and Colorado. Regenerating clearcuts here often do not support the structure or floristics conducive to high snowshoe hare production (Beauvais 2000, Buskirk et al. 2000a, Hodges 2000), and almost never provide good habitat for red squirrel, which is a very important prey species for southern lynx populations (Aubry et al. 2000). We observed very few tracks of snowshoe hare and red squirrel in recent clearcuts surveyed during this study.

Moreover, even the few clearcuts that do achieve early-seral conditions that are appropriate for hare quickly move out of this phase and into a more sterile stem exclusion phase, sometimes achieving the “doghair” configuration observed on several sites during this project. This phase persists for a long time, and holds little value for lynx because it provides minimal forage and cover for snowshoe hares and red squirrels (Buskirk et al. 2000a). Furthermore, removal of large boles during timber extraction usually results in very little coarse woody debris in these mid-seral stands, and lynx depend heavily on coarse woody debris for den sites (Aubry et al. 2000, Squires and Laurion 2000). We observed very few tracks of any species in “doghair” stands surveyed during this study.

In the Central Rocky Mountains, habitat suitability for lynx is likely highest in late-seral stands of conifers. Among other features, late-seral stands typically support multiple tree species, multiple canopy layers (including much foliage in the mid- and understories), dense patches of saplings in tree-fall gaps, large coarse woody debris, and mature trees with high cone productivity. This translates into high abundances of snowshoe hares and red squirrels, as well as abundant den structures (Beauvais 1997, Hodges 2000, Buskirk et al. 2000a). During this study, we clearly encountered the highest numbers of snowshoe hare and red squirrel tracks in structurally diverse, late-seral stands of conifers. Importantly, late-seral stands are more persistent in time than the relatively transient brushy stages of early regeneration. Over time, a timber extraction program that selectively targets late-seral stands probably decreases habitat quality of a given landscape because it eventually places most stands into the persistent and low-quality mid-seral stage.

Thus, based on current knowledge of lynx ecology in the Central Rocky Mountains and observations recorded during this study, good habitat for lynx occurs briefly in selected early-seral conifer stands, and consistently in most late-seral conifer stands (Aubry et al. 2000, Buskirk et al. 2000a, Hodges 2000). The value of such stand types is highest in landscapes with gentle topography and few packed roads and trails. Our 5 lynx observations, however, occurred in 3 separate areas that varied widely in amount of clearcutting, late-seral coverage, topographic roughness, and recreational use. The Big Sandy site (2 lynx observations) had many clearcuts, few late-seral stands, gentle topography, and many snow machine trails. The Pine Creek site (1 lynx observation) also had many packed trails, but was intermediate in both clearcutting and late-

seral coverage; it also had rougher topography. The Water Canyon site (2 lynx observations) had few clearcuts, more late-seral timber, gentle topography, and few packed roads and trails. It is difficult to generalize from such limited data. At the very least, our observations suggest that lynx are capable of using a variety of landscapes in this area. However, we hypothesize that more powerful analyses of habitat use based on larger numbers of lynx observations will reveal a preference for late-seral stands on flat sites with relatively few packed trails.

Lynx on Wyoming BLM holdings

The largest amount of suitable, BLM-administered lynx habitat in the state occurs on the southern terminus of the Overthrust Belt/ Wyoming Range (Figure 1) where there is a significant BLM timber base. This area borders what is generally regarded as the best lynx habitat anywhere in the state; namely, USDA Forest Service (Bridger-Teton National Forest) holdings on the Overthrust Belt/ Wyoming Range in northern Lincoln and western Sublette counties. Relative to the rest of the state, this area supports many lynx and much lynx reproductive activity (B. Oakleaf, Wyoming Game and Fish Department, personal communication; Wyoming Natural Diversity Database, University of Wyoming, unpublished data). Also, 3 of the 5 lynx trails recorded during this study were found in this area. Therefore, it is likely that the Wyoming BLM will have the greatest affect on lynx presence and abundance in the state through management actions in this area.

Currently, the persistence of lynx in the Central Rocky Mountains may depend heavily on immigration from population centers to the north and west (McKelvey et al. 2000a, b). In other words, lynx abundance in Wyoming may be largely a result of “spillover” from other areas rather than within-state reproduction. In turn, the presence of lynx on Wyoming BLM lands may result largely from spillover of individuals from the higher elevations of the Overthrust Belt/ Wyoming Range. At first glance this might suggest that management actions on BLM lands in southwestern Wyoming can do little to affect the overall recovery of the regional lynx population. However, excluding the recent reintroduction of lynx in Colorado (the success of which is still in question), this area is the southern extent of current lynx range. Thus maintenance of lynx in this area will not only halt the range contraction seen in recent decades, but will also help establish a front from which emigrating individuals will emerge to re-colonize historic range to the south. Management actions on BLM holdings in this area can clearly contribute to these goals.

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TABLES

Table 1. Common and Latin names of species mentioned in the text.

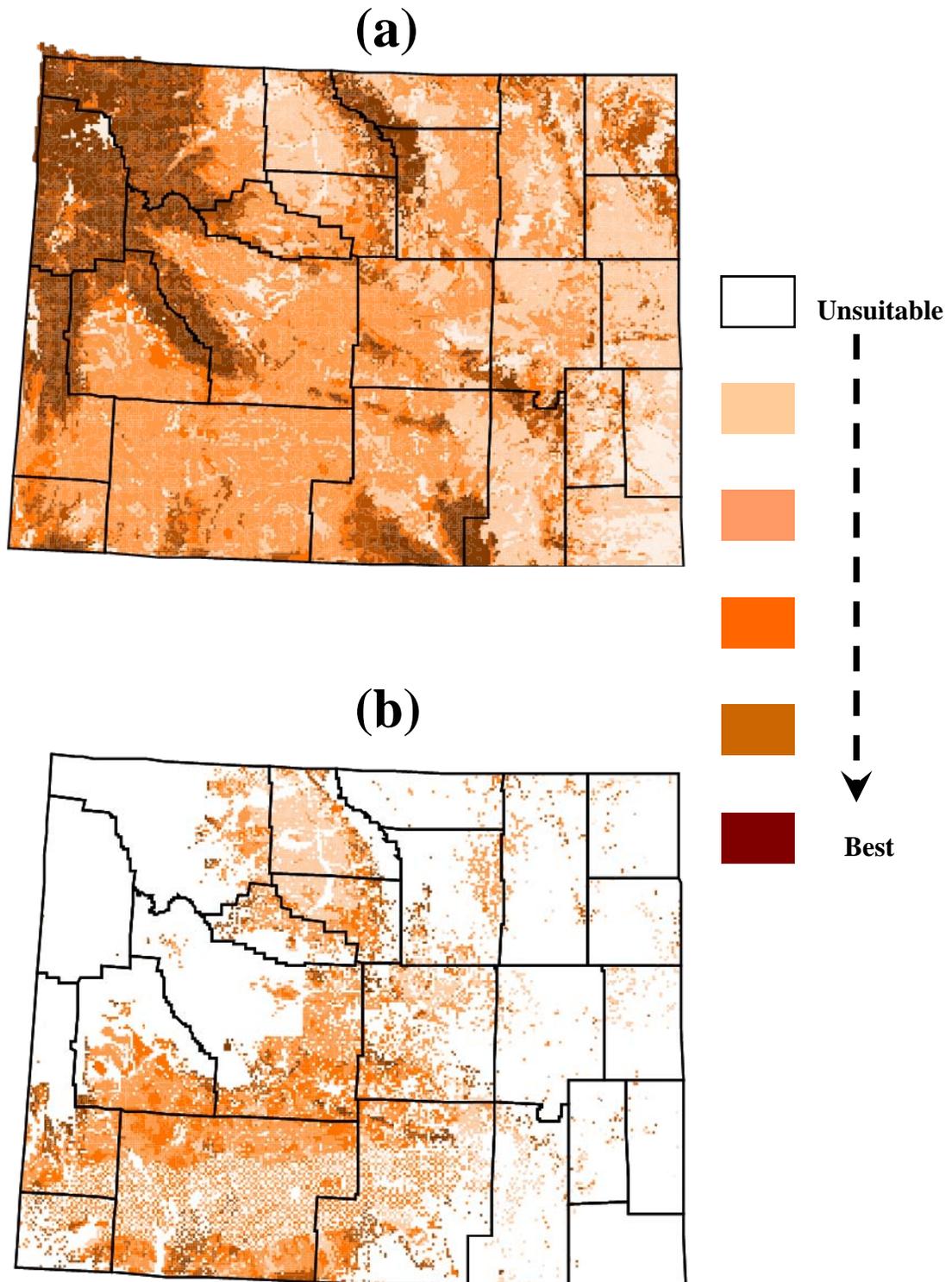
<u>Animals</u>	
American marten	<i>Martes americana</i>
Beaver	<i>Castor canadensis</i>
Black bear	<i>Ursus americanus</i>
Blue grouse	<i>Dendrogapus obscurus</i>
Bobcat	<i>Lynx rufus</i>
Coyote	<i>Canis latrans</i>
Desert cottontail	<i>Sylvilagus audubonii</i>
Domestic dog	<i>Canis familiaris</i>
Elk	<i>Cervus elaphus</i>
Fisher	<i>Martes pennanti</i>
Lynx	<i>Lynx canadensis</i>
Mountain lion	<i>Puma concolor</i>
Muskrat	<i>Ondatra zibethica</i>
Red fox	<i>Vulpes vulpes</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Snowshoe hare	<i>Lepus americanus</i>
White-tailed jackrabbit	<i>Lepus townsendii</i>
Wolverine	<i>Gulo gulo</i>
<u>Plants</u>	
Aspen	<i>Populus tremuloides</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
Englemann spruce	<i>Picea engelmannii</i>
Limber pine	<i>Pinus flexilis</i>
Lodgepole pine	<i>Pinus contorta</i>
Subalpine fir	<i>Abies lasiocarpa</i>
Whitebark pine	<i>Pinus albicaulis</i>
Willow	<i>Salix spp.</i>

Table 2. Lynx habitat suitability scores (0 - 6) for cover types identified by Merrill et al. (1996).

SCORE	COVER TYPES
0	Open water / human settlements / surface mining operations / irrigated crops / dry-land crops
1	Active sand dunes / black sagebrush steppe / unvegetated playa / basin exposed rock and soil / Great Basin foothills grassland / mixed grass prairie / short grass prairie / grass dominated wetland / grass dominated riparian / saltbush fans and flats
2	Bitterbrush shrub steppe / desert shrub / greasewood fans and flats / vegetated dunes
3	Basin big sagebrush / Wyoming big sagebrush / bur oak woodland / shrub dominated riparian / mesic upland shrub / xeric upland shrub
4	Mountain big sagebrush / permanent snow / alpine exposed rock and soil / forest dominated riparian
5	Limber pine woodland / ponderosa pine / juniper woodland / aspen / subalpine meadow / meadow tundra
6	Spruce-fir / Douglas fir / lodgepole pine / clearcut conifer / whitebark pine / burned conifer

FIGURES

Figure 1. Habitat suitability for lynx in Wyoming (a), and on BLM-administered lands in Wyoming (b). The index of habitat suitability is described in Equation 1 in the text.



SURVEY DATES: Snow-tracking stint 1: 6 and 7 January 2001
Snow-tracking stint 2: 5 February 2001
Remote camera active: 20 days (7 January 2001 - 27 January 2001; malfunction precluded full camera session)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys. Conditions on the Grass Creek site were the worst of all 9 sites surveyed. South and west facing slopes were snow-free at low- and mid-elevations, and cool slopes at higher elevations supported a maximum snow depth of only about 30cm. This paucity of snow lead to relatively high abundances of ungulates on the site during the entire winter, which in turn caused areas of trampled snow upon which tracking was difficult. This site lies directly in the rain shadow of the Absaroka Mountains, and thus is chronically dry. This effect was exacerbated by a winter 2000 - 2001 snow pack only about 50% of normal. We suspect snow-tracking is a more productive technique on this site under normal precipitation regimes. However, forest cover is naturally patchy across much of this site, and that natural patchiness is accentuated by past and current timber harvests here. This leads to significant areas of wind-disturbed and wind-hardened snow, which will reduce the effectiveness of snow-tracking on this site in general.

The remote camera station generated some photographs, although not of target species. Based on photograph dates and camera condition at retrieval, it is likely that the camera malfunctioned after about 20 days following placement.

OBSERVATIONS OF LYNX: No observations of lynx were recorded at this site.

HABITAT OBSERVATIONS:

General - The Grass Creek site lies on the southeastern terminus of the Absaroka Mountains and ranges in elevation from 2200 - 3050m, sloping generally upward from east to west. Topography is rough and is characterized by steep V-cut drainages with occasionally dramatic relief, including cliff sets between stream bottoms and ridgelines.

Forest cover is naturally fragmented, with large sagebrush-grasslands interspersed between timbered areas. Forest becomes more contiguous as elevation increases, and is most contiguous on the western boundary of the site. Lodgepole pine dominates forested areas, with Engelmann spruce and subalpine fir becoming more common at higher elevations and in more mesic sites. Aspen stands occur infrequently. Past and current timber harvests occur throughout the site, further fragmenting forest in general and stands of mid- to late-seral stage in particular. Structurally diverse stands with large coarse-woody debris were observed only infrequently.

This site lies directly in the rain shadow of the Absaroka Mountains / Yellowstone Plateau, and thus is rather dry. Streams that drain large basins, such as Grass Creek and Cottonwood Creek, are small relative to streams in comparable settings elsewhere.

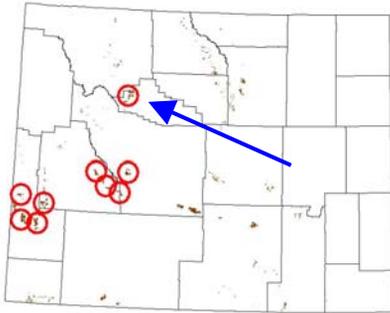
Prey species: Although both snowshoe hare and red squirrel were observed on this site, their abundances were notably low and their distributions fragmented. Alternative prey species such as desert cottontail, white-tailed jackrabbit, and blue grouse were not observed, but likely occur here. Wild ungulates were rather abundant, suggesting at least a moderate availability of carrion.

Competitors: Tracks of both mountain lion and coyote were observed, with the latter being rather common and widespread. Based on general habitat, bobcat and possibly red fox probably occupy this site as well. Low snow pack and abundant snow-free slopes suggest that generalist carnivores can range throughout most of this site in winter. Such access may be reduced in years of heavier precipitation. This area is remote from human occupation and doesn't appear to receive much recreational use, lessening the probability of domestic dog presence here.

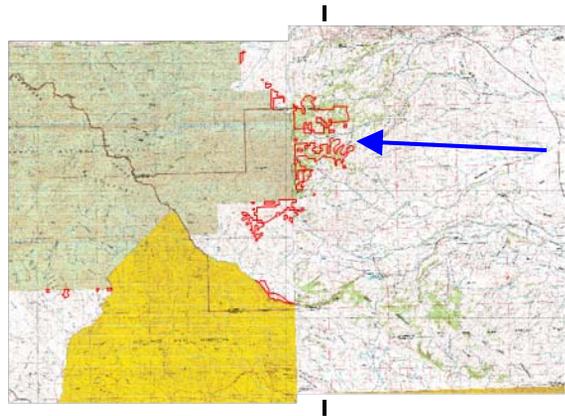
Other species: No significant observations. Wolverine, fisher, and American marten were not observed.

Other: Several recent and regenerating clearcuts occur on this site. Aspen stands appeared to be composed mainly of mature trees with little reproduction except in range exclosures. Winter recreational

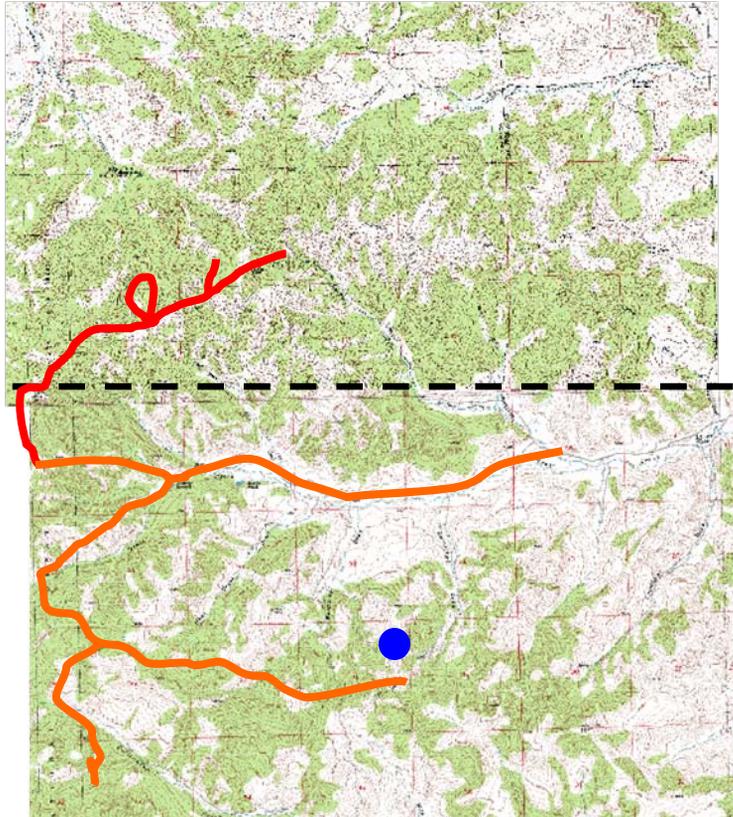
APPENDIX A: GRASS CREEK SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Grass Creek site.



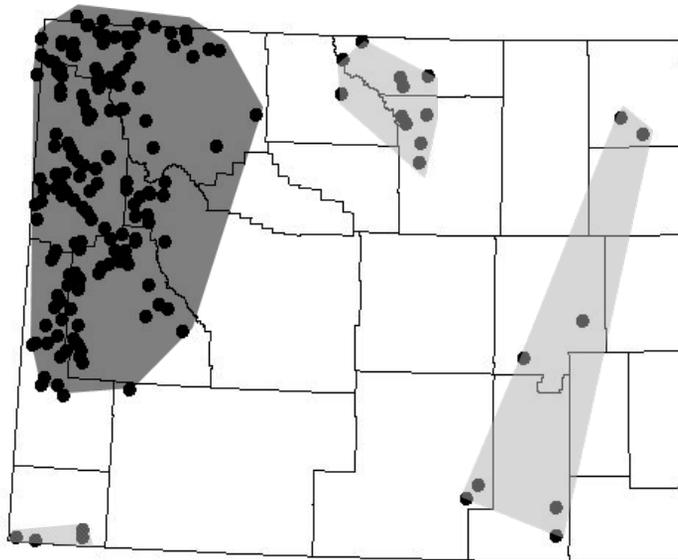
b. Portions of The Ramshorn (left; 43109e) and Thermopolis (right; 43108e) 1:100K scale maps. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the report. Blue arrow shows Grass Creek site.



c. Portions of Soapy Dale Peak (upper; 43108h8) and Milk Creek (lower; 43108g8) 1:24K scale maps. Red line shows survey route, and blue dot shows location of remote camera station, within the Grass Creek site.

Figure 2. (a) Known locations within the state of Wyoming where lynx have been documented; locations represented by black dots. Occurrence data on file at the Wyoming Natural Diversity Database - University of Wyoming. Gray shading indicates 4 distinct clusters of locations; darkest shading indicates the area currently occupied by lynx. (b) Comparison of the habitat suitability index at documented lynx locations (red bars), locations selected at random throughout the state (green bars), locations selected at random within the four distinct clusters of lynx locations, and locations selected at random in the area currently occupied by lynx in Wyoming (yellow bars).

(a)



(b)

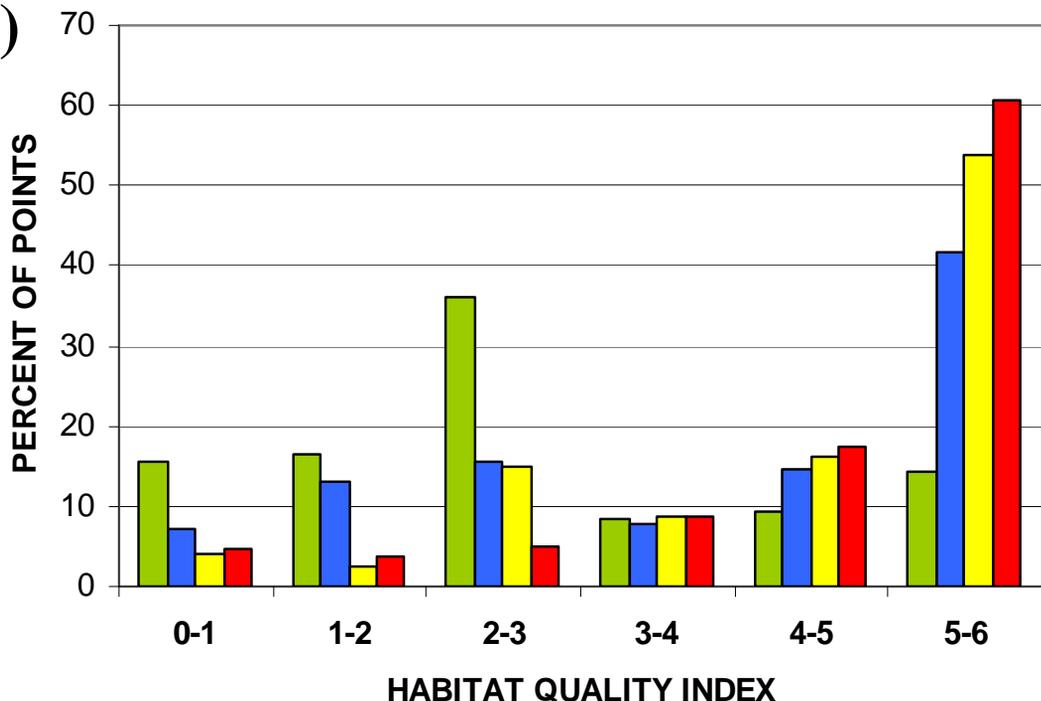
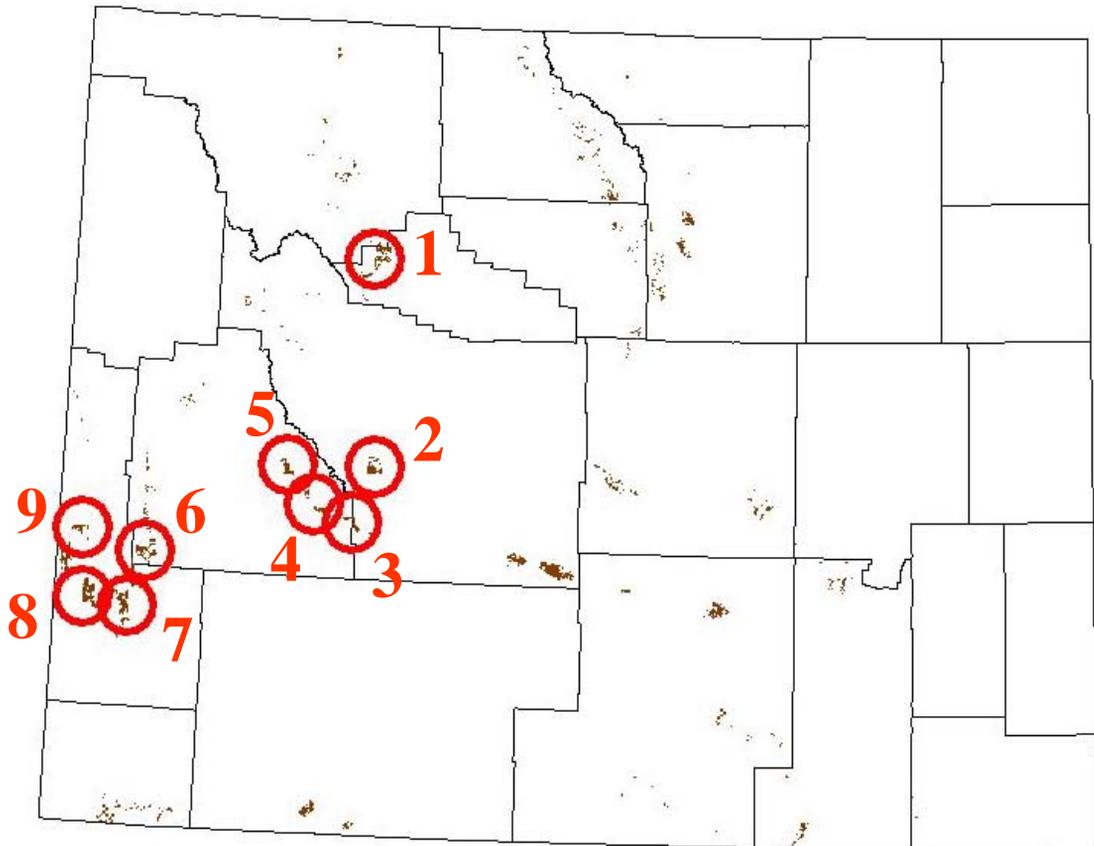


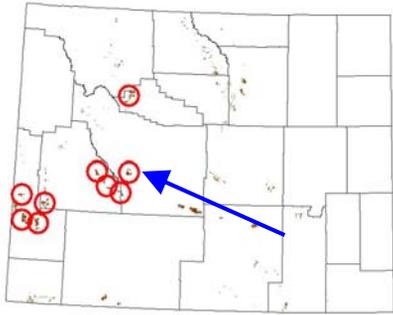
Figure 3. Study sites selected for field survey for lynx, indicated by red circles. Dark polygons represent BLM land surfaces with habitat indices >5 . Red numbers correspond to site names used in the text: (1) Grass Creek; (2) Lander; (3) Blucher Creek; (4) Big Sandy; (5) Scab Creek; (6) Rock Creek; (7) Ham's Fork; (8) Pine Creek; and (9) Water Canyon.



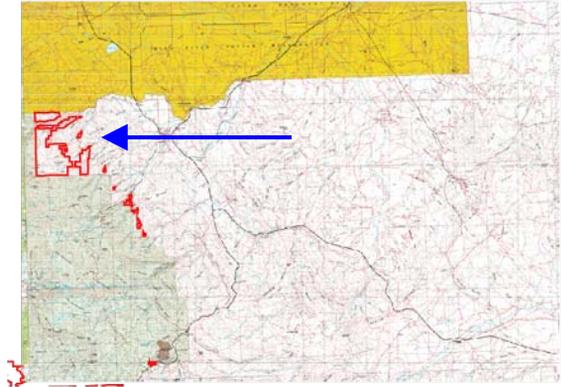
use appeared to be rather low, likely due to a combination of remote location and chronically low snow pack.

PHOTOGRAPHS: None.

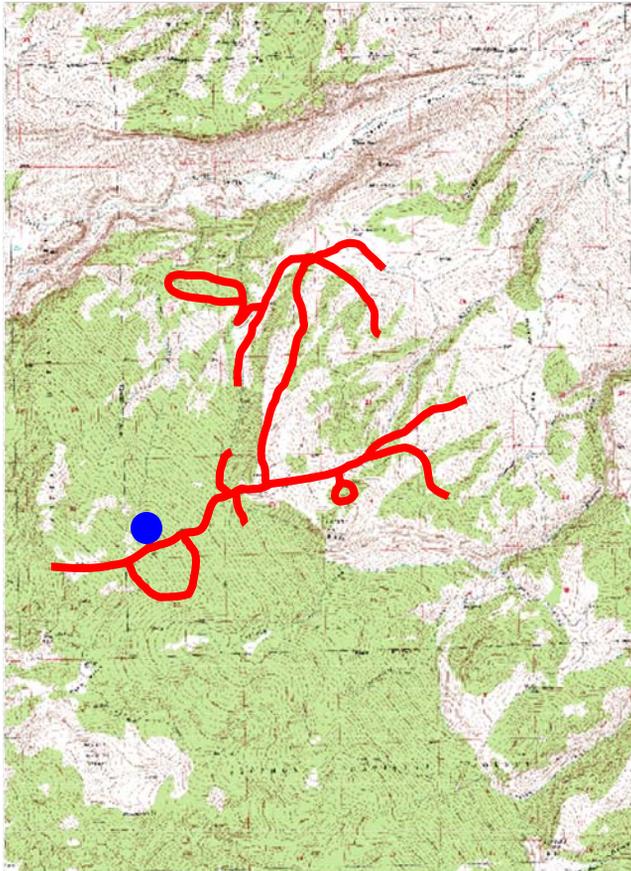
APPENDIX B: LANDER SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Lander site.



b. Lander (42108e) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the report. Blue arrow shows Lander site.



c. Mount Arter (42108g8) 1:24K scale map. Red line shows survey route, and blue dot shows location of remote camera station, within the Lander survey site.

SURVEY DATES: Snow-tracking stint 1: 8 January 2001
Snow-tracking stint 2: 3, 7, and 8 February 2001
Remote camera active: 31 days (8 January 2001 - 8 February 2001)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys. Although this site supported contiguous snow cover, it was thin and heavily weathered (see Photo B-3).

The remote camera station was functional and generated several photographs, although not of target species.

OBSERVATIONS OF LYNX: No observations of lynx were recorded at this site.

HABITAT OBSERVATIONS:

General - The Lander site lies near the southeastern terminus of the Wind River Mountains and ranges from 2070 - 3170m in elevation, sloping upward from east to west. Deeply incised drainages separated by steep ridges occur at lower elevations; this landscape transitions into a smooth and even slope extending from mid- to high elevations.

Forest cover is moderately fragmented at low elevations, becoming more contiguous as elevation increases. Lodgepole pine dominates at all elevations (Photo B-1, B-2), with Engelmann spruce, subalpine fir, aspen, whitebark pine, and limber pine present in lesser and varying amounts (Photo B-3). Tree species richness and stand structural diversity are highest at low, and again at high, elevations. The mid-elevational zone is dominated by doghair stands of lodgepole pine with low structural complexity. Most forest stands appear to be early- to mid-seral in development, with mature stands encountered only infrequently. A significant number of regenerating clearcuts are present on this site (Photo B-1), likely representing mid- to late-seral stands that have been recently removed. Large coarse-woody debris was observed only periodically.

Because this area lies in the rain shadow of the Wind River Mountains it is rather dry and supports a low snow pack, especially relative to sites on the western slope of the range.

Prey: Snowshoe hare and red squirrels were observed in conifer stands throughout this site. Track densities were low to moderate; the most tracks of each species occurred in structurally diverse conifer stands at the lowest and highest elevation zones. Mid-elevation, doghair stands of lodgepole pine supported low densities of potential lynx prey. Although not observed during this project, blue grouse likely occupy this site as well. There are significant concentrations of wintering ungulates at low elevations to the north and east of this site, suggesting at least a moderate availability of carrion in the general area.

Competitors: Tracks of mountain lion, bobcat, and coyote were rather widespread at low- to mid-elevations. Although not observed during this study, red fox may also occupy the lowest portions of this site. Contiguous snow cover and the lack of maintained roads and trails suggest that generalist carnivores may be restricted from the highest elevations of this site in winter. Because of the generally low human presence here, domestic dogs probably occur at very low frequency.

Other species: Two trails made by American marten were recorded near the camera station. No wolverine or fisher were observed.

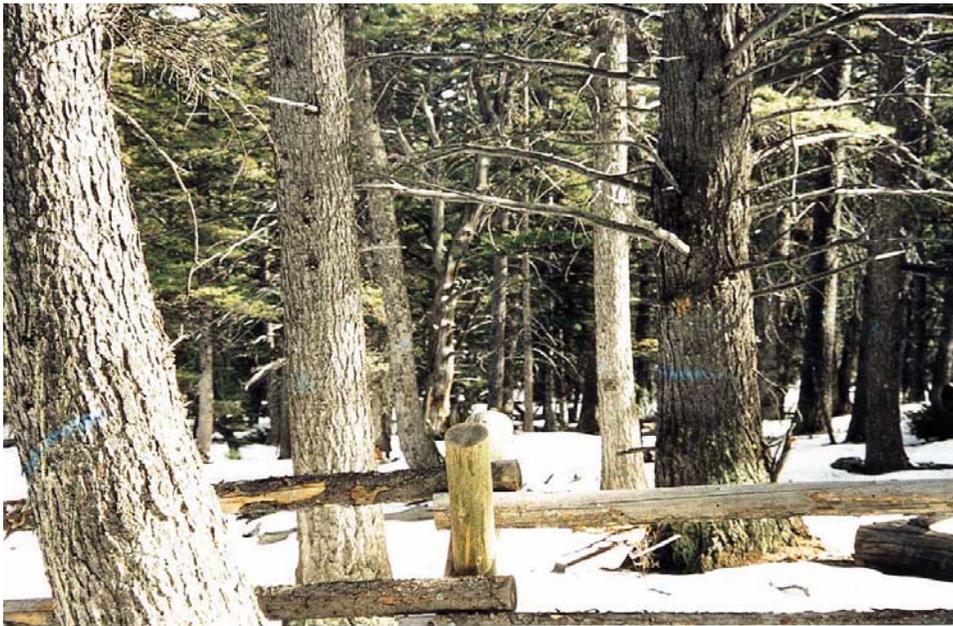
Other: Timber extraction activity has been rather high on this site, with numerous clearcuts present (Photo B-1). Aspen stands are composed mainly of mature trees, with apparently little regeneration. Road densities are low, public access to the site is rather difficult in winter, and snow pack is only minimally able to support snow machines and skiers; not surprisingly, we observed very little recreational use here.

PHOTOGRAPHS

B-1. Regenerating clearcut on the Lander site.



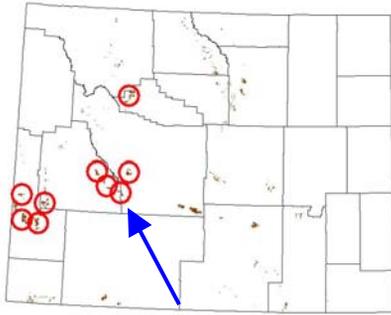
B-2. Late-seral stand of lodgepole pine on the Lander site. Stands of this stage were rare; early- to mid-seral stands were most common, with many stands in doghair configuration.



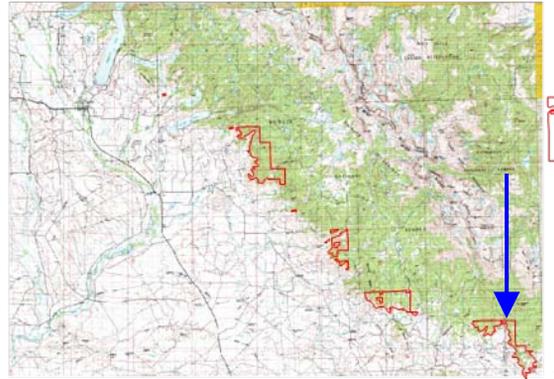
B-3. Mixed stand of lodgepole pine, Engelmann spruce, and subalpine fir on the Lander site. Note the locally patchy and heavily weathered snow cover.



APPENDIX C: BLUCHER CREEK SURVEY SITE

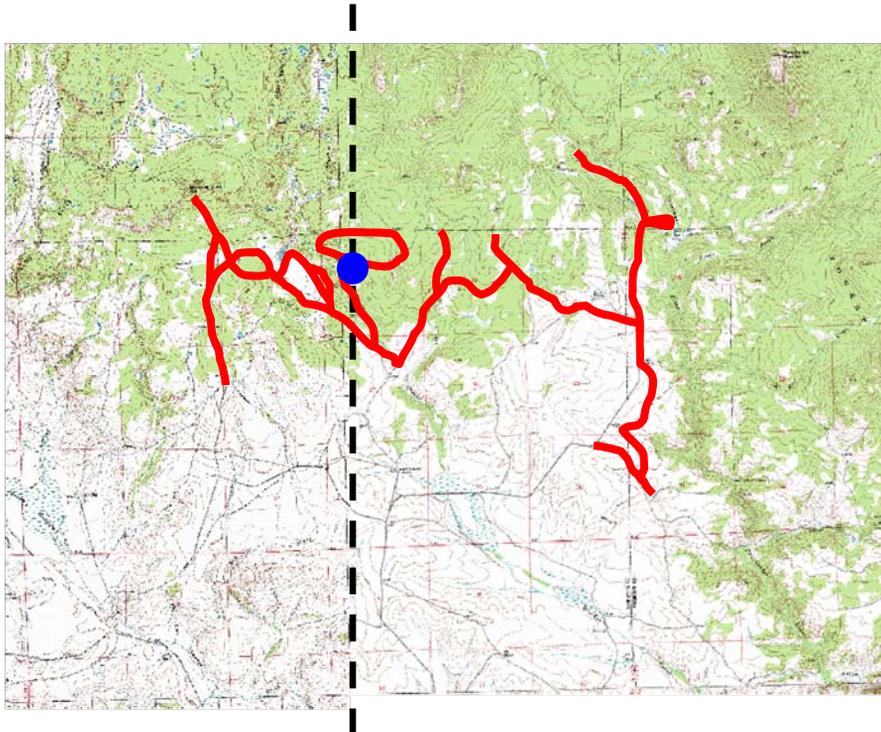


a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Blucher site.



b. Pinedale (42109e) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the text. Blue arrow shows Blucher site.

c. Portions of the Sweetwater Needles (right; 42109e1) and Jensen Meadows (left; 42109e2; left) 1:24K scale maps. Red line indicates survey route, and blue dot shows location of remote camera station, within the Blucher site.



SURVEY DATES: Snow-tracking stint 1: 28, 29, and 30 December 2000
Snow-tracking stint 2: 20 and 21 February 2001
Remote camera active: 54 days (29 December 2000 - 21 February 2001)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys.

The remote camera station was functional and generated several photographs, although not of target species.

OBSERVATIONS OF LYNX: No observations of lynx were recorded at this site, although one probable lynx trail was encountered just to the west closer to the Big Sandy site on 30 December 2001 (described in Appendix D).

HABITAT OBSERVATIONS:

General - The Blucher Creek site lies near the southeastern terminus of the Wind River Mountains and ranges from 2430 - 2630m in elevation, sloping generally upward from south to north. Aside from a significant canyon constraining the Sweetwater River, topography is mostly flat and rolling.

As with most sites surveyed during this project, forest contiguity increases with elevation. Lodgepole pine clearly dominates this site, with many stands in classic doghair configuration: extremely high densities of even-aged trees only 10 - 13cm DBH and 8 - 11m tall, with live branches present only on the top 1 - 2m of the stem. Mammal tracks were only rarely encountered in such stands. Late-seral stands of conifers are very rare here. A significant number of regenerating clearcuts are present on this site, likely representing mid- to late-seral stands that have been recently removed. Large coarse-woody debris was observed only infrequently. Aspen stands, composed mainly of mature individuals, occur infrequently throughout the site.

Because of its windward position on the west slope of the Wind River Mountains, this site appeared to regularly receive more precipitation than rain-shadow sites such as Grass Creek or Lander.

In most respects, habitat at this site is rather similar to that at the Big Sandy site (see Appendix D).

Prey: Snowshoe hare and red squirrel were encountered throughout the site, but were nowhere abundant. Although not observed during this project, blue grouse likely occupy this site as well.

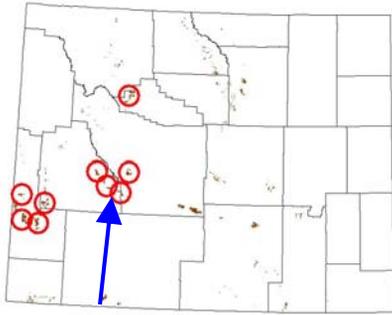
Competitors: Tracks of mountain lion, bobcat, and coyote were recorded here, with the latter species being frequently encountered on the extensive network of snow machine trails dissecting the site. Our observations suggest that these trails are used as travel corridors by coyotes, and likely extend coyote winter range into formerly snowbound areas. Similar effects may be occurring with bobcat and mountain lion. Because of the high recreational use of this area, domestic dogs probably occur at a relatively high frequency.

Other species: Two trails of American marten were observed along Blucher Creek itself. No wolverine or fisher were observed here.

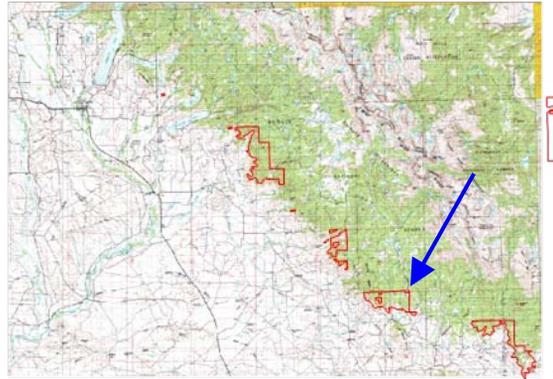
Other: There has been much timber harvesting within this site, and regenerating clearcuts are rather abundant. Aspen stands are composed mainly of mature trees, with apparently little regeneration. There is high recreational use of this site; the Continental Divide Snowmobile Trail runs the length of the site, and many user-created trails are present.

PHOTOGRAPHS: None.

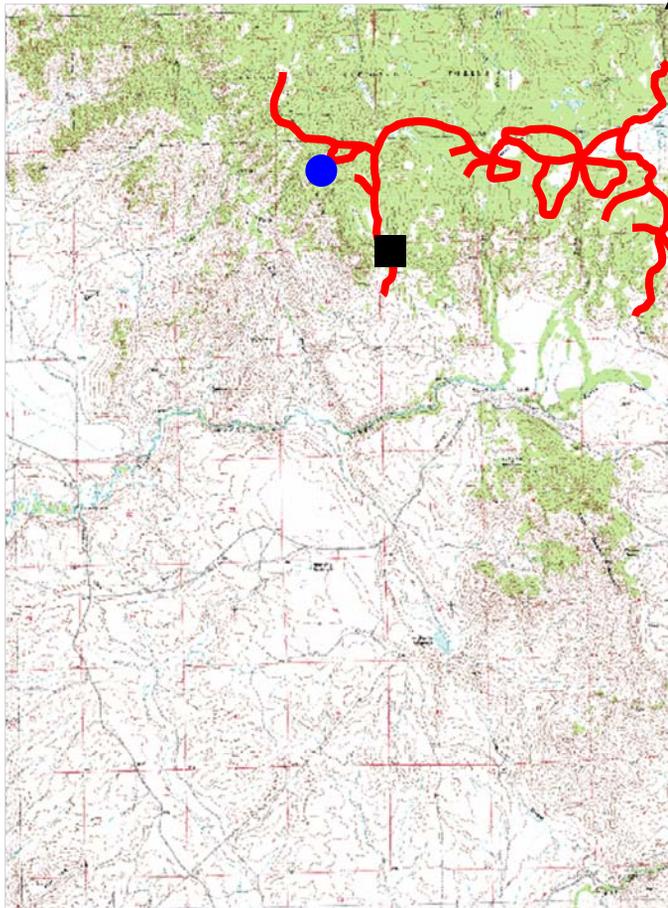
APPENDIX D: BIG SANDY SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Big Sandy site.



b. Pinedale (42109e) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the text. Blue arrow shows Big Sandy site.



c. Leckie (42109e3) 1:24K scale map. Red line indicates survey route, and blue dot shows location of remote camera station, within the Big Sandy survey site.

Black triangle is location of probable lynx track documented 30 December 2001 on USDA Forest Service land just north and east of the Big Sandy site.

Black square is location of possible lynx trail documented 18 February 2001.

SURVEY DATES: Snow-tracking stint 1: 26, 27, and 28 December 2000
 Snow-tracking stint 2: 18 and 19 February 2001
 Remote camera active: 54 days (27 December 2000 - 19 February 2001)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys.

The remote camera station was functional and generated several photographs, although not of target species.

OBSERVATIONS OF LYNX: One probable lynx trail was recorded just north of this site during the 30 December 2000 approach to the Blucher Creek site (Blucher Creek tracking stint #1). One possible lynx trail (Photos D3-7) was recorded in this site during tracking stint #2 (18 February 2001).

TRACK SET #1 - POSSIBLE LYNX - 18 FEBRUARY 2001 (PHOTOS D-3 - D-7)

Location: Southern terminus of Muddy Ridge, northwest of the Leckie gauging station and about 1.2 km west of the Big Sandy River. LAT 42 35 30 // LONG 109 18 10

Description: A single trail of a walking animal was intercepted in rolling topography dominated by stands of doghair lodgepole pine, interspersed with recent clearcuts and aspen inclusions. Substrate was heavily weathered snow with about 3cm of hoar frost on the surface; tracks penetrated only through hoar to snow surface. Trail was estimated to be 24 hours old at time of encounter.

Msrmts (cm):	Stride =	86 / 89 / 89 / 91 / 94 / 94 / 94 / 99 / 102 / 104;	mean = 94.2
	Straddle =	20 / 20 / 20 / 22 / 22 / 22 / 22 / 22 / 23;	mean = 21.5
	Print length =	10 / 10 / 10 / 10 / 10 / 10 / 10 / 10 / 10;	mean = 10.0
	Print width =	10 / 10 / 10 / 10 / 10 / 10 / 10 / 10 / 10;	mean = 10.0

Supporting observations: Toes and interdigital pads were only barely apparent, in contrast to obvious toes and interdigital pads in nearby mountain lion prints. The animal walked through tight brush and low branches, repeatedly traveling under branches only 35 - 50cm above the snow surface without substantially modifying its gait. The animal also walked along several leaning saplings only 7.5cm in diameter for several meters at a time. This trail was encountered at sunset immediately prior to a snowstorm; further supporting observations were not collected.

TRACK SET #2 - PROBABLE LYNX - 30 DECEMBER 2000

Location: On USDA Forest Service (Bridger-Teton National Forest) land just north and east of the Big Sandy site proper, approximately 6.4km north-northwest of Leckie on the divide between Dutch Joe Creek and the west fork of Squaw Creek. LAT N 42 38 04 // LONG W 109 13 33

Description: A single trail of a walking animal was intercepted in gently rolling topography dominated by mixed stands of lodgepole pine, Engelmann spruce, and subalpine fir, interspersed with aspen inclusions and small openings. Substrate varied and included a packed and heavily disturbed snow machine trail, weathered snow with hoar frost on surface, and soft drifted snow. Trail was estimated to be 48 hours old at time of encounter.

Msrmts (cm):	Stride =	61 / 62 / 64 / 64 / 64 / 64 / 65 / 66 / 66 / 67;	mean = 64.3
	Straddle =	17 / 18 / 18 / 18 / 18 / 18 / 18 / 18 / 18;	mean = 17.9
	Print length =	8 / 8 / 9 / 9 / 9 / 9 / 9 / 9 / 9 / 9 / 9;	mean = 8.8
	Print width =	10 / 10 / 10 / 10 / 10 / 10 / 10 / 10 / 10 / 11;	mean = 10.1

Supporting observations: This trail was followed in both directions from point of interception, but surface disturbances precluded observation of long trail segments and collection of supporting evidence.

HABITAT OBSERVATIONS:

General - The Big Sandy site encompasses the main stem of the Big Sandy River in the vicinity of Leckie, on the west slope of the Wind River Mountains. It ranges from 2440 - 2800m in elevation, and slopes

upward from south to north. Topography is generally flat to rolling, with significant slopes occurring only on the flanks of Muddy Ridge.

Forest contiguity increases with elevation, and forest cover is predominantly lodgepole pine. Many stands are in classic doghair configuration: extremely high densities of even-aged trees only 10 - 13cm DBH and 8 - 11m tall, with live branches present only on the top 1 - 2m of the stem (Photo D-2). Mammal tracks were only rarely encountered in such stands. Late-seral stands of conifers are very rare here. Many regenerating clearcuts were observed (Photo D-1), and are assumed to represent mid- to late-seral stands recently removed from the site. Large coarse-woody debris was observed only infrequently. Aspen stands, composed mainly of mature individuals, occur infrequently throughout the site.

Because of its windward position on the west slope of the Wind River Mountains, this site appeared to regularly receive more precipitation than rain-shadow sites such as Grass Creek or Lander.

In most respects, habitat at this site is rather similar to that at the Blucher Creek site (see Appendix C).

Prey: Snowshoe hare and red squirrel were encountered throughout the site, but were nowhere abundant. Although not observed during this project, blue grouse likely occupy this site as well.

Competitors: Coyote tracks were commonly observed, but only 1 bobcat trail and no mountain lion trails were recorded. Coyote tracks were commonly observed on snow machine trails; such trails likely extend coyote winter range into formerly snowbound areas. Similar effects may be occurring with bobcat and mountain lion, although these species appear to be relatively rare here. Because of the high recreational use of this area, domestic dogs may occur at a relatively high frequency.

Other species: American marten were not seen on site, but 3 separate marten trails were observed on USDA Forest Service land to the north and east. No wolverine or fisher were observed here.

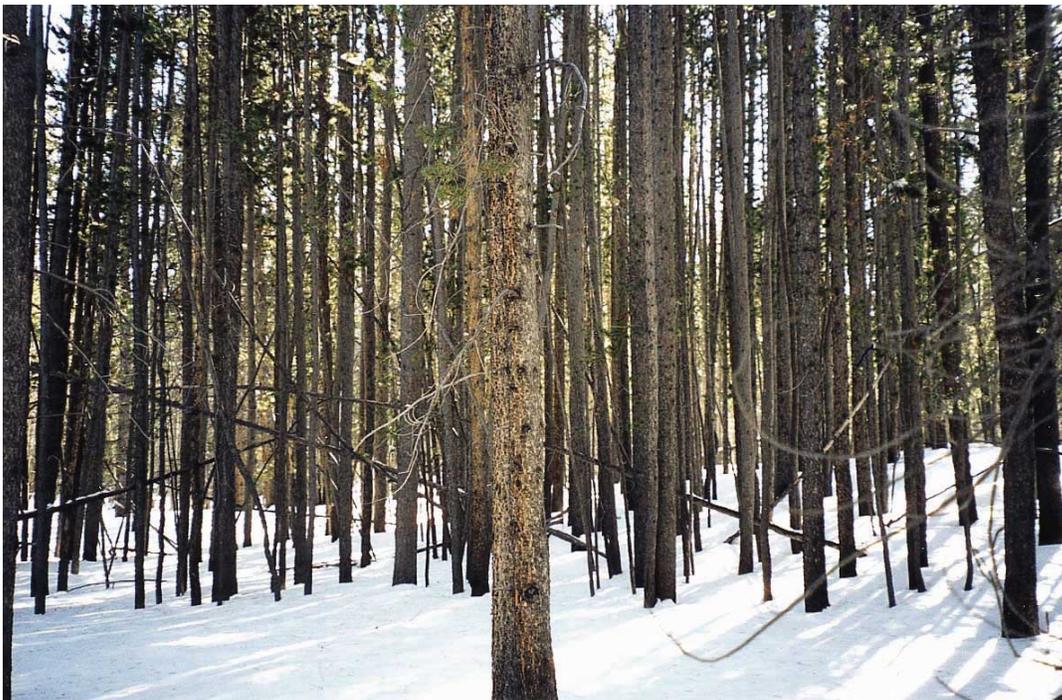
Other: There has been much timber harvesting within this site, and regenerating clearcuts are rather abundant (Photo D-1). Aspen stands here are composed mainly of mature trees, with little regeneration. The Continental Divide Snowmobile Trail runs just north of this site, and several user-created trails dissect the area and are heavily used.

PHOTOGRAPHS

D-1. Regenerating clearcut on the Big Sandy site. Clearcuts were common in this area.



D-2. Doghair stand of lodgepole pine on the Big Sandy site. Such stands covered large portions of the site.



D-3, 4, 5. Track set #1, possible lynx, on the Big Sandy site. D-5 shows the trail of this animal walking under a branch only about 35cm above the snow surface.

(3)



(4)



(5)



D-6, 7. Track set #1, possible lynx, on the Big Sandy site. D-6 shows the trail of this animal traversing a leaning sapling only about 7.5cm diameter. D-7 shows a 50cm-tall gap in tight brush that the animal traveled through apparently unimpeded.

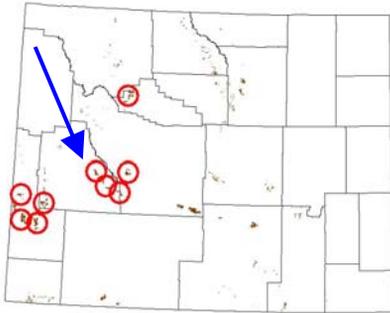
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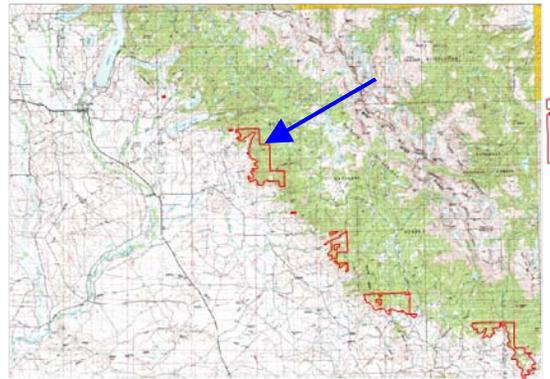
(7)



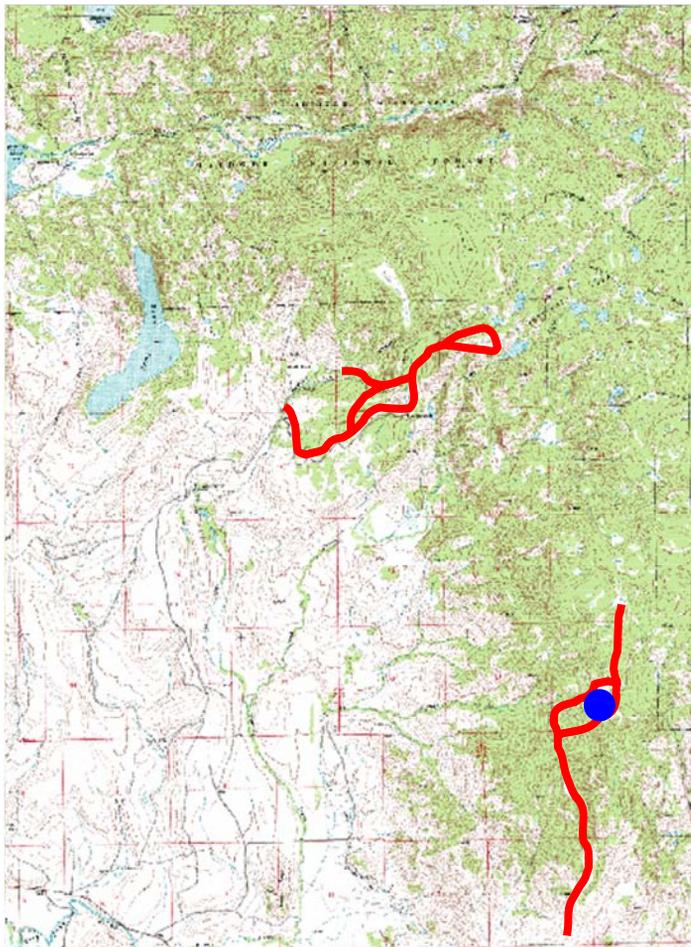
APPENDIX E: SCAB CREEK SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Scab Creek site.



b. Pinedale (42109e) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the text. Blue arrow shows Scab Creek site.



c. Scab Creek (42109g5) 1:24K scale map. Red line indicates survey route, and blue dot shows location of remote camera station, within the Scab Creek survey site.

SURVEY DATES: Snow-tracking stint 1: 2, 3, and 4 January 2001
Snow-tracking stint 2: 11, 12, and 13 February 2001
Remote camera active: 158 days (3 January 2001 - 10 June 2001; camera was reloaded and reset on 11 February 2001 and allowed to run until 10 June 2001)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys. By virtue of its relatively high elevation and windward position on the west slope of the Wind River Mountains, this site appears to receive deeper and more frequent snowfall than others. Tracking conditions here were generally poor, but were the best of any of the 9 sites surveyed during this project.

The remote camera station was functional and generated several photographs, although not of target species (Photo E-1, E-2). One photograph (E-1) of a bobcat was acquired here. This camera was reloaded and allowed to run until 10 June 2001.

OBSERVATIONS OF LYNX: No observations of lynx were made at this site.

HABITAT OBSERVATIONS:

General - The Scab Creek site is on the west slope of the Wind River Mountains about 16km north northeast of the town of Boulder, and is bordered on the north and east by the USDA Forest Service (Bridger-Teton National Forest) Bridger Wilderness Area. The site ranges from 2440 - 2930m in elevation and slopes generally upward from west to east. Topography is rough, with very steep slopes and many rock outcrops on the western edge of the site.

This site is heavily forested and supports more mixed stands of Engelmann spruce and subalpine fir than any other site (Photo E-3, E-4), although lodgepole pine is still abundant. There are more conifer stands in mid- to late-seral stages here than in other sites, with some very large trees and relatively abundant coarse woody debris. Tree-fall canopy gaps were commonly observed in such stands, and clusters of saplings in these gaps contribute much structural diversity to the mid- and understory (Photo E-3, E-4). Aspen stands occur infrequently throughout the site.

Because of its windward position on the west slope of the Wind River Mountains and its relatively high elevation, this site appears to regularly receive more precipitation than any other site surveyed during this project.

Prey: Both snowshoe hare (Photo E-2) and red squirrel were abundant in this site, with red squirrel tracks reaching the highest density here of any site surveyed. Large middens and extensive trail networks were especially common in stands of late-seral conifers. Although not observed during this project, blue grouse likely occupy this site as well. There are significant concentrations of wintering ungulates along the low elevation periphery of this site, suggesting at least a moderate availability of carrion.

Competitors: Bobcat, mountain lion, and coyote tracks were numerous in the lower elevation portions of the site near ungulate winter ranges. Only 1 bobcat trail was encountered at higher elevations, and a photograph (E-1) of a bobcat was acquired at the camera site. Contiguous and deep snow cover, and the lack of maintained roads and trails, suggest that generalist carnivores may be restricted from the highest elevations of this site in winter. Because of the virtual absence of people here in the winter, domestic dogs probably occur at very low frequency.

Other species: Three separate marten trails were observed in this site. No wolverine or fisher were observed here.

Other: Timber harvesting appears to be minimal here. Difficult public access, rough topography, and relative lack of roads apparently preclude recreational use of this site in winter. We observed no signs of human presence here during these surveys.

PHOTOGRAPHS

E1, 2. Photographs of a bobcat (1) and snowshoe hares (2) acquired at the remote camera station on the Scab Creek site. These are a subset of all photos acquired from this station.

(1)



(2)



E-3, 4. Portions of late-seral stands of mixed Engelmann spruce and subalpine fir on the Scab Creek site. This stand type was more common here than at any other site surveyed during this project.

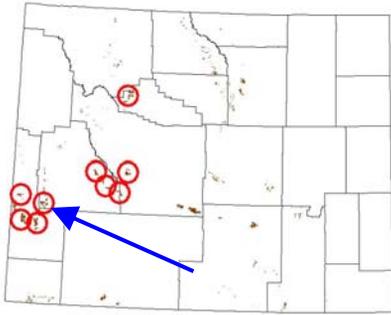
(2)



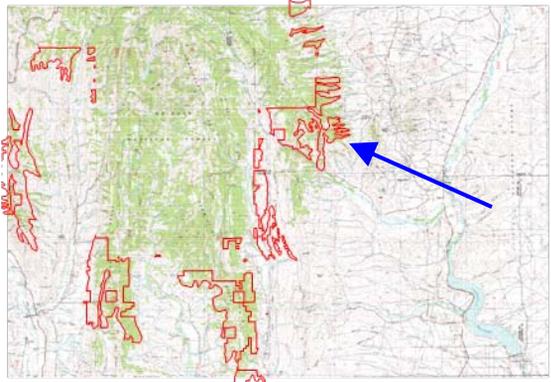
(3)



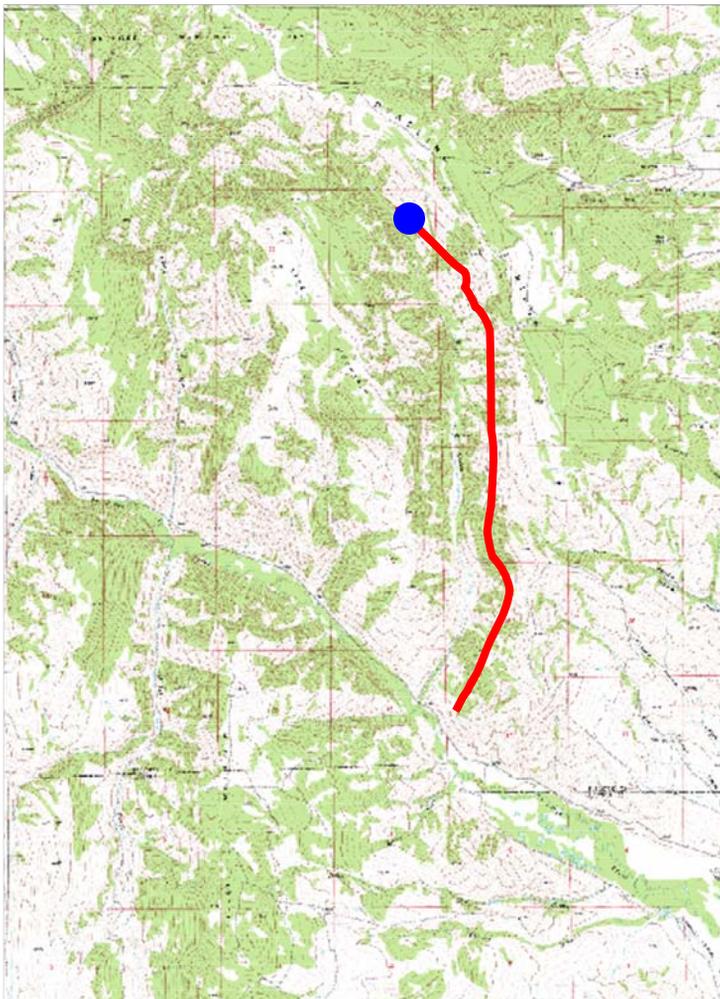
APPENDIX F: ROCK CREEK SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Rock Creek site.



b. Fontenelle Reservoir (42110a) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the report. Blue arrow shows Rock Creek site.



c. Lake Mountain (42110c4) 1:24K scale map. Red line indicates survey route, and blue dot shows location of remote camera station, within the Rock Creek survey site.

SURVEY DATES: Snow-tracking stint 1: 18 March 2000
Snow-tracking stint 2: Not performed due to poor tracking conditions; effort committed to other sites.
Remote camera active: 78 days (18 March 2000 - 5 June 2000)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys. Open slopes and ridgelines on this site are subject to high wind, and consequently support very little snow cover. This paucity of snow leads to a relatively high abundance of ungulates on the site during the entire winter, which in turn results in areas of trampled snow upon which tracking was difficult. Only the Grass Creek and Water Canyon sites had worse tracking conditions than this site.

The remote camera station was functional and generated several photographs (F-1, F-2), but not of target species.

OBSERVATIONS OF LYNX: No observations of lynx were made at this site.

HABITAT OBSERVATIONS:

General - The Rock Creek site encompasses several south-flowing tributaries of LaBarge Creek northwest of the town of Viola, and is centered roughly on Lake Mountain. It ranges from 2200 - 2900m in elevation, and slopes generally upward from southeast to northwest. Topography is rough; the landscape consists of several incised drainages (including Rock Creek, Long Hollow, and Sheep Creek) separated by broad, steep-sided ridges.

Forest cover is naturally fragmented across this site, with significant patches of shrub-steppe separating forested areas. As with the Ham's Fork site, forest here can be best described as occurring in broad "stringers" extending down drainages and cool, mesic slopes from the more contiguous forest on USDA Forest Service (Bridger-Teton National Forest) land to the north and west. Higher elevations of the site and cool, mesic drainages support some structurally diverse stands of mid- to late-seral conifers; several such stands occur on the headwaters of Rock Creek itself. Although forested areas are typically dominated by lodgepole pine, mixed stands of Engelmann spruce and subalpine fir are locally abundant. Large aspen stands occur in stream bottoms, and willow communities dominate the margins of some of the larger streams.

Perhaps due to a rain-shadow effect from the Overthrust Belt / Wyoming Range, this site appears to be rather dry compared to other sites in the vicinity. Open slopes and ridgelines consistently receive high winds, and consequently support many snow-free patches.

In most respects, habitat at this site is rather similar to that at the Ham's Fork site (see Appendix G). However, the snow pack appears to be consistently shallower, and snowfall less frequent, here than at Ham's Fork.

Prey: Tracks of both snowshoe hare (see also Photo F-1) and red squirrel were encountered in conifer stands, with red squirrel being the more abundant of the 2. Several cottontail trails were intercepted along the lowest portion of Rock Creek, and 2 separate flocks of blue grouse were flushed on the survey route during camera retrieval on 5 June 2000. Ungulates are concentrated along LaBarge Creek in winter, suggesting at least a moderate availability of carrion.

Competitors: Of all potential mammalian carnivores here, only coyote tracks were observed. Bobcat and mountain lion almost assuredly occupy this site as well, and red fox may occur at lower elevations along LaBarge Creek. There are many open slopes and ridgelines that receive high winds, and thus hold very little snow; these areas may allow generalist carnivores to range into higher elevations than would be possible with heavier snow loads. Because human presence is not especially high here, domestic dogs probably occur at very low frequencies.

Other species: No American marten, wolverine, or fisher were observed here. Tracks of both beaver and muskrat were documented on the margins of Rock Creek.

Other: This site appears to have received only a small to moderate amount of timber extraction activity. Deciduous shrubs and trees are heavily browsed in this site. There are many saplings 1m - 2m tall that had developed “medusa heads” on terminal branches and subsequently died. Only a moderate amount of recreational activity was seen near LaBarge Creek; human presence here appears to be low in winter.

PHOTOGRAPHS

F-1, 2. Photographs of snowshoe hare (1) and black bear (2) acquired at the camera station on the Rock Creek site. These are a subset of all photographs acquired from this station.

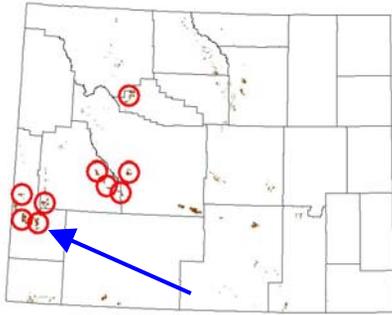
(1)



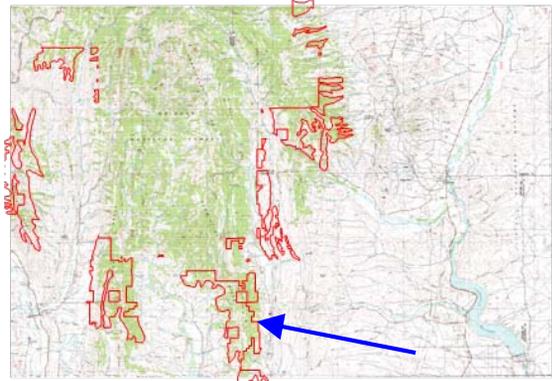
(2)



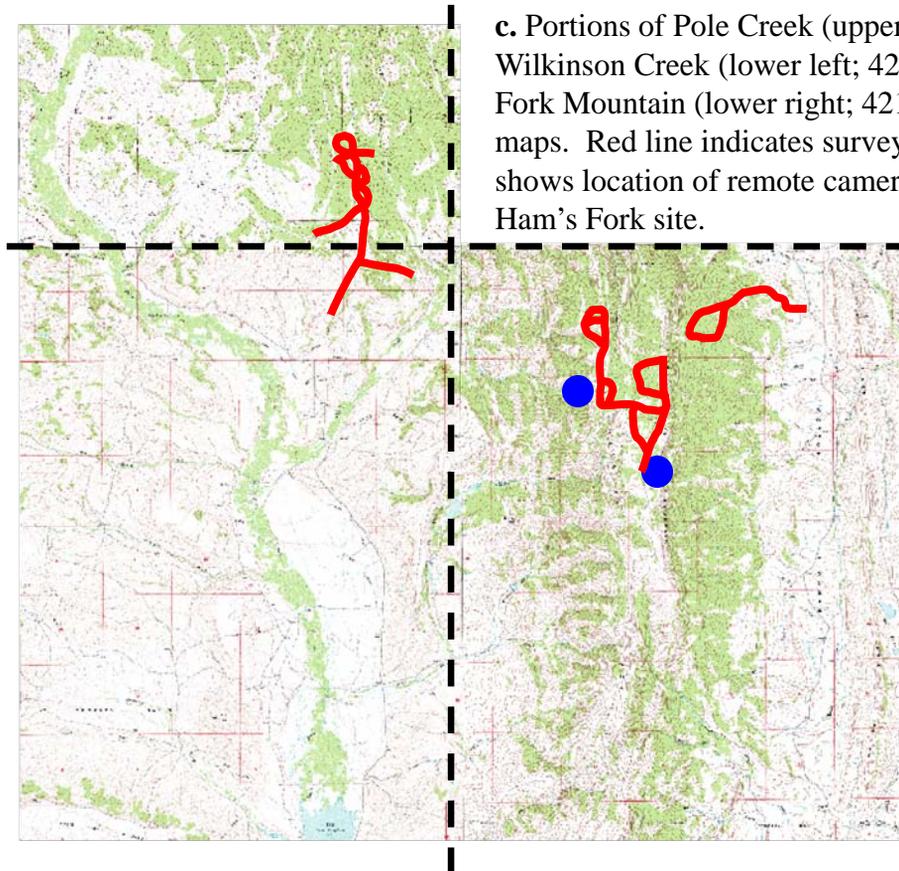
APPENDIX G: HAM'S FORK SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Ham's Fork site.



b. Fontenelle Reservoir (42110a) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the report. Blue arrow shows Ham's Fork site.



c. Portions of Pole Creek (upper; 42110b6), Wilkinson Creek (lower left; 42110a6), and South Fork Mountain (lower right; 42110a5) 1:24K scale maps. Red line indicates survey route, and blue dot shows location of remote camera station, within the Ham's Fork site.

SURVEY DATES: Snow-tracking stint 1: 19 and 20 December 2000
Snow-tracking stint 2: 30 and 31 January, and 1 February, 2001
Remote camera active: 170 days (20 December 2000 - 8 June 2001; camera was reloaded and reset on 1 February 2001 and allowed to run until 8 June 2001)

SURVEY CONDITIONS: Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys. This site appears to receive deeper and more frequent snowfall than most of the others. Tracking conditions here were generally poor, but were better than at all other sites except Scab Creek. Open slopes and ridgetines on this site are subject to high winds, and consequently support very little snow cover.

The remote camera was functional and generated several photographs, including one photograph (G-1, G-2) of an individual *Lynx* spp. at the station on 21 March 2001 (see discussion below).

OBSERVATIONS OF LYNX: One photograph (G-1, G-2) from the remote camera shows an individual felid at the camera station on 21 March 2001. This individual is clearly either a bobcat or lynx. The coat appears to be heavily spotted, and ear tufts are not especially prominent; both of these characters suggest bobcat. The facial ruff is somewhat heavy (compare to bobcat in photograph E-1), possibly suggesting lynx; however, it is reasonable to expect bobcat in winter pelage to show such a ruff. We conclude that this photo is most likely of a bobcat, which is supported by the many bobcat trails recorded at this site during this study.

No observations of lynx were made at this site.

HABITAT OBSERVATIONS:

General - The Ham's Fork site encompasses South Fork Mountain on the southern terminus of Commissary Ridge, which itself lies on the southern terminus of the Overthrust Belt / Wyoming Range in Lincoln County. The site is approximately 32km north of the town of Kemmerer, ranges from 2300 - 2830m in elevation, and slopes generally upward from all sides to the crest of South Fork Mountain. Topography is variable, ranging from steep slopes to gently rolling ridgetops.

Forest cover is naturally fragmented throughout the site, with large areas of shrub-steppe separating forested areas. Forest here can be best described as occurring in broad "stringers" extending down drainages and cool, mesic slopes from the more contiguous forest on USDA Forest Service land to the north. Higher elevations of the site, as well as the east face of South Fork Mountain, support many structurally diverse stands of mid- to late-seral conifers. Although forested areas are typically dominated by lodgepole pine, mixed stands of Engelmann spruce and subalpine fir are locally abundant (Photo G-3, G-5).

Open slopes and ridgetines appear to consistently receive high winds, and consequently support many snow-free patches.

In most respects, habitat at this site is rather similar to that at the Rock Creek site (see Appendix F). However, the snow pack appears to be consistently deeper, and snowfall more frequent, here than at Rock Creek.

Prey: Tracks of snowshoe hare and red squirrel were abundant throughout this site, and were especially common in stands of late-seral conifers (Photo G-3, G-5). Based on track encounters, this site probably had the highest abundance of snowshoe hare of any site surveyed during this project. Red squirrel tracks were almost as abundant here as on Scab Creek. Although not observed during this project, blue grouse likely occupy this site as well. Because of the relatively high coverage of shrub-steppe, species such as desert cottontail and white-tailed jackrabbit may occur in significant densities here.

Competitors: Based on track encounters, bobcat was the most common mammalian carnivore at this site, followed by coyote. Also, as discussed previously, photograph G-1 likely shows a bobcat at the camera station. One mountain lion trail was seen. Red fox were not observed, but may occur along the low-

elevation periphery of this site. Open slopes and ridgelines receive high winds, and thus hold very little snow; these areas may allow generalist carnivores to range into higher elevations than would be possible with heavier snow loads. Because human presence is not especially high here, domestic dogs probably occur at very low frequencies.

Other species: No wolverine, fisher, or American marten were seen here.

Other: Some recent clearcuts were observed (Photo G-4), but the site appears to receive little timber extraction activity. Deciduous shrubs and trees are heavily browsed in this site (Photo G-6). There are many saplings 1 - 2m tall that had developed “medusa heads” on terminal branches and subsequently died. Aspen stands are dominated by mature trees with very little reproduction, and are commonly in the process of converting to conifer overstories. Only a moderate amount of recreational activity was seen.

PHOTOGRAPHS

G-1, 2. Photograph of an individual felid (likely a bobcat) at the camera station on the Ham’s Fork site.

(1)



(2)



G-3. Coarse-woody debris in a late-seral stand of mixed conifers on the Ham's Fork site.



G4. Recent clearcuts on the Ham's Fork site.



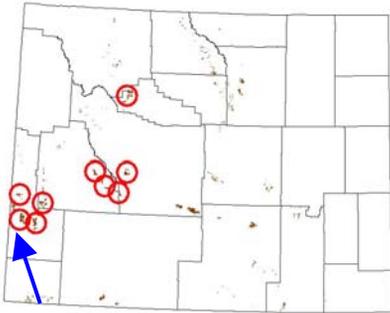
G-5. Late-seral stand of Engelmann spruce and subalpine fir on the Ham's Fork site.



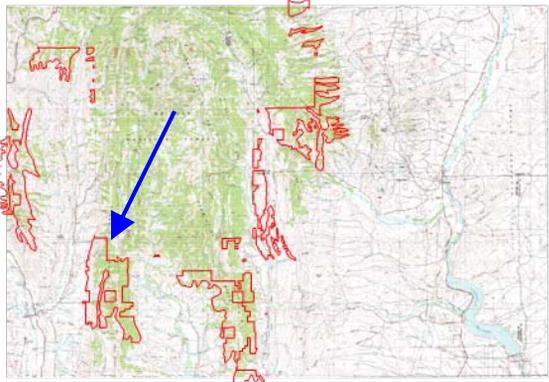
G6. Heavily browsed shrub on the Ham's Fork site. This degree of browsing was common on deciduous shrubs and trees on this site.



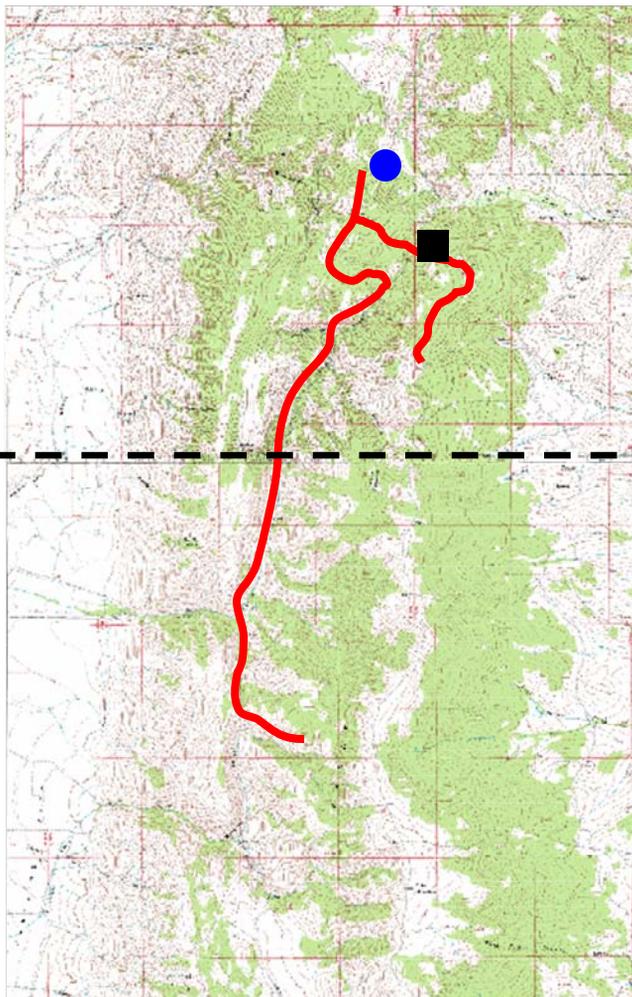
APPENDIX H: PINE CREEK SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Pine Creek site.



b. Fontenelle Reservoir (42110a) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the report. Blue arrow shows Pine Creek site.



c. Portions of Nugent Park (upper; 42110b7) and Sublette Canyon (lower; 42110a7) 1:24K scale maps. Red line indicates survey route, and blue dot shows location of remote camera station, within Pine Creek survey site.

Black square shows location of possible lynx trail documented on 30 January 2000.

SURVEY DATES: Snow-tracking stint 1: 27 and 29 December 1999
Snow-tracking stint 2: 30 January 2000
Remote camera active: 34 days (27 December 1999 - 30 January 2000)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys. Tracking conditions here were adequate, but became poor along the southernmost and easternmost edges of the survey route where wind disturbance was high and snow-free areas were common.

The remote camera station was functional and generated several photographs, but not of target species.

OBSERVATIONS OF LYNX: One possible lynx trail (Photo H-1) was encountered in this area during tracking stint 2 (30 January 2000).

TRACK SET #3 - POSSIBLE LYNX - 30 JANUARY 2000 (PHOTO H-1)

Location: Near the head of Pine Creek, approximately 7.2 km north-northeast of the Pine Creek Ski Area.
LAT 42 09 17 // LONG 110 47 29

Description: Several segments of a trail made by a walking animal were intercepted on a ridgetop dominated by stands of mid-seral lodgepole pine, with occasional aspen inclusions and recent clearcuts. The above location references the point where the first segment was intercepted. Substrate was about 15cm of soft powder, at least 72 hours old, on top of a soft base of old and heavily weathered snow. The trail was made prior to the most recent snowfall, and thus prints were obscured; however, trail segments in protected areas (e.g., dense patches of saplings with high canopy closure) were adequately preserved to allow accurate stride and straddle measurements.

Msrmnts (cm): Stride = 66 / 66 / 67 / 69 / 70 / 72 / 72 / 74 / 74 / 74; mean = 70.4
Straddle = 17 / 18 / 19 / 19 / 19 / 19 / 20 / 20 / 20 / 20; mean = 19.1
Print length = no measurement possible due to snowfall
Print width = no measurement possible due to snowfall

Supporting observations: Trail segments were followed into heavy thickets of saplings and downed trees; the animal repeatedly walked through tight brush and under branches suspended only 50cm above the snow surface without modifying its gait.

HABITAT OBSERVATIONS:

General - The Pine Creek site lies on the southern end of the Tunp Range approximately 12km east of the town of Cokeville, and extends south from the USDA Forest Service (Bridger-Teton National Forest) boundary to the north ends of Dempsey and Rock Creek ridges. It ranges in elevation from 2100 - 2700m, and slopes generally upward from all sides to the main ridge crest. Topography is rather rugged, with an extremely steep mountain face along the west side of the site and incised streams alternating with ridges throughout the remainder.

Forest is naturally fragmented across this site, yet not to the degree seen on the Ham's Fork, Rock Creek, or Water Canyon sites. A moderate amount of clearcutting has occurred here, exacerbating the natural forest fragmentation. Structurally diverse stands of mid- to late-seral conifers are present on slopes and stream bottoms at higher elevations of the site. Although lodgepole pine clearly dominates the composition of most stands, mixed stands of Engelmann spruce and subalpine fir are relatively abundant. Aspen inclusions occur infrequently, and larger streams (such as Pine Creek) support healthy willow communities on their margins.

Prey: Tracks of snowshoe hare and red squirrel were commonly encountered in conifer stands along the entire survey route. Several blue grouse trails were intercepted along the highest 33% of the survey route during both tracking stints. Large herds of ungulates were concentrated on the southern edge of the site, suggesting at least a moderate availability of carrion.

Competitors: In order of track abundance, coyote, bobcat, and mountain lion were recorded on this site. Coyote and mountain lion were clearly more abundant at lower elevations; bobcat trails were documented at higher elevations, but always in close proximity to or following packed snow machine trails. Observations from here and elsewhere suggest that generalist carnivores use packed trails to range into formerly snowbound areas. Wind-scoured slopes and ridgetops on the southern and eastern edges of this site may perform a similar function. Red fox were not observed here, but likely occur at lower elevations. Domestic dogs probably occur at relatively high frequencies near the Pine Creek Ski Area, and possibly at higher elevations in association with skiers and snow machine users.

Other species: No American marten, fisher, or wolverine were observed here.

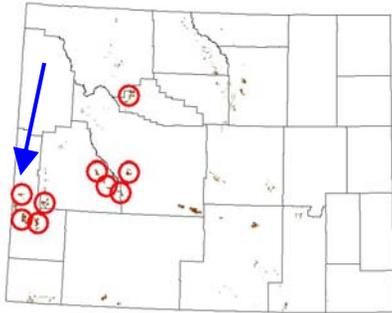
Other: This area has received a moderate to high amount of timber harvest activity, with regenerating clearcuts becoming increasingly common near the USDA Forest Service (Bridger-Teton National Forest) boundary. Much recreational activity occurs here, mostly in the form of on- and off-trail snow machine use. Both designated and user-created trails dissect most of the area.

PHOTOGRAPHS

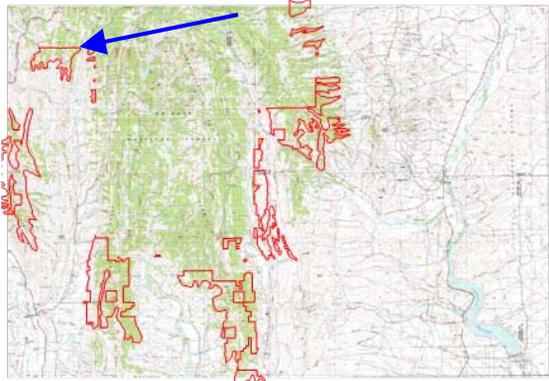
H-1. Possible lynx trail recorded on the Pine Creek site on 30 January 2000. Description and measurements in report text.



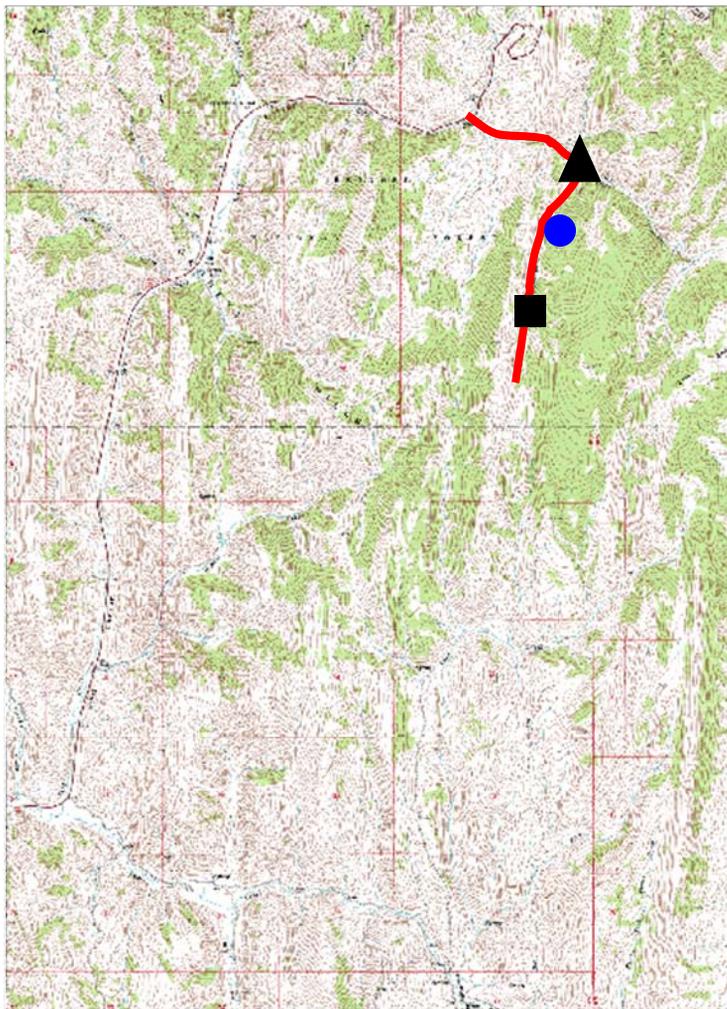
APPENDIX I: WATER CANYON SURVEY SITE



a. State of Wyoming. Dark areas indicate high quality lynx habitat on BLM holdings, as described in the report. Red circles indicate survey sites; blue arrow shows Water Canyon.



b. Fontenelle Reservoir (42110a) 1:100K scale map. Red polygons indicate high quality lynx habitat on BLM holdings, as described in the report. Blue arrow shows Water Canyon site.



c. Salt Flat (42110d8) 1:24K scale map. Red line indicates survey route, and blue dot shows location of remote camera station, just north of the Water Canyon site.

Black triangle is location of probable lynx trail documented 28 December 1999.

Black square is location of possible lynx trail documented on 29 January 2000.

SURVEY DATES: Snow-tracking stint 1: 28 December 1999
Snow-tracking stint 2: 29 January 2000
Remote camera active: 32 days (28 December 1999 - 29 January 2000)

SURVEY CONDITIONS : Snow-tracking conditions were sub-optimal on all survey dates and sites during this project; consistently low snow cover and infrequent snowfall hampered tracking surveys. Tracking and over-snow travel conditions were extremely poor on this site. Of all 9 sites surveyed during this project, only Grass Creek had worse snow conditions. Attempts to access this site from the south were unsuccessful; therefore, access and survey activities were shifted north to the USDA Forest Service (Bridger-Teton National Forest) lands immediately north of the site where snow conditions were much better. We suspect snow-tracking is a more productive technique on this site under more normal precipitation regimes. However, forest cover is naturally patchy across much of this site, leading to significant areas of wind-disturbed and wind-hardened snow. Also, this site sits at a lower elevation than any of the others, likely leading to chronically low snow accumulation. These features will reduce the effectiveness of snow-tracking on this site in general.

The remote camera station was functional and generated several photographs, although not of target species.

OBSERVATIONS OF LYNX: One probable lynx trail (Photo I-1, I-2) was encountered on this site during tracking stint #1 (28 December 1999). One possible lynx trail (Photo I-3, I-4) was encountered on this site during tracking stint #2 (29 January 2000).

TRACK SET #4 - PROBABLE LYNX - 28 DECEMBER 1999 (PHOTO I-1 AND I-2)

Location: In Water Canyon, approximately 2.4km east southeast of Highway 89 and 3.2km northwest of the crest of Pine Knoll. This location is on USDA Forest Service (Bridger-Teton National Forest) land about 3km north of the USDI Bureau of Land Management boundary. LAT 42 29 01 // LONG 110 54 27

Description: Multiple trail segments of a walking animal were intercepted in a willow-dominated stream bottom bordering uplands of sagebrush (north of stream on south-facing slope) and conifer (south of stream on north facing slope) communities. The above location is the point where the first trail segment was intercepted. Substrate varied from very soft, dry snow in conifer stands to hard-packed, crusted snow with much wind disturbance in open areas. No heavy snowfall had occurred on site for at least 15 days prior to this survey. A light snowfall of about 2cm occurred 7 days prior to survey. Trail segments of different ages were observed in the vicinity; the most recent was estimated to be 72 hours old. Most trail segments emerged from snowshoe hare runways in conifer stands to the south and converged on an elk carcass lying in streamside willows. The carcass had been heavily scavenged.

Msrmts (cm): Stride = 58 / 61 / 61 / 64 / 64 / 66 / 66 / 66 / 69 / 69; mean = 64.3
Straddle = 15 / 15 / 15 / 17 / 18 / 18 / 18 / 18 / 20 / 20; mean = 17.4
Print length = 8 / 8 / 8 / 8; mean = 8.0
Print width = 8 / 8 / 8 / 8; mean = 8.0

(Note: print length and width were taken on hard packed surfaces where track penetration was less than 1cm, and thus represent actual foot dimensions)

Supporting observations: Well-formed prints in protected areas showed only indistinct toes and interdigital pads, and were surrounded by a clear halo of disturbed snow caused by heavy fur on the foot. Mountain lion prints in comparable settings were observed about 1.2km away, and showed very crisp toes and interdigital pads. This animal walked for several meters on top of crusted snow that was unable to support more than about 20kg in weight. In softer snow, a distinct trough made by the lower leg was apparent behind tracks only 15cm - 20cm deep, indicating short legs. Urine scent posts with strong feline smell occurred near the scavenged elk carcass, as well as near a piece of elk hide about 200m from the carcass.

TRACK SET #5 - POSSIBLE LYNX - 29 JANUARY 2000 (PHOTO I-3 AND I-4)

Location: At head of Trough Hollow about 2km north of Water Canyon and 2km west of Pine Knoll. LAT 42 27 45 // LONG 110 54 40

Description: Two segments of a trail made by a walking animal were encountered in the bottom of a draw dominated by mid- to late-seral stands of mixed Engelmann spruce and subalpine fir. The above location is the point where the first segment was intercepted. Stands of lodgepole pine, aspen, and small openings were scattered throughout the area. This trail was made before a snowfall of at least 10cm, and thus the prints were obscured; however, trail segments in protected areas (e.g., dense patches of saplings with high canopy closure) were adequately preserved to allow accurate stride and straddle measurements.

Msrmts (cm): Stride = 66 / 66 / 66 / 67 / 67 / 69 / 69 / 69 / 69 / 69; mean = 67.6
Straddle = 15 / 15 / 15 / 15 / 15 / 18 / 18 / 18 / 18 / 19; mean = 16.6
Print length = no measurement possible due to snowfall
Print width = no measurement possible due to snowfall

Supporting observations: Because this trail was filled with snow, it was difficult to follow and thus we were able to collect only minimal supporting data. The animal apparently moved through several stands of tightly packed saplings, and may have traversed a small leaning log only about 7.5cm diameter for several meters.

HABITAT OBSERVATIONS:

General - The Water Canyon site lies on the west slope of the Overthrust Belt in Lincoln County, between the Gannet Hills and Porcupine Ridge. It ranges from 2100 - 2500m in elevation, and slopes generally upward from south to north. Topography is essentially rolling hills, with very steep slopes occurring only occasionally.

Forest cover on this site is naturally fragmented, with large areas of shrub-steppe interspersed between forested ridges and slopes. This fragmentation is especially severe at low elevations on the southern edge of the site. Lodgepole pine is the predominant forest type, with mixed stands of Engelmann spruce and subalpine fir occurring in cooler and more mesic areas. Mid- to late-seral stands with diverse physical structure occur along Trough Hollow, and presumably also in other areas of the site. Aspen stands occur very infrequently. Major streams, such as the Water Canyon drainage, support healthy margins of willows.

Lower elevations of this site are extremely dry, subject to persistent and high winds, and essentially untrackable. However, snow depth increases rapidly with elevation, and higher elevations of the site along the USDA Forest Service (Bridger-Teton National Forest) boundary support a relatively deep snow pack.

Prey: Both snowshoe hare and red squirrel tracks were frequently encountered in conifer stands, and snowshoe hare trails commonly extended into streamside willow communities. Blue grouse were not observed, but likely occupy this site. Ungulate tracks were common, suggesting at least a moderate availability of carrion. This is supported by the presence of an elk carcass being scavenged by the probable lynx in Water Canyon.

Competitors: Coyote, mountain lion, and bobcat trails were observed on this site, but were unexpectedly rare; we suspect these carnivores are more abundant to the south in lower and more open country. Relatively deep and contiguous snow cover, and a lack of packed roads and trails, may preclude generalist carnivores from using higher elevations of this site. Because of the relative lack of human presence here in winter, domestic dogs probably occur only occasionally.

Other species: No significant observations; American marten, wolverine, and fisher were not observed here.

Other: At higher elevations of this site, we observed very little timber extraction activity and recreational use. At lower elevations to the south, snow machine use is apparently somewhat higher, but the lack of harvestable timber likely precludes much timber extraction.

PHOTOGRAPHS

I-1, 2. Probable trail of lynx recorded on the Water Canyon site on 28 December 1999. Description and measurements in report text.

(1)



(2)



I-3, 4. Possible trail of a lynx recorded on the Water Canyon site on 29 January 2000. Description and measurements in report text.

(3)



(4)



The 2 digital themes in this folder, BLMLYNX and STATELYNX, accompany the report:

Beauvais, G.P., D. Keinath, and J. Ratner. 2001. Habitat mapping and field surveys for lynx (*Lynx canadensis*) on lands administered by the USDI-Bureau of Land Management in Wyoming. Unpublished report prepared for the USDI Bureau of Land Management-Wyoming State Office by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.

Details of theme construction and application are described in this report. Both themes were constructed in the ArcView (Environmental Systems Research Institute, Redlands, California) geographic information system, using version 3.1 originally with additional modifications using version 3.2.

Each theme is in a Universal Transverse Mercator (Zone 12) projection.

Relevant fields in the data tables of each theme include:

- Primary* - code associated with the primary land cover type in a given polygon.
- Secondary* - code associated with the secondary land cover type in a given polygon.
- Other* - code associated with the tertiary (if applicable) cover type in a given polygon.
- Prim_perce* - percent of a given polygon covered by its primary land cover type.
- Sec_percen* - percent of a given polygon covered by its secondary land cover type.
- Oth_per* - percent of a given polygon covered by its tertiary (if applicable) land cover type.
- Priscor* - lynx habitat suitability score of the primary land cover type, as described in the report.
- Secscor* - lynx habitat suitability score of the secondary land cover type, as described in the report.
- Othscor* - lynx habitat suitability score of the tertiary (if applicable) land cover type, as described in the report.
- Index* - final index of lynx habitat suitability for a given polygon, as described in the report.