ENDEAVOR WILDLIFE RESEARCH FOUNDATION

THE GREATER YELLOWSTONE LYNX STUDY
2004/2005 ANNUAL REPORT

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Introduction

In 2000, the Canada lynx was federally listed as a threatened species in the conterminous U.S., primarily because national forest plans lacked adequate regulatory mechanisms to protect the species (U.S. Fish and Wildlife Service 2000). During the winter of 2003/04, biologists found probable lynx tracks on the Bridger-Teton National Forest on three occasions (N. Berg, B. Gathercole, and S. Patla, pers. obs). Due to potential implications of lynx presence or absence in existing habitats, it was critical that further study of this forest carnivore be conducted to assess its current status in the southern portion of the Greater Yellowstone Ecosystem (GYE).

Many find the Canada lynx (*Lynx canadensis)* to be of particular interest due to its secretiveness, life history association with snowshoe hares, and unique morphological adaptations. The elusive Canada lynx is an indicator of human impacts on habitat due to its limited distribution in the contiguous 48 states and specific association with boreal forests, deep snow, and snowshoe hares (Murphy et al. 2004). Assessing the presence of lynx is an essential part of determining the health of the southern GYE (Zielinski and Kucera 1995).

Lynx were present in Wyoming both prehistorically (Kurten and Anderson 1980) and historically (Reeve et al. 1986, McKelvey et al. 2000). Lynx presence was last documented in the Wyoming Range in 2001 (Squires et al. 2003), and in Yellowstone National Park in 2004 (Murphy et al. 2004). Lynx populations may have recently declined in the Wyoming Range based on fewer track observations (B. Oakleaf pers. obs). No evidence of lynx was found during winter 2002 in the Wyoming Range (Squires et al. 2003), leading some to question whether this threatened species still remained on the Bridger-Teton National Forest (B-TNF).

Inventory data are essential to avoid adverse effects of potential forest management actions. We formally initiated the Canada lynx survey on the B-TNF during winter 2004/05, in order to provide decision-makers with up to date knowledge concerning this species in this region. We hope to support joint conservation planning efforts among federal and state agencies.

Study Objective

The primary objective of the survey is to document the occurrence, distribution, and demographic characteristics of lynx in the B-TNF 2004-2008. A second objective is to combine information from past lynx research with our current data to further design and evaluate a standardized survey methodology that will be applicable in future surveys elsewhere in the Yellowstone Ecosystem. A third objective is to use this initial study to determine whether a future capture effort is feasible and/or needed.

Methods

We patterned the methods for our preliminary 2004/05 winter tracking survey after those developed for the Yellowstone National Park Lynx Project (Murphy et al. 2004). The methods listed below will be adjusted and more thoroughly executed in future winters as we learn more about our study area and its specific survey needs and requirements. Rather than attempt to apportion survey efforts equally throughout the study area, we focused on areas of recent lynx sighting reports, prime potential habitat (PPH), and past research in the study area conducted by Wyoming Game and Fish Department (WGFD) and the USFS Rocky Mountain Research Station (RMRS).

Identifying Prime Lynx Habitat---We used GIS-based analysis and scientific literature (Sullivan and Sullivan 1988, Koehler 1990, Mowat et al. 2000, and others) to identify habitats such as spruce-fir (*Picea engelmannii*, *Abes lasiocarpa*), lodgepole pine (*Pinus contorta*), and moist Douglas fir (*Pseudotsuga menziesii*) forests which have the highest potential to support snowshoe hares and lynx. Our snow tracking, hair-snare, and prey-based surveys were concentrated in these PPHs.

Ski-based snow tracking surveys---We documented Canada lynx while skiing on transect lines in search of tracks, bed sites, hairs, and scats. The starting locations of snow-tracking surveys in PPH were based on their accessibility to highways, snowmobile or ski trails and the absence of avalanche hazards.

Surveys were classed as "formal" or "informal," based on the timing of recent snowfall and type of data that were collected. Formal data collected included records of tracks left by Canada lynx, tracks of lynx prey (e.g., snowshoe hares), cover types, and snow tracking conditions encountered along transect segments. Formal surveys were conducted at least 12 hours after a snowfall, but only tracks left within the last 24 hours of the survey were tallied. The 12-hour rule provided for at least some tracks to accumulate following the last snowfall. The 24-hour rule ensured that counts would be limited to a short, standardized time period. Informal surveys were conducted when the 12-hour rule precluded a formal survey or when we prioritized transect distance over detailed survey data. During the winter of 2004/05, we primarily conducted informal surveys to maximize search efforts in areas where lynx tracks were found during the previous winter.

Snowmobile-based snow tracking surveys---To greatly increase snow tracking effort, we often used snowmobiles to conduct formal and informal surveys off and along groomed trails, similar to the technique used in YNP to monitor Canada lynx (K. Murphy, pers. comm.).

Air-based snow tracking surveys---We also surveyed remote PPHs for Canada lynx tracks using an airplane, a technique successfully used to monitor populations in YNP (Murphy et al. 2004). One flight occurred at least 24 hours after a new snowfall, mostly

in an area that was too remote to visit on skis. The aircrew consisted of a pilot and two experienced observers.

Documenting carnivore sign---Catalog information such as Universal Transverse Mercator (UTM) location, time, habitat characteristics, and weather and snow conditions were recorded where rare carnivore sign was encountered. We documented tracks of rare carnivores using measurements, plaster casts, and/or photographs. We also collected hairs along tracks and from bed sites and stored them in vials with desiccant for DNA-based identification following Mills et al. (2000) at the Carnivore Conservation Genetics Laboratory, University of Montana, Missoula. Scats were collected, dried at room temperature, and sent to the genetics lab for testing. The reliability of rare carnivore tracks was rated as "definite" if the species' identity was verified by DNA tests and all gait patterns and print measurements were supportive of Canada lynx presence; "probable" when nearly all gaits and prints were supportive, but some aspects of tracks were non-interpretable and/or non-supportive (no useable DNA); and "possible" when most interpretable evidence suggested Canada lynx presence, but details of prints or gait patterns were consistently unclear (no DNA).

Track identification training---Project personnel and volunteers participating in snow tracking surveys received twelve hours of classroom training and 6 hours of field training from Dr. James Halfpenny in December 2004, on the identification and documentation of Canada lynx sign and data collection procedures. In January, EWR provided a hands-on training course on Canada lynx track identification and field protocol to all participating parties.

Camera-based detection of forest carnivores---During winter 2004/05, we deployed three camera stations at opportunistically chosen sites in the Togwotee Pass and Wyoming Range/Hoback Rim sectors to detect rare carnivores and to evaluate the potential for future camera use. Stations contained hair-snares (see below), a visual attractant (pie plates), and scent lure (beaver castorium, catnip). Cameras were triggered when animals interrupted an infrared beam near ground level. We re-checked the stations at 2-4 week intervals to collect hairs from the hair-snares, to collect and replace film in cameras, and to look for rare carnivore tracks.

Hair-snare surveys---To detect Canada lynx presence we deployed one "subjective" transect during winter 2004/05 in the Wyoming Range/Hoback Rim sector following National Lynx Detection Protocol (NLDP) (McKelvey et al. 1999) guidelines for snare and attractant materials, but deviated with respect to the number and spacing between stations. Transect and station sites were chosen subjectively based on vegetation, topography, and logistical constraints and were deployed for four weeks.

Canada lynx sightings and follow-up investigations of tracks---We developed and distributed an information poster for the B-TNF and elsewhere describing lynx appearance and track characteristics. We also had articles printed in local newspapers and interviews with area radio stations in order to request and obtain reports of Canada lynx sightings. We investigated these reports by reviewing sighting records, interviewing

individuals, and where possible, visiting locations where tracks and sightings occurred and documenting the tracks ourselves.

Results

Ski-based snow tracking effort---During winter 2004/05, we completed 13 formal snow tracking surveys ranging from 0.4-8 miles in length, totaling approximately 26 miles; and 27 informal surveys ranging from 0.4-10 miles in length, totaling approximately 110 miles. Surveys focused on PPH and occurred under non-crusted snow conditions that consistently revealed animal tracks. Combined formal and informal data surveys totaled 136 miles.

Snowmobile-based snow tracking effort---During winter 2004/05, we completed 3 formal snow tracking surveys ranging from 2-16 miles in length, totaling approximately 20 miles; and 105 informal surveys totaling approximately 3,200 miles. Informal snowmobile-based snow tracking allowed us to survey relatively large geographic areas in a short period of time. This method proved to be the most effective means of detecting Canada lynx during our first field season.

Aircraft-based snow tracking effort---We completed one snow tracking survey in an airplane, totaling approximately 60 miles. This aerial survey occurred in the Togwotee Pass, Wind River, and Gros Ventre forest sectors.

Camera-based detection effort---During winter 2004/05, we deployed 3 camera stations for 180 total camera nights along trails and roads in the Togwotee Pass and Wyoming Range/Hoback Rim sectors. We detected snowshoe hare, marten, and moose. A set of lynx tracks traveled directly towards and came within 15 meters of one camera station before abruptly changing course, perhaps to avoid the area.

Hair-snare-based detection effort---We deployed and revisited 1 "subjective" transect (6 stations) in the Wyoming Range/Hoback Rim sector during winter 2004/05. We collected one hair sample, which did not amplify to species. Our hair-snare effort was very limited and deviated from standard NLDP.

Canada lynx detections---We made four probable Canada lynx detections during winter 2003/04. Tracks were found twice in the Gros Ventre sector, once in the Togwotee Pass sector, and the tracks of a possible female with two kittens in the Wyoming Range/Hoback Rim sector. Based on track, stride, and straddle measurements and geographic location we suspect that 4-5 Canada lynx were detected during winter 2003/04.

During winter 2004/05, we made twelve definite (DNA-based) Canada lynx detections; seven detections were in the Togwotee Pass sector, four were in the Wyoming Range/Hoback Rim sector, and one was in the Wind River sector. Of the twelve definite (DNA-based) Canada lynx detections, six samples amplified to two unique Wyoming individuals. One male lynx (YNP/FlagstaffM1) was documented on three occasions

(12/20/04, 3/19/05 and 3/23/05) in the Togwotee Pass sector. A second male lynx (WyomingRangeM1) was documented on two occasions (3/4/05 and 3/5/05) in the Wyoming Range/Hoback Rim sector and a third time (3/23/05) in the Wind River Sector.

Of the remaining six definite (DNA-based) Canada lynx detections that did not amplify to individual, we suspect three may have been YNP/Flagstaff M1 and one may have been WyomingRangeM1 based on location, dates where samples were collected, and track measurements. Based on track, stride, and straddle measurements we suspect that the remaining two definite (DNA-based) detections represented 1-2 separate individuals in the Wyoming Range/Hoback Rim sector. This puts the total number of DNA detected individuals at 2-4 during winter 2004/05.

In addition to the twelve definite (DNA-based) detections that were made winter 2004/05 on the B-TNF and Shoshone National Forest (SNF), we also documented eight probable lynx tracks and two possible lynx tracks in the Togwotee Pass sector, one probable lynx track and one possible lynx track in the Wyoming Range/Hoback Rim sector, and one possible lynx track in the Gros Ventre sector. Based on locations and track measurements, we suspect these thirteen additional track (not DNA-based) detections represent 1-3 additional lynx (1-2 in the Togwotee Pass sector, and 1 in the Gros Ventre sector).

We conclude that 2-7 individuals are represented in the 25 combined DNA-and non-DNA-based Canada lynx track detections recorded during winter 2004/05. We strongly believe there were at least 2 lynx in the Togwotee Pass sector and 2 lynx in the Wyoming Range/Hoback Rim sector. One of the lynx from the Wyoming Range/Hoback Rim sector also spent time in the Wind River sector.

Canada lynx food habits---During several backtracking occasions we found prey killed and consumed by lynx, including five snowshoe hares, four red squirrels, one grouse, one weasel, and one mouse.

Detection of prey and other carnivores---Snowshoe hares, red squirrels, American marten, coyotes, and weasels were commonly encountered on snow tracking surveys. Encounter rates for snowshoe hares and red squirrels appeared highest in the Wyoming Range/Hoback Rim and Togwotee Pass sectors of the forest. However, high prey encounter rates were also documented in certain locations in the Wind River, Salt River, and Gros Ventre sectors. Snowshoe hare activity in the drainages west of Merna Junction in the Wyoming Range/Hoback Rim appeared to be particularly high. On multiple occasions we documented young lodgepole pine saplings completely girdled by snowshoe hares, possibly indicating peak population densities (K. Hodges, pers. comm.).

It appeared to us that the forest structure in the Wyoming Range/Hoback Rim sector might be somewhat unique when compared to other sectors on the B-TNF. The Wyoming Range appears to have a larger sub-alpine fir component, with perhaps a thicker understory than the other forest sectors. Future efforts will document differences

in forest type, age, and structure as well as preferred snowshoe hare and lynx habitat on the B-TNF.

Using snow tracking and other methods, we detected nearly all small, medium, and large carnivores known to occur in the B-TNF, including wolverines, grey wolves, grizzly bears, black bears, bobcats, otters, and cougars.

Canada lynx sightings and follow-up investigations of tracks---We interviewed eleven persons and made three field excursions to verify reports of Canada lynx or their tracks. A total of seven interviews (cougar hunter, Canadian trapper, bobcat trapper, wolverine tracker, photographer/backcountry skier, Buffalo Valley resident, and B-TNF snow ranger) convinced us they had likely observed Canada lynx and/or their tracks. In the remaining cases, animal descriptions provided by observers were consistent with characteristics of Canada lynx or bobcat. Interestingly, five of the seven likely sightings were observed in areas where we also documented Canada lynx during 2003/04 and/or 2004/05.

Long distance movements---We documented two long distance movements during 2004/05 through DNA based techniques used at the RMRS Carnivore Genetics Laboratory in Missoula, MT (M. Shwartz, pers. comm.). We detected male lynx YNP/FlagstaffM1 in the Togwotee Pass sector on 12/20/05. This same male lynx was detected on 01/13/04 by the Yellowstone National Park Lynx Project on the east side of Yellowstone Lake (Murphy et al. 2004). The detections of YNP/FlagstaffM1 were eleven months and approximately 50 straight-line miles apart. We detected male lynx WyomingRangeM1 in the Wyoming Range/Hoback Rim sector on 03/04/05. This same male lynx was detected on 03/23/05 in the Wind River sector in the Shoshone National Forest, approximately 50 miles from the first location.

To the best of our knowledge, both YNP/FlagstaffM1 and WyomingRangeM1 represent lynx unique to the Greater Yellowstone Ecosystem. Though the database is not complete, current records suggest these two animals are not associated with the Colorado lynx reintroduction efforts (M. Schwartz, pers. comm.).

Potential Corridors---A collared male lynx crossed Highway 287 multiple times during multiple years (Squires et al. 2003), possibly in the same or similar area near Togwotee Pass each time; this area is relatively close to some of YNP/FlagstaffM1's detection locations. Likewise, WyomingRangeM1's 2004/05 winter locations were relatively close to an area where the above-mentioned collared lynx may have crossed Highway 189/191 near Hoback Rim. The vegetation that defines both the Togwotee Pass and Hoback Rim areas is mostly forested and differs sharply from the surrounding sagebrush/grassland habitats. We would like to further investigate common characteristics, if any, that determine where lynx choose to cross roads.

Conclusions and Recommendations

Canada lynx were positively (DNA-based) detected in three of the five identified forest sectors within our study area during winter 2004/05. In addition to DNA-based detections, probable Canada lynx tracks were located on four of the five identified forest sectors. Despite the relatively wide distribution of Canada lynx tracks within our study area, these detections likely only represented 2-7 individual lynx. The relatively low density of lynx detected is not surprising for a species near the southern periphery of its continental range. However, these detections are an important addition to an ever-enlarging database of Canada lynx presence in the GYE. Winter 2004/05 was a preliminary field season. Our ability to adequately survey the five identified forest sectors on the B-TNF that fall within our study area was limited by weather, insufficient time, lack of suitable equipment (snowmobiles, trucks, and trailers), and limited funding.

In the future, with increased support, we will broaden and strengthen our efforts on the B-TNF. We will continue our snow tracking effort as outlined above but also include more consistent predator, prey, and habitat structure data relating to Canada lynx persistence. This increased scope will add depth to our findings in future years. We desire to provide B-TNF and other agencies and organizations with solid up-to-date research on how they might best manage for Canada lynx persistence in the SGYE over the long-term. Our research has and will continue to provide guidance as to which habitats may be the most critical for the long-term conservation of lynx on the B-TNF.

This preliminary study found that Canada lynx could be consistently located during the winter months on the B-TNF using non-invasive techniques. Our limited knowledge of Canada lynx in the Yellowstone Ecosystem has the potential to increase dramatically with the initiation of a proposed telemetry-based study in the B-TNF. The information obtained will provide invaluable guidance to highway engineers and oil and gas interests, as well as forest managers who develop silvicultural and fire management prescriptions.

We recommend that lynx/coyote research be initiated to better understand and document potential competition between these two species, particularly with respect to winter recreation. We also recommend that lynx/snowshoe hare research be initiated to document trends in snowshoe hare abundance, distribution, habitat preferences, and functional relationships with the Canada lynx.

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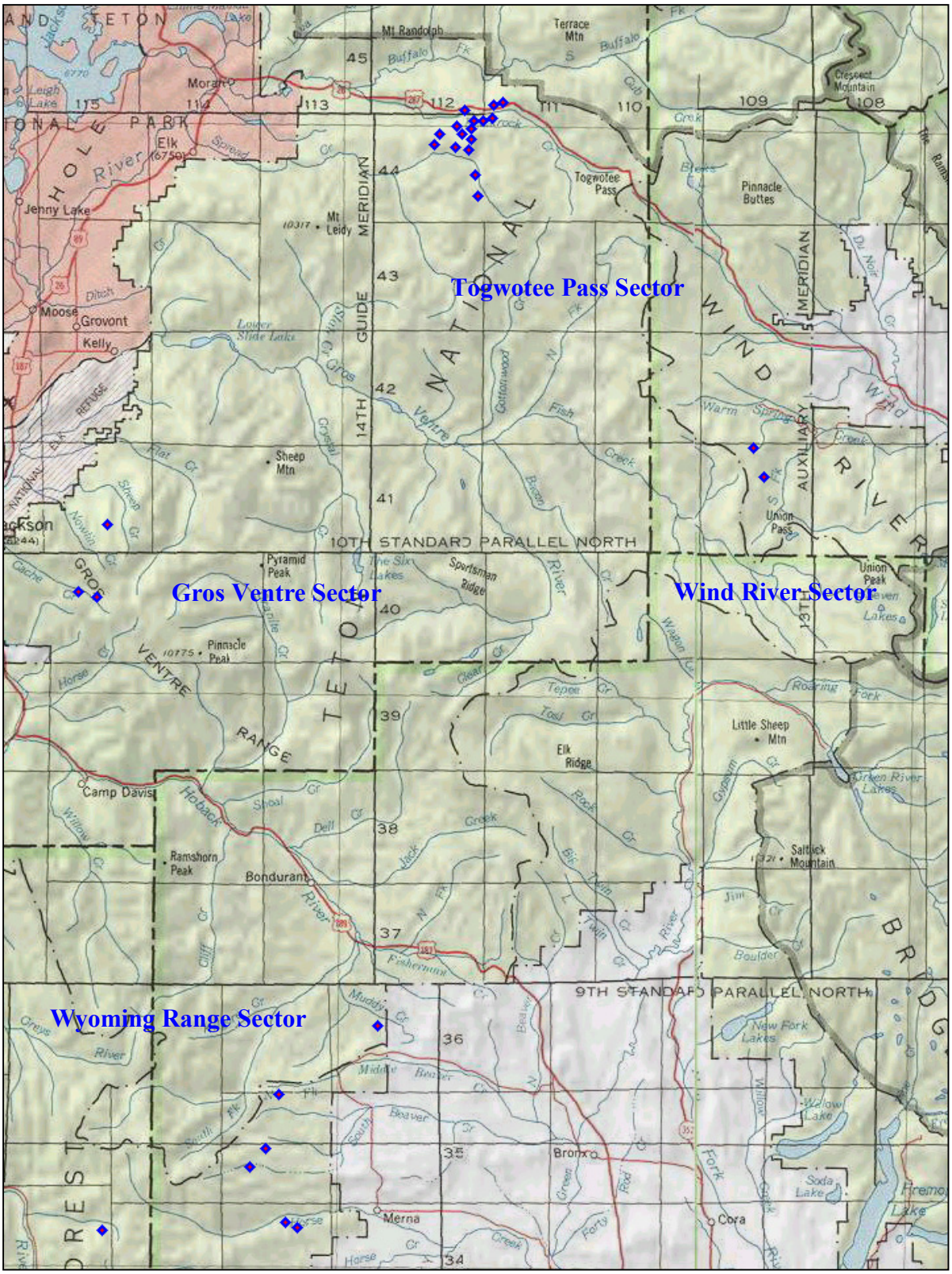

Figure 1. Jan 2004 – June 2005 Bridger-Teton National Forest Canada lynx track locations.