PROGRESS REPORT
WOLVERINE ECOLOGY AND HABITAT USE IN CENTRAL IDAHO

BY

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ABSTRACT

We surveyed for wolverines (Gulo gulo) from January-April 1992 on or adjacent to the Sawtooth National Recreation Area (SNRA). We used live-trapping, snow-tracking, bait stations, and infrared automated camera systems. Live-trapping resulted in the capture of three individual wolverines. Study animals were fitted with radio-transmitter collars and/or intraperitoneal implant transmitters and tracked weekly. Bait stations, combined with infrared camera systems and snow-tracking, proved valuable in detecting wolverine presence and identifying three additional wolverines. Preliminary data suggest that implant transmitters may provide a suitable alternative to radio collars for wolverine.

INTRODUCTION

The wolverine is listed by the U. S. Forest Service as a Sensitive Species, by the Idaho Department of Fish and Game as a Species of Special Concern, and is a federal candidate species for Threatened and Endangered status (Moseley and Groves 1992). Classification as such, is primarily a result of insufficient data concerning this animal's distribution and management needs. Until recently, historical reports and recent sightings provided the only insight regarding the wolverine's local status. This information provided a basis for surveys aimed at better describing wolverine occurrence and distribution throughout Idaho. In 1985, Groves (1987) conducted a statewide mailing survey using a questionnaire requesting information regarding wolverine sightings. As a result, the highest number of confirmed and probable sightings centered around the SNRA/Smoky Mountain complex on the Sawtooth National Forest (SNF). In 1989 and 1990, winter field surveys (Groves and Gadwa 1989; Bachman et al. 1990) were conducted to document occurrence of wolverines in this area. These surveys documented wolverine presence which pointed to the need for further investigation.

As a result of these surveys, a wolverine study was initiated in 1992. The primary objectives of this study (see prospectus, attachment 1) are to: 1) determine wolverine population size, density, and characteristics, 2) determine annual and seasonal home range size, 3) document characteristics of habitat use, and 4) develop management recommendations. Our

goal for this past field season was to test various techniques for surveying, trapping, and radio-marking wolverines. Information from this preliminary effort will allow us to develop a detailed study plan during summer 1992 based on knowledge gained from our effort to date. The purpose of this report is to summarize results from this pilot study conducted from January-April 1992.

STUDY AREA

Our efforts this winter were focused primarily on those areas proximate to baiting and trapping operations. Survey work outside these areas transpired during aerial survey and telemetry flights. Baiting and trapping occurred on and adjacent to the SNRA within the Sawtooth, Challis (CNF), and Boise (BNF) National Forests. Trapping on the CNF occurred in the Beaver Creek, Bear Creek, and Cape Horn Creek drainages west of Stanley, Idaho. Trapping on the BNF was confined to the Fir Creek drainage. On the SNF trapping occurred in the Beaver Creek drainage in the upper Sawtooth Valley. Baiting activity was much more extensive, involving many drainages on all three forests (Table 1).

METHODS

Transportation throughout the study area was accomplished by snowmachine, snowshoes, and skis. A Maule M-5 fixed wing aircraft was used for aerial surveys and radio-telemetry. Directional H-antennae mounted on each wing strut and an additional 4-element yagi antennae facilitated the aerial radio-telemetry.

Road-killed deer and elk carcasses were used as bait. Snowmachines were used to transport baits to selected sites where previous wolverine occurrence had been documented (Bachman et al. 1990; Groves and Gadwa 1989; Gadwa, pers. comm.). A bait site usually consisted of no less than one deer carcass placed on the snow or hung in trees. We checked baits as time and snow conditions allowed and noted presence or absence of scavenger visits. Forty-five gallon barrel live-traps were placed at selected sites along snowmachine trails in drainages where wolverine activity was noted near bait sites. Traps were baited with road-killed deer and elk, beaver, and fish. Various commercial trapping scents were used as attractors. Traps were checked at least once during each 48-h period and daily if a wolverine was noted working the area. A squeeze chute was designed and built as per specifications from Hornocker and Hash (pers. comm.) to facilitate immobilization and handling of captured wolverines. The chute attached to the door end of the barrel trap.

The trapped wolverine was coaxed into the darkened squeeze

chute and the movable top was lowered onto the animal, thereby immobilizing it until anesthetization was complete. Captured wolverines were eartagged, lip-tattooed, aged, sexed, measured, weighed, and photographed. Each was fitted with a radio-transmitter collar and/or intraperitoneal implant transmitter (150-154 mhz. Telonics, Mesa, AZ). Transmitter collars were either 3-mode configuration, fitted with a mercury tip-switch activity sensor (useful in monitoring activity cycles, pulse rate = 60/sec. active, 90/sec. inactive) and mortality sensor (pulse rate = 110/sec.), or 2-mode with single pulse rate transmitter and mortality sensor. Animals fitted with activity sensor transmitters will be remotely monitored during selected periods to document activity patterns. We chose to have implant transmitters only on a single pulse rate (40/sec.) to decrease weight and increase battery life.

Our interest in using implant transmitters was necessitated by two factors: 1) morphological and behavioral characteristics of the wolverine (M. G. Hornocker, pers. comm.) often effect loss and shortened life of radio-transmitter collars, and 2) the probable occurrence of study animals within wilderness (Sawtooth Wilderness, Frank Church River-of-No-Return-Wilderness). Forest Service wilderness management guidelines acknowledge wildlife research within wilderness areas, but encourage low-profile techniques consistent with wilderness precepts. Implant transmitters may eliminate the need for highly visible transmitter collars.

Implant transmitters do have limitations in terms of transmitting range due to shortened antennae length. To test the feasibility of implant transmitters we will systematically compare transmitting range of implant vs. collar transmitters during weekly radio telemetry flights. Study animals fitted with both transmitter collars and implants will serve as test animals. A pre-selected, GPS (Global Positioning System) location, at an above-sea level altitude of 10,000 ft, will serve as the aircraft beginning point. Implant and collar frequencies will be scanned as the aircraft flies straight-line, on a GPS heading, toward the animal's last known location point. If no signal is received prior to reaching that point, the aircraft will circle in ever-increasing radius circles away from that point until reception is made. Once the implant frequency is received, that location point will be documented. When the study animal is located, the two points can be used to calculate the straight-line distance from which the implant signal was received.

Captured pine martens (Martes americana) were sexed, eartagged, and released (9 marten were captured and translocated to South Dakota as part of an interstate exchange program). Other species captured (Table 2) were released. Evidence of other mammal species along the trap lines and any birds associated with the traps or baits were documented (Table 3).

Documenting wolverine presence using remote cameras was tested by Bachman et al. (1990). Their success suggested continued use and testing of this technique. The Manley system,

which uses an infrared/motion detector integrated with an automatic rewind 35mm camera housed in an ammo can, was established at several bait and trap sites (Table 4). The camera systems were mounted in trees within 5 meters of baits. Ektachrome ASA 200, 36-exposure film was used. Cameras were checked daily at trap sites and weekly at bait sites (Table 4).

As time allowed, we followed tracks of individual wolverines to obtain scat samples, document scent-marking, and observe use of different habitats. Banci (1987) described individual non-instrumented wolverines and their home ranges by noting size and morphological variation in tracks. We felt that wolverine track and stride characteristics may provide a means of aiding in the identification of individuals. To test for variation between individuals, we measured front foot length and width, stride length (tip of claw marks on forward most foot to tip of heel of rearward most foot), and inter-stride length (distance between stride groups). Any morphological characteristics such as missing digits, foot damage, or foot drag was noted. Sample measurements were taken only on smooth, level surfaces.

RESULTS AND DISCUSSION

Baiting/Trapping

Twenty-eight bait stations were set on the Sawtooth, Challis, and Boise National Forests (Table 1). Twelve of the 28 baits had confirmed wolverine visits. Several baits were difficult to access and monitor routinely due to weather

conditions. Wolverine visits could not be confirmed or discounted at these sites.

On all but one occasion, we found that once a wolverine discovered a bait, the individual would continue to revisit that site. In most cases, each wolverine visit at a bait lasted little more than one day. Track and remote camera data suggested that one wolverine in the Beaver Creek (CNF) drainage visited a bait site 8 times over a 45-d period. This animal's return to a bait site was not predictable other than it did appear to be influenced by weather. Wolverine activity usually ceased during stormy weather and increased with cold, clear weather. The exception to multiple visits was a bait in Elk Creek (SNF) which was visited only once by a wolverine.

Our findings of the wolverine's acute sense of smell and affinity to carrion bait sites is consistent with Hornocker and Hash (1981). Backtracking wolverines from bait and trap sites showed these animals had sometimes traveled several kilometers, virtually straight-line, to the bait sites. These preliminary data suggest that baiting could be an effective survey technique for wolverines.

A total of 823 trap nights was expended in the capture of three individual wolverines (Table 5). The first animal, a female (F502), was captured on February 4 in Feltham Creek (CNF). On March 12, an adult female (F822), was trapped in Beaver Creek (SNF). The third animal, also an adult female (F602), was captured on Fir Creek Summit (BNF) on March 28. All were fitted

with radio-transmitter collars. The third individual also received a peritoneal implant transmitter. The Feltham Creek wolverine dropped her collar after one week. Movements of the remaining two animals are being tracked weekly. Neither of the wolverines presently instrumented appear to have produced a litter of kits this year.

Snow-tracking of both known and unknown individuals provided opportunity to collect scats and document scent-marking. Approximately 20 scats were collected, air-dried and stored for future analysis. Searches were made for scent marks as described by Koehler et al. (1980). Although wolverines scent-mark with a variety of odorous substances, urine appeared to be the most common effluvia associated with scent-marking. Documentation of direct observation of marking behavior and resultant responsiveness to scent marks by individuals is limited. Further study of this behavioral trait may prove valuable in terms of understanding population characteristics.

Wolverine stride measurements were collected at every opportunity. The wolverine appears to prefer the characteristic mustelid 4-print loping gate (Forrest and Casey 1988) on firm to medium depth snow on level surfaces. We found this to be the most commonly encountered track pattern. These data have yet to be analyzed for individual variation. Snow track measurements were taken of known individuals for comparison with previous and subsequent track encounters. These measurements, combined with temporal spacing of track encounters, suggested the presence of

two individual wolverines not identified by live-trapping or remote cameras: one individual in Beaver Creek (SNF, e671500, n4859730) on March 8, and one in Elk Creek (SNF, e652930, n4905020) on approximately the same date.

Remote Cameras

Forty-five camera nights resulted in 23 photographs of three individual wolverines (Table 4). A remote camera set on a bait site in Beaver Creek (CNF), which had been visited multiple times by what we thought was one wolverine, revealed two individuals using the bait. One of these individuals (designated M12) is a very large wolverine with white front feet. This animal's large body size and correspondingly large track suggest it is probably a male. Although we photographed this wolverine numerous times at two camera sites, we were unable to capture it. The second individual photographed at this site displayed pelage traits consistent with F502. A camera set on a bait site in Fir Creek (BNF), 15 miles to the west, produced photos of M12 and F602 subsequent to her capture.

Our preliminary findings suggest that these cameras, in conjunction with bait stations, are a cost-effective and efficient means to document occurrence of wolverines. They are easy to set up and require little attention or maintenance, other than changing batteries about every 3 weeks. This system provides photo clarity more than adequate for identifying individual wolverines. Combined with snow-tracking data, this

system should enhance our ability to map wolverine movements, and aid in identifying residency status of non-radioed individuals. By combining radio-tracking data with information on wolverine visits to camera-equipped bait stations, we will be evaluating the effectiveness of these cameras as a population monitoring technique.

Aerial surveys

Informal aerial track searches were conducted in conjunction with telemetry flights in the upper South Fork Boise River, the South Fork Payette River, and in the White Clouds area. Track surveys were attempted if the associated telemetry flight occurred within 72 h of a snowstorm. This would insure relatively fresh tracks and fewer sets of tracks to sort. Probable wolverine tracks were identified in Johnson Creek (SNF) (UTM, n4853400,e667700), Silver Creek (BNF) (UTM n4894000,e649500), and Vanity Creek (CNF) (n4927300,e652700). Due to their proximity to trapping and baiting sites, these tracks could not be considered independent of previously identified wolverines.

Radio Tracking

Aerial locations of study animals were made weekly when weather permitted. Ground truthing of aerial telemetry was attempted when weather and access allowed, to better pinpoint locations and test system accuracy. Wolverines are reputed to be

extremely mobile, constant travelers (Hornocker and Hash 1981, Gardner 1985, Magoun 1985, Banci 1987), and as a result can be extremely difficult to radio-track from the ground. Ground tracking was used primarily to locate fresh travel routes. Animals were then backtracked to document scent-marking, hunting activity, and collect scats.

Aerial radio-location data will be studied for home range and habitat use analyses. Preliminary movement data suggest that study animals are not restricted by any geographic boundaries, although they appear to be showing an affinity for particular areas. Aerial locations had routinely found F822 within the upper reaches of the Beaver Creek/Alturus Creek (SNF) drainages until a recent flight found her 19 km to the south in the West Fork of Big Smoky Creek (SNF). F602 has made several long movements of up to 21 km centered out of the Beaver Creek drainage (CNF). Within a week of capture F502 moved over 20 km from her trap site prior to dropping her radio collar. It is unknown whether she returned to the trapping area, although a wolverine with pelage markings similar to hers was photographed in Beaver Creek (CNF), 9 km from her trap site, and 28 days after her disappearance.

Habitat

Aerial locations have shown no trend toward habitat preference within any particular vegetation type. Ground and aerial tracking has shown both study animals and non-radioed

individuals traveling through and using varied vegetative cover types from dense timber to open ridgetops. These animals have frequently moved from low-elevational, timbered drainage bottoms to high elevation, sparsely timbered, cirque basins. Aerial tracking has found wolverines moving long distances across major drainage divides. Hornocker and Hash (1981) noted the wolverine's tendency for long movements and suggested that food availability was the primary determinant factor.

CONCLUSION

Previous wolverine research has been directed primarily at collecting much needed life history and ecological information. Capture techniques developed to accomplish this have varied greatly in style and success. Our aim is to use techniques which have proven successful as well as investigate possible improvements and new ideas. Few survey techniques specific to the wolverine and applicable throughout its North American range, short of formal capture/recapture investigations, have been developed. We feel that testing new capture and survey techniques warrant priority in this study.

Finalizing a formal study plan will be a priority through the spring and early summer. Goals for the summer will include the testing of various census techniques such as baiting and scent stations, monitoring 24-hour activity of radio-collared animals, and continued monitoring of movements and habitat use through radio telemetry. New trapping techniques will be investigated and preparations made for the upcoming winter.

ACKNOWLEDGMENTS

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Table 1. Bait location, monitoring, and wolverine visitation on the Challis (CNF), Sawtooth (SNF), and Boise (BNF) National Forests, January-April, 1992.

Bait location/UTM	Type	Date set	Dates checked	Date of/Days to first Wolverine visit
CNF				
Knapp Cr cutoff e655350 n4922900	1 elk	1-2	1-29 to 3-16	1-29/27
Knapp Cr cutoff e655420 n4922700	1 deer	1-23	1-29 to 3-16	1-29/6
Bernard Lake e659860 n4929790	2 deer	1-18	2-1 to 3-14	2-1/14
Cliff Creek e657420 n4926330	2 deer	1-18	2-1 to 3-14	2-1/14
Feltham bridge e658260 n4927170	1 deer	1-18	2-1 to 3-13	2-1/14
Knapp Creek e543320 n4918000	1 deer	1-24	1-31 to 3-1	*
Bear Creek-Langer e650840 n4925125	1 deer	1-18	2-6 to 3-18	2-3/16
Bear Creek bridge e651270 n4924175	1 deer	1-18	2-6 to 3-18	2-3/16
Beaver Creek e649000 n4920460	3 deer	2-2	2-6 to 3-16	2-11/9
Basin Creek e668660 n4908615	1 elk	2-13	2-17 to 2-27	*
Yankee Fork e691300 n4923000	2 deer	2-13	3-10	*
Valley Creek e657050 n4916350	2 deer	1-24	2-17, 3-10	*
Valley Creek e656110 n4914860	2 deer	1-24	2-17, 3-10	*
SNF				
Vienna Creek e668350 n4851885	3 deer	1-13	1-23, 2-13	*
Beaver Creek e670070 n4857200	2 deer	1-13	2-3 to 3-29	2-28/46
Beaver Creek e669370 n4856690	1 elk	1-19	2-3 to 3-29	2-28/40
Frenchman Creek e677755 n4854030	2 deer	1-13	2-3 to 2-28	*
Frenchman Creek e677015 n4853190	2 deer	1-13	2-3 to 2-28	*
Alturus Creek e665900 n4860890	2 deer	2-7	2-3 to 4-7	*

Table 1 (continued)

Alturus Creek e668215 n4861820	1 deer	2-7	2-3 to 2-28	*
Smiley Creek e674000 n4852520	2 deer	2-7	2-3 to 2-28	*
Smiley Creek e674580 n4850905	2 deer	2-7	2-3 to 2-28	*
4th of July Creek e680210 n4878495	2 deer	2-15	2-24, 3-2	*
Elk Meadows e653180 n4905215	3 deer	2-21	2-25 to 3-30	*
Elk Meadows e652930 n4905020	1 deer/ 1 elk	3-3	2-25 to 3-30	3-11/8
Boulder Creek e699075 n4852695	2 deer	4-2	4-3 to date	*
Pole Creek e685250 n4870590	1 elk	4-6	5-10	*
BNF				
Fir Creek e637990 n4913540	3 deer	3-17	3-18 to 5-5	3-23/6

* No evidence of visit or unable to determine if visited by wolverine.

Table 2. Summary of live-trapping results on the Challis (CNF), Sawtooth (SNF), and Boise (BNF) National Forests, February-April, 1992.

Species	Captures			
	CNF	SNF	BNF	Total
Wolverine	1	3*	1	5
Pine Marten	25	5	1	31
Red Fox	2	0	2	4
Weasel	0	1	0	1
Red Squirrel	1	0	0	1
Total	29	9	4	42

* Includes 2 recaptures of F822.

Table 3. Species list of identified mammals and birds encountered during trapping and surveying on the Challis, Sawtooth, and Boise National Forests, February-April, 1992.

Wolverine (Gulo gulo)
Pine marten (Martes americana)
Fisher (Martes pennanti)*
Weasel (Mustela sp.)
River otter (Lutra canadensis)
Red fox (Vulpes vulpes)
Coyote (Canis latrans)
Black bear (Ursus americanus)
Mountain lion (Felis concolor)
Mule deer (Odocoilus hemionus)
Elk (Cervus elaphus)
Mountain goat (Oreamnos americana)
Moose (Alces alces)
Red squirrel (Tamiasciurus hudsonicus)
Mice/Voles (Cricetidae)
Snowshoe hare (Lepus americanus)
Raven (Corvus corax)
Golden eagle (Aquila chrysaetos)
Gray Jay (Terisoreus canadensis)
Magpie (Pica pica)

*Possible track encounter, Laidlow Creek (BNF)

Table 4. Remote camera locations and results on the Challis (CNF), Boise (BNF), and Sawtooth (SNF) National Forests, March-May, 1992.

Camera Location/UTM	Date set	nights	Species photographed
Knapp cr. cutoff (CNF)/ e655420 n4922700	3-4	10	Wolverine*, Raven R. Fox, R.squirrel
Fir Creek Summit (BNF)/ e637990 n4913540	3-24	42	Wolverine**, R. Fox Raven, Black bear
Pole Creek Summit (SNF)/ e685250 n4870590	4-6	34	film not developed
Boulder Creek (SNF)/ e699075 n4852695	4-2		camera still in place

* M12 and individual resembling F502.
** M12 and F602

Table 5. Morphological characteristics of wolverines captured on the Challis, Sawtooth, and Boise National Forests, 1992.

Catalog number	F502	F822	F602
Date captured	2-4-92	3-12-92	3-28-92
Location	Bernard Lake (CNF)	Beaver Cr. (SNF)	Fir Cr. (BNF)
Sex	Female	Female	Female
Age	--	Adult	Adult
Weight kg	8.6	7.3	7.0
Tot. length cm	90	84	88
Tail length cm	19	20	17
Chest girth cm	41	41.5	38
Neck girth cm	29	24	28
Hind foot l/w cm	--	16.5/7	15.5/6
Condition	1	2	2

Condition explanation:
1 - Appears healthy, few or no broken teeth or mutilation.
2 - Lean body condition, many broken and/or missing teeth, and missing toes.

PROSPECTUS FOR A WOLVERINE INVESTIGATION ON THE SAWTOOTH, CHALLIS, AND BOISE NATIONAL FORESTS

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INTRODUCTION

Little information is available on the biology of the wolverine (Gulo gulo) in North America. Only four major ecological studies of the wolverine have been conducted, one in western Montana (Hornocker and Hash 1981), two in Alaska (Gardner 1985, Magoun 1985), and one in the Yukon (Banci 1987). The wolverine is classified in Idaho as a state Species of Special Concern, a U.S. Fish and Wildlife Service candidate species for listing as Threatened or Endangered under the Endangered Species Act, and a BLM and Forest Service Sensitive Species (Moseley and Groves 1990).

In 1985, Groves (1987) conducted a statewide survey via mail questionnaire to determine the status and distribution of wolverines. He concluded that wolverines were still present in at least three areas in the state: Selkirk Mountains, Lochsa and Kelly Creek drainages, and the Sawtooth Mountains/Smoky Mountains complex. There were more confirmed and probable sightings on and adjacent to the Sawtooth National Forest than anywhere else in Idaho. Not coincidentally, appellants of the Sawtooth NF Management and Travel Plans have raised the wolverine as an issue with regard to wilderness designation and forest management of motorized and nonmotorized travel. These appeals are still unresolved.

In 1989, the Nongame and Endangered Wildlife Program initiated field surveys to determine the extent of the wolverine's distribution in the Sawtooth and Smoky Mountains area (Groves and Gadwa 1989). They located fresh sign of at least two and possibly three different wolverines, and obtained several additional probable sightings. Additional surveys were conducted from January - April, 1990 (Bachman et al. 1990). Fourteen confirmed tracks and three probable tracks were located during these surveys. In addition, a wolverine was successfully photographed at a bait/scent station with a remote infrared-triggered camera.

In Janaury 1990, representatives of the Idaho Fish and Game Department, Sawtooth NF, Challis NF, Boise NF, and Dr. Maurice Hornocker (Wildlife Research Institute) met to discuss the need, logistics, and funding for a wolverine study. All participants in the meeting were in agreement that biological information on

the wolverine is lacking and that a study of wolverines was needed in order to properly manage wolverines as a Sensitive Species and address the impacts of the wilderness/nonwilderness and motorized/nonmotorized issues on wolverines. There was also a general agreement that results of a wolverine investigation in the Sawtooths would be useful information to the Forest Service and state fish and game agencies throughout the range of the wolverine in the western coterminous United States.

STEERING COMMITTEE

An interagency steering committee was formed to guide and oversee a wolverine study. The steering committee consists of Howard Hudak for the Sawtooth NF, John Erickson for the Boise NF, Dave Reeder for the Challis NF, Helen Ulmschneider for the U. S. Fish and Wildlife Service, Maurice Hornocker of the Wildlife Research Institute, Mike Medberry of the Idaho Conservation League, and Craig Groves and Jeff Copeland of the Idaho Department of Fish and Game. Craig Groves has the lead responsibility in coordinating and conducting the study.

OBJECTIVES

The steering committee concluded that any investigation of wolverine biology should be management-oriented and should incorporate a substantial public relations element. The committee agreed to the following broad objectives:

1. Determine the size, composition, and density of the wolverine population on the Sawtooth NF and adjacent parts of the Boise and Challis NFs.

2. Determine seasonal home range size and dynamics of wolverines in the study area.

3. Determine seasonal habitat use of wolverines in the study area and assess prey populations in different habitats.

4. Determine what monitoring methods (snow tracking, hair traps, remote cameras/bait stations) are most appropriate for determining wolverine presence in an area.

5. Develop management recommendations with regard to the impacts of forest management activities (timber sales, road building, motorized recreation, etc.) on wolverines.

6. Extensively promote a positive image of a wolverine study through the news media and conservation community. The fact that the local high school for the Wood River Valley is named the Wood River Wolverines should be capitalized on.

METHODS AND PROJECT DURATION

Studying wolverines is not a small undertaking from a logistical standpoint. Wolverines naturally occur at low densities and are known to have large home ranges encompassing a variety of habitats from low to high elevations. Wolverines will be studied with radiotelemetry techniques in a livetrapping/mark-recapture project. Trapping will be conducted primarily in winter because wolverines are known to occupy lower elevations at this time and may more readily be drawn into baits. We believe that the project will need to last three years in order to sufficiently address the objectives outlined above. **A detailed study plan is currently being prepared.**

PRODUCTS

Annual project reports will be submitted to the Forest Service and any other granting agencies, institutes, or foundations supporting the project. At the end of the 3-year study, a detailed final report will be prepared and submitted to the Forest Service and other entities involved in the study. We anticipate that portions of this final report will be submitted for publication in refereed scientific journals. Portions of the study may also be used by the wildlife research biologist (Jeff Copeland) to fulfill requirements of a M.S. degree in wildlife biology at the University of Idaho. Popular articles for Idaho Wildlife magazine and similar Forest Service publications will also be prepared.

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