WOLVERINE – WINTER RECREATION RESEARCH PROJECT:
INVESTIGATING THE INTERACTIONS BETWEEN WOLVERINES AND WINTER RECREATION

2015 PROGRESS REPORT

DECEMBER 30, 2015

PREPARED BY

KIMBERLY HEINEMEYER, ROUND RIVER CONSERVATION STUDIES
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WITH THE SUPPORT OF PROJECT PARTNERS AND COLLABORATORS INCLUDING:

BOISE, BRIDGER-TETON, CARIBOU-TARGHEE, PAYETTE AND SAWTOOTH NATIONAL FORESTS
IDAHO DEPARTMENT OF FISH AND GAME
LIZ CLAIBORNE ART ORTENBERG FOUNDATION
UNIVERSITY OF MONTANA
GRAND TETON NATIONAL PARK
WYOMING DEPARTMENT OF GAME AND FISH
US FISH AND WILDLIFE SERVICE
IDAHO STATE SNOWMOBILE ASSOCIATION
BRUNDAGE MOUNTAIN RESORT
GRAND TARGHEE RESORT
JACKSON HOLE MOUNTAIN RESORT
CENTRAL IDAHO RECREATION COALITION
DEFENDERS OF WILDLIFE
THE WOLVERINE FOUNDATION
THE SAWTOOTH SOCIETY
THE WINTER RECREATION COMMUNITIES OF CENTRAL IDAHO AND WESTERN YELLOWSTONE.

To obtain additional project information, see www.roundriver.org/wolverine

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The project would not have been possible without individuals within our partnering agencies tirelessly assisting the project in numerous ways. In particular, we thank Diane Evans Mack and Rob Cavallaro (IDFG), Tammy Fletcher and Dave Ovard (Caribou-Targhee National Forest), Ana Egnew (Payette NF), Lisa Nutt and Joe Foust (Boise NF), Robin Garwood (Sawtooth NF), Sarah Dewey (Teton National Park), Gary Hanvey, Kerry Murphy and Jason Wilmot (Bridger-Teton NF) and Alyson Courtemanch and Doug Brimeyer (Wyoming Game and Fish) for diligently ensuring the success of the project. We thank Jeff Copeland (The Wolverine Foundation) for the many ways he assists and advises us. We are indebted to Mark Hebblewhite (University of Montana) for his advice and guidance as a member of our science team. We also want to thank Mark Drew, IDFG Veterinarian for his assistance and time in training us and helping us safely anesthetize wolverines as well as Dr. Don Betts of Driggs, Idaho and Dr. Mary Wood (Wyoming Game and Fish). Many others have helped us – we thank you all for your assistance and support.

We have invested a large amount of effort in the processing, management and organization of numerous large and complex spatial data sets generated or needed by the project. Julia Smith, RRCS, has assumed much of this work and we are grateful for her time, skill and diligence. Similarly, our large field crews, spread across many field sites and study areas, could have been a logistical nightmare if it were not for assistance with project and personnel management provided by Kathleen Wilson, RRCS.

The backbone of this research is high quality data collection under often times challenging winter remote backcountry conditions. We are very grateful for the fearless but always impeccably safe flying of Mark Packila along his uncanny ability to find wolverines. We are indebted to our hard-working 2015 field crew, many who have returned to us year after year and always see the project through to the spring-muddy end: Matt Amick, Anne Blackwood, Grace Carpenter, Chris Cole, Zack Farley, Tom Glass, Dylan Hopkins, Lindsay Jones, Matt Kasprzak, Chris Klingler, Tulley Mackey, Cy McCullough, Josh Metten, Nick Miller, Katy Nelson, Carson White and Jarrod Zweigart. The commitment, professionalism and good humor of our field staff have made the project not only successful but also good fun.

We thank the hundreds of recreationists who agreed to carry funny little orange data loggers while out having fun and who took the time to return them to us. Your contribution provides a critical foundation to the project.

Finally, we thank the wolverines, some who also carried funny, little data loggers for us and who have taught us so much.

WOLVERINE – WINTER RECREATION RESEARCH PROJECT
2015 Progress Report

INTRODUCTION

The potential effects of winter recreation on wolverine reproduction, behavior, habitat use and populations are unknown but of concern (Greater Yellowstone Coordinating Committee 1999, Carroll et al. 2001, May et al. 2006, Copeland et al. 2007, Krebs et al. 2007). In Canada, which could be considered the North American stronghold for the species, wolverine status was changed to 'Special Concern' in May 2014 with increased winter recreation use combined with sensitivity of denning females listed among the primary reasons for this change (www.cosewic.gc.ca).

The goal of the Wolverine – Winter Recreation Study is to robustly identify and evaluate wolverine responses to winter recreation. We have completed the data collection efforts with our 6th winter field season in 2015. Our focus now is on analyzing the complex array of human and animal data to evaluate potential responses of wolverines to different types and intensities of winter recreation. This progress report summarizes the efforts of the last field season.

2015 SUMMARY OF EFFORTS

In 2015, we concluded our major field data collection efforts to document wolverine and backcountry winter recreation presence, movements and habitat use.

2015 STUDY AREAS

In 2015, we continued the monitoring of wolverines and winter recreations in key study areas in central Idaho (Payette and Boise National Forests) while focusing our core effort on completing the second full year of data collection in the western Yellowstone region of Idaho, Montana and Wyoming.

The western Yellowstone study areas fall across five federal jurisdictions and three states. The 'Island Park' study area includes the Centennial and Henry Mountains straddling the Idaho-Montana state line on the Caribou-Targhee, Custer-Gallatin and Beaverhead-Deerlodge National Forests (NFs). The Teton study area encompasses the Teton Mountains which fall within the Caribou-Targhee and Bridger-Teton NFs and Grand Teton National Park in Idaho and Wyoming (Figure 1).

WOLVERINE MONITORING

We undertook both live trapping and camera trap-hair collection monitoring in the western Yellowstone study areas and camera trap-hair collections to continue monitoring wolverines in the key study areas in central Idaho.

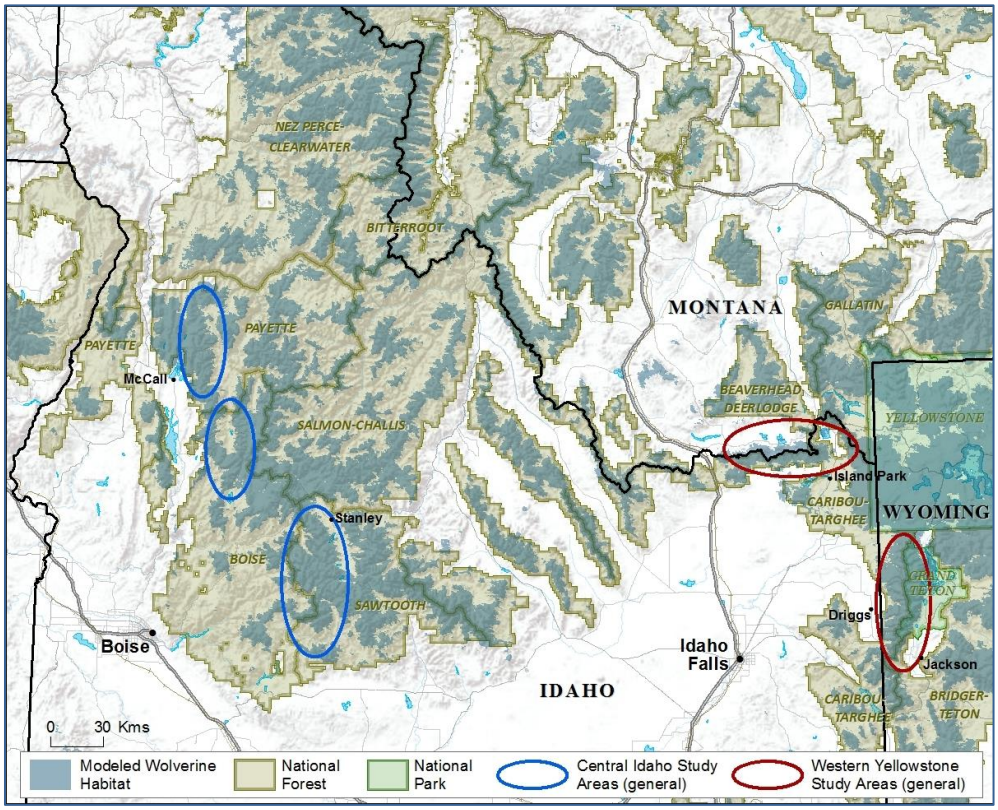

Figure 1. Idaho Wolverine-Winter Recreation Study Region and Study Areas: Central Idaho study areas on the Payette, Boise and Sawtooth National Forests indicated by blue circles, western Yellowstone study areas indicated by red circles.

Salmon Mountains Study Area. In central Idaho, we completed camera and DNA (hair) collection efforts in the Salmon Mountains near McCall on the Payette and Boise National Forests. This winter represented our 6th year of monitoring wolverines in this popular winter recreation area. Our efforts in 2010 and 2011 identified four reproductively active females and four resident males. Based on our subsequent monitoring through 2015, most of these resident animals are no longer present with the exception of F5 who is tentatively identified in photographs near Warm Lake Summit in March 2015 on a station she has routinely visited in prior years. In 2014, we identified and monitored two new wolverines in the Salmon Mountains (one male M12, one female F10) with apparent resident behaviors (e.g., maintain home ranges) with the female establishing a reproductive den in 2014 (Heinemeyer et al. 2014).

We monitored 10 camera-hair snare stations in the Salmon Mountain study area from January-March 2015 for over 700 nights of effort. We did not confirm F10 in the area during 2015 but did have un-identified wolverines visiting the camera-hair snare sites in or near her 2014 home range; these visits did not result in sufficient hair collection for DNA analyses and photos were inconclusive on individual identification. We initially identified and GPS-collared M12 in the Salmon Mountain study area in 2013-14 documenting his movements within the area previously identified as the home ranges of original M2 and M3, and adjacent to the still resident M1. In 2015, we did not detect M1 but found M12 at baited stations within M1, M2 and M3 original home ranges (Figure 2): M12 was found at 9 of our 10 sample sites. If indeed he maintains this vast area as a territory, it would potentially encompass over 1,100 sq. miles rivaling the largest home range we have documented during the study and well exceeding the 'typical' male home range of 500-800 sq. miles.

Based on our camera stations, it appears that the number of wolverines in our Salmon Mountain study area is currently lower than when we initiated the project in 2010. Most notable has been the incremental loss of resident animals without identifying new animals filling these vacant home ranges at densities we initially saw. The probability that we simply did not detect new or resident animals is relatively low given the monitoring effort we invest in the region. Recent analysis suggests that the probability of detecting a wolverine with a baited camera station within its home range over one winter is 86% (Inman et al. 2015). The density of camera – hair snare stations that we deployed and maintained would equate to two or more stations within a typical female home range and more than that within a typical male home range. Additionally, the known resident wolverines readily come into the baited stations and we typically have identified them multiple times over any winter season.

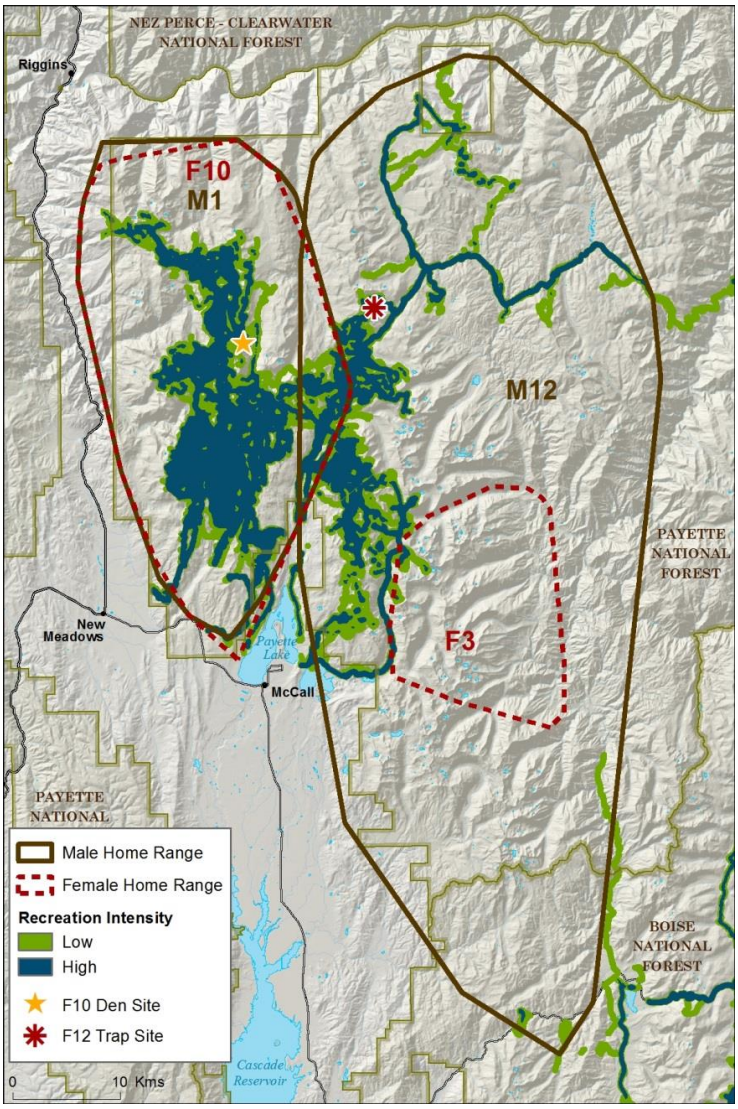

Figure 2. Home ranges of wolverines monitored in the winter of 2014 in the Salmon Mountains near McCall, Idaho. One female F12 was collared on 2014 (location shown), but was never relocated and was likely a transient; another female, F10, denned in late February and her approximate den site is shown. In 2015, M1, F10 and F3 were not detected and are likely no longer present and M12 was identified at baited camera stations in both his 2014 area and the area occupied by M1 in prior years.

Western Yellowstone Study Areas. In our western Yellowstone study areas (Centennials, Henrys, Tetons), we undertook a mix of live trapping and camera-hair snare monitoring to build on efforts started in 2014.

We deployed 5 camera-hair snare stations in the Centennial Mountains at sites that were live traps in 2014. These camera traps were run for a total of 399 trap nights between early January and late March 2015. In this second year of focused effort, we again did not detect a wolverine in the Centennial Mountains (Table 1). We also attempted to undertake an aerial track survey in the Centennials in March 2015 but weather prohibited completing the effort. The Centennials historically were known to support wolverines. Inman (2007) reported five mortalities (3 female, 2 males) between 2001 and 2005 in or near the Centennial Mountains; his work represents the last confirmed observations of wolverines in the mountain range.

In 2014, 2 wolverines (1 male M14, 1 female F11) were captured in the Henry Mountains along the Montana-Idaho border north of the Centennial Mountains. Genetic analysis indicates that F11 is the mother of M14, likely a kit from 2013. She did not den in 2014 and we re-deployed the trap effort in the Henry Mountains in 2015 with the hope of monitoring her through a denning cycle. We did successfully GPS collar her along with a new male M15. We did not detect M14. The female established a reproductive den in late February and we were able to monitor activity at the den through fixed wing flights. Her collar malfunctioned and we were unable to obtain GPS data. This den represents the ninth reproductive den that we have documented. We visited the den site in August after F11 abandoned it, and recorded habitat and structure information. The den was located on the lower slope of a headwall in an area composed of extremely large talus boulders (Figure 3).

We obtained DNA results that show that M15 is also the son of F11 and the sibling of M14. The father is unknown. The male M15 shows movements characteristic of a resident animal and he maintained a home range covering 619 sq. miles including the Henry Mountains and the southern portion of the Madison Range (Figure 4).

We increased our trapping efforts in 2015 in the Tetons after only capturing a single male (M13) in 2014. We established research teams on both sides of the mountain range and undertook a significant trap effort logging 460 total trap nights over the January-March trapping season using both live traps and camera traps. In addition to live traps (239 trap nights), we set up camera-hair snare traps (221 trap nights) for all or part of the winter season (Table 1). The only wolverine detected was again was M13 (nicknamed “Jed”). From DNA analysis, we know he was initially captured in 2002 in another study in the area when he was identified as a subadult at that time. That original capture makes Jed an estimated 14+ years old – well past prime age and it would be expected that he should have been displaced by a younger, prime-age male if one were present. His relatively small home range of 355 sq. miles may be a reflection of his age (Figure 5). We did not identify any females in the Tetons.

We closed trapping in the Tetons in mid-March due to early spring conditions, in late March in the Centennials and by the end of April in the Henry Mountains, prior to grizzly bear emergence. We made a concerted effort through the end of April to recapture F11 to retrieve the malfunctioned collar before it fell off but we were not successful.

All data from the 6 previous years of wolverine tracking efforts were harmonized and compiled into a single geodatabase with final versions of each animal’s points, tracks, and calculated home range for each season in which there was sufficient data for analysis (Table 2).

Table 1. Summary of trapping effort during January-April 2015 within each of the primary mountain ranges or study areas: for each area, the total number of wolverines captured (including recaptures of the same animal) is listed first and the capture success rate is indicated as (captures/100 trap nights).

Study Area	Total Trap Nights	Live Trap Nights	Wolverines Captured	Camera Trap Nights	Photo Captures
Henrys (2 traps)	125	85	4[1] (0.05)	40	6[3] (0.15)
Centennials (5 traps)	399	0	0	399	0
Salmons (10 traps)	718	0	0	718	17[4] (0.02)
Tetons (10 traps)	460	239	3[2] (0.01)	221	3[5] (0.01)

[1] "M15" (x3), "F11" (1x); [2] "M13" (3x); [3] "F11" (3x); [4] "M12" (5x; maybe 6); [5] "M13" (1x)

Figure 3. The denning area of F11 is shown in the upper photo – for scale, look in the lower left quadrat for the field technician lying in the grass. In the lower photo, Kim walks below the large boulder that formed the entrance to the den under the snow.

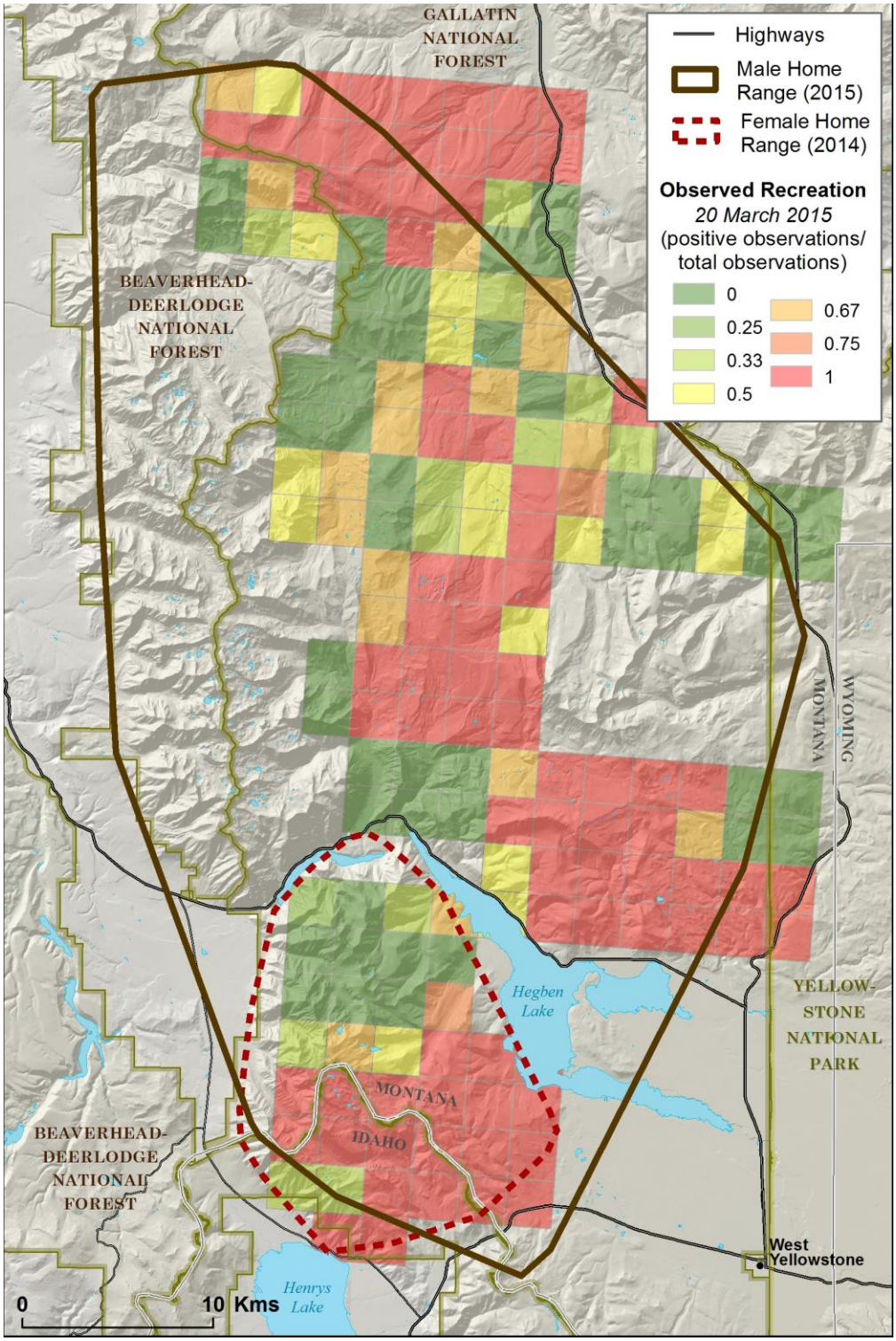

Figure 4. Home ranges of F11 (from 2014 location data) and M15 (2015 location data) in the Henry Mountains with the relative intensity of snowmobile recreation estimated based on an early spring aerial recreation survey; GPS tracking of winter recreationists was limited to the southern portion of this area.

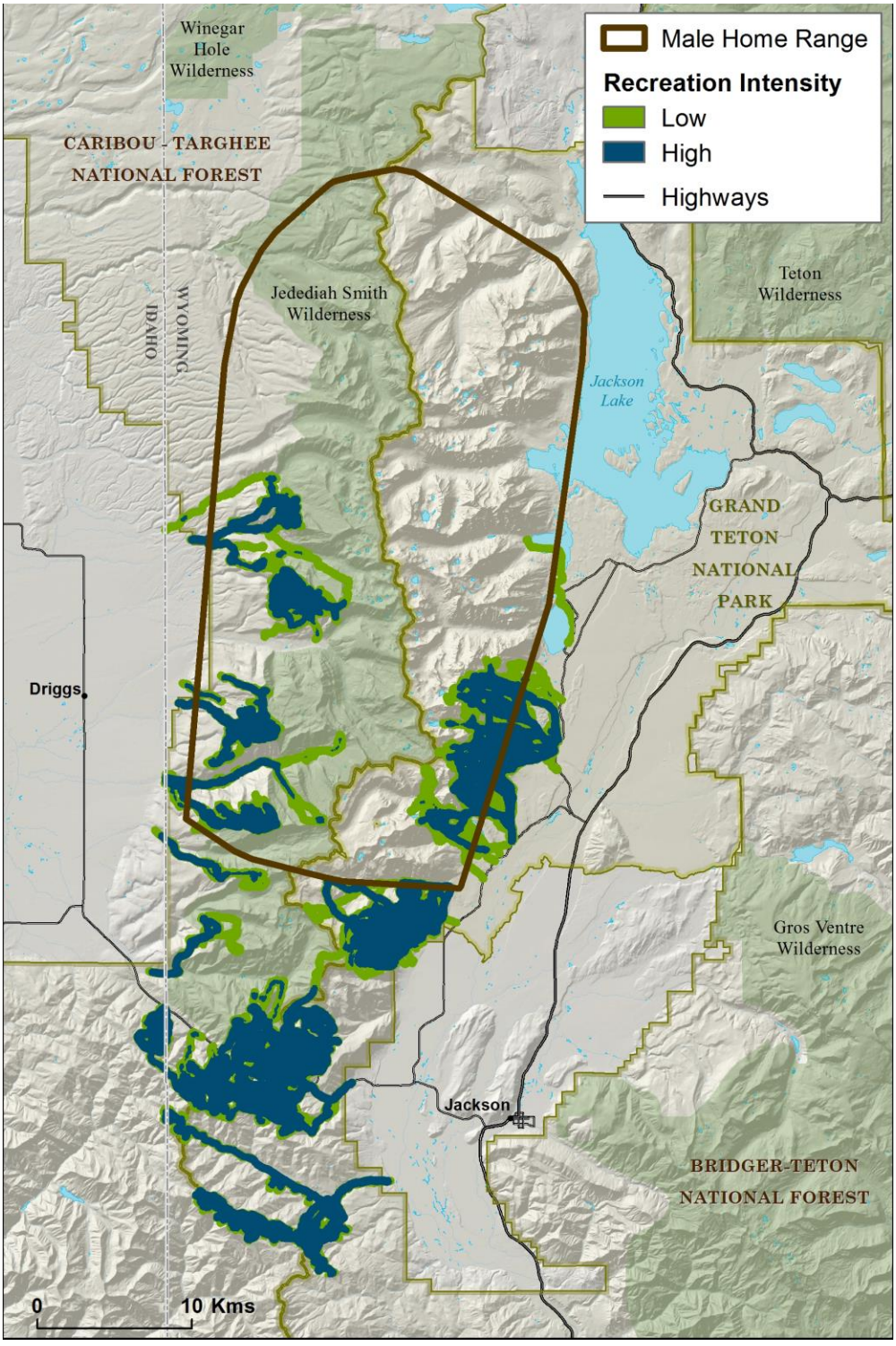

Figure 5. The 2015 minimum convex polygon home range of M13 in the Tetons showing the concentration of winter recreation activity (documented through GPS handouts at all major trailheads) is in the southern portions of his territory and to the south of his territory.

Table 2. Summary of wolverine location and home range data collected over 6 years of field work; only animals with at least 3 weeks of monitoring are included.

Sex	N	Years	n	Days	MCP Ave (range) in km^2	MCP Ave (range) in mi^2
F	10	1-3	818-2976	25-95	357 (162-563)	138 (63-217)
M	9	1-4	316-3217	21-79	1138 (440-2365)	439 (170-1170)

Recreation Monitoring

We continued recreation monitoring in both the Henry and the Teton Mountains including handouts of GPS trackers to backcountry recreationists in the 2015 winter field season. A total of 1,239 GPS tracks were collected from January-March: 83 in the Henrys (82 snowmobile tracks, 1 backcountry ski track) and 1,156 in the Tetons (77 snowmobile tracks, 1,067 ski/snowboard tracks, and 12 mixed recreation tracks; Figure 6). The GPS tracks collected in 2015 combined with the nearly 2,000 collected in the previous winter will provide high quality location data that can be used at multiple spatial and temporal scales to evaluate wolverine responses in the Tetons and Henry Mountains, similar to our central Idaho recreation data collected in prior years. Based on our array of remote trail use counters (19 in the Tetons, 3 in the Henrys), these GPS tracks represents a sample from an estimated 32,500 winter backcountry visits: 29,000 backcountry skier and snowmobiler visits in the Teton Mountain study area and more than 3,500 snowmobiler visits in the Henry Mountain study area.

We also completed an aerial recreation survey on March 20, 2015 in the Henry and southern Madison Range Mountains using methods described in Heinemeyer et al. 2011. This survey documents relative winter recreation levels in the northern part of the home range of M15 that encompasses the southern Madison Mountains where we do not have GPS tracking data from recreationists (Figure 4). Like previous aerial surveys in our other study areas, this survey used a standardized sampling approach to provide an independent estimate of the extent and relative intensity of winter recreation. In addition to filling information gaps, these data will be used when working with the GPS track data to identify any inconsistencies or changing use patterns in areas where GPS monitoring efforts have ended.

Over the summer of 2015, we have completed the validating, compiling and harmonizing of these GPS tracks and combined them with data from all previous years to facilitate analysis and modelling. New recreation intensity grids were calculated and the data are attributed to facilitate the creation of more fine-scale analyses such as daily, weekly or weekend vs weekday spatial layers of recreation intensity.

Base Data Acquisition and Processing

The capture and tracking of wolverine M15 necessitated a redefinition of the West Yellowstone study area boundary and recompilation of base data layers as he covered regions north into the Madison Range. The new West Yellowstone study area now spans four National Forests (Gallatin, Beaverhead-Deerlodge, Caribou-Targhee, and Bridger-Teton) and two National Parks (Grand Teton and Yellowstone). The Central Idaho study area brings in three additional National Forests (Boise, Payette, and Sawtooth) to the overall study area that spans three states (Idaho, Wyoming and Montana). Compiling and harmonizing the best available base data between numerous jurisdictions is a significant and ongoing task. In addition to forest and parks data (roads, trails, winter travel routes, area use restrictions), other base data were recalculated to accommodate the expanded study area, including land cover (vegetation cover, type, seral stage, etc.), vegetation characteristics (e.g., NDVI, brightness and greenness indexes), and terrain variables (elevation, slope, aspect, ruggedness). We acquired and mosaicked high-resolution (1-2 m) NAIP imagery for the entire study area to provide a detailed birds-eye view of cover type (circa 2012) and allow for the calculation of high-resolution visual band indices during peak phenology. We are currently generating a solar insolation covariate as a potential predictor of cooler microclimates that may be important to wolverines for denning and habitat selection.

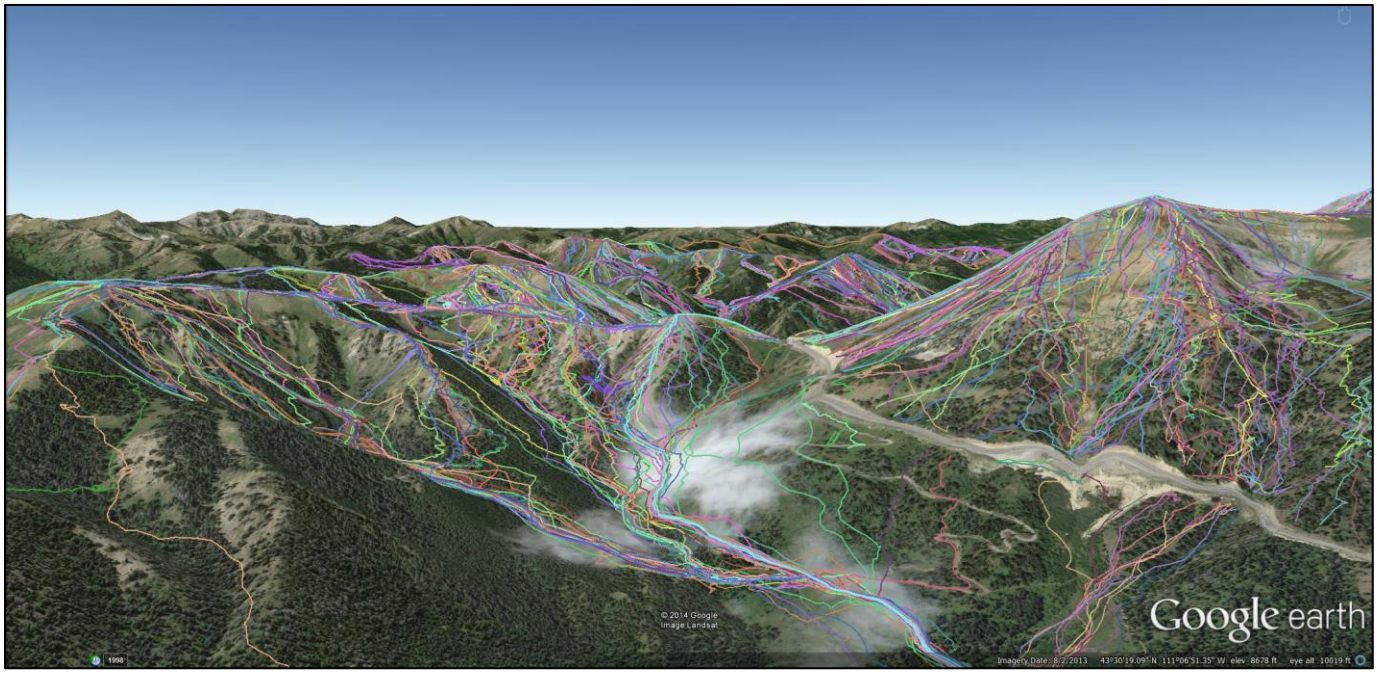

Figure 6. Colored paths are GPS tracks of backcountry recreationists in the Teton Pass area of the southern Tetons; this area is accessible by a paved highway and is a popular backcountry ski destination.

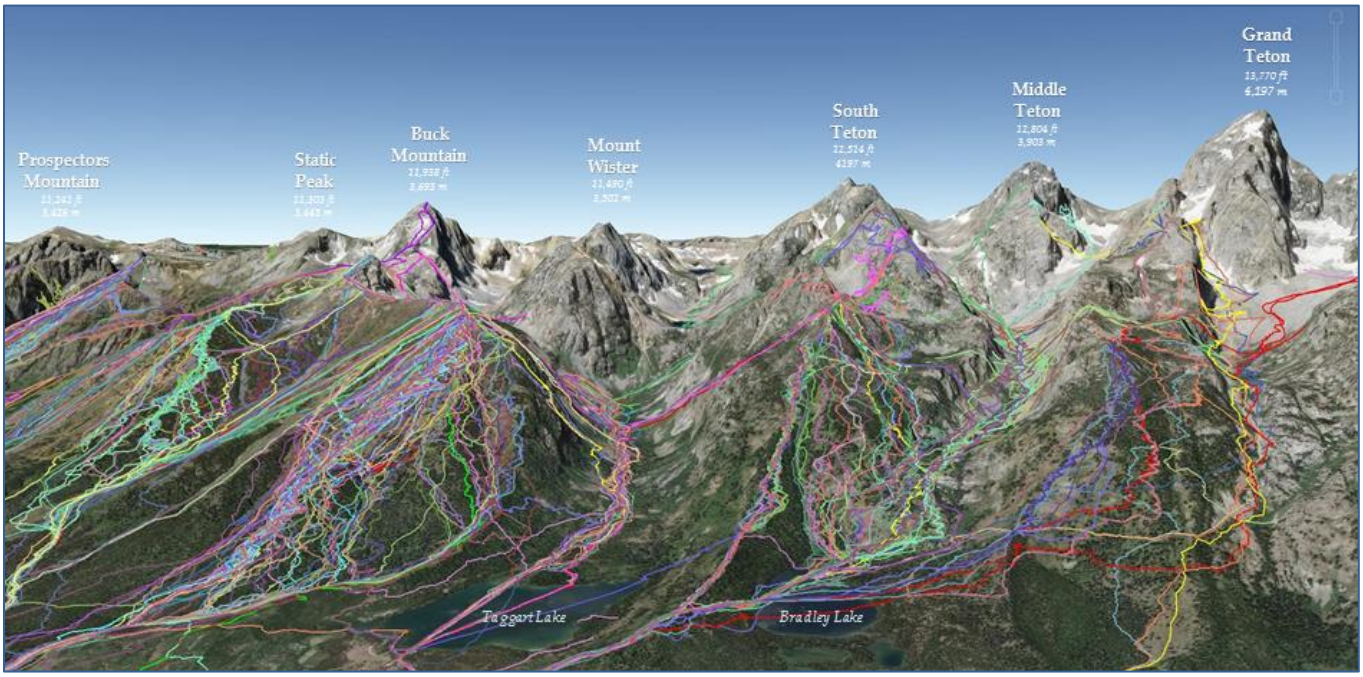

Figure 7. An example of the GPS recreation tracks collected by backcountry skiers in Grand Teton National Park during the winter of 2014; the male wolverine monitored in the Tetons travelled through this area.

Copeland et al 2007 created a 1-variable wolverine niche model based on the annual presence of snow in mid-May. This model captures 98% of all known wolverine den sites worldwide. As such, it represents a parsimonious model and indicates that spring snow may be an important covariate in more fine-scale habitat modeling efforts such as we will be undertaking. Therefore, we have created a spring snow layer for the years 2009-2015 using 250 m resolution MODIS data based on the methods described in Copeland et al (2007). In addition to providing an updated covariate for analysis in our study area, this spring snow model can also be compared to the Copeland et al. 2007 model which was based on snow data from 2000-2006 to detect changes in spring snow cover.

Outreach and Education

Throughout this project, we have attempted to be transparent about the research effort and emerging results of the project. We have completed numerous presentations to public forums across our study region including in McCall, Stanley, Ketchum, Island Park, Idaho Falls, Driggs and Jackson, and have also spent time with elementary, high school and undergraduate college classes over the past 6 years. Presentations have been made at professional or stakeholder conferences including at the Annual Meeting of The Wildlife Society, Society of Conservation Biology, Idaho Wildlife Society Annual Conferences, the Idaho State Snowmobile Association Annual Convention, and the Cross Boundary Wolverine Working Group (BC-Alberta-US group). We have also provided a number of presentations at state and federal agency meetings including to Wyoming Game and Fish, Idaho Fish and Game and to the National Forests where we work.

Next Steps

The field data collection for the wolverine-winter recreation project is completed. Our focus is now on the analyzing responses of wolverines to winter recreation, associated report and publication preparation and presentation, assisting agencies and stakeholders in interpreting the results of the research and continuing outreach efforts. The majority of the analysis and reporting is expected to be completed by the end of 2016.

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