DISTRIBUTION OF JUMPING MICE (*Zapus*) IN WYOMING

Progress Report, 2013

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Contents

Introduction

Preble's meadow jumping mouse (*Zapus hudsonius preblei)* (Preble's hereafter) is found exclusively in riparian and adjacent upland habitats. The suspected range of the subspecies is restricted to the eastern slope of the Rocky Mountains from Colorado Springs, Colorado north to east-central Wyoming. Within its range, the availability of suitable riparian habitat is declining due to agricultural, residential, and commercial development. In 1998, Preble's was listed as Threatened under the Endangered Species Act. Subsequent actions by the United States Fish and Wildlife Service (USFWS) have modified details of the status and management of the subspecies. Currently, Preble's is listed as Threatened in Wyoming and Colorado. Management of Preble's is a high priority for management agencies but effective management has been complicated by taxonomic and distributional uncertainty.

The most recent and most widely accepted taxonomic paradigm regarding the taxon supports the subspecific designation of Preble's as a subspecies of meadow jumping mouse (*Z. hudsonius*). While these investigations have clarified taxonomic confusion to a degree, there remains considerable uncertainty about the distribution of the taxon, particularly in the northern part of its range. Specifically, *Zapus* in the North Platte River basin bear morphologic and genetic similarities to western jumping mouse (*Z. princeps*). It is unclear if individuals in this area are Preble's or western jumping mouse. Others suggest species-level hybridization.

While sampling efforts have taken place within suspected Preble's range in Wyoming, we specifically targeted trapping efforts at the north and west edges of suspected Preble's distribution where no previous sampling had occurred. Furthermore, we collected genetic samples from all *Zapus* captures and thus will be able to positively identify individuals to species level. Many previous sampling efforts did not conclusively assign captured specimens to one of the two *Zapus* species in the area, resulting in significant uncertainties of species boundaries. The purpose of this project was to live-trap jumping mice on the western edge of suspected Preble's distribution in Wyoming to better define distributional boundaries of the subspecies.

Specific objectives for the project were to:

1) Identify distributional boundaries for Preble's Meadow Jumping Mouse in Wyoming.
2) Obtain genetic samples to identify captures to the species level.
3) Provide the United States Fish and Wildlife Service Mountain-Prairie Region Wyoming Ecological Services Field Office with locational and habitat data that will support informed management decisions.
4) Use results to update species (and subspecies) range maps and predictive distribution models in Wyoming.

Methods

Sites were selected along drainages on the northwest and southwest edge of suspected Preble's range in order to systematically determine the actual extent of Preble's distribution in Wyoming. Site selection was aided by maps produced by the Wyoming Natural Diversity Database (WYNDD) summarizing the compilation of all available observation records of Wyoming *Zapus*. At the time of site selection, a draft map produced by Bowe and Beauvais (2012), which itself was largely based on the *Z. h. preblei* maps developed by Keinath et al. (2010a,

2010b) was used. Planning was also completed in coordination with the Wyoming Game and Fish Department Nongame Program and the USFWS Ecological Services Wyoming field office.

We live-trapped small mammals in riparian habitats suitable for jumping mice following methodologies laid out in the USFWS's "Prebles's Meadow Jumping Mouse (*Zapus hudsonius preblei*) Survey Guidelines" (2004). Additionally, all live-trapping and capture processing procedures followed guidelines for trapping and handling small mammals published by the American Society of Mammalogists (Sikes et al. 2011) and were approved by the University of Wyoming's Institutional Animal Care and Use Committee. We used foldable metal small mammal live-traps (Sherman live traps; H. B. Sherman Traps, Inc., Tallahassee, Florida) to capture animals. Traps were set and checked for four nights at each site. Traps were placed within 10 m of the high water mark of streams and arranged in transects with traps spaced approximately 5m apart. Each trap contained polyester bedding material and was baited with 3-way horse feed. Traps were opened at dusk and checked beginning at dawn the following morning. Captures were processed immediately at the site of capture. Traps were closed during the day so that no animals risked overheating inside traps during the day. Captured animals remained in traps until processed individually. The vast majority of captures were small mammal species other than Preble's. All non-target captures were released after processing at the site of capture.

To process small mammals, we gently shook each animal out of its trap into a heavy duty plastic bag with air holes, identified the individual to species (whenever possible), identified the sex, obtained mass, tail length, body length, and total length. Minimally invasive tissue samples (i.e. ear punches) were taken from jumping mice; ear punches were not obtained from other species captured (King et al. 2006, Sikes et al. 2011). Tissue samples were stored in microcentrifuge tubes filled with 95% ethanol. Once the animal was fully recovered and properly oriented, it was immediately released at the capture site.

All *Zapus* captures will be identified to the species level through modern genetic techniques (King et al. 2006). These data along with data to be collected in subsequent years will then be used to systematically identify the range boundary of Preble's in Wyoming.

Results

In 2013, we sampled five sites (Table 1; Figures 1-5). We captured a total of 16 *Zapus* at four of these five sites (Tables 1and 2). We are awaiting results of genetic analyses from the United States Geological Survey's Leetown Science Center. These data will inform us if captures belong to *Z. hudsonius* or *Z. princeps* and will be included in the final report submitted the USFWS as soon as possible (Abernethy and Beauvais In Preperation).

Site Descriptions

F.E. Warren Air Force Base

F.E. Warren Air Force Base is located on the western edge of Cheyenne, Wyoming. We surveyed for jumping mice along Crow Creek which enters the F.E. Warren Air Force Base on its western boundary (Figure 1). Crow Creek is a small, heavily impacted stream. The portion of the creek where we captured jumping mice has a relatively broad riparian zone dominated by a dense willow overstory and a dense grass and forb understory. Further downstream where we did not capture any *Zapus*, the riparian zone narrows and is dominated by a mixture of cattails and willows. Jumping mice at the site may face numerous threats. First, the entire length of Crow Creek surveyed has a considerable noxious weed component in the understory. There is also a considerable

human footprint in the area in the form of roads, campgrounds, bridges, and other infrastructure which may alter runoff and reduce habitat quality as has been observed in other portions of Preble's range. Despite heavy human use in the area, the riparian corridor itself did not show much evidence of human activity (e.g. trampled vegetation etcetera). We did observe various refuse such as barrels, automobile tires, and aluminum cans. We also observed numerous raccoon tracks along the creek but had very few traps disturbed by raccoons or other larger animals. There was some evidence of beaver activity along the creek but only small dams and ponds were present. We live trapped at F.E. Warren Air Force Base from 6/11/2013 to 6/14/2013 and from 7/9/2013 to 7/12/2013. We captured 8 *Zapus*, all during the first live-trapping session (Tables 1 and 2). All *Zapus* captured at this site in the past have been assumed to be Preble's based on distribution and elevation. However, genetic analyses of jumping mice captured on the base in past suggest that *Z. princeps* occur there (Bowe and Beauvais 2012).

Johnson Creek

The Johnson Creek site was located approximately 20 miles southeast of Laramie, Wyoming (Figure 2). Johnson Creek is a small perennial creek with a relatively narrow riparian zone. The riparian corridor is dominated by willow while the understory is dominated by dense, tall grasses and forbs. Additional tree and shrubs at this site included aspen, gooseberry, and shrubby cinquefoil. The area is managed primarily for cattle grazing but is also currently managed as a fishing access area by the Wyoming Game and Fish Department. There is a small (approximately 150 m by 125 m) unnamed reservoir on Johnson Creek that may impede dispersing individuals. We live-trapped the Johnson Creek site from 7/29/2013-8/2/2013 and captured three *Zapus* (Tables 1 and 2).

Laramie River at Tunnel Road

This site was located approximately 25 miles southwest of Wheatland, Wyoming where the Laramie River passes under Tunnel Road (Albany County Road 727) (Figure 3). The Laramie River is a relatively large river with a narrow riparian zone. The riparian corridor is dominated by grass with areas of relatively dense willow. The area is managed for livestock grazing. Livestock grazing at this site has resulted in reduced grass biomass and has altered the structure of willow shrubs. This may represent a threat to Preble's if present at this site. We live-trapped along the Laramie River from 8/5/2013 to 8/9/2013but did not capture any *Zapus* at this site (Table 1).

Harney Creek

The Harney Creek site was located on private land approximately 15 miles south of Laramie, Wyoming (Figure 4). Harney Creek is a small meandering creek. At our live-trapping location, Harney Creek is generally perennial but may become ephemeral in dry years. The site had relatively dense willow overstory with ample grasses and forbs in the understory. This portion of Harney Creek was formerly a cattle ranch but is now exurban. As a result, potential threats to *Zapus* include urban predators including house and feral cats. We live trapped this site from 8/12/2013 to 8/16/2013 and captured two *Zapus* and observed one while checking traps (Tables 1 and 2).

Laramie River at the University of Wyoming Agricultural Experiment Station

This site was located approximately 3miles west of Laramie, Wyoming on private land owned by the University of Wyoming (Figure 5). At this location, the Big Laramie River is a large, meandering river with a wide flood plain. The site lacked a significant overstory component but areas of dense willow and cottonwood forest occur both upstream and downstream. There was tall, dense grass at this site. This land is managed for livestock grazing and is part of the University of Wyoming's Agricultural Experiment Station. Grazing appeared to be light, especially within the floodplain of the river. We live trapped at this site from 8/19/2013 to 8/23/2013 and captured one *Zapus* (Tables 1 and 2).

Conclusions

Ultimately, results from this research will clarify the range boundaries of the Preble's Meadow Jumping Mouse in Wyoming. This directly addresses tasks established in the draft recovery plan prepared by the USFWS in 2003. Specifically, these results will aid in identifying which areas in Wyoming are within the range of the subspecies. Subsequently, management agencies can then take appropriate actions to protect and manage habitat of Preble's in the state. In addition to surveys carried out by WYNDD, WGFD live-trapped several sites along the northern and eastern edge of suspected Preble's range in Wyoming. These efforts yielded 10 *Zapus* captures from two sites. Results of WGFD surveys will be consolidated with the pending genetic results from WYNDD. These data will then be used to update maps and assessments of *Zapus* in Wyoming currently presented in Bowe and Beauvais (2012).

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Figures

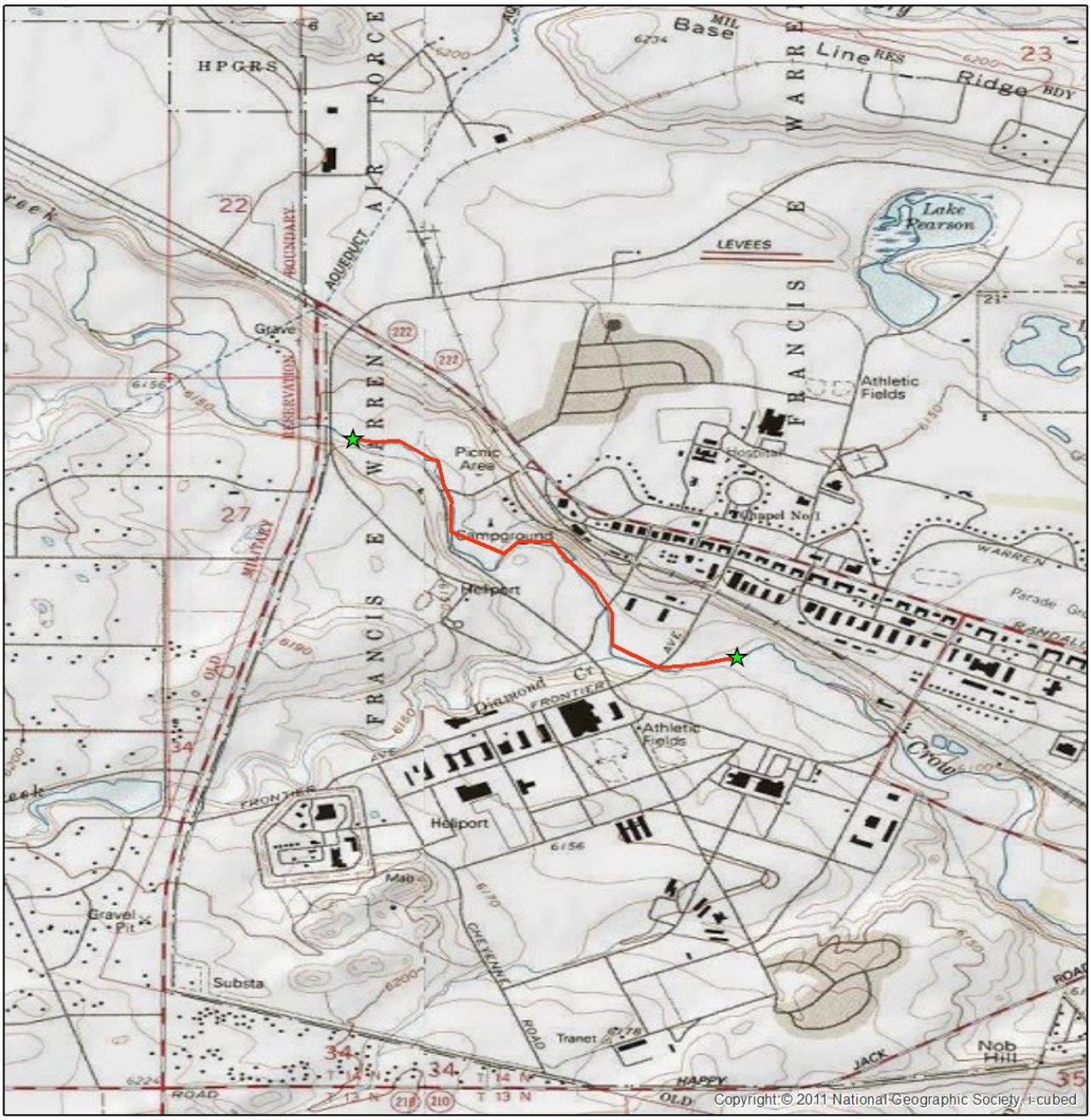
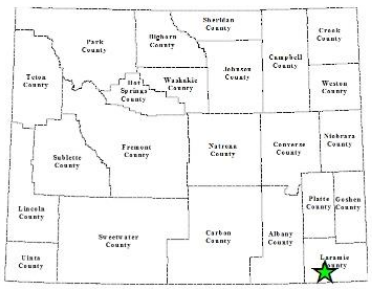


Figure 1. Map of trapping transect at F.E. Warren Airforce Base.

Legend

- Transect End Points
- Trapping Transect



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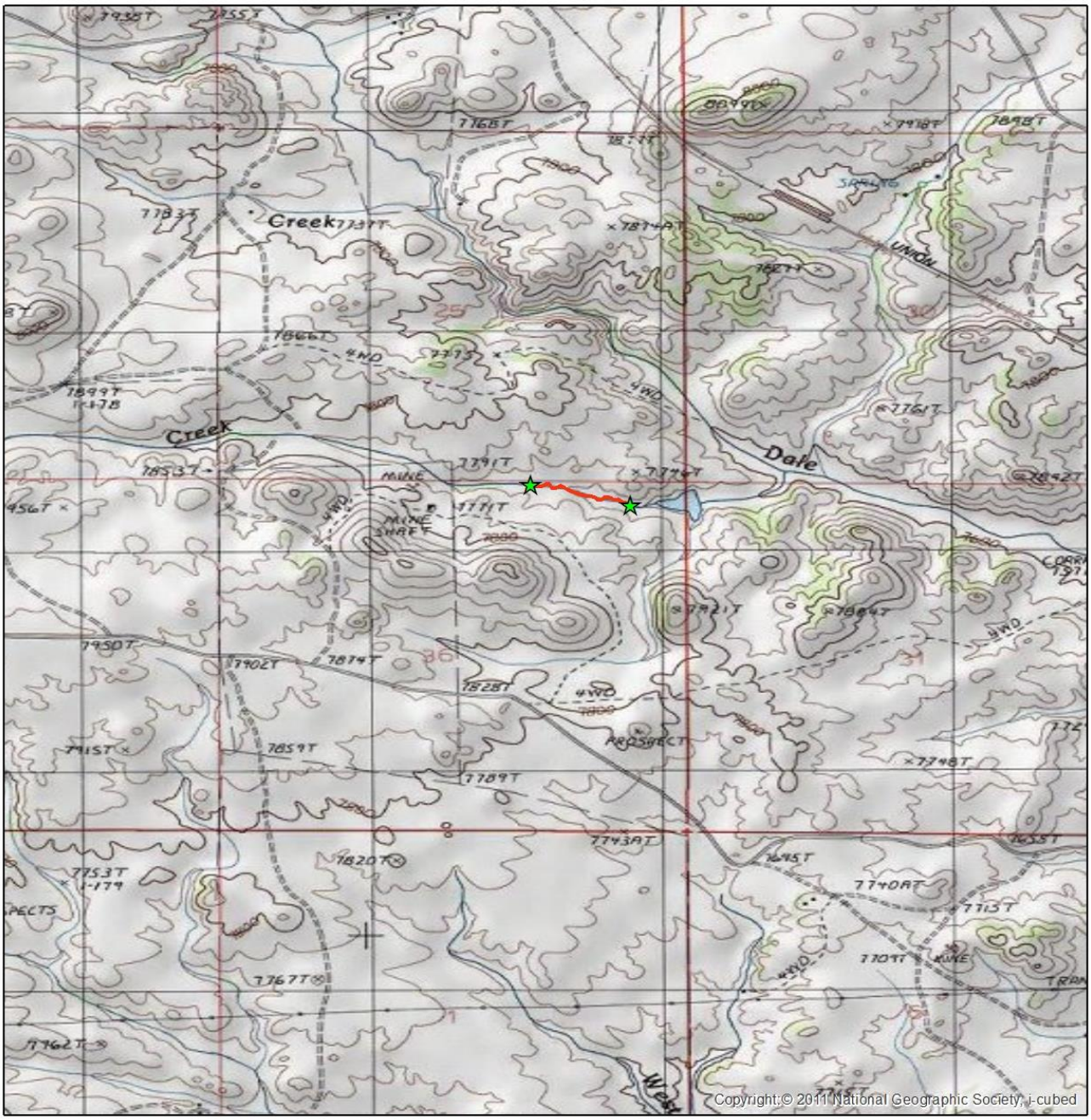
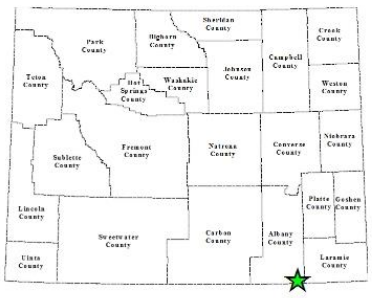


Figure 2. Map of trapping transect at Johnson Creek.



Legend

- Transect End Points
- Trapping Transect

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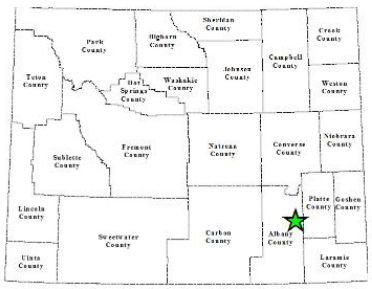
Figure 3. Map of trapping transect at the Laramie River at Tunnel Road.



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Transect End Points

Trapping Transect

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Wyoming Natural Diversity Database

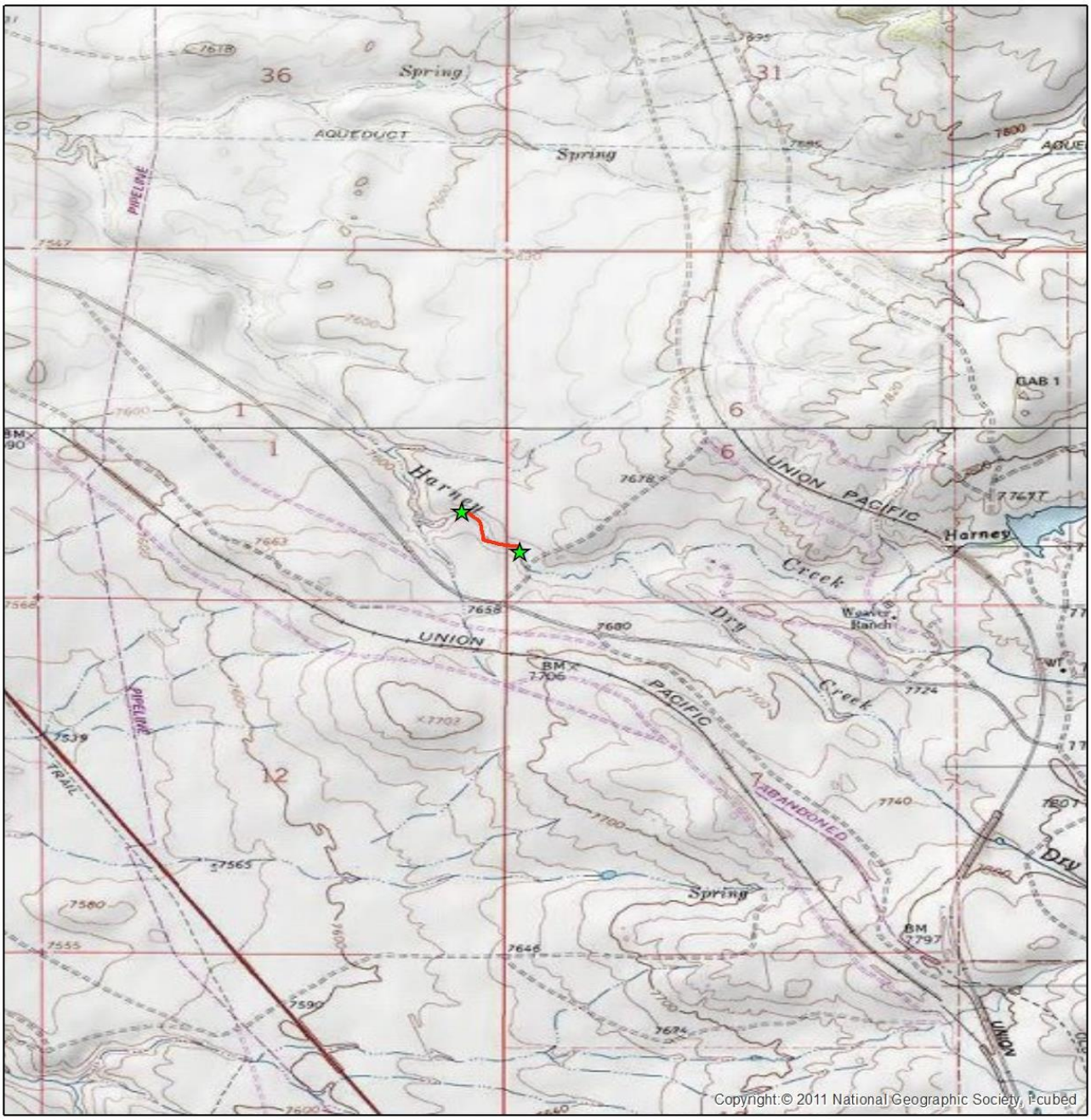
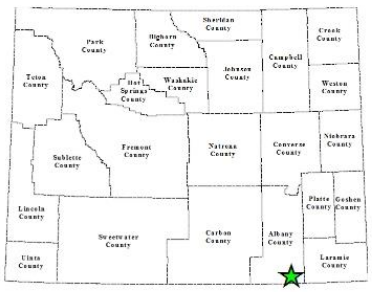


Figure 4. Map of trapping transect at Harney Creek.



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Transect End Points

Trapping Transect

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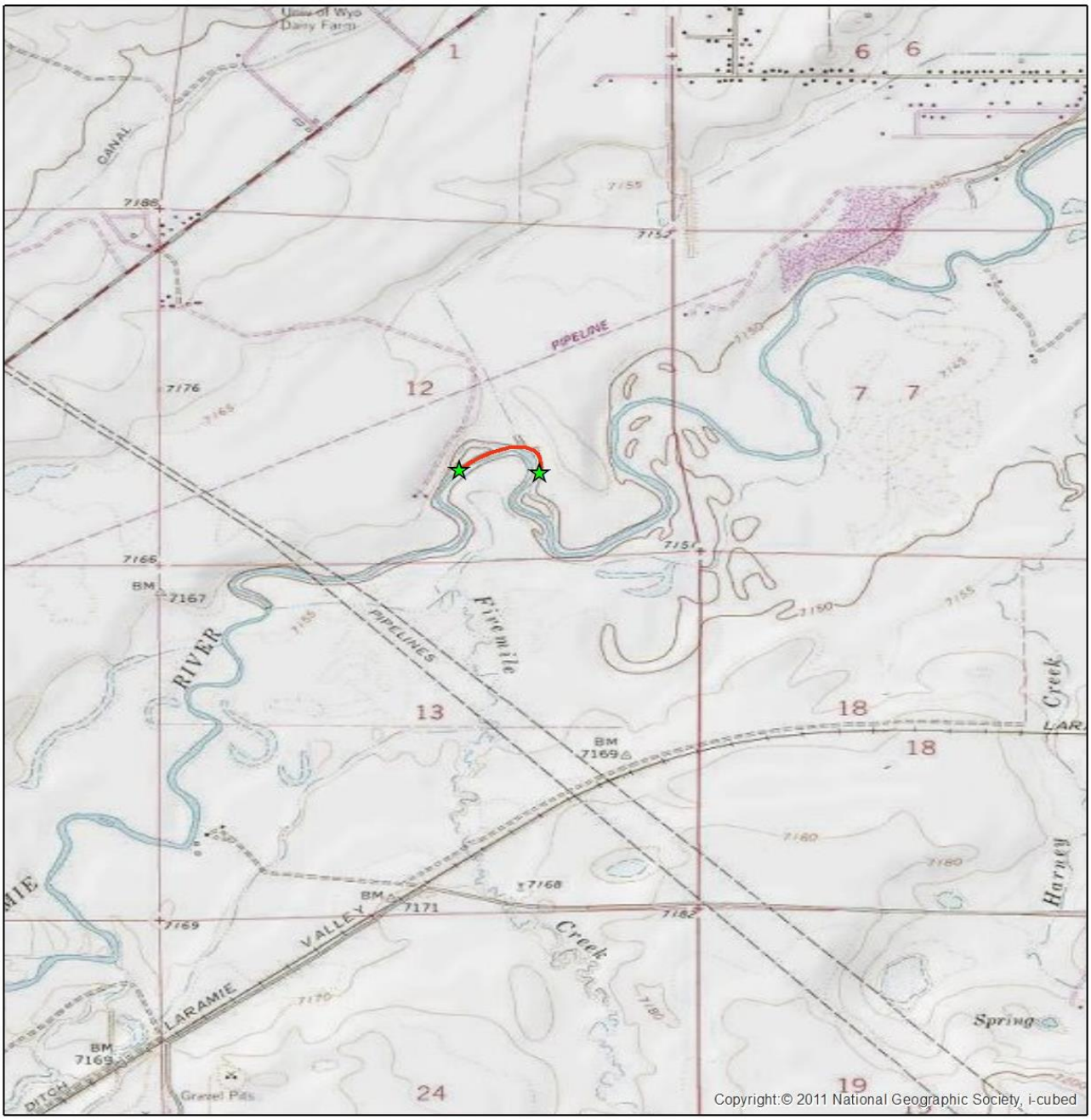
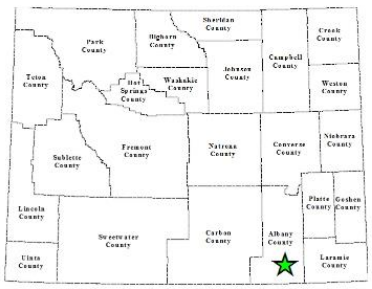
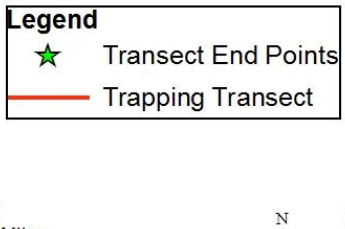
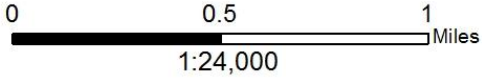


Figure 5. Map of trapping transect at the Laramie River on the University of Wyoming Agricultural Experiment Station.







Tables

Table 1. The number of *Zapus* captured, total trapping effort corrected for sprung traps, and location of transects sampled in 2013.

Site	Number of *Zapus* Captured	Total Trapnights	UTM Zone	UTM Easting	UTM Northing
F.E. Warren	8	2,136	13	4556314	510208
Johnson Creek	4	782	13	4545410	465861
Laramie River at Tunnel Road	0	777	13	4641870	465639
Harney Creek	2	779.5	13	4552380	456335
Laramie River at UW Stock Farm	0	768	13	4570240	446146

Table 2. Information for individual *Zapus* captured in 2013**.**

Zapus Number	Sex	Genetic Material Submitted	Site Name	UTM Zone	UTM Easting	UTM Northing
1	Female	Yes	F.E. Warren	13	510438	4556260
2	Female	No	F.E. Warren	13	510240	4556290
3	Male	Yes	F.E. Warren	13	510233	4556300
4	Female	No	F.E. Warren	13	510388	4556280
5	Male	Yes	F.E. Warren	13	510235	4556290
6	Unknown	No	F.E. Warren	13	510299	4556290
7	Female	Yes	F.E. Warren	13	510419	4556270
8	Female	Yes	F.E. Warren	13	510217	4556300
9	Female	Yes	Johnson Creek	13	465636	4545490
10	Female	Yes	Johnson Creek	13	655442	4545500
11	Female	No	Johnson Creek	13	465538	4545510
12	Male	Yes	Johnson Creek	13	465517	4545510
13	Female	Yes	Harney Creek	13	456341	4552370
14*	Unknown	No	Harney Creek	13	456394	4552300
15	Female	Yes	Harney Creek	13	456409	4552260
16	Female	Yes	UW Stock Farm	13	446421	4570250

***Seen Only**