

**DISTRIBUTION OF JUMPING MICE (*Zapus*) IN
WYOMING**

PROGRESS REPORT, 2012

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Prepared for:

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December 2012

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. 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 northwestern 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 north and west 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 unless a jumping mouse was captured sooner. Traps were arranged in two transects 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 2012, we sampled six sites (Table 1; Figures 1-6). We captured a total of 14 *Zapus* at three of these six sites (Tables 1 and 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 Preparation).

Rock Creek

The Rock Creek site was located approximately 2.5 miles northeast of the town of Arlington, WY (Figure 1). Rock Creek is a small meandering stream with a broad, densely vegetated riparian zone. The overstory plant community was dominated by narrow-leaf cottonwood and willow. Other overstory plants included alder and aspen. The understory was composed of grasses and forbs along with various shrubs including gooseberry, current, and others. There was considerable beaver activity on and along Rock Creek during our survey. The area is currently managed as a fishing access area by the Wyoming Game and Fish Department. The area does not appear to receive heavy human use. We live-trapped the Rock Creek site from 7/23/2012 to 7/27/2012 and captured a total of 12 *Zapus* (Tables 1 and 2). We had one incidental mortality of a *Zapus* at this site on 7/26/2012

(UTM Zone 13N, Easting 402880, Northing 4608694). The individual that died perished while being processed, apparently due to the stress of being handled.

Martin's Cove

The Martin's Cove site was located on the Sweetwater River directly adjacent to the Martin's Cove Mormon Handcart Museum approximately 50 miles southwest of Casper, WY (Figure 2). The Sweetwater River is a small meandering river. At this site, the river is fairly incised. Consequently, the riparian zone around the river was very narrow. Willow dominated the overstory vegetation while weeds, grasses, and small shrubs were dominant in the understory. This area is managed as a working cattle ranch and historical site. If *Zapus* does occur at this site, there are several potential threats associated with the sites proximity to human habitation. Specifically, parking lots and other infrastructure associated with the museum may alter runoff and reduce habitat quality as has been observed in other portions of Preble's range. Also, domestic dogs and domestic (and possibly feral) cats were observed in proximity to the museum. These animals may predate upon small mammals at this site. We live-trapped the Martin's Cove site from 7/30/2012 to 8/2/2012. We did not capture any *Zapus* at the Martin's Cove site (Table 1).

Pathfinder

The Pathfinder site was located approximately 40 miles southwest of Casper, WY on the Sweetwater River as it enters the western boundary of the Pathfinder National Wildlife Refuge (Figure 3). The Sweetwater River is a small meandering river. This site lacked any significant overstory vegetation. The understory was comprised of sagebrush, greasewood, and assorted sedges. Pathfinder National Wildlife Refuge is managed primarily for wildlife habitat but also for livestock grazing and recreational uses. We live-trapped the Pathfinder site from 8/6/2012 to 8/10/2012. We did not capture any *Zapus* at the Pathfinder site (Table 1). Habitat attributes at this site are not those typically associated with Preble's habitat.

Mill Creek

Mill Creek is located approximately 3 miles southwest of Elk Mountain, WY. Mill Creek is a very small, meandering stream (Figure 4). The overstory is dominated by willow while the understory was comprised of willow, grasses, and sedges. This site was intensively grazed by cattle prior to our survey. Livestock grazing at this site has resulted in reduced grass biomass and has altered the structure of willow shrubs. Additionally, a gravel pit operated by Carbon County lies approximately 50 meters east of Mill Creek. Livestock grazing at this site may present a threat to *Zapus*. The gravel pit may also threaten jumping mice through increased sedimentation of Mill Creek. We live-trapped the Mill Creek site from 8/6/2012 to 8/10/2012. We captured one *Zapus* at the Mill Creek site (Tables 1 and 2).

Medicine Bow River

The Medicine Bow River site was located approximately 11 miles northwest of the town of Medicine Bow, WY on the Medicine Bow River (Figure 5). At this location, the Medicine Bow River is a fairly wide, slow-moving river. Only portions of this site had any overstory vegetation. When present, the overstory was dominated by willow. Understory vegetation was characterized by low-growing willows, sedges, and sagebrush. Cattle were present during trapping at this site. If *Zapus* occur at this site, livestock grazing activity likely represents a threat as cattle were observed spending considerable time within the riparian corridor. We live-trapped the Medicine Bow River site from 8/13/2012 to 8/17/2012. We did not capture any *Zapus* at this site (Table 1).

Little Laramie River

The Little Laramie River site was located approximately 20 miles west of Laramie, WY (Figure 6). The trapping

transect was actually placed along the Mammoth Ditch, an irrigation canal drawing water from the Little Laramie River. At this location, the Little Laramie River forms a broad riparian zone dominated by willows and cottonwood trees. Along the Mammoth Ditch, overstory vegetation was dominated by willow while understory was composed of shrubs like wild rose and grasses and forbs. This site is managed for livestock grazing and outdoor recreation (fishing and hunting). We live-trapped the Little Laramie River site from 8/13/2012 to 8/14/2012. We captured one *Zapus* at this site (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 North Platte River, which constitutes the northern and eastern edge of suspected Preble's range in Wyoming. While these efforts did not yield any *Zapus caputres* along the North Platte River, one *Zapus* was captured on the North Laramie River, a tributary to the North Platte. 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).

Literature Cited

- Abernethy, I. M. and G. P. Beauvais. In Preperation. Distribution of *Zapus* in Wyoming. University of Wyoming, Report prepared for the USDI Fish and Wildlife Service by the Wyoming Natural Diversity Database, Laramie, Wyoming.
- Bowe, A. and G. P. Beauvais. 2012. An assessment of species and subspecies of *Zapus* in Wyoming. Report prepared for the USDI Fish and Wildlife Service - Wyoming Field Office by the Wyoming Natural Diversity Database - University of Wyoming, Laramie, Wyoming.
- Keinath, D. A., M. D. Anderson, and G. P. Beauvais. 2010a. Range and modeled distribution of Wyoming's species of greatest conservation need., Wyoming Natural Diversity Database, Laramie, Wyoming.
- Keinath, D. A., A. M.D., and B. G.P. 2010b. Range maps for Wyoming's species of greatest conservation need. Report prepared for the Wyoming Game and Fish Department by the Wyoming Natural Diversity Database, Laramie, Wyoming.
- King, T. L., J. F. Switzer, C. L. Morrison, M. S. Eackles, C. C. Young, B. A. Lubinski, and P. Cryan. 2006. Comprehensive genetic analyses reveal evolutionary distinction of a mouse (*Zapus hudsonius preblei*) proposed for delisting from the US Endangered Species Act. *Molecular Ecology* **15**.
- United States Department of the Interior Fish and Wildlife Service. 2004. Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*) Survey Guidelines. Ecological Services Colorado Field Office Lakewood, CO.

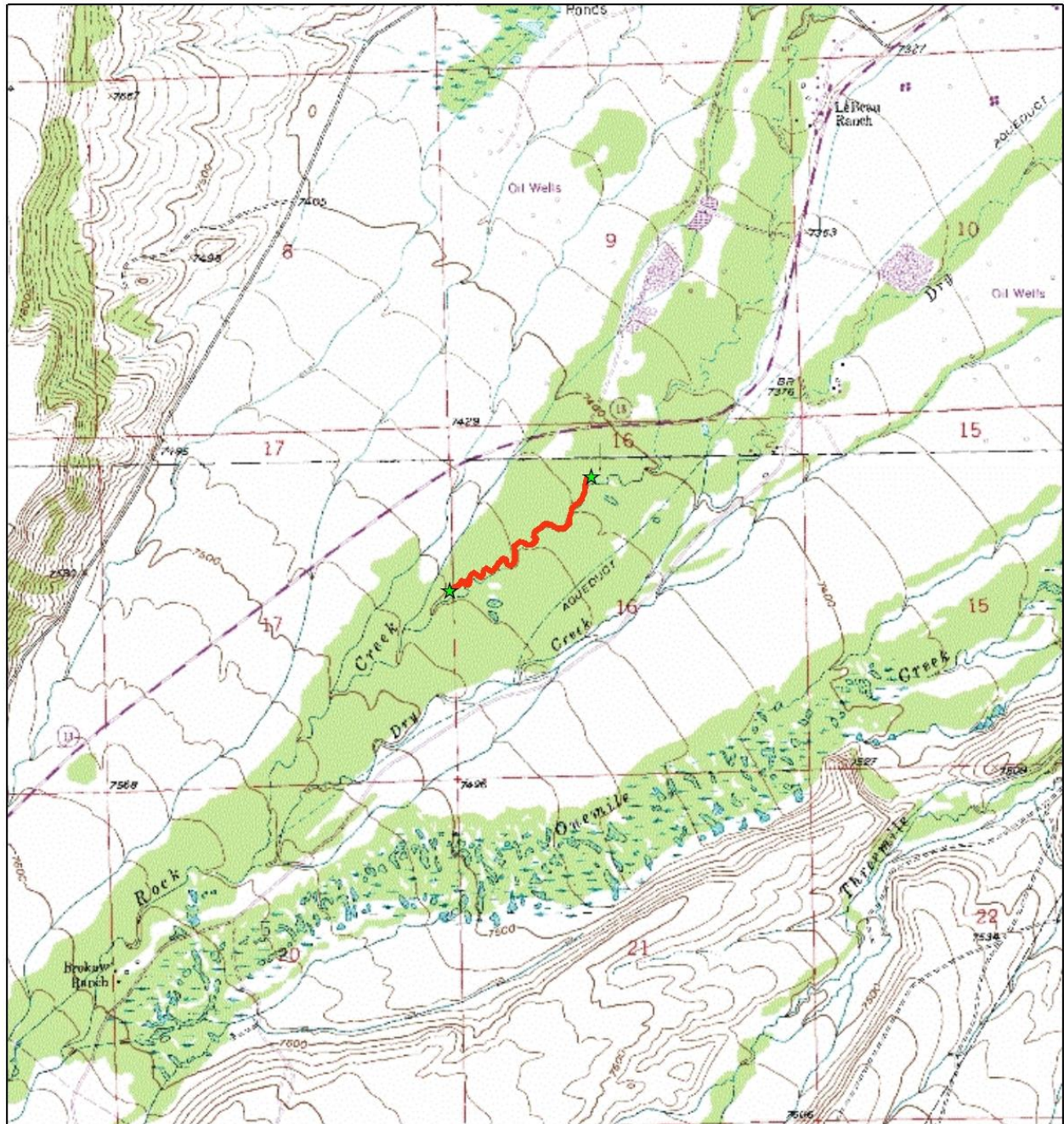
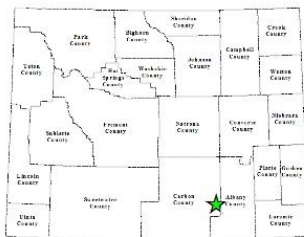


Figure 1. Map of trapping transect along Rock Creek.



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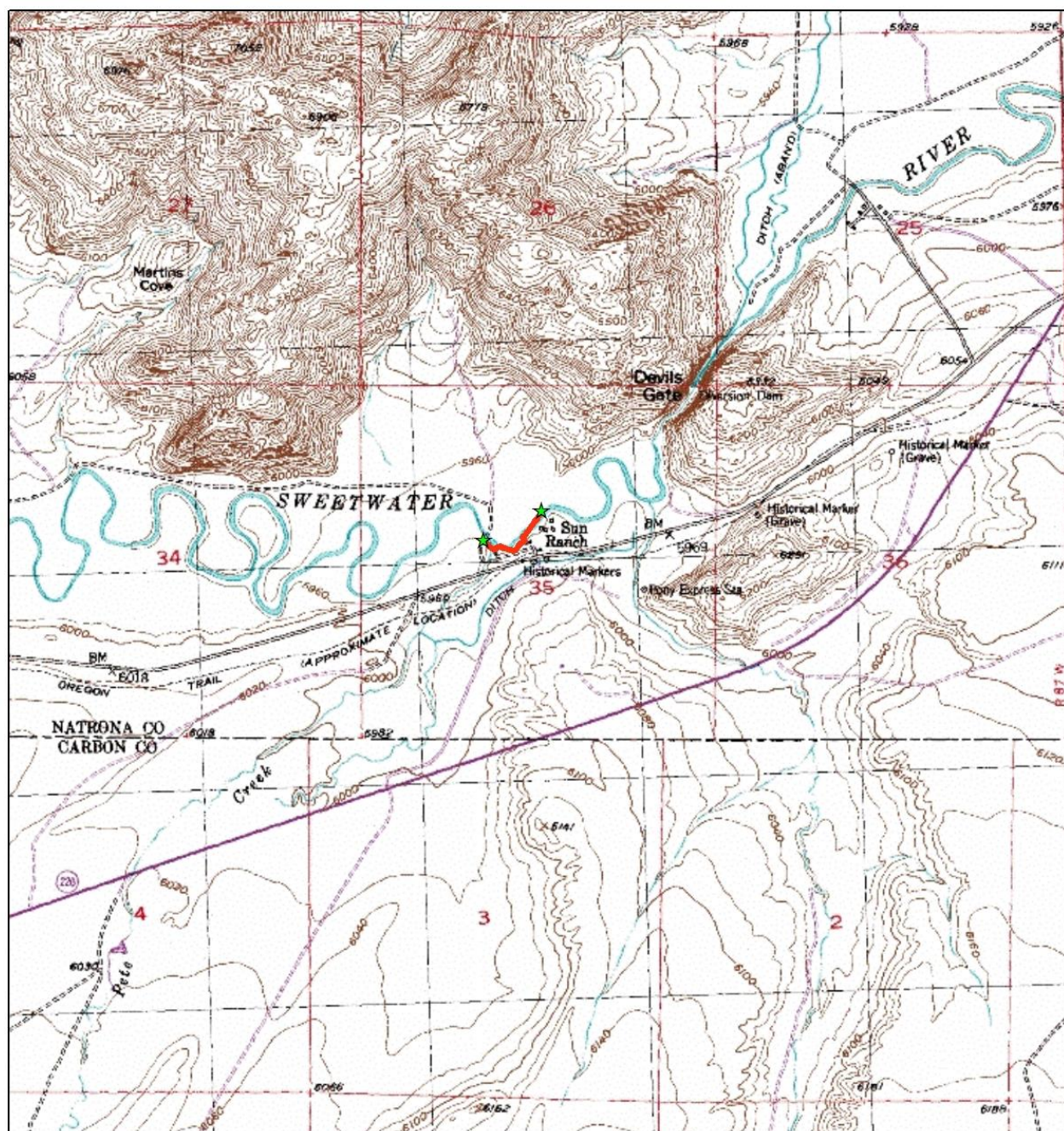
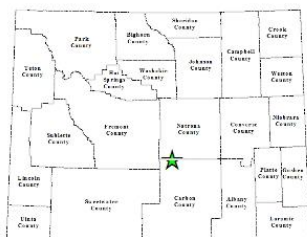
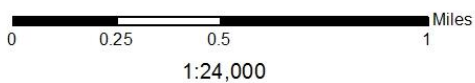


Figure 2. Map of trapping transect at the Martin's Cove site.



Legend

- ★ Transect End Points
- Trapping Transect



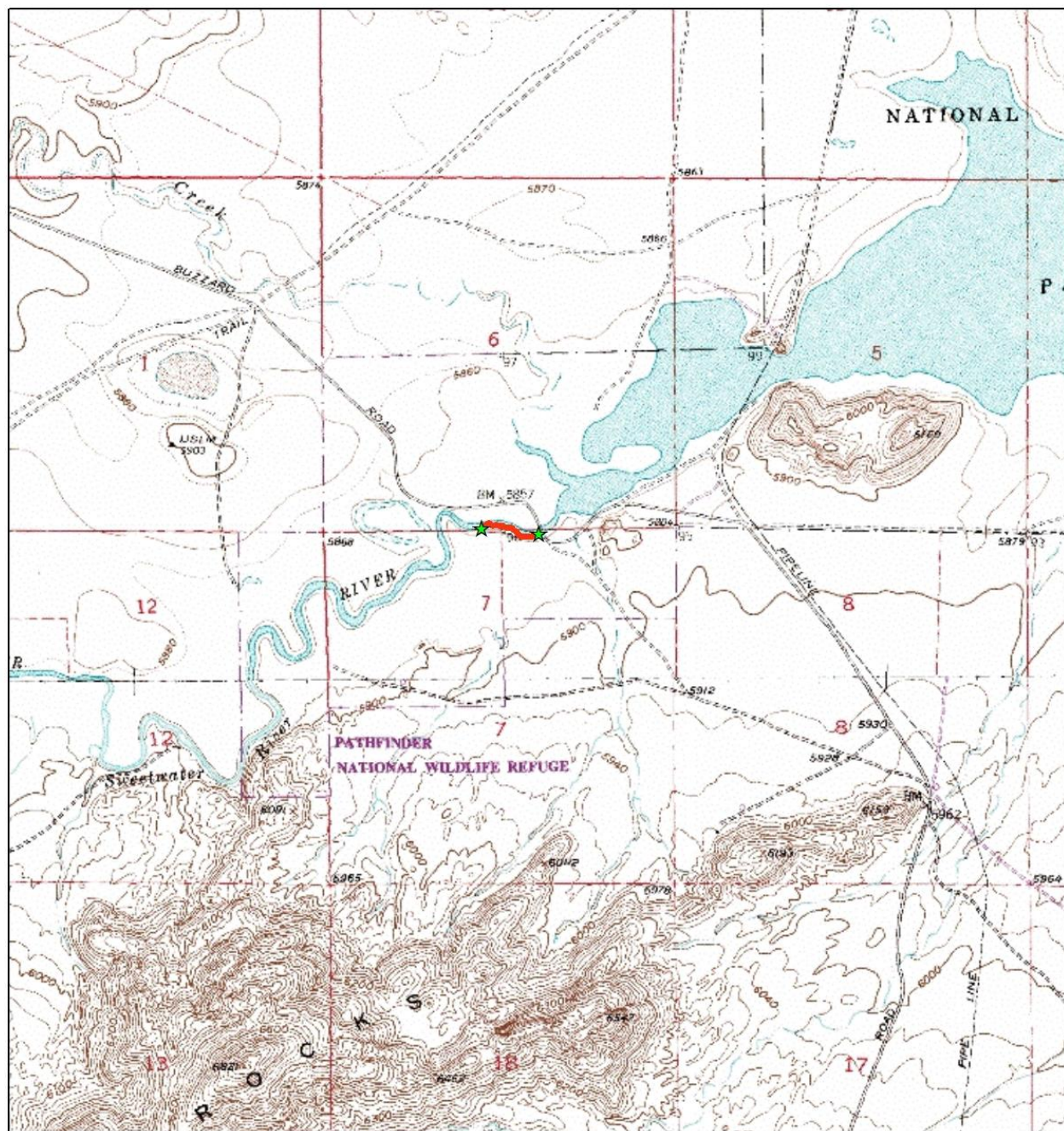
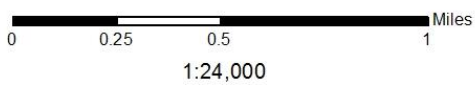
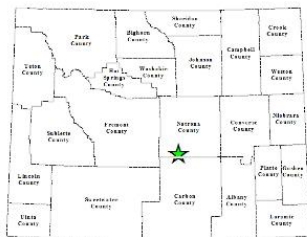


Figure 3. Map of trapping transect at the Pathfinder site.



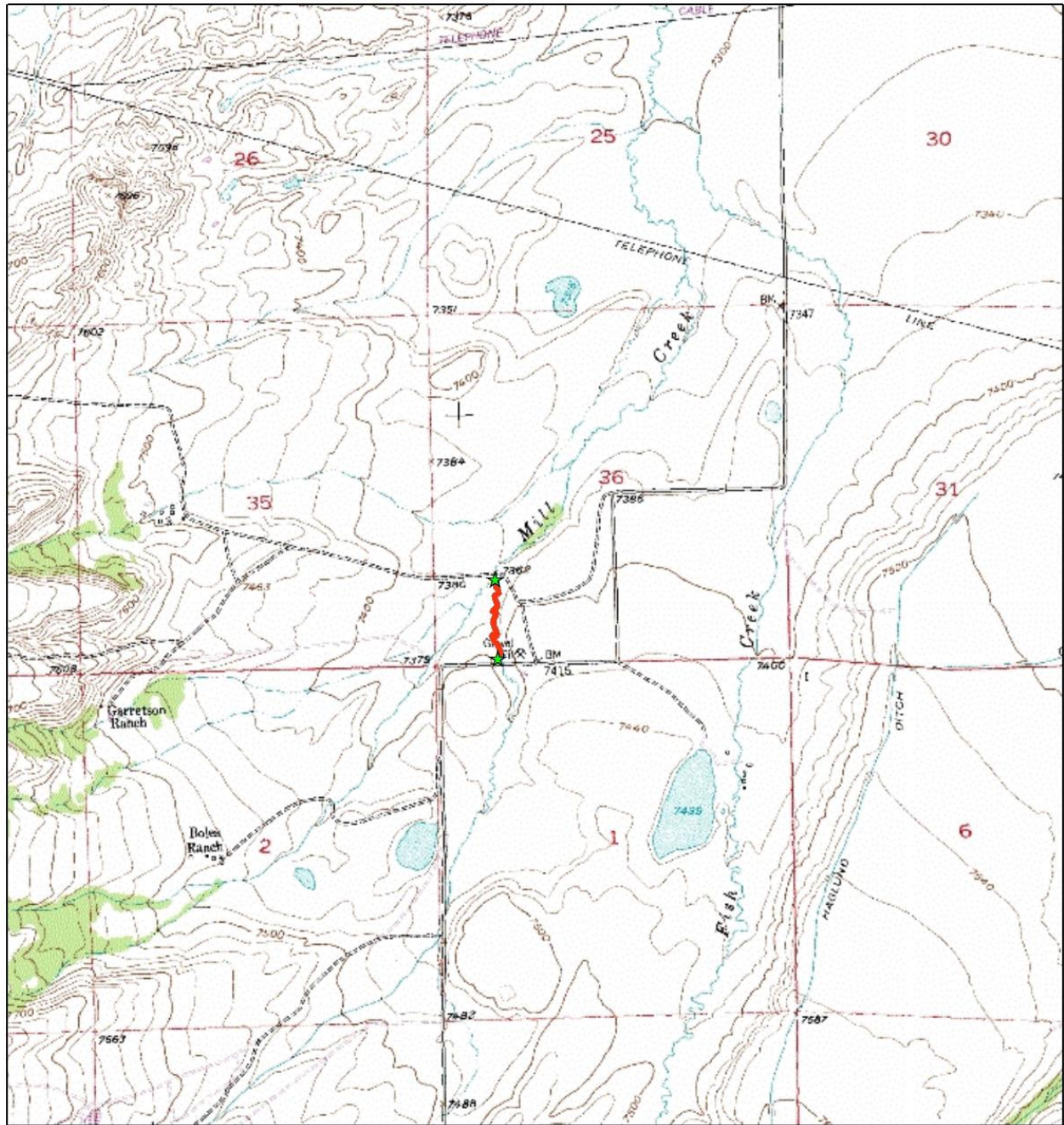
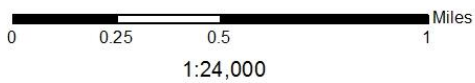
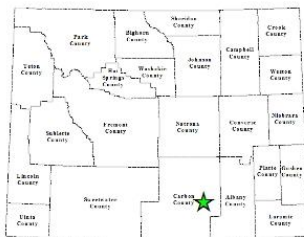


Figure 4. Map of trapping transect along Mill Creek.



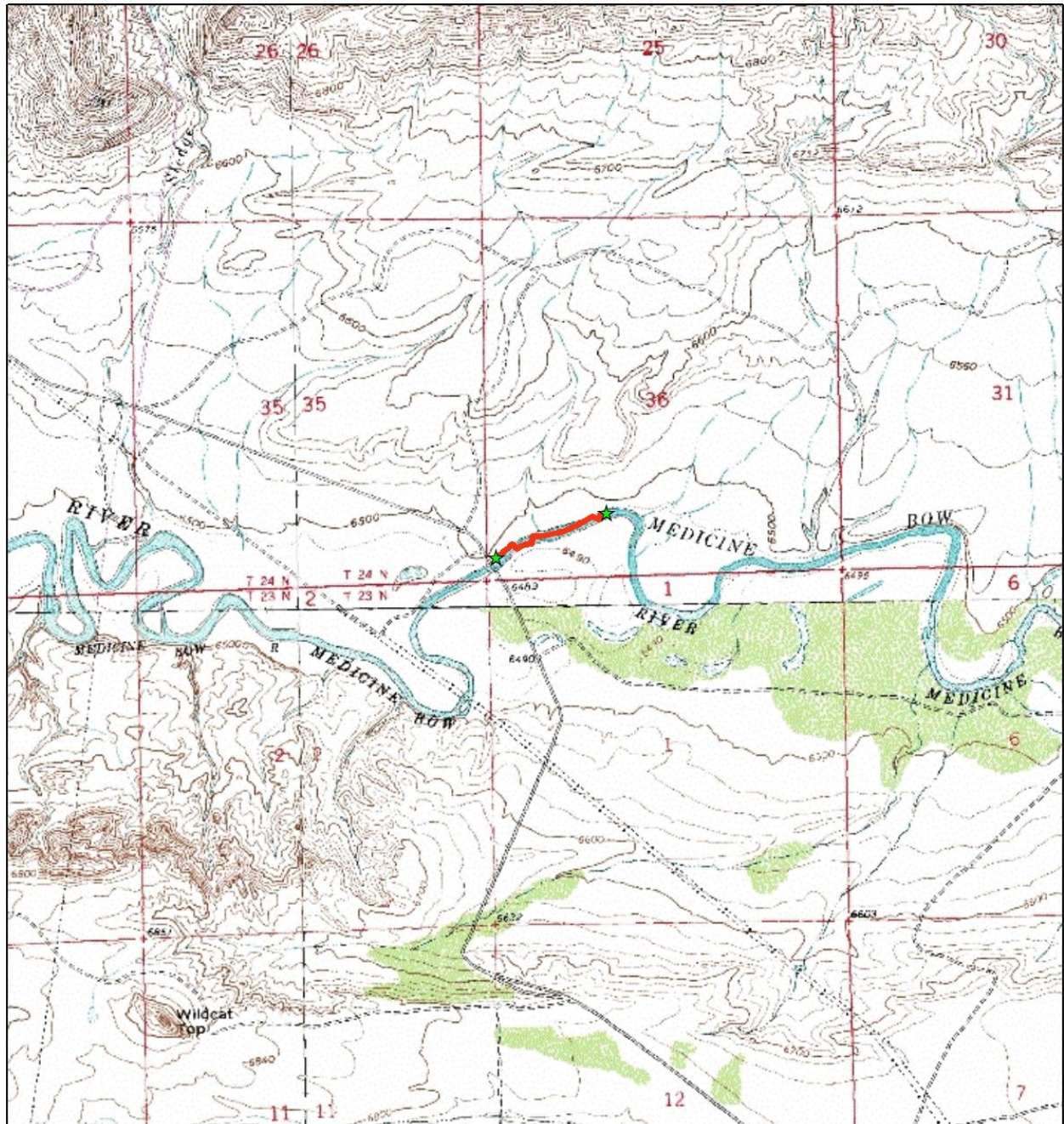
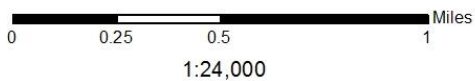
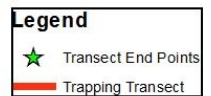
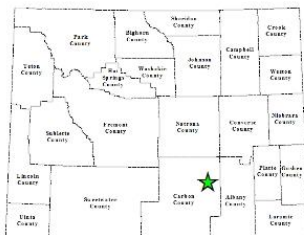


Figure 5. Map of trapping transect along the Medicine Bow River.



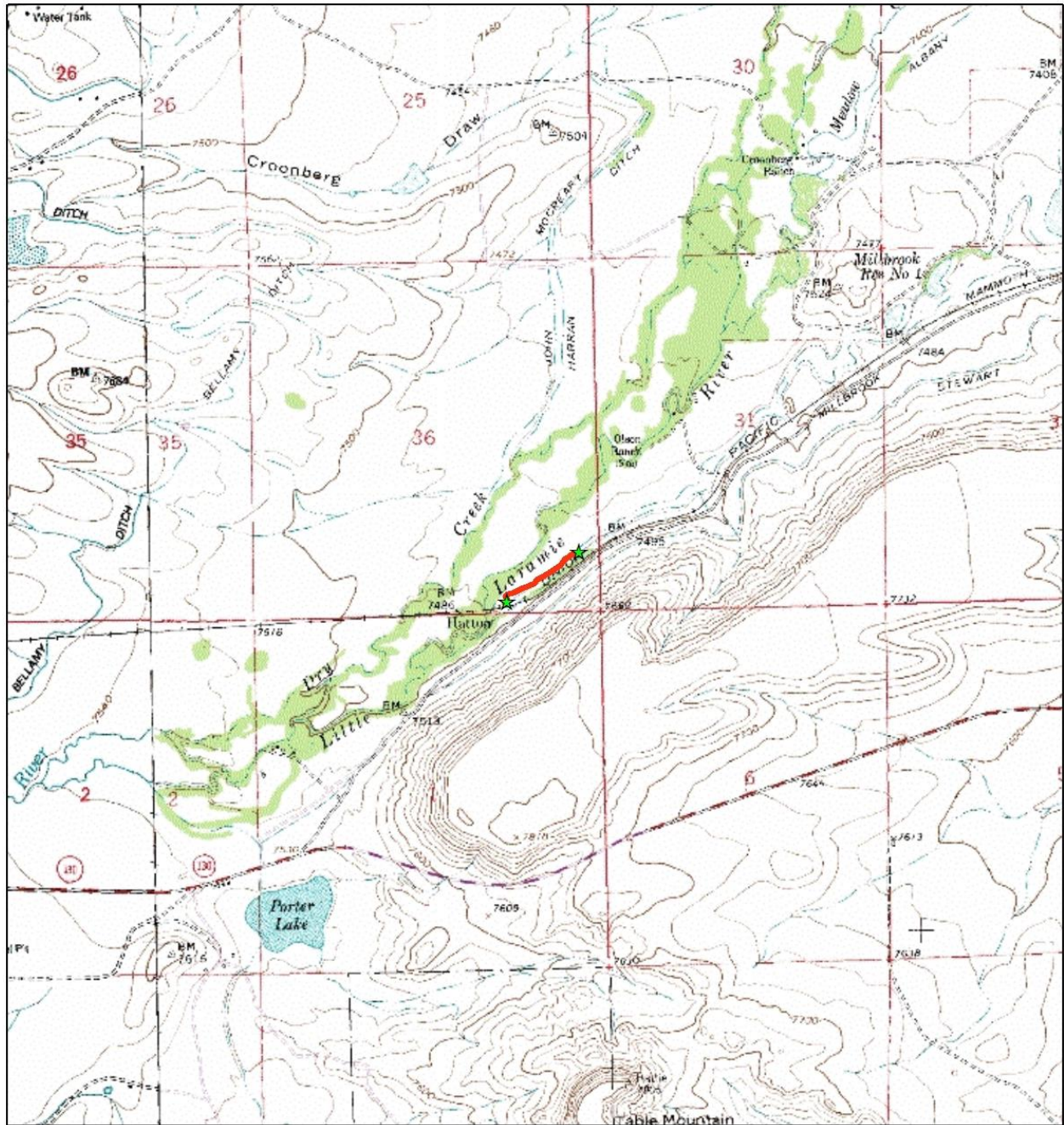
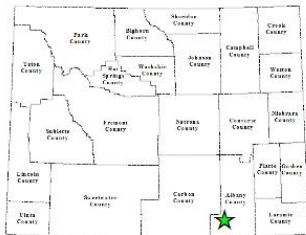


Figure 6. Map of trapping transect along the Little Laramie River.



Legend

- ★ Transect End Points
- Trapping Transect

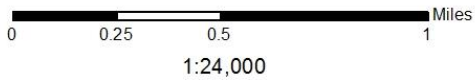


Table 1. The number of *Zapus* captured, total trapping effort corrected for sprung traps, and location of transects sampled in 2012.

Site	Number of <i>Zapus</i> Captured	Total Trapnights	UTM Zone	UTM Easting	UTM Northing
Rock Creek	12	672	13	402726	4608715
Martin's Cove	0	770	13	317255	4701314
Pathfinder	0	763	13	330625	4708010
Mill Creek	1	777	13	378691	4612679
Medicine Bow River	0	827	13	386984	4650900
Little Laramie River	1	200	13	417870	4753126

Table 2. Information for individual *Zapus* captured in 2012.

<i>Zapus</i> Number	Sex	Genetic Material Submitted	Site Name	UTM Zone	UTM Easting	UTM Northing
1	Female	Yes	Rock Creek	13	402618	4608558
2	Male	Yes	Rock Creek	13	402321	4608356
3*	Male	Yes	Rock Creek	13	402878	4608693
4	Male	No	Rock Creek	13	402596	4608553
5	Unknown	No	Rock Creek	13	402184	4608297
6	Male	Yes	Rock Creek	13	402695	4608674
7	Male	Yes	Rock Creek	13	402675	4608612
8	Unknown	Yes	Rock Creek	13	402670	4608605
9	Unknown	Yes	Rock Creek	13	402489	4608499
10	Female	Yes	Rock Creek	13	402479	4608485
11	Female	Yes	Rock Creek	13	402445	4608429
12	Unknown	No	Rock Creek	13	402121	4608255
13	Male	Yes	Mill Creek	13	378696	4612695
14	Female	Yes	Little Laramie River	13	417954	4573154

*Mortality