



Appendix E

2019 USFWS
Biological Opinion



United States Department of the Interior



FISH AND WILDLIFE SERVICE Colorado Ecological Services

IN REPLY REFER TO:
FWS/R6/ES/CO

Front Range:
Post Office Box 25486
Mail Stop 65412
Denver, Colorado 80225-0486

Western Slope:
445 W. Gunnison Avenue
Suite 240
Grand Junction, Colorado 81501-5711

TAILS: 06E24000-2019-F-0328

February 19, 2019

Lieutenant Colonel Jimmy J. Jeoun, Commander
10th Civil Engineer Squadron
8120 Edgerton Drive, Suite 40
USAF Academy, Colorado 80840-2400

Dear Lt. Colonel Jeoun:

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*) and the Interagency Cooperative Regulations (50 CFR 402), this document transmits the U.S. Fish and Wildlife Service's (Service's) final biological opinion on impacts to the federally threatened Preble's meadow jumping mouse (*Zapus hudsonius preblei*) from the U.S. Air Force Academy's (Academy) authorization of construction of a 38-acre commercial development near the North Gate Boulevard entrance that will include a visitor center, hotels, and office space in El Paso County, Colorado. We received your request for formal consultation on January 29, 2019. Critical habitat has not been designated in the project area.

The Academy and the United States Air Force (Air Force) are proposing to enter into an Enhanced Use Lease (EUL) with Blue & Silver Development Partners (Blue and Silver) to complete the True North Commons Development Project within a 58-acre open space EUL property at the Academy (EUL boundary). The development plus off-site stormwater infrastructure will result in short or long-term disturbance of approximately 43 acres. The proposed stormwater detention system will discharge onto uplands east of Monument Creek, which provides habitat for the Preble's mouse.

We base this biological opinion on the Revised January 2019, project description and biological assessment, as well as any subsequent clarifying correspondence. The biological assessment addresses the proposed project's potential direct, indirect, and cumulative impacts to the Preble's meadow jumping mouse. The Service agrees with your determination that the proposed project may affect, and is likely to adversely affect the Preble's meadow jumping mouse. Critical habitat has not been designated in the project area; therefore, none will be affected.

CONSULTATION HISTORY:

The Academy entered into a Conservation Agreement (Agreement) with the Service in April 2000 that is intended to maximize the extent, quality, and connectivity of Preble's mouse habitat within the Academy. The Agreement is typically renewed every 5 years and was last renewed in January 2015. As part of the Agreement, the Academy mapped buffers around drainages (Preble's Conservation Zone) where Preble's mouse habitat occurs. To develop their Preble's Conservation Zone, the Academy followed the Service's mapping boundaries for Critical Habitat and generally mapped habitat within 300 feet of the 100-year floodplain as conservation habitat.

Blue and Silver, the Academy, and the project engineer (Matrix Design Group, Inc.) have coordinated with Brian Mihlbachler, the Academy's Natural Resources Manager, for consultation with the Service. Dr. Mihlbachler also walked the project area with Clint Henke with ERO Resources Corporation (ERO).

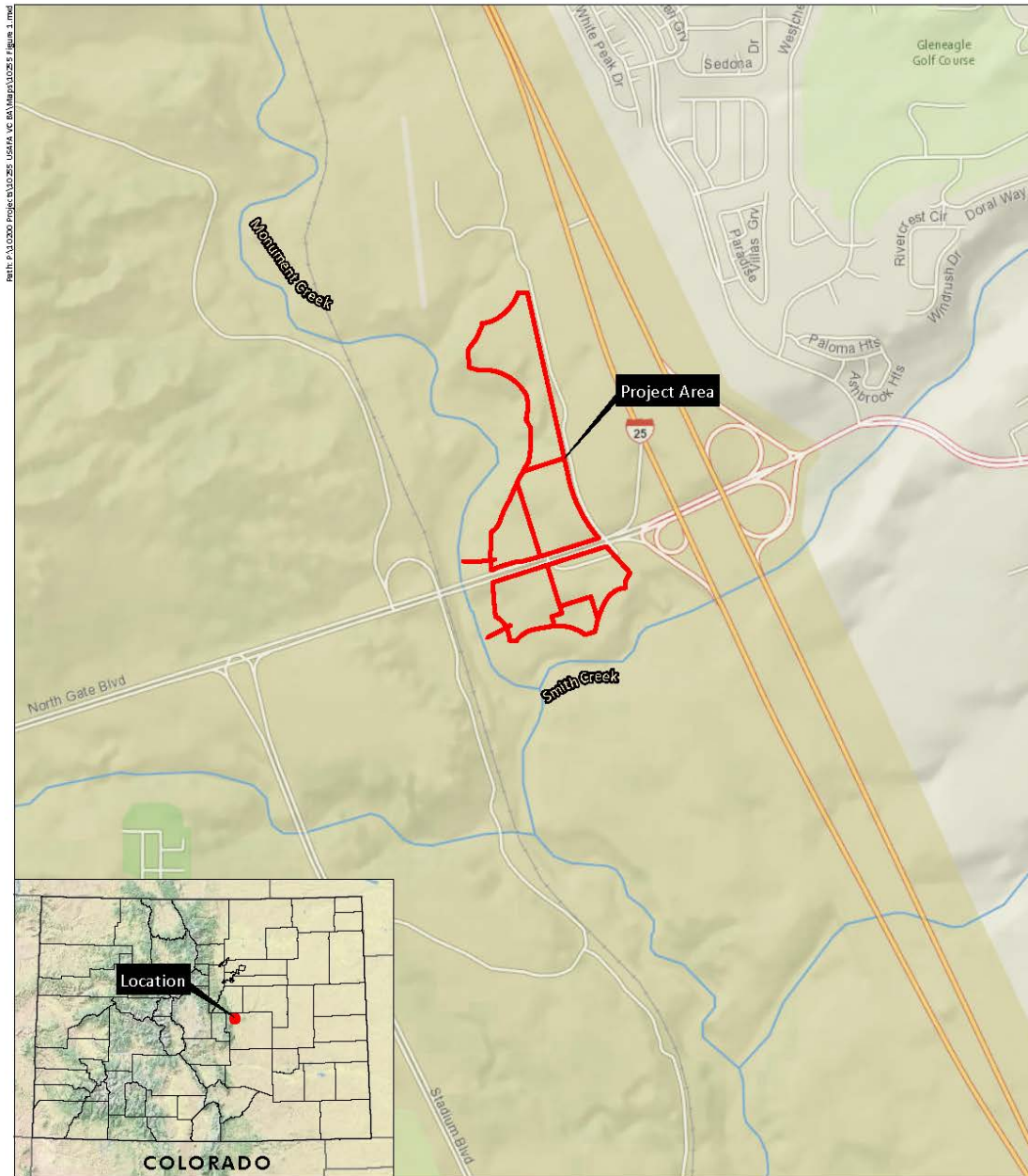
The federal action triggering the section 7 consultation is preparation of an Environmental Assessment under the National Environmental Policy Act (NEPA) by the Academy and the Air Force. The Air Force is the lead agency on the project.

On January 29, 2019, we received your biological assessment.

BIOLOGICAL OPINION**DESCRIPTION OF THE PROPOSED ACTION:**

The Academy and the Air Force are proposing to enter into a EUL with Blue and Silver to design and construct a commercial development located near the North Gate entrance to the Academy that will consist of a visitor center, a luxury destination hotel, a business hotel, office space, open space, and supporting retail/recreational development. The project area includes development on 38 acres of the 58-acre EUL property and approximately 3 acres of North Gate Boulevard and 2 acres off-site for stormwater infrastructure (Figure 1). Riparian and wetland habitats that exist in the northern portion of the EUL area, along Monument Creek, and Smith Creek would largely be avoided. Detention ponds, storm pipes and dispersion basins are currently proposed along the western portion of the development complex that would extend into low-quality Preble's habitat. An important element of the development process includes forming a Business Improvement District (BID) that will own, operate and maintain the True North Commons development and will maintain the stormwater management facilities.

The general drainage patterns will consist of positive drainage from the structures, across landscaping and open space, to curb and gutter within the internal roadways/parking areas and along North Gate Boulevard. Subsequently, stormwater from the roadways will be directed to inlet collection points, where it will be captured and conveyed through an onsite pipe network system to a pair of full spectrum detention ponds located on the west side of the development area: one is north of North Gate Boulevard (north pond) and the other is south of North Gate Boulevard (south pond). These ponds will each release stormwater into the Academy's Preble's Conservation Zone adjacent to Monument Creek.



Path: P:\10255\Project\10255_USAFA_VC_BA\Map\10255_Figure 1.mxd

True North Commons Development

Sections 1 and 12, T12S, R67W; 6th PM
UTM NAD 83: Zone 13N; 513872mE, 4319409mN
Longitude 104.839747°W, Latitude 39.023615°N
USGS Monument, CO Quadrangle

El Paso County, Colorado
Content may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.
Copyright © 2013 National Geographic Society, Incubed



**Figure 1
Vicinity Map**

Prepared for: Blue & Silver Development Partners
File: 10255 Figure 1.mxd [dtd]
January 3, 2019



Portions of this document include intellectual property of ESR and its licensors and are used herein under license. Copyright © 2018 ESR and its licensors. All rights reserved.

The onsite full-spectrum detention ponds are located in natural low areas downslope from the north and south portions of the development areas respectively, and have been designed to reduce the developed flows from the EUL Area to a maximum of the historic peak flows. The detention ponds have been sized and evaluated based on the 100-year storm events in accordance with City of Colorado Springs Drainage Criteria Manual. The proposed flows and detention pond sizing are shown in Table 1 on page 5 of the biological assessment. The total project area including the development acreage, the off-site disturbance area, and the areas subject to indirect impact is approximately 43 acres in size. The full-spectrum detention ponds would release 99 percent of the treated flows into Monument Creek over a period of 120 hours (extended release) following a precipitation event.

The two ponds will each have a storm drain pipe that will convey the treated flows west until they release into a dispersion basin. At this discharge point, there will be a flared-end section to release the runoff into a riprap-lined dispersion basin to mitigate any erosion caused by the point discharge of the runoff. The dispersion basins are sized based on the volume of runoff as well as the anticipated velocity of the flow being discharged from the flared-end section to dissipate the energy and minimize potential impacts to uplands or Monument Creek. The weir of each dispersion basin is approximately 40 feet long, allowing for the point discharge from the flared-end section to spread and be released in a sheet flow condition. The combination of minimal critical depth, low velocity, and infiltration capacity of the downslope soils would alleviate erosion concerns in the uplands resulting from storm water flows. The outfall points for each pond have been designed and positioned to minimally impact what is considered low quality Preble's mouse habitat by the Academy.

This pond discharge design requires additional infrastructure located outside the EUL boundary but within the project boundary where reinforced concrete pipe would be buried from the onsite detention ponds to the dispersion basins. Temporary disturbance from construction equipment would occur within a 100-foot wide area (50 feet on each side of the reinforced concrete pipe) of Academy lands adjacent to (west of) the EUL boundary as well as within the area 50 feet beyond the design boundary of the dispersion basin. Staging for all development construction would either be located within the EUL property boundary or within the project area temporary impact extents.

Conservation Measures

Conservation measures are actions outlined in the project description that the project proponent will implement in order to reduce the environmental impacts of the action or promote the recovery of threatened and endangered species. The Service considers the beneficial effects of these conservation measures during the jeopardy and adverse modification analyses.

Conservation measures are part of the proposed action and their implementation is required under the terms of this consultation.

- Construction of the pipelines and dispersion basins is planned for March 2020, which is during Preble's mouse hibernation period. This timing reduces stress on the species by avoiding the active season when Preble's mice are aboveground during the breeding season.

Minimizing stress on individuals during the breeding season may reduce the loss of productivity and mortality.

- Equipment access in the construction area will be strictly limited. A proposed equipment staging area has been designated in current uplands, and construction access has been limited to existing areas of low-quality habitat as much as possible.
- Installation of temporary fencing to define construction limits and deter access into areas that are not to be affected.
- Compliance with the City of Colorado Springs Drainage Criteria Manual Volume 1, Chapter 6, Section 7.1, which requires using the Urban Drainage and Flood Control District's four-step process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume, stabilizing drainageways, and implementing long-term source controls. This is described on page 17 of the biological assessment.
- Revegetating all temporarily disturbed areas with native seed mixes to reduce erosion and replace habitat value. All areas disturbed during construction will be revegetated with a native seed mix per the Academy's Erosion Control Revegetation, and Tree Care Standards. Additionally, native shrubs and tree species will be planted downstream of each dispersion basin to enhance landscaping around the basins following completion of project construction.
- Installing sediment- and erosion-control devices, such as silt fence, to minimize surface runoff in disturbed areas.
- Placing vehicle tracking control devices at site entrance(s).
- Locating equipment refueling and staging areas on inactive roads or upland areas away from wetlands and riparian areas.
- Placing biodegradable erosion-control blankets on newly seeded steep slopes to control erosion and promote vegetation establishment.
- The BID will monitor conditions in the project area. Any signs of erosion identified by the BID inspections would be repaired quickly by the BID.
- The following criteria will be used to assess the success of mitigation efforts. These minimum standards must be met at the end of two growing seasons for woody revegetation to be considered successful and, hence, to be released from monitoring requirements:
 - For upland areas, the grasses and shrubs will achieve at least 80 percent cover of adjacent undisturbed reference areas. At least 50 percent of the canopy cover will consist of native perennial grasses.
 - Tree and shrub plantings will have at least 80 percent survival.
 - State-listed noxious weeds will be controlled to prevent competition with the planted vegetation. Noxious weeds will not exceed 10 percent canopy cover in the revegetated areas. This minor degree of noxious weed infestation will likely not be detrimental to Preble's mice based on documentation that the species is not precluded by the presence of weedy vegetation.
 - Upland sites will be adequately stabilized to prevent gulying, severe erosion, and sedimentation. Areas of soil instability will be promptly treated (e.g., riprap, silt fence, erosion matting, and hay bales) to prevent further site degradation beyond that found preconstruction.

ACTION AREA:

The action area is not only the immediate area involved in the action, but also includes all areas to be affected directly or indirectly by the Federal action (50 CFR § 402.02). The action area contains the most far-reaching potential effects of the Federal and non-Federal actions on the species being discussed. The action area is defined by measurable or detectable changes in land, air, and water or to other measurable factors that will result from the proposed action. In other words, the action area is not limited to the “footprint” of the action, but rather encompasses the biotic, chemical, and physical impacts to the environment resulting directly or indirectly from the action.

We describe the action area as including not only the project area, which is defined by the limits of the project’s disturbance, but also downstream reaches of Monument Creek. We include downstream reaches in order to evaluate the proposed project’s potential secondary impacts from erosion, sedimentation, pollution, hydrologic changes, and fragmentation. We use 3.0 miles to conservatively define the action area’s downstream limit along a drainage, based on the 2.3-mile (4.0-kilometer) maximum recorded dispersal distance for the Preble’s meadow jumping mouse.

STATUS OF THE PREBLE’S MEADOW JUMPING MOUSE:

The Service added the Preble’s meadow jumping mouse to the List of Endangered and Threatened Wildlife in 50 CFR 17.11 as a threatened species on May 13, 1998 (63 FR 26517). As discussed in more detail under the Environmental Baseline section, previous trapping surveys and habitat evaluations confirm that the species occupies the action area.

Taxonomy

The Preble’s meadow jumping mouse is a member of the family Dipodidae (jumping mice) with four living genera, two of which, *Zapus* and *Napaeozapus*, are found in North America (Hall 1981). The three living species within the genus *Zapus* are *Z. hudsonius* (the meadow jumping mouse), *Z. princeps* (the western jumping mouse), and *Z. trinotatus* (the Pacific jumping mouse). Edward A. Preble (1899) first documented the meadow jumping mouse from Colorado. Krutzsch (1954) described the Preble’s as a separate subspecies of meadow jumping mouse limited to Colorado and Wyoming. Taxonomic authorities recognize the Preble’s subspecies of meadow jumping as 1 of 12 subspecies of meadow jumping mouse (Hafner *et al.* 1981).

A September 2013 publication in *Molecular Ecology* further evaluated the genetic relationship between jumping mice, including the Preble’s (Malaney and Cook, 2013). This study broadly evaluated the entire *Zapus* genus, including all 12 subspecies of meadow jumping mice (*Z. hudsonius*) and confirmed that the Preble’s is distinct from neighboring subspecies that were previously proposed to be taxonomically synonymized (*Z. h. campestris* and *Z. h. intermedius*) (Malaney and Cook, 2013, pp. 8, 10). However, the study concludes that Preble’s is closely related to two meadow jumping mouse subspecies that are found in Alaska and Canada (*Z. h. tenellus* and *Z. h. alascensis*), which the study refers to as the “northern lineage” of meadow jumping mice (Malaney and Cook 2013, p. 8, 10). Although the study suggests that the Preble’s meadow jumping mouse is genetically similar to two subspecies of jumping mice found in

Alaska and Canada, it does not propose to revise the formal taxonomy of Preble's or any of the other subspecies of jumping mice (Malaney and Cook 2013, p. 10). Specifically, the study concludes, "additional tests will be required before hypotheses of infraspecific taxonomic synonymy can be implemented... [and that] a revised taxonomy of the group is needed but is outside the context of this study" (Malaney and Cook, p. 10).

Although the Preble's may be genetically similar to two other subspecies found more than 800 miles away in Alaska and Canada, the study confirms that the Preble's is genetically isolated from its nearest neighbors found in Wyoming and New Mexico (Malaney and Cook 2013, p. 10). Therefore, even if the Preble's were to be taxonomically synonymized into a "northern lineage," the Preble's appears to be both (1) distinct, due to the significant geographic separation from the two other subspecies of the "northern lineage" and (2) significant, because the loss of this southernmost population along the Front Range would represent a range retraction of more than seven latitudinal degrees to the north, likely resulting in a significant gap in the range of the taxon. Therefore, the best available information continues to indicate that the Preble's is a valid subspecies of meadow jumping mice (SEI 2006a, p. 44).

Physical Description

The Preble's is a small mouse with an extremely long tail, large hind feet, and long hind legs, which enable jumping mice to make prodigious leaps (Figure 3). The long tail is bicolored, lightly furred, and twice as long as the body. The large hind feet are three times as large as those of other mice of similar body size. Preble's have a distinct, dark, broad stripe on its back that runs from head to tail and is bordered on either side by grey to rusty, orange-brown fur. The hair on the back of all jumping mice appears coarse compared to other mice. White hairs on the underside are finer.



Figure 3. The Preble's meadow jumping mouse, or Preble's, has an extremely long tail, large hind feet, and a distinctive dark stripe running along its back. Unlike deer mice or voles, the Preble's makes incredible jumps to escape predators. Left photo: The Preble's is in "torpor," or cold-induced hibernation/sleep. (USFWS)

Adult Preble's are approximately 7 to 10 inches (18 to 25 centimeters) long and the tail is 4 to 6 inches (10 to 15 centimeters) long (Kruttsch 1954; Fitzgerald *et al.* 1994; Fitzgerald *et al.* 2011). The average weight of 120 adult Preble's captured early in their active season prior to June 18 was 0.6 ounces (17 grams); included were 10 pregnant females weighing more than 0.8 ounces (20 grams) (Meaney *et al.*, 2002).

Preble's meadow jumping mouse Life History

Habitat

Preble's meadow jumping mice live in well-developed, plains riparian vegetation with adjacent, relatively undisturbed grassland communities and a nearby water source (Figure 4). The well-developed, plains riparian vegetation typically includes a dense combination of grasses, forbs, and shrubs; a taller shrub and tree canopy may be present (Bakeman 1997). When a taller canopy is present, the shrub canopy is often willow (*Salix* spp.), although other shrub species, including snowberry (*Symphoricarpos* spp.), chokecherry (*Prunus virginiana*), hawthorn (*Crataegus* spp.), Gambel's oak (*Quercus gambelli*), alder (*Alnus incana*), river birch (*Betula fontinalis*), skunkbrush (*Rhus trilobata*), wild plum (*Prunus americana*), lead plant (*Amorpha fruticosa*), dogwood (*Cornus sericea*) and others may also occur (Bakeman 1997, Shenk and Eussen 1998).



Figure 4. Preble's habitats feature dense riparian vegetation, such as willows and cottonwoods, and adjacent grassy uplands within 300 feet of the 100-year floodplain, with an open water source nearby. (USFWS)

Preble's have rarely been trapped in uplands adjacent to riparian areas (Dharman 2001; Hansen 2006). However, Preble's feed and rest in adjacent uplands (Shenk and Sivert 1999b; Schorr 2001) as far out as 328 feet (100 meters) beyond the 100-year floodplain (Ryon 1999; Tanya Shenk-Colorado Division of Wildlife, 2002). Adjacent uplands used by the Preble's are extremely variable ranging from open grasslands to ponderosa pine (*Pinus ponderosa*) woodlands (Corn *et al.* 1995; Pague and Grunau 2000).

Riparian shrub cover, tree cover, and the amount of open water nearby are good predictors of Preble's densities (White and Shenk 2000). Based on habitat quality, estimates of Preble's abundance range from 6 to 110 mice per mile with an average of 53 mice per mile of stream (White and Shenk 2000). A comparison of habitats at capture locations on the Department of Energy's Rocky Flats Site in Jefferson County, Colorado, and the U.S. Air Force Academy (Academy) in El Paso County, Colorado, revealed that Academy sites had lower plant species richness at capture locations but considerably greater numbers of Preble's (Schorr 2001). However, the Academy sites also had higher densities of both grasses and shrubs. Preble's abundance is likely driven by the density of riparian vegetation rather than the diversity of plant species.

During the active season, Preble's construct day nests composed of grasses, forbs, sedges, rushes, and other available plant material. Day nests may be globular in shape or simply raised mats of litter, and are most commonly above ground but may also be below ground. Day nests are typically located under debris at the base of shrubs and trees, or in open grasslands (Ryon 2001). Mice may have multiple day nests in both riparian and grassland communities (Shenk and Sivert 1999a), and may abandon a nest after approximately one week of use (Ryon 2001).

Hydrologic regimes that support Preble's habitat range from large perennial rivers such as the South Platte River to small ephemeral drainages only 3 to 10 feet wide, as at Rocky Flats and in montane habitats at higher elevations. Flooding is a common and natural event in the riparian systems along the Front Range of Colorado. This periodic flooding helps create a dense vegetative community by stimulating sprouting from willow shrubs and the growth of herbs and grasses in freshly deposited soil.

Hibernation:

Preble's is a true hibernator, usually entering hibernation in September or October and emerging the following May, after a long hibernation period of seven to eight months. Adults enter hibernation first before than young of the year because they accumulate the necessary fat stores more quickly. Similar to other subspecies of meadow jumping mouse, Preble's do not store food for hibernation. Instead, while hibernating, the Preble's persists on fat stores accumulated prior to hibernation (Whitaker 1963).

Hibernacula (hibernation nests) of Preble's have been located both within and outside of the 100-year floodplain of streams (Shenk and Sivert 1999a; Ryon 2001; Schorr 2001). Those hibernating outside of the 100-year floodplain would likely be less vulnerable to flood-related mortality. Fifteen apparent Preble's hibernacula have been located through radio telemetry, all

within 260 feet of a perennial streambed or intermittent tributary (Bakeman and Deans 1997; Shenk and Sivert 1999a; Schorr 2001).

Hibernacula have been located under willow, chokecherry, snowberry, skunkbrush, sumac (*Rhus* spp.), clematis (*Clematis* spp.), cottonwoods (*Populus* spp.), Gamble's oak, thistle (*Cirsium* spp.), and alyssum (*Alyssum* spp.) (Shenk and Sivert 1999a). At the Air Force Academy near Colorado Springs, 4 of 6 likely hibernacula found by radio-telemetry were located in close proximity to coyote willow (*Salix exigua*) (Schorr 2001). The one excavated hibernaculum at Rocky Flats south of Boulder, was found 30 feet above the streambed, in a dense patch of chokecherry and snowberry (Bakeman and Deans 1997). The nest was constructed of leaf litter 12 inches below the surface in coarse textured soil.

Movements and Home Range:

Radio telemetry and mark-recapture data provide insight into the Preble's home ranges and dispersal capabilities. At Plum Creek in Douglas County, Colorado, the Preble's home ranges averaged 1.24 acres (0.50 hectares) based on radio-telemetry (Trainor *et al.* 2012, p. 432). In the Pike National Forest of Colorado, travel distances averaged 1,357 feet (413.9 meters) with an approximate home range size of 1.02 acres (Hansen 2006, p. 158). At the Air Force Academy in El Paso County, Colorado, home ranges were between 0.42 to 9.49 acres (0.17 to 3.84 hectares), with an average home range of 3.48 acres (1.41 hectares) (Schorr 2003, p. 9). During this study, the farthest distance moved by individual Preble's ranged from 43 to 3,176 feet (13 to 968 meters), with an average maximum travel distance of 1,188 feet (362 meters) (Schorr 2003, p. 9). An earlier study documented a Preble's moving as far as 1.1 kilometers (0.7 mile) in 24 hours (Ryon 1999, p. 12). However, compared to radio telemetry data, mark-recapture data suggest that the Preble's may have longer dispersal capabilities. Mark-recapture data between active seasons identified mice traveling more than 4 kilometers (2.3 miles) along a linear riparian system (Schorr 2003, p. 10; Schorr 2012b, pp. 1274, 1278).

Reproduction and Lifespan:

Preble's have two litters per year, but may have up to three litters per year. An average of five young is born, but the size of a litter can range from two to eight young (Quimby 1951; Whitaker 1963). Preble's are long-lived for a small mammal, surviving up to three years, in comparison with many species of mice and voles that seldom live a full year. Along South Boulder Creek, Boulder County, Colorado, seven individuals originally captured as adults were still alive two years later, having attained at least three years of age (Meaney *et al.*, 2002).

Although Preble's are long-lived compared to other small rodents, the annual survival rate is low. Preble's survival rates appear to be lower over the summer than over the winter. Over-summer survival rates ranged from 22 to 78 percent and over-winter survival rates ranged from 56 to 97 percent (Shenk and Sivert 1999b; Schorr 2001; Meaney *et al.* 2002). Higher overwintering survival rates indicate that predation or other factors impact Preble's during the active season.

Predation:

Known predators of the Preble's include garter snakes (*Thamnophis* spp.), prairie rattlesnake (*Crotalus viridus*), bullfrog (*Rana catesbiana*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), house cat (*Felis catus*), long-tailed weasel (*Mustela frenata*), and red-tailed hawk (*Buteo jamaicensis*) (Shenk and Sivert 1999a; Schorr 2001). Drowning and vehicle collisions also kill Preble's (Schorr 2001; Shenk and Sivert 1999a). Other causes of death include starvation, exposure, disease, and insufficient fat stores for hibernation (Whitaker 1963).

Diet:

Although fecal analyses provide the best data on Preble's diet, they overestimate the components of the diet that are less digestible. Preble's diets shift seasonally, consisting primarily of insects and fungi after emerging from hibernation, and shifting to fungi, moss, seeds, and pollen during mid-summer (July through August), with insects again added in September (Shenk and Sivert 1999a). The shift in diet along with shifts in mouse movements suggests that Preble's may require specific seasonal diets, perhaps related to the physiological constraints imposed by hibernation (Shenk and Sivert 1999a).

Preble's Abundance and Trends

Due to the difficulty of implementing long-term trapping studies needed to assess population sizes, quantitative studies designed to estimate Preble's populations have occurred at only a few sites in Colorado. As a result, we lack a reliable regional, Statewide, or rangewide population estimate for the Preble's. Without long-term trapping studies, our understanding of population densities is limited for the Preble's in Wyoming (WGFD 2005, p. 36; WGFD 2010, p. IV-2-66). In Colorado, we have several population estimates, but little trend information for Preble's populations. In addition, because jumping mouse population sizes in a given area vary significantly from year to year (Quimby 1951, pp. 91–93; Whitaker 1972, p. 4), short-term studies may not accurately characterize abundance. In one ongoing trapping study, population highs of 24 and 69 Preble's per site were estimated for two control sites in 1999; subsequent trapping in 2002, during regional drought conditions, found no Preble's at either site (Bakeman 2006, p. 11). Over 4 years, Preble's populations varied widely and were absent at certain sites during some seasons, suggesting that 10 or more years of study might be necessary to assess the full extent of variation in Preble's populations (Meaney *et al.* 2003, p. 620).

Because the Preble's occupies linear riparian communities, researchers estimate abundance as the number of mice per kilometer (or mile) of riparian corridor. Estimates of linear abundance range widely, from 2 to 67 mice per kilometer (3 to 107 mice per mile) with a mean of approximately 27 mice per kilometer (44 mice per mile) (Shenk 2004). These above abundance estimates, coupled with sufficient knowledge of occupied stream miles, may provide a rough indicator of Preble's numbers within a stream reach or drainage, but may overestimate actual population size (Hayward 2002). The Recovery Team used the 27 mice per km (44 mice per mi) population estimate (Shenk 2004) to approximate the number of stream miles required to support varying sized populations of the Preble's (USFWS 2003, p. 25).

As with abundance estimates, the difficulty of implementing long-term trapping studies limits the availability of population trend data for the Preble's. Since 1998, there have been few attempts to characterize changes in Preble's populations over time. One long-term study at the Air Force Academy (Academy) in El Paso County, Colorado, provides the most thorough estimate of population trends for the subspecies. Mark-recapture data over 7 years at the Academy suggested that populations were declining (Schorr 2012b, p. 1277).

Preble's Status and Distribution

The Preble's lives along the foothills in southeastern Wyoming, southward along the eastern edge of the Front Range of Colorado to Colorado Springs, El Paso County (Hall 1981; Clark and Stromberg 1987; Fitzgerald *et al.* 1994; Fitzgerald *et al.* 2011). Knowledge about the current distribution of the Preble's comes from collected specimens, and live-trapping locations from both rangewide survey efforts and numerous site-specific survey efforts conducted in Wyoming and Colorado since the mid-1990s. The Denver Museum of Nature and Science (DMNS) houses recently collected specimens. Trappers file survey reports with the Service's Field Offices in Colorado and Wyoming.

In Wyoming, capture locations of mice confirmed as the Preble's, and locations of mice identified in the field as Preble's and released, extend in a band from the town of Douglas southward along the Laramie Range to the Colorado border, with captures east to eastern Platte County and Cheyenne, Laramie County. The Preble's does not likely extend west past the crest of the Laramie Range in Wyoming (Bowe and Beauvais 2012). In Colorado, the distribution of the Preble's forms a band along the Front Range from Wyoming southward to Colorado Springs, El Paso County, with eastern marginal captures in western Weld County, western Elbert County, and north-central El Paso County.

The Preble's is likely an Ice Age relict (Hafner *et al.* 1981; Fitzgerald *et al.* 1994; Fitzgerald *et al.* 2011). Once the glaciers receded from the Front Range of Colorado and the foothills of Wyoming and the climate became drier, the Preble's was confined to the riparian (river) systems where moisture was more plentiful. The semi-arid climate in southeastern Wyoming and eastern Colorado limits the eastern extent of riparian corridors and restricts the range of the Preble's. The Preble's has not been found east of Cheyenne in Wyoming or on the extreme eastern plains in Colorado. The dry shortgrass prairie defines the eastern boundary for the subspecies and may present a barrier to eastward expansion (Beauvais 2001).

Higher elevations along the Laramie Range and the Front Range likely impose the western boundary of the Preble's. The Service has used 2,300 meters (7,600 feet) in elevation as the general upward limit of Preble's habitat in Colorado (USFWS 1998). Recent morphological examination of specimens has confirmed Preble's to an elevation of approximately 7,600 feet in Colorado (Meaney *et al.* 2001) and to 7,750 feet in southeastern Wyoming (DMNS, 2001). In a modeling study of habitat associations in Wyoming, Keinath (2001) found suitable habitat predicted in the Laramie Basin and Snowy Range Mountains (west of known Preble's captures) but very little suitable habitat predicted on the plains of Goshen, Niobrara, and eastern Laramie counties (east of known Preble's captures).

The Preble's is closely associated with riparian ecosystems that are linear in nature and represent a small percentage of the landscape. If Preble's habitat is destroyed or modified, populations in those areas may decline or be extirpated. The main factor threatening the subspecies is the decline in the extent and quality of Preble's habitat (USFWS 1998; Hafner *et al.* 1998; Shenk 1998). Habitat alteration, degradation, loss, and fragmentation resulting from urban development, flood control, water development, intensive agricultural activities, and other human land uses have adversely affected Preble's populations. Habitat destruction may impact individual Preble's directly or by destroying nest sites, food resources, and hibernation sites, by disrupting behavior, fragmenting habitats, or by creating a barrier to movement.

Although there is little information on historic distribution and abundance of the Preble's, surveys identified various locations where the subspecies was historically present but is now absent (Ryon 1996). Despite numerous surveys, the Preble's has not recently been found in the Denver or Colorado Springs metropolitan areas and is believed to be extirpated from these areas because of extensive urban development. Since at least 1991, the Preble's has not been found in Denver, Adams, or Arapahoe Counties in Colorado. Its absence in these counties is likely due to urban development, which has altered, reduced, or eliminated riparian habitat (Compton and Hugie 1993; Ryon 1996).

Preble's Occupied Range in Colorado:

A map layer, "Preble's occupied range," developed by Colorado Parks and Wildlife (CPW 2007) estimates the acres of habitats occupied by the Preble's in Colorado. CPW developed this occupied range layer by drawing habitat polygons around points where trappers have captured Preble's. Based on the trapping records, CPW estimated that Colorado supports approximately 89,771.7 acres (36,329.3 hectares) of occupied Preble's habitats.

However, CPW's mapping effort underestimates the actual acres of potentially occupied habitats in Colorado because it incorporates only trapped habitats. The point data used to draw the *occupied range* polygons records only Preble's captures, but trappers have not trapped all the potential or likely occupied Preble's habitats in Colorado. Although CPW's occupied range map is an estimate, it is the best available estimate of acres of occupied habitat for the Preble's in Colorado. The layer overestimates potential habitats elsewhere, by including areas of non-habitat.

Threats to the Preble's

Below we summarize threats to the Preble's. Our most recent 12-month status review for the Preble's published in the **Federal Register** on May 23, 2013, provides more detail and analysis regarding threats (78 FR 31679; <https://federalregister.gov/a/2013-12387>).

Agricultural Land Conversions:

Conversion of native riparian ecosystems to commercial croplands and grazed rangelands was identified as the major threat to the Preble's in Wyoming (Clark and Stromberg 1987; Compton and Hugie 1993). Certain grazing and haying management scenarios maintain what appears to

be good habitat for the Preble's. However, intensive grazing and haying operations may negatively impact Preble's by removing food and shelter. While some Preble's populations coexist with livestock operations, overgrazing can decimate riparian communities on which the subspecies depends. Similarly, haying operations and the associated water development that allow significant riparian vegetation to remain in place appear to be compatible with persistence of Preble's populations. In fact, large populations of Preble's occur in grazed and hayed areas along Cottonwood Creek, Chugwater Creek, and Horse Creek in Wyoming.

Recreational Trails:

Recreational trail systems frequently parallel or intersect riparian communities and thus are common throughout Preble's. Trail development can alter natural communities and may impact the Preble's meadow jumping mouse by: Modifying nest sites, food resources, and hibernation sites; fragmenting habitat; and increasing predation. Humans and pets using these trails may alter behavior patterns of Preble's and cause a decrease in survival and reproductive success.

Habitat Fragmentation:

Habitat fragmentation limits the range and abundance of the Preble's. In general, as animal populations become more fragmented and isolated, it becomes more difficult for them to persist. Small, isolated patches of habitat are unable to support as many Preble's as larger patches of habitat. When threats to persistence are similar, larger populations are more secure from extirpation than smaller ones.

Hydrologic Changes:

Hydrology of a waterway influences the structure and function of the corresponding riparian ecosystems. Water development and management may facilitate development of lush riparian vegetation by maintaining more moisture in the riparian areas for longer periods, particularly during drought. However, changes in timing and abundance of water may also alter the channel structure, riparian vegetation, and the adjacent floodplain, which may be detrimental to the persistence of Preble's. Increased development and impervious surface within a drainage can result in more frequent and severe flood events and prevent the maintenance of riparian communities. Bank stabilization, channelization, and other measures to address flooding and storm water runoff have increased the rate of stream flow, straightened riparian channels, and narrowed riparian areas (Pague and Grunau 2000). Riprap and other stabilization structures designed to reduce erosion can destroy riparian vegetation, while preventing or prolonging its reestablishment. Erosion control measures can adversely alter the hydrologic processes and riparian plant communities such that Preble's populations can no longer persist.

Aggregate mining:

Alluvial aggregate extraction may produce long-term changes to Preble's habitat by altering hydrology and removing riparian vegetation. Extraction removes and often precludes reestablishment of habitat components required by the Preble's, such as vegetation for feeding

and sheltering and deposits of alluvial sands and gravels that may be important hibernation locations for hibernation.

Transportation Corridors:

Transportation and utility corridors frequently cross Preble's meadow jumping mouse habitat and may negatively affect populations. Road construction and maintenance degrades, destroys, and fragments Preble's habitats. Roads and bridges also may act as barriers to dispersal. Accidents within or near riparian areas may spill chemicals, fuels and other substances into wetlands and waterways that may impact the Preble's and its habitat. Sewer, water, communications, gas, and electric lines cross Preble's and contribute to habitat disturbance and fragmentation through new construction and periodic maintenance. Impacts related to construction are often temporary if adequate rehabilitation and reclamation actions are implemented.

Noxious weeds:

Invasive, noxious plants can encroach upon a landscape and displace native plant species. This change reduces the abundance and diversity of native plants, and may negatively impact cover and food sources for Preble's. The control of noxious weeds may also impact Preble's where large-scale removal of vegetation occurs through chemical treatments and mechanical mowing operations.

Pesticides and Herbicides:

Pesticides and herbicides are used within the range of the Preble's. Inappropriate use of these chemicals may harm the Preble's directly or when ingested with food or water. Overall, an integrated pest management approach (use of biological, chemical, and mechanical control) may help reduce the threat of chemicals, but allow for the control of target species.

Floods:

Floods occur throughout the Preble's range in the Wyoming and Colorado foothills and plains. Preble's and their streamside habitats evolved under historic flood regimes, so populations and habitats naturally respond to floods. While floods may affect Preble's populations by killing individuals and destroying riparian and adjacent upland habitats, the effects to vegetation are usually temporary. Vegetation typically reestablishes quickly after floods, although larger floods may delay recovery. Routine flooding may help maintain the vegetative communities that provide suitable habitat for the Preble's. Preble's that hibernate outside the 100-year floodplain are less likely to drown in a flood.

However, manmade increases in impervious surfaces and the loss of vegetation caused by human activities or catastrophic wildfire can result in an increased frequency and severity of flood events. Flooding is often a byproduct of wildfires and may act synergistically to alter the composition and structure of riparian ecosystems for many years (Ellis 2001, p. 159). Therefore, extreme floods may prevent the re-establishment of the Preble's favored riparian vegetation,

forcing mice to disperse until habitats recover. Although an extreme flood can eliminate an entire Preble's population in an affected stream reach, floods are less likely to eliminate the Preble's from an entire drainage system if populations extend into side tributaries or headwaters unaffected by the flood. Therefore, maintaining the connectivity of riparian habitats between stream reaches is crucial to maintaining the security of Preble's populations faced with an increased incidence of flooding.

In September 2013, heavy rains in Colorado flooded streams and inundated many riparian and upland habitats occupied by the Preble's in Larimer, El Paso, Boulder, and Weld Counties. By drowning Preble's, scouring vegetation, removing topsoil, and depositing debris, early estimates suggest that the flood disaster affected approximately 60 percent of the Preble's occupied range and approximately 70 percent of its designated critical habitat in Colorado.

Many Preble's may have drowned where the flash floods were large, unpredictable, or destructive. Throughout the flood disaster zone, especially in more mountainous (montane) habitats of the Front Range foothills, the flash floods completely inundated the Preble's habitats, with the fast moving floodwaters often extending far beyond the limits of the floodplain. Many Preble's in these high intensity flash flood areas may not have been able to escape the floodwaters and washed downstream or drowned. Preble's densities were low before the flood disaster, especially in the montane habitats at the westernmost extent of the Preble's range, so the floods may have significantly reduced rangewide population numbers.

Trapping surveys, habitat evaluations, and remote imagery will be necessary to gauge the full effect of the flood disaster on the Preble's. Although population and habitat losses were likely significant across approximately 60 percent of the Preble's occupied range, some Preble's may have survived. Survivors will be critical to the Preble's recovery in the flood disaster zone.

Wildfire:

Fire, particularly catastrophic fires, can alter habitat dramatically and change the structure and composition of the vegetation communities such that the Preble's may no longer persist. In addition, precipitation falling in a burned area may degrade Preble's habitat by causing greater levels of erosion and sedimentation. Controlled use of fire may be one method to maintain appropriate riparian, floodplain, and upland vegetation within Preble's habitat. However, over the past several decades, as human presence has increased throughout the Preble's range, significant effort has been made to suppress fires. Long periods of fire suppression may result in a build-up of fuel and result in a catastrophic fire that significantly impacts Preble's habitats by burning vegetation or increasing catastrophic floods.

Predation:

The increasing presence of humans near Preble's habitats may result in increased level of predation that may pose a threat to the mouse. The striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), red fox, and the domestic and feral cat are found in greater densities in and around areas of human activity; all four of these species feed opportunistically on small mammals. Introduction of species such as the bullfrog into waters within the Preble's range may

result in additional predation. The fact that summer mortality is higher than overwinter mortality underscores the impact that predators can have on Preble's.

Climate Change:

Climate change may negatively affect the Preble's meadow jumping mouse and its habitat, primarily by causing changes in stream flows resulting in reduced quality and quantity of riparian habitats. Trends of warming in the mountains of western North America could decrease snowpack, hasten spring runoff, and reduce summer flows (IPCC 2007a). While fewer cold days and nights could result in increased plant biomass yield in colder environments, increased summer heat may increase the frequency and intensity of wildfires, decrease the productivity of riparian vegetation, and increase the frequency and duration of droughts (IPCC 2007a). Stream-flow reductions or seasonal changes in flow due to climate change will probably cause a greater disruption in those watersheds with a high level of human development (Hurd *et al.* 1999) where human demands for water resources are greatest.

ENVIRONMENTAL BASELINE:

The environmental baseline is the past and present effects of all Federal, State, or private actions and other human activities in the action area, the anticipated effects of all proposed Federal actions in the action area that have already undergone formal or early section 7 consultation, and the effects of State or private actions that are contemporaneous with the consultation in progress.

The project area is on Academy property and is generally bounded by Monument Creek to the west, Smith Creek to the south, I-25 to the east, and the closed Academy Aardvark airstrip to the north. The land surrounding the development complex consists mostly of shortgrass and mid-grass prairie and shrublands. Scattered upland forested habitat occurs in the northern portion of the EUL area. Riparian and wetland habitat occurs along Monument Creek, Smith Creek, and north of the proposed development in an area where seeps exist and feed into an unnamed tributary to Monument Creek.

Monument Creek consists of a perennial stream that flows from north to south immediately west of the main project area. Smith Creek consists of an intermittent tributary that flows from east to west into Monument Creek and is located immediately south of the main project area.

Vegetation within portions of the project area to be developed consists of a mix of native and nonnative herbaceous vegetation including cheatgrass (*Bromus tectorum*), smooth brome (*Bromus inermis*), blue grama (*Bouteloua gracilis*), buffalograss (*Bouteloua dactyloides*), sand dropseed (*Sporobolus cryptandrus*), prickly pear (*Opuntia polyacantha*), hedgehog cactus (*Echinocereus* sp.), and Great Plains yucca (*Yucca glauca*). Riparian areas along Monument Creek and the northern portion of the project area consist of sandbar willow (*Salix exigua*), snowberry (*Symphoricarpos* sp.), narrowleaf cottonwood (*Populus angustifolia*), Gambel oak (*Quercus gambelii*), and ponderosa pine (*Pinus ponderosa*). Wetlands also occur in portions of the project area and are dominated by broadleaf and narrowleaf cattail (*Typha* spp.), Nebraska sedge (*Carex nebrascensis*), Emory's sedge (*Carex emoryi*), Baltic rush (*Juncus arcticus*), common threesquare (*Schoenoplectus pungens*), Nuttall's sunflower (*Helianthus nuttalli*), and other grasses and forbs.

The majority of the upland habitat throughout the project area is considered non-habitat or low-quality habitat for the Preble's mouse. The banks along Monument and Smith Creeks that generally contain wetland and riparian shrubs and trees, as well as wetland and riparian habitat within the northern portion of the project area, are considered high- or moderate-quality habitat. A mix of native and nonnative grasses including sand dropseed, smooth brome, blue grama, and buffalograss are prevalent in upland areas that surround the high- and moderate-quality habitat. Ponderosa pine is the prominent tree throughout the majority of the upland woodlands in the project area. Where wetlands and riparian habitat are able to form, sandbar willow, cattail, and Nebraska and Emory's sedges are prominent.

The primary soil in the project area is the Tomah-Crowfoot complex on 8 to 15 percent slopes. These soils typically occur in alluvial fans and consist of loamy sand near the surface with more coarse sand at lower depths.

Status of the Preble's meadow jumping mouse within the Proposed Project and Action Areas

The project area is within known occupied habitat for the species and historic trapping efforts have documented the species within the project vicinity along Smith and Monument Creeks. Therefore, we presume that the species occurs in appropriate habitats adjacent to the project area.

The April 2000 Conservation Agreement and the Academy calculated a Preble's meadow jumping mouse population on the site ranging from 1,513 to 4,864 based on trapping surveys of suitable habitat along Monument Creek and its tributaries. In addition, the conservation boundary, measured as 300 feet from the 100-year floodplain of Monument Creek and its tributaries totals approximately 3,245 acres. Using the high end of the range (4,864 mice) in order to derive the likely maximum number of mice exposed to project activities, we calculate a population estimate of approximately 1.5 mice/acre within high quality habitats on the Academy along Monument Creek and its tributaries. Based on this estimate, the 0.40-acre area of impact may support 1 Preble's mouse. In addition, using trapping survey data from the Academy from 2000 – 2018, which included multiple efforts in some years, an average population of 63.3 Preble's mice per mile was calculated, with a range of 15 – 158 Preble's mice per mile.

The action area includes downstream reaches for approximately 3 miles. Using a density of 63.3 Preble's mice per mile of stream, the action area potentially supports a population of approximately 190 Preble's meadow jumping mice. However, this estimate assumes that the species is evenly distributed throughout the riparian and upland habitats and that all habitats are high quality. We know that this assumption produces an estimate of mice that is likely higher than the actual number, but this estimate is reasonable and we have no information that would allow for a more accurate number.

Regulatory Actions under the ESA Completed by the Service for the Preble's meadow jumping mouse

Since listing the Preble's meadow jumping mouse in May 1998, we have conducted 195 formal consultations pursuant to section 7 of the ESA and issued 22 incidental take permits pursuant to

section 10(a)(1)(B) of the ESA for the Preble’s in Colorado. In Wyoming, we have completed 13 formal consultations under section 7 of the ESA, but have not issued any incidental take permits under section 10(a)(1)(B) of the ESA.

Table 1 below summarizes the acres of habitat lost in Colorado and Wyoming through actions consulted on under section 7 of the Act, which currently accounts for approximately 4.2 percent of CPW’s occupied range for Colorado. These consultations occurred on a variety of actions, including residential and commercial developments, transportation projects, recreational facilities, and water supply projects.

Table 1. Total acres of permanent and temporary Preble’s mouse habitat loss analyzed by the Service under the ESA between May 1998 and May 2018, in Colorado and Wyoming. All Preble’s mice associated with this habitat are considered to be taken. We assume that habitat lost temporarily will return to functionality within 3 to 5 years; therefore, we expect that some of the temporarily lost acres depicted below have returned to function as suitable habitat.

* The total acres of permanent and temporary habitat loss analyzed under section 10 does not include the Livermore Habitat Conservation Plan (HCP) in Larimer County, Colorado, completed in January 2004, which analyzed up to 3,357 acres of permanent habitat loss. As of March 2015, there are no enrollments in the Livermore HCP and we have not completed any section 10 consultations in Wyoming.

† Colorado Parks and Wildlife (CPW) created their occupied range data layer for the Preble’s mouse by buffering upstream and downstream habitats around positive capture locations, thereby estimating that there are 89,771.7 acres of occupied Preble’s mouse range in Colorado. We lack a similar estimate for Wyoming, so we use the estimate for Colorado as a conservative rangewide estimate.

‡ Project proponents completely restore, and often enhance, habitats that they temporarily impact.

Regulatory Authority of the ESA	Number of Exemptions or Permits		Permanent Loss (acres)		Temporary Loss‡ (acres)	
	Colorado	Wyoming	Colorado	Wyoming	Colorado	Wyoming
Section 7 (Federal consultations)	195	13	855.69	70.97	2,192.66	42.69
Section 10 (non-Federal consultations)	22	0	426.3 *	0	270*	0
STATE TOTALS =	217	13	1,281.99*	70.97	2,462.66*	42.69
RANGEWIDE TOTAL =	230		1,352.96*		2,505.35*	
Percent of Preble’s Occupied Range (CPW layer†) in Colorado			1.51%		2.79%	
			4.3%			

Factors Affecting the Environment of the Preble’s meadow jumping mouse within the Action Area

The proposed project will occur on a relatively undisturbed native landscape. The adjacent riparian areas associated with Smith and Monument Creeks have been degraded by upstream development and loss of beaver. The vegetation community has been altered by weeds. Culverts and bridges along the creeks may limit Preble’s mouse movements up and down the affected drainages.

Climate Change

Because of the short duration of the proposed project, we do not think that climate change will affect the species.

EFFECTS OF THE ACTION

The project is expected to affect 0.40 acres of Preble’s mouse habitat, 0.38 acres of which are temporary and 0.02 are permanent. Most of these impacts are in upland grassland habitats that are likely used by the species primarily for foraging, day-nesting, and some dispersal.

Direct adverse impacts are anticipated from the proposed project to low-quality Preble’s mouse habitat. Approximately 0.02 acre (1,000 square feet) of permanent impacts to low-quality habitat outside of the EUL would occur from construction of the dispersion basins. Approximately 0.38 acres (16,500 square feet) of temporary impacts from excavation to install the storm outfall pipes from each detention pond, grading around each dispersion basin, and access are anticipated. No direct or permanent impacts would occur to the Monument or Smith Creek wetland and riparian habitat. Treated stormwater flows from the dispersion basins are anticipated to reach the Monument Creek channel.

Table 2. Direct permanent and temporary impacts on Preble’s habitat throughout the project area.

Habitat Type	Impacts (in acres)						
	Dispersion Basins		Storm Outfall Pipes/Access/Staging		Total Temp.	Total Perm.	Total Impacts
	Temp.	Perm.	Temp.	Perm.			
High	0	0	0	0	0	0	0
Moderate	0	0	0	0	0	0	0
Low	0	0.02	0.38	0	0.38	0.02	0.40
Total	0	0.02	0.38	0	0.38	0.02	0.40

Further, surface flows from the north dispersion basin would occur over about 1.1 acres of land between the dispersion basin and Monument Creek. Flows from the southern dispersion basin would occur over 0.58 acres of land between the dispersion basin and Monument Creek. Surface flows from the dispersion basins may result in indirect effects to low quality and moderate quality habitat adjacent to, and within Monument Creek. The periodic surface flows may be beneficial to Preble’s mice since the increase in hydrology may, after time, allow for mesic vegetation to establish. Additionally, native shrubs will be planted downstream of the dispersion basins to diversify the existing habitat, which is expected to result in an ecological functional lift, once the vegetation establishes.

Because higher than anticipated surface flows resulting from unforeseen upstream events could result in erosion or channelization of flows in moderate quality habitat, the BID will monitor conditions in the project area. Any signs of erosion identified by the BID inspections would be repaired quickly by the BID.

The onsite soils' moderate infiltration rate will allow a majority of the detained flows to seep into the ground at the detention pond and dispersion basins. Because of the size of the basins and the designed detention time, flow modeling shows that the additional infiltration results in less than a 5 percent increase in discharge volume over the undeveloped condition.

Disturbances in this area would include grading and excavation along the extent of the piping run and dispersion basin, which could lead to temporary impacts from stormwater runoff.

Temporary impacts include the installation of the storm outfall pipes as well as the grading required to tie in the dispersion basins, totaling approximately 16,500 square feet. Staging for all development construction will either be located within the EUL property boundary or within the project area temporary impact extents.

Effects to the Preble's meadow jumping mouse

Because construction in identified Preble's mouse habitat areas is scheduled while the Preble's mouse is hibernating, and all impacts will be in non-hibernation upland habitats, the effects to individuals of the species are expected to be minimal; however, incidental mortality to hibernating individuals from being crushed or buried by grading equipment is possible. Additional impacts due to temporary habitat loss may result in disruption of normal dispersal, foraging, breeding, and hibernation activities as well as reduced productivity while vegetation in temporarily affected areas recovers. Increased exposure to predation and weather may result from loss of vegetation and lead to death, increased energy expenditure for foraging or escaping predation, and subsequent decrease in productivity and survival. After revegetation, the site is expected to support habitat as good as before the project.

Indirect effects likely also include inadvertent injury to Preble's mice, displacement from habitat, and disruption of normal behavior by increased activity within the area. The presence of lighting could affect the species' use of habitats near the corridor and cause them to change movement and foraging behaviors both during and after construction. An increase in surface flows could increase mesic vegetation that would benefit the Preble's mouse.

Using the methodology provided above in the ***Status of the Preble's meadow jumping mouse within the Proposed Project and Action Areas*** section, we anticipate that up to 1 Preble's meadow jumping mouse could be taken by completion of the project. Given the amount and type of habitat, we believe that this is a conservative estimate.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The surrounding lands outside of Academy boundaries could be developed in the future as the populations of Colorado Springs and Monument increase. New development is occurring in properties adjacent to several of the Monument Creek tributaries near the project area. Such

activities may affect Preble's mouse habitat directly and may have indirect effects, such as reducing water quality, contributing to increased base flows, and introducing domestic pets to areas occupied by the Preble's mouse.

Recreation levels are moderately high along the New Santa Fe Trail and will likely increase as more people utilizing the amenities of the new development increase. However, areas along Smith and Monument Creeks near the new complex would remain inaccessible to the public.

Portions of El Paso County, including portions of the Academy, have locally severe infestations of nonnative and noxious species, including knapweed (*Centaurea* sp.) and thistle species (*Cirsium* sp.). Nonnative and noxious species do not pose a significant threat to Preble's habitat, but may reduce the amount of desirable forage, restricting population sizes and productivity.

CONCLUSION:

The Service defines "jeopardize the continued existence of" as to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

Recovery calls for improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria identified in section 4(a)(1) of the ESA (50 CFR § 402.02).

After reviewing the current status of the affected species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Preble's mouse. We base our conclusion on the following:

- The impact area constitutes a small portion of the species' occupied range, approximately 0.00004 percent. Although take of the Preble's meadow jumping mouse from project construction is likely, the anticipated level is small in proportion to the size of the population as a whole.
- Because all impact will occur in upland habitats where Preble's mouse hibernation is unlikely and will be conducted during hibernation and because connectivity along Monument and Smith Creeks will not be affected, the likelihood of the survival and recovery of the Preble's meadow jumping mouse will not be appreciably reduced through implementation of the proposed action.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to 4(d) of the ESA prohibit the take of endangered and threatened animals, respectively, without special exemption. Take is to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. The Service defines harm as an "act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures

wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.” The Service defines “harass” as “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.” Incidental take is defined as “takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant.” Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Academy so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Academy has a continuing duty to regulate the activity covered by this incidental take statement. If the Academy (1) fails to assume and implement the terms and conditions, or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the applicant must report the progress of the action and its impact on the species or subspecies to the Service as specified in the incidental take statement. [50 CFR § 402.14(i)(3)]

AMOUNT OR EXTENT OF TAKE:

The Service anticipates that project completion will result in incidental take of no more than 1 individual mouse, as measured by the surrogate of the permanent and temporary loss of 0.4 acres of Preble’s meadow jumping mouse habitats. This take will be difficult to detect because of the species’ small size, solitary nature, and hibernation underground. However, we estimate the amount of take by considering incidental mortality to individuals from crushing or burial; reduced productivity from the disruption of normal dispersal, foraging, breeding, and hibernation activities; and increased exposure to weather and predators from the loss of cover.

In the above biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

The reasonable and prudent measures, and implementing terms and conditions, minimize the effects of incidental take that might otherwise result from the action. In addition to the Conservation Measures already proposed as part of the project description, the Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Preble’s meadow jumping mouse:

1. The Academy will monitor the extent of habitat impacted to ensure that it does not exceed the authorized area or the authorized take limits.
2. The Academy will monitor all aspects of restoration to assure its completion and success.

3. The Academy will ensure that best management practices and conservation measures designed to minimize take are implemented and successful.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Academy must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring. These terms and conditions are non-discretionary.

The following terms and conditions implement the reasonable and prudent measures:

1. The Academy shall ensure that proposed conservation measures (outlined above and in the biological assessment), are formally adopted and implemented.
2. The Academy or their agent will designate a qualified environmental manager or management team to be onsite to inform workers of permit conditions, monitor construction, and assure that habitat avoidance and conservation measures are implemented.
3. The Academy will ensure that implementation of Preble's meadow jumping mouse habitat restoration will be supervised by a qualified ecologist experienced in habitat restoration. This includes implementation of an approved integrated weed management plan.
4. The Academy will include as a binding condition of project approval that annual monitoring of onsite revegetation efforts and noxious weeds be conducted. Monitoring will extend for at least three growing seasons (or until such time as the Academy and the Service determine that proposed revegetation has been successfully completed). Success criteria were described previously in the *Conservation Measures* section on page 4.
5. In the unlikely event that a Preble's meadow jumping mouse is encountered (dead, injured, or hibernating) during construction activities, the Colorado Field Office of the Service shall be contacted immediately at 303 236-4773.

The Service believes that the proposed action will adversely affect no more than 0.4 acres of Preble's meadow jumping mouse habitat, resulting in incidental take of no more than 1 Preble's meadow jumping mouse. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action.

If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Academy must immediately provide an explanation of the

causes of the increased level of taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS:

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

We have no conservation recommendations.

REINITIATION NOTICE:

This concludes formal consultation on proposed Federal actions related to constructing the True North development on the U.S. Air Force Academy in El Paso County, Colorado.

“Reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) If a new species is listed or critical habitat designated that may be affected by the identified action.”

At any time, if incidental take exceeds the take authorized by this biological opinion, any operations causing such take must cease pending reinitiation.

If the Service can be of any additional assistance, please contact Alison Deans Michael of the Colorado Field Office by telephone at (303) 236-4758 or by email to alison_michael@fws.gov.

Sincerely,

Drue L. DeBerry
Colorado and Nebraska Field Offices Supervisor

ec: USAFA (Brian Mhlbachler)
Michael

LITERATURE CITED

- Bakeman, M.E. 1997. Conclusions and recommendations from the report on habitat findings of the Preble's meadow jumping mouse. Unpublished report to the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife. 13 pp. + tables and figures.
- Bakeman, M.E. and A. Deans. 1997. Habitat of the Preble's meadow jumping mouse at Rocky Flats, Colorado. Pp. 19-35 in Report on habitat findings on the Preble's meadow jumping mouse (ed. M. Bakeman). Unpublished report to the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife. 91 pp.
- Bakeman, M.E. 2006. 2005 Preble's meadow jumping mouse abundance and survival at the East Plum Creek Conservation Bank, Douglas County, Colorado. Unpublished report for the Colorado Department of Transportation. 15 pp.
- Beauvais, G.P. 2001. Preble's meadow jumping mouse (*Zapus hudsonius preblei*) in Wyoming: Status report, July 2001. Unpublished report of the Wyoming Natural Diversity Database. 13 pp.
- 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.
- Clark, T.W. and M.R. Stromberg. 1987. Mammals in Wyoming. University of Kansas Museum, Lawrence, Kansas. 314 pp.
- CNHP. Colorado Natural Heritage Program. 2007. Annual monitoring report for the Upper South Platte Watershed Restoration Project's Pawnee montane skipper surveys. Submitted to the Pike National Forest.
- Compton, S.A. and R.D. Hugie. 1993. Status report on *Zapus hudsonius preblei*, a candidate endangered species. Pioneer Environmental Services, Inc. Report submitted to U.S. Fish and Wildlife Service. Logan, Utah. 32 pp.
- Corn, J.G., C.A. Pague, A.R. Ellingson, M. Sherman, T. Zwiejacz, G. Kittel, and C. Fleming. 1995. Final report on the geographic extent of the Preble's meadow jumping mouse population on the United States Air Force Academy. Presented to the U.S. Air Force Academy. 44 pp.
- CPW. Colorado Parks and Wildlife. 2007. ArcGIS Shapefile: Occupied range for the Preble's meadow jumping mouse in Colorado. File Name: `pjm_ndis030907`. Downloaded from <http://ndis.nrel.colostate.edu/> on October 30, 2010.

- Dharman, A.T. 2001. Movement patterns of Preble's meadow jumping mouse. M.S. Thesis. Colorado State University, Fort Collins, Colorado.
- Ensign Technical Services, Inc. 1999. Report on Preble's Meadow Jumping Mouse Movement Assessment at Dirty Woman and Monument Creeks, El Paso County, CO. Submitted to Colorado Department of Transportation, Region 2.
- Fertig, W. 1994. Guide to Sensitive Wyoming Plants of US Forest Service Region 2 (with emphasis on plants of Bighorn, Medicine Bow, and Shoshone National Forests). Unpublished report prepared as a handout for the T&E species identification workshop conducted for US Forest Service Region 2 in Laramie, WY, 11 May 1994.
- Fertig, W. 2000. Rare vascular plant species in the Wyoming portion of the Utah-Wyoming Rocky Mountains Eco-region. Prepared for the Wyoming Nature Conservancy by the Wyoming Natural Diversity Database, Laramie, WY.
- Fertig, W., R. Black and P. Wolken. 2005. Range-wide Status Review of Ute Ladies'-Tresses. Prepared for the U.S. Fish and Wildlife Service.
- Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. University Press of Colorado, Niwot. 467 pp.
- Hafner, D.J., E. Yensen, and G.L. Kirkland, Jr. (eds.). 1998. North American rodents: status survey and conservation action plan. International Union for the Conservation of Nature and Natural Resources, Gland, Switzerland. 171 pp.
- Hafner, D.J., K.E. Petersen, and T.L. Yates. 1981. Evolutionary relationships of jumping mice (Genus *Zapus*) of the southwestern United States. *Journal of Mammalogy* 62:501-512.
- Hall, E.R. 1981. The Mammals of North America. John Wiley and Sons, Inc., New York. 1181 pp.
- Hansen, C.M. 2006. Monitoring and movements of the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) in montane drainages of Pike National Forest, Colorado. M.S. Thesis, University of Colorado, Colorado Springs. 181 pp.
- Hurd, B., N. Leary, R. Jones, and J. Smith. 1999. Relative regional vulnerability of water resources to climate change. *Journal of the American Water Resources Association* 35:1399-1409
- IPCC. 2007a: Summary for Policymakers. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22.

- IPCC. 2007b. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.
- Kaufman, D.W., E.J. Finch, and G.A. Kaufman. 1990. Small mammals and grassland fires. pp. 46-80 in *Fire in North American tallgrass prairies* (S. L. Collins and L. L. Wallace, eds.). University of Oklahoma Press, Norman, OK.
- Keinath, D.A. 2001. Habitat associations of Preble's meadow jumping mice in Wyoming: A GIS model and descriptive analysis. Report prepared for U. S. Fish and Wildlife Service, Cheyenne, Wyoming. Prepared by Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.
- Krutzsch, P.H. 1954. North American jumping mice (genus *Zapus*). University of Kansas Publications, Museum of Natural History 7:349-472.
- Malaney, J. L., & Cook, J. A. (2013). Using biogeographical history to inform conservation: the case of Preble's meadow jumping mouse. *Molecular ecology*, 22(24), 6000-6017.
- Meaney, C., A. Ruggles, N.W. Clippinger, and B. Lubow. 2002. The impact of recreational trails and grazing on small mammals in the Colorado Piedmont. *The Prairie Naturalist* 34:3-4.
- Meaney, C.A., A. Ruggles, C. Ahrens, and C. Ruggles. 2001. Survey for Preble's meadow jumping mice, Trout Creek at Rainbow Falls, Manitou Experimental Forest, Pike National Forest. Unpublished report prepared for Pike & San Isabel National Forest, Pikes Peak Ranger District, Colorado Springs.
- Meaney, C.A., A.K. Ruggles, B.C. Lubow, and N.W. Clippinger. 2003. Abundance, survival, and hibernation of Preble's meadow jumping mice (*Zapus hudsonius preblei*) in Boulder County, Colorado. *The Southwest Naturalist*. 48(4):610-623.
- Meaney, C., M. Bakeman, M. Reed-Eckert, and E. Wostl. 2007. Effectiveness of ledges in culverts for small mammal passage. June 2007. Report No. CDOT-2007-9. Final Report.
- Milly, P.C.D., K.A. Dunne, and A.V. Vecchia. 2005. Global pattern of trends in streamflow and water availability in a changing climate. *Nature* 438:347-350.
- Pague, C.A. and L. Grunau. 2000. Conservation planning handbook for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Unpublished report to the Colorado Department of Natural Resources. 44 pp.
- Perry, L. G., Andersen, D. C., Reynolds, L. V., Nelson, S. M., & Shafroth, P. B. 2012. Vulnerability of riparian ecosystems to elevated CO₂ and climate change in arid and semiarid western North America. *Global Change Biology*, 18(3), 821-842.

- Preble, E.A. 1899. Revision of the jumping mice of the genus *Zapus*. U.S. Department of Agriculture, North American Fauna 15:1-41.
- Quimby, D.C. 1951. The life history and ecology of the jumping mouse, *Zapus hudsonius*. Ecological Monographs 21:61-95.
- Riedel, L. 2002. *Spiranthes diluvialis* update: habitat, conservation issues, and monitoring. City of Boulder Open Space and Mountain Parks, Boulder, Colorado.
- Ryon, T.R. 1996. Evaluation of the historic capture sites of the Preble's meadow jumping mouse in Colorado. MS thesis, University of Colorado, Denver. 65 pp.
- Ryon, T.R. 1999. Travel distance and movement patterns of the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) at the Rocky Flats Environmental Technology Site. Journal of Colorado-Wyoming Academy of Science 31:12.
- Ryon, T.R. 2001. Summer nests of the Preble's meadow jumping mouse. Southwestern Naturalist 46 (3): 376-378.
- Schorr, R.A. 2001. Meadow jumping mice (*Zapus hudsonius preblei*) on the U.S. Air Force Academy, El Paso County, Colorado. Colorado Natural Heritage Program, Unpublished report to the Natural Resources Branch, U.S. Air Force Academy. 55 pp.
- Schorr, R.A. 2011. 2011 Annual Summary of Activities Conducted Under Subpermit No. TE-059369. Submitted to USFWS by Colorado Natural Heritage Program. October 20, 2011.
- Schorr, R.A. 2012. 2012 Annual Summary of Activities Conducted Under Subpermit No. TE-059369. Submitted to USFWS by Colorado Natural Heritage Program. August 28, 2012.
- Schorr, R. A. 2012b. Using a temporal symmetry model to assess population change and recruitment in the Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Journal of Mammalogy, 93(5), 1273-1282.
- SEI (Sustainable Ecosystems Institute). 2006a. Evaluation of Scientific Information Regarding Preble's Meadow Jumping Mouse. July 21, 2006. 82 pp.
- Shenk, T. 1998. Conservation assessment and preliminary conservation strategy for Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Fort Collins (CO): Colorado Division of Wildlife. 38 pp.
- Shenk, T.M. and J.T. Eussen. 1998. Habitat use and distribution of Preble's meadow jumping mouse (*Zapus hudsonius preblei*) in Larimer and Weld counties, Colorado. Unpublished report of the Colorado Division of Wildlife. 25 pp. + figures.

- Shenk, T. and M. Sivert. 1999a. Movement patterns of Preble's meadow jumping mouse (*Zapus hudsonius preblei*) as they vary across time and space. Fort Collins (CO): Colorado Division of Wildlife. 35 pp.
- Shenk, T.M. and M.M. Sivert. 1999b. Temporal and spatial variation in the demography of Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Unpublished report of the Colorado Division of Wildlife. 16 pp.
- Sipes, S. D. and V. J. Tepedino. 1995. Reproductive biology of the rare orchid, *Spiranthes diluvialis*: breeding system, pollination, and implications for conservation. *Conservation Biology* 9(4):929-938.
- Sipes, S.D., V.J. Tepedino, and W.R. Bowlin. 1993. The pollination and reproductive ecology of *Spiranthes diluvialis* Sheviak (Orchidaceae). Pp 320-333 in R. Sivinski and K. Lightfoot, eds. Proceedings of the Southwest Rare and Endangered Plant Conference. Miscellaneous publication No. 2. New Mexico Forestry and Conservation Division. Santa Fe, New Mexico.
- SPWRAP. 2006. Memorandum of Agreement for Implementation and Operation of the Colorado Portion of the Platte River Recovery Implementation Plan. Signed by the State of Colorado, Department of Natural Resources and the South Platte Water-Related Activities Program, Inc. November 17, 2006.
- Stoecker, R.E. 1999. Preble's Jumping Mouse Survey. Black Squirrel Creek at Shoup Road. El Paso County, Colorado. Prepared for Mr. Jim Scott, Colorado Springs, CO. July 1999. Prepared by Robert E. Stoecker, Ph.D. Stoecker Ecological Consultants, Inc. Boulder, CO. 6 pp.
- SWCA. 2000. Preble's meadow jumping mouse survey report for Black Squirrel Creek on the Blake Property, El Paso County, Colorado. Prepared for Classic Communities, Colorado Springs, Colorado; the U.S. Fish and Wildlife Service, Lakewood, Colorado, and the Colorado Natural Heritage Program, Fort Collins, Colorado. Prepared by SWCA Inc., Westminster, Colorado.
- USFWS. U.S. Fish and Wildlife Service. 1998. Final rule to list the Preble's meadow jumping mouse as a threatened species. *Federal Register* 63(92):26517-26530.
- USFWS. U.S. Fish and Wildlife Service. 2003. Draft Recovery Plan Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Region 6, Lakewood, Colorado. November 5, 2003. 95 pp. (Note: this plan was not a formally adopted Draft Recovery Plan issued by the Service.)
- USFWS. U.S. Fish and Wildlife Service (2013). Endangered and Threatened Wildlife and Plants; 12-Month Finding on Two Petitions to Delist the Preble's Meadow Jumping Mouse. May 24, 2013. 78 FR 31679. *Federal Register* 78 (101): 31679 -31712 (34 pages). Available online: <https://federalregister.gov/a/2013-12387>.

Whitaker, J.O., Jr. 1963. A study of meadow jumping mouse, *Zapus hudsonius* (Zimmerman), in central New York. *Ecological Monographs* 33:215-254.

White, G.D. and T.M. Shenk. 2000. Relationship of Preble's meadow jumping mouse densities to vegetation cover. Report to the Colorado Division of Wildlife. 13 pp.