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Endangered and Threatened Wildlife and Plants; Final Rule To Amend the Listing for the Preble's Meadow Jumping Mouse (Zapus hudsonius preblei) To Specify Over What Portion of Its Range the Subspecies Is Threatened; Final Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R9–ES–2007–0003; 92220–1113–0000; C6]

RIN 1018–AV64

Endangered and Threatened Wildlife and Plants; Final Rule To Amend the Listing for the Preble's Meadow Jumping Mouse (Zapus hudsonius preblei) To Specify Over What Portion of Its Range the Subspecies Is Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service/USFWS), under the authority of the Endangered Species Act of 1973, as amended (Act), amend the listing for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) (Prebles) to specify over what portion of its range the subspecies is threatened. Based on the best scientific and commercial data available, we have determined that the Prebles is a valid subspecies and should not be delisted based upon taxonomic revision; the subspecies is not threatened throughout all of its range; and the portion of the subspecies' current range located in Colorado represents a significant portion of the current range where the subspecies should retain its threatened status. This determination is based on a thorough review of all available information, which indicates that Prebles' populations in Wyoming are more widespread and threats to the subspecies less severe than those known at the time of listing, but that in Colorado the Prebles is likely to become endangered within the foreseeable future.

DATES: This rule is effective August 11, 2008.

FOR FURTHER INFORMATION CONTACT: Susan Linner, Field Supervisor, U.S. Fish and Wildlife Service, Colorado Field Office at 134 Union Blvd., Suite 670, Lakewood, CO 80228; telephone (303) 236–4773. Individuals who are hearing-impaired or speech-impaired may call the Federal Relay Service at 1–800–877–8339 for TTY assistance.

SUPPLEMENTARY INFORMATION:

General Information

Meadow jumping mice (*Zapus hudsonius*) are small rodents with long tails, large hind feet, and long hind legs. Total length of an adult is approximately 187 to 255 millimeters (7 to 10 inches), with the tail comprising 108 to 155 millimeters (4 to 6 inches) of that length (Krutzsch 1954, p. 420; Fitzgerald *et al.* 1994, p. 291).

Typical habitat for Prebles is comprised of well-developed riparian vegetation with adjacent, relatively undisturbed grassland communities and a nearby water source (Bakeman 1997, pp. 22–31). Prebles are typically captured in areas with multi-storied cover with an understory of grasses or forbs or a mixture thereof (Bakeman 1997, pp. 22–31; Bakeman and Deans 1997, pp. 28–30; Meaney *et al.* 1997a, pp. 15–16; Meaney *et al.* 1997b, pp. 47–48; Shenk and Eussen 1998, pp. 9–11; Schorr 2001, pp. 23–24). The shrub canopy is often willow (Salix spp.), although other shrub species may occur (Shenk and Eussen 1998, pp. 9–11). Trainor *et al.* (2007, pp. 471–472) found that high-use areas for Prebles tended to be close to creeks and were positively associated with the percentage of shrubs, grasses, and woody debris. Hydrologic regimes that support Prebles' habitat range from large perennial rivers such as the South Platte River to small drainages only 1 to 3 meters (m) (3 to 10 feet (ft)) in width.

Meadow jumping mice are primarily nocturnal or crepuscular (active during twilight), but also may be active during the day. The Prebles uses uplands at least as far out as 100 m (330 ft) beyond the 100-year floodplain (Shenk and Sivert 1999a, p. 11; Ryon 1999, p. 12; Schorr 2001, p. 14; Shenk 2004; USFWS 2003b, p. 26). While the Prebles' dispersal capabilities are thought to be limited, in one instance a Prebles was documented moving as far as 1.1 kilometers (km) (0.7 mile (mi)) in 24 hours (Ryon 1999, p. 12). The Prebles typically enters hibernation in September or October and emerges the following May (Whitaker 1963, p. 5; Meaney *et al.* 2003).

For additional information on the biology of this subspecies, see the May 13, 1998, final rule to list the Prebles as threatened (63 FR 26517) and the June 23, 2003, final rule designating critical habitat (68 FR 37275).

Previous Federal Actions

We listed the Prebles as threatened under the Act on May 13, 1998 (63 FR 26517). On May 22, 2001 (66 FR 28125), we adopted a final section 4(d) special rule for the Prebles that provides exemptions from section 9 take prohibitions for certain rodent control activities, ongoing agricultural activities, maintenance and replacement of existing landscaping, and existing uses of water. On October 1, 2002 (67 FR 61531), we amended this rule to provide exemptions for certain noxious weed control and ditch maintenance activities. The special rule, as amended, was scheduled to end May 22, 2004, but was made permanent on May 20, 2004 (69 FR 29101). On June 23, 2003, we designated critical habitat for the Prebles in portions of Colorado and Wyoming (68 FR 37275).

In June 2000, the Service established the Preble's Meadow Jumping Mouse Recovery Team (Recovery Team) composed of scientists and stakeholders. In June 2003, the Recovery Team provided their recommendations to the Service in the form of a draft recovery plan. The Service revised this technical working draft in November 2003. This document (hereafter referred to as the Preliminary Draft Recovery Plan) suggests the long-term protection of populations spread throughout the current range of the subspecies in order to lessen or eliminate threats. In particular, the documents suggest long-term protection of 1 large population (with June abundances of 2,500 or more individuals), 2 medium populations (with June abundances of 500–2,499 individuals), and 6 small populations (with evidence of occupancy; possibly 150 mice) within the North Platte River basin; 2 large, 3 medium, and 18 small populations within the South Platte River basin; and 1 large population, and 6 small populations within the Arkansas River basin (USFWS 2003b, pp. 19–23). Recovery planning efforts were halted in December 2003 after new information became available questioning the taxonomic validity of the subspecies. While the availability of the Preliminary Draft Recovery Plan (USFWS 2003b) has not yet been announced in the **Federal Register**, it represents the best scientific information available to us concerning recovery needs of the Prebles.

On December 23, 2003, we received two nearly identical petitions, from the State of Wyoming's Office of the Governor and Coloradans for Water Conservation and Development, seeking to remove the Prebles from the Federal List of Endangered and Threatened Wildlife (Freudenthal 2003; Sonnenberg 2003). The petitions maintained that the Prebles should be delisted based on the taxonomic revision suggested by Ramey *et al.* (2003) and new distribution, abundance, and trends data that suggested the subspecies was no longer threatened or endangered (Freudenthal 2003, p. 1; Sonnenberg 2003, p. 1).

On March 31, 2004, we published a notice announcing a 90-day finding that the petitions presented substantial information indicating that the

petitioned action may be warranted (69 FR 16944). On February 2, 2005, we published a 12-month finding that the petitioned action was warranted and a proposed rule to remove Prebles from the Federal List of Endangered and Threatened Wildlife (70 FR 5404). This notice also opened a 90-day public comment period. The proposed delisting was based upon a taxonomic revision suggested by Ramey *et al.* (2004a (a revision of Ramey *et al.* 2003)), which concluded that Prebles should be synonymized with a neighboring subspecies (Ramey *et al.* 2004a, pp. 1, 13). Although this report remained unpublished and had received mixed peer reviews, we concluded that a lack of distinct genetic and morphologic differences suggested that Prebles was likely not a valid subspecies of meadow jumping mouse (*Zapus hudsonius*). Considering the weight that the findings of Ramey *et al.* (2004a) had in the proposed delisting, verifying these results prior to making a final decision on the proposal was a high priority of the Service (Williams 2004; Morgenweck 2005). As such, we contracted with the U.S. Geological Survey (USGS) to conduct additional genetic analysis of Prebles and four neighboring subspecies of meadow jumping mice (USGS 2005, pp. 1–4).

On January 25, 2006, the USGS released its report concluding that the Prebles should not be synonymized with neighboring subspecies of meadow jumping mice (King *et al.* 2006a, pp. 2, 29). On February 17, 2006, the Service extended the rulemaking process an additional 6 months as allowed under section 4(b)(6)(B)(i) of the Act (71 FR 8556). This USGS study indicated that there was substantial disagreement regarding the sufficiency or accuracy of the available data relevant to the determination contained in our proposed rule. We reopened the comment period for an additional 60 days and announced that we intended to assemble a panel of experts to carefully review and assess the two studies.

On March 30, 2006, we published a notice of availability of the King *et al.* (2006a) and Ramey *et al.* (2005) data and extended the comment period on the proposed delisting rule an additional 30 days (71 FR 16090). We then contracted with Sustainable Ecosystems Institute (SEI) to organize a scientific review panel to analyze, assess, and weigh the reasons why the data, findings, and conclusions of King *et al.* differed from the data, findings, and conclusions of Ramey *et al.* (as written in this sentence, and hereafter, ''Ramey *et al.*'' or ''King *et al.*'' without a modifying date refers to the overall work of these authors instead of a specific publication) (USFWS 2006, p. 14). On July 21, 2006, SEI delivered a final report to the Service (SEI 2006a).

On September 26, 2006, the State of Wyoming submitted a 60-day notice of intent to sue over our failure to publish a final determination on our 2005 proposed delisting rule within the timeframes allowed by the Act. On January 24, 2007, the State of Wyoming filed a petition for review with the court. On June 22, 2007, the Service and the State of Wyoming reached a settlement agreement which required that, by October 31, 2007, we submit to the **Federal Register** for publication either (1) a withdrawal of our 2005 proposed delisting regulation; or (2) a new proposed regulation considering the Prebles' taxonomy and the subspecies' threatened status in light of all current distribution, abundance, and trends data (*State of Wyoming* v. *U.S. Department of the Interior*, No. 07CV025J (District of Wyoming 2007)). On November 7, 2007, we published a revised proposed rule to amend the listing of the Prebles to specify over what portion of its range the subspecies is threatened and opened a 75-day public comment period (72 FR 62992). Under the settlement agreement with the State of Wyoming, the Service agreed to submit a final determination on the revised proposed rule to the **Federal Register** no later than June 30, 2008.

Public Comments Solicited

Comments on this rulemaking were accepted from February 2 to May 3, 2005 (70 FR 5404, February 2, 2005), from February 17 to April 18, 2006 (71 FR 8556, February 17, 2006; 71 FR 16090, March 30, 2006), and from November 7, 2007 to January 22, 2008 (72 FR 62992, November 7, 2007). Open houses and public hearings were held on December 10, 2007, in Lakewood, Colorado, and on December 12, 2007, in Wheatland Wyoming (72 FR 62992, November 7, 2007). These opportunities to comment were publicized via the **Federal Register**, press releases, public notices in area newspapers, postings on our Web site, and direct contact with Federal and State agencies, county governments, scientific organizations, and other interested parties. In addition, the media provided substantial coverage of the proposals. Comments could be hand delivered to us, submitted to us via e-mail, mail, the Federal e-Rulemaking Portal, fax, or provided during public hearing testimony.

Comments were submitted by a variety of parties including the general public, business interests, environmental organizations, and Federal, State, and local governments. We received 122 written, faxed, or e-mailed comments during public comment periods (excluding peer reviewers' comments discussed below). An additional eight comments were provided during two public hearings. On March 24, 2006, the Service received a Data Quality Act challenge on behalf of Coloradans for Water Conservation and Development and the Colorado Farm Bureau. While this challenge was handled separately from this rulemaking, all of the relevant issues raised also were considered public comments and considered in this final determination. All of the public comments available prior to the July 2006 SEI panel were made available to the panelists.

Peer Review

In accordance with our Interagency Policy for Peer Review in Act Activities (59 FR 34270, July 1, 1994) and the Office of Management and Budget's (OMB) Final Information Quality Bulletin for Peer Review (70 FR 2664, January 14, 2005), we sought the expert opinions of appropriate and independent specialists regarding this rulemaking. First, we contacted five reviewers with expertise in genetics, systematics, and small mammals to review the taxonomic portions of this document. Four of those solicited provided comments during one or more of the comment periods (Gore 2008; Hoekstra 2005; Kelt 2005, 2006, 2008; Spencer 2005, 2006a, 2008). All of the peer reviews submitted prior to the July 2006 SEI panel meeting were made available to the expert panelists (Hoekstra 2005; Kelt 2005, 2006; Spencer 2005, 2006a). Second, we contacted an additional five reviewers with expertise in small-mammal biology, riparian-community ecology and status, population dynamics and extinction risk, and/or development trends and land-use conflicts to review the remainder of the 2007 revised proposal. All five of these reviewers provided comments (Anderson 2008; Beauvais 2008; Buskirk 2008; Nupp 2008; Travis 2008).

Given the information now available, all of the experts who commented on taxonomic portion of the rule were supportive of our discussion, analysis, and/or conclusions. No reviewers expressed significant concerns over our analysis of the Prebles' taxonomy.

Reviews that focused on the remainder of the 2007 revised proposed rule were generally supportive of Service efforts, but provided criticism

and suggestions regarding various aspects of the revised proposed rule. Six reviewers provided comments on whether evidence we presented in the revised proposed rule sufficiently supported our removal of the Act's protections for the Wyoming populations. Three reviewers supported our proposal as being reasonable based on evidence presented. Two reviewers questioned the proposal based largely on adequacy of existing knowledge regarding Prebles' populations in Wyoming. One reviewer opposed the proposal, calling it weakly supported. Two reviewers suggested that the revised proposed rule should have made better use of geographic information systems (GIS) to depict and analyze trapping efforts, documented occurrence, appropriate habitat, and projected threats.

Reviewer opinions also varied on use of the Wyoming—Colorado State line to delineate a significant portion of Prebles' range. While reviewers generally considered a division based on the North Platte River basin and the South Platte River basin more appropriate from an ecological or mouse population perspective, three concluded that the use of the State line was supported by the differing levels of threats described. Two reviewers called for more detailed analysis of threats as related to both sides of the State line. One reviewer discounted significant differences in threats across the State line. Three reviewers mentioned the administrative or practical convenience of using the State line.

Summary of Public Comments

We reviewed all comments from peer reviewers and the public for substantive issues and new information regarding this rulemaking. Substantive comments received during the comment periods have been addressed below or incorporated directly into this final rule. Comments of a similar nature have been grouped together under subject headings in a series of issues and responses.

Technical and Editorial Comments

Issue: Several technical and editorial comments were provided by respondents. In addition, peer reviewers and other commenters provided or suggested additional literature to consider in our final rule.

Response: We corrected inaccuracies in the revised proposed rule wherever appropriate. We also edited portions of the text to make it clearer. We reviewed and incorporated relevant additional literature and information when appropriate. The list of literature cited in this rule will be posted online (*http://www.fws.gov/mountain-prairie/species/mammals/preble/*).

Defining a ''Listable Entity'' under section 4 of the Act.

Issue: We received numerous comments on taxonomic data quality and quantity. Many questioned the amount of data necessary to make such taxonomic determinations. Some commenters questioned the basis for the initial listing of the subspecies. Other commenters discussed whether the available data relied upon in our 2005 proposed rule was sufficient or insufficient. Some commenters suggested we should employ the precautionary principle when making a call on delisting. Other commenters questioned our apparent reliance upon the peer reviewer ''majority vote'' as a justification for our 2005 proposed delisting. Still other commenters noted or questioned evidence of political interference in this rulemaking process.

Response: The Act requires that we base our determinations upon the best scientific and commercial information available. As a result, we evaluate all of the available information, its adequacy and reliability, and determine what the weight of evidence suggests. This final rule meets this standard. These issues and the available data are discussed below in the sections titled: Taxonomy; Other Taxonomic Information Available Prior to Listing; Taxonomic Information Solicited After Listing; and Taxonomic Conclusions.

Issue: Many questioned the standards used to test what is a valid subspecies. Some commenters suggested philosophical differences played a role in shaping the hypothesis of each researcher and what each researcher considered a valid subspecies. Other commenters suggested that the Service is inconsistent in applying subspecies standards in its section 4 determinations. Some commenters noted that there are no quantitative standards in use by the scientific community or the Service with which to objectively describe subspecies. Some commenters suggested that acceptance by the scientific community is often nothing more than opinion.

Response: As defined by the Act, a species includes any subspecies of fish or wildlife or plant, and any distinct population segment (DPS) of any species of vertebrate fish or wildlife which interbreeds when mature. The Act does not further define subspecies. Service regulations (50 CFR 424.11) state that ''In determining whether a particular taxon or population is a species for the purposes of the Act, the Secretary shall rely on standard taxonomic distinctions and the biological expertise of the Department and the scientific community concerning the relevant taxonomic group.'' This regulatory standard is consistent with the Act's requirement that we make such determinations solely on the basis of the best scientific and commercial data available. The Service consistently applies this standard.

In this case, we determine that the best scientific and commercial data available support the conclusion that the Prebles is a valid subspecies. While philosophical differences among researchers may play a role in what a particular researcher considers a biologically meaningful difference, we conclude that the weight of evidence supports the Prebles as a valid subspecies.

Specifically, the Prebles' geographic isolation from other subspecies of meadow jumping mice (Krutzsch 1954, pp. 452–453; Long 1965, pp. 664–665; Beauvais 2001, p. 6; Beauvais 2004; SEI 2006a, p. 34) has resulted in the accretion of considerable genetic differentiation (King *et al.* 2006b, pp. 4336–4348; SEI 2006a, pp. 41–43). The available data suggest that the Prebles meets or exceeds numerous, widely accepted subspecies definitions (Mayr and Ashlock 1991, pp. 43–45; Patten and Unitt 2002, pp. 26–34; SEI 2006a, p. 44).

In terms of quantitative standards, the 75 percent rule (Amadon 1949; Patten and Unitt 2002) is one of the only widely employed quantitative subspecies definitions (Haig *et al.* 2006, pp. 1584–1594). This definition suggests a subspecies is valid if 75 percent or more of a population is separable from all (or > 99 percent of) members of the overlapping population. As noted by SEI (2006a, p. 44), the Prebles exceeds this quantitative standard.

Issue: We received numerous comments regarding the status of the Prebles relative to the requirements of the Interagency Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the ESA (DPS policy) (61 FR 4722, February 7, 1996) including the suggestion that the Prebles should or could be split into multiple DPSs based on significant genetic differences observed between populations north and south of Denver (Ramey *et al.* 2005, pp. 334–341; King *et al.* 2006a, pp. 28–29).

Response: The available data supports the taxonomic status of the Prebles as a valid subspecies making most comments about potential application of the DPS policy moot. We do not believe splitting the subspecies into multiple DPSs would be prudent or beneficial

from a conservation perspective. In this case, we do not foresee any significant benefit to recovering multiple DPSs instead of a single listed entity.

Issue: Some commenters suggested that the Service's revised proposed rule (72 FR 62992, November 7, 2007) displayed bias in our presentation of the available information. Specifically, some commenters suggested we highlighted flaws in reports questioning the taxonomic validity of the Prebles, while not offering similar critiques of information supporting the subspecies' taxonomic validity.

Response: To the maximum extent possible, we attempted to objectively portray the available information regardless of the position it articulated. All information was held to a similar level of critical review. However, we have reviewed the final rule relative to the specific objections and made minor revisions where appropriate.

Ramey *et al.* and King *et al.*

Issue: Some commenters suggested the Ramey *et al.* (2003, 2004a, 2004b, 2005) studies exhibited bias. Some commenters questioned whether the studies could be relied upon because the studies were largely funded by the State of Wyoming, one of the petitioners. Other commenters noted that the conclusions strayed beyond genetics and taxonomy into policy considerations.

Response: Ramey *et al.* (2004a, 2004b, 2005) were subjected to extensive peer and public review, were reviewed and approved by a peer-reviewed journal, and were reviewed by the SEI expert panel. All of this information has been taken into consideration in this final determination.

Issue: Some commenters suggested the King *et al.* (2006a, 2006b) studies exhibited bias. It was suggested that Dr. King has a history of designating unwarranted or questionable subspecies. Some commenters questioned Dr. King's qualifications. Other commenters suggested that USGS was inherently biased because the Service and USGS are sister agencies under the Department of the Interior.

Response: King *et al.* (2006a, 2006b) were the subject of extensive peer review and public review, were reviewed and approved by a peer-reviewed journal, and were reviewed by the SEI expert panel. All of this information has been taken into consideration in this final determination.

We believe the USGS research team was well qualified to conduct the analysis. For example, their previous work concerning Atlantic salmon (*Salmo salar*) was upheld by a National Research Council (2002b, p. 4) review. This validation provided us with confidence that these researchers' expertise could meet our scientific needs. We do not believe that USGS' research conclusions were biased by the fact that it is a sister agency to the Service.

Issue: Some commenters questioned the critiques raised by peer reviewers and the scientific community. Rebuttals were offered for each criticism of Ramey *et al.* (2005) listed in the proposed rule. It was suggested that we failed to explain that many of these issues were relevant to the draft they evaluated (Ramey *et al.* 2004a, 2004b), but resolved in the publication (Ramey *et al.* 2005). Finally, it was suggested that many of these same issues plague the King *et al.* (2006b) report.

Response: We have revised this section (see the Taxonomic Information Solicited After Listing section below) so as to clearly explain that many of the issues raised by peer reviewers of Ramey *et al.* (2004a, 2004b) were rectified in the 2005 publication (Ramey *et al.* 2005). Each of these critiques was carefully considered. All of the issues remaining in this section of this final rule continue to remain relevant and may have contributed, at least in part, to the conclusions of Ramey *et al.* (2005).

For example, while the comment defended the use of museum specimens, we remain concerned that Ramey *et al.*'s (2004a, 2004b, 2005) reliance upon museum specimens may have contributed to contamination of numerous key samples. As noted by Douglas (2004), the quality of DNA extracted from museum specimens is often inferior, fragmented, and low quantity. As a result, amplification can be difficult and cross-contamination with other high-quality DNA can occur. Ramey *et al.* (2004a, p. 6) confirmed ''some DNA extracts, most notably those of older museum specimens (prior to 1980), did not amplify well or at all.'' King *et al.* (2006b, pp. 4355–4357) demonstrated that numerous key DNA sequences were not repeatable. Most importantly, SEI (2006a, pp. 21–30) confirmed evidence of contamination of key Ramey *et al.* samples after reviewing the original supporting data. While other explanations are possible (King *et al.* 2006, p. 4345; Ramey *et al.* 2007, p. 3519), we have concluded that the Ramey *et al.* (2005) data demonstrates sufficient evidence of contamination to warrant inclusion on this list of concerns.

Similarly, results can be meaningfully altered if a museum specimen's tag (marking locality and subspecies) is incorrect. This appears to be the case with museum specimens KU115895, KU115896, and KU115897 (Anderson & Jones 1971 as cited in King *et al.* 2006b, p. 4357). That said, museum specimens remain a valuable resource in providing specimens from a large geographic area and often allow a study to be executed in relatively short time. As recommended by the literature, proper precautions are required (Cooper and Poinar 2000).

Most of the other critiques of Ramey *et al.* centered on study design and the thoroughness of the evaluation. We continue to list these issues because each of these factors may have influenced the study's results and conclusions. We also have tried to clarify when a similar issue may have influenced the results and conclusions of King *et al.* The relative importance of many of these issues is discussed in the SEI report (SEI 2006, pp. 20–43).

Issue: Numerous commenters suggested that the sampling regime was a critical difference between the two studies (Ramey *et al.* 2004a, 2004b, 2005; King *et al.* 2006a, 2006b). Several commenters suggested that Crandall and Marshall (2006) represented the best scientific and commercial information available in that their report combined the Ramey *et al.* (2005) and King *et al.* (2006a) data into a single, comprehensive analysis.

Response: We think that an ideal sampling strategy, with unlimited resources, would sample many individuals from many populations across the range of all 12 recognized meadow jumping mouse subspecies. Instead, Ramey *et al.* sampled a few individuals from many sites, while King *et al.* sampled many individuals from a few sites. Each approach has its strengths and weaknesses.

The Ramey *et al.* approach likely captures variation across the range of the subspecies (Ramey *et al.* 2005, p. 332), but may underestimate the level of within-population variation, inflate within-subspecies variance, and potentially lower the between-subspecies differentiation (King *et al.* 2006b, p. 4346). The King *et al.* population-oriented approach likely denotes the diversity within a population (King *et al.* 2006b, p. 4346), but may not capture variance along past or present contact zones between the subspecies (SEI 2006a, pp. 31–43) and may predispose the results to an exaggeration of genetic distances among subspecies (Ramey *et al.* 2007, p. 3519). We considered each of these potential sources of bias in our evaluation of the available data. Overall, we concluded that sampling played only a minor role

in shaping differences between the two studies. Instead, we believe apparent contamination among a number of key samples was likely the primary reason the Ramey *et al.* (2005) and King *et al.* (2006b) mtDNA data differed. While Crandall and Marshall (2006) employed a hybrid approach reevaluating both the Ramey *et al.* and King *et al.* mtDNA sequences, this unpublished study has a number of important weaknesses (see Spencer 2006b) including the inclusion of these same questionable samples. As Crandall and Marshall (2006, p. 5) put it, ''much is dependent on these few samples.'' We have concluded that inclusion of these apparently contaminated samples makes the mtDNA results and conclusions of Ramey *et al.* (2005) and Crandall and Marshall (2006) unreliable.

Issue: Several commenters suggested that even if the apparently contaminated samples are removed from the analysis, the data still supports the conclusions of Ramey *et al.* (2005).

Response: No data or analysis were presented to support the assertion that Ramey *et al.*'s key conclusions would not differ if the suspect samples were removed. Ramey *et al.* (2007, p. 3520) state that ''With the samples in question excluded, analysis of molecular variance results just exceed our threshold, but the Prebles is still not even close to being reciprocally monophyletic.'' This suggests the mtDNA results would satisfy Ramey *et al.*'s (2005, p. 332) a priori mtDNA hypothesis for a valid subspecies where there was greater molecular variance among than within subspecies. Overall, we feel the available data is compelling in its support of the validity of this taxon.

Issue: A few commenters suggested that Ramey *et al.* set up subspecies standards in advance of data collection, while King *et al.* relied upon post-hoc interpretations of the data.

Response: Our evaluation of Ramey *et al.* (2003, p. 4; 2004a, p. 4; 2005, pp. 331–334), USGS (2005, p. 3) and King *et al.* (2006a, p. 5; 2006b, p. 4332) revealed that both research teams developed their hypotheses in advance of data collection which they consistently applied throughout the process.

Issue: A few commenters questioned whether hybridization between the Prebles and the western jumping mouse could have impacted each study's results.

Response: Genetic distance between the Prebles and the western jumping mouse is significant (King *et al.* 2006b, p. 4341), and the available genetic studies experienced no difficulty differentiating between the two species (Riggs *et al.* 1997, pp. 6–11; Ramey *et al.* 2005, p. 332; King *et al.* 2006b, p. 4341). Wunder and Harrington (1996, section 6.0) also ruled out hybridization based on a small sampling of random amplification of polymorphic DNA (RAPD) (an amplification of random segments of DNA with single primer of arbitrary nucleotide sequence). Based upon the best scientific and commercial information available, we do not believe hybridization is occurring between these two distinct species.

Issue: Several commenters suggested King *et al.* examined too much data. Specifically, it was suggested that the statistically significant differences observed by King *et al.* were the result of the large number of microsatellite loci (the specific position of a gene or other chromosomal marker) examined and not reflective of any meaningful biological difference.

Response: We find no support for the position that significant differences detected by King *et al.* were an artifact of an excessively large sample size. The Ramey *et al.* and King *et al.* microsatellite results do not appear dependent upon the number of loci examined (5 and 21 loci, respectively) as both data sets support a statistically significant independent cluster that corresponds to the Prebles (Crandall and Marshall 2006, pp. 26–27; SEI 2006a, p. 43). This, in combination with other available data, supports continued recognition of the subspecies as a valid taxon.

Information Quality and Peer Review for Taxonomy

Issue: Numerous commenters suggested we should not rely upon unpublished literature that has not been subjected to a scientific journal's peer review process. They felt that using Ramey *et al.* or King *et al.* violated the Data Quality Act (44 U.S.C. 3516 *et seq.*) and Service policy. Several commenters thought we should reopen the comment period once these documents were accepted for publication or published.

Response: The Act requires that our actions be based upon the best scientific and commercial information available. Occasionally, relevant scientific and commercial information is not, or has not yet been, published. In these cases, peer review may assist us in our evaluation of the available science. At this point, most of the key literature relevant to the subspecies' taxonomy has been subjected to extensive peer review, reviewed and published by peer-reviewed journals, and reviewed by the SEI expert panel. Additionally, the public has had an opportunity to review and comment on all of the relevant literature (70 FR 5404, February 2, 2005; 71 FR 8556, February 17, 2006; 71 FR 16090, March 30, 2006; 72 FR 62992, November 7, 2007). Finally, we have conducted numerous peer reviews of our regulatory proposals (70 FR 5404, February 2, 2005; 71 FR 8556, February 17, 2006; 71 FR 16090, March 30, 2006; 72 FR 62992, November 7, 2007) in compliance with the Interagency Cooperative Policy for Peer Review in Act Activities (59 FR 34270, July 1, 1994) and the Office of Management and Budget's ''Final Information Quality Bulletin for Peer Review'' (Office of Management and Budget 2004). We have evaluated all of the available information, its adequacy and reliability, and determined what the weight of evidence suggests. Given the above, we feel we have exceeded all Federal requirements for information quality and peer review.

Issue: Several commenters questioned the independence, impartiality, political motivation, and appropriate expertise of select local peer reviewers. Some commenters questioned the independence and impartiality of the Colorado Division of Wildlife (CDOW) in soliciting these peer reviews.

Response: The CDOW solicited and received nine peer reviews of Ramey *et al.* (2004a) from regional scientists with a variety of expertise relevant to the questions at hand. These reviews were transmitted to us on April 24, 2004. We believe that the CDOW acted independently and impartially in selecting qualified reviewers of the subject study. During the summer of 2004, we solicited reviews from seven additional scientists selected for expertise in genetics and systematics. Reviewers were targeted from a wide variety of areas to geographically balance the CDOW review. Collectively, this diverse group of experts provided a balanced and objective review. To maintain consistency, we later contacted the same 16 experts to peer review Ramey *et al.* (2004b) and King *et al.* (2006a). It should be noted that some reviewers declined to participate in subsequent rounds of review (Ramey *et al.* 2004b; King *et al.* 2006a) because of these accusations of bias.

Issue: Some commenters questioned why the Service asked non-geneticists to review King *et al.* (2006a).

Response: As noted above, we solicited peer reviews of King *et al.* (2006a) from the same 16 reviewers asked to review Ramey *et al.* (2004a, 2004b). While we recognized this group included some non-geneticists, we felt consistency among reviewers was critical. We note that most of the non-

geneticists voluntarily declined to participate in the review of King *et al.* (2006a). The one exception, Armstrong (2006), is a respected academic with considerable expertise on the Prebles. His review was useful.

Expert Panel

Issue: Several commenters questioned the Service's decision to organize a scientific panel to review the available information on the species' taxonomic and conservation status.

Response: Recognizing the controversial nature of this determination, the Service decided not to organize and convene an expert panel ourselves. Instead, we contracted with an independent organization to assemble and manage the scientific review panel.

Issue: Numerous parties had issue with the SEI expert panel. Some commenters opined that the SEI panel was tainted because the composition of the panel and the time allotted to participants was altered to favor a particular outcome. Some commenters questioned the objectivity and qualifications of SEI and the panelists.

Response: We stand by the process used in the SEI review panel. Following an open and competitive bid process, SEI was selected as the contractor in June 2006. Once selected, SEI ran all aspects of this process within the bounds of the contract. The selection and retention of panelists as well as the agenda was entirely within SEI's purview. SEI also determined that the public could attend. In addition, Drs. Ramey, Crandall, and King addressed the panel in person. Other scientists participated over the phone. Questions from the audience were also presented for the panel's consideration. The panel also had access to published literature, unpublished reports, third-party critiques, public comments, and other materials suggested by interested parties (SEI 2006a, pp. 48–55). Overall, we think that the process was fair, open, and unbiased.

Furthermore, we believe SEI and the panelists were well qualified to conduct the contracted review. SEI regularly conducts such scientific reviews including panels on northern spotted owl, pallid sturgeon, and Everglades restoration (see: *http://www.sei.org/*). The panelists' qualifications are well established. As illustrated in appendix 1 of the SEI (2006a, pp. 56–82) report, each panelist has an extensive background in the genetic and systematic issues relevant to the Prebles' review.

Issue: Some commenters suggested that the SEI report went beyond the original scope of their contract. Specifically, commenters suggested the SEI report should have abstained from offering reviewers' taxonomic conclusions.

Response: We contracted with SEI to analyze, assess, and weigh the reasons why the data, findings, and conclusions of the two studies differed (USFWS 2006, p. 14). Incorporation of the panelists' taxonomic conclusions was a natural outgrowth of the contract's stated purpose. The final report fully satisfied SEI's contractual obligations.

Availability of Taxonomic Information

Issue: Several commenters raised a concern that we relied on a paper (King *et al.* in review) for this rulemaking that we did not possess and thus was not available for public review during the comment period. Since this report was not available, some commenters requested an extension of the comment period.

Response: The revised proposed rule referenced a document by USGS cited as ''King *et al.* (in review).'' This article was not the primary jumping mouse study by King *et al.* The primary study and its supporting data were released to the public in early 2006 (King *et al.* 2006a; 71 FR 8556, February 17, 2006; 71 FR 16090, March 30, 2006) and published in *Molecular Ecology* in late 2006 (King *et al.* 2006b).

Instead, King *et al.* (in review) was a comment article that *Molecular Ecology* intended to publish in the News and Views section of the journal, in response to Ramey *et al.* (2007) (another comment article). These comment articles were cited once in the revised proposed rule in a sentence that read: ''Other evaluations of the available literature and data include Ramey *et al.* (in press), King *et al.* (in review), Crandall and Marshall (2006), Spencer (2006b), and Cronin (2007).'' This sentence cited King *et al.* (in review), among other documents, to inform the public we were aware of its existence. However, our determination that the Prebles is a valid subspecies did not use or rely on this document.

The comment was correct that we did not have this document in our files. By citing the document as ''in review,'' we intended to convey that the document had been drafted and submitted for publication, but not yet accepted as it was still undergoing peer review. The USGS typically does not release documents unless they have been accepted for publication or otherwise peer reviewed. As the peer review process for this document remains incomplete, the article is solely in the possession of USGS and the reviewing journal.

Given the context of this citation and its inconsequentiality to our determination, we do not think that this document was critical to the public's review or understanding of our proposal. Therefore, we did not grant an extension of the comment period.

Distribution, Status, Population Size, and Population Trends

Issue: Some commenters contended that our 2005, 12-month finding and proposed rule should have evaluated the distribution, abundance, trends, and threats information from the delisting petitions.

Response: On February 2, 2005, we issued a 12-month finding on a petition to delist the Prebles and proposed to remove the mouse from the Federal list of endangered and threatened species (70 FR 5404, February 2, 2005). The basis for the proposed action was that the Prebles was ''likely not a valid subspecies of meadow jumping mouse.'' It was not necessary or appropriate to consider distribution, abundance, trends, or threats until it was determined that the Prebles qualified as a listable entity under the Act. Once we determined that the Prebles was a valid subspecies, we considered all relevant information on Prebles' distribution, abundance, trends, and threats in our revised proposed rule (72 FR 62992, November 7, 2007) and in this final rule.

Issue: Some commenters suggested that Figure 1 could have been more clear or more informative. Specific suggestions put forth were to: Include more detail; depict all jumping mouse captures noting the species; and provide a better explanation of the data depicted in the key and text. One reviewer commented that the database from which Figure 1 was derived should be available to the public.

Response: Figure 1 was too busy and difficult to read in the **Federal Register**. As a result, we have split this graphic representation of occupancy into a Wyoming (Figure 1) and a Colorado figure (Figure 2). We also revised the corresponding text. This final rule more clearly depicts known Prebles' distribution and results of other trapping efforts. The supporting data (Service 2008) is available upon request.

Issue: Reviewers commented that distribution of available habitat and threats to the Prebles could be mapped, quantified, and better visualized through use of GIS. One reviewer suggested that we clearly map all threats or confirm that project constraints make these measures impractical.

Response: The Service has mapped potential Prebles' habitat (67 FR 47154, July 17, 2002; 68 FR 37276, June 23, 2003), as has the Wyoming Natural Diversity Database (WNDD) (Beauvais 2001, 2004), the CDOW, and some Colorado counties. The Center for the West produced a series of GIS maps predicting growth through 2040 for the west including the Colorado Front Range and Wyoming (Travis *et al.* 2005, pp. 2–7). These models represent a good approximation of projected development pressures. We also worked with the CDOW to examine protection status of designated critical habitat units and other selected areas supporting the Prebles. These results are summarized in the 5-factor analysis below.

Issue: We received numerous comments on data quality and quantity relative to the subspecies' status. Many noted limited available information or data on historical and current range, current abundance, population trends, threats, and ecological relationships. Some commenters suggested this illustrated the weakness of our original listing and, therefore, suggested we should delist range-wide. Other commenters suggested a change in listing status in any portion of the subspecies' range should be precluded until better data is available.

Response: The Act requires our determinations be based upon the best scientific and commercial information available. As a result, we evaluate all of the available information, its adequacy and reliability, and determine what the weight of evidence suggests. This final rule meets this standard.

Issue: One reviewer suggested that we quantify relative abundance of the Prebles and compare abundance estimates to habitat features to better define quality habitat. This reviewer thought we could estimate relative abundance by calculating and comparing Prebles captured per trap night (number of traps employed times number of nights of trapping) for all trapping efforts throughout Prebles' range.

Response: Where we have abundance information, we present it in this final rule. Data available is not adequate to quantify and compare the relative abundance of the Prebles across its range with any reasonable degree of confidence (i.e., much of the trapping was on small sites and over short periods with inconsistent timing and conditions).

Issue: One commenter claimed our analysis is flawed because the Prebles cannot be differentiated from the western jumping mouse.

Response: Genetic markers are effective in differentiating meadow jumping mice and western jumping mice (Riggs *et al.* 1997, pp. 2–8; Ramey *et al.* 2005, pp. 344–346; King *et al.* 2006b, pp. 4341, 4344). Additionally, Discriminant Function Analysis (DFA) (analysis of cranial measurements and an anterior medial toothfold characteristic) appears to be a reliable technique for differentiating the two species (Conner and Shenk 2003a). We acknowledge that, for a number of historical and recent capture sites, mice were tentatively identified in the field based on capture location, size, and external features, but definitive identification to species was never attempted. In many of these cases, genetic samples were not obtained nor were voucher specimens taken; therefore, the specimen's species identity remains inconclusive. As noted below, positive identification to species is only an issue in areas of overlapping range (i.e., high-elevation sites in Colorado and most of Wyoming). We have addressed potential shortcomings for species identification in our analysis, and we have reviewed and modified the text for added clarity.

Issue: Several commenters noted that Prebles are now known from more drainages and a greater number of sites than at the time of listing. These commenters suggested this was evidence that Prebles' populations are secure. One commenter requested that we state the specific number of sites where the Prebles is known to occur.

Response: We have acknowledged an increase in our knowledge of distribution of Prebles, especially in the Wyoming portion of its range. We have summarized areas of known or potential occurrence by river basin, drainage (8-digit USGS hydrologic units), and river or stream. We also have emphasized instances where confirmed captures have extended our knowledge of Prebles' range and occurrence. We think that the number of individual capture sites is less meaningful. Documentation of multiple capture sites within portions of drainages or along streams where Prebles' populations occur is largely a function of trapping effort. When multiple sites are within close proximity of each other, counting each occurrence instead of a single population exaggerates abundance. Further, as one peer reviewer correctly cautioned, trends cannot be established from the number of documented sites alone, and that an increase in documented sites resulting from increased trapping efforts could mask a decreasing population trend.

Issue: One commenter stated that the Prebles' range has not declined significantly. This commenter suggested the subspecies is now known to be present in virtually all historically documented locations except those in the greater Denver area.

Response: The subspecies' declines within Colorado are fully explained in Factor A below. This analysis includes the apparent extirpation of the subspecies from approximately 420 km (260 mi) in and downstream of areas with concentrated human development. In terms of historically documented locations (i.e., sites from which we have specimens prior to 1980), we are aware of 17 such sites in Colorado. Of these, only one of these sites is currently thought to support the Prebles. The majority of historical records of Prebles in Colorado come from what is now widely known as the Front Range urban corridor, which extends well beyond the Denver area. In Wyoming, with the possible exception of Cheyenne, the Prebles is likely present at the few sites where it was historically documented.

Issue: One commenter concluded that the high number of section 7 consultations conducted in Colorado as compared to Wyoming was evidence of ''expansive range and increasing populations'' in Colorado.

Response: A more reasonable explanation for the number of section 7 consultations is that human development is expanding into areas of Prebles' occurrence. In Wyoming, far less development is occurring in areas where the Prebles is present.

Issue: Some commenters questioned how we established that over 80 percent of trapping efforts in Colorado since listing have failed to capture Prebles. They questioned whether western jumping mice were included in the results and questioned the expertise of the trappers conducting the studies. Some commenters requested comparative trapping success rates from Wyoming trapping.

Response: From 1998 to 2007, 27 percent of 1,350 data points associated with trapping efforts targeting Prebles in Colorado have resulted in captures of jumping mice (USFWS 2008). When we controlled for repeated trapping at single sites, such as established research sites, jumping mouse capture rates drop to less than 20 percent. Even this estimate may be high as some of these jumping mice were likely western jumping mice, particularly those from high-elevation trapping efforts.

From 1998 to 2007, 74 percent of 219 data points associated with trapping efforts in Wyoming have resulted in captures of jumping mice (USFWS

2008). The overlapping range of Prebles and western jumping mouse in Wyoming must be considered when comparing Preble's capture success between the two States. Based on individual mice confirmed to species, it is likely that more of the successful trapping efforts in Wyoming captured only western jumping mice. Of positive jumping mouse capture sites, 29 percent of the sites included only Prebles, 55 percent of the sites included only western jumping mice, 5 percent of the sites had both species present, and specimens from 11 percent of the successful sites were never positively identified to species.

All jumping mouse trapping efforts since listing have been carried out by researchers holding Service and State permits. While experience of individual biologists may vary, we believe all individuals permitted to trap Prebles are qualified to conduct such surveys.

Foreseeable Future

Issue: One commenter stated that foreseeable future as defined in the revised proposed rule was too short, citing climate change projections to 100 years and Service HCPs issued for 50 years.

Response: The term foreseeable future is not defined by the Act or in the implementing regulations at 50 CFR part 424. Merriam-Webster's Law Dictionary (1996) defines ''foreseeable'' as such as that which reasonably can or should be anticipated such that a person of ordinary prudence would expect it to occur or exist under the circumstances (Merriam-Webster's Dictionary of Law 1996; *Western Watershed Project* v. *Foss* (D. Idaho 2005; CV 04–168–MHW). Determination of foreseeable future is typically based on the timeframe over which the best available scientific data allows us to reasonably assess the threats and the species' response to those threats, and is supported by species-specific factors, including the species' life history characteristics (e.g., generation time) and population dynamics. From a scientific perspective, it would be inappropriate to set foreseeable future timeframes so short that natural variability in the ecosystem of the species, short-term population dynamics, or the expression of life history traits of the species through generational-scale variation in reproductive success or recruitment cannot be accounted for in the longer-term examination of factors impacting the species. Typically, threats tend to operate through their effects on survival and productivity over multiple generations, with one to two generations being insufficient to separate natural variability from directional effects of threats. Whenever possible, we will determine the ''foreseeable future'' based on a detailed assessment of threats and species-specific biological information.

For the Prebles, we defined foreseeable future based upon a threat-projection timeframe because future development intensity and patterns are likely to be the single greatest factor contributing to the subspecies' future conservation status. The foreseeable future for the Prebles, based on the currently available data, extends to approximately 2040. While it is likely human population growth and development projections could be extrapolated out into the more distant future, growth and development projections beyond this point are of increasingly lower value as uncertainty escalates. However, we agree that not all threat factors are necessarily foreseeable over the same time horizon and that for some threat factors a longer time horizon may be appropriate. Thus, this rule considers the range of climatic conditions predicted by the Intergovernmental Panel on Climate Change (IPCC) for the 21st century. While climate projections routinely go out past this 2040 time horizon (IPCC 2007, p. 7), climate change forecasts, like human development projections, become less certain as they are extended into the future (Hall 2008; Meyers 2008). The IPCC acknowledged this uncertainty in their most recent report when they stated that projections beyond the next two decades depend on specific emission scenarios (IPCC 2007, p. 7). The duration of section 10 permits, issued in support of approved Habitat Conservation Plans, have no bearing on what is foreseeable for this subspecies.

Impacts From Increased Human Population and Development

Issue: Some commenters stated that local extirpations of Prebles in the Front Range urban corridor cannot be used to speculate about future threats in other portions of its range. They suggested that development threats are localized and do not affect most Prebles' populations.

Response: While threats do vary across the range of the subspecies, we believe that the rule adequately captures and presents the severity of the issue across all portions of the subspecies' range. The direct and indirect effects of human development have resulted in substantial habitat alteration across large parts of the Colorado range. While habitat alteration has been most severe in the expanding Front Range urban corridor, projected future human growth will substantially extend this area of impact. Additional threats exist outside of areas of intense human development. For example, linear projects such as roads and pipelines may impact multiple counties and can affect rural habitat as well as that in urbanizing areas, and potential impacts from overgrazing are more likely to affect Prebles' habitat in rural areas than in areas of high residential density.

Issue: Some commenters suggested that population growth forecasts can be unreliable. They pointed to the current housing slump and suggest that population growth within the Prebles' range will be less than predicted. One commenter stated that the Center for the American West models' depiction of development patterns in the future have limited utility since they assume that all private land is technically buildable and available for development.

Response: Any future predictions include a degree of uncertainty. That said, we consider projections and related models to be the best information available on this subject. Economic downturns, that are relatively short-lived, are unlikely to significantly alter long-term forecasts.

The Center for the American West models (Travis *et al.* 2005, pp. 2–7) predict development patterns on a sub-regional basis. The fate of individual parcels could be determined by a number of factors not addressed by the models, and the model developers have noted that the projections should not be applied to individual properties. We have cited these models in evaluating threats related to likely patterns of future human growth, not the presumed fate of individual properties. We have expanded our discussion of the models and their use in the text.

Issue: One reviewer noted that while human development in Wyoming is likely to be far less than in Colorado, Wyoming does not ''lack'' development and much of it will be in rural areas. A few commenters addressed current and modeled future human population growth in Wyoming centered near Cheyenne. One reviewer questioned whether the absence of the Prebles in Cheyenne area was the result of development. Another reviewer concluded that projected growth in the Cheyenne area would not result in impacts to the Prebles because it would not overlap areas known to support the subspecies.

Response: We acknowledge that human development is likely to occur in portions of Wyoming now supporting the Prebles. However, we believe that expansion of human presence and

related threats will be localized and relatively minor, and will not threaten the continued persistence of the Prebles in those areas.

Known occurrence records suggest that the Prebles is not common or widely present in the South Platte River basin in Wyoming. The cause of this rarity is unknown. The continued existence of the Prebles in the Cheyenne area also is unknown. Sites of recent confirmation of the Prebles in the South Platte River basin of Wyoming have been well upstream from Cheyenne. Development could impact Prebles' populations in the Cheyenne area, should they exist. However, the long-term viability of populations in these drainages is more likely to depend on persistence in upstream portions of the drainages rather than the Cheyenne area.

Issue: Some commenters predicted that secondary impacts associated with human development in Colorado would impact Prebles' habitat in southern Wyoming. Particular issues raised included vacation homes, human recreational activities, water resource development and storage, and aggregate mining.

Response: As human populations in Colorado, particularly northern Colorado, continue to grow, secondary impacts may spill over into southeastern Wyoming. Regarding vacation homes, the Center for the West models of human population growth take into account urban, suburban, ex-urban, and rural development (*http://www.centerwest.org/futures/west/2040.html; http://www.centerwest.org/futures/archive/development/development_wy.html*). These projections suggest ex-urban development could link Cheyenne and Fort Collins by mid-century, but indicate little development in the documented range of the Prebles in Wyoming. While some development will undoubtedly occur, we do not have data to indicate meaningful impacts are likely anywhere in the Wyoming portion of the subspecies' range, except around Cheyenne where the subspecies has not been recently documented to occur.

While increasing population may result in increased recreation, new water development, or additional aggregate mining, we are not aware of any specific proposals that would increase the effects of these types of activities on Prebles' populations. These issues are evaluated further in our 5-Factor analysis below.

Impacts From Agriculture

Issue: Some commenters stated that grazing is not a significant threat, as evidenced by the special 4(d) rule allowing continued agricultural activities. One commenter stated that chronic violations of grazing regulations on public grazing lands impact Prebles' habitat. One commenter provided a Bureau of Land Management (BLM) (2004) report on public range in Wyoming, to demonstrate that range improvements have occurred over time. The report stated that range conditions have improved over time; efforts are under way to stop invasive weeds; and wildlife populations have increased.

Response: Our special rule provides exemption from take prohibitions under section 9 of the Act for certain land uses including continued agriculture. While overgrazing can and does impact Prebles' habitat, and in some cases can be a threat, the 4(d) rule (66 FR 28125, May 22, 2001; 67 FR 61531, October 1, 2002; 69 FR 29101, May 20, 2004) was instituted to acknowledge that those ongoing agricultural operations maintaining habitat that supports the Prebles are an asset to conservation and recovery. Through this special rule, we anticipated increased opportunity to partner with agricultural interests toward conservation of the Prebles.

While we are aware of instances where operators have violated provisions of their grazing permits, we have concluded that this is not a widespread threat within the Prebles' range. We solicited and received data and information on livestock grazing from the U.S. Forest Service (USFS) regarding three National Forests that support Prebles' populations. Allotment inspection records or monitoring reports were received from the Laramie Ranger District, Medicine Bow National Forest in Wyoming (Florich 2008); the Canyon Lakes Ranger District, Arapahoe National Forest (Hodges 2008); and the South Park Ranger District, Pike National Forest (Branch 2008). While the records include instances of non-compliance and note grazing impacts to habitat, more often they reflect livestock grazing conducted in accordance with grazing plans that are consistent with maintenance of Prebles' habitat. Federal agencies, including the USFS and BLM, work cooperatively with the Service to fulfill their responsibilities under the Act. For example, we recently coordinated with the USFS regarding permittee non-compliance issues on the Arapahoe National Forest's Greyrock allotment. In that area, riparian habitat along the North Fork, Cache La Poudre River is recovering following remedial measures to counteract overgrazing.

We reviewed BLM (2004). While not specific to the Prebles' range, we are encouraged by its conclusions that conditions on BLM grazing lands in Wyoming are improving.

Issue: One commenter stated that the Service inappropriately cited the Taylor (1999) trapping study as evidence of Prebles' compatibility with grazing. This comment indicated that: The properties on which the trapping was conducted are not representative of most grazing operations; the report documents grazing impacts on riparian habitat; and Prebles' populations may have decreased since this study because of drought.

Response: The study at issue is by far the most extensive effort conducted on private lands in Wyoming. Jumping mice were captured at 18 of 21 survey sites representing diverse habitat conditions. Genetic testing confirmed Prebles at 11 sites, western jumping mice at 3 sites, both species at 3 sites, and one site was never identified to species (it is also worth noting that although many sites had multiple captures, not all specimens were preserved for species identification). Capture sites included both ideal habitat, such as riparian habitat or sub-irrigated hayfields, and sites where grazing or other factors had impacted habitat quality. While Prebles' habitat and populations are likely affected by periodic droughts, results of this trapping effort demonstrate a broad, long-term ability of the subspecies to coexist with traditional agricultural operations in Wyoming.

Issue: Some commenters recommended that we explore additional threats to the Prebles in Wyoming from agricultural conversion to biofuels.

Response: As discussed in the revised proposed rule, the conversion of native habitat to row crops has become increasingly rare in both Colorado and Wyoming (U.S. Department of Agriculture 2000, Tables 2, 3, & 9). This trend likely reflects that riparian habitats (and other areas) that could be feasibly converted to crop production have already been converted. Although pressures to increase agricultural production may result from the demand to produce biofuels, we are not aware of information that indicates this would result in meaningful decreases in the Prebles' riparian habitat in Wyoming. We explored whether former cropland removed from production through the Conservation Reserve Program (CRP) is now being returned to production and concluded that this scenario is likely to

have a negligible impact on the Prebles and its habitat. The issue is further discussed in Factor A below.

Other Potential Threat Factors

Issue: One commenter noted that if the Prebles was delisted, forestry operations including thinning and prescribed burns could be a significant threat.

Response: The role of fire, a natural part of the ecosystem, is discussed under Factor E below. Thinning of trees increases sunlight at ground level and prescribed burns release nutrients, both of which can promote increased vegetative growth at ground level. While these forest management activities can result in adverse impacts to Prebles' habitat, the impacts are generally temporary and offset by long-term benefits. In general, we conclude that management designed to improve forest health or prevent catastrophic fire will contribute to the long-term conservation of the Prebles and its habitat.

Issue: Some commenters highlighted threats that occur range-wide including: Lack of adequate regulatory mechanisms in the absence of the Act's protections; invasive weeds; hydrologic changes brought on by climate change; and catastrophic fire. We also received some comments supporting our conclusion that only minor threats occur in Wyoming, but substantial threats related to human development occur in Colorado.

Response: This rule summarizes the magnitude, immediacy, and likelihood of foreseeable threats in both States and as well as at the county or drainage level where supporting data are available. While some threats are relatively similar across portions of the two States, these non-development-related threats are not substantial factors driving the subspecies' conservation status. We believe small, fragmented populations are likely at greatest risk from these secondary threat factors. Across most of the subspecies' Colorado range, development actions will increasingly cause populations to become small and fragmented, thus, susceptible to these factors. The available data suggest that few Wyoming Prebles' populations suffer from small population size and fragmentation, and no foreseeable threats are likely to substantially increase this inherent vulnerability. Thus, despite a continued risk from some potential threats in both Wyoming and Colorado, these factors are not likely to threaten or endanger the subspecies in all of its range.

Issue: Some commenters recommended that we explore additional threats to the Prebles in Wyoming from energy development, especially coalbed methane and natural gas.

Response: Information on coalbed methane targets in Wyoming (Jones and DeBruin 1990, p. 10) indicates that coalfields and the range of the Prebles have little overlap in Wyoming. Furthermore, the coalfields that are nearest the subspecies' range are believed to have low coalbed methane development potential (DeBruin 2004, p. 6). Similarly, only a small portion of the Wyoming range of the Prebles may overlap with oil and gas producing formations (e.g., cretaceous and early tertiary rocks). A much larger portion of the subspecies' range overlaps with exposed undifferentiated precambian rocks or other non oil and gas producing formations (DeBruin 2002). Based on the limited potential for development of these resources within the Wyoming range of Prebles, we conclude that these activities (directly or indirectly) would not meaningfully affect the conservation status of the Prebles in Wyoming now or in the foreseeable future.

Issue: Some commenters believe there is a lack of understanding regarding the relationship between the two jumping mouse species in all Wyoming drainages.

Response: We do know that the Prebles and the western jumping mouse coexist in multiple drainages in both Wyoming and Colorado. In absence of evidence to the contrary, we conclude that this coexistence is not a recent occurrence. Because information is lacking as to whether, or to what degree, populations of Prebles and western jumping mice impact one another, we cannot conclude that western jumping mouse presence is a threat to the Prebles. However, further research may be valuable to identify the relationship between the two species where they co-occur.

Issue: We received several comments on the potential threat to the Prebles from climate change. These commenters suggested that we had not given sufficient attention to future threats caused or compounded by climate change; that it could affect future demand and competition for water resources and influence water resource development; and that a warming climate could cause shifts in the subspecies' range and increase the importance of high-latitude, high-altitude Prebles' populations in Wyoming to the subspecies' survival. In contrast, we received a comment that future precipitation changes were too uncertain to be used in an analysis of future threats.

Response: According to the IPCC (2007, p. 2) ''warming of the climate system is unequivocal, as it is now evident from observations of increases in global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.'' In general, a trend of warming in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, and reduce summer flows (IPCC 2007, p. 11). While this change could affect the Prebles and its habitat, to date, a negative impact has not been documented. A significant degree of uncertainty exists as to how projected climate changes, alone and in concert with other threats, will affect the Prebles over the foreseeable future. This issue is discussion in greater detail in Factor E below.

Issue: One reviewer noted that our analysis struggles to weigh cumulative effects, and that threats to the Prebles were likely larger than a simple account of individual effects.

Response: In the biological sense, cumulative effects include effects of stressors imposed by more than one mechanism, that when taken together can have different or more dramatic effects than those recognized from any one alone. In the context of threats to the Prebles, a combination of identifiable threats may have more impact than what would be expected for each individually. Cumulative effects are difficult to predict. Based on the best information available, we have considered the potential for cumulative effects of threats in our analysis. In many instances, we cite that small or fragmented populations may be more vulnerable to specific threats; this outcome also is likely the case with regard to vulnerability to cumulative effects.

Issue: One commenter cited a report by Cryan (2004) that indicates that habitat for meadow jumping mice is increasing in the West.

Response: Cryan (2004, p. 7) reviewed and synthesized existing information on meadow jumping mice in the northern Great Plains (North Dakota, South Dakota, Nebraska, Montana, and Wyoming). While he attributed a likely increase in meadow jumping mouse habitat in the western parts of the Great Plains to westward expansion of riparian forests and mixed-grass prairie, this assertion was not specific to the range of the Prebles nor do we see this habitat trend occurring within the subspecies' range.

Existing Protections

Issue: Several commenters stated that we failed to properly consider Federal,

State, and local efforts to conserve the Prebles. One commenter thought that we did not differentiate between Federal and other lands in terms of future development threats. Some commenters suggested that States and counties will continue to protect the Prebles regardless of delisting. One commenter stated that extensive local regulations prohibit development in riparian habitat. Other commenters suggested that conservation measures by State and local governments are widespread and that lands set aside as open space or under conservation easements protect Prebles' habitat. The CDOW (Nesler 2008) commented that our recognition of ongoing efforts in Colorado is incomplete. The CDOW provided an estimate that, as of spring 2007, 45 percent of occupied Prebles' habitat in Colorado was protected in public lands, land trusts, or through conservation easements.

Response: Both the revised proposed rule and this final rule considered the differential level of threat facing Prebles' populations and their habitat on Federal and other lands. In general, private lands face the greatest threat from direct development pressures. However, Federal and other public lands are not immune from development threats. Roads, trails, recreational facilities including campgrounds, and other human development is likely to affect habitat present on public lands. Indirect effects of upstream development also can meaningfully impact Prebles' populations on protected lands.

Effectiveness of local regulations in maintaining naturally functioning riparian corridors varies greatly depending on how these apparently flexible regulations are implemented. While certain local regulations are designed to conserve wetlands or floodplains on private lands, their effectiveness in conserving Prebles is uncertain. It is also unlikely they would effectively control land uses (grazing, mowing, cutting, and burning) that may affect the hydrology, vegetation, and hibernacula sites on which the Prebles depends. Importantly, most local regulations are flexible and provide little assurance. It is not clear what level of interest in Prebles' conservation would continue following delisting.

We have worked with the CDOW to further understand, document, map, and analyze the lands in public ownership in Colorado. This rule appropriately weighs existing and likely future conservation efforts. All of these factors are discussed below in Factor D and considered in the Conclusion of the 5-Factor Analysis.

Issue: Some commenters stated that there is no proof that existing HCPs are working to protect the Prebles.

Response: HCPs developed for the Prebles are designed to support its conservation and recovery. Permit conditions and monitoring requirements help insure that conservation benefits ensue. Some individual HCPs are complete and have met their planned objectives while other HCPs are in the implementation or monitoring phase.

Issue: One commenter stated that the CWA is the ''cornerstone of surface water quality protection,'' and requires mitigation of all wetland and riparian habitats impacted. Thus, security of the Prebles' habitat is assured under the CWA.

Response: The primary purpose of the CWA is to protect water quality. To achieve this goal, the CWA seeks to avoid and minimize impacts to jurisdictional wetlands. Human impacts to many habitats utilized by the Prebles (including riparian and floodplain habitats outside of jurisdictional wetlands, and adjacent upland habitats) are not directly addressed by the CWA.

Issue: Some commenters suggested that we had not followed section 4(b)(1)(A) of the Act and our Policy for Evaluation of Conservation Efforts (PECE Policy) (68 FR 15100, March 28, 2003) when addressing beneficial measures to conserve the Prebles.

Response: Section 4(b)(1)(A) of the Act requires that we make listing determinations solely on the basis of the best scientific and commercial data available after conducting a review of the species' status and after taking into account those efforts being made by State and local governments. This rulemaking meets this standard, including consideration of efforts being made by State and local governments.

The PECE policy was developed to ensure consistent and adequate evaluation of current and future conservation efforts when considering species for addition to the Federal list of endangered and threatened species. This policy does not apply to delisting determinations. Nevertheless, we have appropriately weighed existing and likely future conservation efforts. This evaluation, included in Factor D below, considered Federal, State, and local regulations; land ownership, use, and management; and relevant programs and initiatives of conservation significance to the Prebles.

Issue: Several commenters suggested the subspecies was threatened in Wyoming by a lack of adequate regulatory mechanisms.

Response: Under the Act, listing can be justified in cases where the entity suffers from the inadequacy of existing regulatory mechanisms. In order to meet this standard, the lack of adequate protections, typically in combination with other threat factors, must result in the species being in danger of extinction throughout all or a significant portion of its range (i.e., endangered) or likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (i.e., threatened). The Wyoming population of Preble's do not appear, at present or within the foreseeable future, dependent upon regulatory mechanisms to maintain their conservation status. As such, the lack of regulatory mechanisms does not appear to threaten or endanger this portion of the range and, thus, the Act's protections are not warranted in Wyoming because of inadequate regulatory mechanisms.

Prebles Status Under the Act, Service Conclusions, and Our Use of Significant Portion of Range

Issue: One commenter suggested that we would be in violation of the Interagency Policy Regarding the Role of the State Agencies in Act Activities and Executive Order 13352 if we failed to delist the Prebles, since both the States of Wyoming and Colorado supported delisting.

Response: Neither the Interagency Policy Regarding the Role of the State Agencies in Act Activities (59 FR 34275, July 1, 1994) nor Executive Order 13352 (69 FR 52989, August 30, 2004) delegates Act listing decisions to the States. Such delegation would violate the Act. Instead, the Interagency Policy Regarding the Role of the State Agencies in Act Activities requires that we solicit and utilize the expertise of and information possessed by State agencies. Similarly, Executive Order 13352 promotes cooperative conservation, with an emphasis on appropriate inclusion of local participation in Federal decision making, in accordance with their representative agency missions, policies, and regulations. We have worked, and will continue to work cooperatively in seeking and utilizing all relevant information in possession of both the Wyoming Game and Fish Department (WGFD) and the CDOW as required for decisions made under section 4 of the Act. Thus, we have met or exceeded the requirements of the Interagency Policy Regarding the Role of the State Agencies in Act Activities and Executive Order No. 13352.

Issue: Several commenters suggested that the Service should delist the Prebles because of the economic impact of the listing or the expense of conservation efforts relative to the

conservation benefits realized. Some commenters suggested that the Final Listing Priority Guidance for Fiscal Year 2000 (Listing Priority Guidance) (57 FR 57114, October 22, 1999) requires that we focus our efforts on listing actions that provide the greatest conservation benefits.

Response: Any determination on whether a species is threatened or endangered must be based solely on the basis of the species conservation status using the best scientific and commercial information available. Spending on a species or economic impacts cannot be considered in such a determination.

The Final Listing Priority Guidance for Fiscal Year 2000 (57 FR 57114, October 22, 1999) does not apply to this rulemaking. The Listing Priority Guidance provides guidance for assigning relative priorities to listing actions conducted by the Service's Listing Program under section 4 of the Act. The guidance clearly articulates that delisting activities are not part of the listing program. Delisting activities have been undertaken by the Service's Recovery Program since fiscal year 1999.

Issue: One commenter was concerned that the revised proposed rule was inconsistent with Prebles' status as classified by the WNDD.

Response: The WNDD (2003, p. A–12) lists the Prebles among 1 of 35 mammal species or subspecies of concern in Wyoming (specific ranking and ranking criteria available at: *http://uwadmnweb.uwyo.edu/wyndd/SOC/2003_WYNDD_Soc.pdf*). In making our determination we considered the best scientific and commercial information available including information available from the WNDD. However, our evaluation and determination of status under the Act is not dictated by the WNDD classification of the Prebles.

Issue: Several commenters stated that the 2007 Department of the Interior Solicitor's opinion (U.S. Department of the Interior 2007) was an incorrect interpretation of the Act. These commenters argued that we have authority to list or delist only whole species, subspecies, and DPSs—in other words, if we find a species to be in danger of extinction in only a significant portion of its range, we must list it and apply all of the protections of the Act to its entire range, even to portions of the range that are not at risk. These commenters opined that the ''partial-listing'' approach represents a dramatic departure from thirty years of listing practice.

In particular, some commenters suggested the Prebles should be protected rangewide because it is threatened over a significant portion of its range. They suggested ''partial-listings'' would lead to a limitless series of petitions and lawsuits over the status of taxa in portions of their ranges.

Others suggested the subspecies should be delisted throughout its entire range, unless the threats are so severe in the Colorado portion of the range that it puts the subspecies' ''future * * * in doubt.'' This commenter suggested the Service's new listing approach inappropriately allows ''partial-listings'' when the loss of a portion of range results in a decrease, no matter how small, in the ability to conserve a species, subspecies, or DPS.

Response: We agree with the interpretation of the Act set forth in the Solicitor's opinion, and disagree with these comments for the reasons given in that opinion. It is true that the Act only allows the listing and delisting of species, subspecies, or DPSs. As such, this action lists the Preble's because the subspecies is likely to become endangered within the foreseeable future in a significant portion of its range. However, once we determine listing is appropriate, section 4(c) of the Act requires we ''specify with respect to each such species over what portion of its range it is threatened.'' In this case, we are specifying that the subspecies is threatened in Colorado. Thus, the protections of the Act are only necessary and shall only apply in the Colorado portion of its range.

The interpretation of the Act advocated by these commenters fails to give sufficient consideration to the import of section 4(c), is inconsistent with legislative history of the Act that strongly supports the view that Congress intended to give the Secretary broad discretion to tailor the protections of the Act with the needs of the species, and would lead to absurd results.

Moreover, even before the 2007 Solicitors opinion, we have applied differential levels of protections for species facing differential levels of threats in different parts of their range. For example, in 1978, the gray wolf (*Canis lupus*) was protected as endangered in the lower-48 States, except in Minnesota, where it was protected as threatened (a lower level of protection is often provided to threatened species than to endangered species) (43 FR 9607, March 9, 1978). Nor is the listing determination for Prebles the only listing determination applying the Solicitor's opinion. In our 2008 Gunnison prairie dog 12-month finding (73 FR 6660, February 5, 2008), we determined that the Gunnison's prairie dog does not warrant the Act's protections throughout its range, but that the significant portion of the species' range located in central and south-central Colorado and north-central New Mexico does warrant protection under the Act.

According to the Solicitor's opinion, we have broad discretion in defining what portion of a range is ''significant,'' but this discretion is not unlimited. Specifically, we may not define ''significant'' to require that a species is endangered only if the threats faced by a species in a portion of its range are so severe as to threaten the viability of the species as a whole. The suggestion by one of the commenters that a portion of the range of a species can be significant only if its loss would put the ''future [of the species] in doubt'' rests on a single quote from hearing testimony on a bill that was a precursor to the Act. If by the future of the species being in doubt the commenter means that the threat to the portion of the range must threaten the entire species, such an interpretation would read the ''significant portion or its range'' language from the Act. Unlike the Solicitor's opinion, the commenter did not address this issue, or the relevant case law.

For this determination, we used an analysis similar to that we have used in other recent listing determinations: A portion of a species' range is significant if it is part of the current range of the species and it contributes substantially to the representation, resiliency, or redundancy of the species. The contribution must be at a level such that its loss would result in a decrease in the ability to conserve the species. In other words, in considering significance, the Service asks whether the loss of this portion likely would eventually move the species toward extinction, but not to the point where the species should be listed as threatened or endangered throughout all of its range.

To determine if a portion of the species' range contributes substantially to the resiliency of the species, the Service considered in this instance: (1) To what extent does this portion of the range contribute to the total of large blocks of high-quality habitat? (2) To what extent do the population size and characteristics within this portion of the range contribute to the ability of the species to recover from periodic disturbances? (3) To what extent does this portion of the range act as a refugium of the species? (4) To what extent does this portion contain an important concentration of habitats necessary for certain life history functions?

To determine if a portion of the species' range contributes substantially

to the redundancy of the species, the Service considered in this instance: (5) To what extent does this portion of the range contribute to the total [gross area] range of the species? (6) To what extent does this portion of the range contribute to the total population of the species? (7) To what extent does this portion of the range contribute to the total suitable habitat? (8) To what extent does this portion of the range contribute to the geographical distribution of the species?

To determine if a portion of the species' range contributes substantially to the representation of the species, the Service considered in this instance: (9) To what extent does this portion of the range contribute to the genetic diversity of the species? (10) To what extent does this portion of the range contribute to the morphological/physiological diversity of the species? (11) To what extent does this portion of the range contribute to the behavioral diversity of the species? (12) To what extent does this portion of the range contribute to the diversity of ecological settings in which the species is found?

These questions provide for a relative ranking (high, medium, and low) of the level of the portion's contribution to the listable entity's (species, subspecies or DPSs) representation, resiliency, or redundancy. Because the questions may not be independent of each other or equivalent in value, it is inappropriate to ''sum'' the high, medium, and low rankings across questions or arrive at a total ''score.'' Rather, the questions are tools to identify those factors that are important in considering a portion's contribution to resiliency, redundancy, and representation, and whether it is significant. The Service then reviews the results and the justifications to decide whether the portion contributes substantially to the representation, redundancy and resiliency of the listable entity (species, subspecies or DPS). In general, if the contribution to the representation, resiliency, or redundancy of all the questions is low, the portion likely does not contribute substantially to representation, resiliency, or redundancy; if the contribution to the representation, resiliency, or redundancy of most or multiple questions are high, the portion likely contributes substantially to representation, resiliency, or redundancy.

Issue: Several commenters suggested the ''partial-listing'' approach allowed by the Solicitor's opinion undoes the effect of the 1978 DPS amendments to the Act.

Response: We do not believe this approach undoes the 1978 amendments to the Act, instead it compliments the 1978 amendments. A DPS of a vertebrate species which interbreeds when mature is considered and treated as a species (i.e., a listable entity) under the Act. A significant portion of the range is a portion of the range of the listed entity (whether a full species, subspecies, or DPS of a vertebrate) that contributes meaningfully to the conservation of the species. Therefore, we may apply the protections of the Act in a significant portion of a DPS. In addition, we may apply the protections of the Act in a significant portion of a species or subspecies of non-vertebrate.

According to our DPS policy (61 FR 4722, February 7, 1996), a DPS must be discrete and must be significant to the taxon to which it belongs (species or subspecies) as a whole. The term ''significant'' in the Act's definitions of endangered and threatened species should not be considered entirely equivalent to the ''significance'' element of the DPS policy. We recognize, however, that many of the attributes (described below) we have identified as important for evaluating whether a portion of a species' range is significant are similar to the attributes identified in the DPS policy as being appropriate for evaluating the significance of a potential DPS. There is no requirement that a significant portion of the range be discrete, but similar to DPSs, a significant portion of the range must be significant. As explained in detail previously, the significance of a significant portion of the range is based on an evaluation of its contribution to the conservation of the listable entity being considered. The DPS policy lists four possible factors to consider when determining significance, but does not limit consideration of significance to only those four factors. The considerations we made in this instance for determining whether a portion is significant encompass and expand on some of the concepts in the DPS policy.

Issue: One commenter suggested we use a 4(d) rule to reduce regulatory restrictions in more secure portions of its range instead of this ''partial-listing'' approach.

Response: Special rules under section 4(d) of the Act apply only where the protections of the Act are in place. Thus, once we determined the subspecies was not threatened in the Wyoming portion of its range, use of section 4(d) was no longer an option for Prebles populations in Wyoming. While a 4(d) rule allows us to tailor the Act's taking provisions as necessary and advisable to provide for the conservation of the species, the approach utilized here also eliminates the need for critical habitat and consultation under section 7 of the Act. We believe this approach is more consistent with the intention of Congress as expressed in the legislative history concerning the phrase ''significant portion of its range.''

Issue: Some commenters questioned our analysis and conclusion regarding the status of the Prebles in Wyoming as compared to our analysis and conclusion regarding Colorado. They stated that, like Colorado, the Wyoming portion of the range is necessary for resiliency, redundancy, and representation of the Prebles, and that loss of populations in Wyoming would result in a decrease in our ability to conserve the Prebles. Some commenters stated that Preble's populations in Wyoming should be protected because, even with the protections of the Act, the subspecies continues to decline in Colorado. These commenters suggested Wyoming Preble's populations will likely be essential to conserving the subspecies.

Response: The Wyoming portion of its range is necessary for resiliency, redundancy, and representation of the Prebles. The basis for amending the listing of the Prebles in the Wyoming portion of its range is not the lack of significance of Wyoming populations to the survival of the subspecies, but rather that Wyoming populations appear secure into the foreseeable future without protections of the Act. Overall, in the absence of the Act's protective measures, we believe the subspecies will likely remain secure and well distributed across Wyoming into the foreseeable future. We have concluded that the lack of present or threatened impacts to the Prebles in these areas indicates that this subspecies is neither in danger of extinction, nor likely to become endangered within the foreseeable future, throughout all of its range. Thus, the Prebles does not merit continued listing as threatened throughout all of its range. In Colorado, where we have determined the Prebles remains threatened, the Act will provide for the subspecies' protection and, with the assistance of our partners, eventual recovery.

Issue: Some commenters suggested a ''partial delisting'' would not improve the conservation status of the subspecies and would treat different communities inequitably with regards to the level of protection required and costs associated with them over different geographic areas.

Response: We believe this approach allows for a more surgical application of the Act, as envisioned by Congress when it wrote the ''significant portion of its range'' language. The Act does not

allow us to consider in this listing decision whether there would be higher costs in Colorado than in Wyoming. On the whole, we believe this targeted approach provides for the necessary and appropriate needs of the species, while avoiding unnecessary regulatory burdens.

Issue: Two reviewers suggested that our proposal, which would result in the removal of the Act's protections for the Prebles in Wyoming, but not in the Colorado portion of its range, may limit human activities in Colorado and thereby encourage the transfer of those same activities and impacts to the Prebles' habitats in Wyoming.

Response: We have concluded that this outcome is unlikely. For example, we cannot envision prohibitions of the Act limiting residential development in Colorado to the extent that development options in Wyoming are pursued that would otherwise not be pursued. Much more likely, human development activities planned in Colorado that could adversely impact the Prebles would be modified. Prebles' occurrence is largely limited to riparian corridors and adjacent uplands that make up a small portion of the Colorado Front Range. Most activities that could prove harmful to the subspecies and its habitat can be feasibly modified to avoid impacts, or adverse effects can be addressed through section 7 consultations or HCPs. If relocation of projects occurs, in most cases we think that viable project alternatives are likely to be near the originally proposed site.

Issue: A few commenters stated that a change in listing status could preclude further investigation, monitoring, and assessing of the Prebles in Wyoming. Other commenters argued that we did not explain how maintenance of populations in Wyoming would be assured without monitoring. Some commented that a 5-year monitoring plan should be developed to monitor State and county commitments to conserve the Prebles and its habitat. One suggested a ''special rule'' be developed to assure such monitoring.

Response: As discussed previously, according to 50 CFR 424.11(d) of our regulations, we may delist a species if the best available scientific and commercial data indicate that the species is neither endangered nor threatened for the following reasons: (1) The species is extinct; (2) the species has recovered and is no longer endangered or threatened; and/or (3) the original scientific data used at the time the species was classified were in error. Section 4(g)(1) of the Act requires us to monitor a species for at least 5 years after it is delisted based on recovery. In this case, we are amending the status of the Prebles based on new information that was not available at the time of listing. Of the three options laid out in 50 CFR 424.11(d) of our regulations and identified above, we have determined that this case most appropriately falls under option (3) the original scientific data used at the time the species was classified were in error. The Act does not require us to monitor a species in such cases. However, we intend to work with the State and other interested parties in Wyoming to continue monitoring efforts for the subspecies.

The State of Wyoming has committed to conducting ongoing monitoring efforts for the Prebles and to ensuring its long-term viability (Freudenthal 2008). The State has expressed an interest in working with the Service in developing monitoring protocols. The State is working with the WNDD to determine relative connectivity of Prebles' populations in Wyoming. In addition, the WNDD (Griscom *et al.* 2007) is engaged in a 5-year to 7-year study with the USFS to inventory and monitor Prebles' populations, correlate populations with habitat conditions, and measure effects of fire and livestock grazing.

Issue: Several commenters stated that any delisting rule for the Prebles must provide evidence that the subspecies has met the recovery criteria cited in the Preliminary Draft Recovery Plan.

Response: Because this action is based upon error (i.e., ''the original scientific data used at the time the species was classified were in error'') and not recovery, satisfying the Preliminary Draft Recovery Plan is not necessary. Additionally, recovery plans are not regulatory documents and are instead intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. In short, recovery of a species is a dynamic process requiring adaptive management that may, or may not, fully follow the guidance provided in a recovery plan. Finally, the Preliminary Draft Recovery Plan is a draft and has not been approved by either the Service or the Recovery Team.

That said, we believe that our determinations regarding the conservation status of Prebles in Wyoming and Colorado are largely consistent with the recovery concepts described in the Preliminary Draft Recovery Plan. In Wyoming, the Preliminary Draft Recovery Plan focuses on maintaining 1 large population and 2 medium populations. The availability of large, connected areas of suitable habitat with confirmed Prebles occurrence records suggests these populations currently exist (USFWS 2003b, pp. iv, 29; Beauvais 2004; USFWS 2008). Because these populations face no meaningful threats over the foreseeable future, we believe these populations will be maintained well into the foreseeable future. Thus, the protections of the Act are no longer necessary or appropriate in this portion of range. The same is not true for Prebles' populations in Colorado where the protections of the Act remain necessary.

Issue: One commenter questioned our conclusions and stated that there was no indication that habitat conditions for the Prebles have improved since the time of listing and that the same threats persist.

Response: Our determination that the Prebles should remain listed in the Colorado portion of its range recognizes the continuation of the main threats identified at the time of listing. Our determination regarding Prebles populations in Wyoming is based on expanded knowledge of populations present and subsequent evaluation of foreseeable threats in relation to areas supporting these populations.

Issue: One commenter noted that, based on extrapolated estimates of the Prebles per mile and extent of apparently occupied habitat, more Prebles exist in Colorado than are needed for recovery as proposed in the Preliminary Draft Recovery Plan.

Response: Extrapolation of Prebles' numbers based on limited distribution and population data must be made with caution. Habitat varies greatly across the known range of the subspecies and the actual extent of occupied habitat is largely unknown. In addition, the Preliminary Draft Recovery Plan does not emphasize total numbers of Prebles throughout the subspecies' range, but rather the documentation of existing populations of specified size and distribution, establishing stability of these populations over time, and the elimination of threats. We cannot, based on the best available information, conclude that Prebles' populations in Colorado meet these criteria or warrant removal of the protections of the Act.

Use of State Line To Delimit the Colorado Significant Portion of Range

Issue: Some commenters questioned the use of the State line to delineate the Colorado significant portion of range. They were concerned that the State border does not represent a biological divide between Prebles' populations. Furthermore, they contend that southern Wyoming and northern Colorado are ecologically similar, as are

the dominant agricultural land uses. Some suggested the use of the State line to delineate the Colorado significant portion of range appeared to be a political compromise. Some commenters suggested that we should study Prebles' interactions across the State line. One reviewer questioned whether a metapopulation or source-sink structure existed with populations in one State, dependent on populations in the other. Other commenters stated that management practicality favors use of the State line. One respondent commented that landowners are used to and better understand regulations based on governmental lines (rather than watershed lines) and that regulation based on State or county lines best corresponds to local zoning and development-related permitting.

Response: The State line is not a strict ecological divide. However, this rule incorporates this geopolitical boundary because it appropriately divides differential threats to the north and south. As such, it is relevant biologically to the subspecies' status.

Furthermore, the available data suggests use of the State line will not split any Prebles' populations into federally protected and unprotected segments. Prebles' populations in the Upper Lodgepole, Upper Laramie, Crow Creek, and Lone Tree Creek drainages are not known in Colorado, and Prebles' populations in the Cache La Poudre drainage are not known to occur in Wyoming. While such populations may exist, we see little potential for Prebles' populations in any drainage to have a significant component in the immediate area of the Wyoming-Colorado State line. Based on known dispersal abilities of the Prebles and proximity of known populations in Wyoming and Colorado, interaction across the State line is not known or likely to occur. Even if such interactions exist, they are likely infrequent or unimportant to populations on either side. Further, if such dependency exists, we do not anticipate it would be disrupted by the action in this final rule. Threats north of the border that would disrupt any metapopulation dynamic are minimal, while populations in Colorado remain protected.

As we have described, there also is a practical consideration supporting use of the State line to delineate the significant portion of range where the Act's protections are still necessary.

Issue: One commenter thought that political boundaries may be supportable in the assessment of listing status in cases where State regulations vary, but noted that there are no such differences between Wyoming and Colorado.

Response: Differential protection under State regulations could render a State line an important boundary of differing threats. In this case, we have concluded that levels of threats differ largely because of differing levels of projected human population growth. Rationale for using the State line is the same (i.e., differential threats) though the reason for the threats differs.

Modification of the Boundaries for the Colorado Significant Portion of Range

Issue: We received numerous comments regarding our delineations of the southern, eastern, and western boundaries of the Colorado significant portion of range. Some supported the boundaries as proposed. One feared that altering the proposed lines of protection could detract from recovery activities. Another commenter suggested that boundaries were adequately delineated, and that block clearances and site exclusions are viable regulatory options to address concerns at sites within the significant portion of range where the Prebles was not likely present. One commenter stated that attempts to fine tune boundaries by drainages or counties were inappropriate and supported the proposed latitude-longitude boundaries. This commenter concluded that ''simplest is best.'' In contrast, we also received comments that we should remove areas where appropriate habitat for Prebles was not present.

Response: We have considered these comments and continue to conclude that a broad delineation of the Colorado significant portion of range is appropriate. Such a delineation is likely to encompass all Prebles' populations, maximizing conservation potential within Colorado. Fine-scale delineation of habitat is more akin to a critical habitat designation and not appropriate for a significant portion of the range designation of where the Act's protections apply. Elimination of all non-habitat would require determinations of habitat suitability for each individual stream reach creating an unwieldy task. Furthermore, only listing the subspecies in these stream reaches would require lengthy legal descriptions of all habitat boundaries including possible UTM delineations (a standardized coordinate system based on the metric system and a division of the earth into sixty 6-degree-wide zones). This would be difficult for the public, other Federal agencies, State agencies, local governments and other interested parties to interpret and implement.

We also considered an intermediate approach. This approach would apply the Act's protections to all riparian areas and their associated wetlands, their 100-year floodplain and an additional 100 m (330 ft) within the portion of Colorado west of 103 degrees 40 minutes West, north of 38 degrees 30 minutes North, and east of 105 degrees 50 minutes West. One difficulty with this approach is that 100-year flood plains have not been designated by Federal Emergency Management Agency throughout the range of the subspecies. Because these designations have not been defined across the range, the actual table at 50 CFR 17.11 would require lengthy legal descriptions including possible UTM delineations. Alternatively, we considered applying the Act's protections to all riparian areas and their associated wetlands plus a defined buffer (such as 1,000 m (3,300 ft)) within the portion of Colorado west of 103 degrees 40 minutes West, north of 38 degrees 30 minutes North, and east of 105 degrees 50 minutes West. This approach would likely be inaccurate as actual utilized habitat varies across streams and within streams based on topography of that particular reach. An additional complication with this approach is defining ''riparian areas and their associated wetlands.'' Generally, these terms lack a regulatory definition. Perhaps the closest regulatory definition is Clean Water Act's (CWA) area of authority described as ''navigable waters of the United States.'' Unfortunately, many areas utilized by Prebles fall outside these jurisdictional wetlands. As such, the actual table at 50 CFR 17.11 would again require lengthy legal descriptions including possible UTM delineations. As such, we believe these intermediate approaches would also be difficult for the public, other Federal agencies, State agencies, local governments and other interested parties to interpret and implement.

Instead, we will continue to determine potential for habitat at a particular site to support the Prebles on a case-by-case basis. All block clearances and site exclusions will continue to be subject to individual review, amendment, and expansion/contraction as more information becomes available on Prebles' presence.

Issue: Some commenters opined that Prebles' populations in particular drainages, counties, or stream reaches in Colorado should be removed from protection under the Act based on considerations similar to those we cited for removing protections in Wyoming. One commenter suggested that all areas where threats were less severe should be excluded from protections in Colorado. The State of Wyoming suggested that we remove protections of the Act for

Prebles' populations in Lone Tree-Owl, Crow Creek, and Upper Laramie drainages in Colorado.

Response: We have considered these comments and continue to conclude that existing Prebles' populations in Colorado represent a single significant portion of range that should not be further subdivided. While we also considered splitting the subspecies into significant portions of the range based on river basins (i.e., only removing the Act's protections in the North Platte River basin), we concluded that this would be more difficult to administer with little conservation benefit to the subspecies.

Given expected development patterns in the Colorado portions of these drainages, we do not believe the available data support Wyoming's proposal to remove the Act's protections for Prebles' populations in Lone Tree-Owl, Crow Creek, and Upper Laramie drainages in Colorado. While we recognize that information is currently lacking to confirm the presence of existing Prebles' populations in the Colorado portion of Lone Tree-Owl and Crow Creek drainages, we believe that, based on the availability of suitable habitat (Pague and Granau 2000, pp. 2–3, 5–3, 7–3), portions of these drainages may be occupied.

Issue: One reviewer suggested that we extend the limits of the Colorado significant portion of range protection further east to include lower basins and the confluence of occupied rivers and streams. This reviewer thought that such protection might be critical to habitat connectivity and dispersal.

Response: In cases where lower portions of drainages and basins are thought to be outside of the current range of the Prebles, we doubt that dispersal via these routes would occur as suitable habitat no longer exists and is not viewed as likely recoverable. Therefore, we do not see any reason to extend protection to these areas that are unlikely to support the subspecies. Connectivity among populations in separate drainages may be occurring overland where drainages have closely adjacent headwater streams or by way of water conveyance ditches.

Other Issues

Issue: One commenter suggested that our final rule should address Prebles' status in Wyoming by June 30, 2008, consistent with our settlement agreement with the State of Wyoming, but allow for additional time to consider status of the Prebles in Colorado.

Response: Our revised proposed rule addressed the status of the Prebles throughout its range. It would be inconsistent with our draft guidance on the application of a significant portion of range analysis and settlement agreement to delay our final determination for any part of the Prebles' range. Status of the Prebles in Colorado will be further evaluated during future 5-year reviews.

Issue: Several commenters requested that the final rule clarify how the removal of the Act's protections in Wyoming impacts existing HCPs and previous section 7 consultations including mitigation, monitoring, and reporting requirements.

Response: No HCPs are in effect in Wyoming so this portion of the issue is moot. Previous commitments made through the section 7 process with respect to an action area in Wyoming will no longer be binding as of the effective date of this listing determination; however, coordination with lead Federal agencies should be pursued to substantiate their jurisdiction over other aspects of previously approved projects. For example, commitments specific to the Prebles and to conservation of wetlands and adjacent buffers under CWA permits may overlap.

Issue: Some commenters questioned how the proposed action might impact section 9 take prohibitions and the section 7 consultation process, including jeopardy determinations.

Response: The prohibitions under section 9 of the Act and requirements under section 7 of the Act apply to the portion of the subspecies' range where it remains threatened. Our jeopardy analysis will be conducted on the significant portion of range which remains listed (i.e., Colorado), rather than the subspecies' range as a whole. The question we will ask with regard to the jeopardy analysis is, ''does the proposed action appreciably reduce the likelihood of survival and recovery of the species within the significant portion of range where the prohibitions of the Act apply?''

Taxonomy

The Prebles is a member of the family *Dipodidae* (jumping mice) (Wilson and Reeder 1993, p. 499), which contains four extant genera. Two of these, *Zapus* (jumping mice) and *Napaeozapus* (woodland jumping mice), are found in North America (Hall 1981, p. 841; Wilson and Ruff 1999, pp. 665–667).

In his 1899 study of North American jumping mice, Edward A. Preble concluded the *Zapus* genus consisted of 10 species (Preble 1899, pp. 13–41). According to Preble (1899, pp. 14–21), *Z. hudsonius* (the meadow jumping mouse) included five subspecies. Preble (1899, pp. 20–21) classified all specimens of the meadow jumping mouse from North Dakota, Montana, South Dakota, Wyoming, Nebraska, Colorado, and Missouri as a single subspecies, *Z. h. campestris*. Cockrum and Baker (1950, pp. 1–4) later designated specimens from Nebraska, Kansas, and Missouri as a separate subspecies, *Z. h. pallidus*.

Krutzsch (1954, pp. 352–355) revised the taxonomy of the *Zapus* genus after studying morphological characteristics of 3,600 specimens. This revision reduced the number of species within this genus from 10 to 3, including *Z. hudsonius* (the meadow jumping mouse), *Z. princeps* (the western jumping mouse), and *Z. trinotatus* (the Pacific jumping mouse). According to Krutzsch (1954, pp. 385–453), the meadow jumping mouse included 11 subspecies.

Krutzsch (1954, pp. 452–453) described and named the subspecies Prebles (*Zapus hudsonius preblei*) based on geographic separation and morphological (physical form and structure of an organism) differences. Krutzsch (1954, pp. 452–453) discussed the presence of physical habitat barriers and the lack of known intergradation (merging gradually through a continuous series of intermediate forms or populations) between the Prebles, known only from eastern Colorado and southeastern Wyoming, and other identified subspecies of meadow jumping mice ranging to the east and north. Additionally, Krutzsch (1954, pp. 452–453) examined the morphometric characteristics of 4 adult and 7 non-adult specimens. Krutzsch (1954, pp. 452–453) reported 7 distinguishing traits, but only published quantitative results (9 measurements) on two of these traits (n=3) (Krutzsch 1954, p. 465). Acknowledging the small number of samples upon which his conclusion was based, Krutzsch (1954, p. 453) nonetheless concluded that the differences between Prebles and neighboring meadow jumping mice was considerable and enough to warrant a subspecific designation.

In Krutzsch's analysis, subspecies neighboring Prebles included *Zapus hudsonius campestris* in northeastern Wyoming, southwestern South Dakota, and southeastern Montana; *Z. h. intermedius* in North Dakota, and northwestern, central, and eastern South Dakota; and *Z. h. pallidus* (Cockrum and Baker 1950) in Nebraska, Kansas, and Missouri (Krutzsch 1954, pp. 441–442, 447–452). In 1981, Hafner *et al.* (1981, p. 501) identified *Z. h. luteus* from Arizona and New Mexico as another neighboring subspecies of meadow

jumping mouse. This population had previously been assumed a subspecies of western jumping mouse (Krutzsch 1954, pp. 406–407; Hall and Kelson 1959, pp. 774–776; Jones 1981, p. iv). Among recognized subspecies, Krutzsch (1954, p. 452) found that Prebles most closely resembled *Z. h. campestris* from northeastern Wyoming, but documented differences in coloration and skull characteristics.

Krutzsch's description (1954), as modified by Hafner *et al.* (1981, p. 501), with 12 subspecies of meadow jumping mice, has been generally accepted by most small mammal taxonomists for the past half-century (Hall and Kelson 1959, pp. 771–774; Long 1965, pp. 664–665; Armstrong 1972, pp. 248–249; Whitaker 1972, pp. 1–2; Hall 1981, pp. 841–844; Jones *et al.* 1983, pp. 238–239; Clark and Stromberg 1987, p. 184; Wilson and Reeder 1993, p. 499; Hafner *et al.* 1998, pp. 120–121; Wilson and Ruff 1999, pp. 666–667).

Other Taxonomic Information Available Prior to Listing

As part of a doctoral dissertation, Jones (1981, pp. 4–29, 229–303, 386–394, 472) analyzed the morphology of 9,900 specimens within the *Zapus* genus from across North America, including 39 Prebles' specimens. Jones' dissertation (1981, p. 144) concluded that the Pacific jumping mouse was not a valid taxon and suggested reducing the number of species in the genus to two (the western jumping mouse and the meadow jumping mouse). At the subspecific level, Jones (1981, pp. V, 303) concluded that no population of meadow jumping mouse was sufficiently isolated or distinct to warrant subspecific status. Regarding the Prebles, Jones (1981, pp. 288–289) wrote that ''No named subspecies is geographically restricted by a barrier, with the possible exception of *Z. h. preblei* [Preble's meadow jumping mouse]'' which ''appears to be isolated,'' but that ''no characteristics indicate that these populations have evolved into a separate taxon.'' Jones' taxonomic conclusions regarding the Prebles are difficult to evaluate as he did not compare the Prebles to *Z. h. campestris*, the closest neighboring subspecies, nor did he conduct statistical tests of morphological differences between the Prebles and any other subspecies. This dissertation was approved by Jones' doctoral committee and the Indiana State University's School of Graduate Studies in 1981 (Jones 1981, p. ii). Jones' (1981) findings were not published in a peer-reviewed journal and were not incorporated into the formal jumping mouse taxonomy.

Prior to listing, the CDOW contracted for a genetic analysis of the Prebles (Riggs *et al.* 1997). Riggs *et al.* (1997, p. 1) examined 433 base-pairs in 1 region of the mitochondrial deoxyribonucleic acid (mtDNA) (maternally inherited genetic material) across 5 subspecies of meadow jumping mouse (92 specimens). This study concluded that the Prebles' specimens formed a homogenous group recognizably distinct from other nearby populations of meadow jumping mice (Riggs *et al.* 1997, p. 12). At the request of the Service, Hafner (1997, p. 3) reviewed the Riggs study, inspected Riggs' original sequence data, and agreed with its conclusions. The supporting data for this report remain privately held (Ramey *et al.* 2003, p. 3). The Riggs *et al.* (1997) results were not published in a peer-reviewed journal. Prior to listing, this study was the only available information concerning the genetic uniqueness of the Prebles relative to neighboring subspecies.

Our original listing determined that Krutzsch's (1954) revision of the meadow jumping mouse species, including the description of the Prebles, was widely supported by the scientific community as indicated by the available published literature (63 FR 26517, May 13, 1998). Our 1998 determination weighed the information in unpublished reports, such as Jones (1981), and public comments on the rule and found that they did not contain enough scientifically compelling information to suggest that revising the existing taxonomy was appropriate (63 FR 26517, May 13, 1998). Our 1998 conclusion was consistent with Service regulations that require us to rely on standard taxonomic distinctions and the biological expertise of the Department and the scientific community concerning the relevant taxonomic group (50 CFR 424.11).

Taxonomic Information Solicited After Listing

In 2003, the Service, the State of Wyoming, and the Denver Museum of Nature and Science funded a study to resolve ongoing taxonomic questions about the relationship between the Prebles and neighboring mouse taxa (USFWS 2003a, pp. 1–2). In December 2003, we received a draft report from the Denver Museum of Nature and Science examining the uniqueness of the Prebles relative to other nearby subspecies of meadow jumping mice (Ramey *et al.* 2003). In 2004, the Service and other partner agencies provided additional funding to expand the scope of the original study (USFWS 2004). In August 2005, an expanded version of this original report was published in the journal *Animal Conservation* (Ramey *et al.* 2005). This publication included an examination of morphometric differences, mtDNA, and microsatellite DNA (a short, noncoding DNA sequence, usually two to five base-pairs, that is repeated many times within the genome of an organism). Ramey *et al.* (2005, pp. 339–341) also examined the literature for evidence of ecological exchangeability among subspecies (a test of whether individuals can be moved between populations and can occupy the same ecological niche).

Ramey *et al.*'s morphometric analysis tested 9 skull measurements of 40 Prebles, 40 *Zapus hudsonius campestris*, and 37 *Z. h. intermedius* specimens (Ramey *et al.* 2005, p. 331). Their results did not support Krutzsch's (1954, p. 452) original description of the Prebles as ''averaging smaller in most cranial measurements'' (Ramey *et al.* 2005, p. 334). Ramey *et al.* (2005, p. 334) found that only one cranial measurement was significantly smaller, while two cranial measurements were significantly larger.

Ramey *et al.* examined 346 base-pairs in 1 region of the mtDNA across 5 subspecies of meadow jumping mice (205 specimens) (Ramey *et al.* 2005, pp. 331–332, 335). Ramey *et al.* (2005, p. 335, 338) found low levels of difference between the Prebles and neighboring subspecies. The subspecies failed Ramey *et al.*'s tests of uniqueness in that the subspecies did not show greater molecular variance among than within subspecies or did not demonstrate nearly complete reciprocal monophyly with respect to other subspecies. The data demonstrated that all of the mtDNA haplotypes (alternate forms of a particular DNA sequence or gene) found in the Prebles also were found in *Zapus hudsonius campestris*. The mtDNA data demonstrated evidence of recent gene flow between the Prebles and neighboring subspecies (Ramey *et al.* 2005, p. 338).

Ramey *et al.* (2005, pp. 333–334, 338) analyzed 5 microsatellite loci across 5 subspecies of meadow jumping mice (195 specimens). The subspecies failed Ramey *et al.*'s tests of uniqueness in that the subspecies did not show greater molecular variance between than within subspecies and that multiple private alleles were not at a higher frequency than shared alleles at the majority of loci (Ramey *et al.* 2005, p. 333). Ramey *et al.* (2005, p. 340) concluded that these results were consistent with their morphometric and mtDNA results.

Finally, a review of the literature found no published evidence of adaptive or ecological differences

between Prebles and other subspecies of jumping mouse. Ramey *et al.* (2005, pp. 339–341) conclude that the lack of morphological difference supported the proposition of no adaptive or ecological difference.

Based on hypothesis testing using four lines of evidence—morphometrics, mtDNA, microsatellites, and a lack of recognized adaptive differences—Ramey *et al.* (2005, p. 340) concluded that Prebles and *Zapus hudsonius intermedius* should be synonymized with *Z. h. campestris*.

Prior to publication of Ramey *et al.* (2005) in *Animal Conservation*, the CDOW and the Service solicited 16 peer reviews of the 2004 draft report provided to the Service (Ramey *et al.* 2004a). Fourteen of these reviewers provided comments (Armstrong 2004; Ashley 2004; Bradley 2004; Conner 2004; Crandall 2004; Douglas 2004; Hafner 2004; Meaney 2004; Mitton 2004; Oyler-McCance 2004; Riddle 2004; Sites 2004; Waits 2004; White 2004). In 2005, the Service approached the same 16 experts to review Ramey *et al.* 2004b (an expansion of Ramey *et al.* 2004a). Eleven of these reviewers provided comments (Ashley 2005; Baker and Larsen 2005; Bradley 2005; Crandall 2005; Douglas 2005; Hafner 2005; Maldonado 2005; Mitton 2005; Oyler-McCance 2005; Waits 2005; White 2005). In 2006, some of these reviewers provided comments on Ramey *et al.* (2005) as part of their review of King *et al.* (2006a). Krutzsch (2004) also reviewed Ramey *et al.* (2004a). In August 2006, *Animal Conservation* published two critiques of Ramey *et al.* (2005) (Martin 2006; Vignieri *et al.* 2006) and two responses (Crandall 2006b; Ramey *et al.* 2006a).

Many of the reviewers generally supported the findings of Ramey *et al.* (Baker and Larsen 2005; Bradley 2004, 2005; Crandall 2004, 2005; Hafner 2004; Krutzsch 2004; Maldonado 2005; Meaney 2004; Mitton 2004, 2005; Riddle 2004; Sites 2004; Waits 2004, 2005). However, the reviewers raised a number of important issues. Because these experts reviewed the unpublished reports (Ramey *et al.* 2004a, 2004b), many of the criticisms were addressed prior to publication in *Animal Conservation* (Ramey *et al.* 2005). For example, reviewers recommended that the study be augmented to include microsatellite data; this information was added to the published version (Ramey *et al.* 2005). Some of the most significant unresolved issues identified included:

(1) Reliance upon museum specimens which can be prone to contamination (Douglas 2004, 2005, 2006; Hafner 2006; Maldonado 2005);

(2) The reliability of, and failure to validate, specimens' museum identification tag (Ashley 2005; Douglas 2004, 2005; Hafner 2004; Oyler-McCance 2004, 2005, 2006);

(3) The sampling regime and its impact on the analysis (Ashley 2006; Crandall 2006a; Douglas 2006; Hafner 2006; Maldonado 2005, 2006; Oyler-McCance 2004, 2006);

(4) Reliance upon a small portion (346 base-pairs) of mtDNA (Ashley 2004, 2005; Baker and Larsen 2005; Crandall 2004, 2005, 2006a; Douglas 2004, 2005, 2006; Hafner 2005, 2006; Maldonado 2005; Oyler-McCance 2004, 2005, 2006; Riddle 2004; Sites 2004; Waits 2004, 2005);

(5) The small number of microsatellite DNA loci examined (five) (Crandall 2006a; Oyler-McCance 2006; Hafner 2006; Vignieri *et al.* 2006, p. 241);

(6) The statistical tests employed (Crandall 2004; Douglas 2004, 2005; Hafner 2006; Maldonado 2005; Mitton 2005; Oyler-McCance 2005, 2006);

(7) The criteria used and factors considered to test taxonomic validity as well as alternative interpretations of the data (Ashley 2004; Conner 2004; Douglas 2004, 2005, 2006; Hafner 2005, 2006; Oyler-McCance 2004, 2005; Vignieri *et al.* 2006, pp. 241–242; White 2004);

(8) Whether the western jumping mouse was an appropriate outgroup (a closely related group that is used as a rooting point of a phylogenetic tree) (Douglas 2004);

(9) Failure to measure all of the morphological traits examined by Krutzsch (1954) (Vignieri *et al.* 2006, p. 238); and

(10) An inadequate evaluation of ecological exchangeability and habitat differences among subspecies (Ashley 2004; Conner 2004; Douglas 2004; Meaney 2004; Mitton 2004; Oyler-McCance 2004, 2005; Sites 2004; Vignieri *et al.* 2006, p. 238; Waits 2004, 2005). Collectively, these critiques indicated that delisting based on the conclusions of Ramey *et al.* alone might be premature.

Because the proposed rule to delist the Prebles relied solely upon an unpublished report (Ramey *et al.* 2004a) that had received mixed peer reviews (see above), verifying these results was a high priority of the Service (Morgenweck 2005; Williams 2004). Thus, in 2006, the Service contracted with USGS to conduct an independent genetic analysis of several meadow jumping mouse subspecies (USGS 2005, pp. 1–4). The USGS study concluded that the Prebles should not be synonymized with neighboring subspecies (King *et al.* 2006a, pp. 2, 29). An expanded version of this report was published in the journal *Molecular Ecology* (King *et al.* 2006b). This study included an examination of microsatellite DNA, 2 regions of mtDNA, and 15 specimens critical to the conclusions of Ramey *et al.* (2005).

King *et al.*'s (2006b, p. 4336) microsatellite analysis examined approximately 4 times the number of microsatellite loci (21) and more than 1.75 times more specimens (348 specimens) than Ramey *et al.* (2005) across the same 5 subspecies of meadow jumping mice. King *et al.* (2006b, p. 4337) concluded that their microsatellite data demonstrated a strong pattern of genetic differentiation between the Prebles and neighboring subspecies. King *et al.* (2006b, pp. 4336–4341) also reported that multiple statistical tests of the microsatellite data verified this differentiation.

In their evaluation of mtDNA, King *et al.* (2006b, p. 4341) examined approximately 4 times the number of base-pairs across 2 regions (374 control region and 1,006 cytochrome-B region base-pairs) and more than 1.5 times more specimens (320 specimens for the control region analysis and 348 for the cytochrome-B analysis) than Ramey *et al.* (2005) across the same 5 subspecies of meadow jumping mice. King *et al.* (2006b, p. 4341) concluded that these data suggested strong, significant genetic differentiation among the five subspecies of meadow jumping mice surveyed.

Additionally, their mtDNA results indicated that the Prebles did not share haplotypes with any neighboring subspecies (King *et al.* 2006b, p. 4341). Such haplotype sharing contributed to Ramey *et al.*'s (2004a, pp. 1, 9; 2005, p. 335) conclusion that the Prebles was not unique and that the Prebles was a less genetically variable population of *Zapus hudsonius campestris*. Because of these conflicting results, King *et al.* (2006b, pp. 4355–4357) reexamined 15 specimens from the University of Kansas Museum collection that were key in Ramey *et al.*'s determination that neighboring subspecies shared haplotypes. King *et al.* (2006b, p. 4357) could not duplicate the mtDNA sequences reported by Ramey *et al.* for these specimens. If these specimens were removed from the analysis, neither study would illustrate haplotype sharing between the Prebles and neighboring subspecies. King *et al.* (2006b, p. 4357) concluded that ''these findings have identified the presence of a systemic error in the control region data reported by Ramey *et al.* (2005)'' and ''calls into question all of the results of Ramey *et al.* (2005) based on the

mtDNA genome and prevents analysis of the combined data.'' King *et al.* (2006, p. 4357) noted that possible reasons for the difference in sequences included contamination, mislabeling of samples, or other procedural incongruity. Ramey *et al.* (2007, pp. 3519–3520) proposed a number of alternative explanations for these contradictory results including nuclear paralogs (copies of mtDNA sequence that have been incorporated into the nuclear genome and are now pseudogenes, that is, they are no longer functional), heteroplasmy (the existence of more than one mitochondrial type in the cells of an individual), different amplification primers and conditions, and template quality.

Overall, King *et al.* (2006b, p. 19) concluded that considerable genetic differentiation occurred among all five subspecies and found no evidence to support the proposal to synonymize the Prebles, *Zapus hudsonius campestris*, and *Z. h. intermedius*.

Prior to its release, King *et al.* (2006a) underwent an internal peer review per USGS policy (USGS 2003, pp. 3, 6, 12, 28–33). In an effort to provide consistent, comparable reviews, we solicited peer reviews from the same 16 reviewers asked to review Ramey *et al.* (2004a, 2004b). Nine of the experts provided comments (Armstrong 2006; Ashley 2006; Bradley 2006; Crandall 2006a; Douglas 2006; Hafner 2006; Maldonado 2006; Oyler-McCance 2006; Riddle 2006). Ramey *et al.* (2006b, 2007) also critiqued King *et al.* (2006a, 2006b).

Most of the reviewers supported the findings of King *et al.* (Armstrong 2006; Ashley 2006; Douglas 2006; Hafner 2006; Maldonado 2006; Oyler-McCance 2006; Riddle 2006). These reviews offered a number of issues and possible explanations why the results differed from Ramey *et al.* Because reviewers were asked to review the unpublished report (King *et al.* 2006a), some of the issues were addressed in the *Molecular Ecology* publication (King *et al.* 2006b). For example, numerous reviews suggested expanding the geographic range of the study by adding a Prebles' population in Wyoming; this issue was addressed in the published version (King *et al.* 2006b). Similarly, the publication incorporated the suggestion to retest the museum specimens Ramey *et al.* (2005) identified as having shared haplotypes for signs of cross contamination. Some of the other issues raised included:

(1) The sampling regime and its impact on the analysis (Armstrong 2006; Ashley 2006; Crandall 2006a; Douglas 2006; Oyler-McCance 2006; Ramey *et al.* 2007, p. 3519; Riddle 2006);

(2) Failure to evaluate morphometrics and ecological exchangeability (Crandall 2006a);

(3) Reliance upon a small portion of control region mtDNA (Riddle 2006);

(4) The number of loci examined (i.e., too many), the programs used to analyze the data, and the resulting sensitivity in detecting difference (Crandall 2006a; Ramey *et al.* 2006b; Ramey *et al.* 2007, p. 3519);

(5) a specimen collection methodology which could cause contamination (Ramey *et al.* 2007, p. 3519);

(6) The statistical tests employed (Crandall 2006a; Douglas 2006; Maldonado 2006; Riddle 2006); and

(7) The criteria used and factors considered to test taxonomic validity and alternative interpretations of the data (Bradley 2006; Crandall 2006a).

Given the discrepancies between the Ramey *et al.* and King *et al.* reports, we contracted for a scientific review to analyze, assess, and weigh the reasons why the data, findings, and conclusions of the two studies differed (USFWS 2006, p. 14). Following an open and competitive bid process, we selected SEI as the contractor (USFWS 2006).

SEI assembled a panel of experts with the necessary scientific expertise in genetics and systematics (SEI 2006a, pp. 7, 56–82). The panelists reviewed, discussed, and evaluated all of the literature relevant to this issue including published literature, unpublished reports, third-party critiques, public comments, and other materials suggested by interested parties (SEI 2006a, pp. 48–55). Additionally, the panel examined and reanalyzed the raw data (SEI 2006a, pp. 8, 21) used by Ramey *et al.* and King *et al.*, including the mtDNA data, microsatellite DNA data, and original sequence chromatograms (automated DNA sequence data output recordings) (SEI 2006a, pp. 8, 23). The scientific review panel was open to the public and allowed for interactions among panel members, Dr. King, Dr. Ramey, other scientists, and the public.

In July 2006, SEI delivered a report outlining its conclusions to the Service (SEI 2006a). Although the panelists were not obligated to reach a consensus, they did not disagree on any substantive or stylistic issues (SEI 2006a, p. 9). Thus, the report represented the consensus of all three panelists, as well as the individual opinions of each panelist. The panel organized its evaluation into four sections corresponding with the different types of scientific evaluations performed, including morphology, ecological exchangeability, mtDNA, and microsatellite DNA. The panel's findings with regard to each are summarized briefly below. The full report is available for review at *http://www.fws.gov/mountain-prairie/species/mammals/preble/Prebles_SEI_report.pdf.*

Morphology: The panel found that all seven of the morphological characters examined by Krutzsch (1954, pp. 452–453) should have been reexamined in order to support Ramey *et al.*'s proposed taxonomic revision. The panel also concluded that the type specimen (the original specimen from which the description of a new species is made) of each taxon should have been included in the analysis. The panel's conclusion was that an insufficient test of the morphological definition of the Prebles had been conducted to support the synonymy of the Prebles with other subspecies (SEI 2006a, p. 41).

Ecological Exchangeability: The panel concluded that no persuasive evidence was presented regarding ecological exchangeability, and that the ecological exchangeability of the subspecies remains unknown (SEI 2006a, p. 41).

MtDNA: The panel noted that data provided by Ramey *et al.* (2005) and King *et al.* (2006b) differed in geographic sampling strategy, amount of sequence data examined, aspects of the analysis, and quality (SEI 2006a, p. 41). All of these could help explain why the two studies came to differing conclusions. However, the panel noted that the most significant difference between the two studies in terms of mtDNA was whether the Prebles shared any mtDNA haplotypes with other subspecies of meadow jumping mice. Upon review of the raw data, the panel found evidence of contamination within some of the key sequences reported by Ramey *et al.* and that the supporting data for the samples in question was of poor quality and/or quantity (SEI 2006a, pp. 23–32). The panel concluded that no reliable evidence existed of any haplotype sharing between the Prebles and neighboring subspecies (SEI 2006a, p. 42). The panel determined that if the conflicting mtDNA sequences were removed from consideration, the two studies' mtDNA data would largely agree (SEI 2006a, p. 32). The panel also suggested that because the western jumping mouse and the meadow jumping mouse are distantly related, western jumping mouse may perform poorly as an outgroup, leading to poor resolution of relationships among meadow jumping mouse subspecies. While both Ramey *et al.* and King *et al.* used western jumping mice as their outgroup, an unrooted analysis lacking these genetic points of reference showed

clearer phylogenetic structuring between the subspecies (SEI 2006a, p. 42).

Microsatellite DNA: The panel found that the two microsatellite datasets contain similar information. The panel pointed out that both the Ramey *et al.* (2005) and King *et al.* (2006b) microsatellite data, as well as Crandall and Marshall's (2006) reanalysis of these data, strongly support a statistically significant independent cluster that corresponds to the Prebles, providing support for a distinct subspecies (SEI 2006a, pp. 42–43). The panel indicated that while the microsatellite data alone did not make a strong case for evolutionary significance, in concert with the mtDNA data (discussed above), the two datasets corroborate the distinctness of the Prebles (SEI 2006a, p. 43).

The panel's overall conclusion was that the available data are broadly consistent with the current taxonomic status of the Prebles as a valid subspecies and that no evidence was presented that critically challenged its status (SEI 2006a, p. 4). In August 2006, Ramey *et al.* (2006c) submitted a statement to the Service disputing the approach and conclusions of the SEI report. Some of the most significant issues raised included: (1) Objection to the deference given to Krutzsch (1954); (2) disagreement with the suggestion that all seven morphometric characters examined by Krutzsch (1954) and the type specimen should be reexamined; (3) dispute with the assertion that Ramey *et al.*'s (2005) evaluation of ecological significance was inadequate; (4) the contention that the Prebles and neighboring subspecies remain weakly genetically differentiated; and (5) SEI's failure to develop objective standards for testing the validity of suspect subspecies. No new data or analyses were presented in this statement, and the panel previously considered most of these contentions (Ramey *et al.* 2003, 2004a, 2004b, 2005, 2006a, 2006b; SEI 2006a, 2006b, 2006c). Other evaluations of the available literature and data include Ramey *et al.* (2007), Crandall and Marshall (2006), Spencer (2006b), and Cronin (2007).

Taxonomic Conclusions

When listed in 1998, the Prebles was widely recognized as a valid subspecies by the scientific community (Hall and Kelson 1959, pp. 771–774; Long 1965, pp. 664–665; Armstrong 1972, pp. 248–249; Whitaker 1972, pp. 1–2; Hall 1981, pp. 841–844; Jones *et al.* 1983, pp. 238–239; Clark and Stromberg 1987, p. 184; Wilson and Reeder 1993, p. 499; Hafner *et al.* 1998, pp. 120–121; Wilson and Ruff 1999, pp. 666–667). At the time of listing, Krutzsch (1954) represented the best available information on the taxonomy of the Prebles (63 FR 26517, May 13, 1998). Our 1998 conclusion was consistent with Service regulations that require us to rely on standard taxonomic distinctions and the biological expertise of the Department and the scientific community concerning the relevant taxonomic group (50 CFR 424.11). However, when the best available science indicates that the generally accepted taxonomy may be in error, the Service must rely on the best available science (*Center for Biological Diversity, et al.*, v. Robert Lohn, *et al.*, 296 F. Supp. 2d. 1223 W.D. Wash. 2003). Such considerations led to our February 2, 2005, proposal to delist the Prebles based upon information that questioned the subspecies' taxonomic validity (70 FR 5404).

We now determine that the best scientific and commercial data available support the conclusion that the Prebles is a valid subspecies. Specifically, the Prebles' geographic isolation from other subspecies of meadow jumping mice (Krutzsch 1954, pp. 452–453; Long 1965, pp. 664–665; Beauvais 2001, p. 6; Beauvais 2004; SEI 2006a, p. 34) has resulted in the accretion of considerable genetic differentiation (King *et al.* 2006b, pp. 4336–4348; SEI 2006a, pp. 41–43). The available data suggest that the Prebles meets or exceeds numerous, widely accepted subspecies definitions (Mayr and Ashlock 1991, pp. 43–45; Patten and Unitt 2002, pp. 26–34; SEI 2006a, p. 44). In reaching this conclusion, we have not used a presumption that we must rely on the established taxonomy in the absence of conclusive data to the contrary (see SEI report at p. 39). After a review of all available information, we have determined that the taxonomic revision for the Prebles suggested in our proposed delisting rule (70 FR 5404, February 2, 2005) is no longer appropriate.

Historical Range and Recently Documented Distribution

Generally, the Prebles' range includes portions of the North Platte, the South Platte, and the Arkansas river basins (Long 1965, p. 665; Armstrong 1972, pp. 248–249; Clark and Stromberg 1987, p. 184; Fitzgerald *et al.* 1994, p. 293; Clippinger 2002, p. 20).

At the time of listing, we described the historical range in Wyoming as including five counties (Albany, Laramie, Platte, Goshen, and Converse), but cited only two sites with recent reports of jumping mice likely to be the Prebles. We cited a study by Compton and Hugie (1993, p. 6) suggesting the subspecies might be extirpated in Wyoming and comments by the WGFD that the Prebles had likely been extirpated from most or all of its historical range in Wyoming (Wichers 1997).

At the time of listing, we assumed that most of the subspecies' current range was in Colorado. Within Colorado, the final listing rule described a presumed historical range including portions of 10 counties (Adams, Arapahoe, Boulder, Denver, Douglas, El Paso, Elbert, Jefferson, Larimer, and Weld) and cited recent documentation of the subspecies in 7 of these 10 counties (Boulder, Douglas, El Paso, Elbert, Jefferson, Larimer, and Weld).

Since we listed the Prebles in 1998, our knowledge about distribution of the subspecies has grown substantially. Numerous trapping surveys conducted during the last 9 years in Wyoming and Colorado have documented the subspecies' presence or likely absence at locations of suitable habitat. While many recent trapping efforts have been at locations with no record of historical surveys, most have been within the presumed historical range of the Prebles or in adjacent drainages where habitat and elevation appeared suitable. Thus, the recent increase in sites of Prebles' occurrence likely represents an improvement in our understanding of the subspecies' range as a result of increased trapping effort rather than any actual expansion of the range of the Prebles.

In Wyoming, recent captures and confirmed identification have expanded our knowledge of the distribution of the Prebles to include over two dozen new plains, foothills, and montane sites, including presence west of the Laramie Mountains in the North Platte River basin and in the Upper Laramie River drainage in Albany County (Taylor 1999; USFWS 2008). Post-listing activities have identified many additional sites occupied by the subspecies. Since listing, trapping efforts in Wyoming targeting Prebles have captured jumping mice at 72 percent of sites (124 of 173 sites) (USFWS 2008). Of positive jumping mouse capture sites, 29 percent of the sites included only Prebles, 55 percent of the sites included only western jumping mice, 5 percent of the sites had both species present, and specimens from 11 percent of the successful sites were never positively identified to species. These data also reveal that the Prebles occurs in four of the five counties that we described as the likely historical range at the time of listing including Albany, Laramie, Platte, and

Converse counties. While generalized range maps (Long 1965, p. 665, Armstrong 1972, pp. 248–249, Clark and Stromberg 1987, p. 184) depicted Prebles' range extending east into Goshen County, we have no evidence that the subspecies was ever present there.

At the time of listing, we discussed how increased trapping efforts in Colorado had recently documented distribution in Elbert, Larimer, and Weld counties. We also suggested other sites where trapping should occur to determine if Prebles were present. Additional trapping since listing has expanded the documented distribution of the Prebles in Colorado to include: (1) Additional foothill and montane sites along the Front Range in Larimer, Boulder, Jefferson, and Douglas counties; (2) previously untrapped rural prairie and foothill streams in southern Douglas County and adjacent portions of Elbert County; and (3) additional prairie and foothill streams in northwestern El Paso County. Although we have identified some additional sites occupied by the Prebles, since listing over 80 percent of Colorado trapping efforts targeting Prebles have failed to capture jumping mice (as illustrated in Figure 2 below) (USFWS 2008). In 2007, 2 of 31 trapping efforts targeting new sites in Colorado resulted in captures of jumping mice. These negative trapping results suggest that the subspecies is rare or extirpated from many portions of the subspecies' historical range in Colorado. Areas where the subspecies is presumed extirpated are discussed in the Factor A discussion below.

BILLING CODE 4310–55–P

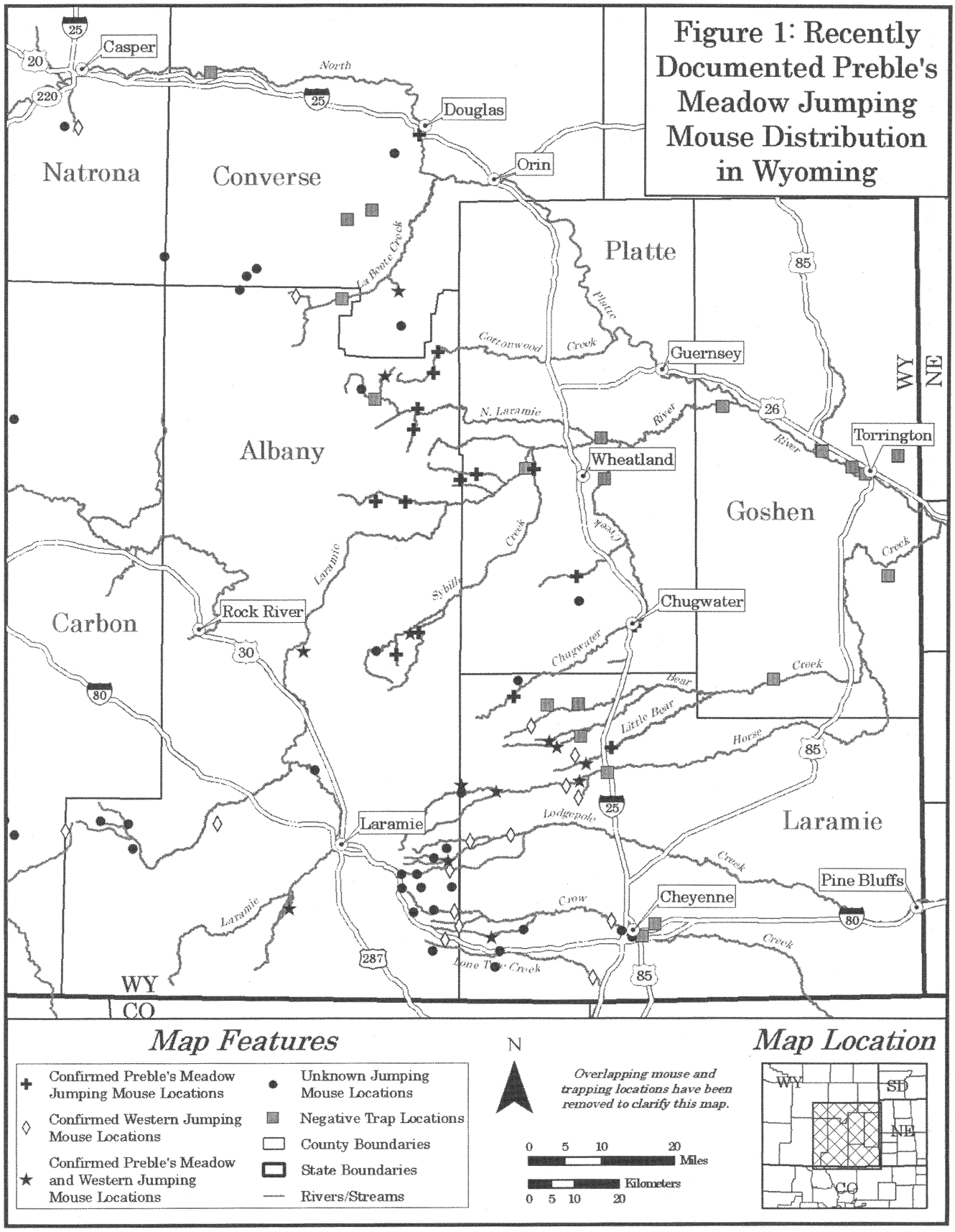
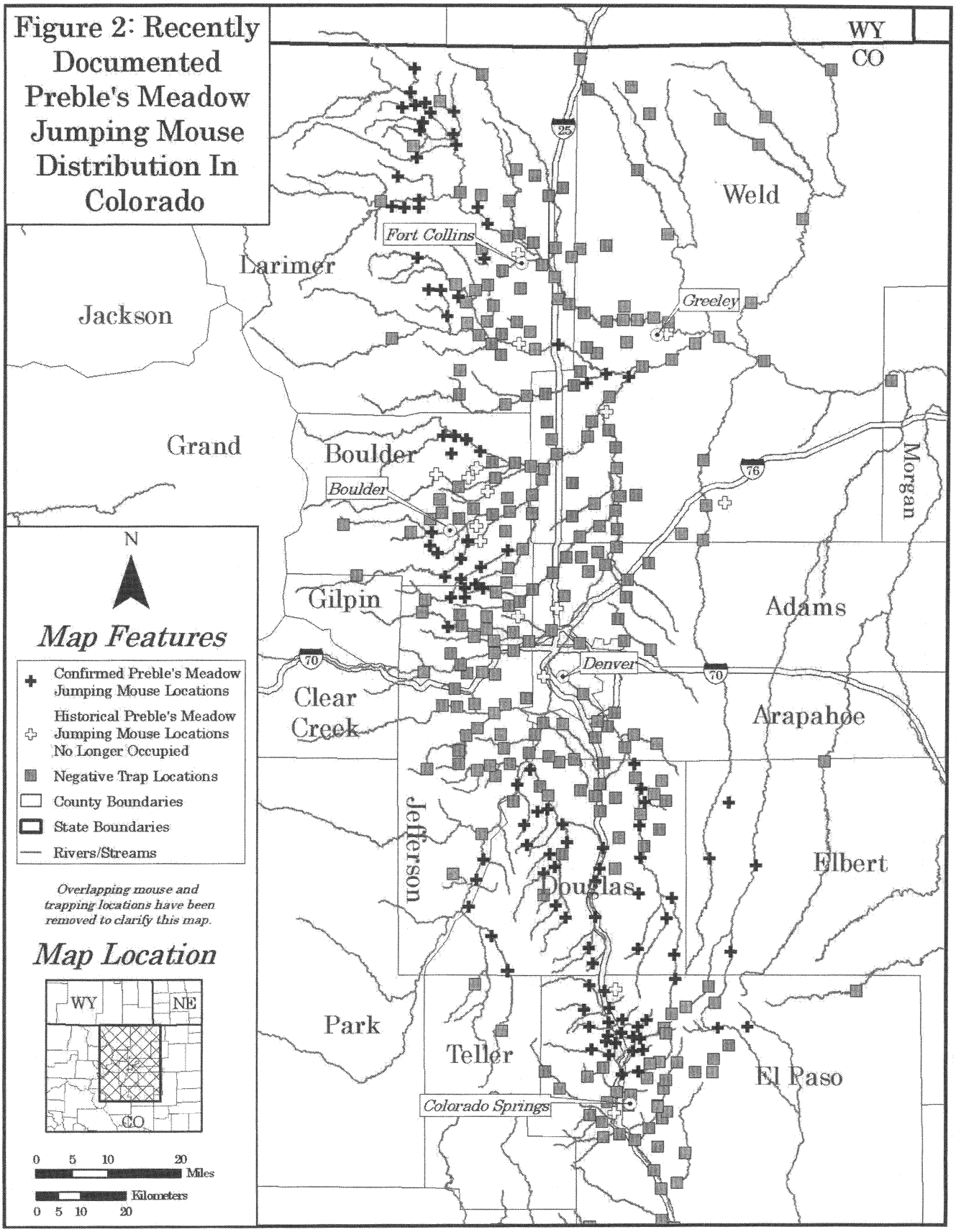


Figure 1: Recently Documented Preble's Meadow Jumping Mouse Distribution in Wyoming
Casper
Douglas
Orin
Guernsey
Torrington
Wheatland
Chugwater
Rock River
Laramie
Cheyenne
Pine Bluffs
Natrona
Converse
Platte
Albany
Goshen
Carbon
Laramie
WY
NE
CO
SD
North
La Bonte Creek
Cottonwood
Creek
Platte
N. Laramie
River
Laramie
Sybille
Chugwater
Bear
Little Bear
Horse
Lodgepole
Crow
Lone Tree Creek
Map Features
Confirmed Preble's Meadow Jumping Mouse Locations
Confirmed Western Jumping Mouse Locations
Confirmed Preble's Meadow and Western Jumping Mouse Locations
Unknown Jumping Mouse Locations
Negative Trap Locations
County Boundaries
State Boundaries
Rivers/Streams
N
Overlapping mouse and trapping locations have been removed to clarify this map.
0 5 10 20 Miles
0 5 10 20 Kilometers
Map Location



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The Prebles has now been recently documented in portions of Albany, Laramie, Platte, and Converse counties in Wyoming; and in portions of Boulder,

Douglas, El Paso, Elbert, Jefferson, Larimer, and Weld counties in Colorado (Figures 1 and 2). The North Platte River at Douglas, Wyoming, marks the northernmost confirmed location for the Prebles. Specimens from Colorado Springs, Colorado, mark the southernmost documented location of the Prebles.

The Prebles is generally found at elevations between 1,420 m (4,650 ft) and 2,300 m (7,600 ft). At the lower end of this elevation gradient, the semi-arid climate of southeastern Wyoming and eastern Colorado limits the extent of riparian corridors and restricts the range of the Prebles (Beauvais 2001, p. 3). The Prebles is likely an Ice Age relict; once the glaciers receded from the Front Range of Colorado and the foothills of Wyoming and the climate became drier, the Prebles was confined to riparian systems where moisture was more plentiful (Fitzgerald *et al.* 1994, p. 1994; Smith *et al.* 2004, p. 293). The eastern boundary for the subspecies is likely defined by the dry shortgrass prairie, which may present a barrier to eastward expansion (Beauvais 2001, p. 3). In Wyoming, the Prebles has not been found east of Cheyenne, Laramie County (Beauvais 2001, p. 3). Habitat modeling and trapping suggest the subspecies does not occur in Wyoming's Goshen, Niobrara, and eastern Laramie counties (Keinath 2001, p. 7). In Colorado, the Prebles has not been found on the extreme eastern plains (Clippinger 2002, pp. 20–21).

At the higher elevations, discerning the status of the Prebles is complicated by the overlap in the ranges of the Prebles and the western jumping mouse (Long 1965, pp. 665–666; Clark and Stromberg 1987, pp. 184–187; Schorr 1999, p. 3; Bohon *et al.* 2005; Schorr *et al.* 2007, p. 5). Field differentiation between the Prebles and the western jumping mouse is difficult (Conner and Shenk 2003a, p. 1456). Generally, the western jumping mouse occurs in the montane and subalpine zones and the Prebles occurs lower, in the plains and foothills (Smith *et al.* 2004, p. 10). Using this information as a guide, many jumping mice were trapped and released without being conclusively identified as either a Prebles or a western jumping mouse. Western jumping mice have been verified at elevations well below the upper elevation limit of the Prebles (Smith *et al.* 2004, p. 11), leading to difficulty in making assumptions regarding identification based on elevation. Drainages where overlapping ranges have been verified include: The Glendo Reservoir, Lower Laramie, Upper Laramie, and Horse Creek drainages in Wyoming (Conner and Shenk 2003b, pp. 26–27, 34–37; Meaney 2003; King 2006a; King 2006b; King *et al.* 2006b, pp. 4351–4353); and the Cache La Poudre, Big Thompson, and Upper South Platte River drainages in Colorado (Bohon *et al.* 2005; King 2005; King 2006a; King *et al.* 2006b, pp. 4351–4353; Schorr *et al.* 2007).

Size, external morphology, dentition, skull measurements, and genetic analysis can all be used to differentiate meadow jumping mice from western jumping mice (Krutzsch 1954, pp. 351–384; Klingenger 1963, p. 252; Riggs *et al.* 1997, pp. 6–11; Conner and Shenk 2003a; Ramey *et al.* 2005, p. 332; King *et al.* 2006b, p. 4341). The following description of the Prebles' current distribution and status emphasizes locations where individual mice have been positively identified through genetic analysis or DFA (Conner and Shenk 2003a). Information regarding individual mice and capture locations can be found in Riggs *et al.* (1997, pp. 7–11, A1–A4), Conner and Shenk (2003b, pp. 31–35), and King *et al.* (2006b, pp. 4351–4353). Positive identification of individual mice is most important in areas where both the Prebles and the western jumping mouse occur. Overlap appears to occur in most of Wyoming's occupied drainages (as described further below). In Colorado, with few exceptions, jumping mice positively identified below 2,050 m (6,700 ft) have been Prebles. Between 2,050 m (6,700 ft) and 2,320 m (7,600 ft) in Colorado, Prebles and western jumping mice are known to have an overlapping distribution in the Cache La Poudre, Big Thompson, and Upper South Platte River drainages.

Below is a summary of recent (since 1980) trapping data by drainage (as defined by 8-digit USGS hydrologic units), within both Wyoming (e.g., the North and South Platte River basins) and Colorado (e.g., the South Platte River and Arkansas River basins). Although trapping data is important because it absolutely confirms the occurrence of jumping mice at particular locations, trapping data is only one of several lines of evidence we use to estimate the actual range of the subspecies. Records have been compiled by the Service (2008) in coordination with the WNDD, State of Wyoming, and CDOW. Figure 1 above illustrates all recently confirmed Prebles' capture locations in Wyoming. Figure 2 above illustrates all recent Prebles' capture locations in Colorado. Given wide areas of overlapping range in Wyoming, we require all Wyoming specimens to be confirmed as Prebles in order to be considered in our discussion below (and in Figure 1). In Colorado, jumping mice are considered Prebles in our discussion below (and in Figure 2) when identification is confirmed or, if they occur in areas below 2,050 m (6,700 ft), where western jumping mice have not been documented.

North Platte River Basin, Wyoming—In the North Platte River basin, occurrence of the Prebles has been confirmed in four Wyoming counties (Converse, Platte, Albany, and Laramie) as reported by drainage below.

The Middle North Platte drainage represents the northern extent of the reported Prebles' historic range. Jones (1981) examined one Prebles' specimen from within this drainage, trapped at Boxelder Creek, Converse County. Recent trapping surveys have been quite limited and generally at high elevations. Although several other recent jumping mice have been trapped in this drainage, these specimens have not been confirmed as Prebles.

In the Glendo Reservoir drainage, the Prebles is known from several locations, including along the North Platte River at Douglas (King 2006b), and Cottonwood Creek and its tributaries (Meaney 2003; King 2006a; King 2006b; King *et al.* 2006b, pp. 4351–4353). While the western jumping mouse also has been confirmed from the Glendo Reservoir drainage, trapping records to date suggest that the Prebles is more common.

In the Lower Laramie drainage, the Prebles has been confirmed from the Laramie River and its tributaries, including the North Laramie River, and Sturgeon, Wyman, Rabbit, and Luman creeks; as well as several locations along Chugwater Creek and its tributaries (King 2006b; King *et al.* 2006b, pp. 4351–4353). Both Prebles and western jumping mice occur in the Sybille Creek, Friend Creek and the Friend Park areas (Conner and Shenk 2003b, pp. 26–27, 34–37; King 2006a; King 2006b; King *et al.* 2006b, pp. 4351–4353). The Lower Laramie drainage appears to support coexisting Prebles and western jumping mice in multiple locations.

In the Horse Creek drainage, the Prebles has been widely documented west of Interstate Highway 25 (I–25) and at one site east of I–25. The majority of these recent captures have been made in Bear Creek and its tributaries, and in headwaters of Horse Creek and its tributaries. Both Prebles and western jumping mice inhabit multiple sites on both creeks (Conner and Shenk 2003b, pp. 26–27, 34–37; Meaney 2003; King 2006b; King *et al.* 2006b, pp. 4351–4353).

In the Upper Laramie drainage, the Prebles has been confirmed at Hutton

Lake National Wildlife Refuge (NWR) and from a site north of Laramie (Meaney 2003). Other specimens at these same sites have been confirmed as western jumping mice (Meaney 2003; King 2006a). Therefore, it appears likely that both Prebles and western jumping mice are present at multiple sites in this drainage. Based on positive identification of the Prebles from the sites mentioned above, Smith *et al.* (2004, p. 12) suggested the range of the Prebles may extend into the Upper Laramie River, Little Laramie River, Rock Creek, and possibly the Medicine Bow River. Documented occurrence of Prebles' populations in these areas would represent a significant extension of the known range of the subspecies in Wyoming.

South Platte River Basin, Wyoming—Within the Wyoming portion of the South Platte River basin, Prebles have been confirmed present, albeit possibly in low numbers, within two drainages in Laramie and Albany Counties.

In the Upper Lodgepole drainage, jumping mice have been found from several locations at and upstream of Highway 211. While at least one Prebles has been confirmed (Riggs *et al.* 1997, pp. 7–11, A1–A4), most of the captured mice have been identified as western jumping mice (Meaney 2003; King 2006a). Therefore, while this drainage supports the Prebles, its distribution may be limited.

Although historically reported from Cheyenne (Krutszch 1954), presumably from the Crow Creek drainage, Prebles' occurrence in this drainage remains uncertain. Specimens from Warren Air Force Base were assumed to be Prebles based on the elevation of 1,900 m (6,150 ft), but subsequent analyses identified only western jumping mice (Riggs *et al.* 1997, pp. 7–11, A1–A4; Conner and Shenk 2003b, pp. 26–27, 34–37; King 2006a). The only recent confirmed Prebles occurrence in this drainage comes from the South Crow Creek Reservoir area (Meaney 2003). Additional efforts have only verified western jumping mice from Middle Crow Creek, the South Fork of Middle Crow Creek, and South Crow Creek Reservoir (Meaney 2003; King 2006a). No jumping mice have been reported downstream of Cheyenne.

The Lone Tree Creek drainage was previously assumed to be inhabited by the Prebles. However, DFA analysis of existing museum specimens (Conner and Shenk 2003b, pp. 26–27, 34–37) and genetic analysis of specimens obtained from trapping efforts (Riggs *et al.* 1997, pp. 7–11, A1–A4; King 2006a), have only confirmed the presence of western jumping mice in this drainage.

South Platte River Basin, Colorado—Prebles has been recently documented within the South Platte River basin in seven counties: Larimer, Weld, Boulder, Jefferson, Douglas, Elbert, and El Paso. From the Wyoming State line south through the Denver area, little recent documentation of the Prebles exists from sites east of the foothills where most of the subspecies' historical records occur. This area largely corresponds to the Front Range urban corridor, an area experiencing continued human population growth and development (Clippenger 2002, pp. 22–26; Colorado Demography Office 2007). At higher elevation plains and foothills sites south of the Denver area, the Prebles has been documented at a number of locations where riparian habitats are still largely intact. With rare exception, all jumping mouse records verified below 2,050 m (6,700 ft) in the South Platte River drainage of Colorado have been Prebles.

In the Cache La Poudre River drainage, jumping mice have been documented on sites upstream of Fort Collins, Larimer County, at elevations consistent with known Prebles' distribution. These sites include the main stem Cache La Poudre River and its tributaries, including Young Gulch and Stove Prairie Creek, and the North Fork Cache La Poudre River and its tributaries, including Stonewall, Rabbit, and Lone Pine Creeks. Shenk and Eussen (1999, pp. 11–12) cautioned that both Prebles and western jumping mice were likely present in some of these areas. Subsequent genetic analysis confirmed both the Prebles and the western jumping mouse in Cherokee Park at 2,260 m. (7,480 ft) (King 2005, 2006b), but only Prebles have been confirmed from lower elevations, including Rabbit and Lone Pine Creeks, the Livermore Mountain area, and the North Fork of the Cache La Poudre River (Riggs *et al.* 1997, pp. 7–11, A1–A4; King *et al.* 2006b, pp. 4351–4353). Despite a number of trapping efforts, no jumping mice have been recently documented within the Fort Collins area of Larimer County or downstream on the Cache La Poudre River to its confluence with the South Platte River at Greeley, Weld County (USFWS 2008).

Within the Big Thompson drainage, the Prebles has been documented in foothills sites along Buckhorn Creek and certain of its tributaries, and on Dry Creek, in Larimer County. Three tributaries of Buckhorn Creek up to 2,240 m (7,360 ft) had Prebles; however, both Prebles and western jumping mice were confirmed from the Lakey Canyon site at 2,170 m (7,120 ft), and a mouse from the North Fork of the Big Thompson River at 2,170 m (7,120 ft) was confirmed as a western jumping mouse (King 2006a). Despite a number of trapping efforts, the Prebles has not been documented on the Big Thompson and Little Thompson Rivers through the Front Range urban corridor, but has been found on both rivers east of I–25, in Weld County.

In the Saint Vrain drainage, the Prebles has been documented along the Saint Vrain River and its tributaries, and water conveyance ditches upstream of the town of Hygiene, on two tributaries of Boulder Creek west of the City of Boulder, and along South Boulder Creek, all in Boulder County; and on upper reaches of Coal and Rock Creeks, Jefferson County. On Rocky Flats NWR, Jefferson County, the Prebles has been documented on Rock Creek, as well on nearby Walnut and Woman Creeks within the Middle South Platte-Cherry Creek drainage. Several of these locations include mice confirmed as Prebles (Riggs *et al.* 1997, pp. 7–11, A1–A4; Conner and Shenk 2003b, pp. 26–27, 34–37). Prebles' occurrence has not been documented along eastern parts of the drainage, the Saint Vrain River from Hygiene, Boulder County, downstream to its confluence with the South Platte River, along Boulder Creek from the City of Boulder east to its confluence with the Saint Vrain River, or downstream of Rocky Flats NWR on Walnut, Woman, or Dry creeks.

In the Clear Creek drainage, the Prebles has been verified in the foothills on Ralston Creek (Riggs *et al.* 1997, pp. 7–11, A1–A4), and unidentified jumping mice have been captured on two tributaries of Clear Creek at elevations consistent with Prebles' occurrence (below 2,300 m (7,600 ft)). No jumping mice have been captured on either creek downstream through the urban corridor to the South Platte River.

In the Upper South Platte drainage, the Prebles has been documented immediately upstream of Chatfield Reservoir on the South Platte River, and also well upstream on the South Platte River and its tributaries in Jefferson and Douglas Counties to near the Teller County-Douglas County line. The USFS provided a summary of Prebles' trapping efforts at 15 sites in the Upper South Platte drainage in the Pike National Forest (Bohon *et al.* 2005). Based on examination of voucher specimens, Prebles were confirmed at six sites up to 2,300 m (7,600 ft) and western jumping mice were confirmed from six sites, the lowest of which, at 2,030 m (6,660 ft), was lower than five Prebles' sites (Bohon *et al.* 2005). Schorr *et al.* (2007) also summarized co-occurrence of the Prebles and the

western jumping mouse in the same area. Also in the Upper South Platte drainage, the Prebles has been widely documented upstream of Chatfield Reservoir on Plum Creek, including occurrences on East Plum Creek, West Plum Creek, and various tributaries, all in Douglas County (Riggs *et al.* 1997, pp. 7–11, A1–A4; Conner and Shenk 2003b, pp. 26–27, 34–37; King *et al.* 2006b, pp. 4351–4353). Western jumping mice have also been confirmed in this drainage at 1,800 m (5,900 ft) and 1,950 m (6,400 ft) (Conner and Shenk 2003b, pp. 26–27, 34–37). An estimated 64 km (40 mi) of streams are occupied by the Prebles throughout the Plum Creek watershed (Pague and Schuerman 1998, p. 5). On the downstream portion of this drainage, below Chatfield Reservoir, there is no recent documentation of Prebles' presence on the South Platte River through Denver.

In the Middle South Platte-Cherry Creek drainage, Prebles have been found on Cherry Creek and its tributaries from approximately the Arapahoe County—Douglas County line, upstream to the headwaters of East and West Cherry Creeks near the Palmer Divide in El Paso County. Also within the Middle South Platte-Cherry Creek drainage, limited trapping efforts have documented the Prebles on Running Creek and a tributary, Hay Creek, in Elbert County. Based on limited genetic analysis and DFA, western jumping mice have not been confirmed from this drainage. The Prebles has not been documented downstream along Cherry Creek through Arapahoe County and Denver to the South Platte River. Because of numerous negative trapping efforts and loss of contiguous suitable habitat from development, we no longer consider the greater Denver area (including most of Denver County and portions of Adams, Arapahoe, Boulder, Broomfield, Douglas, and Jefferson Counties) to be occupied. On the South Platte River downstream from the Denver area, a single Prebles was recently captured from near the South Platte River in Milliken, Weld County, not far from the confluence of the Big Thompson River and South Platte River (Savage and Savage 2001). Northwest of Denver and widely separated from other captures in this drainage, Prebles has been documented on Walnut and Women Creeks at Rocky Flats NWR.

Farther east, Prebles has been recorded on Kiowa Creek, Elbert County. Additional trapping in suitable habitat in Elbert County would be useful to document whether the Prebles is present along significant reaches of the Middle South Platte-Cherry Creek and Kiowa Creek drainages, and on the Bijou Creek drainage, Elbert County, where it has not yet been documented. The only trapping effort to date in the Bijou Creek drainage was an unsuccessful effort in apparently suitable habitat in Arapahoe County.

Arkansas River Basin, Colorado—In the Arkansas River basin, current occurrence of the Prebles is limited largely to the Fountain Creek drainage and specifically to Monument Creek and its tributaries north of Colorado Springs. Genetic analysis and DFA have thus far confirmed no western jumping mice from within the Prebles' range in this drainage (Conner and Shenk 2003b, pp. 26–27, 34–37; King *et al.* 2006b, pp. 4351–4353). The Prebles has been well studied at the U.S. Air Force Academy (Academy) on Monument Creek and its tributaries, and has been documented farther upstream on Monument Creek and on tributaries to the east and north toward the Palmer Divide. Numerous Prebles' captures on streams in northwestern El Paso County are the result of extensive trapping that has taken place in conjunction with proposed development projects. Downstream of the Academy, numerous surveys indicate that the Prebles has little likelihood of occurrence along Monument Creek through the downtown portions of Colorado Springs. Similarly, extensive trapping with negative results suggests that the Prebles is now extirpated from Cottonwood Creek and its tributaries.

In the Chico Creek drainage, jumping mice (assumed to be Prebles as explained above) have been documented on the upper reaches of Black Squirrel Creek and on a tributary, both in El Paso County. Limited trapping efforts in potential Prebles' habitat farther to the east in the Chico Creek drainage and in the Big Sandy Creek drainage have not documented Prebles' occurrence. Downstream, to the east and south, these drainages appear to have little habitat suitable for the Prebles.

Within the Arkansas River basin south of the documented Prebles' locations, jumping mice have not been documented within southern El Paso, Pueblo, and Fremont counties, despite targeted trapping efforts (Bunn *et al.* 1995; Werner 2003).

In conclusion, according to the existing trapping records, the Prebles appears to be widespread in the North Platte River basin where trapping efforts confirm the subspecies' distribution across at least four drainages. The Prebles appears scarce within the Wyoming portion of the South Platte River basin, where trapping efforts to date provide few confirmed occurrences of the subspecies and suggest that the western jumping mouse is much more widespread. Within the Colorado portion of the South Platte River Basin, the Prebles has little likelihood of occurrence in portions of some drainages that coincide with the Front Range development corridor (areas around I–25 from Fort Collins south through the Denver metropolitan area); is more widespread in foothills and some montane areas within these same drainages; and is generally present in rural portions of drainages south of Denver. In the Arkansas River basin in Colorado, Prebles' distribution appears very limited, with confirmed occurrence largely in upper Monument Creek and some headwater tributaries.

Data limitations do not allow us to equate documented distribution with range. For example, the Prebles has been documented in two places approximately 19 km (12 mi) apart along Kiowa Creek in Elbert County, and it is reasonably likely to occur both between these sites and further downstream in the drainage, but no trapping has occurred to confirm or deny this assertion. Similarly, on Trout Creek a Prebles was documented in Douglas County near the Teller County line, and it is reasonable to assume the subspecies also may occur in Teller County. Given these data limitations, ''range'' is defined in the Conclusion of the 5-Factor Analysis section of this rule below.

Abundance

Studies designed to estimate populations of the Prebles have occurred on only a few sites. As a result, no reliable regional, Statewide, or rangewide population estimates for the Prebles have been developed. Population density and trends are not well known in Wyoming (WGFD 2005, p. 36). There are a few population estimates but little trend information for Prebles' populations in Colorado. In addition, because jumping mouse populations 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 an ongoing trapping study, population highs of 24 and 69 Prebles per site were estimated for 2 control sites in 1999; subsequent trapping in 2002, during regional drought conditions, found no Prebles present at either site (Bakeman 2006, p. 11). Meaney *et al.* (2003, p. 620) estimated Prebles' populations on study sites over 4 years, noted absence of the Prebles at certain sites during some seasons, and suggested that 10 or more years of study might be necessary to

assess the full extent of population variation.

White and Shenk (2000, p. 9) summarized abundance estimates from nine sites in Colorado during 1998 and 1999 (Meaney *et al.* 2000; Kaiser-Hill 2000; Ensight Technical Services 1999, 2000, 2001; Shenk and Sivert 1999b; Schorr 2001). Since Prebles are found in linear riparian communities, abundances were estimated in number of individuals per km (or mi) of riparian corridor. Estimates of linear abundance ranged widely, from 4 to 67 mice/km (6 to 107 mice/mi) with a mean of 33 +/− 5 mice/km (53 +/− 8 mice/mi) (White and Shenk 2000, p. 9). The subsequent addition of new sites and 2 more years of data (2000–2001) provided a range of 2 to 67 mice/km (3 to 107 mice/mi) and a mean of 27 +/− 4 mice/km (44 +/− 6 mice/mi) (Shenk 2004).

The above estimates, coupled with sufficient knowledge of occupied stream miles, may provide a rough indicator of Prebles' numbers within a stream reach or drainage. The Recovery Team used the above estimate (Shenk 2004) to approximate stream miles required to support varying sized populations of the Prebles (USFWS 2003b, p. 25). Hayward (2002) cautioned that reliance on an average number of mice per length of stream to predict population sizes would result in the overestimation of actual population size for about half of all sites. Of additional concern in any assessment of Prebles' population size is the potential for including western jumping mice in the estimate (Bohon *et al.* 2005; Schorr *et al.* 2007, p. 4). This issue is of particular importance in areas where both Prebles and western jumping mice are known to occur, including most sites in Wyoming and higher elevation Colorado sites.

The Prebles' population estimates above do not include estimates for riparian corridors along mountain streams or any sites in Wyoming. In Pike National Forest, Colorado, site inspection of many streams previously mapped as Prebles' habitat revealed poorly developed or intermittent riparian vegetation surrounded by sparse uplands dominated by pine forest (Bohon *et al.* 2005). Poor trapping success even in apparently suitable habitat suggested low population densities in Pike National Forest compared to those at lower elevations (Bohon *et al.* 2005; Hansen 2006, p. 168). In studies targeting the Prebles at higher elevation riparian sites in Douglas, Jefferson, and Teller counties, Schorr et al. (2007, p. 4) reported a 0.6 percent capture rate of jumping mice over 19,500 trap nights. In Albany County, Wyoming, Griscom *et al.* (2007) reported jumping mouse capture rates of 0.5 percent on the Douglas Ranger District and 1.3 percent on the Laramie Ranger District of Medicine Bow National Forest (over 3,200 trap nights in each district). Because coexistence of the Prebles and the western jumping mouse was likely in both studies, the capture rate of the Prebles was probably significantly lower. In comparable trapping effort in high-quality habitat at lower elevations, Schorr (2001, p. 18) reported a 3.5 percent capture rate of Prebles over 14,700 trap nights at the Academy, and Meaney *et al.* (2003, p. 616) reported a 3.4 percent capture rate of Prebles over 21,174 trap nights along South Boulder Creek, Boulder County. While we think that more research is needed before definitive conclusions can be drawn regarding Prebles' abundance and security along montane streams and headwaters, it appears that these reaches support a lower density of mice than plains and foothill sites.

Population Trends

Without comprehensive population estimates for the subspecies, the only basis for trend assessment is presence or absence surveys in historically documented sites (Smith *et al.* 2004, p. 29). This presence/absence information paints a very different picture for Wyoming compared to Colorado.

In Wyoming, we now have much more information regarding Prebles' distribution than we had at time of listing, when we knew of only two occupied sites. Much of what we noted in the listing to be historical range of the Prebles in Wyoming has now been definitively found to support the subspecies. But, while many jumping mice have been confirmed as Prebles in the North Platte River basin, trapping records to date suggest the subspecies is uncommon in the South Platte River basin, with only western jumping mice confirmed present at several locations within presumed Prebles' range.

In Colorado, historical trapping records establish that the Prebles was present in a range that included major plains streams from the base of the Colorado Front Range east to at least Greeley, Weld County (Armstrong 1972, p. 249; Fitzgerald *et al.* 1994, p. 293; Clippenger 2002, p. 18). Recent trapping efforts have documented that the Prebles is rare or absent from these same areas today (Ryon 1996, p. 2; Clippinger 2002, p. 22; USFWS 2008). This pattern is especially apparent along prairie riparian corridors directly or indirectly impacted by human development. This issue is discussed further in Factor A below.

Summary of Factors Affecting the Subspecies

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing, reclassifying, or removing species from listed status. ''Species'' is defined by the Act as including any species or subspecies of fish or wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). Once the ''species'' is determined we then evaluate whether that species may be endangered or threatened because of one or more of the five factors described in section 4(a)(1) of the Act. We must consider these same five factors in delisting determinations. Under 50 CFR 424.11(d), we may remove the protections of the Act if the best available scientific and commercial data substantiate that the species is neither endangered nor threatened for the following reasons: (1) The species is extinct; (2) the species has recovered and is no longer endangered or threatened; or (3) the original scientific data used at the time the species was classified were in error. Data error applies when subsequent investigations show that the best scientific or commercial data available when the species was listed, or the interpretation of such data, were in error.

We may delist a species for any of the above reasons only if such data substantiate that the species is neither endangered nor threatened. Determining whether a species meets these definitions requires consideration of the same five categories of threats specified in section 4(a)(1) of the Act. For species that are already protected as endangered or threatened, this analysis of threats is an evaluation of both the threats currently facing the species and the threats that are reasonably likely to affect the species in the foreseeable future following removal of the Act's protections.

Under section 3 of the Act, a species is ''endangered'' if it is in danger of extinction throughout all or a ''significant portion of its range'' and is ''threatened'' if it is likely to become endangered within the foreseeable future throughout all or a ''significant portion of its range.'' The word ''range'' in the phrase ''significant portion of its range'' refers to the range in which the species currently exists. Range is discussed further in the Conclusion of the 5-Factor Analysis section of this proposal below. For the purpose of this analysis, we evaluate whether the currently listed subspecies should be considered threatened or endangered.

Then, we consider whether there are any portions of the subspecies' range in danger of extinction or likely to become endangered within the foreseeable future.

Foreseeable future is determined by the Service on a case-by-case basis, taking into account a variety of species-specific factors such as lifespan, genetics, breeding behavior, demography, threat-projection timeframes, and environmental variability. For the purposes of this proposal, we define foreseeable future based upon a threat-projection timeframe because future development intensity and patterns are likely to be the single greatest factor contributing to the subspecies' future conservation status. As described in more detail below, human-population-growth projections extend out to 2035 in Colorado and 2036 in Wyoming. Similarly, water requirements are estimated through 2030 in Colorado and 2035 in Wyoming. A Center for the West model predicting future land-use patterns projects development changes within the range of the Prebles through 2040. Such projections frame our analysis as they help us understand what factors can reasonably be anticipated to meaningfully affect the subspecies' future conservation status. In our view, the foreseeable future for this subspecies, based on the currently available data, extends to approximately 2040. While it is likely some of the above estimates could be extrapolated out into the more distant future, development projections beyond this point are of increasingly lower value as uncertainty escalates. We also believe that not all threat factors are necessarily foreseeable over the same time horizon. When reliable data is available, we consider a longer time horizon.

The following analysis examines all five factors currently affecting, or that are likely to affect, the Prebles within the foreseeable future.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Introduction—Decline in the extent and quality of Prebles' habitat is the primary factor threatening the subspecies (Bakeman 1997, p. 78; Hafner *et al.* 1998, p. 122; Pague and Grunau 2000). In our 1998 final rule to list Prebles as threatened (63 FR 26517, May 13, 1998), we stated that Colorado east of the Front Range and adjacent areas of southeastern Wyoming had changed, over time, from predominantly prairie habitat intermixed with perennial and intermittent streams, and associated riparian habitats, to an agricultural and increasingly urban setting.

In our listing decision, we determined that Prebles' populations had experienced a decline and faced continued threats linked to widespread loss and fragmentation of the subspecies' required riparian habitat from human land uses including—urban, suburban, and recreational development; highway and bridge construction; water development; instream changes associated with increased runoff and flood control efforts; aggregate (sand and gravel) mining; and overgrazing (63 FR 26517, May 13, 1998). These human land-use activities affect the Prebles by directly destroying its protective cover, nests, food resources, and hibernation sites; disrupting behavior; or acting as a barrier to movement. We noted that such impacts reduced, altered, fragmented, and isolated habitat to the point where Prebles' populations may no longer persist. We also noted that patterns of capture suggested that Prebles' populations fluctuate greatly over time at occupied sites, raising questions regarding security of currently documented populations that are isolated and affected by human development.

Historical records in Colorado (pre-1980) illustrate areas of Prebles' occupancy along the Front Range within both foothill and prairie riparian corridors (Armstrong 1972, p. 249; Fitzgerald *et al.* 1994, p. 293). Between 1980 and 2005, the human population of Colorado counties within the Prebles' range increased by nearly 60 percent, from 1.7 million to 2.7 million (Colorado Demography Office 2007). As explained further below, the apparent absence of the Prebles in areas of substantial development, where trapping had previously confirmed the subspecies' presence, supports the conclusion that human land uses adversely affect Prebles' populations.

Ryon (1996) evaluated the condition of eight historical Prebles' capture sites in six Colorado counties based on vegetation structure, dominant plant species, and trapping results. Ryon reported no Prebles' captures at any of the seven sites trapped (one site no longer contained suitable habitat) (1996, p. 25). In addition, he reported that the historical sites contained fewer native species in plant communities and were lacking the multi-strata vegetation structure he observed at sites where trapping had recently confirmed Prebles' presence (Ryon 1996, p. 30). Investigations into land-use changes at the historical sites suggested that most had been directly altered in terms of habitat or had been influenced by habitat fragmentation (Ryon 1996, p. 30). Clippinger (2002, pp. 14–29) mapped and compared past (through 1972) and current (post-1972) distribution records of the Prebles in central Colorado and southeastern Wyoming based on museum specimens, published accounts, and unpublished reports. Clippinger reported that his distribution maps illustrated a loss of Prebles' populations in expanding urban and suburban areas, especially around Cheyenne, Denver, and Colorado Springs, and in general along the eastern extent of historical range (Clippinger 2002, p. 22). Note that Clippinger's reference to historical range is based on the few existing records (through 1972) documenting Prebles' occurrence. These records are focused around what is now the I–25 urban corridor and based upon our current knowledge of the subspecies do not truly represent the likely extent of the historical range of the subspecies. The apparent loss of historically occupied sites (those 17 sites where the subspecies was documented to occur prior to 1980) provides insight into human development impacts on Prebles' habitat. Only 1 of 17 of these documented historical sites of Prebles' occurrence in Colorado (Bear Creek, Boulder County) is thought to currently support the Prebles.

Prebles' populations have little likelihood of occurrence along large portions of major river and stream reaches within the subspecies' historical described range in Colorado including:

- The Cache La Poudre River within Fort Collins and downstream to its confluence with the South Platte River at Greeley, 60 km (37 mi);
- The Big Thompson River and Little Thompson River through the Front Range urban corridor east to I–25, approximately 50 km (32 mi);
- The Saint Vrain River from Hygiene to its confluence with the South Platte River, 35 km (22 mi);
- Boulder Creek from Boulder east to its confluence with the Saint Vrain River, approximately 35 km (22 mi);
- Walnut, Woman, and Dry Creeks downstream from Rocky Flats NWR to the confluence of Dry Creek and beyond to the South Platte River, 40 km (25 mi);
- Ralston Creek and Clear Creek through the urban corridor to the South Platte River, approximately 40 km (25 mi);
- The South Platte River downstream of Chatfield Reservoir through Denver to Brighton, 60 km (38 mi);
- The South Platte River downstream from Brighton to Greeley, approximately 55 km (34 mi) (one recent capture described above);

• Cherry Creek from the Arapahoe County-Douglas County line downstream through Denver to the South Platte River, 30 km (19 mi); and

• Monument Creek downstream from its confluence with Cottonwood Creek through Colorado Springs, approximately 15 km (9 mi).

In total, Prebles populations appear to have little likelihood of occurrence along 420 km (260 mi) of major river and stream reaches in and downstream of areas with concentrated human development. However, despite apparent downstream extirpations, many of these same streams continue to support Prebles populations in their upstream reaches or tributaries.

Historical losses relative to ongoing threats are relevant in predicting whether the subspecies is likely to become endangered in all or a significant portion of its current range within the foreseeable future. It appears unlikely that the Prebles can be returned to the historical localities within the Front Range urban corridor; however, we find that the subspecies' apparent local extirpation from areas of human development provides useful perspective about the potential impacts of future development within the remaining range of the Prebles. If the protections of the Act were removed, we expect these threat factors, discussed in more detail below, would continue to affect the subspecies in large portions of its current range into the foreseeable future.

For the purposes of this final rule, we reviewed and considered the best available information regarding threats within the range of the Prebles, including Ryon (1996), Bakeman (1997), Shenk (1998), Pague and Granau (2000), Clippinger (2002), and Service (2003b). We summarize these accounts below.

Following listing, The Nature Conservancy, under a contract with the Colorado Division of Natural Resources, formed a Prebles Meadow Jumping Mouse Science Team (Pague 1998). With guidance from the Science Team and following numerous meetings with scientists and stakeholders, Pague and Grunau (2000) developed a conservation planning handbook that addressed each of seven Colorado counties containing Prebles populations. The document identified key issues that stress the Prebles for all presumed threat factors operating in known or suspected Prebles' habitat, and assigned a qualitative risk assessment level to each of the identified issues. The work of Pague and Granau (2000) continues to provide important, science-based insight into threats to, and potential conservation strategies for, the Prebles in Colorado on a county-by-county basis. Habitat-related ''issues'' identified as high or very high priority in one or more counties included habitat conversion through housing, commercial, and industrial construction; travel corridor (i.e., roadway) construction; travel corridor maintenance; fragmentation of habitat and corridors; hydrological flow impairment; habitat conversion to a reservoir; bank stabilization; high impact livestock management; rock and sand extraction; invasive weeds; and catastrophic fire (Pague and Granau 2000, pp. 1–15, 2–12, 3–13, 4–14, 5–14, 6–15, 7–14). Pague (2007) provided observations updating the 2000 report. No comparable document exists for the four Wyoming counties where the subspecies occurs.

The Prebles is listed as a ''threatened'' species in Colorado by the CDOW. Colorado's Comprehensive Wildlife Conservation Strategy lists the meadow jumping mouse (including both the Prebles and *Zapus hudsonius luteus,* which occurs in extreme south-central Colorado) as a ''Species of Greatest Conservation Need,'' citing threats to habitat and range including habitat conversion (due to housing, urban, and exurban development) and habitat degradation (due to altered native vegetation and altered hydrological regime) (CDOW 2006, p. 102).

The WGFD does not list the meadow jumping mouse (including both the Prebles and *Zapus hudsonius campestris,* which occurs in northeastern Wyoming) among their list of ''mammalian species of special concern.'' The WGFD classifies the meadow jumping mouse as NSS5, indicating that it is widely distributed, population status suspected to be stable, and habitat not restricted (Freudenthal 2008). In contrast, the Wyoming Comprehensive Wildlife Plan (WCWP) lists the meadow jumping mouse as a ''Species of Greatest Conservation Need'' (WGFD 2005, p. 10). Fruedenthal (2008) noted that this listing is applied to numerous species and that it reflects relative lack of data regarding these species.

The WCWP identifies ecoregions in the State and provides a summary of ''mean habitat quality'' scores for each ecological system (or habitat) within the ecoregion (WGFD 2005, pp. 19–25). Within the three Wyoming ecoregions that include Prebles' range (Central Shortgrass Prairie, Northern Great Plains Steppe, and Southern Rocky Mountains), the two ecological systems most likely to support the Prebles (Rocky Mountain Lower Montane Foothill Riparian and Shrubland, Western Great Plains Riparian/Western Great Plains Floodplain) ranked in the lowest 20 percent in mean habitat quality relative to the State's other ecosystems (WGFD 2005, pp. 19–25). Among threats to habitat in these ecoregions are invasive plants, residential development radiating from the Cheyenne area, and recreation in the Southern Rocky Mountain region (WGFD 2005, pp. 53, 55, 56).

The direct impacts of development on the Prebles and its habitat have likely slowed since our 1998 listing because of protection afforded to the Prebles and its critical habitat rangewide under the Act. One indication of continuing adverse impacts to the Prebles and its habitat is the number of formal consultations performed to date under section 7 of the Act and the number of section 10 permits issued to date in conjunction with approved Habitat Conservation Plans (HCPs). Section 7 of the Act requires Federal agencies to consult with the Service to ensure that their actions do not jeopardize the continued existence of the subspecies or cause destruction or an adverse modification of critical habitat. Thus far, the section 7 process has been successful in preventing Federal actions from jeopardizing the continued existence of the subspecies or resulting in the destruction or adverse modification of critical habitat.

Section 10(a)(1)(B) of the Act authorizes the Service to issue permits for non-Federal actions that result in the incidental taking of listed wildlife. Incidental take permit applications must be supported by an HCP that identifies conservation measures that the permittee agrees to implement for the species to avoid, minimize, and mitigate the impacts of the requested incidental take.

As of June 2008, we have conducted 130 formal section 7 consultations (113 in Colorado, 17 in Wyoming) and issued 19 HCP-related incidental take permits (all in Colorado) for projects affecting the Prebles. We have authorized take for actions that did not result in jeopardy but nevertheless may result in permanent impacts to over 340 ha (840 ac) of Prebles' habitat, and temporary impacts to more than twice that amount of habitat. These projects have incorporated conservation measures or mitigation to avoid or minimize adverse impacts to the Prebles.

However, even with the protections afforded to the subspecies under section 7, we have concluded that habitat overall has continued to decline in quality and quantity, especially in Colorado. In the absence of listing, projects in Prebles' habitat would go

forward with reduced Federal oversight. Other Federal, as well as State and local regulatory mechanisms, that may provide protection for the Prebles and its habitat are evaluated under Factor D below.

Residential and Commercial Development—Clippinger (2002) assessed the impacts of residential development on the Prebles. He analyzed Colorado land-cover data compared to positive and negative trapping results for the Prebles in a GIS analysis and concluded that the likelihood of successful trapping of Prebles was reduced by either low- or high-density residential developments when the developments were within 210 m (690 ft) of the trapping sites (Clippinger 2002, pp. iv, 94). Clippinger (2002, p. iv) noted that the Prebles can be a useful indicator of environmental integrity in riparian areas and associated upland areas in the Colorado Piedmont. These data suggest that nearby development increases the risk of local extirpation of Prebles from occupied sites.

Theobald *et al.* (1997) emphasized both housing density and spatial patterns in evaluating effects of residential development on wildlife habitat. They concluded that while clustered development can decrease habitat disturbance (Theobold *et al.* 1997, p. 34), much of the Rocky Mountain West is experiencing what has been termed ''rural sprawl'' where rural areas are growing at a faster rate than urban areas (Theobold *et al.* 2001, p. 4). In Colorado, residential demand and State law encourage developers to design subdivisions with lots of at least 14 ha (35 ac) each with one house, to avoid detailed county subdivision regulations (Riebsame *et al.* 1996, p. 420). The Larimer County Master Plan (Larimer County Planning Division 1997) cites a trend toward residential properties with relatively large lots, which leads to scattered development and more agricultural land taken out of production. Where public and private lands are intermingled, private land ownership typically follows valley bottoms (Theobald *et al.* 2001, p. 5), thus rural development is likely to disproportionately affect valley-bottom riparian areas (Riebsame *et al.* 1996, p. 402), the favored habitat of the Prebles. Beyond direct impact to habitat, when ranches are subdivided, subsequent residential construction and associated disturbance can result in the disruption of wildlife movement along stream corridors (Riebsame *et al.* 1996, p. 402). Rural development disproportionately occurs around edges of undisturbed public lands and affects the conservation value of the undisturbed public lands (Hansen *et al.* 2005, p. 1900).

Human development often causes subtle effects on riparian habitat as well. Indirect effects of human settlement have resulted in declines in native trees and shrubs, greater canopy closure, and a more open understory with reduced ground cover within riparian habitat (Miller *et al.* 2003, p. 1055). An open understory does not favor the Prebles, which prefers dense ground cover of grasses and shrubs and is less likely to use open areas where predation risks are assumed to be higher (Trainor *et al.* 2007, pp. 472–476; Clippinger 2002, pp. 69, 72).

Fragmentation is another indirect impact of development occurring in proximity to Prebles' habitat. The Prebles is closely associated with narrow riparian systems that represent a small percentage of the landscape within the subspecies' range. Fragmentation of these linear habitats limits the extent and size of Prebles' populations. As populations become fragmented and isolated, it becomes more difficult for them to persist (Caughley and Gunn 1996, pp. 165–189). Major risks associated with small populations include—demographic stochasticity (an increased risk of decline in small populations due to variability in population growth rates arising from random differences among individuals in survival and reproduction within a season); environmental stochasticity (an increased risk of decline in small populations due to variation in birth and death rates from one season to the next in response to weather, disease, competition, predation, or other factors external to the population); and loss of genetic variation (a reduction in the amount of diversity retained within populations and an increased chance that deleterious recessive alleles may be expressed; the loss of diversity can limit a population's ability to respond adaptively to future environmental changes) (Caughley and Gunn 1996, pp. 165–189). These issues are discussed in greater detail in Factor E below. The Recovery Team determined that small, fragmented units of habitat will not be as successful in supporting the Prebles in the long term as larger areas of contiguous habitat (USFWS 2003b, p. 21). On a landscape scale, maintenance of dispersal corridors linking patches of Prebles' habitat may be critical to the subspecies' conservation (Shenk 1998, p. 21).

One indicator of the level of development pressure since listing is the number of development-related section 7 consultations and HCPs completed by the Service. Of the 127 formal consultations and 19 HCPs completed in Colorado, 19 section 7 consultations and 10 HCPs were specifically for residential and commercial developments with direct adverse effects to the Prebles or its habitat. Approved projects allowed for adverse impacts (permanent or temporary) in excess of 210 ha (520 ac) of Prebles' habitat. While conservation measures or mitigation in various forms have been incorporated into all permitted projects, implementation of these habitat restoration and enhancement measures has been hampered by factors such as drought or flooding. Recent development pressure has been most concentrated south of Denver, Colorado, in Douglas and El Paso counties; eight section 7 consultations and three HCPs have occurred in the Middle South Platte-Cherry Creek drainage, all south of Denver, and eight section 7 consultations and four HCPs have occurred in the Fountain Creek drainage. We also have worked with other Federal agencies and a substantial number of landowners and developers to avoid adverse impacts to Prebles' habitat, thus avoiding formal consultation or the need for HCPs. Additional planned residential and commercial development projects that would adversely affect Prebles' habitat in Colorado are continually being reviewed by the Service. Since listing, protections afforded under the Act have slowed, but not eliminated, the loss of Prebles' habitat due to residential and commercial development in Colorado. We conclude that in the absence of the protections under the Act, Prebles' habitat in Colorado and the populations it supports would be lost at a greatly increased rate from residential and commercial development.

Continued rapid development is expected along Colorado's Front Range as the human population continues to grow. The State of Colorado expects the population of counties supporting the Prebles to increase by an additional 1.5 million people from 2005 to 2035 (an increase of 69 percent), including: 100,000 in Boulder County; 284,000 in Douglas County; 43,000 in Elbert County; 371,000 in El Paso County; 154,000 in Jefferson County; 203,000 in Larimer County; and 326,000 in Weld County (Colorado Demography Office 2008). These expected increases support Pague and Grunau's (2000) conclusion that habitat conversion is a very high priority issue to the Prebles in Larimer, Weld, and El Paso counties, and a high

priority issue for the remaining counties supporting the Prebles in Colorado.

In contrast to the situation in Colorado, no formal section 7 consultations or HCPs have been sought for residential or commercial development in Wyoming. This reduced level of consultations reflects the general lack of development pressure within Prebles' habitat. This relative lack of development pressure is predicted to continue into the foreseeable future as described below.

Wyoming estimates that the population of the counties supporting the Prebles will increase by about 11,000 people from 2005 to 2020, including: An increase of 800 in Albany County; an increase of 1,500 in Converse County; an increase of 9,100 in Laramie County; and a decrease of 400 in Platte County (Wyoming Department of Administration and Information 2007). Commercially available estimates suggest counties supporting the Prebles will increase by about 18,400 people from 2006 through 2036, including: A decline of 3,700 in Albany County; an increase of 3,500 in Converse County; an increase of 18,300 in Laramie County; and an increase of 300 in Platte County (Economy.com 2007 as provided by Lui 2007).

While population growth rates provide valuable insight into development pressures, they may not provide a complete picture. For example, human population increases in Cheyenne, Fort Collins, Greeley, Longmont, the immediate Denver metropolitan area, and much of Colorado Springs are likely to have little direct impact on the Prebles because the subspecies appears to have little likelihood of occurrence within and downstream from these cities. Conversely, substantial human population increases in the Laramie Foothills of Larimer County, Colorado, or southern portions of Douglas County, Colorado, are likely to have a high impact to the Prebles. In Wyoming, given the small projected increases in the human population, we expect rural development will continue to have only small, localized impacts.

Modeling exercises also can provide some insights into future land-use development patterns. While these models have weaknesses, such as an inability to accurately predict economic upturns or downturns, uncertainty regarding investments in infrastructure that might drive development (such as roads, airports, or water projects), and an inability to predict open-space acquisitions or conservation easements, we nevertheless think that such models are useful in adding to our understanding of likely development patterns. For example, in 2005, the Center for the West produced a series of maps predicting growth through 2040 for the West including the Colorado Front Range and Wyoming (Travis *et al.* 2005, pp. 2–7). The projections for the Colorado Front Range (available at: *http://www.centerwest.org/futures/frtrng/2040.html*) illustrate significant increases in urban/suburban, low-density suburban, and exurban land uses across virtually all private lands within the Colorado portion of the Prebles' range. These projections depict that only small isolated patches of Prebles' habitat in public ownership, including headwater areas in Federal ownership, would avoid the direct impacts of residential and associated commercial development. In his review of the revised proposed rule, Travis (2008) noted that while land-use modeling and projections retain uncertainties and are not at a resolution useful for assessing habitat patterns, both the empirical record and the projections show development filling gaps along the Colorado Front Range. Although similar maps for Wyoming are older (*http://www.centerwest.org/futures/archive/development/development_wy.html*) or less refined (*http://www.centerwest.org/futures/west/2040.html*), they suggest only limited increases in development, primarily around Cheyenne. Travis (2008) called the difference between land development trends in the Colorado Front Range and those in Wyoming ''logical and real.''

Based upon known impacts to the Prebles associated with current development pressures and best available projections for future development (as described above and in relation to Factor D below), we conclude that residential and commercial development constitutes a substantial threat to the Prebles in Colorado, now and into the foreseeable future. In Wyoming, residential and commercial development is likely to be limited with only small, localized impacts to the Prebles expected. While more significant development is projected in the vicinity of Cheyenne, recent trapping efforts have not confirmed presence of Prebles in this area.

Transportation, Recreation, and Other Rights-of-Way Through Habitat—At the time of listing, the Service concluded that roads, trails, or other linear development through the Prebles' riparian habitat could act as partial or complete barriers to dispersal (63 FR 26517, May 13, 1998). These forms of development have continued to affect and fragment Prebles' habitat. Since listing, the Service has conducted 40 formal consultations under section 7 of the Act for road or bridge projects (33 in Colorado and 7 in Wyoming) resulting in permitted impacts to approximately 50 ha (125 ac) of Prebles' habitat. In addition, a formal 2005 programmatic section 7 consultation with the Federal Highway Administration for the Wyoming Statewide Transportation Improvement Program could result in 19 future highway projects with impacts to 42 ha (104 ac) of Prebles' habitat. Under the Douglas County (Colorado) Regional HCP for the Prebles, completed in May 2006, 67 approved road and bridge construction projects by Douglas County, and the cities of Parker and Castle Rock, may affect up to 122 ha (302 ac) of Prebles' habitat over a 10-year period.

One of the largest road projects is the improvement to I–25 in El Paso County, Colorado. The proposed construction will affect 10 of the eastern tributaries of Monument Creek thought to support the Prebles (Bakeman and Meaney 2001, p. 21). Impacts to the Prebles include habitat fragmentation and modification, change in population size, and behavioral impacts (Bakeman and Meaney 2001, pp. 18–20). While measures to avoid, minimize, and mitigate impacts were identified, the project will have significant cumulative effects on Prebles in the Monument Creek drainage, especially east of I–25 (Bakeman and Meaney 2001, pp. i, ii, 22–27).

With an increased human population, a high level of road construction and maintenance projects will occur; in the absence of the Act's protective measures, impacts to the Prebles and its habitat would likely be substantial. While the Act rarely stops such projects, it does promote measures to avoid, minimize, or compensate for impacts to the subspecies and helps control the level of negative impacts to the Prebles and its habitat. Pague and Grunau (2000) considered ''travel corridor construction'' to be a high-priority issue to Prebles' populations in Weld, Douglas, Elbert, and El Paso counties in Colorado.

Human-caused impacts associated with recreation include backcountry roads, trails, and campgrounds, which are often located along streams and near water (WGFD 2005, p. 56). Recreational trail systems are frequently located within riparian corridors (Meaney et al. 2002, p. 116). The development of trail systems can affect the Prebles by modifying its habitat, nesting sites, and food resources in both riparian and upland areas. Use of these trails by

humans or pets can alter wildlife activity and feeding patterns (Theobold *et al.* 1997, p. 26). Meaney *et al.* (2002, pp. 131–132) suggest fewer Prebles were found on sites with trails than on sites without trails. While temporal and spatial variation in Prebles' numbers resulted in low precision of population estimates and weak statistical support for a negative trail effect, the authors considered the magnitude of the potential effect sufficient to encourage careful management and additional research (Meaney *et al.* 2002, pp. 115, 131–132). Since the listing of the Prebles in 1998, a dozen recreational trail projects with proposed impacts to Prebles' habitat in Larimer, Boulder, Douglas, and El Paso counties, Colorado, have been addressed through section 7 consultations or HCPs. None have been addressed through section 7 in Wyoming. An additional 24 trail projects have been permitted under the Douglas County Regional HCP. As human populations continue to increase (as discussed above), we anticipate increased demand for recreational development in public open space and on conservation properties. Without protections afforded by the Act, Prebles' populations on properties free from residential and commercial development threats will still be subject to widespread threats from future recreational development and increased human use.

Many utility lines (sewer, water, gas, communication, and electric lines, and municipal water ditches) cross Prebles' habitat. Current and future utility rights-of-way through these habitats will cause habitat destruction and fragmentation from periodic maintenance and new construction. Since the listing of the Prebles, 20 utilities projects adversely affecting the Prebles and its habitat have been evaluated through section 7 consultations (16 in Colorado, 4 in Wyoming). In addition, an approved HCP with Denver Water permits impacts to 34 ha (84 ac) of Prebles' habitat at multiple sites in Colorado. While often more costly than trenching, avoidance measures such as directional drilling under riparian crossings can reduce or avoid impacts to the Prebles. If the Prebles were to be delisted, we do not anticipate that project operators would voluntarily directionally drill to avoid Prebles' habitat.

Overall, we conclude that threats related to transportation, recreation, and other rights-of-way through habitat are directly related to human population pressures. Thus, we expect these issues will have substantial impacts to Prebles' populations in Colorado, but less impacts to Prebles' populations in Wyoming.

Hydrologic Changes—Establishment and maintenance of riparian plant communities are dependent on the interactions between surface-water dynamics, groundwater, and river-channel processes (Gregory *et al.* 1991, pp. 542–545). Changes in hydrology can alter the channel structure, riparian vegetation, and valley-floor landforms (Gregory *et al.* 1991, pp. 541–542; Busch and Scott 1995, p. 287). Thus, changes in the timing and abundance of water can be detrimental to the persistence of the Prebles in these riparian habitats due to resultant changes in vegetation (Bakeman 1997, p. 79). Changes in hydrology may occur in many ways, but two of the more prevalent are the excessively high and excessively low runoff cycles in watersheds with increased areas of paved or hardened surfaces, and disruption of natural flow regimes downstream of dams, diversions, and alluvial wells (Booth and Jackson 1997, pp. 3–5; Katz *et al.* 2005, pp. 1019–1020).

Urbanization can dramatically increase frequency and magnitude of flooding while decreasing base flows (the portion of stream flow that is not surface runoff and results from seepage of water from the ground into a channel slowly over time; base flow is the primary source of running water in a stream during dry weather) (Booth and Jackson 1997, pp. 8–10; National Research Council 2002a, pp. 182–186). Infiltration of precipitation is greatly reduced by increases in impervious surfaces. The magnitude of peak flows increases in urban areas as water runs off as direct overland flow. Increased peak flows can exceed the capacity of natural channels to transport flows, trigger increased erosion, and degrade habitat (Booth and Jackson 1997, pp. 3–5). Changes in hydrology associated with urbanization can result in channel downcutting, lowering of the water table in the riparian zone, and creation of a ''hydrologic drought,'' which in turn alters vegetation, soil, and microbial processes (Groffman *et al.* 2003, p. 317). Meanwhile, reduced infiltration results in reduced groundwater recharge, reduced groundwater contributions to stream flow, and, ultimately, reduced base flows during dry seasons (National Research Council 2002a, p. 182; Groffman *et al.* 2003, p. 317). Established methods of mitigating downstream impacts of urban development, such as detention basins, have only limited effectiveness; downstream impacts are probably inevitable without limiting the extent of watershed development (Booth and Jackson 1997, p. 17).

In response to altered hydrology, stormwater-management, flood-control, and erosion-control efforts occur along many streams within the former and current range of the Prebles. The methods used include channelization; construction of detention basins, outfall structures, drop structures, riprap banks, impervious cement channels; and other structural stabilization. Structural stabilization methods designed to manage runoff and control erosion can increase the rate of stream flow, shorten channel length, narrow riparian areas, destroy riparian vegetation, and prevent or prolong the time required for vegetation reestablishment (Booth and Jackson 1997, p. 4). These impacts may affect plant composition, soil structure, and physiography of riparian systems to the point where habitat supporting the Prebles is so altered that populations can no longer persist. Pague and Grunau (2000) considered ''bank stabilization'' to be a high-priority issue for the Prebles in Weld and El Paso counties. Since the listing of the Prebles, 22 stormwater management, stream stabilization, or outfall structure projects with impact to Prebles' habitat have been addressed through formal section 7 consultations in Colorado; none have occurred in Wyoming.

The Prebles' apparent absence downstream from most areas of extensive urbanization (including Cheyenne, Wyoming, and Fort Collins, Longmont, Boulder, Golden, Denver, Parker, and Colorado Springs, Colorado) may be attributable to such changes in hydrology described above. Corn *et al.* (1995, p. 14) and Schorr (2001, p. 30) expressed concern over the integrity of protected riparian habitats on Monument Creek and its tributaries through the Academy because of development activities upstream. In 2007, all eastern tributaries of Monument Creek on the Academy experienced adverse impacts to occupied Prebles' habitat due to erosive head cutting, channel degradation, and impacts to vegetation that were attributable to regional stormwater management, and commercial and residential development (Mihlbachler 2007).

In Colorado, degraded riparian habitats have been restored, in part as mitigation for adverse impacts to the Prebles. Work to restore Prebles' habitat through a 0.86 km (0.54 mi) urban stream reach of East Plum Creek, Douglas County appears to have increased vegetation cover and Prebles' use (Bakeman 2006, pp. 4, 8). The effort

has restored connectivity of upstream and downstream riparian habitat though this previously degraded urban stream reach. Similarly, recent projects on Cherry Creek, Douglas County, have restored groundwater levels and downcut channels in or near Prebles' habitat by employing rock or sheet pile drop structures.

If we were to delist the Prebles, we believe that runoff-related impacts to riparian habitats within and downstream of development would likely increase in areas of high development, such as along Colorado's Front Range urban corridor, and that restoration of impacted riparian systems would be somewhat less likely to occur.

At the time of listing, we stated that the Prebles depended on vegetative habitat that was in turn dependent on physical factors including surface flows and groundwater. Water development and management in its various forms alters vegetation composition and structure, riparian hydrology, and flood-plain geomorphology directly, as well as through alterations to habitat located downstream; these alterations often, but not always, have adverse impacts to the Prebles (63 FR 26517 May 13, 1998). The creation of irrigation reservoirs at the expense of native wetlands is a factor that negatively affected Prebles' populations over the previous century (Fitzgerald *et al.* 1994, p. 293). Reservoirs with barren shorelines can create barriers to Prebles' movement and fragment populations along stream corridors.

Current and future reservoir construction is necessary to respond to municipal water needs. By 2030, municipal and industrial demand for water in Colorado will increase 60 percent, by 578 million cubic meters (m^3) (469,000 acre-feet (af)) yearly in the South Platte River drainage and by 41 percent, 133 million m^3 (108,000 af) yearly in the Arkansas River drainage (Colorado Water Conservation Board 2004). Even under the most optimistic scenarios, the Colorado Water Conservation Board (2004, p. 13–17) estimated a shortfall relative to municipal and industrial demands of 111 million m^3 (90,000 af) of water in the South Platte drainage and 22 million (m^3) (18,000 af) in the Arkansas drainage by 2030. The expanded storage and transport of water that will be needed to address these demands has the potential to significantly impact Prebles' habitat. Pague and Grunau (2000) considered hydrological impacts (water quality, flow regime, and groundwater) to be a high-priority issue to the Prebles in all Colorado counties supporting populations.

Since the listing of the Prebles, we have conducted two section 7 consultations for new reservoirs in Colorado, the Reuter-Hess Reservoir in Douglas County and the Pinewood Springs Reservoir in Larimer County. Through these consultations, 7 ha (17 ac) of impacts to Prebles' habitat were authorized. Three water projects currently proposed will, if developed, significantly affect Prebles' habitat including—the proposed expansions of existing Halligan and Seaman Reservoirs in the Cache La Poudre drainage, Larimer County, Colorado, and storage reallocation at Chatfield Reservoir, in the Upper South Platte drainage, Jefferson and Douglas counties, Colorado. Options being considered at Halligan Reservoir could inundate up to 4.0 km (2.5 mi) of Prebles' habitat and affect the Prebles' critical habitat at the site of the proposed dam. At Seaman Reservoir, the currently favored option would inundate about 4.0 km (2.5 mi) of Prebles' critical habitat. Options being investigated at Chatfield Reservoir have generated a preliminary estimate that up to 130 ha (330 ac) of existing Prebles' habitat, including almost 28 ha (70 ac) of critical habitat, would be inundated. These and other water projects also will result in alteration of flows that could further affect Prebles' habitat.

In Wyoming, estimates of projected water use in the Platte River Basin through 2035, range from a 38 million m^3 (31,000 af) decrease to a 90 million m^3 (73,000 af) increase (Wyoming Water Development Commission 2006, p. 10). No significant reservoir projects are currently planned within Prebles' habitat in Wyoming. While the Platte River Plan identifies ''upper Laramie River storage'' as a future storage opportunity (Wyoming Water Development Commission 2006, p. 31), potential impacts to Prebles are uncertain based on limited knowledge of the subspecies' occurrence in the drainage and uncertainty regarding the location of any future water projects.

Beyond direct effects to the Prebles and its habitat through construction or inundation, changes in flows related to water diversion, storage, and use also affect riparian habitats downstream in a variety of ways. In the foreseeable future, a number of changes in amount and timing of diversions, water uses, and return flows will affect many streams supporting the Prebles. The cumulative impacts of such changes to specific Prebles' populations, both adverse and potentially beneficial, are difficult to predict. As flows are captured or diverted, or as groundwater supplies are depleted through wells, natural flow patterns are changed, and more xeric plant communities may replace the riparian vegetation. Sediment transport is disrupted by on-stream reservoirs. Loss of sediment encourages channel downcutting, which in turn affect groundwater levels (Katz *et al.* 2005, p. 1020). The resulting conversion of habitats from moist or mesic, shrub-dominated systems to drier grass- or forb-dominated systems make the area less suitable for the Prebles.

Given the projected future demands for water, we conclude that major water development projects affecting the Prebles in Colorado would likely occur regardless of whether the subspecies remains listed. Measures to minimize and compensate for impacts specific to the Prebles and its habitat are less likely to be incorporated into project plans if the subspecies were to be delisted. Fewer and smaller projects are likely to occur in Wyoming, creating a negligible threat.

Aggregate Mining—At the time of listing, we cited alluvial aggregate mining as a threat to the Prebles. Aggregate mining is focused on floodplains, where these mineral resources most commonly occur, and specifically on the same gravel deposits that may provide important hibernation sites (63 FR 26517, May 13, 1998). Alluvial aggregate mining continues to be a threat to the Prebles in Colorado. Alluvial aggregate extraction may produce long-term changes to Prebles' habitat by removing (often permanently) shrub and herbaceous vegetation, and by altering hydrology. Often, mined pits are constructed with impervious liners and converted to water reservoirs after aggregate is removed. This conversion precludes restoration of riparian shoreline vegetation and alters adjacent groundwater flow.

Since listing, we have conducted formal consultation under section 7 of the Act regarding impacts to the Prebles at two aggregate mines in Colorado. We have worked with project proponents to avoid impacts at others. At Rocky Flats NWR, private aggregate mining activities could affect Prebles' habitat directly or through alteration of hydrology along Rock Creek. While aggregate mining continues to affect floodplains in the Colorado Front Range, many project sites are along downstream reaches of larger streams and rivers where Prebles' populations now appear absent. Pague and Grunau (2000) considered ''rock and sand extraction'' to be a high-priority issue in Weld, Jefferson, and Douglas counties. While some stream channels within the range of the Prebles, in Wyoming have historically been mined for aggregate,

including the Laramie River at Laramie and Lodgepole and Crow creeks at Cheyenne, mining is not widespread (Wyoming State Geological Survey (WSGS) 2008).

Since construction aggregates are so low in value relative to their weight, transportation costs require that aggregate sources be located as close to the point of use as possible (WSGS 2008). Therefore, threats related to aggregate mining are likely to be more intense in areas in close proximity to human development. Thus, we expect this issue will have greater impact on Prebles' populations in Colorado. Given the high cost of transporting aggregate, increased development in Colorado will not cause a significant increase in aggregate mining in Wyoming. To the extent that aggregate mining will occur in Wyoming, it is likely to continue to be in close proximity to development such as the expanding urban centers of Laramie and Cheyenne.

Oil and Gas—As a result of public comments we received, we also investigated whether oil and gas exploration and extraction poses a threat to the Prebles. A large portion of the subspecies' Wyoming range overlaps with exposed undifferentiated precambian rocks or other formations with low potential for of oil and gas development (DeBruin 2002). A GIS analysis of oil and gas potential (Anderson 1990) relative to the subspecies likely range (Beauvais 2004) indicates that approximately 79 percent of the Prebles range in Wyoming occurs in areas with low oil and gas potential. This analysis indicates that less than 1 percent of the Prebles range in Wyoming occurs in areas with high oil and gas potential, while approximately 20 percent overlap with areas of moderate oil and gas potential. Even within these moderate and high potential areas, only one oil and gas field occurs (DeBruin 2002). In addition, coalfields and the range of the Prebles have little overlap in Wyoming (DeBruin 2004, p. 2) indicating a minimal risk of Prebles habitat being altered for coal production. In Colorado, many new wells are being drilled on the plains within or to the east of the Front Range urban corridor (mostly in Weld County). Few Prebles exist in areas of current oil and gas production exploration and production. In addition, wells are usually located in upland areas away from riparian habitats supporting Prebles' populations. Based on the limited potential for development of these resources within the range of Prebles, we conclude that these activities (directly or indirectly) will not meaningfully affect the conservation status of the Prebles throughout its range now or in the foreseeable future.

Agriculture—At the time of listing we cited conclusions by Compton and Hugie (1993a; 1993b) that human activities, including conversion of grasslands to farms and livestock grazing, had adversely impacted Prebles. They concluded that development of irrigated farmland had a negative impact on Prebles' habitat, and that any habitat creation it produced was minimal (Compton and Hugie 1993a; Compton and Hugie 1993b). In general, negative trapping results suggest that the Prebles does not occur in areas cultivated for row crops. Historically, the rapid rate of native habitat conversion to row crops likely had a significant adverse impact on the Prebles. Because conversion of native habitat to row crops has become increasingly rare in both Colorado and Wyoming (U.S. Department of Agriculture 2000, Tables 2, 3, & 9), such conversions are unlikely to present a similar threat in the future in any portion of the subspecies' range.

Although pressures to increase agricultural production may result from the demand to produce biofuels, we are not aware of information that suggests this would result in meaningful decreases in the Prebles' riparian habitat in Colorado or Wyoming. We conclude that in the absence of protections afforded by the Act, only a little of the subspecies' habitat is at risk from agricultural conversion. In Wyoming, where such a scenario in Prebles' habitat appears more likely than in Colorado, we explored whether former cropland removed from production for conservation purposes is now being returned to production. For example, through the CRP, farmers and ranchers enroll eligible agricultural land in 10- to 15-year contracts and plant appropriate cover such as grasses and trees in crop fields and along streams. The plantings help prevent soil and nutrients from running into regional waterways and affecting water quality. The long-term vegetative cover also improves wildlife habitat and soil quality. Wildlife habitat provided through the CRP can be at risk when CRP contracts expire and lands are returned to agricultural production.

In Wyoming counties within the range of the Prebles, the percent of cropland enrolled in the CRP program ranges from 0 to 26 percent. CRP contracts that will eventually expire for Wyoming counties within the range of the subspecies include: 1,736 ha (4,286 ac) currently enrolled in Converse County; 38,164 ha (94,234 ac) currently enrolled in Laramie County; and 23,612 ha (58,301 ac) currently enrolled in Platte County (Farm Service Agency 2008). In Albany County, there are 5,910 hectares (ha) (14,594 acres (ac)) identified by the U.S. Department of Agriculture as ''cropland'' and none of this cropland is currently enrolled in the CRP (Farm Service Agency 2008). While some landowners may not choose to renew their contracts given current and expected demand for biofuel raw materials, these counties have not witnessed a meaningful decline in enrollment since the biofuels boom began. From 2004 to 2007, enrollment: declined 74 ha (183 ac) in Converse County; increased 778 ha (1,922 ac) in Laramie County; declined 186 ha (460 ac) in Platte County; and did not change in Albany County (Farm Service Agency 2008). These data suggest changes in enrollment are likely to have a negligible impact on the Prebles and its habitat.

The Prebles uses native grass and alfalfa hayfields that are in or adjacent to suitable riparian habitat. This juxtaposition is often the case, since hay production requires large amounts of water. Mowing of hay may directly kill or injure Prebles, reduce food supply (since many plants will not mature to produce seed), and remove cover. Late season mowing may be especially problematic, because Prebles are approaching hibernation and their nutritional needs are high (Clippinger 2002, p. 72). Additionally, hay production may preclude growth of willows and other shrubs that are important as hibernation habitat for the Prebles. Hayfields often are irrigated through ditch systems. The Prebles uses overgrown water conveyance ditches and pond edges, and may use agricultural ditches as dispersal routes (Meaney *et al.* 2003, pp. 612–613). Ditch maintenance activities may kill individual Prebles and periodically alter their habitat. Existing special regulations at 50 CFR 17.40(1) exempt certain ditch maintenance operations from take prohibitions of the Act in recognition that habitat the ditches provide is dependent on the ditches retaining their function. Prebles' populations have persisted in areas hayed for many years (Taylor 1999). Haying operations that allow dense riparian vegetation to remain in place are likely compatible with persistence of Prebles' populations.

Impacts to riparian habitat from livestock are well documented in the scientific literature (Kauffman and Krueger 1984, pp. 431–435; Armour *et al.* 1991, pp. 7–11; Fleischner 1994, pp. 629–638; Belsky *et al.* 1999, pp. 419–431; Freilich *et al.* 2003, pp. 759–765). Livestock have damaged 80 percent of

stream and riparian ecosystems in the western United States (Belsky *et al.* 1999, p 419.). Adverse impacts of grazing include changes to stream channels (downcutting, trampling of banks, increased erosion), flows (increased flow and velocity, decreased late-season flow), the water table (lowering of the water table), and vegetation (loss to grazing, trampling, and through altered hydrology) (Kauffman and Krueger 1984, pp. 432–435).

Impacts from cattle grazing to other jumping mice have been documented by Frey (2005), Giuliano and Homyack (2004), and Medin and Clary (1989). Ryon (1996, p. 3) cited livestock grazing as a contributor to the lack of structural habitat diversity he observed on historical Prebles' sites in Colorado. On a working ranch in Douglas County, Colorado, Prebles were detected within cattle exclosures, but not on grazed areas. Previous trapping had documented Prebles upstream and downstream, but not on the ranch (Ensight Technical Services 2004, p. 9). On private lands in Douglas County, Colorado, Pague and Schuerman (1998, pp. 4–5) observed a swift rate of residential land development and significant fragmentation of habitat, but noted that in some cases accompanying secession of grazing had allowed recovery of degraded riparian habitats.

In Colorado, City of Boulder lands endured intensive grazing, farming, or haying regimes until they became part of the Boulder Open Space system. Grazing and haying, used as land management tools, continue on Boulder Open Space sites currently supporting the Prebles. In their study of small mammals on Boulder Open Space, Meaney *et al.* (2002, p. 133) found no adverse effects of managed grazing on abundance of individual small mammal species or on species diversity.

There is no doubt that cattle can greatly affect vegetation, especially in times of drought; grazing practices that assure maintenance of riparian shrub cover may be a key consideration in maintaining Prebles' populations (Ensight Technical Services 2004, p. 9). Recent drought, in combination with grazing, may have had an increased effect on Prebles' habitat.

Overgrazing threats are not limited to large livestock producing operations. On subdivided ranch properties, often termed ''ranchettes,'' horses and other livestock can heavily affect the small tracts within which they are fenced (Pague and Grunau 2000, p. 1–14). In Colorado, many large ranch properties are being subdivided into ranchettes. We have concluded that this represents a widespread threat to significant areas of Colorado, where an increase in rural development is forecast in the foreseeable future. Pague and Grunau (2000) considered ''high impact livestock grazing'' to be a high-priority issue for the Prebles in Larimer, Weld, Elbert, and El Paso counties in Colorado, largely due to the projected increase in such ranchettes. Based on human growth projections, subdivision of ranches is expected to be minimal in portions of Wyoming where the Prebles exists.

In Wyoming, where large-scale commercial ranching is more prevalent in the Prebles' range than in Colorado, overgrazing is thought to occur sporadically across the landscape, most obviously where cattle congregate in riparian areas in winter and spring. Grazing has occurred within Prebles' habitat for many decades, and populations of Prebles have been documented on sites with a long history of grazing. For example, jumping mice were trapped at 18 of 21 sites on True Ranches properties (mice from 14 of these sites have since been confirmed as Prebles (King *et al.* 2006b, pp. 4351–4353)), primarily within sub-irrigated hay meadows that have been subjected to livestock grazing and hay production for approximately 100 years (Taylor 1999, p. 5).

At the time of listing we addressed overgrazing by livestock. We stated that it may cause significant impacts to Prebles' habitat, but that timing and intensity of grazing were probably important in maintaining habitat and that maintenance of woody vegetative cover could be key (63 FR 26517, May 13, 1998). Overgrazing was thought to have eliminated the Prebles from much of its former Wyoming range (Clark and Stromberg 1987, p. 185; Compton and Hugie 1993b, p. 4). Trapping efforts since listing have greatly expanded our understanding of the subspecies' range in Wyoming, showing that our assertions that grazing eliminated the Prebles from these areas were incorrect.

As suggested by Bakeman (1997, p. 79) and Pague and Grunau (2000, p. 1–17), and as supported by the examples above, grazing is compatible with Prebles when timing and intensity are appropriately managed. We now believe that agricultural operations that have maintained habitat supportive of Prebles' populations are consistent with conservation and recovery of the subspecies. In recognition of this, in 2001 we adopted special regulations at 50 CFR 17.40(1) which exempted existing agricultural activities, including grazing, plowing, seeding, cultivating, minor drainage, burning, mowing, and harvesting, from the prohibitions of the Act. The exemption does not apply to new agricultural activities or to those that expand the footprint or intensity of the activity. We established the exemption to provide a positive incentive for agricultural interests to participate in voluntary conservation activities and to support surveys and studies designed to determine status, distribution, and ecology of Prebles, which in turn could lead to more effective recovery efforts.

The number of cattle in counties currently known to support the Prebles, in Wyoming totaled 270,000 head in 2006 (National Agriculture Statistics Service 2007). Cattle numbers appear stable in Albany, Converse, and Laramie counties, but higher than the average for the last 20 years in Platte County. Cattle numbers in Colorado counties supporting the Prebles totaled 666,000 head in 2006; 550,000 of these cattle were in Weld County (National Agriculture Statistics Service 2007). Excluding Weld, all of these Colorado counties have shown a marked downward trend in cattle numbers over the past 20 years, reflecting human development on former agricultural lands (National Agriculture Statistics Service 2007).

Overall, we expect traditional grazing operations to continue in Wyoming. Such operations have generally proven compatible with maintenance of Prebles' populations, suggesting timing and intensity have generally been managed appropriately. This management has taken place without oversight of the Act as allowed in the special regulations at 50 CFR 17.40(1). We have no reason to conclude that the management of these ranches will change in an adverse way over the foreseeable future.

Summary—Within Colorado, human land uses within the Prebles' range have destroyed, degraded, and fragmented habitat and continue to do so. While protections of the Act have avoided, minimized, and helped to compensate for direct human land-use impacts to occupied Prebles' habitat, direct and secondary impacts to riparian habitats have likely diminished the areas that are capable of sustaining Prebles' populations. Given the projected future growth rates in Colorado, and absent protections associated with Federal activities and listing under the Act, we have concluded that threats posed by human development activities discussed above would rise dramatically following delisting. Most Colorado Prebles' sites documented since listing are subject to the same level of threats discussed above for the Colorado

portion of the range in general. Documentation of these new sites does not change our conclusion as to the current and future conservation status of the subspecies in this portion of its range. Regulatory mechanisms that could help reduce such negative impacts, while currently limited, are discussed under Factor D below.

In Wyoming, the Prebles appears to be much more widely distributed than previously assumed, while current and future threats to habitat and range appear limited. At the time of listing, the Prebles was not known to exist in the North Platte River basin and known from only two sites in Wyoming's portion of the South Platte River basin (63 FR 26517). Since listing, additional distributional data has verified that the subspecies is widespread in the North Platte River basin with demonstrated occupancy in 4 drainages and at least 15 rivers or streams; we also believe the subspecies also may occur in multiple rivers or streams in a fifth North Platte drainage (the Middle North Platte). An improved understanding of the subspecies' distribution suggests that historical agricultural activities, such as grazing and haying, have had a minimal impact on the subspecies to date. In short, continuation of these long-standing activities appears supportive of existing Prebles' populations. We have no indication these agricultural practices are likely to change in the foreseeable future in ways that would affect the subspecies' long-term conservation status. A low projected human population growth rate is predicted for the four Wyoming counties occupied by the Prebles, suggesting that few development-related threats are likely in this portion of the subspecies' range into the foreseeable future. In short, the best scientific and commercial information suggests that impacts to the Wyoming portion of the subspecies' range are likely to be minor with only small and localized effects. Therefore, we conclude that present or threatened destruction, modification, or curtailment of the Prebles' habitat and range in Wyoming do not suggest that the subspecies requires listing in this portion of its range in order to sustain it for the foreseeable future.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The Prebles is not collected for commercial or recreational reasons and we have no information to indicate that the subspecies would be once it is delisted. Some collection of specimens occurs for scientific and educational purposes and these activities will continue to be permitted under existing state regulations in both Colorado and Wyoming once the subspecies is delisted. Although we are aware that unintentional mortalities have resulted from capture and handling of Prebles by permitted researchers, the level of take associated with this activity does not rise to the level that would affect populations of the subspecies, nor is it likely to do so once we remove the protections of the Act. Furthermore, we have no information to indicate that collection for scientific or educational reasons is it likely to become, a significant threat to the subspecies, even if the protections afforded the subspecies under Colorado and Wyoming state laws were removed (see our discussion below of Factor D).

C. Disease or Predation

At the time of listing, we had no evidence of disease causing significant impacts to the Prebles (63 FR 26517, May 13, 1998). No further evidence exists that any parasite or disease has caused a significant impact to populations. While plague relationships for most North American rodents are poorly understood, plague may interact synergistically with other natural and human-induced disturbances, increasing risk of local extirpation and rangewide extinction (Biggins and Kosoy 2001, p. 913). Plague has not been documented in the Prebles. However, Pague and Grunau (2000, p. 1–19) considered disease to be a potentially high-priority issue for the Prebles. They cited unknown resistance of the Prebles to plague and other diseases, and noted that small populations could be especially vulnerable to effects of an epizootic. Should disease materialize into a substantive issue, we believe populations in Colorado would be at higher risk because development pressures in this portion of the range are more likely to result in small, fragmented, and unsustainable populations.

At the time of listing, we addressed potential predators of the Prebles whose densities could increase in the suburban or rural environment, including striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), and the domestic cat (*Felis catus*) (63 FR 26517, May 13, 1998). Increased impacts of native and exotic predators that accompany rural development can affect species viability (Hansen *et al.* 2005, p. 1899). We noted opinions that free-ranging domestic cats and feral cats locally presented a problem to Prebles' populations. Where predator populations are increased through human land uses, they may contribute to the loss or decrease of Prebles. Generally, we have found proponents of new residential developments near Prebles' habitat to be receptive to prohibitions on free-ranging cats and dogs (*Canis domesticus*) when negotiating minimization measures through section 7 of the Act. However, enforcement is often through covenants administered by homeowners' associations, with uncertain success. If the Prebles were to be delisted and Federal protection under the Act discontinued, similar covenants on new development in and near Prebles' habitat would be less likely, and existing covenants may not be as strictly enforced. Beyond previously known or anticipated predators of jumping mice, introduction of non-native bullfrogs (*Rana catesbiana*) in Colorado has resulted in predation on Prebles (Trainor 2004, p. 58). However, we have no information to suggest that predation from bullfrogs has affected Prebles' populations.

While many uncertainties remain regarding disease and predation, we believe the best available scientific and commercial data suggest that disease is most likely to only be a factor in small and fragmented populations, and that increases in predation will likely only contribute to the reduction, fragmentation, and loss of Prebles' populations when such populations are exposed to increased human presence. As noted above, increased human presence is expected to be a significant issue in Colorado and of minimal concern in Wyoming. Thus, we expect these issues have the potential to meaningfully affect Prebles' populations in developing areas of Colorado, but comparable impacts in Wyoming are not expected.

D. The Inadequacy of Existing Regulatory Mechanisms

This factor considers the regulatory mechanisms that would remain in place in the absence of the Act's protective measures. Current and likely future protections are considered. In areas where the protections of the Act are removed, the Service has no assurances that previous conservation commitments made under sections 7 or 10 of the Act will remain in place.

At the time of listing, we cited the lack or ineffectiveness of laws and regulations protecting the Prebles and its habitat (63 FR 26517, May 13, 1998). Protective measures discussed below include Federal, State, and local protections.

Federal Protections—Existing Federal laws, such as the CWA (33 U.S.C. 1251 *et seq.*), Federal Power Act (16 U.S.C.

791a *et seq.*), Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*), National Forest Management Act (16 U.S.C. 1600 *et seq.*), Federal Land Policy and Management Act (43 U.S.C. 1701 *et seq.*), Food Security Act (16 U.S.C. 3801 *et seq.*), and National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), provide limited protection for non-listed species.

Section 404 of the CWA generally requires avoidance and minimization (when practicable), and mitigation of adverse impacts to jurisdictional wetlands and waters of the United States associated with filling. Human impacts to jurisdictional wetlands may be permitted when alternatives that would avoid wetlands are found not to be practicable. Section 404 of the CWA does not apply to non-jurisdictional waters or wetlands. In these cases, activities affecting these waters or wetlands would not require Federal permits under section 404 of the CWA. More importantly, section 404 of the CWA provides no comparable safeguards for non-jurisdictional riparian and upland areas used by the Prebles.

The CWA, section 303, establishes the water quality standards and Total Maximum Daily Load (TMDL) programs. Water quality standards are set by States, Territories, and Tribes. They identify the uses for each waterbody, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. Colorado and Wyoming are required under section 305(b) of the CWA to complete an assessment of their surface waters. From this assessment a CWA 303(d) list of impaired water bodies is developed. These are waters that are not currently meeting their designated uses because of impairments to the waters.

The EPA encourages communities, watershed organizations, and local, state, tribal, and federal environmental agencies develop and implement watershed plans to meet water quality standards and protect water resources. These plans can include measures that will help protect riparian areas and may in some cases provide benefits to the Preble's Meadow Jumping Mouse. For example, in Wyoming the Crow Creek Watershed Plan coordinated by the Laramie County Conservation District, includes recommendations to protect riparian habitat because of the benefits for water quality (the plan is available at *http://www.lccdnet.org/waterquality/watershed%20plan/FinalPlan.pdf*). While these efforts to improve water quality have the potential to improve or protect riparian habitat, the measures are typically not mandatory and such watershed planning efforts do not encompass the range of the subspecies. Thus, the CWA provides only limited protection of habitats utilized by the Prebles and is not capable of substantially reducing threats to individual Prebles' populations or to the subspecies as a whole.

On lands administered by the USFS and BLM, the current status of the Prebles as threatened invokes management priorities in accordance with protections of the Act. If delisted, these protections would no longer apply. However, Federal land-management agencies, through their regulations, policies, and management plans, work to ensure long-term conservation of all wildlife species of concern. Of the three National Forests supporting Prebles' populations, the Medicine Bow–Routt National Forest has a forest management plan that includes standards and guidelines specific to conservation of the Prebles. The Arapahoe–Roosevelt National Forest and the Pike–San Isabel National Forest have forest plans that predate the listing of the Prebles (Warren 2007). If delisted, the Prebles would likely be considered a subspecies warranting conservation concern by Federal land-holding agencies and, as such, retain some continued degree of conservation priority.

On military installations, the Sikes Act Improvement Act of 1997 (16 U.S.C. 670a *et seq.*) requires each facility that includes land and water suitable for the conservation and management of natural resources to complete an Integrated Natural Resources Management Plan (INRMP). This plan must integrate implementation of the military mission of the installation with stewardship of the natural resources found there. In both Colorado and Wyoming, this process has provided the opportunity to consider the potential impacts of military actions on the Prebles.

The Academy in El Paso County, Colorado, has an INRMP in place, a conservation and management plan, and a programmatic consultation under section 7 of the Act, which provide guidance for Air Force management decisions for certain activities that may affect the subspecies. Research on the Prebles is ongoing at the Academy; the conservation and management plan is designed to be updated as new information is collected. Warren Air Force Base in Laramie County, Wyoming, has an INRMP and a conservation and management plan. However, the base may only support the western jumping mouse. Both plans are designed to be in place for 5 years. The emphasis given to conservation of the Prebles in these plans may decline in the future if the subspecies were to be delisted.

The presence of Prebles has been documented at two of the Service's NWRs. We manage the Rocky Flats NWR, near Boulder, Colorado, in a manner consistent with conservation of the Prebles. This management is unlikely to change if the Prebles were to be delisted.

More recently, a single Prebles as well as western jumping mice have been confirmed from Hutton Lake NWR near Laramie, Wyoming. Because the subspecies was only recently documented on Hutton Lake NWR, the subspecies' needs were previously not explicitly addressed in management documents. While past management was primarily waterfowl oriented, refuge management plans have been developed to address the needs of the Prebles (Kelly 2008).

Service-approved HCPs and their incidental take permits contain management measures and protections for identified areas that protect, restore, and enhance the value of these lands as habitat for the Prebles. These measures, which include explicit standards to avoid, minimize, and mitigate any impacts to the covered (sub)species and its habitat, are designed to ensure that the biological value of covered habitat for the Prebles is maintained, expanded, or improved. Large regional HCPs expand upon the basic requirements set forth in section 10(a)(1)(B) of the Act and reflect a voluntary, cooperative approach to large-scale habitat and (sub)species conservation planning. The primary goal of such HCPs is to provide for the protection and management of habitat essential for the conservation of the (sub)species while directing development to other areas. In any HCP, permittees may terminate their participation in the agreement and abandon the take authorization set forth in the permit.

To date, we have approved 19 single-species HCPs for the Prebles, all in Colorado. Eighteen of the associated permits allow approximately 280 ha (700 ac) of permanent or temporary impact to Prebles' habitat, and preserve or enhance habitat to offset impacts. The largest of these, the approved HCP for Douglas County and the Towns of Castle Rock and Parker, allows impacts of up

to 170 ha (430 ac), in exchange for the acquisition of 24 km (15 mi) of stream (455 ha (1,132 ac) of habitat) acquired and preserved for the long-term benefit of the Prebles.

The remaining HCP, issued in January 2006, is the Livermore Area HCP in Larimer County. The planning area for this HCP includes a large portion of Larimer County, approximately 1,940 square km (750 square mi), including a Prebles' ''conservation zone'' estimated at approximately 324 km (201 mi) of stream and 8,570 ha (21,320 ac). The HCP cites protection of 114 km (71 mi) of stream, mostly on CDOW lands; however, it is not clear what proportion of these areas support Prebles. Local landowners and public agencies holding land within the boundaries of this HCP may opt for coverage under the HCP and receive take permits for activities consistent with the HCP. The Livermore Area HCP is designed to support current land uses, including ranching and farming. However, inclusion of landowners is optional, and they may choose to pursue land uses inconsistent with those specified in the HCP. Thus far, we have issued no individual permits under this HCP.

Of the two regional HCPs in development, the El Paso County effort is proceeding slowly and the Boulder County effort appears to be on hold. It is unlikely that these conservation plans would be completed or implemented if the Prebles did not remain listed under the Act.

State Protections—Under the nongame provisions of the CDOW Regulations (Chapter 10, Article IV) the Prebles currently may only be taken legally by permitted personnel for educational, scientific, or rehabilitation purposes. This regulation would remain in effect if the Prebles was delisted under the Act. In Wyoming, continued classification of the meadow jumping mouse as a ''nongame species'' under section 11 of Chapter 52 (Nongame Wildlife) of the Wyoming Game and Fish Commission regulations would protect the Prebles from takings and sales by allowing the issuance of permits only for the purpose of scientific collection. As mentioned previously in our discussion under Factor B, overutilization for commercial, recreational, scientific, or educational purposes is not now, nor is it likely to become, a significant threat to the subspecies, even if the protections afforded the subspecies under Colorado and Wyoming laws were removed.

Numerous State lands (CDOW and WFGD lands, State Park lands, State Land Board lands) and mitigation properties (such as those of the Colorado Department of Transportation) would continue to provide a measure of protection for the Prebles should it be delisted. While some of these conservation properties may have management specifically designed to preserve and enhance Prebles' habitat, others are managed more generally for wildlife habitat, for human recreation, or for multiple uses.

State programs have been available to help preserve the Prebles through the acquisition, preservation, and management of its habitat. These include the Great Outdoors Colorado Trust Fund and the Species Conservation Trust Fund. In comments to the Service, then Colorado Department of Natural Resources Commissioner, Russell George, stated that State and local initiatives could provide for conservation of the Prebles, independent of Federal oversight. He listed nearly 40 conservation projects in 5 Front Range Colorado counties where the Prebles ''may be present'' (George 2004). The conservation value of many of these projects is uncertain since most were developed without specific regard to the Prebles' distribution and its conservation.

Local Protections—At the time of listing, we pointed out that while a myriad of regional or local regulations, incentive programs, and open-space programs existed, especially in Colorado, few specifically protected the Prebles or its habitat from inadvertent or intentional adverse impacts (63 FR 26517, May 13, 1998). Many local regulations create a process of site-plan review that ''considers'' or ''encourages'' conservation of wildlife, wetlands, and other natural habitats, but have no mandatory measures requiring avoidance or mitigation of impacts. Effectiveness of local regulations in maintaining naturally functioning riparian corridors varies greatly depending on how these apparently flexible regulations are implemented. Following listing under the Act, development and other projects in and near Prebles' habitat have received increased scrutiny from local jurisdictions, often in coordination with Service authorities. Open-space acquisitions and easements also have taken the presence of the Prebles into account. It is not clear what level of interest in Prebles' conservation would continue following delisting. Local governments would likely relax review procedures for projects in known or suspected Prebles' habitat. Beyond the direct impact to Prebles' habitat, secondary impacts of development (including increased recreational use, altered flow regimes and groundwater levels, and increase in domestic predators) are unlikely to be adequately addressed. While certain local regulations are designed to conserve wetlands or floodplains on private lands, it is unlikely they would effectively control land uses (grazing, mowing, cutting, and burning) that may affect the hydrology, vegetation, and hibernacula sites on which the Prebles depends. The adequacy of such protective measures is more important within Colorado than Wyoming given the intense development pressures in the Colorado counties where the Prebles occurs.

Douglas County, Colorado, owns 14 properties that encompass 24 km (15 mi) of stream and associated riparian habitats potentially beneficial to the Prebles (Matthews 2004). Of Douglas County streams on non-Federal property within the county-mapped Riparian Conservation Zone, 105 km (65 mi), or 23 percent, are under some form of permanent protection (Matthews 2004), including 77 km (48 miles) on Plum Creek and its tributaries and 25 km (16 mi) on Cherry Creek and its tributaries (Matthews 2008). However, occurrence of the Prebles on many of these properties has not been extensively documented. For example, while there are 23.4 km (14.5 mi) of mapped riparian corridors on the large Greenland Ranch conservation property, the presence of the Prebles has been documented at only two sites. Future conservation efforts to augment protected areas and to link protection over large expanses of connected streams in Douglas County could contribute greatly to maintaining secure Prebles' populations in the Upper South Platte and Middle South Platte-Cherry Creek drainages. If the Prebles was delisted, management priorities on protected lands and direction of future conservation efforts would likely change. In order to ensure long-term management for the Prebles, the Preliminary Draft Recovery Plan suggests the Service and our partners develop and implement long-term management plans and cooperative agreements prior to delisting (USFWS 2003b, pp. iv, 33, 39, 47–47, 51–52).

Larimer County has acquired or secured easements to considerable lands, including some properties under the Laramie Foothills Project, in partnership with The Nature Conservancy, the City of Fort Collins, and the Legacy Land Trust. While conservation efforts have increased, especially in the Livermore Valley, residential development remains the largest threat to the Prebles in the county (Pague 2007). The extent to

which Prebles' populations are supported by these properties, the fate of remaining private lands in the North Fork, Cache La Poudre River and its tributaries, and the ability to link conservation lands and traditional agricultural lands supporting the Prebles along stream reaches are key to protecting the potentially large Prebles' population thought to exist in this area.

The City of Boulder, Boulder County, and Jefferson County have extensive lands protected under their open-space programs. While the extent of known Prebles' occurrences in these counties is limited compared to that documented in Larimer and Douglas counties, known populations exist on open space protected from residential and commercial development.

Overall, the CDOW examined land ownership of over 58,000 ha (143,000 ac) in Colorado they considered occupied by the Prebles and concluded 45 percent of the area was ''protected'' (i.e., in public ownership, land trust, or conservation easement) (Nesler 2008). Occupancy of land was calculated based on proximity to documented meadow jumping mouse capture locations. Captures are the result of trapping surveys, which may disproportionately target public lands easily trapped for research purposes or proposed development sites trapped for Act compliance purposes. Thus, the 45 percent statistic may not reflect the actual proportion of suitable habitat that is protected. Still it suggests some meaningful progress toward recovery of the subspecies in this portion of its range.

At the request of the Service, the CDOW conducted a similar evaluation for specific areas we consider of high importance to Prebles' conservation in Colorado. These included designated Prebles' critical habitat units and additional units of proposed critical habitat where the proposed units were excluded from the final designation due to ongoing conservation efforts (HCPs in development in Boulder, Douglas, and El Paso counties). While our proposal and designation of critical habitat units focused on lands in public ownership, which may bias the results, examination of these areas provides some perspective into potential protections in place in Colorado.

Across nine total units, lands in public ownership, land trusts, or conservation easements comprised approximately 51 percent of these areas (Kindler 2008). Percentage of lands in these categories varied greatly from unit to unit as follows:

- 45 percent of critical habitat unit SP4, which encompasses approximately 141.8 km (88.1 mi) of streams within the North Fork of the Cache La Poudre River watershed;
- 96 percent of critical habitat unit SP5, which encompasses approximately 82.4 km (51.2 mi) of streams within the Cache La Poudre River watershed;
- 64 percent of critical habitat unit SP6, which encompasses approximately 69.2 km (43.0 mi) of streams within the Buckhorn Creek watershed;
- 64 percent of proposed critical habitat unit SP8, which encompasses approximately 11.8 km (7.3 mi) of streams within the South Boulder Creek watershed;
- 13 percent of critical habitat unit SP10, which encompasses approximately 12.9 km (8.0 mi) of streams within the Ralston Creek watershed;
- 45 percent of the proposed critical habitat unit SP11, which encompasses approximately 32.1 km (19.9 mi) of streams within the Cherry Creek watershed;
- 31 percent of the proposed critical habitat unit SP12, which encompasses approximately 146.6 km (91.1 mi) of streams within the Plum Creek watershed; and
- 5 percent of the proposed critical habitat unit A1, which encompasses approximately 56.3 km (35.0 mi) of streams within the Monument Creek watershed.

Units SP4, SP12 and A1 correspond to the three large Prebles' populations in Colorado called for in the Preliminary Draft Recovery Plan. Units SP4 and SP12 demonstrate 45 percent and 31 percent in protected land use categories, respectively. The 5 percent protected in unit A1 underestimates the actual percent of this large population protected as the proposed critical habitat unit excluded the Air Force Academy. The Preliminary Draft Recovery Plan calls for documentation of these Prebles' populations, maintenance of habitat connectivity over long expanses of streams, and the elimination of future threats within these drainages. While the above percentages of lands in protected ownership categories is encouraging, existing protections do not fulfill Preliminary Draft Recovery Plan objectives, nor do they assure the future well-being of these Prebles' populations.

As discussed above, fragmentation of Prebles' habitat and resulting impacts on the future security of Prebles' populations is a significant concern. Even in drainages where lands in public ownership or private properties dedicated to conservation are relatively extensive, development of intervening private lands is likely to fragment habitat and may impact Prebles' populations. As of this writing, we have not obtained data on fragmentation within the above areas.

Many of the public ownership areas are high-elevation, montane headwater habitats. As discussed previously, such areas may have less suitable habitat that supports lower density Prebles' populations than at plains and foothill sites. Additionally, within Colorado, it appears that as elevation increases there is an increased occurrence of the western jumping mouse. Thus, in order to rely upon the contribution that these high elevation areas provide to the long-term security of the Prebles, positive identification to species and localized demographic data would be required.

Finally, public ownership may not preclude properties from human development, other land uses, or management priorities incompatible with the well-being of the Prebles. Those lands that are protected and managed in a manner that is compatible with the needs of the Prebles may be subject to secondary impacts from activities off site. Most prominent among these secondary impacts are those resulting from changes in flow regimes. Recent evidence suggests secondary impacts from development of private land upstream from the Academy (proposed unit A1) threaten the integrity of habitat present and the Prebles' population it supports.

In Wyoming, as would be expected in areas where development pressures are substantially less, the regional and local regulations affecting Prebles habitat appear to be less extensive than in the Colorado portion of its range. Currently Albany, Laramie, and Platte Counties in Wyoming have zoning regulations including the regulation of subdivision development (Reid in litt.). These and other local protections provide some protection of water resources and floodplains and reduce soil erosion. Overall, local protections in the Wyoming portion of the Prebles range appear minimal.

Reinitiated recovery planning efforts will work to further define recovery needs and coordinate progress toward these goals with State, other Federal, and local entities. While the above statistics suggest additional recovery efforts are required, the potential for protecting existing Prebles' populations and recovering the subspecies in Colorado appears high. While fewer protections are in place in Wyoming, substantially reduced threat levels (see Factor A discussion) indicates that comparable protections are not necessary in this portion of the subspecies' range.

Summary—In the absence of the Act's protective measures, Federal conservation efforts for the Prebles would be largely limited to Federal properties, where the subspecies may be maintained as a priority subspecies and conserved through existing or future management plans.

While State regulations in both Colorado and Wyoming would regulate purposeful killing of Prebles; as noted in Factors B and D above, we do not view this as a significant concern driving the subspecies' long-term conservation status. If delisted, State and local regulations would do little to conserve the Prebles or its habitat on private lands. Public land holdings, conservation easements, and other conservation efforts, past and future, could support the Prebles on specific sites.

In Colorado, the extent and pattern of conservation efforts in relation to Prebles' distribution, and the appropriate management of Prebles' habitat, would largely dictate the long-term viability of Prebles' populations.

At this time, no large populations and few medium populations, as described in the Preliminary Draft Recovery Plan, are known to exist in Colorado on contiguous stream reaches that are secure from development. Management plans that specifically address threats to the Prebles are few, and management priorities would likely change if we were to delist the subspecies. Much of the intervening private lands would likely be subject to development within the foreseeable future (this issue is described in more detail in Factor A above). If we were to delist the subspecies, given current and projected levels of protections, we believe that most Prebles' populations in Colorado would not be secure into the foreseeable future.

In Wyoming, the best available scientific and commercial information indicates that at least one large population (in the Lower Laramie drainage) and two medium populations (in the Glendo and Horse Creek drainages) occur along contiguous stream reaches that are secure from development as recommended in the Preliminary Draft Recovery Plan (USFWS 2003b, pp. 19, 22). While regulatory measures in Wyoming do not guarantee protection of these populations, such assurances are not needed because threats to the Prebles and the subspecies' habitat are limited for the foreseeable future (see Factor A discussion).

E. Other Natural or Manmade Factors Affecting the Subspecies' Continued Existence

At the time of listing, we judged this subspecies susceptible to a number of other factors, including impact from naturally-occurring events including flooding, invasive weeds and weed control programs, pesticides and herbicides, and secondary impacts associated with human-caused development (63 FR 26517, May 13, 1998). For most of these factors, we have little more information than we had at the time of listing. Additional concerns that were not considered at the time of listing include the potential for competition between the Prebles and the western jumping mouse, and future effects of changing climate on the Prebles, including its potential to heighten threats from fire and drought.

Flooding and fire are natural components of the Wyoming and Colorado foothills and plains, and Prebles' habitat naturally waxes and wanes with these events. While these natural events may affect Prebles' populations by killing individuals and by destroying riparian and adjacent upland habitat on which they depend, the effects to vegetation are often temporary. Normal flooding and fire events also may help maintain the vegetative communities that provide suitable habitat for the Prebles. An increase in impervious surfaces and denuding of vegetation caused by human activity can result in increased frequency and severity of flood events and prevent the re-establishment of favored riparian communities. While an extreme flood event has potential to eliminate an entire Prebles' population in an affected stream reach, it would be less likely to eliminate a population over an entire drainage where Prebles' occurrence extends to side tributaries and headwaters.

Periodic fire may be of value in maintaining riparian, transitional, and upland vegetation within Prebles' habitat. In a review of the effects of grassland fires on small mammals, Kaufman *et al.* (1990) found a positive effect of fire on meadow jumping mice in one study and no effect on the species in another study. Fire may regenerate decadent willow (*Salix* sp.) stands along streams and encourage higher stem densities considered more favorable to the Prebles.

Long periods of fire suppression result in fuel buildup, especially in forested areas, and can result in catastrophic fires that alter habitat dramatically, change the structure and composition of the vegetative communities, and potentially affect large numbers of Prebles or multiple populations. Following more intense fires, precipitation in a burned area may degrade Prebles' habitat by causing greater levels of flooding, erosion, and sedimentation along creeks. As habitat redevelops, it will likely be reoccupied by the Prebles, assuming that there are occupied, connected stream reaches where Prebles' populations have continued to persist.

An example of catastrophic fire in Prebles' habitat occurred in 2002. The Hayman and Schoonover fires in Jefferson and Douglas counties, Colorado, encompassed over 3,000 ha (7,500 ac) of potential Prebles' habitat, or approximately 20 percent of the potential habitat within the boundaries of Pike National Forest (Elson 2003). Approximately 342 ha (844 ac) of proposed critical habitat were burned. While riparian habitat that was lightly burned was expected to recover relatively quickly, increases in erosion and sedimentation downstream have been severe, and may continue to affect Prebles' habitat for many years. Because of severe fire-related impacts, we withdrew from the final critical habitat designation for the Prebles (68 FR 37275, June 23, 2003) a portion of Gunbarrel Creek that we had proposed as critical habitat for the subspecies before the Hayman fire. Even prior to the Hayman and Schoonover fires, Pague and Granau (2000), in their consideration of Prebles conservation in Colorado, considered catastrophic fire to be a high-priority issue for Douglas County.

Fire has the potential to affect the Prebles' populations both directly and indirectly. The intensity, extent, and location of any fire event will likely dictate the nature and severity of the impact to the Prebles. Catastrophic fire events are, by their nature, rare, but have the potential over the foreseeable future to impact any existing foothill and montane Prebles' population.

Drought is another issue that can have a significant negative effect on the Prebles. Drought lowers stream flows and the adjacent water table, in turn impacting riparian habitat on which the subspecies is dependent. Drought may exacerbate adverse impact of cattle grazing on Prebles habitat. Frey (2005, p.62) found that drought had a major influence on the status and distribution of *Zapus hudsonius luteus* in New Mexico. In 2002, a year with regional drought conditions, Bakeman (2006, p. 11) failed to capture Prebles at two sites where he had previously documented substantial populations. While Prebles populations have coexisted with

periodic drought, significant increases in frequency or severity of drought could impact the persistence of Prebles. This is likely to be a more significant factor for small and fragmented populations, while large populations with substantial tracts of suitable habitat will be better protected.

Invasive, noxious plants can encroach upon a landscape, displace native plant species, form monocultures of vegetation, and may negatively affect food and cover for the Prebles. The control of noxious weeds may entail large-scale removal of vegetation and mechanical mowing operations, which also may affect the Prebles. The tolerance of the Prebles for invasive plant species remains poorly understood. Leafy spurge (*Euphorbia esula*) may form a monoculture, displacing native vegetation and thus reducing available habitat (Selleck *et al.* 1962; Pague and Grunau 2000, p. 1–18). Nonnative species including tamarisk (*Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*) may adversely affect the Prebles (Garber 1995, p. 16; Pague and Grunau 2000, p. 1–18). Existing special regulations at 50 CFR 17.40(1) exempt take incidental to noxious weed control. We instituted this exemption to recognize that control of noxious weeds is likely to produce long-term benefits to native vegetation supportive of the Prebles.

It remains unknown to what extent point and non-point source pollution (sewage outfalls, spills, urban or agricultural runoff) that degrades water quality in potential habitat may affect the abundance or survival of the Prebles. From an examination of their kidney structure, it is not clear whether Prebles require drinking water from open water sources, or may obtain water through dew and their foods (Wunder 1998). Likewise, it is unknown whether pesticides and herbicides, commonly used for agricultural and household purposes within the range of the Prebles, pose a threat to Prebles directly, or through their food supply, including possible bioaccumulation.

Human-caused development creates a range of additional potential impacts (through human presence, noise, increased lighting, introduced animals, and the degradation of air and water quality) that could alter Prebles' behavior, increase the levels of stress, and ultimately contribute to loss of vigor or death of individuals, and extirpation of populations. Introduced animals associated with human development may displace, prey upon, or compete with the Prebles. Feral cats and house mice were common in and adjacent to historical capture sites where Prebles were no longer found (Ryon 1996, p. 26). While no cause-and-effect relationship was documented, the Prebles were 13 times less likely to be present at sites where house mice were found (Clippinger 2002, p. 104). We have an incomplete understanding of the mechanisms by which the breadth of human-caused development impacts Prebles' populations. However, the absence of Prebles' populations in portions of Colorado drainages where riparian habitat appears relatively favorable but human encroachment is pervasive suggests a potential cause-and-effect relationship. Cumulative impacts from a variety of factors in addition to habitat loss may contribute to local extirpations.

Colorado's Comprehensive Wildlife Conservation Strategy lists ''scarcity'' as a threat to meadow jumping mice that may lead to inbreeding depression (CDOW 2006, p. 102). Small populations can be threatened by stochastic, or random, changes in a wild population's demography or genetics (Brussard and Gilpin 1989, pp. 37–48; Caughley and Gunn 1996, pp. 165–189). A stochastic demographic change in small populations, such as a skewed age or sex ratio (for example, a loss of adult females), can negatively affect reproduction and increase the chance of extirpation. Isolation of populations may disrupt gene flow and create unpredictable genetic effects that could impact Prebles' persistence in a given area. While the susceptibility of the Prebles to such events has not been researched, the documented tendency for Prebles' numbers to vary widely over time heightens concern for small and isolated populations. Within populations, periodic lows in numbers of Prebles present more accurately reflect potential vulnerability than typical or average numbers present. Although many trapping efforts have targeted Prebles in small, isolated reaches of habitat, few have documented presence. As noted above, we have determined that populations in Colorado would be at higher risk over the foreseeable future because development pressures in this portion of the range are more likely to result in small, fragmented, and unsustainable populations.

The relative ranges, abundance, and relationship between the Prebles and the western jumping mouse are not yet clearly understood, especially in Wyoming. Recent confirmation of extensive range overlap in Wyoming and the apparent predominance of the western jumping mouse in some southern Wyoming drainages with few or no recent records of Prebles, provide reason for concern. It is unknown whether western jumping mice are actively competing with Prebles, affecting Prebles' population size, and possibly limiting distribution, or if this distribution pattern is unrelated to their interaction. Additional study of this issue would be desirable. Although questions remain, we do not have information to indicate that presence of the western jumping mouse constitutes a threat to the Prebles.

Climate change is another issue of potential concern. According to the IPCC (2007, p. 2), ''Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.'' Average Northern Hemisphere temperatures during the second half of the 20th century were very likely higher than during any other 50-year period in the last 500 years and likely the highest in at least the past 1,300 years (IPCC 2007, p. 2). It is very likely that over the past 50 years: cold days, cold nights, and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent (IPCC 2007, p. 2). It is likely that: Heat waves have become more frequent over most land areas, and the frequency of heavy precipitation events has increased over most areas (IPCC 2007, p. 2). It is difficult to ascertain what impact these changes have had on the subspecies.

The IPCC (2007, p. 7) predicts that changes in the global climate system during the 21st century are very likely to be larger than those observed during the 20th century. For the next two decades, a warming of about 0.2 °C (0.4 °F) per decade is projected (IPCC 2007, p. 7). Afterward, temperature projections increasingly depend on specific emission scenarios (IPCC 2007, p. 7). Various emissions scenarios suggest that by the end of the 21st century, average global temperatures are expected to increase 0.6 to 4.0 °C (1.1 to 7.2 °F) with the greatest warming expected over land (IPCC 2007, pp. 7–9). Localized projections suggest the West may experience among the greatest temperature increase of any area in the lower 48 States (IPCC 2007, p. 9). The IPCC says it is very likely that hot extremes, heat waves, and heavy precipitation will increase in frequency (IPCC 2007, p. 8). There also is high confidence that many semi-arid areas like the western United States will suffer a decrease in water resources due to climate change (IPCC 2007, p. 8).

While these global and regional projections are the most accurate use of

the available models, we also attempted to obtain more localized predictions. Specifically, we submitted an information request for climate change projections specific to the range of the subspecies to the National Center for Atmospheric Research via their Regional Climate-Change Projections Multi-Model Ensembles program. As of this writing, we have not received a response.

Potential impacts to the Prebles from predicted future climate changes are somewhat uncertain. A trend of warming in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, and reduce summer flows (IPCC 2007, p. 11). 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, p. 1402). The three major river basins that support the Prebles have heightened vulnerability to the effects of climate change due to the degree of human development (particularly in Colorado), natural variability in stream flow, ratio of precipitation lost to evapotranspiration, and groundwater depletion (Hurd *et al.* 1999, p. 1404). Conflicts between human needs for water and maintenance of existing wetland and riparian habitats could be heightened. While fewer cold days and nights could result in increased vegetative yield in colder environments, increased summer heat may increase the frequency and intensity of wildfires, and areas affected by drought may increase (IPCC 2007, p. 13). Overall, it appears reasonable to assume that Prebles will be affected negatively by climate change, and that changes in stream flows and resultant effects on riparian habitats may be a key factor. Adverse impacts seem more likely in those drainages where human demand for water resources is greatest; however, we lack sufficient certainty to predict more specifically how climate change will affect Prebles' populations.

While many uncertainties remain regarding other natural or manmade factors, we believe the best available scientific and commercial data are insufficient to indicate that these factors are a threat to the long-term conservation status of the Prebles. To the extent that meaningful impacts are possible, small and fragmented mouse populations are likely to be more vulnerable.

Conclusion of the 5-Factor Analysis

As required by the Act, we considered the five potential threat factors to assess whether the Prebles is threatened or endangered throughout all or a significant portion of its range. When considering the listing status of a species, the first step in the analysis is to determine whether the species is in danger of extinction throughout all of its range. If this is the case, then we list the species in its entirety. For instance, if the threats to a species are directly acting on only a portion of its range, but they are at such a large scale that they place the entire species in danger of extinction, we would list the entire species.

Destruction and modification of habitat and the resulting curtailment of range is the most significant factor affecting the future conservation status of the subspecies. Within Wyoming, new distributional data and a better understanding of threats has altered our perception of the subspecies' status in this portion of its range. At the time of listing, the Prebles was not known to exist in the North Platte River basin and known from only two sites in Wyoming's portion of the South Platte River basin (63 FR 26517). Since listing, additional distributional data has verified that the subspecies is widespread in the North Platte River basin with demonstrated occupancy in 4 drainages (Glendo Reservoir, Lower Laramie, Horse Creek, and Upper Laramie) and at least 15 rivers or streams (North Platte River, Cottonwood Creek, Cottonwood Creek tributaries, North Laramie River, Sturgeon Creek, Wyman Creek, Rabbit Creek, Luman Creek, Chugwater Creek, Chugwater Creek tributaries, Sybille Creek, Friend Creek, Friend Park area, Bear Creek, Bear Creek tributaries, Horse Creek, and Horse Creek tributaries). Based on habitat availability, apparent historic occupancy (Jones 1981, p. 469), recent untested Zapus captures (some of which may be Prebles), and proximity to the confirmed Prebles in Douglas, Wyoming, we believe the subspecies also may occur along multiple rivers or streams in a fifth North Platte drainage (the Middle North Platte). Trapping efforts to date suggest that the subspecies may remain limited in number and distribution within the Wyoming portion of the South Platte River basin.

While abundance information is limited, the existence of large, connected areas of suitable habitat with confirmed Prebles occurrence records (USFWS 2003b, pp. iv, 29; Beauvais 2004; USFWS 2008) suggests that Wyoming supports one large population (with a June abundance of greater than 2,500 adults) and two medium-sized populations (with a June abundance of more than 500 adults). In the absence of significant threats, these large and medium populations are believed large enough to be self-sustaining. Furthermore, Wyoming's large and medium populations are distributed across three different drainages (including the Chugwater Creek portion of the Lower Laramie drainage, the Horse Creek portion of the Horse drainage, and the Cottonwood Creek portion of the Glendo Reservoir drainage), distributing risk from any one catastrophic or stochastic event.

An improved understanding of the subspecies' distribution, including the subspecies' continued occurrence in grazed portions of Wyoming, suggests that historical agricultural activities, such as grazing and haying, have had a minimal impact on the subspecies to date (as discussed in greater detail in Factor A above). In short, continuation of these long-standing activities appears supportive of existing Prebles' populations. We have no indication these agricultural practices are likely to change in the foreseeable future in ways that would affect the subspecies' long-term conservation status. A low projected human population growth rate is predicted for the four Wyoming counties occupied by the Prebles, suggesting that few development-related threats are likely in this portion of the subspecies' range into the foreseeable future.

Other factors considered included: overutilization, disease, predation, fire, flooding, drought, invasive weeds, weed control programs, pesticides, herbicides, non-point source pollution, secondary impacts associated with human development, scarcity, the potential for competition between the Prebles and the western jumping mouse, and the future effects of climate change. Although questions remain regarding some of these factors, we do not have sufficient information to indicate that any of these factors, individually or cumulatively, are a threat to the subspecies' long-term conservation status in this portion of its range. To the extent that meaningful impacts are possible, these factors are likely to be most significant to small and fragmented populations. In Wyoming, we expect these factors will continue to have only small, localized impacts on the subspecies.

Threats to the Colorado portion of range (discussed in more detail below), indicate that, in the absence of the Act's protections, most of the Colorado Prebles' populations will face a high risk of extirpation within the foreseeable future. While properties in public ownership provide some meaningful protections across portions of Colorado

(particularly in high-elevation and headwater areas), these areas are not adequate to provide for the subspecies' long-term well-being in Colorado in the absence of the Act's protections.

Based on a better understanding of distribution and threats, we find that the available data do not support the conclusion that the Prebles is likely to become endangered in the foreseeable future throughout ''all'' of its range. Overall, in the absence of the Act's protective measures, we believe the subspecies will likely remain secure and well distributed across Wyoming into the foreseeable future. Distributional data has verified that the subspecies is more widespread in the North Platte River basin of Wyoming than previously known, and we are not aware of any threats that are likely to have significant effects on the long-term conservation status of populations of Prebles in this portion of its range. We expect threats to the Wyoming portion of the subspecies' range to be minor with only small and localized effects. We believe North Platte populations are sufficiently large and widely distributed to withstand these impacts. We conclude that the lack of present or threatened impacts to the Prebles in these areas indicates that this subspecies is neither in danger of extinction, nor likely to become endangered within the foreseeable future, throughout all of its range. Thus, the Prebles does not merit continued listing as threatened throughout all of its range.

Having determined that the Prebles does not meet the definition of threatened or endangered in all of its range, we must next consider whether there are any significant portions of the subspecies' range that are in danger of extinction or are likely to become endangered in the foreseeable future. On March 16, 2007, a formal opinion was issued by the Solicitor of the Department of the Interior, ''The Meaning of 'In Danger of Extinction Throughout All or a Significant Portion of Its Range' '' (U.S. Department of the Interior 2007). We have summarized our interpretation of that opinion and the underlying statutory language below. A portion of a species' range is significant if it is part of the current range of the species and is important to the conservation of the species because it contributes meaningfully to the representation, resiliency, or redundancy of the species. The contribution must be at a level such that its loss would result in a decrease in the ability to conserve the species.

The first step in determining whether a species is threatened or endangered in a significant portion of its range is to identify any portions of the range of the species that warrant further consideration. The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be both significant and either threatened or endangered. To identify those portions that warrant further consideration, we determine whether there is substantial information indicating that (1) the portions may be significant, and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the range that are unimportant to the conservation of the species, such portions will not warrant further consideration.

If we identify any portions that warrant further consideration, we then determine whether in fact the species is threatened or endangered in any significant portion of its range. Depending on the biology of the species, its range, and the threats it faces, it may be more efficient for the Service to address the significance question first, or the status question first. Thus, if the Service determines that a portion of the range is not significant, the Service need not determine whether the species is threatened or endangered there; if the Service determines that the species is not threatened or endangered in a portion of its range, the Service need not determine if that portion is significant.

The terms ''resiliency,'' ''redundancy,'' and ''representation'' are intended to be indicators of the conservation value of portions of the range. Resiliency of a species allows the species to recover from periodic disturbances. A species will likely be more resilient if large populations exist in high-quality habitat that is distributed throughout the range of the species in such a way as to capture the environmental variability found within the range of the species. It is likely that the larger size of a population will help contribute to the viability of the species overall. Thus, a portion of the range of a species may make a meaningful contribution to the resiliency of the species if the area is relatively large and contains particularly high-quality habitat or if its location or characteristics make it less susceptible to certain threats than other portions of the range. When evaluating whether or how a portion of the range contributes to resiliency of the species, it may help to evaluate the historical value of the portion and how frequently the portion is used by the species. In addition, the portion may contribute to resiliency for other reasons; for instance, it may contain an important concentration of certain types of habitat that are necessary for the species to carry out its life-history functions, such as breeding, feeding, migration, dispersal, or wintering.

Redundancy of populations may be needed to provide a margin of safety for the species to withstand catastrophic events. This concept does not mean that any portion that provides redundancy is per se a significant portion of the range of a species. The idea is to conserve enough areas of the range such that random perturbations in the system act on only a few populations. Therefore, we must examine each area based on whether that area provides an increment of redundancy that is important to the conservation of the species.

Adequate representation ensures that the subspecies' adaptive capabilities are conserved. Specifically, we should evaluate a portion to see how it contributes to the genetic diversity of the species. The loss of genetically based diversity may substantially reduce the ability of the species to respond and adapt to future environmental changes. A peripheral population may contribute meaningfully to representation if there is evidence that it provides genetic diversity due to its location on the margin of the species' habitat requirements.

Based on the discussion in our 5-factor threats analysis above, we readily identified the Colorado portion of the current range of the Prebles as warranting further consideration to determine if it is a significant portion of the range that is threatened or endangered. Even with the new information confirming the extent of the range in Wyoming, the range in Colorado still constitutes a substantial portion of the current range, and the threats are largely concentrated in that portion.

We considered the question of how to define the portion of the current range that we would consider further. We concluded that it was appropriate to consider all of the current range in Colorado as a single portion of the range for the purpose of this analysis. We have determined that the Wyoming/Colorado State line is an appropriate delineation for separating the populations in the two States because the respective threats to the subspecies appear to be

significantly different in the two States. Furthermore, Prebles' populations in the Upper Lodgepole, Upper Laramie, Crow Creek, and Lone Tree Creek drainages are not known in Colorado, and Prebles' populations in the Cache La Poudre drainage are not known to occur in Wyoming. While our survey data is limited, this suggests use of the State line is unlikely to split any Prebles' populations into federally-protected and unprotected segments.

While we also considered splitting the subspecies into significant portions of the range based on river basins (i.e., only removing protections in the drainages of the North Platte River basin), it is unlikely the split between the North Platte and South Platte River basins are an appreciably more meaningful biological divide. The available information suggests that: Prebles populations are known from the headwater portions of both the Upper Lodgepole drainage within the South Platte River basin and the Horse Creek drainage within the North Platte River basin; suitable habitat from these drainages come within a few hundred meters of each other; and the habitat in this area, while not ideal for traversing, lacks an obvious physical barrier. This apparent proximity and lack of barriers suggest occasional crossing may occur. This contrasts with the areas on either side of the State line where apparently unoccupied and unsuitable habitat predominates. Furthermore, we believe using basins to divide the significant portion of range would be more difficult to administer. Thus, given that there does not appear to be any additional biological benefit to the subspecies and our assertion that the respective threats to the Prebles appear to be significantly different in the two States, we have determined that the State line represents the appropriate northern boundary for the Colorado significant portion of range.

Within Colorado, threats to the Prebles are comparable between the South Platte River basin and Arkansas River basin. Similarly, threats to the Prebles are comparable north and south of Denver. Because both of these possible partitions have a comparable status, further division of the subspecies' range between these two portions of its range in Colorado is, at present, unnecessary.

Another possibility we considered was whether smaller units might be appropriate. For example, we considered each individual drainage or each individual county. Given the best scientific and commercial information available, we concluded that such subdivisions would not result in units that would each meaningfully contribute to the representation, resiliency, or redundancy of the subspecies at a level such that its loss would result in a decrease in the ability to conserve the subspecies. In our view, only when drainages or counties are aggregated are they significant per the above definition. The most logical aggregation of drainages is basins, which are already considered above. The most logical aggregation of counties within Colorado is a north and south of Denver split, which also is already considered above. Therefore, further division of the subspecies' range within Colorado is either not appropriate or unnecessary.

To determine whether the Prebles is threatened in any significant portion of its range, we first consider how the concepts of resiliency, representation, and redundancy apply to the conservation of this particular subspecies. The Colorado portion of the range meaningfully affects resiliency in that it encompasses a high percentage of the entire range's large blocks of high quality habitat, and contributes to the species' long-term viability by allowing it to recover from disturbance and respond resiliently to environmental change. Similarly, presumed sizable populations within this portion of range are sufficiently robust to make a high contribution to the ability of the subspecies to recover from periodic disturbance. The Preliminary Draft Recovery Plan accounts for resiliency by calling for the long-term protection of a number of large and medium populations. The Recovery Team estimated that large and medium populations would require a network of 72 to 126 km (45 to 78 mi) and 14 to 26 km (9 to 16 mi), respectively, of connected streams (mainstem plus tributaries) whose hydrology supports riparian vegetation and provides Prebles' habitat (USFWS 2003b, p. 25). The Colorado portion of the range meaningfully affects resiliency in that it includes three of the four large populations and three of the five medium populations called for in the Preliminary Draft Recovery Plan (USFWS 2003b, p. 22). These recommendations may have slightly overestimated Colorado's contribution to resiliency as the Preliminary Draft Recovery Plan assumed no occupancy in the Upper Laramie drainage (which appears to be occupied and may support sizable populations) and the Middle North Platte-Casper (which may be occupied, although current occupancy has not been confirmed). Even if one assumes additional sizable populations in these Wyoming drainages, the Colorado portion of the subspecies' range offers a high level of contribution to the subspecies' resiliency.

The Colorado portion of the range meaningfully affects redundancy in that it appears to make: a high level of contribution to the total range of the subspecies; a high level of contribution to the total population of the subspecies; a medium to high level of contribution to the total suitable habitat; and a high level of contribution to the geographic distribution of the subspecies. Specifically, the Colorado portion of range includes all or substantial portions of 13 of the 19 drainages comprising the current range of the Prebles (9 of which have confirmed occupancy in Colorado). Furthermore, this portion of range includes 2 of the 3 river basins within the subspecies' range (all of the Arkansas River basin and the vast majority of the South Platte River basin) amounting to approximately half of the subspecies' potential suitable habitat. While Colorado totaled about 65 percent of the proposed critical habitat by river-mile and total acreage (67 FR 47154, July 17, 2002), this estimate may have overestimated Colorado's share of suitable habitat as recent data suggests a more widespread distribution across the North Platte River basin in Wyoming. Still, Colorado populations of Prebles are a major contributor to the total population of the subspecies and loss of the subspecies across this portion of the range would result in a substantial gap in the range of the subspecies. Collectively, this confirms that the Colorado portion of the subspecies' range offers a high level of contribution to the subspecies' redundancy.

Finally, the Colorado portion of the range meaningfully affects representation in that it makes a high level of contribution to the genetic diversity of the subspecies. The available data demonstrate that Colorado populations demonstrate genetic material substantially unique with significant differences among populations north and south of Denver. Specifically, 3 of the 4 known mtDNA control region haplotypes are limited to Colorado populations with 2 of the 4 known mtDNA control region haplotypes only occurring south of Denver (King *et al.* 2006b, p. 4358). Within the mtDNA cytochrome b region, 17 of 21 haplotypes are limited to Colorado populations, with 9 of the 21 haplotypes only occurring south of Denver (King *et al.* 2006b, p. 4359). Microsatellite DNA data also demonstrates significant divergence

within the subspecies north and south of Denver. Again, the above estimates may slightly overestimate Colorado's share of the subspecies' genetic diversity and divergence as King *et al.* (2006b, p. 4333) only analyzed 28 Wyoming specimens. Still, this confirms that the Colorado portion of the subspecies' range offers a high level of contribution to the subspecies' representation.

We conclude that the loss of the Prebles within Colorado would result in a decrease in the ability to conserve the subspecies. We have determined that, based on its importance to the conservation of the subspecies and because it contributes meaningfully to Prebles' representation, resiliency, or redundancy, the Colorado portion of the range constitutes a significant portion of the subspecies' range as described in the Act.

If we identify any portions as significant, we then determine whether in fact the species is threatened or endangered in this significant portion of its range. Within Colorado, riparian habitat has been severely modified or destroyed by human activities. With current and projected human population increases and commensurate increases in urban and rural development, road construction, and water use, the ongoing loss and modification of riparian habitat will continue in much of the Prebles' Colorado range. Even with the protections of the Act, development in Colorado has continued to affect Prebles' habitat, both directly and indirectly. The best currently available information suggests that at least half of the Prebles' current range in Colorado is on private land with potential for future development. In the absence of the Act's protections, most of this habitat could be lost or degraded within the foreseeable future. While appreciable lands in Colorado supporting the Prebles are controlled by Federal or State agencies, or have been set aside as open space by local governments, many of these areas also are likely to experience some habitat degradation in the absence of the Act's protections. Some of these areas will experience negative indirect effects from upstream development. Where conservation properties are not extensive, the Prebles' populations are likely to become small, fragmented, and unsustainable. Additional recovery efforts are required to establish and protect extensive contiguous conservation properties in Colorado.

Besides ''present or threatened destruction, modification, or curtailment of its habitat or range,'' a variety of other factors were considered including: overutilization, disease, predation, fire, flooding, drought, invasive weeds, weed control programs, pesticides, herbicides, non-point source pollution, secondary impacts associated with human development, scarcity, the potential for competition between the Prebles and the western jumping mouse, and the future effects of climate change. In general, we do not have conclusive information to indicate that these factors are, individually, a threat to the subspecies' long-term conservation status. To the extent that meaningful impacts are possible, these factors are likely to be most significant to smaller and more fragmented populations. Thus, we expect these issues could be meaningful as cumulative impacts in the Colorado portion of subspecies' range where development pressures are likely to substantially reduce and fragment populations.

Our improved understanding of the subspecies' range in Colorado does not change our conclusion as to the Prebles' status in this portion of the subspecies' range. As noted above, new data have expanded the confirmed distribution of the Prebles to include additional sites in Boulder, Douglas, El Paso, Jefferson, and Larimer counties. Most of the newly discovered sites are subject to the same level of threats discussed above. Thus, recently documented sites in Colorado do not meaningfully alter the future conservation status of the subspecies in this portion of its range.

Determining whether a significant portion of range is threatened or endangered requires a consideration of the magnitude and immediacy of threats. Growth patterns suggest continuous development radiating out from urban/suburban centers across nearly all non-protected portions of the subspecies' range within the foreseeable future. Prebles' populations closest to these urban/suburban centers will be subject to high-magnitude, imminent threats that would, in the absence of the Act's protections, extirpate populations in the near future. At present, none of Colorado's presumed large or medium populations currently face such high magnitude, imminent threats. This suggests this significant portion of range is not in danger of extinction (i.e., not currently endangered).

Prebles' populations further from these urban/suburban centers face gradually escalating threats over the foreseeable future as development's footprint expands into important suitable and occupied Prebles habitat. In the absence of the Act's protections, within the foreseeable future, most Prebles' populations will be faced with a high risk of extirpation. The available information suggests that the Cache La Poudre system may be the only drainage approaching sufficient quantity and quality of protected habitat to provide for the subspecies' long-term conservation needs. Thus, based on the best scientific and commercial information available, we find that, in the absence of the Act's protections, the Prebles is likely to become endangered within the foreseeable future throughout the Colorado portion of its range (i.e., currently threatened). That said, we believe, with continued protection and additional strategic recovery efforts, recovery will eventually be achieved in the Colorado portion of the subspecies' range.

In conclusion, the best scientific and commercial data suggest that the Prebles is not likely to become endangered in the foreseeable future throughout all of its range. We base this conclusion primarily on a lack of present or threatened impacts to the Prebles or its habitat in Wyoming. However, based on the magnitude of development threats and other pressures to the populations throughout the Colorado portion of the range, and the lack of effective regulatory mechanisms in the absence of the Act's protective measures, we conclude that the significant portion of the subspecies' range within Colorado continues to meet the definition of threatened under the Act, and should remain listed. Therefore, we are amending the listing for the Prebles to specify that the subspecies is threatened in only the Colorado portion of its range.

Determining the Boundary of the Significant Portion of the Range

In determining the boundaries of the significant portion of its range where the subspecies is threatened, we may consider factors such as whether there is a biological basis (e.g., population groupings, genetic differences, or differences in ecological setting) or differences in threats due to regulatory basis (e.g., international or State boundaries where the threats might be different on either side of the boundary) for dividing the range into finer portions and whether extinction risk is spread evenly across the range of the subspecies. Significant portion of range boundaries may consist of geographical features, constructed features (e.g., roads), or administrative boundaries at any scale when biological factors are the basis for defining the significant portion of range.

If we determine a subspecies is threatened in a specified significant portion of range, the boundaries used to

legally define the extent of a significant portion of range are identified. We used here the following principles to determine the boundaries:

(1) Boundaries enclose and define the area where threats are sufficient to result in a determination that a portion of a subspecies' range is significant, and is endangered or threatened.

(2) Boundaries clearly define the portion of the range that is specified as threatened or endangered, and may consist of geographical or administrative features or a combination of both.

(3) Boundaries do not circumscribe the current distribution of the subspecies so tightly that opportunities for recovery are foreclosed.

The scale of the boundaries is determined case-by-case to be appropriate to the size of the portion of the subspecies' range, and the availability of unambiguous geographic or administrative boundaries. As previously stated the range of the subspecies is the general area in which the subspecies can be found, including migratory corridors, seasonal habitats, and habitats used on a regular, though not necessarily seasonal, basis.

The scale at which one defines the range of a particular species is fact and context dependant. In other words, whether one defines the range at a relatively coarse or fine scale depends on the life history of the species at issue, the data available, and the purpose for which one is considering range.

The Prebles is secretive, almost never observed without trapping, and relatively rare even where present. Confirmed occupancy is based almost entirely on intensive trapping efforts, requiring hundreds of trap nights. Prebles are able to move miles along stream corridors over their lifetime (Schorr 2003), typically utilizing riparian (river) corridors. Although the subspecies commonly uses riparian vegetation immediately adjacent to a stream, other features that provide habitat for the subspecies include seasonal streams (Bakeman 1997), low moist areas and dry gulches (Shenk 2004), agricultural ditches (Meaney *et al.* 2003), and wet meadows and seeps near streams (Ryon 1996). Given records of confirmed presence and patterns of existing riparian habitat, we can draw inferences as to what we would consider occupied drainages or portions of these drainages.

To date, aside from some earlier work from the CDOW and the Colorado Natural Heritage Program, the objective of most trapping surveys has not been to document the limits of occupied habitat in Colorado. While much of the Prebles' distribution is on private lands, most trapping surveys on private lands have been conducted by consultants, based on anticipated development of the property by landowners. This has resulted in far more trapping on private lands within the expanding development corridor than on private lands in rural lands where no development is planned. Therefore, we have less assurance of current presence or potential absence of the Prebles in areas further removed from the Front Range development corridor.

Trapping can only confirm presence, not prove absence. At some sites, researchers have seen dramatic changes in estimated populations from season-to-season and year-to-year (Meaney *et al.* 2002, p. 122; Bakeman 2006, p. 4). A single trapping effort in any presumed occupied site could be unsuccessful if it corresponded to times when few or no mice are likely to be present. Prebles may move in and out of areas (individuals have been shown to move miles along stream corridors over their lifetime). In areas within the range of the subspecies, multiple trap efforts in a drainage or portions of a drainage are needed to provide strong evidence that Prebles are likely absent. Again, in many areas outside the Front Range development corridor trapping has been more limited; in some areas where presence has not been confirmed by trapping we do not believe trapping data is determinative of the Prebles' absence at particular sites, much less whole drainages or portions thereof.

As with other determinations under the Act, we do not define the current range on the basis of conclusive evidence; rather, we use the best available data. The purpose of defining range (and hence the significant portion of the range) is to set the boundaries of the protections of the Act. Therefore, defining the boundaries too narrowly may lead to the failure to protect some Prebles. On the other hand, drawing the boundaries relatively expansively will not lead to unnecessary expense on the part of the Service or the public because, as described in detail below, existing guidance on block clearance zones will remain in place. Therefore, in the context of describing the current range for the purpose of defining the scope of the listing for the Prebles, we have determined that it is appropriate to use a relatively coarse scale to capture all of the areas where the best available data, presented below, suggests the Prebles is likely to occur. As noted above, boundaries are not to circumscribe the current distribution of the subspecies so tightly that opportunities for recovery are foreclosed.

The Preliminary Draft Recovery Plan suggests maintaining at least one recovery population within each drainage (to provide resiliency, representation, and redundancy) within the existing range of the subspecies. The Preliminary Draft Recovery Plan, which represents the best available science, identifies thirteen drainages in Colorado that comprise the area significant to the conservation of the subspecies including Big Sandy, Big Thompson, Bijou, Cache La Poudre, Chico, Clear Creek, Crow Creek, Fountain Creek, Kiowa, Lone Tree-Owl, Middle South Platte-Cherry Creek, Saint Vrain, and Upper South Platte (as illustrated in Figure 3). Based on the assessments of habitat by the Recovery Team, the Preliminary Draft Recovery Plan includes these drainages as representing the current range of the subspecies on the presumption that suitable habitat and at least a small population occurs in each. An intent of the Preliminary Draft Recovery Plan is to preserve populations throughout the existing range to maximize the preservation of the remaining genetic diversity that may be present. While we recognize that information is currently lacking to confirm the presence of existing Prebles' populations in some of these drainages, we believe that, based on the availability of suitable habitat (Pague and Granau 2000, pp. 2–3, 5–3, 7–3), portions of these drainages may be occupied.

For convenience in distinguishing this boundary on-the-ground we employ latitude and longitude coordinates. We have concluded that the latitude and longitude boundaries below provide an appropriate delineation for the significant portion of the Prebles' range in Colorado. These boundaries are inclusive of all areas likely to support Prebles' populations in Colorado. As a result, all records confirming Prebles' occurrence in Colorado are captured within these boundaries. We think that it is highly unlikely that there will be discovery of currently existing Prebles' populations outside these boundaries in Colorado. Therefore, we conclude that removing protections outside these boundaries in Colorado would be of little biological consequence. Thus, based on best available data, we have identified the portion of Colorado west of 103 degrees 40 minutes West, north of 38 degrees 30 minutes North, and east of 105 degrees 50 minutes West as the significant portion of the range of the subspecies (illustrated in Figure 3).

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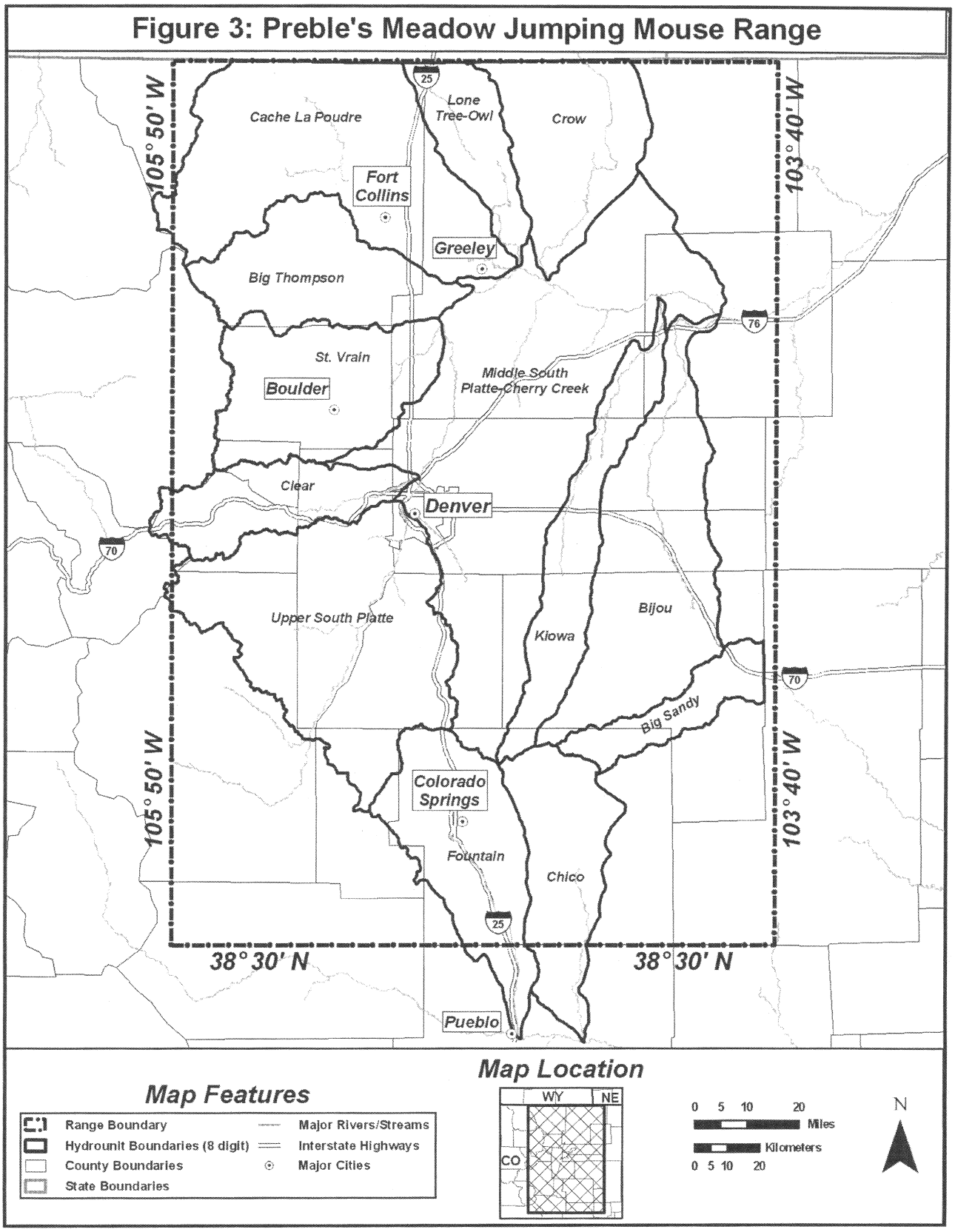

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Eastern Boundary (103 Degrees, 40 Minutes West)

This boundary is inclusive of all areas within the current Prebles' survey guidelines (east to a north-south line through Fort Morgan, Morgan County) (USFWS 2004), and also includes the eastern (downstream) extent of the Big Sandy drainage (designated in the Preliminary Draft Recovery Plan).

Southern Boundary (38 Degrees, 30 Minutes North)

This boundary is inclusive of all areas within the current survey guidelines (south including all of El Paso County) and also includes the majority of the Fountain Creek and Chico Creek drainages (designated in the Preliminary Draft Recovery Plan). Habitat in the southern portion of El Paso County is limited. The small portions of the Fountain and Chico drainages that fall outside the boundary are outside of the current survey guidelines and believed not to support the Prebles.

Western Boundary (105 Degrees 50 Minutes West)

This boundary is inclusive of elevations up to and beyond 2,316 m (7,600 ft) in the Cache La Poudre River, Clear Creek and Upper South Platte drainages and all portions of the Big Thompson and St. Vrain drainages. As such, it includes all high-elevation areas where we believe that the Prebles is likely to occur.

Administrative Processes

As part of our management of the subspecies on-the-ground within this significant portion of range area, the Service will continue to use block clearance zones to eliminate unnecessary processes (e.g., compliance with section 7 of the Act) while protecting the listed entity. In designating a block clearance zone, the Service eliminates the need for individuals or agencies to coordinate with the Service prior to conducting activities at locations within the Prebles' range when the area affected by the action is wholly contained within the designated block clearance zone. The establishment of these block clearance zones is based on the likely absence of the subspecies within the area, and little likelihood that any of the area would be of importance to the recovery of the subspecies. Block clearance zones have been approved for the Denver metropolitan area (including most of Denver County and portions of Adams, Arapahoe, Boulder, Broomfield, Douglas, and Jefferson counties) and along Monument, Cottonwood, and Sand creeks in the Colorado Springs area. While this substantially reduces the regulatory burden, should an individual Prebles be found in a block-cleared area, it would be fully protected under the Act. In addition, outside of the block clearance zone, but within the significant portion of range, we would continue to identify, on a project-by-project basis, whether surveys for the Prebles are needed based on whether suitable habitat is present within the action area of the project and results of recent trapping surveys nearby.

We considered excluding block clearance zones from the listing as outside the current range of the subspecies, but we have concluded that approach would be impractical and ill-advised. For example, Prebles' block clearance zones expand on a near annual basis. If a revision to the Code of Federal Regulations was required to achieve this revision, the process would require annual proposed and final rules. This approach would be both unwieldy from a workload perspective and result in an unnecessary delay in reducing our regulatory oversight as this process typically takes a year to complete. Furthermore, the listing backlog (i.e., a shortfall of funds that preclude the listing of species that are warranted-but-precluded from threatened or endangered status and the designation of critical habitat) would preclude relisting areas even if future information suggests the area was removed prematurely (unless emergency listing was deemed appropriate). This double standard as well as the difficult and time-consuming nature of the process suggests this approach is not realistic, not desirable, and inappropriate. As we have in the past, the Service will consider modification of the current block-clearance zones, or the addition of new zones, when the available data demonstrate such an action is appropriate.

Effects of the Rule

This action amends the listing for the Prebles by specifying that the subspecies is threatened in the Colorado portion of its range. The prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, no longer apply to this subspecies in Wyoming. Federal agencies are no longer required to consult with us to ensure that any action they authorize, fund, or carry out in Wyoming would not likely jeopardize the continued existence of the subspecies or result in destruction of or adversely modify critical habitat in Wyoming. However, to the extent an activity in Wyoming would adversely affect the subspecies or critical habitat within its range listed in Colorado, consultation under section 7 would still be required. The take exemptions of the 4(d) special rule are no longer necessary and, therefore, no longer apply in Wyoming (May 22, 2001, 66 FR 28125; October 1, 2002, 67 FR 61531; May 20, 2004, 69 FR 29101). This action eliminates critical habitat (June 23, 2003, 68 FR 37275) in Wyoming.

Paperwork Reduction Act

This rule does not contain any new collections of information that require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

The Service has determined that Environmental Assessments and Environmental Impact Statements, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Act. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

References

A complete list of all references cited herein is available upon request from the Colorado Field Office (see **ADDRESSES**).

Author

The primary authors of this document are staff located at the Colorado Field Office (see **ADDRESSES**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and record keeping requirements, Transportation.

Regulation Promulgation

■ Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below.

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

■ 2. Amend § 17.11(h) by revising the entry for ''Mouse, Preble's meadow jumping'' under ''MAMMALS'' in the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
MAMMALS							
*	*	*	*	*	*		*
Mouse, Preble's meadow jumping.	*Zapus hudsonius preblei.*	U.S.A. (CO, WY) ...	U.S.A., north-central CO (that portion of Colorado west of 103 degrees 40 minutes West, north of 38 degrees 30 minutes North, and east of 105 degrees 50 minutes West).	T	636	17.95(a)	17.40(l)
*	*	*	*	*	*		*

■ 3. Amend § 17.40(l) as follows:

■ a. By revising paragraph (l)(2)(vi)(E) to read as set forth below; and

■ b. By revising paragraph (l)(4) to read as set forth below.

§ 17.40 Special rules—mammals.

* * * * *

(l) * * *

(2) * * *

(vi) * * *

(E) Any future revisions to the authorities listed in paragraphs (l)(2)(vi)(A) through (D) of this section that apply to the herbicides proposed for use within the species' range as specified in the fourth column of the table in § 17.11(h).

* * * * *

(4) *Where does this rule apply*? The take exemptions provided by this rule are applicable within the significant portion of the range of the Preble's meadow jumping mouse as specified in the fourth column of the table in § 17.11(h).

* * * * *

§ 17.95 [Amended]

■ 4. In § 17.95(a), amend the entry for ''Preble's Meadow Jumping Mouse (*Zapus hudsonius preblei*)'' by removing paragraphs (4) through (7), and by redesignating paragraphs (8) through (13) as (4) through (9), respectively.

Dated: June 26, 2008.

H. Dale Hall,

Director, U.S. Fish and Wildlife Service.

[FR Doc. E8–15141 Filed 7–9–08; 8:45 am]

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