Petition to
Remove Preble's Meadow Jumping Mouse
(*Zapus hudsonius preblei*)
from the List of Endangered and Threatened Wildlife

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1.0 Introduction and Summary of Petition

Pursuant to 50 CFR § 424.14 and § 4(b)(3) of the Endangered Species Act (16 U.S.C. §1533(b)(3)), the Coloradans for Water Conservation and Development (CWCD) petitions the Secretary of the Interior (Secretary) to remove (delist) Preble's meadow jumping mouse (*Zapus hudsonius preblei*) from the List of Endangered and Threatened Wildlife based on data error and taxonomic revision.[1] *Z. h. preblei* was listed as threatened on May 13, 1998 (63 FR 26517). The State of Wyoming and others have long insisted that the administrative record developed by the U.S. Fish and Wildlife Service (Service) to justify the initial listing of *Z. h. preblei* is indefensible. The final listing rule (63 FR 26517) ignored concerns raised by the State and others that *Z. h. preblei* may not be a valid subspecies and that too little survey work had been completed to allow even an educated guess about its distribution and abundance, much less current or projected population trends. Nor did the final rule demonstrate that *Z. h. preblei* was threatened at the time of the listing or show how it would (or could) become threatened in the foreseeable future. Rather, the final rule contained vague, unquantifiable descriptions of non-specific effects without demonstrating that such effects rise to the level of significance required for listing. Current best available scientific information clearly demonstrates that concerns raised by the State and others were justified and that listing *Z. h. preblei* should never have occurred.

The Endangered Species Act (Act) and Service regulations implementing the Act specifically address delisting. The Secretary, upon receiving a substantive[2] petition for any change in listing status, must conduct a review of the species' status. This petition provides substantive scientific information, which The CWCD contends represents the current best available scientific information, that demonstrates delisting *Z. h. preblei* is warranted and the CWCD requests the Secretary proceed without delay in making the positive 90-day finding required by 50 CFR § 424.14(b)(1) and immediately initiate an updated and accurate status review compliant with the time frame outlined in 50 CFR § 424.14(b)(3).

[1] 50 CFR § 424.11(d) provides three reasons for delisting a species. 50 CFR § 424.11(d)(3) allows a species to be delisted if the original data used to classify a species as threatened or endangered is in error. The regulation describes data error as "subsequent investigations may show that the best scientific or commercial data available when the species was listed, or the interpretation of such data, were in error." In addition, the Service has, on a number of occasions, utilized new information and taxonomic revision to delist which is also relevant to *Z. h. preblei* (http://endangered.fws.gov/wildlife.html).

[2] Substantive information is "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted" (50 CFR § 424.14 (b)(1)).

The CWCD requests that delisting proceed expeditiously for the same reasons the Service has cited when removing other species from the List of Endangered and Threatened Wildlife – delay in delisting will cost government agencies staff time on conducting Section 7 consultation on actions that may affect a species not in need of protection under the Act. Delisting will relieve existing restrictions and allow Federal agencies to minimize any further delays in project planning and implementation for actions that may affect *Z. h. preblei*.[3]

Current best available scientific information supports three conclusions that have direct bearing on the status of *Z. h. preblei* as a threatened species. First, contrary to Krutzsch (1954) who initially proposed *Z. h. preblei* as a subspecies based on morphological examination of a meager 11 specimens (only four of which were adults), current best available scientific information indicates that *Z. h. preblei* is not a valid subspecies. Recent phylogenetic analysis (Ramey and Liu, 2003) demonstrates that *Z. h. preblei* is not different from the Bear Lodge meadow jumping mouse (*Z. h. campestris*) which is not listed as threatened, endangered or a candidate species. Further, the administrative record used by the Service to justify the listing contains genetic (Riggs *et al*., 1997) and morphometric (Jones, 1981) analysis completed prior to the listing that suggested there may be no difference between *Z. h. preblei* and *Z. h. campestris*. Second, best available scientific information predicts connectivity (along corridors of suitable habitat) between areas that have been historically considered the ranges of *Z. h. campestris* in northeastern Wyoming and *Z. h. preblei.* Although not extensively surveyed, specimens from the area indicate that the area between the two ranges is occupied by *Z. h. campestris* which cannot be genetically differentiated from *Z. h. preblei*. Consequently, it would be erroneous to conclude that *Z. hudsonius* considered by the Service to be Preble's is a distinct population segment (pursuant to the discreteness element in the Service's distinct population segment recognition policy - 61 FR 4722) of *Z. h. campestris* (i.e., geospatially isolated from *Z. h. campestris*) and, therefore, eligible for listing pursuant to the Act. Third, this petition demonstrates that even if *Z. hudsonius* considered by the Service to be Preble's were a valid subspecies or a distinct population segment of *Z. h. campestris*, current best available scientific information demonstrates that it does not meet the criteria established in 50 CFR § 424.11(c) for listing as threatened (the third element considered in the Service's distinct population segment recognition policy). Post-listing information demonstrates that *Z. hudsonius* considered by the Service to be Preble's are much more common and widely distributed along

[3] These are the reasons provided by the Service for making the 2000 delisting of the Dismal Swamp southeastern shrew immediately effective (65 FR 10420).

Wyoming and the Colorado Front Range than originally believed and that threats to these mice are not as egregious or ubiquitous as suggested by the Service in the final listing rule.

Well before *Z. h. preblei* was listed as a threatened species, questions were raised regarding the taxonomic validity of the subspecies. Many have questioned whether Krutzsch (1954) should have proposed *Z. h. preblei* as a valid subspecies based on examination of only four adult specimens and at least one researcher took exception to Krutzsch's apparent "splitting" after examining a number of additional specimens (Jones, 1981). But, given the mouse's relative obscurity and lack of economic importance, the question remained essentially academic until it was suggested that the species be placed on the List of Endangered and Threatened Wildlife in the early 1990s.

During preparation of the Service's initial status review of the species in 1992, the administrative record shows that taxonomic validity was debated and that the Service concluded that additional phylogenetic analysis was necessary before proceeding with the status review. Unfortunately, no such analysis occurred and the Service completed the status review without a "hard look" at taxonomic validity. In 1997, a year before the final listing rule, mitochondrial DNA analysis conducted by Biosphere Genetics Inc. indicated that *Z. h. preblei* could not be differentiated from *Z. h. campestris* (Riggs *et al*., 1997). The 1997 analysis was recently validated by a more thorough evaluation completed by the Denver Museum of Nature & Science which concluded that *Z. h. preblei* is not different from *Z. h. campestris* (Ramey and Liu, 2003).

This petition addresses the Service's policy of recognition of distinct population segments. Even though *Z. hudsonius* considered by the Service to be Preble's is actually *Z. h. campestris*, the Act does allow the listing of a distinct vertebrate population segment even though the species may not be eligible for listing across its entire range. To date, several distinct population segments have been listed or proposed for listing as threatened or endangered. The CWCD is concerned that there are some who might try to argue that jumping mice previously believed to be *Z. h. preblei* should remain listed as a distinct population segment of *Z. h. campestris* and that the Service might be inclined to support such an argument despite clear Congressional instructions to list distinct population segments only "sparingly".[4] In response to such an argument and any Service reluctance to proceed with delisting, this petition demonstrates, using best available scientific information, that *Z. hudsonius* considered by the Service to be Preble's cannot be listed as a distinct population segment of *Z. h. campestris*

[4] Senate Report 151, 96th Congress, 1st Session.

because it fails to meet two of the elements outlined in the Service's recognition policy (61 FR 4722): 1) discreteness; and 2) its conservation status does not meet the criteria for listing as threatened pursuant to the Act.

The portion of the definition of discreteness that applies to *Z. hudsonius* considered by the Service to be Preble's requires a population segment to be markedly separated from other populations as a consequence of physical, physiological, ecological or behavioral factors. Although Krutzsch (1954) initially suggested that *Z. h. preblei* was geographically isolated from *Z. h. campestris*, habitat suitability modeling conducted by the Wyoming Natural Diversity Database failed to identify what Krutzsch considered an unsuitable habitat void between the historic ranges of *Z. h. preblei* and *Z. h. campestris*. In addition, 2003 phylogenetic work by the Denver Museum of Nature & Science as well as genetic analysis completed in 1997 by Biosphere Genetics Inc. identified specimens of *Z. h. campestris* from suitable habitat between the historic ranges where *Z. hudsonius* were not supposed to occur, at least according to Krutzsch.

Even if one completely ignored the best available scientific information and argued that *Z. h. campestris* along the Colorado and Wyoming Front Range is discrete from *Z. h. campestris* in northeastern Wyoming, its conservation status still does not meet the criteria for listing as threatened pursuant to the Act. Current understanding of the distribution and abundance of extant populations of *Z. hudsonius* considered by the Service to be Preble's, based on only six years of post-listing surveys, is in stark contrast to assumptions made by the Service at the time it was listed. Post-listing surveys for *Z. hudsonius* considered by the Service to be Preble's have shown it to be much more widespread and ubiquitous than anyone suspected. And, as this petition demonstrates, it is nearly certain that even more populations will be discovered in the future in both Colorado and Wyoming.

Z. hudsonius considered by the Service to be Preble's are now known to occur well beyond the range initially described by Krutzsch (1954) and others. The eastern and western limits of its range are still not well defined but significantly extend beyond the limits assumed by the Service in the final listing rule. Recent captures on the Laramie Plains in the Upper Laramie Hydrologic Unit indicate that *Z. hudsonius* considered by the Service to be Preble's occurs much further west in Wyoming than historic accounts of *Z. h. preblei* assumed. According to Gary Beauvais, Director of the Wyoming Natural Diversity Database, *Z. h. preblei* (now known to be *Z. h. campestris*) appear to be common in the Upper Laramie Hydrologic Unit. The

eastern extent of the range was recently extended with post-listing captures in the Kiowa Hydrologic Unit in Colorado and its 2003 rediscovery near Greeley, where the Service suggested in the final listing rule the mouse had been extirpated.

One of the primary factors the Service cited in its decision to list *Z. h. preblei* was its apparent disappearance from a number of historically occupied sites. The CWCD contends, based on the current understanding of the distribution and abundance of *Z. hudsonius* considered by the Service to be Preble's across eastern Wyoming and Colorado (and because only a portion of potentially suitable habitat has been surveyed), that the loss of jumping mice at some historically occupied sites has had no demonstrable adverse impact to its viability and certainly doesn't point toward a reasonable conclusion that the species is moving toward extinction. Historic sites no longer thought to be occupied represent less than 10 percent of the currently known occupied sites. More importantly, however, the Service has not demonstrated that the loss of a few historically occupied sites has had an adverse impact on persistence and cannot do so except by extrapolating similar effects elsewhere which would contradict post-listing distribution, abundance and trend information. The Service has not, nor can it, demonstrate that the loss of *Z. hudsonius* considered by the Service to be Preble's from a few historic sites or the future loss of additional populations in the vicinity of urban development along the Colorado Front Range has or will sufficiently increase the risk of extinction for the species as a whole given the fact that the majority of the currently known occupied sites occur in remote areas, generally well removed from the effects described in the final listing rule. In addition, because *Z. hudsonius* considered by the Service to be Preble's occurs over a relatively large area, it should be protected from stochastic perturbations which can adversely affect species with limited ranges.

For this petition, The CWCD has assembled the best scientific and commercial data available for *Z. hudsonius* considered by the Service to be Preble's and have adequately documented, based on a careful review of those data, that the assumptions regarding taxonomy, distribution, abundance and trends and factors affecting the species, used by the Service to justify listing *Z. h. preblei*, are not valid. *Z. hudsonius* considered by the Service to be Preble's are now known to be widespread and ubiquitous and face no identifiable risk of becoming endangered in the foreseeable future over all or a significant portion of its range. That conclusion is based on the following primary findings:

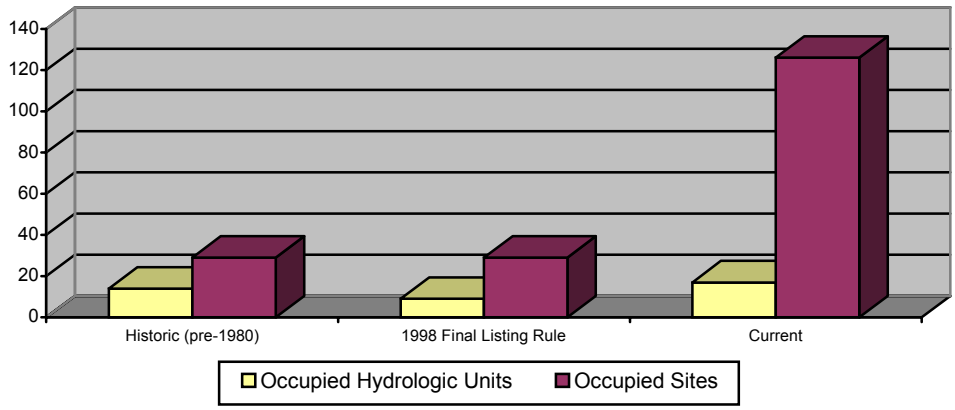
- *Z. hudsonius* considered by the Service to be Preble's were historically[5] found in 14 hydrologic units[6] in Colorado and Wyoming (see Figure 1-1). In the 1998 final listing rule, the Service could locate these jumping mice in only nine hydrologic units. Since the listing, *Z. hudsonius* considered by the Service to be Preble's have been captured in 17 hydrologic units including all historically occupied hydrologic units, three hydrologic units where they were historically unknown and eight that were not known to be occupied at the time of the listing;
- Historically, *Z. hudsonius* considered by the Service to be Preble's were known from 29 sites[7] in Colorado and Wyoming. At the time of the 1998 final listing rule, they were also known to occur at 29 sites but, according to the Service, had disappeared from a number of counties and sites that had been occupied historically, which led to Service speculation of dramatic population declines and extirpations. Currently, *Z. hudsonius* considered by the Service to be Preble's are known from 126 sites throughout its historic range and beyond which represents about a 400 percent increase over the number of sites known historically and at the time of the listing (see Figure 1-1);
- A significant amount of potential habitat has not been surveyed and recent captures indicate that the current range of *Z. hudsonius* considered by the Service to be Preble's is only partially known and is much more extensive than suggested by Krutzsch (1954) and assumed by the Service in the final listing rule. Based on recent trapping records and habitat suitability modeling, extensive areas north, east and west of the currently known range are nearly certain to contain additional occupied sites. The potential for additional populations of *Z. hudsonius* considered by the Service to be Preble's has been discussed by a number of authors including Pague and Grunau (2000) for Colorado and Beauvais (2001 and 2003) for Wyoming and has been demonstrated by recent captures in the Upper Laramie Hydrologic Unit in Wyoming and the Kiowa Hydrologic Unit in Colorado;
- In the Service's listing factor evaluation (63 FR 26517), the majority of the presumed threats to *Z. hudsonius* considered by the Service to be Preble's used to justify the 1998 listing were vague, unsupported or very general in nature. However, none of the effects rise to the level of a threat justified by the specificity of the Act's threatened definition (50 CFR § 424.02(m)). Where presumed site-specific threats were identified in the 1998 final listing rule, they were applicable to only a few urban populations and were not pertinent to a significant portion of the species' range. The presumed threats discussed in the final listing rule do not demonstrate that *Z. hudsonius* considered by the Service to be Preble's is now or would become threatened over all or a significant portion of its range in the foreseeable future; and

[5] All records prior to 1980 are considered historic records.

[6] This petition analyzes distribution of *Z. hudsonius* considered by the Service to be Preble's based on eight digit hydrologic units which the Service is similarly using as the basis for recovering the species (U.S. Fish and Wildlife Service, 2002b). The hydrologic units discussed in this petition are identical to those identified in the Service's working draft Preble's recovery plan and rule designating critical habitat (68 FR 37276). The CWCD agrees with the Service that using hydrologic units to evaluate distribution is most appropriate and more biologically meaningful than geopolitical-based (i.e., county) analysis.

[7] For purposes of this petition, occupied sites were determined using the method developed by the Colorado Division of Wildlife, Natural Diversity Information Source. An occupied site is defined as an area where the species is known to occur. Individual sites were identified by combining known occurrence with mapped riparian vegetation and applying a one mile buffer up and downstream including main and side channels. Additionally, a 100-meter buffer was applied to incorporate foraging and hibernaculum habitat. Where riparian mapping does not exist, the stream channel was buffered laterally by 100 meters using a stream coverage produced from 1:24,000 or 1:100,000 topographic maps. Overlapping polygons were combined into a single site.

Figure 1-1
Summary of Historic and Current Hydrologic Units and Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's



- Post-listing survey results demonstrate that the Service's listing assumption that *Z. hudsonius* considered by the Service to be Preble's seemed to be absent in appropriate habitat was based more on the lack of surveyor ability to recognize suitable habitat than on the absence of mice within suitable habitat. The post-listing literature documents very successful trappings after habitat requirements became better understood.

During the past few years, it has been generally recognized that *Z. hudsonius* considered by the Service to be Preble's are much more abundant than previously believed. However, the Service took no action based on the results of post-listing surveys. This points to a very significant procedural flaw in the Service's implementation of the Act. It would seem reasonable and prudent that once the number of occupied sites increased well beyond those that were known at the time of the listing, an updated status review or a timely recovery planning effort would be conducted by the Service to assure that the listing decision was still appropriate. The Service has conducted similar reassessments for a number of other species and proceeded with delisting. In the case of *Z. h. preblei*, this did not occur even when the number of known occupied sites doubled and tripled.

There is ample precedence for the Service expeditiously delisting *Z. h. preblei* based on information presented in this petition. The Service has delisted a number of species based on taxonomic revisions and on additional discoveries of populations not known to exist at the time of listing. To date, seven species have been delisted because of taxonomic revision alone.[8]

[8] See http://endangered.fws.gov/wildlife.html

Not delisting *Z. h. preblei* would be inconsistent with previous delisting decisions made by the Service.

One recent delisting example that is strikingly similar to *Z. h. preblei* (based on distribution, abundance, threats and taxonomic revision) is the Dismal Swamp southeastern shrew. *Sorex longirostris fisheri* was listed by the Service as threatened in 1986. At the time of the listing, this species was believed to occur in only two cities in Virginia and four counties in North Carolina, which is similar to the limited distribution of *Z. h. preblei* assumed by the Service in the listing decision.

In 1994, shrew specimens collected throughout coastal North Carolina were compared with the voucher specimen for *S. l. fisheri* at the Smithsonian's National Museum of Natural History. This comparison indicated that specimens collected from southeastern North Carolina were the same as the voucher specimen for *S. l. fisheri* from Lake Drummond, the type locality for the subspecies. Similar to the current situation with *Z. h. preblei*, questions were raised in 1995 regarding the distribution and taxonomy of *S. l. fisheri*. Based on additional field surveys and on morphologic and genetic analysis, the Service concluded that *S. l. fisheri* was much more widespread and ubiquitous than previously believed. The Service removed *S. l. fisheri* from the List of Endangered and Threatened Wildlife in 2000 (65 FR 10420) based on the conclusion that data supporting the original classification were incomplete. The Service delisted the shrew without being prompted by a petition.

To list a species as threatened pursuant to the Act, the Service has an obligation to clearly demonstrate (not assume) that the species "**is** likely to become an endangered species within the foreseeable future throughout all or a **significant** portion of its range" (emphasis added – 50 CFR § 424.02(m)). In listing Preble's, the Service ignored perhaps the two most important terms in the definition of a threatened species – "is" and "significant". Is, as used in the Act, does not mean "could be" or "may be". Is implies a high degree of certainty rather than conjecture or speculation. Recently, in the 2002 candidate assessment for the black-tailed prairie dog, the Service reiterated that effects must be significant enough to be characterized as a threat and this characterization cannot be made unless the degree of significance of an effect is such that the influence on the status of the species is sufficient for it to meet the threatened definition in the Act (U.S. Fish and Wildlife Service, 2002a). In the final listing rule (63 FR 26517), the agency did not demonstrate that *Z. hudsonius* considered by the Service to be Preble's was threatened at the time of the listing nor show how it would (or could) become

threatened in the foreseeable future. Rather, the Service chose to provide somewhat vague descriptions of non-specific threats that might be adversely affecting the species without demonstrating that such effects rise to the level of significance required for listing.

When listing a species as threatened or endangered, the Service has a responsibility to clearly and objectively demonstrate, using vigorous and tested scientific methods, that the listing criteria established by the Act and the Service's regulations (i.e., a species is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range) have been met. It should not act hastily nor in the absence of adequate data – both of which occurred during the listing of *Z. h. preblei*. Uncertainty does not justify listing. It is clear that the Service failed in its responsibility when it hastily listed *Z. h. preblei* in 1998.

2.0 *Zapus hudsonius preblei* is Not a Valid Subspecies

Given the severe economic and social consequences often associated with listing a species as threatened or endangered, it would seem reasonable that a clear understanding of the taxonomic validity of a species would be prerequisite to listing. This was not the case with *Z. h. preblei*. We now know that *Z. h. preblei* is not different from *Z. h. campestris* (Riggs *et al*., 1997 and Ramey and Liu, 2003).

Historically, meadow jumping mice along the Colorado and Wyoming Front Range were considered *Z. h. campestris*. It was not until the 1950s that these mice were proposed by Krutzsch (1954) as separate and distinct from *Z. h. campestris*. Krutzsch described *Z. h. preblei* as a separate subspecies based on examination of only 11 specimens of which only 4 were adults – an extremely small sample size to suggest subspecies designation. Krutzsch admitted that *Z. h. preblei* most closely resembled *Z. h. campestris* but explained that they differed as follows:

> "From topotypes of *Z. h. campestris*, *Z. h. preblei* differs as follows: Upper parts generally dull, averaging lighter, less black-tipped hair; dorsal band less distinct; sides duller; averaging smaller in most cranial measurements taken; least interorbital constriction narrower; auditory bullae smaller, less well inflated; incisive foramina narrower, not truncate posteriorly; frontal region more inflated."

Between the time Krutzsch designated *Z. h. preblei* as a distinct subspecies and the beginning of the Service's initial investigations into the status of *Z. h. preblei*, researchers paid little attention to the genus and most generally adopted Krutzsch's proposed *Zapus* subspeciation. One notable exception was Jones (1981) who disagreed with Krutzsch and recognized no subspecies of *Z. hudsonius* after examining a number of additional specimens. Another exception was Hafner *et al*. (1981) who rejected Krutzsch's assignment of three populations of southwestern jumping mice to *Z. princeps*, based partially on genetics analysis, and proposed they were actually a subspecies of *Z. hudsonius*.

In the early 1990s, the Service began investigating whether *Z. h. preblei* should be listed as endangered or threatened pursuant to the Act. Obviously, this resulted in great interest in the conclusions reached by Krutzsch. In 1992, the Service retained Pioneer Environmental Consulting, Inc. (Pioneer) to conduct a status survey of *Z. h. preblei*. In a June 5, 1992 memorandum to the Service, Pioneer (Hugie and Compton, 1992a) initiated what would

become a costly, decade-long debate focused on whether *Z. h. preblei* is different from *Z. h. campestris*. The administrative record contains a June 5, 1992 memorandum prepared by Pioneer to the Service and Colorado Division of Wildlife (CDOW) describing difficulty they anticipated in distinguishing *Z. h. preblei* from *Z. h. campestris*. Pioneer evaluated a number of study skins and were unable to identify pelage characteristics that could be used to differentiate the two subspecies. They also addressed the quantitative differences in skull and baculum anatomy that had been pivotal in Krutzsch's "splitting" *Z. h. preblei* from *Z. h. campestris*. Although skull and baculum differences were evident between species of *Zapus* (i.e., between *Z. hudsonius* and *Z. princeps*), Pioneer concluded that such differences did not exist between *Z. h. preblei* and *Z. h. campestris*. Pioneer found that "no external or internal quantitative differences are described between the two subspecies in the primary references." In the June 5, 1992 memorandum, Pioneer first suggested that *Z. h. preblei* might actually be *Z. h. campestris* and concluded "it is questionable whether the two subspecies are different at all other than in description of historical range." In the memorandum, Pioneer then asked the Service and CDOW a very pointed question - "Is it reasonable to continue work on a listing package where the subject species can only be positively identified by internal skull or baculum characteristics or laboratory analysis of hair pigment and width?"

A meeting was held with Pioneer, the Service and CDOW on June 9, 1992 to discuss the June 5, 1992 memorandum. A summary of that meeting was provided in a second (June 10, 1992) memorandum from Pioneer to the Service and CDOW (Hugie and Compton, 1992b). The memorandum indicates that ample discussion regarding the taxonomic validity of *Z. h. preblei* occurred at the June 9, 1992 meeting. According to the memorandum, the meeting participants recognized that it may be necessary to conduct genetics studies to substantiate *Z. h. preblei* as a valid subspecies "before a study of subspecies status should even be considered." In particular, the discussion centered on whether *Z. h. preblei* was different from *Z. h. campestris*. The meeting participants went so far as to prepare a list of individuals considered capable of completing the genetics studies which is included in the memorandum. However, according to the administrative record, such studies were never conducted and the Service proceeded directly to the status review.

In 1993, Pioneer completed the status report for *Z. h. preblei* (Compton and Hugie, 1993). Amazingly, the status report ignores questions raised earlier regarding the validity of the subspecies.

By the time the Service proposed to list *Z. h. preblei* as an endangered species in 1997 (62 FR 14093), the focus of the taxonomic debate had shifted from distinguishing *Z. h. preblei* from *Z. h. campestris* to distinguishing *Z. h. preblei* from the western jumping mouse (*Z. princeps princeps*) because the range of the two jumping mice overlapped along the Front Range of Colorado and Wyoming and they are generally difficult to tell apart. In fact, the proposed listing rule relied on Krutzsch's early work to describe how *Z. h. preblei* was different from *Z. h. campestris* and no mention is made in the proposed listing rule regarding Pioneer's earlier concerns regarding the taxonomic validity of *Z. h. preblei*.

In 1997, CDOW retained Biosphere Genetics Inc. (Biosphere) to generate molecular genetic data for jumping mice. The goal of the Biosphere study was to determine "whether and how molecular data might support and help objectify the view, based on more traditional criteria, of the Preble's mouse as an evolutionary unit distinct from other species and subspecies of the genus *Zapus"* (Riggs *et al*., 1997). Biosphere evaluated molecular genetic data from 20 jumping mice populations (*Z. h. preblei* and *Z. p. princeps*) in Colorado and four in Wyoming as well as from other subspecies of *Zapus*. The Biosphere report concluded that a group of populations ranging from southern Albany County, Wyoming, south along the Front Range of the Rocky Mountains to western Las Animas County, Colorado, formed a coherent genetic and geographic group which they called the "Preble's group".

The analysis conducted by Biosphere demonstrated the long-held notion that two separate species of jumping mice with overlapping ranges occur along the Colorado and Wyoming Front Range (*Z. hudsonius* and *Z. princeps*). But this is not the most important conclusion reached in the Biosphere report. In the report (page 10, item 7), Biosphere conclude that "two samples identified as *Z. h. campestris* from Weston County, Wyoming … are indistinguishable from other samples in the Preble's group in the present analysis." This was the first direct evidence that *Z. h. preblei* was not different from *Z. h. campestris*. And, it came prior to the listing.

On page 9 of the Biosphere report, a bootstrap consensus tree is provided which identifies samples that constitute the coherent Preble's group. Evaluating the locations of these samples provides further support for the conclusion that *Z. h. preblei* is the same as *Z. h. campestris* and suggests that there may be only one subspecies of genetically-recognizable *Zapus hudsonius* in Colorado and Wyoming and perhaps in western Nebraska and northern New Mexico, which is similar to the conclusion reached by Jones (1981).

Figure 2-1 shows the counties where specimens were collected which formed Biosphere's Preble's group (Riggs *et al*., 1997). Also shown are historical ranges of various subspecies of *Zapus hudsonius* (from Beauvais, 2003). The figure suggests that jumping mice from areas which have historically been considered to be occupied by separate and distinct subspecies were found by Biosphere to form a coherent evolutionary group (at least according to mitochondrial DNA non-coding region variation). In other words, the phylogenetic analysis conducted by Biosphere does not support distinct evolutionary units for *Z. h. preblei* and *Z. h. campestris* and even raises questions about the taxonomic validity of *Z. h. luteus* and *Z. h. pallidus* because specimens from both their historic ranges were indistinguishable from other specimens in the Preble's group.

To date, the Service has generally ignored the possibility that *Z. h. preblei* was not a valid subspecies. It appears from the administrative record that the Service early on chose to proceed with listing despite concerns raised by Pioneer during preparation of the status survey. In addition, the Service chose to ignore the direct evidence provided by the Biosphere report (Riggs *et al*., 1997) that *Z. h. preblei* was not different from *Z. h. campestris*.

Because of the reluctance of the Service to act on information previously provided, the State determined it was necessary to succinctly, and as conclusively as possible, address the question of the taxonomic validity of *Z. h. preblei*. The State contracted with Drs. Rob Roy Ramey and Hsiu-Ping Liu of the Denver Museum of Nature & Science to test the following hypotheses:

> Question: Is *Z. h. preblei* a unique subspecies relative to other nearby *Z. hudsonius* subspecies?
>
> > Hypothesis 1A: *Z. h. preblei* is a unique taxon, distinguishable from other subspecies of *Z. hudsonius* using mitochondrial DNA (mtDNA) sequence data.
> >
> > Hypothesis1B: *Z. h. preblei* is not unique or distinguishable.

To test the hypotheses, Ramey and Liu (2003) collected DNA samples from specimens in museum collections at the Denver Museum of Nature & Science, the University of Kansas, the Nebraska State Museum and the University of New Mexico. They did not include ear punch tissues samples from live captured animals. By using only museum specimens, the authors believed their results would be fully repeatable and additional questions could be addressed about each specimen at a later date, such as morphological distinctiveness.

Figure 2-1. Counties With Jumping Mice that Riggs et al. (1997) Included in the "Preble's Group" Based on Mitochondrial DNA Non-Coding Region Variation

Ramey and Liu evaluated specimens across the range of each subspecies of *Z. hudsonius* in order to sample the maximum extent of genetic variation across subspecies. The authors also included a limited sample from each of the subspecies of *Z. princeps* for use as an outgroup for phylogenetic analyses.

Ramey and Liu's work resulted in three important conclusions. First, using a pairwise comparison between *Z. h. preblei* and *Z. h.* campestris, analysis of molecular variance revealed that most of the genetic variation was within rather than among these subspecies, thus refuting hypothesis 1A and therefore failing the test of genetic uniqueness. Second, utilizing the test of genetic and ecological exchangeability, as proposed by Crandall *et al*. (2000) for distinct populations, analysis of the mtDNA data does not refute the hypothesis of historic or recent genetic exchange between *Z. h. preblei* with *Z. h. campestris*. Third, Ramey and Liu's review of the literature revealed no quantitative evidence to reject the hypotheses of historic or recent ecological exchangability between *Z. h. preblei* with *Z. h. campestris*.

The authors analysis refuted Hypothesis 1A, that *Z. h. preblei* is a unique taxon, distinguishable from other subspecies of *Z. hudsonius,* using mitochondrial DNA sequence data. The results of the mtDNA analysis reveal that *Z. h. preblei* is a less genetically variable population of the *Z. h. campestris* and, according to the Ramey and Liu should be synonomized with *Z. h. campestris*. And, the failure of evidence to reject hypotheses of genetic and ecological exchangeability between *Z. h. preblei* with *Z. h. campestris*, using the approach of Crandall *et al*. (2000), means that *Z. h. preblei* with *Z. h. campestris* should be treated as a single population.

3.0 *Z. hudsonius* Considered by the Service to be Preble's is Not a Distinct Population Segment of *Zapus hudsonius campestris*

The above discussion demonstrates that meadow jumping mice along the Colorado and Wyoming Front Range are not different from *Z. h. campestris* - which alone is sufficient justification for delisting. However, the CWCD is concerned that some may now be compelled to argue that *Z. h. campestris* along the Colorado and Wyoming Front Range is a distinct population segment (DPS) that should still be afforded threatened status pursuant to the Act. The CWCDe, therefore, finds it necessary to provide the Secretary with information that describes why *Z. h. preblei* considered by the Service to be Preble's does not constitute a DPS of *Z. h. campestris*. The CWCD also believes it prudent to remind the Service that Congress instructed the Secretary to use her authority with regard to DPS sparingly and only when the biological evidence indicates such action is warranted.[9]

In 1996, the Service published a list of three elements that the agency would consider in a decision regarding the status of a possible DPS as endangered or threatened under the Act (61 FR 4722). The three elements include:

1. Discreteness of the population segment in relation to the remainder of the species to which it belongs;
2. The significance of the population segment to the species to which it belongs; and
3. The population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).

This section discusses Element 1 and demonstrates, using the best available scientific information, that *Z. h. campestris* in eastern Wyoming and Colorado is not "discrete" from populations of *Z. h. campestris* that inhabit the Black Hills of northeastern Wyoming. Section 4 of this petition addresses Element 3 and demonstrates current distribution, abundance and trend information for *Z. h . campestris* in eastern Wyoming and Colorado does not meet the criteria for listing pursuant to the Act. Section 5 demonstrates that the factors affecting the species described by the Service in the final listing rule do not affect all or a significant portion of the species' range.

[9] See Senate Report 151, 96th Congress, 1st Session.

Service policy provides two "tests" for discreteness (61 FR 4722), only one of which is applicable to the case at hand.[10] A population segment may be considered discrete if it satisfies the following conditions

> "It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavior factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation"

As was discussed above in Section 2, no quantitative measures of "genetic discontinuity" were found by either Riggs *et al*. (1997) or Ramey and Liu (2003) between Front Range and Black Hills *Z. h. campestris*. In fact, neither of the studies were able to conclude that the two populations were different. According to the best available scientific information, no genetic discontinuity (quantitative or qualitative) exists. There is a well documented record of continual problems associated with trying to identify morphological discontinuity that would allow identification of subspecies of *Z. hudsonius* and even allow researchers to distinguish between *Z. hudsonius* and *Z. princeps*. Jones (1981) basically repeated Krutzsch's (1954) work, except with more specimens, and concluded that there is no morphological evidence for subspeciation anywhere within *Z. hudsonius*. During preparation of a 1992 status survey for *Z. h. preblei*, the administrative record indicates that the Service's own contractor concluded that "no external or internal quantitative differences are described between the two subspecies in the primary references" and that "it is questionable whether the two subspecies are different at all other than in description of historical range" (Hugie and Compton, 1992a).

The idea that there is a lack of connectivity between the two populations of *Z. hudsonius* in eastern Wyoming goes back to Krutzsch (1954) who first postulated that meadow jumping mice along the Front Range were geographically isolated from populations of *Z. h. campestris* in the Black Hills. To support this geospatial isolation argument, Krutzsch noted "Much territory inhospitable to *Zapus* … intervenes between the ranges of *Z. h. preblei* and *Z. h. campestris*. This area (northern Platte, Goshen, eastern Converse, Niobrara, and southern Weston counties, Wyoming) is chiefly rolling hills and short grass prairie and … is only locally suitable for *Zapus*." For the most part, Krutzsch's isolation argument was accepted by his contemporaries - primarily based on a perceived lack of suitable habitat and lack of meadow jumping mouse specimens between what Krutzsch considered the ranges of *Z. h. preblei* and *Z. h. campestris*.

[10] The second condition involves taxon that extend across international borders.

However, the presence of "much territory inhospitable to *Zapus*" or a suitable habitat gap isolating the two populations of *Z. h. campestris* contradicts Riggs *et al*. (1995) and Ramey and Liu's (2003) conclusion that the two populations are not genetically different. This contradiction can only be resolved one of two ways: Either:

- The gap between the two populations has only occurred relatively recently and not enough time has passed to allow genetic differences to develop; or
- There is no suitable habitat gap that isolates the two populations.

The CWCD contends that the best available scientific information indicates that the latter argument is most plausible and that there is connectivity (through corridors of suitable habitat) between *Z. h. campestris* populations in eastern Wyoming. The best available scientific information suggesting connectivity between the two populations is from a habitat suitability assessment conducted by the Wyoming Natural Diversity Database (WYNDD) and genetic and morphometric analysis of specimens collected from the supposed gap.

In 2001, WYNDD (Keinath, 2001) completed a study for the Service that: 1) developed a generalized, predictive habitat model for *Z. h. preblei* in southeastern Wyoming; and 2) provided a descriptive analysis of the habitats. The study resulted in development of a model applied classification-tree analysis of known occupied and unoccupied sites for *Z. h. preblei* to determine which habitat characteristics were useful in predicting their occurrence. Keinath (2001) provides a detailed description of development of the model in his report. Although Keinath only published the results of his model for southeastern Wyoming, he actually developed results for the entire eastern portion of Wyoming including the area of the supposed gap described by Krutzsch.

At our request, WYNDD provided the results of the model for the entire eastern portion of Wyoming and the results are shown for the area of Krutzsch's supposed gap in Figure 3-1. As the figure shows, WYNDD's model results predict suitable habitat corridors between the historic ranges of *Z. h. campestris* and *Z. h. preblei* through northern Converse and Campbell counties. The suitable habitat corridor extends across the headwaters of the Dry Fork Cheyenne, Antelope and Upper Belle Fourche Hydrologic units. *Z. h. campestris* is known to occupy the Upper Belle Fourche Hydrologic Unit.

Figure 3-1. WYNDD Predicted Suitable Habitat and Locations of Specimens Identified as *Z. hudsonius* in Northeastern Wyoming

There is one *Zapus* record, representing 18 individual jumping mice, from the suitable habitat corridor in the Dry Fork Cheyenne Hydrologic Unit at Red Butte (see Figure 3-1). The Red Butte Site is approximately 33 miles northwest of what has recently been considered the northern extent of the range of *Z. hudsonius* considered by the Service to be Preble's. The Red Butte mice, first reported by Long (1965), were initially identified as *Z. p. princeps*. However, in its Biological and Conservation Database, WYNDD has questioned whether the specimens might actually be *Z. h. preblei* (now known to be *Z. h. campestris*). It does not appear that specimens from this collection were cataloged so positive identification as *Z. h. campestris* or *Z. p. princeps* cannot be determined.

In addition to positive capture records, WYNDD's Biological and Conservation Database also contains records where surveys have been conducted but no mice were found. The only survey identified in the database in the vicinity of the model-predicted suitable habitat corridor was trappings conducted by the U.S. Forest Service on Thunder Basin National Grasslands along the Cheyenne River at the intersection of Weston, Converse and Niobrara counties in the Upper Cheyenne Hydrologic Unit. Unfortunately, the U.S. Forest Service trap site appears to be at least 10 miles southeast of the nearest predicted suitable habitat for *Z. hudsonius*.

WYNDD's suitable habitat model predicts a second suitable habitat corridor between the north end of the Laramie Range and the Big Horn Mountains (see Figure 3-1). That corridor extends through Converse, Natrona, Johnson, Washakie, Big Horn and Sheridan counties and likely into Montana. According to WYNDD's Biological and Conservation Database, little trapping has occurred in this corridor. However, there are two records of *Z. hudsonius* from the corridor that merit careful consideration.

In the southern end of the corridor, in northwestern Natrona County, a jumping mouse was collected in the Badwater Hydrologic Unit that has muddled the question of *Z. hudsonius* distribution in Wyoming since the early 1990s. The Badwater mouse was collected in 1963, but unfortunately its skull is missing rendering it useless for morphometric analysis. The remainder of the specimen is in the collection at the University of Colorado Museum. The collection location is nearly 100 miles northeast of the nearest known record of *Z. hudsonius*. Garber (1995) determined that the Badwater mouse was not *Z. hudsonius* because it was outside the "known distribution of *Z. h. preblei*" and concluded the specimen was probably *Z. p. princeps*. However, this was not the conclusion reached by Biosphere (Riggs *et al*., 1997). Biosphere included the Badwater mouse in its phylogenetic analysis of *Z. h. preblei*. Although this mouse

is not specifically discussed in the Biosphere report, the report's bootstrap consensus tree firmly places the Badwater mouse within the "Preble's group".

In WYNDD's suitable habitat corridor in northern Johnson County, approximately 85 miles northeast of the Badwater mouse, a specimen of *Z. hudsonius* (not identified to subspecies) has been collected near Buffalo at Lake De Smet (see Figure 3-1). According to Gary Beauvais, Director of the WYNDD, other researchers have reported capturing jumping mice in the vicinity of Lake De Smet in the Clear Hydrologic Unit. The Lake De Smet mouse specimen is in the University of Colorado Museum and has not received much attention from *Z. h. preblei* researchers. However, the specimen was included in the Biosphere phylogenetic analysis. In the report, Riggs *et al*., (1997) concluded that the Lake De Smet mouse was found to be most similar to two reference specimens of *Z. h. campestris* from Custer County, South Dakota, although the authors did not include the Lake De Smet mouse in the "Preble's group".

It is apparent that suitable habitat exists between the historic ranges of *Z. h. campestris* and *Z. h. preblei* (now known to be *Z. h. campestris*). It is further apparent, even on the basis of very little trapping, that there appears to be *Z. hudsonius* occupying this habitat. And, the best available scientific information supports the conclusion that the jumping mice in these corridors are *Z. h. campestris*. It would be extremely difficult to argue that Colorado and Wyoming Front Range *Z. h. campestris* are isolated (i.e., discrete) from Black Hills populations given the results of WYNDD's habitat suitability assessment and genetic analysis of specimens collected, to date, from the suitable habitat corridor.

4.0 Current Distribution, Abundance and Trend Information Demonstrates that *Z. hudsonius* Considered by the Service to be Preble's Does Not Meet the Criteria for Listing as Threatened Pursuant to the Act

The best available scientific information demonstrates that *Z. hudsonius* considered by the Service to be Preble's does not meet the criteria for listing – even if treated as isolated from other populations of *Z. h. campestris* in northeastern Wyoming. Post-listing surveys have shown it to be widespread and ubiquitous and occurring in many areas well beyond the range described by the Service in the final listing rule and documented by earlier researchers (i.e., Krutzsch, 1954). Current best available scientific information contradicts the Service's primary justification for listing the species.

4.1 Data Sources

Three primary sources of information were used in the petition to evaluate the distribution, abundance and trends of *Z. hudsonius* considered by the Service to be Preble's. Wyoming information was provided by the Wyoming Natural Diversity Database (WYNDD, 2003) which maintains point observation database (POD) locations where individual or several individual specimens of *Zapus* have been reliably observed in Wyoming. The POD locations include all current and historic records and has been updated to include trapping reports provided to WYNDD as of November, 2003.

The discussion of historic and current distribution of *Z. hudsonius* considered by the Service to be Preble's in Colorado is based upon element occurrence records (EORs) maintained by the Colorado Natural Heritage Program (CNHP, 2002) and the Service and the Preble's Meadow Jumping Mouse Occupied Range, Colorado geographic information system (GIS) coverage prepared by the Colorado Division of Wildlife (CDOW), Natural Diversity Information Source (NDIS) (CDOW, 2002). The CNHP and Service EORs contain capture locations from trapping reports submitted to the Service. The EORs include point locations for positive captures, negative captures, evaluated habitat areas and historic captures. The NDIS GIS coverage was used to identify occupied sites in Colorado.

4.2 Historic Distribution of *Z. hudsonius* Considered by the Service to be Preble's

For purposes of this petition and to be consistent with the CNHP EORs classification, historic records include all captures documented prior to 1980. Historic records exist for Larimer, Weld, Boulder, Jefferson, Denver, Adams, Arapahoe, and El Paso counties in Colorado and Laramie, Converse, Albany and Platte counties in Wyoming (Pague and Grunau, 2000; Armstrong, 1972; Warren, 1942; Long, 1965; Jones, 1981; Krutzsch, 1954; Jones and Jones, 1985; CNHP, 2002; and WYNDD, 2003). In the 1998 final listing rule (63 FR 26517), the Service described the historic range in Wyoming as including Natrona and Goshen County. However, no historic records for are known from these counties. Figure 4-1 shows the locations of historic records in Colorado and Wyoming and sites are listed on Table 4-1.

Historically, the distribution of *Z. hudsonius* considered by the Service to be Preble's in Wyoming was poorly understood - primarily because survey efforts in Wyoming prior to the listing were minimal. WYNDD POD contains 11 historic (pre-1980) records. Historic records from Wyoming are reported from seven hydrologic units including Middle North Platte-Casper, Glendo Reservoir, Lower Laramie, Horse, Upper Lodgepole, Crow and Lone-Tree Owl.

A number of researchers have provided information regarding historic specimens in Wyoming (Krutzsch, 1954; Long, 1965; Jones, 1981; Clark and Stromberg, 1987; Garber, 1995; Beauvais, 1998 and 2001). Historically, *Z. hudsonius* considered by the Service to be Preble's was considered rare in Wyoming (Long, 1965) and many of the historic records lack collection dates. As late as 1995, Garber (1995) could confirm only three historic records in Wyoming - all of which were attributed to Krutzsch's 1954 evaluation of the genus. In addition, he noted a record referenced by Clark and Stromberg (1987) from Laramie County (but was unable to determine the capture location of this specimen) and an unverified 1984 trapping record from Lodgepole Creek (also from Laramie County).

Historic records of *Z. hudsonius* considered by the Service to be Preble's in Colorado are also poorly documented (Pague and Grunau, 2000 and Ryon, 1997). CNHP EORs contain 18 historic records in Colorado from 17 sites (see Table 4-1).[11] In addition, Armstrong (1972)

[11] CNHP EORs map two historic Colorado records (Pumping Station and Sangraco Lake) at the same location.

Figure 4-1. Locations of CNHP and WYNDD Historic (pre-1980) Records of *Z. hudsonius* Considered by the Service to be Preble's

Table 4-1
Historic (pre-1980) CNHP and WYNDD Records of *Z. hudsonius* Considered by the Service to be Preble's in Colorado and Wyoming

Associated Stream or General Location	County	Collection Year	Reference
Middle North Platte-Casper Hydrologic Unit			
Box Elder Creek	Converse	pre-1981	Jones (1981)[2]
Glendo Reservoir Hydrologic Unit			
North Horseshoe Creek	Converse	1909	Krutzsch (1954)
Lower Laramie Hydrologic Unit			
Chugwater Creek	Platte	pre-1954	Krutzsch (1954)
Horse Hydrologic Unit			
Unnamed Tributary to Horse Creek	Laramie	pre-1981	Jones (1981)
South Fork Horse Creek	Laramie	pre-1981	Jones (1981)
Mill Creek	Laramie	pre-1981	Jones (1981)
Upper Lodgepole Hydrologic Unit			
Lodgepole Creek	Laramie	pre-1965	Long (1965)
North Lodgepole Creek	Laramie	pre-1981	Jones (1981)
Crow Hydrologic Unit			
Crow Creek	Laramie	1888	Krutzsch (1954)
South Fork Crow Creek	Laramie	1964	Garber (1995)[2]
Lone Tree-Owl Hydrologic Unit			
Unnamed Tributary to Lone Tree Creek	Albany	pre-1981	Jones (1981)
Cache La Poudre Hydrologic Unit			
SE of Fort Collins	Larimer	1954	Armstrong (1972)
Greeley	Weld	unknown	Armstrong (1972)
Big Thompson Hydrologic Unit			
Loveland	Larimer	1895	U.S. National Museum (collection #430, 435)
St. Vrain Hydrologic Unit			
Brushy Mountain	Boulder	1935	Denver Museum of Natural History (accession #2971)
Dry Creek	Boulder	1913	University of Colorado (collection #503)
Niwot	Boulder	1930	Denver Museum of Natural History (accession #2394)
Elmer Johnson Ranch	Boulder	1951	University of Colorado (accession #5210)
Left Hand Canyon	Boulder	1966	Cruzan (1968)
Gravel Pits	Boulder	1967	Cruzan (1968)
S Boulder	Boulder	1918	University of Colorado (catalogue #1225)
Middle South Platte-Cherry Creek Hydrologic Unit			
Croke Lake	Adams	1936	Denver Museum of Natural History (accession #2822)
Lowline Canal near Banner Lake	Weld	1956	Colorado State University (collection #14)
Ft. St. Vrain	Weld	1977	Compton and Hugie (1993)
Clear Hydrologic Unit			
Pumping Station	Jefferson	1909	Denver Museum of Natural History (collection #64)
Sangraco Lake	Jefferson	unknown	Armstrong (1972)
Upper South Platte Hydrologic Unit			
South Platte River/Denver	Denver	1885	Cary (1911)
Fountain Hydrologic Unit			
Dirty Woman Creek	El Paso	1972	Jones and Jones (1985)
Colorado Springs	El Paso	1912	Warren (1942)
Unknown Hydrologic Unit			
Unknown[1]	Arapahoe	Unknown	Armstrong (1972); Warren (1942)

1 = Armstrong (1972) reports a specimen from Arapahoe County (Warren, 1942) without a precise location. This specimen is not included in the CNHP EORs and is not shown on Figure 4-1 or Map 1.
2 = All records credited to Jones (1981) and Garber (1995) are considered historic records.

identified a historic record from Arapahoe County (reported by Warren, 1942). However, because the capture location for the Arapahoe County specimen cannot be determined, it is not included in the CNHP EORs and is not shown on Figure 4-1. Historic capture dates in Colorado range from 1885 to 1977, although capture dates for two specimens are not known. Historically, *Z. hudsonius* considered by the Service to be Preble's are known from seven Colorado hydrologic units including Big Thompson, Cache La Poudre, Clear, Fountain, Middle South Platte-Cherry Creek, St. Vrain and Upper South Platte (see Figure 4-1).

4.2.1 Middle North Platte-Casper Hydrologic Unit Historic Records

One historic record exists from this hydrologic unit. Two specimens were reported by Jones (1981) from Box Elder Creek in southwestern Converse County, Wyoming. WYNDD mapped this record approximately 3 miles southwest of Pole Mountain near the confluence of Gunnysack Creek with Box Elder Creek on the Medicine Bow-Routt National Forest. However, the location accuracy of this record is general (± 5 miles). Box Elder Creek is tributary to the North Platte River.

4.2.2 Glendo Reservoir Hydrologic Unit Historic Records

Krutzsch (1954) reported specimens from the Laramie Range near Esterbrook, Wyoming. The WYNDD mapped capture location is in the headwaters of North Horseshoe Creek in southeastern Converse County. North Horseshoe Creek is tributary to Horseshoe Creek. WYNDD mapped this record approximately 1.5 miles northeast of Sunset Hill and about 2 miles west of the Platte-Converse County line. The location accuracy of this record is also general (± 5 miles). According to WYNDD, these specimens were probably collected in 1909 (see Table 4-1).

4.2.3 Lower Laramie Hydrologic Unit Historic Records

A single specimen was reported by Krutzsch (1954) from the Town of Chugwater, Wyoming prior to 1954 (see Table 4-1). WYNDD mapped the capture location adjacent to Chugwater Creek in southeastern Platte County. The mapped capture location is on the eastern edge of the hydrologic unit. The location accuracy is general (± 5 miles).

4.2.4 Horse Hydrologic Unit Historic Records

WYNDD POD contains three historic records from this hydrologic unit – all reported by Jones (1981) from the vicinity of Horse Creek, Wyoming. All the historic records are mapped by

WYNDD in western Laramie County in the upper portions of the Horse Creek drainage. The first historic record is from Mill Creek approximately 29 miles southwest of Chugwater where two mice were captured. This record has minute location accuracy (± 1.5 miles). Mill Creek is tributary to Horse Creek. WYNDD mapped this record approximately 0.25 miles east of the Laramie-Albany County line and approximately 3 miles northeast of Powell Mountain.

The second historic record is from an unnamed tributary to Horse Creek approximately 31 miles southwest of Chugwater where a single specimen was captured. WYNDD mapped this second historic record approximately 2 miles south of the Mill Creek historic record and about 0.25 miles east of the Laramie-Albany County line and 3.3 miles southwest of Powell Mountain. According to WYNDD, the location accuracy of this record is minute (± 1.5 miles). The capture location is mapped directly north of Fisher Canyon Road.

The third historic record is from South Fork Horse Creek where a single specimen was captured near the intersection of Fisher Canyon Road with Highway 211. However, the location accuracy of this record is general (± 5 miles). WYNDD mapped this historic record approximately 5.3 miles southeast of the historic Mill Creek Site and approximately 0.7 miles upstream of the confluence of South Fork Horse Creek with Horse Creek.

4.2.5 Upper Lodgepole Hydrologic Unit Historic Records

Historic records from this hydrologic unit are also from western Laramie County from the upper portions of the Lodgepole Creek drainage. Both records have minute location accuracy (± 1.5 miles). Long (1965) reported a single specimen at Lodgepole Creek west of Chadwick Reservoir No. 3 at Islay, Wyoming. WYNDD mapped this record at the Highway 211 crossing of Lodgepole Creek directly west of the reservoir.

A second historic record was reported by Jones (1981) about 5.5 miles west of the Islay record on North Lodgepole Creek in the northern portion of the hydrologic unit. WYNDD mapped this record approximately 2.7 miles west of the confluence of North Lodgepole Creek with Lodgepole Creek and about 1.5 miles east of the Laramie-Albany County line.

4.2.6 Crow Hydrologic Unit Historic Records

Historic records are known from the Crow Hydrologic Unit in southwestern Laramie County. WYNDD mapped one of the captures adjacent to Crow Creek near Cheyenne,

Wyoming on F.E. Warren Air Force Base. This is Wyoming's earliest record (1888). According to WYNDD, the Crow Creek historic record has general (± 5 miles) location accuracy.

The second historic record from this hydrologic unit is from South Fork Crow Creek (Garber, 1995). This specimen's capture location was reported as the Laramie Range eastern flank between Cheyenne and Laramie, Wyoming. WYNDD mapped the capture site adjacent to South Fork Crow Creek (see Figure 4-1) approximately 1.8 miles southwest of the intersection of Highway 210 and Crystal Lake Road. This record has minute location accuracy (± 1.5 miles). Even though this specimen is lacking a skull, Garber (1995) tentatively identified it as Preble's based on location, measurements and time of year of the capture.

4.2.7 Lone Tree-Owl Hydrologic Unit Historic Records

Only one historic record exists from Albany County, Wyoming. That record is from an unnamed tributary to Lone Tree Creek in the Lone Tree-Owl Hydrologic Unit. The record was reported by Jones (1981) from the old railroad town of Sherman in the Laramie Range. The capture location is mapped by WYNDD directly adjacent to the Lone Tree-Owl/Cache La Poudre Hydrologic Unit boundary. However, WYNDD assigns only general location accuracy to this record (± 5 miles).

4.2.8 Cache La Poudre Hydrologic Unit Historic Records

Two historic records exist for this hydrologic unit – both from Colorado. Both records were reported by Armstrong (1972). One of the records is from Greeley in southwestern Weld County and is of unknown collection date. CNHP has mapped this record in the center of Greeley in the vicinity of the Greeley No. 3 Ditch.

The second historic record is from 1954 from southeast Larimer County in Fort Collins. The capture location is mapped by CNHP approximately 1 mile north of Colorado State University adjacent to the Fort Collins Irrigation Ditch.

4.2.9 Big Thompson Hydrologic Unit Historic Records

The Big Thompson Hydrologic Unit in Larimer County provides one of the earliest records for Colorado. This specimen, captured in 1895, was collected by E.A. Preble from an irrigation ditch near Loveland (southeast Larimer County) and is the type locality for the subspecies. However, Preble did not consider this specimen to be *Z. h. preblei* – rather he considered it to be *Z. h. campestris*.

4.2.10 St. Vrain Hydrologic Unit Historic Records

Most of the historic records of *Z. hudsonius* considered by the Service to be Preble's in Colorado are from the St. Vrain Hydrologic Unit in southeast Boulder County. The earliest records are from the 1910s from South Boulder and Dry Creek. The South Boulder historic record was mapped by CNHP adjacent to Bear Creek Canyon southeast of Boulder. The Dry Creek historic record was mapped by CNHP northeast of Baseline Reservoir on the east side of Boulder.

In the 1930s, *Z. hudsonius* considered by the Service to be Preble's were collected near Niwot (adjacent to Dry Creek) and Hygiene and in the 1950s from the Elmer Johnson Ranch southwest of St. Vrain Creek. Specimens were captured in the 1960s from the Sawmill Ponds in the City of Boulder and along Boulder Creek and at the mouth of Left Hand Canyon.

4.2.11 Middle South Platte-Cherry Creek Hydrologic Unit Historic Records

Three historic records exist from this hydrologic unit (see Table 4-1 and Figure 4-1). In Adams County, *Z. hudsonius* considered by the Service to be Preble's were collected near Badding Reservoir (Croke Lake) in 1936. A second specimen was collected in this hydrologic unit in 1956 east of Hudson, Colorado from what is now Banner Lakes State Wildlife Area in southcentral Weld County. The third record is from 1977 from an irrigation canal on the Ft. St. Vrain Nuclear Generating Station in southwest Weld County.

4.2.12 Clear Hydrologic Unit Historic Records

Two historic records from the Clear Creek Hydrologic Unit in Jefferson County are included in the CNHP EORs. The earliest record (1909) is from a location near Westminster in the Big Dry Creek or Little Dry Creek drainage. No collection date is available for the second record which is reported by CNHP as near Sangraco Lake. CNHP mapped both records at the same location and we consider them to represent a single historic site.

4.2.13 Upper South Platte Hydrologic Unit Historic Records

On specimen of *Z. hudsonius* considered by the Service to be Preble's was collected from the South Platte River in Denver County in 1885 – the oldest record known for Colorado. CNHP mapped the record adjacent to Weir Gulch near its confluence with the South Platte River.

4.2.14 Fountain Hydrologic Unit Historic Records

Two historic records exist from the Fountain Hydrologic Unit in El Paso County – the earliest (1912) from Colorado Springs. CNHP mapped this record on Monument Creek in the center of Colorado Springs.

The second historic record from this hydrologic unit is more recent (1972) – from Dirty Woman Creek (a tributary to Monument Creek) east of the Town of Monument, Colorado. Although no specimens exist, Pague and Grunau (2000) reported notes taken from students and faculty of the U.S. Air Force Academy that record jumping mice from the Academy over many years.

4.3 1995 Positive 90-Day Finding for a Petition to List *Z. h. preblei* as Threatened or Endangered

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On August 16, 1994, the Service received a petition from the Biodiversity Legal Foundation (Biodiversity) that requested the Service list *Z. h. preblei* as threatened or endangered throughout its range. According to the Service (60 FR 13950), the petition contained "substantive" information that the species was imperiled by "ongoing and increasing urban, agricultural, ranching, and recreational development; wetland and riparian habitat destruction and/or conversion; and inadequacy or lack of governmental protection for the subspecies and its habitats."[12] On March 15, 1995, the Service published a positive 90-day finding and concluded that there was substantial information to indicate that listing the subspecies may be warranted (60 FR 13950). With the positive 90-day finding, the Service initiated a status review of the species.

When the positive 90-day finding was published, very little was known about the distribution of *Z. hudsonius* considered by the Service to be Preble's and relatively few surveys had been completed. Previous Service efforts to locate the mouse had been largely unsuccessful (Compton and Hugie, 1993). The Service indicated in the positive 90-day finding that the species appeared to have been "extirpated" from previously occupied habitats in both

[12] It is difficult to understand what portion of the very brief Biodiversity petition the Service considered substantive. Also, it is important to recognize that the 1994 Biodiversity petition contains no information documenting population declines in *Z. hudsonius* considered by the Service to be Preble's. In fact, the Biodiversity petition states "there is very little data to document specific population declines." Biodiversity argued that "it can be **assumed** (emphasis added) that the rapid and severe destruction and reduction in the extent of suitable moist habitat in the Preble's Meadow Jumping Mouse's historic range have resulted in corresponding decline in population numbers."

Wyoming and Colorado. The Service also stated that there may have been "precipitous" declines in populations throughout its range and that "difficulty" had been experienced in finding the species in apparently suitable habitats (60 FR 13950).

In the positive 90-day finding, the Service characterized its distribution as restricted to only two known populations in Colorado and "apparently none in Wyoming" and stated it was uncertain if two other populations in Colorado still existed. Known populations in Colorado reported by the Service in the positive 90-day finding were limited to:

- U.S. Department of Energy's Rocky Flats Environmental Technology Site (Rocky Flats) in northern Jefferson County in the Middle South Platte-Cherry Creek and St. Vrain Hydrologic units; and
- Adjacent City of Boulder Open Space land in the St. Vrain Hydrologic Unit in southern Boulder County.

The positive 90-day finding also recognized that a specimen tentatively identified as *Z. h preblei* was captured in 1994 at the Air Force Academy in El Paso County along Monument Creek in the Fountain Hydrologic Unit.

CNHP EORs contain 26 records of *Z. hudsonius* considered by the Service to be Preble's from the 1989 through 1994 trapping seasons which suggests that they were somewhat more widespread than reported by the Service in its positive 90-day finding (see Table 4-2). During that period, CNHP records indicate *Z. hudsonius* considered by the Service to be Preble's were known from nine sites in the Middle South Platte-Cherry Creek, St. Vrain, Fountain and Upper South Platte Hydrologic units (see Figure 4-2). The majority of the CNHP EORs are from Rocky Flats where *Z. hudsonius* considered by the Service to be Preble's were first discovered in 1991. Pre-1995 CNHP EORs from Rocky Flats are from Rock Creek (St. Vrain Hydrologic Unit), Woman Creek, Walnut Creek and Smart Drainage (Middle South Platte-Cherry Creek Hydrologic Unit).[13]

The CNHP EORs include a 1993 capture from Doudy Draw (tributary to South Boulder Creek in the St. Vrain Hydrologic Unit) south of Eldorado Springs, Colorado. Doudy Draw is located on City of Boulder Open Space lands. The species was also known from Coal Creek in the St. Vrain Hydrologic Unit from the Tracy Collins parcel on City of Boulder Open Space lands where it was captured in 1989 (Compton and Hugie, 1993).

[13] The hydrologic unit designation for these sites is somewhat arbitrary as NDIS delineated sites overlap hydrologic unit boundaries.

Figure 4-2. Locations of Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's Identified in the 1995 Positive 90-Day Finding and Pre-1995 CNHP EORs

Table 4-2 Known Extant Populations of *Z. hudsonius* Considered by the Service to be Preble's Identified in the 1995 Positive 90-Day Finding and CNHP Pre-1995 EORs	
Site	**County**
St. Vrain Hydrologic Unit	
Rock Creek	Jefferson
Coal Creek – Tracy Collins Parcel	Boulder
South Boulder Creek in Boulder - Van Vleet Parcel	Boulder
South Boulder Creek near Eldorado Springs - Doudy Draw	Boulder
Middle South Platte-Cherry Creek Hydrologic Unit	
Walnut Creek	Jefferson
Woman Creek	Jefferson
Smart Drainage	Jefferson
Upper South Platte Hydrologic Unit	
West Plum Creek at Perry Park	Douglas
Fountain Hydrologic Unit	
Monument Creek	El Paso

The CNHP EORs contain a single pre-1995 record from the Upper South Platte Hydrologic Unit which is not mentioned in the Service's positive 90-day finding. In 1994, CNHP captured *Z. hudsonius* considered by the Service to be Preble's on West Plum Creek approximately 3 miles west of Larkspur at Perry Park. In subsequent years, they would be found in a number of drainages in this hydrologic unit.

The CNHP EORs do not contain pre-1995 records from the Van Vleet parcel (City of Boulder Open Space land) which is adjacent to South Boulder Creek. However, Compton and Hugie (1993) reported capturing *Z. hudsonius* considered by the Service to be Preble's from this site in 1992. NDIS combines this record with other records from the vicinity into a single site which we call the South Boulder Creek in Boulder Site (CDOW, 2002).

4.4 1997 Proposed Rule to List *Z. h. preblei* as Endangered

Two years elapsed between the positive 90-day finding and the Service's proposed rule to list the species, which allowed two additional field trapping seasons (1995 and 1996). On March 25, 1997, the Service proposed to list *Z. h. preblei* as endangered (62 FR 14093). At the time of the proposed listing, the species was known to occur at 18 locations at 15 sites in four counties in Colorado and at three sites in two counties in Wyoming. The Service claimed that it was absent from five historically occupied counties in Colorado and three in Wyoming (62 FR 14093). Known occupied sites at the time of the proposed rule to list the species as endangered are listed on Table 4-3 and shown on Figure 4-3.

Table 4-3 Known Extant Populations of *Z. hudsonius* Considered by the Service to be Preble's Identified in the 1997 Proposed Listing Rule and Pre-1997 CNHP EORs and WYNDD POD	
Site	**County**
Upper Lodgepole Hydrologic Unit	
Middle Lodgepole Creek	Albany
North Branch Middle Lodgepole Creek	Albany
Crow Hydrologic Unit	
Crow Creek	Laramie
St. Vrain Hydrologic Unit	
Rock Creek	Jefferson
Coal Creek – Tracy Collins Parcel	Boulder
Coal Creek at Rocky Flats	Jefferson
South Boulder Creek in Boulder - Van Vleet Parcel	Boulder
South Boulder Creek in Boulder– Gebhard and Burke parcels	Boulder
South Boulder Creek near Eldorado Springs - Doudy Draw	Boulder
St. Vrain Creek at 75th	Boulder
Middle South Platte-Cherry Creek Hydrologic Unit	
Walnut Creek	Jefferson
Woman Creek	Jefferson
Smart Drainage	Jefferson
Upper South Platte Hydrologic Unit	
East Plum Creek west of Hunt Mountain	Douglas
East Plum Creek north of Tomah	Douglas
West Plum Creek at Perry Park	Douglas
Plum Creek at Sedalia	Douglas
Indian Creek at Lambert Ranch	Douglas
Fountain Hydrologic Unit	
Monument Creek Smith Creek	El Paso
West Monument Creek	El Paso

The CNHP EORs contain 52 records of captures during the 1995 and 1996 trapping seasons. Half of the capture records reported for the two year period came from the Air Force Academy along Monument Creek and its tributary Smith Creek in the Fountain Hydrologic Unit. Nearly a third of the capture records came from Rocky Flats in the Middle South Platte-Cherry Creek and St. Vrain Hydrologic units.

The Service's proposed listing rule is consistent with the WYNDD POD for *Z. hudsonius* considered by the Service to be Preble's captured in Wyoming during 1995 and 1996. WYNDD has 16 POD records for the 1995 and 1996 field seasons which are about equally distributed between the Crow and Upper Lodgepole Creek Hydrologic units.

4.4.1 Upper Lodgepole Hydrologic Unit Proposed Listing Rule Records

At the time of the 1997 proposed rule to list, the Service recognized that the species occurred at two locations in the Upper Lodgepole Hydrologic Unit (along North Branch Middle

Figure 4-3. Location of Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's Identified in the 1997 Proposed Listing Rule and Pre-1997 CNHP EORs and WYNDD POD Records

Lodgepole Creek and Middle Lodgepole Creek) within the Medicine Bow-Routt National Forest in Albany County (Garber, 1995). The locations of these sites are shown on Figure 4-3.

Both records occur in the upper portions of the hydrologic unit in what is known as the Eagle Rock Wetland Complex. The Middle Lodgepole Creek record is located approximately 0.75 miles upstream (west) of the confluence of Middle Lodgepole Creek with North Branch Middle Lodgepole Creek. The North Branch Middle Lodgepole Creek record is approximately 1.7 miles northwest of the Middle Lodgepole Creek record and approximately 2.3 miles upstream (west) of the confluence of the two creeks.

4.4.2 Crow Hydrologic Unit Proposed Listing Rule Records

In 1995, specimens were captured along Crow Creek in the Crow Creek Hydrologic Unit on F.E. Warren Air Force Base in Laramie County. In 1996, additional captures were made along Crow Creek by CNHP. Debate continues over the taxonomy of the jumping mice on the Air Force base. The Service considers these mice to be *Z. h. preblei* for purposes of the Act. However, morphometric (Connor and Shenk, 2001) and genetic (Riggs *et al*., 1997) analysis indicate they are likely *Z. p. princeps*.

4.4.3 St. Vrain Hydrologic Unit Proposed Listing Rule Records

In the proposed listing rule, the Service noted a number of historic and recent records from Boulder County in the St. Vrain Hydrologic Unit. In 1995, extensive surveys were conducted on City of Boulder and Boulder County Open Space lands. Of the 13 sites surveyed, *Z. hudsonius* considered by the Service to be Preble's were captured from the Van Vleet and Gebhard parcels along South Boulder Creek. In 1996, they were again collected on the Van Vleet Site and the Burke 1 Site, also along South Boulder Creek. All of the South Boulder Creek EORs were combined by NDIS into a single site (South Boulder Creek in Boulder Site) which is located generally along South Boulder Creek south of Base Line Reservoir and north of Marshall Lake.

In 1996, two specimens were captured on Jefferson County Open Space lands near the mouth of Coal Creek Canyon west of Rocky Flats. This location was combined by NDIS with the record from the Tracy Collins parcel to identify a single site (Coal Creek at Rocky Flats Site).

4.4.4 Middle South Platte-Cherry Creek Hydrologic Unit Proposed Listing Rule Records

In Jefferson County, the Service recognized that the species occurred in all four drainages at Rocky Flats. Three of the Rocky Flats sites (Walnut Creek, Woman Creek and Smart Drainage) are contained in the Middle South Platte-Cherry Creek Hydrologic Unit. *Z. hudsonius* considered by the Service to be Preble's have been reported annually from all the Rocky Flats sites since they were first discovered in 1991.

4.4.5 Upper South Platte Hydrologic Unit Proposed Listing Rule Records

Z. hudsonius considered by the Service to be Preble's were captured from the Plum Creek drainage in Douglas County in 1995 from a site on East Plum Creek near Larkspur. In 1996, additional surveys located the species at a second East Plum Creek site, on Plum Creek south of Sedalia and at a site on Indian Creek (a tributary to Plum Creek) south of Louviers (see Table 4-3 and Figure 4-3).

4.4.6 Fountain Hydrologic Unit Proposed Listing Rule Records

The proposed listing rule notes captures occurred at the Air Force Academy in 1994 and 1995 along Monument Creek in El Paso County. In 1996, additional *Z. hudsonius* considered by the Service to be Preble's were captured along Smith Creek east of the Air Force Academy. The Monument and Smith Creek EORs were combined by NDIS to form a single site (Monument Creek Site).

4.5 1998 Final Rule Listing *Z. h. preblei* as Threatened

Although the Service initially proposed to list *Z. h. preblei* as endangered, on May 13, 1998 the Service listed the species as threatened (63 FR 26517). Only one field season (1997) occurred between the proposed and final listing rules. However, the number of additional occupied sites discovered during that field season was significant. Presumably, this is why the Service listed *Z. h. preblei* as threatened rather than endangered. Sites which were known to have extant populations at the time of the final listing rule are listed on Table 4-4. The locations of extant populations known at the time of the listing are shown on Figure 4-4. At the time of the final listing rule, the Service believed the species occurred in seven Colorado counties and two counties in Wyoming. *Z. hudsonius* considered by the Service to be Preble's were known from nine hydrologic units including Upper Lodgepole, Crow, Lone-Tree Owl, Middle South Platte-

Table 4-4 Known Extant Populations of *Z. hudsonius* Considered by the Service to be Preble's Identified in the 1998 Final Listing Rule and Pre-1998 CNHP EORs and WYNDD POD	
Site	**County**
Upper Lodgepole Hydrologic Unit	
Middle Lodgepole Creek	Albany
North Branch Middle Lodgepole Creek	Albany
Crow Hydrologic Unit	
Crow Creek	Laramie
Lone Tree-Owl Hydrologic Unit	
Lone Tree Creek at Warren	Weld
Cache La Poudre Hydrologic Unit	
Middle Fork Rabbit Creek	Larimer
Lone Pine Creek	Larimer
St. Vrain Hydrologic Unit	
Rock Creek	Jefferson
Coal Creek – Tracy Collins Parcel	Boulder
Coal Creek at Rocky Flats	Jefferson
South Boulder Creek in Boulder - Van Vleet Parcel South Boulder Creek in Boulder– Gebhard and Burke parcels	Boulder
South Boulder Creek near Eldorado Springs - Doudy Draw	Boulder
Lake Ditch	Boulder
St. Vrain Creek at 75th	Boulder
Middle South Platte-Cherry Creek Hydrologic Unit	
Walnut Creek	Jefferson
Woman Creek	Jefferson
Smart Drainage	Jefferson
Hay Gulch	Elbert
Clear Hydrologic Unit	
Ralston Creek	Jefferson
Upper South Platte Hydrologic Unit	
East Plum Creek west of Hunt Mountain	Douglas
East Plum Creek north of Tomah	Douglas
West Plum Creek at Perry Park	Douglas
Plum Creek at Sedalia	Douglas
Indian Creek at Lambert Ranch	Douglas
Little Willow Creek	Douglas
Cook Creek	Douglas
Willow Creek	Douglas
Fountain Hydrologic Unit	
Monument Creek Pine Creek Smith Creek	El Paso
West Monument Creek	El Paso
Cottonwood Creek	El Paso
Beaver Creek	El Paso

Figure 4-4. Location of Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's Identified in the 1998 Final Listing Rule and Pre-1998 CNHP EORs and WYNDD POD Records

Cherry Creek, St. Vrain, Clear, Cache La Poudre, Upper South Platte and Fountain.

CNHP EORs identify a number of new sites discovered during the 1997 trapping season. At the time of the listing, CNHP EORs indicate the species was known from 26 sites in Colorado distributed across seven hydrologic units (see Table 4-4). No additional extant populations were discovered in Wyoming between the proposed and final rules – but few, if any surveys, were conducted. In the 1998 final listing rule, the Service reported extant populations only from the Crow Creek Site on F.E. Warren Air Force Base in Laramie County and at the North Branch Middle Lodgepole Creek and Middle Lodgepole Creek sites in Albany County (see Figure 4-4).

4.5.1 Upper Lodgepole Creek Hydrologic Unit Final Listing Rule Records

No additional sites were discovered in this hydrologic unit between the proposed and final listing rules.

4.5.2 Crow Hydrologic Unit Final Listing Rule Records

No additional sites were discovered in this hydrologic unit between the proposed and final listing rules.

4.5.3 Lone Tree-Owl Hydrologic Unit Final Listing Rule Records

Although known to occur historically in this hydrologic unit in Wyoming (see Table 4-1), *Z. hudsonius* considered by the Service to be Preble's were not captured in recent time until 1997 (Lone Tree Creek in northwestern Weld County). CNHP mapped this site north of the Highway 87 crossing of Lone Tree Creek.

4.5.4 St. Vrain Hydrologic Unit Final Listing Rule Records

Two additional sites were discovered in the St. Vrain Hydrologic Unit in 1997. The Lake Ditch Site was identified in Boulder County about 4.3 miles west of Hygiene and about 3.5 miles south of Lyons. The second 1997 discovered site was also in Boulder County along St. Vrain Creek west of its crossing of 75th Street approximately 0.75 miles south of Hygiene.

4.5.5 Middle South Platte-Cherry Creek Hydrologic Unit Final Listing Rule Records

One very important site was discovered in this hydrologic unit in 1997 when *Z. hudsonius* considered by the Service to be Preble's were found at Hay Gulch (tributary to Box

Elder Creek) on the eastern edge of the hydrologic unit. The Hay Gulch Site represents the first capture in Elbert County and significantly extended the range of the species to the east.

4.5.6 Clear Hydrologic Unit Final Listing Rule Records

Two historic records exist from this hydrologic unit. However, the species was not captured from the hydrologic unit in recent time until 1997 when they were found by CNHP along Ralston Creek in Jefferson County directly west of Ralston Reservoir.

4.5.7 Cache La Poudre Hydrologic Unit Final Listing Rule Records

Although two historic records exist from this hydrologic unit, it was not known to be occupied prior to 1997 when two sites were discovered in Larimer County. *Z. hudsonius* considered by the Service to be Preble's were found along Lone Pine Creek in Cherokee State Park Wildlife Area. They were also found along North Fork Rabbit Creek about 3.7 miles south of Halligan Reservoir and about 0.5 miles north of its confluence with Middle Fork Rabbit Creek. NDIS combined all the Rabbit Creek drainage capture records into a single site (CDOW, 2002) which we call Middle Fork Rabbit Creek Site.

4.5.8 Upper South Platte Hydrologic Unit Final Listing Rule Records

Three additional sites were discovered in the Upper South Platte Hydrologic Unit in 1997 – all in Douglas County. The Little Willow Creek Site is located in Roxborough State Park in western Douglas County about 1 mile southeast of Aurora Rampart Reservoir. The Willow Creek Site is approximately 0.8 miles south of the Little Willow Creek Site but is mapped as a separate site by NDIS. The Cook Creek Site is located about 3.5 miles south of Larkspur and approximately 2 miles downstream (south) of Cook Creek's confluence with East Plum Creek.

4.5.9 Fountain Hydrologic Unit Final Listing Rule Records

During the 1997 trapping season, the number of known occupied sites in the Fountain Hydrologic Unit increased as *Z. hudsonius* considered by the Service to be Preble's were found in drainages tributary to Monument Creek. NDIS mapped three additional sites in this hydrologic unit based on 1997 captures including Kettle Creek, Stanley Creek and Beaver Creek. The sites were not mapped contiguous with the Monument Creek Site based on distance between capture locations (CDOW, 2002).

4.6 Current Distribution of *Z. hudsonius* Considered by the Service to be Preble's

Six trapping seasons have passed since *Z. h. preblei* was listed as threatened by the Service. Since the listing, additional surveys have been conducted in both Colorado and Wyoming. The results of those survey efforts clearly demonstrate that *Z. hudsonius* considered by the Service to be Preble's is much more widespread and ubiquitous than previously believed. Records maintained by the CNHP, the Service and WYNDD indicate the species is now known to occupy 126 sites in Colorado and Wyoming. Known currently occupied sites are listed on Table 4-5 and are shown in Map 1 (attached to the end of this petition). Equally important, the species is now known to occur in all hydrologic units historically occupied and three where it was previously unknown.

In this section we describe the results of trapping surveys conducted after the listing. We also compare what is currently known about the distribution of *Z. hudsonius* considered by the Service to be Preble's in each hydrologic unit to its historic distribution. We are aware the some may criticize they way occupied sites were delineated for purposes of this petition and we recognize that some of the sites described below may be incorporated into large occupied complexes. For instance, in the Cache La Poudre Hydrologic Unit, individual sites occurring along the North Fork Cache La Poudre River may actually comprise a single, extremely large site that includes the North Fork and its tributaries (i.e., Dale Creek and Fish Creek) all the way into Wyoming. However, rather than speculate at this point as to what sites could be combined based on future surveys, we determined it most reasonable to strictly follow the protocol developed by CDOW/NDIS in delineating occupied sites.

4.6.1 Middle North Platte-Casper Hydrologic Unit Current Occupied Sites

Historically, *Z. hudsonius* considered by the Service to be Preble's were known in this hydrologic unit from a single site reported by Jones (1981) on Box Elder Creek. It was unknown in the hydrologic unit in recent time. In 1999, the U.S. Forest Service captured two specimens in this hydrologic unit approximately 8 miles southeast of the historic Box Elder Creek Site on Stickey Creek. The recent capture location and historic site are shown on Map 1.

Table 4-5 Historic and Current Known Extant Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's			
Historic Sites	**Current Occupied Sites**	**Current Site County**	**Principal Current Occupied Tributaries**
Middle North Platte-Casper Hydrologic Unit			
Box Elder Creek	Stickey Creek	Converse	
Glendo Reservoir Hydrologic Unit			
North Horseshoe Creek	North Platte River	Converse	
	Bed Tick Creek	Converse	
	Horseshoe Creek	Converse	
	Cottonwood Creek	Albany	
Lower Laramie Hydrologic Unit			
Chugwater Creek	Chugwater Creek	Laramie	Threemile Creek
	Friend Creek	Albany	
	North Laramie River	Albany	Sturgeon Creek
			Wyman Creek
	Sybille Creek	Platte	
	North Sybille Creek	Albany	
	Rabbit Creek	Platte	
	Luman Creek	Platte	
	Duck Creek	Albany	
	South Hunton Creek	Platte	
	North Richeau Creek	Platte	
	Richeau Creek	Platte	
	Spring Creek	Laramie	
Horse Hydrologic Unit			
Mill Creek	Horse Creek at Highway 211	Laramie	South Fork Horse Creek
Unnamed Tributary to Horse Creek	North Fork South Fork Bear Creek	Laramie	
South Fork Horse Creek	North Fork Bear Creek	Laramie	
	South Fork Bear Creek	Laramie	
	Little Bear Creek west of I-25	Laramie	Paulson Branch Little Bear Creek
	Little Bear Creek east of I-25	Laramie	
	Horse Creek at I-25	Laramie	
	Paulson Branch of Little Bear Creek	Laramie	

Table 4-5 (continued)			
Historic Sites	**Current Occupied Sites**	**Current Site County**	**Principal Current Occupied Tributaries**
Upper Lodgepole Hydrologic Unit			
North Lodgepole Creek	North McKenchie Creek	Albany	
Lodgepole Creek	Middle Lodgepole Creek	Albany	North Branch Middle Lodgepole Creek
	South Lodgepole Creek at Pole Mountain	Albany	
	South Lodgepole Creek at Government Gully	Albany	
	Lodgepole Creek	Laramie	
Crow Hydrologic Unit			
Crow Creek	Crow Creek	Laramie	
South Fork Crow Creek	South Fork Middle Crow Creek	Albany	
	Middle Crow Creek	Albany	
	South Branch North Fork Crow Creek	Albany	
Lone Tree-Owl Hydrologic Unit			
Unnamed Tributary to Lone Tree Creek	Lone Tree Creek at Granite	Laramie	
	Lower Branch Lone Tree Creek	Laramie	
	Lone Tree Creek at Warren	Weld	
	Lone Tree Creek at Carr	Weld	
Cache La Poudre Hydrologic Unit			
SE of Fort Collins	Fish Creek	Larimer	
Greeley	Dale Creek	Larimer	Georges Gulch
			Fish Gulch
	North Fork Cache La Poudre River at Halligan Reservoir	Larimer	Dale Creek
	Bull Creek	Larimer	
	Elk Horn Creek	Larimer	
	Stonewall Creek	Larimer	Tenmile Creek
			Lone Tree Creek
	Middle Fork Rabbit Creek	Larimer	North Fork Rabbit Creek
	North Fork Cache La Poudre River northeast of Livermore	Larimer	Lone Pine Creek
			Stonewall Creek
			North Poudre Canal
	Lone Pine Creek	Larimer	
	Cache La Poudre River at Glen Echo	Larimer	Sevenmile Creek
			Crown Point Gulch
			Mineral Springs Gulch

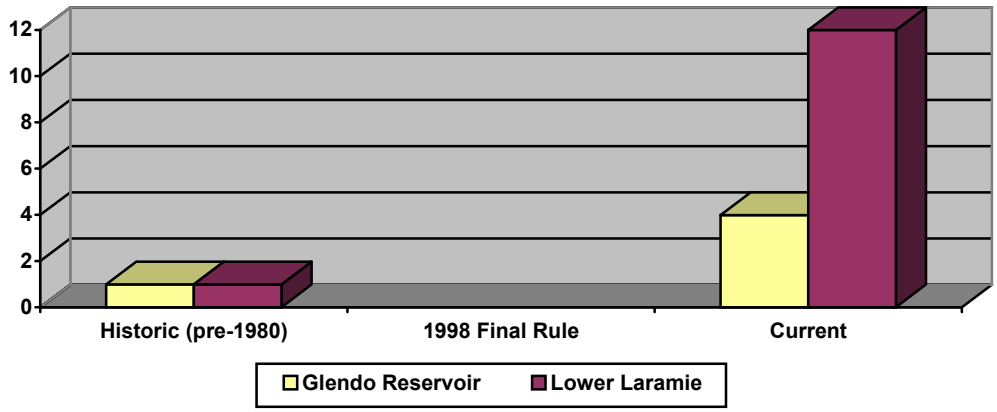
Table 4-5 (continued)			
Historic Sites	**Current Occupied Sites**	**Current Site County**	**Principal Current Occupied Tributaries**
Cache La Poudre Hydrologic Unit (continued)			
	Cache La Poudre River at Mishawaka	Larimer	Young Gulch
			Stove Prairie Gulch
	Cache La Poudre River south of Sheep Mountain	Larimer	Poverty Gulch
			Buck Gulch
			Stevens Gulch
	Cache La Poudre River south of Red Mountain	Larimer	Skin Gulch
	South Fork Cache La Poudre River	Larimer	Pendergrass Creek
	Cache La Poudre River at La Porte	Larimer	Mill Canyon
			Pleasant Valley and Lake Canal
			Dry Creek Ditch
	Arthurs Gulch	Larimer	
Big Thompson Hydrologic Unit			
Loveland	Bear Gulch	Larimer	
	Buckhorn Creek	Larimer	Lakey Canyon
			Twin Cabin Gulch
	Little Bear Gulch	Larimer	
	North Fork Big Thompson River	Larimer	Dunraven Glade
			West Creek
			Fox Creek
	Cedar Creek	Larimer	Dry Creek
	Upper Little Thompson River	Larimer	West Fork Little Thompson River
	Little Thompson River at Hillsboro Reservoir	Weld	
	South Platte River at Milliken	Weld	
	Big Thompson/Little Thompson Confluence	Weld	
	Sheep Creek	Larimer	
St. Vrain Hydrologic Unit			
Left Hand Canyon	St. Vrain Creek at Lyons	Boulder	Supply Ditch
Elmer Johnson Ranch			Stone Canyon
Brushy Mountain			St. Vrain Supply Canal
Niwot			South Ledge Ditch
Gravel Pits			Highland Ditch
Dry Creek			Rough and Ready Ditch
S Boulder			Longmont Supply Ditch
			Oligarchy Ditch
			Swede Ditch
			Boulder Feeder Canal

Table 4-5 (continued)			
Historic Sites	**Current Occupied Sites**	**Current Site County**	**Principal Current Occupied Tributaries**
St. Vrain Hydrologic Unit (continued)			
	St. Vrain Creek at 75th	Boulder	Mill Ditch
			Clover Basin Ditch
			James Ditch
			Niwot Ditch
			Peck Ditch
	Lake Ditch	Boulder	
	Gregory Canyon	Boulder	
	Bear Creek near Bear Park	Boulder	
	Coal Creek at Superior	Boulder	Community Ditch
	South Boulder Creek near Eldorado Springs	Boulder	South Boulder Diversion Canal
			Community Ditch
			Doudy Draw
			Davidson Ditch
			South Boulder Foothills Ditch
	Coal Creek at Rocky Flats	Jefferson	South Boulder Diversion Canal
	Rock Creek	Jefferson	
	South Boulder Creek in Boulder	Boulder	Goodhue Ditch
			South Boulder Canyon Ditch
			New Dry Creek Ditch
			Enterprise Ditch
			Empson Ditch
			Davidson Ditch
	Coal Creek at Centaur Village	Boulder	
	Upper Bear Canyon	Boulder	
Middle South Platte-Cherry Creek Hydrologic Unit			
Ft. St. Vrain	Walnut Creek	Jefferson	
Lowline Canal near Banner Lake	Woman Creek	Jefferson	
Croke Lake	Smart Drainage	Jefferson	
	Cherry Creek at Baldwin Gulch	Douglas	Newlin Gulch
			Baldwin Gulch
	Cherry Creek at Parker	Douglas	Sulphur Gulch
	Hay Gulch	Elbert	
	Cherry Creek at Kinney Creek	Douglas	Lemon Gulch
			Kinney Creek
	Cherry Creek north of Franktown	Douglas	Bayou Gulch
			McMurdo Gulch

Table 4-5 (continued)			
Historic Sites	**Current Occupied Sites**	**Current Site County**	**Principal Current Occupied Tributaries**
Middle South Platte-Cherry Creek Hydrologic Unit (continued)			
	Cherry Creek south of Franktown	Douglas	Willow Creek
			Russellville Gulch
	Running Creek	Elbert	
	Lake Gulch	Douglas	Upper Lake Gulch
	East Cherry Creek at Russellville Road	Douglas	
	West Cherry Creek	Douglas	
	Antelope Creek	Douglas	
	East Cherry Creek east of Bucks Mountain	Douglas	Iron Gulch
	East Cherry Creek north of Table Rock	Douglas	
Clear Hydrologic Unit			
Pumping Station/Sangraco Lake	Ralston Creek	Jefferson	
	Elk Creek	Jefferson	
Chico Hydrologic Unit			
None	Peyton	El Paso	
Upper South Platte Hydrologic Unit			
South Platte River/Denver	Chatfield Reservoir East	Douglas	Plum Creek
			Spring Gulch
	Chatfield Reservoir West	Douglas	
	Indian Creek at Lambert Ranch	Douglas	Lehigh Gulch
	Unnamed Tributary to Indian Creek	Douglas	
	Little Willow Creek	Douglas	
	Willow Creek	Douglas	
	West Plum Creek at Sedalia	Douglas	Jarre Creek
			Garber Creek
			Jackson Creek
			East Plum Creek
	East Plum Creek at Castle Rock	Douglas	Hangmans Gulch
			Sellers Gulch
	Indian Creek at Pine Nook	Douglas	
	Bear Creek at Moonridge	Douglas	
	South Platte River near Trumbull	Jefferson	
	East Plum Creek north of Tomah	Douglas	
	West Plum Creek at Bear Creek	Douglas	Bear Creek
	East Plum Creek west of Hunt Mountain	Douglas	
	West Plum Creek at Perry Park	Douglas	Gove Creek
	Wigwam Creek	Jefferson	

Table 4-5 (concluded)			
Historic Sites	**Current Occupied Sites**	**Current Site County**	**Principal Current Occupied Tributaries**
Upper South Platte Hydrologic Unit (continued)			
	North Trout Creek	Douglas	Polhemus Gulch
			Eagle Creek
	South Trout Creek	Douglas/Teller	
	Cook Creek	Douglas	
	Carpenter Creek	Douglas	
	South Platte River at Oxyoke	Jefferson	
	Kennedy Gulch	Jefferson	
Fountain Hydrologic Unit			
Colorado Springs	Monument Creek	El Paso	Beaver Creek
Dirty Woman Creek			Jackson Creek
			Smith Creek
			Black Squirrel Creek
			Pine Creek
			Dry Creek
	Beaver Creek	El Paso	
	Deadmans Lake	El Paso	
	Lehman Run	El Paso	
	Kettle Creek	El Paso	
	Stanley Creek	El Paso	
	North Monument Creek	El Paso	
Kiowa Hydrologic Unit			
None	North Kiowa Creek	Elbert	
	South Kiowa Creek	Elbert	
Upper Laramie Hydrologic Unit			
None	A number of currently occupied sites have been identified in this hydrologic unit. However, we are unable to disclose their location because the majority are located on private lands and WYNDD has agreed not to disclose specific locations where *Z. hudsonius* considered by the Service to be Preble's have been captured. The Service should contact Gary Beauvais, Director of the Wyoming Natural Diversity Database, to discuss the locations of currently occupied sites in this hydrologic unit.		

Figure 4-5
Summary of Historic and Current Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's in the Glendo Reservoir and Lower Laramie Hydrologic Units



4.6.2 Glendo Reservoir Hydrologic Unit Current Occupied Sites

Prior to 1999, *Z. hudsonius* considered by the Service to be Preble's were known from this hydrologic unit from a single historic record along North Horseshoe Creek. No recent captures were known from this hydrologic unit during the listing process. However, four additional occupied sites were discovered in this hydrologic unit after the listing (see Figure 4-5 and Table 4-5).

In 1999, a single specimen was found in Converse County along the North Platte River within the City of Douglas by the Service (North Platte River Site). A second occupied site was identified in Converse County on Bed Tick Creek south of the North Platte River during surveys for a Wyoming Interstate Company (WIC) pipeline.

Z. hudsonius considered by the Service to be Preble's were discovered in 1999 in this hydrologic unit along Horseshoe Creek near its confluence with Trail Creek by the U.S. Forest Service in Converse County. The Horseshoe Creek Site is approximately 9 miles southwest of the historic record from North Horseshoe Creek reported by Krutzsch (1954). Two surveys, conducted by Taylor (1999) and the U.S. Forest Service, found *Z. hudsonius* considered by the Service to be Preble's on Cottonwood Creek in this hydrologic unit in north Albany County in Cottonwood Park west of Albany Peak.

4.6.3 Lower Laramie Hydrologic Unit Current Occupied Sites

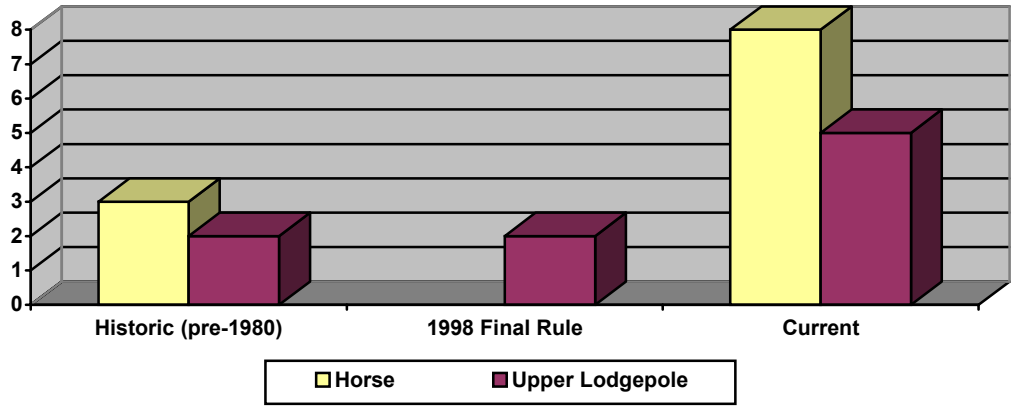
Historically, *Z. hudsonius* considered by the Service to be Preble's were known from a single site (Chugwater Creek) on the extreme southeastern edge of this hydrologic unit (see Figure 4-1 and Map 1). No specimens were reported from this hydrologic unit during the listing process. Since the listing, *Z. hudsonius* considered by the Service to be Preble's have been discovered at 12 sites in this hydrologic unit (see Figure 4-5). All 12 sites were discovered during 1999 surveys conducted by Taylor (1999), the U.S. Forest Service, during surveys of stream crossings for the WIC Pipeline and by Western Ecosystem Technology (WEST). Current occupied sites in this hydrologic unit are listed on Table 4-5.

Taylor (1999) discovered *Z. hudsonius* considered by the Service to be Preble's at Three Mile Creek, Chugwater Creek and its tributary Spring Creek just south of the Laramie-Platte County line in Laramie County near Lambert, Wyoming in the southern portion of the hydrologic unit. The collections occurred approximately 20 miles southeast of the historic record on Chugwater Creek in the Town of Chugwater. About 9 miles west of the historic Chugwater Creek record, specimens were found during surveys for the WIC Pipeline at three sites along South Hunton, North Richeau and Richeau creeks (see Map 1). The collection sites are west of Slater, Wyoming and Walker Draw in Platte County.

The U.S. Forest Service reported capture of *Z. hudsonius* considered by the Service to be Preble's at two locations on Friend Creek in northern Albany County in 1999. The capture locations were about 0.5 miles northeast of Friend Park and approximately 2 miles west of Laramie Peak in the northern portion of the hydrologic unit. East of Friend Park, specimens were also captured in northern Albany County at three locations along the North Laramie River. Captures were made on the North Laramie River and along its tributaries including Sturgeon Creek and Wyman Creek (Taylor, 1999).

West of Wheatland, Wyoming, Taylor (1999) reported capturing *Z. hudsonius* considered by the Service to be Preble's along Sybille Creek north of the Cooney Hills. The capture location is approximately 2.5 miles upstream (south) of Sybille Creek's confluence with the Laramie River and north of Hightower Road in western Platte County. About 9 miles west of the Sybille Creek Site, Taylor (1999) also captured specimens on Rabbit and Luman creeks (tributaries to the Laramie River) in western Platte County. WEST captured *Z. hudsonius* considered by the Service to be Preble's on North Sybille Creek on the southwestern edge of this hydrologic unit in eastern Albany County. The captures occurred at Morton Pass in the

Figure 4-6
Summary of Historic and Current Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's in the Horse and Upper Lodgepole Hydrologic Units



Laramie Mountain Range about 2.5 miles northeast of Plumbago Canyon. Specimens were also captured on Duck Creek near its confluence with Pole Creek by Taylor (1999) in northeastern Albany County. The capture location is mapped by WYNDD approximately 2 miles south of Pine Mountain. Duck Creek is tributary to the Laramie River.

4.6.4 Horse Hydrologic Unit Current Occupied Sites

The Horse Hydrologic Unit has three historic records but was not known to be occupied during the listing process (see Figures 4-1 and 4-6). Since the listing, Z. hudsonius considered by the Service to Preble's have been discovered at eight sites in the hydrologic unit (see Table 4-5).

All of the recent captures occurred in the western portion of the hydrologic unit (see Map 1) in the headwaters of drainages on the eastern flank of the Laramie Range. Many of the recent captures in this hydrologic unit were made in the Bear Creek drainage. The most eastern captures from this drainage were from Little Bear Creek east of Interstate 25 (Taylor, 1999). Further west, toward the headwaters of Horse Creek, additional captures were reported by WEST near Horse Creek Siding and east of Fisher Canyon at Highway 211. As shown in Map 1, the upper Horse Creek captures are in close proximity to the historic record from the South Fork Horse Creek reported by Jones (1981).

WYNDD POD contains 11 capture records in the vicinity of the Horse Creek crossing of Highway 211. We have combined these records into a single site we call Horse Creek at Highway 211 (see Map 1). *Z. hudsonius* considered by the Service to be Preble's have also

been recently found in a number of other drainages in the Horse Creek Hydrologic Unit in northwestern Laramie County. Captures at two sites were reported by Taylor (1999), both east and west of Interstate 25 on Little Bear Creek about 26 miles north of Cheyenne. Taylor (1999) also reported capturing specimens on North Fork Bear Creek, South Fork Bear Creek and North Fork South Fork Bear Creek (see Map 1). These sites are located west of Interstate 25.

4.6.5 Upper Lodgepole Hydrologic Unit Current Occupied Sites

Historically, the species is known from two sites in the Upper Lodgepole Hydrologic Unit (see Figure 4-1). Current trapping records now indicate there are at least five occupied sites in the hydrologic unit (see Table 4-5). All historic and current occupied sites are located in the headwaters of Lodgepole Creek in eastern Albany and western Laramie counties (see Map 1).

In 1998, WEST confirmed that *Z. hudsonius* considered by the Service to be Preble's still existed along Lodgepole Creek at Islay where they were reported historically by Long (1965). In addition, the U.S. Forest Service reported capturing specimens at a number of additional locations in the headwaters of Lodgepole Creek including along North McKenchie Creek in the Pole Mountain area near Highway 210. *Z. hudsonius* considered by the Service to be Preble's were also reported on Middle Lodgepole Creek (and North Branch Middle Lodgepole Creek) in the Eagle Rock Wetland Complex.

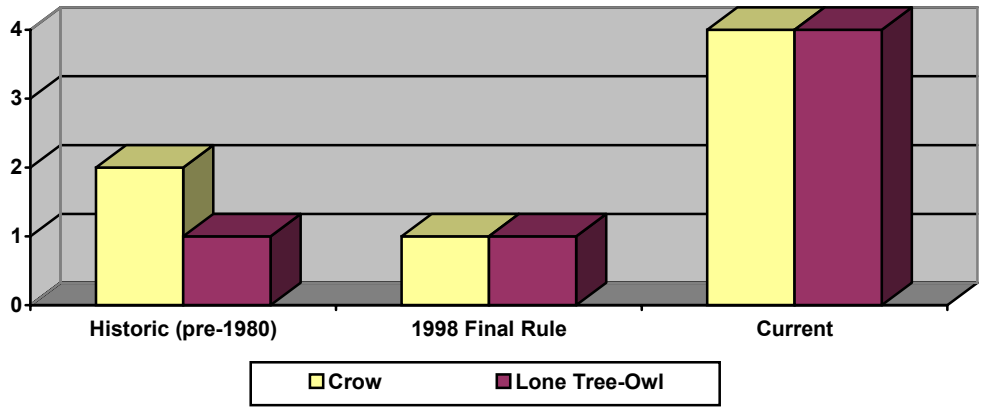
Specimens have been captured recently from two sites on South Lodgepole Creek. One site is located in the Pole Mountain area about 1.5 miles northwest of Upper North Crow Reservoir. The second site is 3.2 miles east of Government Gully.

4.6.6 Crow Hydrologic Unit Current Occupied Sites

Historically, two sites in this hydrologic unit have been known to be occupied. Four sites are currently known (see Figure 4-7). Crow Creek on F.E. Warren Air Force Base continues to be occupied by *Z. hudsonius* considered by the Service to be Preble's. They were again captured by WYNDD from Crow Creek in 2002 (Gary Beauvais, WYNDD. pers. comm.).

The U.S. Forest Service reported capturing *Z. hudsonius* considered by the Service to be Preble's at three additional sites in this hydrologic unit in 1998 in western Laramie County. The South Branch North Fork Crow Creek Site is located near Upper North Crow Reservoir. The Middle Crow Creek Site is located about 3.5 miles north of Buford, Wyoming. The South Fork Middle Crow Creek Site is located about 1.7 miles south of the Middle Crow Creek Site.

Figure 4-7
Summary of Historic and Current Sites Occupied by Z. *hudsonius* Considered by the Service to be Preble's in the Crow and Lone Tree-Owl Hydrologic Units



4.6.7 Lone Tree-Owl Hydrologic Unit Current Occupied Sites

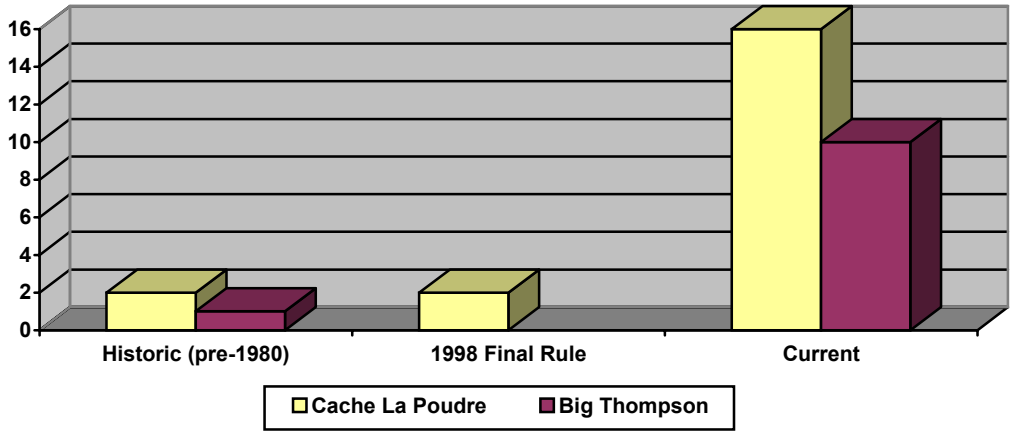
Currently *Z. hudsonius* considered by the Service to be Preble's are known from four sites in this hydrologic unit, including sites in both Colorado and Wyoming. Historically, only one record exists from this hydrologic unit (see Figure 4-7). In Wyoming, captures have occurred recently at two locations in southwestern Laramie County. The first site is approximately 0.5 miles southwest of Granite, Wyoming on Lone Tree Creek at the Harriman Interchange on Interstate 80. The second Wyoming site is on the lower branch of Lone Tree Creek about 1 mile west of Valley Reservoir. *Z. hudsonius* considered by the Service to be Preble's are known recently from two sites in this hydrologic unit in Colorado in northwestern Weld County (Lone Tree Creek at Carr and Warren). The Warren site was known at the time of the final rule to list.

4.6.8 Cache La Poudre Hydrologic Unit Current Occupied Sites

Although *Z. hudsonius* considered by the Service to be Preble's were discovered at new sites throughout its range after the listing, in the Cache La Poudre Hydrologic Unit the number of new site discoveries was dramatic (see Figure 4-8 and Map 1). Historically, only two sites in the hydrologic unit are known to have been occupied (see Table 4-5). Trapping after the listing identified Preble's at 16 sites (see Figure 4-8).

In 1998, CDOW completed a trapping survey of Larimer and Weld counties which included portions of the Cache La Poudre Hydrologic Unit (Shenk and Eussen, 1999). Prior to the 1998 listing, very few surveys for determining the presence or absence of meadow jumping mice had

Figure 4-8
Summary of Historic and Current Sites Occupied by Z. *hudsonius* Considered by the Service to be Preble's in the Cache La Poudre and Big Thompson Hydrologic Units



been conducted in these two counties. Of the 39 locations surveyed by CDOW in 1998, *Z. hudsonius* considered by the Service to be Preble's were captured at 21 locations.

In the northern portion of this hydrologic unit, a single specimen was captured at the Fish Creek Site in 1998 (see Map 1). The Fish Creek Site is mapped by NDIS on the Colorado-Wyoming border west of Highway 287 in northern Larimer County. The Dale Creek Site is also located along Highway 287 in northern Larimer County. The site is located about 3.5 miles southeast of the Fish Creek Site at Virginia Dale at the Highway 287 crossing of Dale Creek.

South of the Dale Creek Site, *Z. hudsonius* considered by the Service to be Preble's were captured on the North Fork Cache La Poudre River both north and south of Halligan Reservoir west of Highway 287 during the 1998 CDOW survey. Specimens were captured at several additional sites on the North Fork Cache La Poudre River in 1998, including near Livermore. On the west side of the reservoir, captures were made along Meadow Creek. About 3.5 miles west of Meadow Creek is the Bull Creek Site where 13 specimens were captured during the 1998 CDOW surveys (see Map 1).

South of Halligan Reservoir, *Z. hudsonius* considered by the Service to be Preble's were discovered in the Rabbit Creek drainage in 1997 (Middle Rabbit Creek Site) at Cherokee Park State Wildlife Area. The location is about 1 mile northwest of Calloway Hills and is mapped by NDIS separately from the adjacent North Fork Cache La Poudre River at Halligan Reservoir Site.

In 2000, Preble's were captured at Stonewall Creek east of the capture locations on the North Fork Cache La Poudre River at Halligan Reservoir. The site is located about 5.5 miles north of Livermore and is bisected by Highway 287. The site, as mapped by NDIS, includes two tributaries – Tenmile and Lone Tree creeks. The Lone Pine Creek Site is located about 8 miles west of Livermore. The site was discovered in 1997 and is also located within the Cherokee Park State Wildlife Area.

NDIS has mapped five occupied sites along the Cache La Poudre River in Larimer County in the southern portion of this hydrologic unit (see Map 1). NDIS mapping of the five sites incorporates a number of tributaries (see Table 4-5). The sites are located adjacent (mainly to the south) to State Highway 14 west of Poudre Park, Colorado. The Cache La Poudre River at Mishawaka Site was discovered in 1998 by CDOW and includes Young Gulch and Stove Prairie Gulch. Directly west of the Mishawaka site is the Cache La Poudre south of Red Mountain Site. This site includes Skin Gulch and was discovered in 1998 by CDOW. NDIS mapped the Cache La Poudre River south of Sheep Mountain Site directly west of the Red Mountain site along the river and including Poverty Gulch, Buck Gulch and Stevens Gulch. This site was also discovered in 1998 during CDOW surveys (Shenk and Eussen, 1999). The fifth Cache La Poudre River site (at Glen Echo) is located about 8 miles west of the Sheep Mountain site. Three tributaries are included in the NDIS mapping of this site – Sevenmile Creek, Crown Point Gulch and Mineral Springs Gulch (see Table 4-5).

The South Fork Cache La Poudre Site is also located south of State Highway 14 and west of the Cache La Poudre at Sheep Mountain Site (see Map 1). NDIS mapping of this site includes Pendergrass Creek. *Z. hudsonius* considered by the Service to be Preble's were discovered at this site in 1998 by CDOW.

Specimens were captured at Arthurs Gulch in 1998. Arthurs Gulch is on the west side of Horsetooth Reservoir in Lory State Park just west of Fort Collins on the edge of the hydrologic unit.

4.6.9 Big Thompson Hydrologic Unit Current Occupied Sites

Z. hudsonius considered by the Service to be Preble's were known from a single site in the Big Thompson Hydrologic Unit prior to the listing and surveys conducted by CDOW in 1998 (Shenk and Eussen, 1999). Since the listing, specimens have been collected at 10 sites in this

hydrologic unit (see Table 4-5 and Figure 4-8). Current known occupied sites in this hydrologic unit are shown on Map 1.

The Bear Gulch and Little Bear Gulch sites are located about 3.5 miles northwest of Masonville and the Cedar Creek Site is about 3 miles west of Masonville. Dry Creek is included in the NDIS mapping of the Cedar Creek Site.

Two occupied sites are located in the northern portion of the hydrologic unit northwest of Fort Collins. The Buckhorn Creek Site is mapped at the confluence of Buckhorn Creek with Twin Cabin Gulch and NDIS includes Lakey Cabin and Twin Cabin Gulch in the mapped site (CDOW, 2002). Immediately east of the Buckhorn Creek Site is the Sheep Creek Site. Both sites were discovered in 1998 by CDOW during Larimer and Weld County surveys (Shenk and Eussen, 1999).

In 1998, *Z. hudsonius* considered by the Service to be Preble's were discovered on the North Fork Big Thompson River by CDOW. The site is mapped by NDIS near Glen Haven about 6 miles northeast of Estes Park. Tributaries included in the site are Dunraven Glade, West Creek and Fox Creek. Specimens were also found on the Little Thompson River in 1998. The capture location is in the southern portion of the hydrologic unit just north of Pinewood Springs where the Little Thompson River crosses State Highway 36.

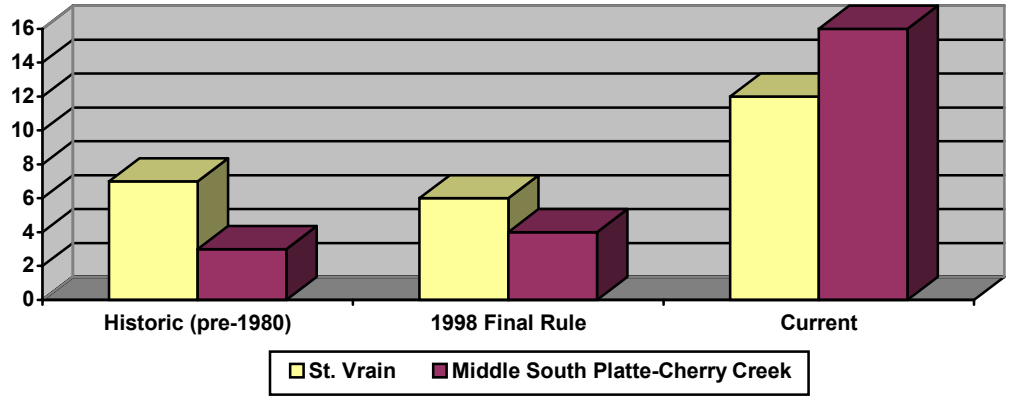
In 2003, three sites were found to contain *Z. hudsonius* considered by the Service to be Preble's in the eastern portion of the hydrologic unit immediately adjacent to Greeley and near Milliken and Hillsboro Reservoir. The sites are located on the South Platte River and on the Big Thompson and Little Thompson rivers at their confluence. In the final listing rule, the Service had suggested that the mouse had been extirpated in the vicinity of Greeley.

4.6.10 St. Vrain Hydrologic Unit Current Occupied Sites

Z. hudsonius considered by the Service to be Preble's were historically known from seven sites in this hydrologic unit. Currently 12 sites are known to be occupied in the hydrologic unit in Boulder and Jefferson counties (see Figure 4-9). Most of the sites mapped by NDIS are extensive in this hydrologic unit and incorporate a number of tributaries (CDOW, 2002).

The St. Vrain Creek at Lyons Site is located just south of Lyons. As mapped by NDIS, the site includes numerous tributaries (see Table 4-5). Most of the collection records for this site are from 1997 and 1999. Southeast of the St. Vrain Creek at Lyons Site is the St. Vrain

Figure 4-9
Summary of Historic and Current Sites Occupied by Z.*hudsonius* Considered by the Service to be Preble's in the St. Vrain and Middle South Platte-Cherry Creek Hydrologic Units



Creek at 75th Site which, according to CNHP EORs, was discovered in 1996. NDIS mapped this site to include a number of tributaries including Mill Ditch, Clover Basin Ditch, James Ditch, Niwot Ditch and Peck Ditch. Southwest of the St. Vrain at Lyons Site is the Lake Ditch Site which was discovered in 1997.

Two sites are known along Coal Creek in southern Boulder County. Southwest of Superior is the Coal Creek at Superior Site which was discovered in 1999. NDIS included Community Ditch within the boundaries of this site. A little over a mile southwest of the Superior site is the Coal Creek at Rocky Flats Site which was first identified in 1989 (Tracy Collins Parcel). NDIS includes the South Boulder Diversion Canal in the boundaries of this site.

NDIS mapped the Gregory Canyon Site in southwest Boulder. We could not identify a CNHP or Service EORs for this site. In 2000, *Z. hudsonius* considered by the Service to be Preble's were discovered along Bear Creek immediately south of the Gregory Canyon Site southwest of Boulder.

NDIS has divided the South Boulder Creek populations into two distinct sites. The first site is in Boulder and includes a number of tributaries including Goodhue Ditch, South Boulder Canyon Ditch, New Dry Creek Ditch, Enterprise Ditch, Empson Ditch and Davidson Ditch. About 30 captures from this site are contained in the CNHP and Service records.

The second NDIS site on South Boulder Creek is located near Eldorado Springs near Eldorado Springs State Park. NDIS included a number of tributaries within the boundaries of

this site including South Boulder Diversion Canal, Community Ditch, Doudy Draw, Davidson Ditch and South Boulder Foothills Ditch. The site was discovered in 1993 with captures at Doudy Draw.

Rock Creek, at Rocky Flats, is contained within this hydrologic unit. *Z. hudsonius* considered by the Service to be Preble's were first discovered in this drainage in 1991 and have been recaptured at the site annually.

4.6.11 Middle South Platte-Cherry Creek Hydrologic Unit Current Occupied Sites

Z. hudsonius considered by the Service to be Preble's were known historically from this hydrologic unit from three occupied sites. Currently, the species is known from 16 sites (see Table 4-5 and Map 1). Three of the currently occupied drainages are at Rocky Flats (Walnut Creek, Woman Creek and Smart Drainage) in Jefferson County where it was first discovered in 1991.

Until recently, the most eastern Colorado record of *Z. hudsonius* considered by the Service to be Preble's was known from this drainage. In 1997, the species was captured at Hay Gulch in Elbert County on the eastern edge of this hydrologic unit (see Map 1). In 2000, another eastern site was discovered in Elbert County (Running Creek Site) south of the Hay Gulch Site and just east of Elizabeth.

The remaining current occupied sites in this hydrologic unit are located in the Cherry Creek drainage. NDIS has mapped five sites on Cherry Creek. The most northern Cherry Creek site is Cherry Creek at Baldwin Gulch where *Z. hudsonius* considered by the Service to be Preble's were captured in 2000 near Jordan Road in Douglas County. NDIS included Newlin Gulch and Baldwin Gulch as tributaries within the boundaries of this site. South of this site is the Cherry Creek at Parker Site where specimens were captured in 1999 in Parker just west of State Highway 83. Sulphur Gulch is included as a tributary to this site. South of Parker, at the confluence of Cherry Creek and Kinney Creek, is the Cherry Creek at Kinney Creek Site which was discovered in 2000. Two currently occupied sites are located on Cherry Creek in the vicinity of Franktown. The Cherry Creek north of Franktown Site was discovered in 1999 at the confluence of Cherry Creek and McMurdo Gulch. South of Franktown, *Z. hudsonius* considered by the Service to be Preble's were discovered in 1998 by CNHP at Castlewood Canyon State Park in Douglas County.

In addition to the Cherry Creek sites, a number of sites have also been discovered on tributaries to Cherry Creek. Three sites have been discovered on East Cherry Creek. The northern most site discovered to date on East Cherry Creek is the East Cherry Creek at Russellville Road Site which is just north of the intersection of Russellville Road and State Highway 83 in southeastern Douglas County. This site was discovered in 2000. Two additional sites have been discovered on East Cherry Creek about 7 miles south of the Russellville Road site. Both sites were discovered in 2000 in the southwestern corner of Douglas County and east of State Highway 83.

Z. hudsonius considered by the Service to be Preble's have also been found in West Cherry Creek. The West Cherry Creek Site is approximately 1.5 miles southwest of the Cherry Creek at Russellville Road Site in Douglas County. This site was discovered in 1998. The Antelope Creek Site was discovered in 1999 in the southwestern portion of the hydrologic unit between State Highway 93 and Interstate 25 in southeastern Douglas County. Antelope Creek flows to Haskell Creek which is tributary to West Cherry Creek. The Lake Gulch Site was discovered in 1998 near the intersections of Lake Gulch Road and Castlewood Canyon Road south of Castlewood Canyon State Park.

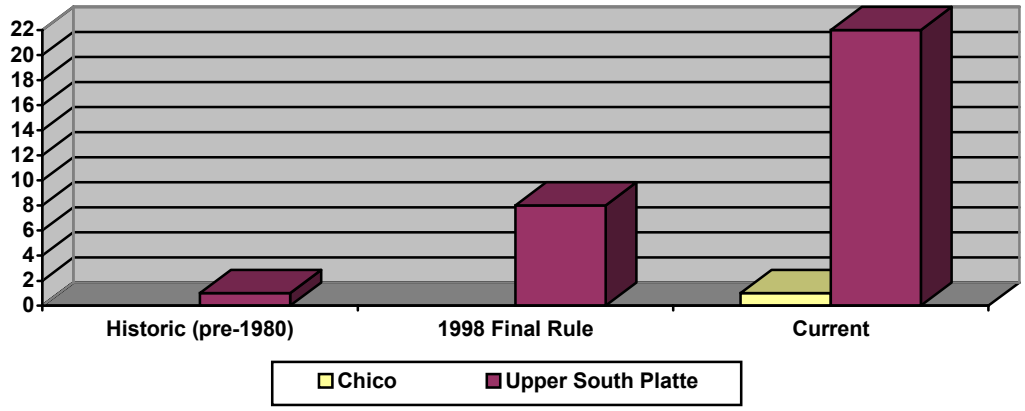
4.6.12 Clear Hydrologic Unit Current Occupied Site

Two currently occupied sites are known to occur in this hydrologic unit (see Table 4-5). In 1997, CNHP captured *Z. hudsonius* considered by the Service to be Preble's at Ralston Creek in Jefferson County (see Map 1). The capture site is on the west side of Ralston Reservoir north of Golden. Specimens were collected at a second location in this hydrologic unit in 2002 at Elk Creek approximately 6 miles southwest of the Ralston Creek Site. Historically, *Z. hudsonius* considered by the Service to be Preble's are known in this hydrologic unit from two records from a single site east of Standley Lake which is located about 10 miles east of Ralston Reservoir (see Map 1).

4.6.13 Kiowa Hydrologic Unit Current Occupied Sites

According to Service EORs, *Z. hudsonius* considered by the Service to be Preble's were recently captured in the Kiowa Hydrologic Unit at two sites along Kiowa Creek (see Table 4-5 and Map 1). These captures are extremely important considering that it again brings into question assumptions made by the Service during the listing process and previous status

Figure 4-10
Summary of Historic and Current Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's in the Chico and Upper South Platte Hydrologic Units



reviews for the species as to the eastern edge of subspecies' range in Colorado. The Kiowa Hydrologic Unit is not historically known to be occupied by the species.

4.6.14 Upper South Platte Hydrologic Unit Current Occupied Sites

According to NDIS mapping and CNHP and Service EORs, the Upper South Platte Hydrologic Unit contains 22 sites currently occupied by *Z. hudsonius* considered by the Service to be Preble's (see Figure 4-10). Historically, Preble's were known from only one site in this hydrologic unit (see Table 4-5). Sites occupied by *Z. hudsonius* considered by the Service to be Preble's in this hydrologic unit are primarily located in Douglas County although specimens have also been collected in Teller County which was not historically considered by the Service or Krutzsch (1954) within the historic range of the species.

Two sites exist at Chatfield Reservoir in and adjacent to Chatfield State Recreation Area (see Map 1). On the southeast side of the reservoir, *Z. hudsonius* considered by the Service to be Preble's were found at the confluence of Plum Creek with Chatfield Reservoir on the west side of Highway 85 in 1998. In 1998, specimens were discovered along the South Platte River at its confluence with Chatfield Reservoir and west of the Plum Creek Site.

Much of the East and West Plum Creek drainages in this hydrologic unit are known to contain the species. NDIS has mapped three distinct sites on each of the creeks (CDOW, 2002). In addition, a number of the tributaries to both creeks are known to be occupied by *Z. hudsonius* considered by the Service to be Preble's.

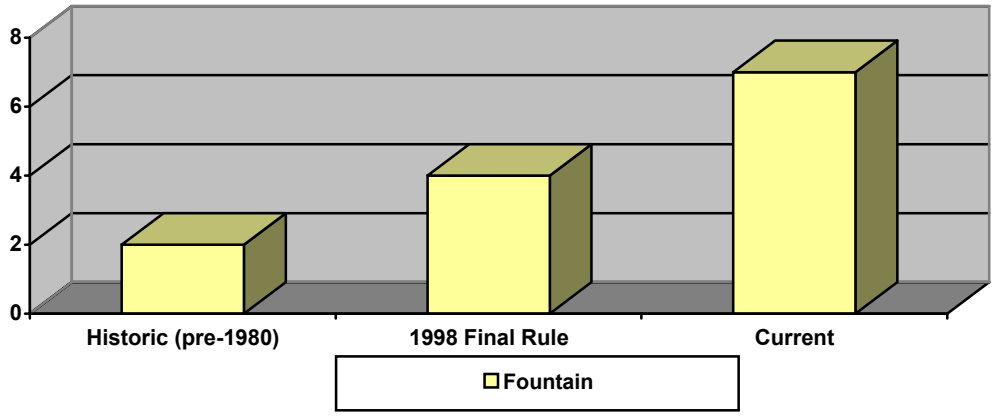
The species was discovered along East Plum Creek at Castle Rock in 1998. The Castle Rock site extends north and south of Castle Rock and includes Hangmans Gulch and Sellers Gulch. *Z. hudsonius* considered by the Service to be Preble's have also been discovered on East Plum Creek north of Tomah, Colorado. The Tomah site was discovered in 1995 and is located about 1.3 miles south of the East Plum Creek at Castle Rock Site. Immediately south of the East Plum Creek at Tomah Site is the third site on East Plum Creek. We have called this site East Plum Creek west of Hunt Mountain. The site was discovered in 1995 and extends along East Plum Creek north of Larkspur.

On West Plum Creek, specimens have been captured at three sites. The northern most site we have called West Plum Creek at Sedalia. NDIS mapped this site beginning at Sedalia and extending south approximately 8 miles along West Plum Creek. The site includes a number of tributaries including Jarre, Garber, Jackson and East Plum creeks. The site was discovered in 1996 by CNHP. South of the Sedalia site is the West Plum Creek at Bear Creek Site which was discovered in 2000. The site is located at the confluence of Bear Creek and West Plum Creek in Douglas County mostly west of Perry Park Road. Immediately south of this site is the West Plum Creek at Perry Park Site which was discovered in 1994 (the earliest recent record in the drainage).

Z. hudsonius considered by the Service to be Preble's have been found on a number of tributaries to Plum Creek including Indian Creek. The species is known to occupy three sites in the Indian Creek drainage. Indian Creek at Lambert Ranch and the Unnamed Tributary to Indian Creek sites are located just west of the West Plum Creek at Sedalia Site and south of Louviers, Colorado. Further upstream, specimens have been found on Indian Creek near Pine Nook. This site was discovered in 1999 by CNHP. Just west of the Pine Nook site, *Z. hudsonius* considered by the Service to be Preble's were discovered along Bear Creek at Moonridge in 2000.

In the vicinity of Roxborough State Park in Douglas County the species has been found in Willow Creek and Little Willow Creek near Aurora Rampart Reservoir. The Willow Creek sites are located west of the Indian Creek at Lambert Ranch Site. In the southeastern portion of the hydrologic unit in Douglas County, *Z. hudsonius* considered by the Service to be Preble's have been found at sites on Cook and Carpenter creeks (both tributary to East Plum Creek). The Cook Creek Site was discovered in 1997 – Carpenter Creek was discovered in 1999. Both sites are just west of Interstate 25 near Greenland.

Figure 4-11
Summary of Historic and Current Sites Occupied by *Z. hudsonius* Considered by the Service to be Preble's in the Fountain Hydrologic Unit



In the southwestern portion of Douglas County and adjacent Teller County, *Z. hudsonius* considered by the Service to be Preble's have been discovered at two locations along Trout Creek southeast of Deckers, Colorado. NDIS included portions of Polhemus Gulch and Eagle Creek in the boundaries of the North Trout Creek site. In 2000, Preble's were also found along Wigwam Creek southwest of Deckers and north of Cheesman Lake.

4.6.15 Chico Hydrologic Unit Current Occupied Sites

Historically, the species is not known from this hydrologic unit which is located in the southeastern portion of its historically-known range. *Z. hudsonius* considered by the Service to be Preble's were captured south of Peyton in 1998 in the northern portion of this hydrologic unit, presumably in the Brackett Creek drainage (CDOW, 2002).

4.6.16 Fountain Hydrologic Unit Current Occupied Sites

This hydrologic unit is known to have been historically occupied from two sites (see Table 4-5). NDIS currently has seven sites mapped in this hydrologic unit in El Paso County (see Figure 4-11).

The largest occupied site is Monument Creek including its tributaries (see Map 1). It has been suggested that the Monument Creek drainage is currently believed to contain the largest known population of *Z. hudsonius* considered by the Service to be Preble's. Most of its tributaries, including Beaver, Jackson, Smith, Black Squirrel, Pine and Dry creeks, also are

known to be occupied. NDIS has mapped the extensive Monument Creek Site to incorporate these principal tributaries (CDOW, 2002).

In addition, NDIS has mapped other sites on these tributaries which are spatially disassociated with the Monument Creek Site. Separate sites have been mapped on Beaver Creek, Deadmans Lake, Lehman Run, Kettle Creek, North Monument Creek and Stanley Creek.

4.6.17 Upper Laramie Hydrologic Unit Current Occupied Sites

One of the most exciting recent Wyoming discoveries is the capture of *Zapus* in the Upper Laramie Hydrologic Unit. Several specimens from this hydrologic unit were recently identified as *Z. h. preblei* (now known to be *Z. h. campestris*) by Cheri Jones at the Denver Museum of Nature & Science using morphometric analysis. *Z. hudsonius* considered by the Service to be Preble's are not historically known from this hydrologic unit. In fact, this hydrologic unit is west of the Laramie Mountains which has been described by the Service and Krutzsch (1954) as the western limit of the range of the species. It was once believed that elevation along the Laramie Range precluded the mouse from occupying the Upper Laramie Hydrologic Unit. However, recent captures of *Z. hudsonius* on the east side of the Laramie Range at nearly 8,000 feet and its discovery at Fish and Dale creeks in northern Larimer County, Colorado suggest that there may not be an elevation barrier precluding the species from this hydrologic unit.

WYNDD recently completed a study for the Service that developed a generalized, predictive model for Preble's in southeastern Wyoming (Keinath, 2001). The model applied classification-tree analysis of then known and absent capture locations of Preble's to identify site-specific environmental criteria that may be useful in predicting Preble's distribution. The modeling effort completed by WYNDD predicted "much" suitable habitat in the Laramie Basin and the Snowy Range Mountains which has historically been considered outside the range of the species. The Service recognized the potential for suitable habitat in the Laramie Basin and Snowy Range Mountains in the proposed 2002 critical habitat rule (67 FR 47154).

In 2001, WYNDD addressed the possibility of the species occurring west of the Laramie Mountain Range in its status report for Preble's (Beauvais, 2001). WYNDD summarized the potential occurrence of Preble's west of the Laramie Mountain Range as follows:

"…the northern and eastern extents of Z. h. preblei range have not yet been firmly established. In Wyoming, presumed Z. h. preblei have been documented in both the North Platte and South Platte basins, with collection sites as far north as the town of Douglas, west to the town of Boxelder, and east to the vicinity of Slater. The Laramie Mountains are generally regarded as the western boundary of Z. h. preblei in Wyoming. However, the USDA Forest Service and other field workers have captured several suspected Z. h. preblei between 7500 – 8500 ft elevation in the Laramie Range. Because much of the crest of the range is lower than this, and because suitable habitat exists at lower elevations to the west in the Laramie Valley and Shirley Basin, this suggests that occurrence farther west is possible."

Trapping conducted by WYNDD in 2000 captured *Zapus* at four locations in the Laramie Valley west of the Laramie Mountains. One site is located on Hutton Lake National Wildlife Refuge near Sand Creek in central Albany County. The capture location is approximately 10 miles south of Laramie. The three other sites are in the northern portion of the hydrologic unit and well separated from the national wildlife refuge. These sites are on the Laramie and Little Laramie rivers but their locations have not been disclosed by WYNDD at the request of the landowners. During the status review, the Service should contact WYNDD to learn the locations of these sites.

WYNDD's discovery of *Z. h. preblei* (now known to be *Z. h. campestris*) in this hydrologic unit greatly extends the western extent of the range in Wyoming. It is plausible that future surveys may show mice even further west and into the Shirley Basin. The species presence in the Rock Creek, Little Laramie River and possibly the Medicine Bow River Hydrologic units should be seriously considered by the Service during the status review and WYNDD should be encouraged and funded to trap suitable habitat in these units.

4.7 Other Sites Where *Z. hudsonius* Considered by the Service to be Preble's May Have Been Misidentified as *Z. p. princeps*

The results of Connor and Shenk's (2001) morphometric evaluation of *Z. h. preblei* and *Z. p. princeps* indicate that some specimens historically identified as *Z. p. princeps* were, according to the authors, actually *Z. h. preblei* (now known to be *Z. h. campestris*). Connor and Shenk examined 16 southeastern Wyoming specimens and seven specimens initially identified as Z. *p. princeps* were reidentified as *Z. h. preblei* using morphometric measurements. All seven specimens reidentified were captured in 1948 from three locations in Albany County along North Sybille Creek near its confluence with Bear Creek. The captures occurred at elevations ranging from 6,420 and 6,760 feet, well below the Service's elevation threshold for *Z.*

h. preblei. The Service has recognized that this species has been captured up to 7,750 feet in Wyoming (67 FR 47154).

However, Connor and Shenk did not change the identification of one of the specimens collected in 1948 from this area. According to the morphometric measurements, that specimen was correctly identified as *Z. p. princeps*. If Connor and Shenk's conclusions are correct, *Z. p. princeps* and *Z. h. preblei* (now known to be *Z. h. campestris*) were occupying the same habitat at the same time.

WYNDD has provided us with a list of all the records for *Z. p. princeps* from relatively low elevations on the east and west slopes of the Laramie Mountain Range.[14] The majority of the *Z. p. princeps* records in the WYNDD POD were from Long (1965). Based on Connor and Shenk's finding, WYNDD has questioned whether some of the captures initially identified as *Z. p. princeps* may actually be *Z. h. preblei* (now known to be *Z. h. campestris*) (Gary Beauvais, WYNDD. pers. comm.). For this petition, we examined all WYNDD *Z. p. princeps* records at elevations less than 7,800 feet within the currently delineated range of *Z. h. preblei*.

WYNDD POD contains five records for *Z. p. princeps* in the upper portions of the Crow Creek drainage in close proximity to recent captures identified as *Z. hudsonius* considered by the Service to be Preble's. WYNDD *Z. p. princeps* records include captures from South Fork Crow Creek. The *Z. p. princeps* capture location is at approximately 7,750 feet elevation and is close to a *Z. h. preblei* record on South Fork Crow Creek reported by the U.S. Forest Service in 1998. In the Upper Lodgepole Hydrologic Unit, records of *Z. p. princeps* exist proximate to historic and recent collections of *Z. h. preblei* near Islay. In the Lower Laramie Hydrologic Unit, a *Z. p. princeps* specimen was reported by Long (1965) southwest of recent *Z. h. preblei* captures by the U.S. Forest Service at Friend Park. The elevation of this *Z. p. princeps* record is 7,500 feet which is equivalent to the recent Friend Park Preble's records (7,550 feet).

In the upper portions of the Horse Creek Hydrologic Unit, a WYNDD *Z. p. princeps* record is located adjacent to an unnamed tributary of Horse Creek at roughly the same location as a historic specimen identified as *Z. h. preblei*. A second *Z. p. princeps* record is located south of a historic *Z. h. preblei* record on Mill Creek.

Questionable *Z. p. princeps* records exist in the Middle North Platte-Casper Hydrologic Unit along La Prele Creek about 21 miles south and 24 miles west of Douglas at an elevation of

[14] CNHP does not maintain records for *Z. p. princeps* in Colorado (Michael Menefee, CNHP. pers. comm.).

approximately 7,700 feet. The capture location for this specimen is just east of the Little Medicine Bow Hydrologic Unit. *Z. hudsonius* considered by the Service to be Preble's is not currently known from the Little Medicine Bow Hydrologic Unit, but Keinath (2001) has predicted suitable habitat in the hydrologic unit and Beauvais (2001) has discussed their possible occurrence in the hydrologic unit.

Another questionable *Z. p. princeps* record exists in the Dry Fork Cheyenne Hydrologic Unit, the Red Butte Site discussed in Section 3 of this petition, from which *Z. h. preblei* are not historically or currently known. The capture location is adjacent to the South Fork of the Dry Fork Cheyenne River approximately 21 miles north and 24 miles west of Douglas at an elevation of approximately 7,700 feet.

Two low elevation records exist for *Z. p. princeps* from the Laramie Range on the south side of Casper Mountain on the western edge of the Middle North Platte-Casper Hydrologic Unit. Both captures occurred approximately 7 miles south of Casper at elevations between 6,000 and 6,370 feet in the headwaters of Red Creek.

Connor and Shenk's (2001) reidentification of seven of 16 specimens of *Z. p. princeps* as *Z. h. preblei* (now known to be *Z. h. campestris*) during their morphometric evaluation suggests *Z. h. preblei* may have been significantly under accounted in previous surveys and may be even more abundant than this petition indicates.

4.8 Additional Sites Which May Contain *Z. hudsonius* Considered by the Service to be Preble's

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The species distribution and abundance were not adequately addressed by the Service during the listing process and post-listing surveys and the best available scientific information demonstrate that a significant amount of unsurveyed habitat exists throughout its historic range and that additional surveys will continue to identify a number of new populations. Perhaps the best example of how inadequate surveys led to erroneous assumptions and conclusions during the listing process is the work completed by Shenk and Eussen (1999) the summer after the final listing rule was published. In 1998, Shenk and Eussen surveyed 22 sites in Larimer County and discovered *Z. hudsonius* considered by the Service to be Preble's at 20 of these sites. One of the capture locations was along a large water transfer ditch. According to Pague and Grunau (2000), ditches have historically been under-represented in sampling and they

recognized a number of other ditches in Larimer County that support "what appears to suitable vegetation" for the mouse. In Wyoming, *Z. hudsonius* considered by the Service to be Preble's have been collected along a number of ditches including collections from Threemile Creek (part of the Chugwater Creek Site), Wyman Creek, Horse Creek and South Fork Bear Creek (Renee Taylor, True Cos. pers. comm.).

The CDOW, in consultation with the Preble's meadow jumping mouse (PMJM) Scientific Team, has prepared individual site conservation and planning recommendation reports for a number of counties in Colorado where *Z. hudsonius* considered by the Service to be Preble's are known to occur (Pague and Grunau, 2000). In several of these reports, additional potential habitat was identified along specific stream segments from satellite imagery, examination of aerial photographs, CDOW riparian mapping and roadside surveys. Pague and Grunau (2000) recognized the need for additional surveys along those stream segments. Table 4-6 identifies stream segments in two Colorado counties (Larimer and Boulder) where CDOW and the PMJM Science Team have identified high potential for new or expanded occurrences.

Table 4-6
Stream Segments Identified by CDOW and the PMJM Science Team in Larimer and Boulder Counties as Having High Potential for New or Expanded Occurrence of *Z. hudsonius* Considered by the Service to be Preble's

County	Stream Segment
Larimer	North Saint Vrain Creek
	Little Thompson River (and tributary streams)
	Dale Creek
	Deadman Creek
	Sixmile Creek
	Boxelder Creek headwaters
	Coal Creek headwaters
	Sixmile Creek
	Redstone Creek
	Other stream segments in the mountainous areas
	Ditches that support suitable vegetation for Preble's
Boulder	South St. Vrain Creek
	Rock Creek
	Coal Creek
	Ditches and gulches between Nelson Road and Lyons

For Elbert County, Pague and Grunau (2000) recognized that the number of sites sampled to date was very low and inadequate to allow for more than speculation about population sizes in the county. However, they stated that the county contained a large number of miles of apparently suitable habitat along several stream segments. Pague and Grunau (2000) also stated that if the apparently suitable habitat was occupied in most of the suitable steam segments, Elbert County may have a large number of mice. They concluded that more

sampling in the county was necessary to identify with certainty the species' range. Pague and Grunau (2000) also suggested that additional surveys would discover new populations in Douglas County and suggested sampling in foothills streams and other large streams not yet sampled.

WYNDD (Gary Beauvais, WYNDD. pers. comm.) has expressed confidence that a number of additional sites will be discovered in the future. Other researchers have expressed similar confidence (Renee Taylor, True Cos. pers. comm.). WYNDD is particularly intrigued by the recent captures on the North Platte River in Douglas. The North Platte River provides a potential dispersion corridor to both the east (toward Nebraska) and to the west toward Casper.

It is also worth noting that during genetic testing for CDOW, Riggs *et al*. (1997) determined that a specimen previously identified as *Z. p. princeps* from the San Isabel National Forest in western Las Animas County, Colorado was genetically similar to what the authors termed the "Preble's group." The Service addressed this specimen in the final listing rule (63 FR 26517) where it noted "the presence of Preble's in Las Animas County would significantly expand its known range southward." The status review should consider the possibility of the species occurring south of the currently known range.

5.0 Final Listing Rule Summary of Factors Affecting *Z. hudsonius* Considered by the Service to be Preble's are Unsupportable and/or Do Not Apply to a Significant Portion of the Range

In its final listing rule (63 FR 26517), the Service presented a "Summary of Factors Affecting the Species" that they believed justified listing the species as threatened. For purposes of this petition, we have grouped the Service's listing factors into two general categories:

- Biogeographical Listing Factors - the apparent local extirpation from historically occupied sites in Colorado and Wyoming and difficulty in finding meadow jumping mice in apparently suitable habitat suggested to the Service a population decline in recent decades; and
- Threats Listing Factors – the Service speculated habitat loss and degradation, caused by agricultural, residential, commercial, and industrial development, imperiled the species continued existence.

This section of the petition addresses each of the factors discussed by the Service in the final listing rule and their relationship to DPS Element 3. The following discussion is important if *Z. h. campestris* along the Colorado and Wyoming Front Range are geospatially isolated from other populations of *Z. h. campestris* in northeastern Wyoming – which we contend is not supported by the best available scientific information (see Section 3 of this petition). The focus of the discussion in this section is whether the Summary of Factors Affecting the Species described in the final listing rule are still or were ever relevant given what is currently known about the distribution and specific location of extant populations. In particular, the discussion focuses on whether the presumed effects discussed by the Service in the final listing rule demonstrate that the species is likely to become endangered in the foreseeable future in all or a significant portion of its currently known range.

5.1 Biogeographical Listing Factors

The final listing rule states "the Service believes that Preble's meadow jumping mouse has undergone a decline in range and that populations within its remaining range have been lost." To support that conclusion, the Service offered the following:

Final Listing Rule General Distribution Conclusions

- Recent trapping has failed to produce captures at historical sites and sites with apparently suitable habitat within Preble's historical range; and

- Trapping surveys provide evidence that Preble's has declined throughout portions of its range.

Final Listing Rule Wyoming Distribution Conclusions

- Preble's is not currently known from its former range in Albany, Goshen and Natrona counties;
- A study by Compton and Hugie (1993), which was funded by the Service, found it difficult to assess historical trends and current status of Preble's due to the scarcity of demographic data. Based on their review, Compton and Hugie recommended that Preble's be listed as a threatened species. However, according to the Service, after a largely unsuccessful search for suitable habitat in Wyoming and unsuccessful trapping surveys for Preble's at five sites in southeastern Wyoming in 1993, Compton and Hugie concluded that Preble's might be extirpated from Wyoming. Their revised recommendation was that Preble's be listed as an endangered species.

Final Listing Rule Colorado Distribution Conclusions

- Preble's is not known to be currently present in Adams, Arapahoe, and Denver counties where it was historically documented;
- Nine historic Preble's capture sites were investigated in six Colorado counties through trapping and site history. Preble's was absent at all nine sites because of changes in habitat. The Service concluded that the range of Preble's had decreased, especially adjacent to or east of the Interstate Highway 25 urban corridor;
- Recent surveys for Preble's at certain other sites with potential habitat in Colorado were unsuccessful in documenting presence. Surveys funded and carried out by the Department of the Army at Fort Carson Military Reservation in El Paso and Pueblo counties resulted in no Preble's captures despite 3,311 trapnights of effort in apparently suitable habitat. Private researchers and U.S. Department of Agriculture and U.S. Forest Service personnel found no Preble's in limited surveys of seemingly appropriate habitats within Pawnee National Grassland in northern Weld County;
- Thirty-three 1997 surveys from Adams, Arapahoe, Denver, Douglas, Larimer and Weld counties failed to locate Preble's; and
- The Service suggested that development of the Denver metropolitan area had created a north-south gap in Preble's range.

The final listing rule relied upon each of the above assumptions to reach the conclusion that *Z. hudsonius* considered by the Service to be Preble's had undergone a significant decline in range and that populations within its remaining range had been lost. However, surveys conducted after the listing clearly demonstrate that these findings are either factually incorrect or insignificant in terms of population viability.

5.1.1 General Distribution Conclusions

Throughout the rule making process, the Service alleged that trappings at historic sites and in apparently suitable habitat had failed to find extant populations and that the lack of

captures provided evidence that populations had declined throughout all or a portion of its range. This general assumption is not valid. Post-listing trapping results clearly demonstrate that as surveyor ability to recognize suitable habitat improved, so did the success rate of trapping. The Service acknowledged the improved ability of surveyors to recognize suitable habitat in the 2002 proposed critical habitat rule (67 FR 47154).

Prior to the final listing rule, characteristics of suitable habitat were poorly understood, which often resulted in unsuccessful trappings. In the final listing rule, the Service discusses improved ability to recognize suitable habitat reported by Meaney *et al.* (1997). By targeting mostly small drainages with dense vegetation, they were able to capture *Z. hudsonius* considered by the Service to be Preble's in 7 of 10 sites trapped. Also, in the final listing rule, the Service reported CNHP was able to capture specimens at 10 of 13 sites in the Plum Creek watershed in Douglas County by using aerial photographs to identify suitable habitat. Even as the Service prepared the final listing rule, the administrative record shows that trapping success was beginning to improve remarkably. In 1998, after the final listing rule was published, Shenk and Eussen (1999) reported capturing the species at 20 of 22 sites trapped in Larimer County.

Perhaps most telling, regarding improvements in post-listing trapping success, is the CNHP EORs which contains the results of all the trapping reports submitted to the Service during the 2000 trapping season in Colorado. Of all the sites surveyed in Colorado in 2000, *Z. hudsonius* considered by the Service to be Preble's were captured at about 50 percent of the sites (trapped - found compared to trapped – not found records). This is an extremely high capture rate for a species that is supposed to be rare. WYNDD (Gary Beauvais, WYNDD. pers. comm.) has indicated similar improvement in trapping success in Wyoming as surveyors became more knowledgeable about habitat characteristics. Others have reported that potential habitat in Wyoming is now much more easy to identify (Renee Taylor, True Cos. pers. comm.).

Compared to the pre-listing surveys conducted by the Service, when Garber (1995) and Compton and Hugie (1993) searched largely in vain for viable populations of in Wyoming and Colorado, surveys after the listing have been much more successful and have demonstrated *Z. hudsonius* considered by the Service to be Preble's to be widespread and ubiquitous throughout and beyond its historic range. The Service's listing assumption that the species was absent in apparently suitable habitat has been proven to be incorrect (see Map 1).

When discussing general distribution in the final listing rule, the Service noted that the species was absent from nine sites where it had been historically collected. It is generally recognized that many species of wildlife disappear from areas of extensive human development. However, the question that the Service does not address in the final listing rule is whether the loss of the species from nine historic sites constitutes a significant portion of the species' range. We believe that the loss of *Z. hudsonius* considered by the Service to be Preble's at less than 10 percent of the known currently occupied sites is meaningless to the persistence of the species. How can historic extirpation from nine sites be considered significant to the species persistence when it has recently been discovered at nearly 100 new sites – some of which extend the range of the species well beyond the range described by the Service in the final listing rule? Further, how can the loss of nine historically occupied sites constitute a significant portion of the species' range when *Z. hudsonius* considered by the Service to be Preble's is currently known from about 130 sites and nearly certain to be discovered at other new sites in the future? To determine that the species is threatened based on a loss of less than 10 percent of the currently occupied sites would contradict conclusions made by the Service in other recent delisting decisions (see Section 6).

The relevance of extirpation at a few historic sites must also be considered in context with where *Z. hudsonius* considered by the Service to be Preble's is currently known to exist. Historically, the species was found in 14 hydrologic units in Colorado and Wyoming (see Table 4-1). It is currently found in all of the historically occupied hydrologic units and three additional hydrologic units where it was previously unknown. The number of sites currently occupied in each hydrologic unit equals or exceeds the number of historically occupied sites.

An analysis of post-listing distribution, abundance and trends, fails to demonstrate a significant range-wide population decline sufficient to justify listing the species as threatened as the Service contends in its final listing rule. If the Service argues that *Z. h. campestris* along the Colorado and Wyoming Front Range is a threatened DPS, it needs to demonstrate how the species is likely to become endangered in the foreseeable future in all or a significant portion of its range given what is currently known about its current distribution and abundance.

5.1.2 Wyoming Distribution Conclusions

One of the reasons used by the Service to list was the assumed absence of the species in Wyoming, which was largely based on surveys completed by Compton and Hugie (1993) and Garber (1995). In the final listing rule, the Service indicated that the species was absent from

Albany, Goshen, and Natrona counties. We question the biological relevance of the Service's use of geopolitical boundaries in describing the biogeography of this species. It is much more biologically meaningful to evaluate the species distribution based on sites occupied historically and currently by hydrologic unit. However, to clarify the record, after the final listing *Z. hudsonius* considered by the Service to be Preble's were discovered at 12 sites in Albany County. We are unsure why the Service considers the species absence from Goshen and Natrona counties to be relevant. As can be seen from Table 4-1, there are no historic records of the species from either county. What is more relevant is the fact that *Z. hudsonius* considered by the Service to be Preble's still occurs in all hydrologic units where it was historically found in Wyoming and is also present, apparently at a number of sites, in the Upper Laramie Hydrologic Unit where it was not previously known to occur (see Section 4.6.17).

Surveys conducted after the listing have found *Z. hudsonius* considered by the Service to be Preble's at a number of sites throughout southeastern Wyoming. To date, the species is known to occur at 36 sites in Wyoming (see Table 4-5). In addition, a potentially large number of sites are known to occur in the Upper Laramie Hydrologic Unit which are not listed on Table 4-5. *Z. hudsonius* considered by the Service to be Preble's are historically known from only 11 sites in Wyoming (see Table 4-1). The species is now known to occur in all hydrologic units historically occupied in Wyoming and in the Upper Laramie Hydrologic Unit on the west side of the Laramie Range where it was historically unknown. In fact, the Service's assumption that the western limit of species in Wyoming is restricted by the Laramie Mountain Range is not valid given WYNDD's recent capture of *Z. hudsonius* considered by the Service to be Preble's in the Laramie Valley west of the Laramie Range and post-listing collections from Fish and Dale creeks on the Colorado-Wyoming border in Larimer County, Colorado. WYNDD's discovery of the species west of the Laramie Range supports their earlier prediction that a great deal of potentially suitable habitat exists in southeastern Wyoming that has not been previously surveyed. *Z. hudsonius* considered by the Service to be Preble's may indeed be discovered in the Rock Creek, Little Laramie River and Medicine Bow River Hydrologic units in the future.

The assumed rarity of the species in Wyoming was addressed by WYNDD in 2001. At the end of the 2000 trapping season in Wyoming, Beauvais (2001) summarized the distribution of *Z. hudsonius* considered by the Service to be Preble's in Wyoming as follows:

"In 1998 WYNDD was aware of only 13 stream segments in southeast Wyoming where Z. h. preblei had been captured. Furthermore, the most recent captures on 11 of these stream segments had occurred prior to 1980. In contrast, WYNDD is currently aware of 46 stream segments in southeast Wyoming where suspected Z. h. preblei have been captured, and the most recent captures on 36 stream segments have occurred since 1998."

5.1.3 Colorado Distribution Conclusions

In the 1998 final listing rule, the Service used the fact that the species was no longer believed to occurred in Adams, Arapahoe and Denver counties as one of the reasons the species should be listed. Although its absence from these counties may appear relevant, we believe that when put in perspective and carefully examined, its absence in these counties has little relevance to the persistence of *Z. hudsonius* considered by the Service to be Preble's across its current known range.

Denver County Historic Record. Only one historic record for *Z. hudsonius* considered by the Service to be Preble's exists from Denver County – an 1885 specimen reported by Carey (1911) along the South Platte River. According to the CNHP EORs, that record is the only historic record from the Upper South Platte Hydrologic Unit (see Table 4-1). Currently, *Z. hudsonius* considered by the Service to be Preble's are known from 22 sites in this hydrologic unit (see Table 4-5). Even if the species no longer occurs within Denver County, it is well established in the South Platte Hydrologic Unit upstream of the Denver metropolitan area at a number of locations including Chatfield State Park (approximately 13 miles upstream of the historic record site – see Map 1).

Adams County Historic Record. The Adams County historic record is from the Middle South Platte-Cherry Creek Hydrologic Unit – one of three historic records from this hydrologic unit. *Z. hudsonius* considered by the Service to be Preble's are currently known to occupy 16 sites in this hydrologic unit (see Table 4-5 and Map 1).

Arapahoe County Historic Record. It is impossible to draw any conclusions regarding this historic record. The historic specimen was initially reported by Warren (1942) but without a specific location. CNHP was unable to map the location of this specimen and we were unable to determine what hydrologic unit it was captured within. The specimen was likely from either the Upper South Platte or Middle South Platte-Cherry Creek Hydrologic units where *Z. hudsonius* considered by the Service to be Preble's are currently known to occur at a significant number of sites.

In the final listing rule the Service also stated that 33 surveys conducted in 1997 failed to locate the species in Douglas, Larimer and Weld counties. Questions about the relevance of using presence or absence within a geopolitical boundary to justify listing a species aside, after the final listing rule was published *Z. hudsonius* considered by the Service to be Preble's were located at a number of sites in all three counties (see Map 1). At the end of the 2003 trapping season, *Z. hudsonius* considered by the Service to be Preble's were known to occupy nearly 30 sites in Douglas County, over 20 sites in Larimer County and five sites in Weld County.

The Service also discusses the failure to capture the species at Fort Carson Military Reservation in El Paso County and on Pawnee National Grassland in northern Weld County in the final listing rule. Again, we question the relevance of the failure to capture *Z. hudsonius* considered by the Service to be Preble's at these locations during pre-1995 surveys in the decision to list the species as threatened. The species is not known historically from either location. Pawnee National Grasslands is in the lower Crow Hydrologic Unit. Capture records from this hydrologic unit are known historically and recently from only the upper portions of the hydrologic unit in Wyoming.

Fort Carson Military Reservation is south of Colorado Springs. The most southern historic record is in Colorado Springs north of Fort Carson. If *Z. hudsonius* considered by the Service to be Preble's were found on Fort Carson, it would represent a significant southern extension of the historic and currently known range of the species. The species apparent absence from Fort Carson is not surprising nor is it justification for listing the species.

The Service notes in the final listing rule that the Denver metropolitan area has created a "north-south gap" in the species range. We question whether such a "gap" really exists. In 2002, *Z. hudsonius* considered by the Service to be Preble's were discovered along Elk Creek within the supposed "gap". In 2001, the species was found at Kennedy Gulch west of the South Platte River and in the supposed "gap". Clearly, more thorough trapping between the Kennedy Gulch and Elk Creek sites is necessary to justify the existence of this supposed "gap". And, even if the Service can confirm that such a "gap" exists, they need to demonstrate that such a "gap" represents justification for listing a DPS as threatened.

5.2 Threats Listing Factors

Although most of the Summary of Factors Affecting the Species discussion in the final listing rule were biographical and related to a perceived population decline, the final listing rule does mention a few presumed threats to the species. The Act provides the Secretary five listing factors to consider when listing a species as threatened or endangered. Those factors include:

- The present or threatened destruction, modification, or curtailment of habitat or range;
- Overutilization for commercial, recreational, scientific, or educational purposes;
- Disease or predation;
- The inadequacy of existing regulatory mechanisms; and
- Other natural or manmade factors affecting a species continued existence.

After carefully reviewing the best available scientific information, we have reached two important conclusions about the Service's assumptions regarding the listing factors for *Z. h. preblei*. First, none of the information provided by the Service or in the recent literature suggests that there is a significant downward trend in populations across its currently occupied range. In fact, it is nearly certain that additional (and perhaps many) populations will be discovered in the future. Absent this downward population trend, it is impossible to conclude that any (or all) of the effects associated with the factors listed in the final listing rule rise to the level justifying listing the species as threatened under the Act. Simply put, if there is no demonstrable downward population trend in a species which is widespread and ubiquitious, how can the species be threatened? Regrettably, the threats in the final listing rule appear to be an attempt by the Service to explain a phenomenon (alleged widespread population decline) that has been clearly demonstrated by post-listing surveys not to have occurred. Second, none of the effects discussed in the final listing rule individually or cumulatively rise to the level of threat justifying listing of the species because they do not adversely affect a significant portion of the species' range. This is particularly evident when the effects are reviewed based on what we currently know about the species' distribution and abundance.

Admittedly, the threats discussed in the final listing rule may have had relevance when only a handful of populations were known to exist in Colorado but they are insignificant today given the currently known widespread and ubiquitous distribution of *Z. hudsonius* considered by the Service to be Preble's. Had the Service conducted adequate surveys during the listing process and been more objective about the cause-and-effect of the threats discussed in the

final listing rule, they would have realized that none of the effects applied to a significant portion of the species' range – not now nor in the foreseeable future.

In its recent candidate assessment for the black-tailed prairie dog, the Service describes several "important thresholds" which must be met before it can be determined that a species is threatened (U.S. Fish and Wildlife Service, 2002a). In the candidate assessment the Service states:

> *"First, demonstrable or likely potential effects on the species must be identified. Moreover, these effects must be significant enough to be characterized as threats. This characterization cannot be made unless the degree of significance of an effect or effects is such that the influence on the status of the species is sufficient to meet the threatened definition. Secondly, this definition requires a* ***significant demonstrable effect*** *(i.e., a threat) that is or may become apparent within the foreseeable future."*

The most important phrase in the description is "significant demonstrable effect". To meet the definition of threatened in the Act, the effect must occur at a level which adversely affects the persistence of a species over a significant portion of its range. In addition, the effect must be demonstrable - not speculative or hypothetical. If the effect cannot be shown to threaten the persistence of the species (currently or in the foreseeable future) over a significant portion of its range, listing is not warranted.

In this section we discuss each of the listing factors and the effects described in the final listing rule. The discussion is organized by the five listing factors listed above. Most importantly, we discuss whether the best available scientific information indicates that, to use the Services' own definition, a significant demonstrable effect has or would occur over a significant portion of the currently known range of *Z. hudsonius* considered by the Service to be Preble's in the foreseeable future.

5.2.1 The Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

According to the final listing rule, widespread habitat alteration was responsible for the perceived decline in *Z. hudsonius* considered by the Service to be Preble's and is the primary future threat. We have demonstrated in Section 4 of this petition, based on post-listing survey results, that this perceived decline did not occur. The primary types of habitat alteration which the Service contends in the final listing rule resulted in the population decline were related to:

- Agricultural land conversions;
- Grazing;
- Alluvial aggregate extraction;
- Water development and management and instream flood control;
- Highway, road, bridge, trail and other linear developments;
- Invasive weeds; and
- Residential, commercial and industrial development (i.e., urbanization).

For the reasons discussed below, which are substantiated by post-listing surveys, these habitat alterations have not resulted in a significant demonstrable effect sufficient to meet the threatened definition in the Act. *Z. hudsonius* considered by the Service to be Preble's is currently known to occur in all historically-occupied hydrologic units (and more). The number of sites currently occupied in each hydrologic unit is equal to or exceed the number of historically-known sites. Nor do we believe, based on the discussion below, there are significant demonstrable effects (i.e., a threats) that may become apparent within the foreseeable future. When landscape alterations are considered over the entire currently known range of the species, only discrete, insignificant and relatively small portions of the range can be shown to have been adversely affected or likely to be affected in the foreseeable future. These site-specific effects, if they occur, will only impact a small number of currently occupied sites and will not affect the persistence of the species over a significant portion of its range. And, these site-specific impacts cannot be extrapolated over a significant portion of the currently known range.

Agricultural Land Conversions. In the final listing rule, the Service speculated that agricultural development had a negative impact on the species. Historically, some populations were undoubtedly affected by agriculture. However, as with all other effects discussed in the final listing rule, the Service provided no evidence to support the presumption that current or future agricultural development would result in a significant demonstrable effect to the species at a level sufficient to justify listing. For agricultural land conversions to represent a threat to the persistence of the species, it would be necessary to demonstrate that there exists a significant upward trend in land conversions.

However, best available scientific information indicates that no significant upward trend occurred in the decade preceding the listing. To evaluate the significance of this presumed effect, we examined information from the U.S. Department of Agriculture – National Agricultural Statistics Service Data Base which is available on the internet.[15] We queried the database to determine the acres of total harvested croplands in each county currently known to be occupied

[15] The National Agricultural Statistics Service data base can be accessed at www.nass.usda.gov.81/ipedb/.

by *Z. hudsonius* considered by the Service to be Preble's. That query resulted in acreage estimates for three years during the last decade (1987, 1992 and 1997). Table 5-1 provides the results of the harvested cropland acreage query.

Table 5-1
Total Acres of Harvested Cropland in Counties Currently Occupied by *Z. hudsonius* Considered by the Service to be Preble's During the Decade Preceding Listing

County	1997 Harvested Acres	1992 Harvested Acres	1987 Harvested Acres
Colorado			
Boulder	41,542	42,180	39,969
Douglas	15,999	15,577	15,239
Elbert	79,310	87,025	78,708
El Paso	35,243	28,735	30,922
Jefferson	7,597	5,226	7,417
Larimer	127,348	130,997	142,430
Weld	547,532	558,312	547,613
Colorado Total	**854,571**	**868,052**	**862,298**
Wyoming			
Albany	89,792	81,541	75,497
Converse	78,593	76,511	78,156
Laramie	174,411	157,137	159,739
Platte	89,492	78,974	92,258
Wyoming Total	**432,288**	**394,163**	**405,650**
Total Both States	**1,286,859**	**1,262,215**	**1,267,948**

The table demonstrates that there was no significant upward trend of agricultural land conversion in the counties currently occupied in the decade preceding the listing (i.e., no significant demonstrable effect). In fact, in Colorado counties currently occupied there was a net reduction in harvested croplands during the decade preceding the listing. In Wyoming, land converted to harvested croplands increased by about 7 percent between 1987 and 1997. However, in Wyoming most currently occupied sites are well removed from areas used as croplands. When all currently occupied counties are combined, there was about a 1.5 percent increase in harvested croplands during the decade preceding the final listing rule.

Agricultural Statistics Service database queries indicates that there was not a significant upward trend (i.e., significant demonstrable effect) in agricultural land conversion preceding listing. Without a significant upward trend there can be no present or threatened destruction, modification, or curtailment of habitat or range from agricultural land conversion at a level sufficient to justify listing pursuant to 50 CFR § 424.02(m).

Grazing. In the final listing rule, the Service summarizes anecdotal statements from a few researchers that suggest grazing may have adverse effects on *Z. hudsonius* considered by the Service to be Preble's. In fact, in the final listing rule, the Service seems to suggest that the

reason Compton and Hugie (1993) were unable to locate the species in southeastern Wyoming was related primarily to grazing. However, no evidence is provided by the Service in the final listing rule to support that grazing has had a significant demonstrable effect on the species.

Pague and Grunau (2000) stated that grazing is a natural ecological process throughout the range of the species and is often an "important management strategy" for maintaining high quality Preble's habitat." Post-listing surveys have shown *Z. hudsonius* considered by the Service to be Preble's to be present in numerous areas which are grazed and Pague and Grunau discuss many examples where livestock management "co-occurs with what are apparently high quality occurrences of Preble's." As with any private land use, the authors point to examples of grazing management highly compatible with Preble's and other areas where riparian vegetation is greatly reduced by grazing.

To determine the significance of the presumed grazing effect, we queried the Agricultural Statistics Service's online database to determine the number of cattle and calves present in each county currently occupied by the species. According to the results of that query, the numbers of cattle and calves has decreased from a peak of approximately 1,322,000 in 1977 to approximately 1,165,000 in 2001 – an overall decrease of about 11 percent.

While somewhat cyclical, current numbers of cattle and calves present in Colorado counties occupied by the species is at its lowest since 1975. Cattle and calf numbers in Colorado counties currently occupied peaked in 1978 at approximately 1,034,000. In 2001, the Agricultural Statistics Service estimates approximately 811,000 cattle and calves in Colorado counties currently occupied – a reduction of nearly 22 percent of 1978 estimates. With the exception of Weld County, numbers of cattle and calves have decreased throughout the species range in Colorado relatively consistently between 1975 and 2001. In Douglas and Larimer counties, both of which contain a large number of currently occupied sites, cattle and calf numbers dropped by about 40 percent between 1975 and 2001.

In Wyoming counties with *Z. hudsonius* considered by the Service to be Preble's, there were approximately 327,000 cattle and calves in 1975. Numbers dropped dramatically throughout the 1980s and early 1990s. In the decade preceding the listing, there was a significant downward trend in the number of cattle and calves in southeastern Wyoming counties. This downward trend is not mentioned by the Service in the final listing rule. In 1993, the number dropped to a low of 225,000 – about 76 percent of 1975 levels. In the late 1990s

the number of cattle and calves began to increase. In 2001, approximately 354,000 cattle and calves were present in Wyoming counties currently occupied by *Z. hudsonius* considered by the Service to be Preble's. However, numbers of cattle and calves again declined in most counties in 2002. Although numbers stayed relatively constant in Platte County, Albany County dropped from 69,000 in 2001 to 63,000 in 2002; Converse County dropped from 85,000 to 78,000; and Laramie County dropped from 90,000 to 87,000.[16] Total cattle and calves in Wyoming counties currently occupied by *Z. hudsonius* considered by the Service to be Preble's in 2002 was 338,000 which represents about a 3 percent increase over 1975 estimates.

In 2001, the number of cattle and calves in counties currently occupied by *Z. hudsonius* considered by the Service to be Preble's was about 11 percent less than the peak numbers reached in 1978. The overall trend in cattle and calf production in these counties is downward (although cyclical). If cattle grazing is a threat to the species (the Service has yet to present evidence of significant demonstrable effect), the current downward trend in cattle and calf production across the currently known occupied range would indicate this effect will be diminished in the future and does not represent a present or threatened destruction, modification, or curtailment of habitat or range at a level sufficient to justify listing pursuant to 50 CFR § 424.02(m).

Alluvial Aggregate Development. Even though there is a growing demand for aggregate along the Colorado Front Range, predicting where, when and if aggregate development will occur in an area is not possible. However, the potential threat to *Z. hudsonius* considered by the Service to be Preble's from aggregate development is probably primarily limited to the Colorado Front Range – we are unaware of any aggregate development in close proximity to occupied sites in Wyoming. The only locations Pague and Grunau (2000) could document in Colorado where the species had been or could be potentially impacted by extraction of sand, rock and gravel was along Ralston Creek and at Rocky Flats in Jefferson County.

The U.S. Geological Survey (USGS) has recently completed a 5-year study of aggregate resource needs along the Colorado Front Range between Denver and Fort Collins (Knepper, 2002). One of the products of that study is a digital map of the lithology and aggregate quality attributes of geologic formations (Knepper, *et al*., 1999).[17] The USGS digital map provides estimates of physical and chemical properties of each geologic map unit and a generalized

[16] Cattle and calf estimates for the year 2002 are available at www.nass.usda.gov/wy/internet/cntydata/ce-cattle.pdf
[17] Wyoming geologic units have not been assigned attributes that would allow prediction of development potential.

lithographic descriptor for each unit. The attributes provide an estimate of the potential of those map units for natural aggregate used in Portland cement concrete. The USGS rated the map units as:

- Satisfactory;
- Fair;
- Poor; or
- Unsuitable.

To determine the potential for future aggregate development to affect *Z. hudsonius* considered by the Service to be Preble's in Colorado, the CWCD compared the NDIS Preble's current occupied sites with the digital aggregate potential map prepared by the USGS using GIS. The aggregate quality of the geologic map unit(s) for each currently occupied Colorado site is provided on Table 5-2.

As can be seen on Table 5-2, 28 of the 90 currently occupied sites (about 31 percent) in Colorado occur on geologic map units which are considered by USGS to have poor and/or unsuitable aggregate. Because of the poor quality of the aggregate available at these sites, it is unreasonable to assume or speculate that potential development of aggregate constitutes a threat to these populations. The remainder of the current occupied sites occur on geologic map units that have either satisfactory or fair aggregate for at least a portion of the occupied site.

Table 5-2 also includes landowners of the current occupied sites. Landowner is important in considering the potential for future aggregate development of a site because, in some cases, landownership may preclude development.

In the Cache La Poudre Hydrologic Unit, 16 current occupied sites occur in geologic map units where aggregate quality (at least for a portion of the site) is considered by USGS as either satisfactory or fair. However, of these 16 sites eight are located, at least partially, on national forest lands where aggregate development is likely precluded. Five of the sites occur at least partially on Cherokee Park or Lone Pine State Wildlife Management areas, Horsetooth Reservoir State Recreation Area, or on the Bellvue and Watson Lake State Fish units where aggregate development is likely precluded. Only three current occupied sites occur on satisfactory or fair geologic map units where ownership is entirely private.

Table 5-2
Landownership of Current Known Sites Occupied *Z. hudsonius* Considered by the Service to be Preble's in Colorado and Wyoming and Aggregate Development Potential for Colorado Currently Occupied Sites

Current Occupied Site	County	Site Owner	Aggregate Development Potential
Middle North Platte-Casper Hydrologic Unit			
Stickey Creek	Converse	National Forest, State and private	
Glendo Reservoir Hydrologic Unit			
North Platte River	Converse	Private	
Bed Tick Creek	Converse	State and private	
Horseshoe Creek	Converse	National Forest, State and private	
Cottonwood Creek	Albany	National Forest, State and private	
Lower Laramie Hydrologic Unit			
Chugwater Creek	Laramie	State and private	
Friend Creek	Albany	National Forest and private	
North Laramie River	Albany	National Forest, BLM, State and private	
Sybille Creek	Platte	Private	
North Sybille Creek	Albany	BLM and private	
Rabbit Creek	Platte	State and private	
Luman Creek	Platte	State and private	
Duck Creek	Albany	BLM, Wyoming State Wildlife Habitat Management Unit and private	
South Hunton Creek	Platte	Private	
North Richeau Creek	Platte	State and private	
Richeau Creek	Platte	State and private	
Spring Creek	Laramie	State and private	
Horse Hydrologic Unit			
Horse Creek at Highway 211	Laramie	Private	
North Fork South Fork Bear Creek	Laramie	State and private	
North Fork Bear Creek	Laramie	State and private	
South Fork Bear Creek	Laramie	State and private	
Little Bear Creek west of I-25	Laramie	State and private	
Little Bear Creek east of I-25	Laramie	Private	
Horse Creek at I-25	Laramie	Private	
Paulson Branch of Little Bear Creek	Laramie	Private	
Upper Lodgepole Hydrologic Unit			
North McKenchie Creek	Albany	National Forest, State and private	
Middle Lodgepole Creek	Albany	National Forest and private	
South Lodgepole Creek at Pole Mountain	Albany	National Forest and private	
South Lodgepole Creek at Government Gully	Albany	National Forest	
Lodgepole Creek	Laramie	Private	

Table 5-2 (continued)			
Current Occupied Site	**County**	**Site Owner**	**Aggregate Development Potential**
Crow Hydrologic Unit			
Crow Creek	Laramie	Warren Air Force Base and private	
South Fork Middle Crow Creek	Albany	National Forest, BLM and private	
Middle Crow Creek	Albany	National Forest and private	
South Branch North Fork Crow Creek	Albany	National Forest and private	
Lone Tree-Owl Hydrologic Unit			
Lone Tree Creek at Granite	Laramie	Private	
Lower Branch Lone Tree Creek	Laramie	State and private	
Lone Tree Creek at Warren	Weld	State and private	Unsuitable
Lone Tree Creek at Carr	Weld	Private	Unsuitable/Poor
Cache La Poudre Hydrologic Unit			
Fish Creek	Larimer	National Forest and private	Satisfactory
Dale Creek	Larimer	Private	Satisfactory/Fair
North Fork Cache La Poudre River at Halligan Reservoir	Larimer	BLM, Cherokee Park State Wildlife Area and private	Satisfactory/Fair
Bull Creek	Larimer	National Forest and private	Satisfactory
Elk Horn Creek	Larimer	National Forest, State and private	Satisfactory/Unsuitable
Stonewall Creek	Larimer	Private	Satisfactory/Unsuitable
Middle Fork Rabbit Creek	Larimer	Cherokee Park State Wildlife Area and private	Satisfactory
North Fork Cache La Poudre River northeast of Livermore	Larimer	Private	Satisfactory/Unsuitable
Lone Pine Creek	Larimer	Lone Pine State Wildlife Area and private	Satisfactory/Poor/Unsuitable
Cache La Poudre River at Glen Echo	Larimer	National Forest and private	Satisfactory
Cache La Poudre River at Mishawaka	Larimer	National Forest, State and private	Satisfactory/Fair
Cache La Poudre River south of Sheep Mountain	Larimer	National Forest	Satisfactory/Fair
Cache La Poudre River south of Red Mountain	Larimer	National Forest and private	Satisfactory/Fair
South Fork Cache La Poudre River	Larimer	National Forest and private	Satisfactory/Fair
Cache La Poudre River at La Porte	Larimer	BLM, Bellevue and Watson Lake State Fish Units and private	Satisfactory/Unsuitable
Arthurs Gulch	Larimer	Horsetooth Reservoir State Recreation Area and private	Fair/Unsuitable
Big Thompson Hydrologic Unit			
Bear Gulch	Larimer	National Forest and private	Fair
Buckhorn Creek	Larimer	National Forest and private	Fair
Little Bear Gulch	Larimer	National Forest and private	Fair
North Fork Big Thompson River	Larimer	National Forest and private	Satisfactory/Fair
Cedar Creek	Larimer	National Forest and private	Fair

Table 5-2 (continued)			
Current Occupied Site	**County**	**Site Owner**	**Aggregate Development Potential**
Big Thompson Hydrologic Unit (continued)			
Upper Little Thompson River	Larimer	National Forest and private	Satisfactory/Fair
Little Thompson River at Hillsboro Reservoir	Larimer	Private	Satisfactory/Unsuitable
South Platte River at Milliken	Weld	Private	Satisfactory
Big Thompson/Little Thompson Confluence	Weld	Private	Satisfactory/Unsuitable
Sheep Creek	Larimer	National Forest and private	Fair
St. Vrain Hydrologic Unit			
St. Vrain Creek at Lyons	Boulder	Private	Satisfactory/Fair/Unsuitable
St. Vrain Creek at 75th	Boulder	Boulder County Open Space and private	Satisfactory/Unsuitable
Lake Ditch	Boulder	Private	Fair/Unsuitable
Gregory Canyon	Boulder	Private	Fair/Unsuitable
Bear Creek near Bear Park	Boulder	Private	Fair/Unsuitable
Coal Creek at Superior	Boulder	Private	Unsuitable
South Boulder Creek near Eldorado Springs	Boulder	Eldorado Canyon State Park and private	Satisfactory/Fair/Poor/Unsuitable
Coal Creek at Rocky Flats	Jefferson	Jefferson County Open Space and private	Fair/Poor/Unsuitable
Rock Creek	Jefferson	Rocky Flats (future National Wildlife Refuge) and private	Poor/Unsuitable
South Boulder Creek in Boulder	Boulder	City of Boulder Open Space and private	Satisfactory/Poor/Unsuitable
Coal Creek at Centaur Village	Boulder	Private	Unsuitable
Upper Bear Canyon	Boulder	Private	Fair/Unsuitable
Middle South Platte-Cherry Creek Hydrologic Unit			
Walnut Creek	Jefferson	Rocky Flats (future National Wildlife Refuge) and private	Poor/Unsuitable
Woman Creek	Jefferson	Rocky Flats (future National Wildlife Refuge) and private	Poor/Unsuitable
Smart Drainage	Jefferson	Rocky Flats (future National Wildlife Refuge) and private	Poor/Unsuitable
Cherry Creek at Baldwin Gulch	Douglas	Private	Satisfactory
Cherry Creek at Parker	Douglas	Private	Satisfactory/Unsuitable
Hay Gulch	Elbert	Private	Unsuitable
Cherry Creek at Kinney Creek	Douglas	Private	Satisfactory/Poor/Unsuitable
Cherry Creek north of Franktown	Douglas	Private	Satisfactory/Poor/Unsuitable
Cherry Creek south of Franktown	Douglas	Castlewood Canyon State Recreation Area and private	Satisfactory/Unsuitable
Running Creek	Elbert	Private	Satisfactory/Unsuitable
Lake Gulch	Douglas	Private	Unsuitable
East Cherry Creek at Russellville Road	Douglas	State and private	Unsuitable
West Cherry Creek	Douglas	Private	Poor/Unsuitable
Antelope Creek	Douglas	Private	Satisfactory/Unsuitable

Table 5-2 (continued)			
Current Occupied Site	**County**	**Site Owner**	**Aggregate Development Potential**
Middle South Platte-Cherry Creek Hydrologic Unit (continued)			
East Cherry Creek east of Bucks Mountain	Douglas	Private	Unsuitable
East Cherry Creek north of Table Rock	Douglas	Private	Unsuitable
Clear Hydrologic Unit			
Ralston Creek	Jefferson	Private	Fair/Unsuitable
Elk Creek	Jefferson	BLM and private	Satisfactory/Fair
Chico Hydrologic Unit			
Peyton	El Paso	Private	Satisfactory
Upper South Platte Hydrologic Unit			
Chatfield Reservoir East	Douglas	Chatfield Lake State Recreation Area and private	Satisfactory/Poor/Unsuitable
Chatfield Reservoir West	Douglas	Chatfield Lake State Recreation Area and private	Satisfactory/Poor
Indian Creek at Lambert Ranch	Douglas	Private	Satisfactory/Poor/Unsuitable
Unnamed Tributary to Indian Creek	Douglas	Private	Poor/Unsuitable
Little Willow Creek	Douglas	Roxborough State Park and private	Fair/Unsuitable
Willow Creek	Douglas	Roxborough State Park and private	Fair/Unsuitable
West Plum Creek at Sedalia	Douglas	Private	Satisfactory/Unsuitable
East Plum Creek at Castle Rock	Douglas	Private	Satisfactory/Poor/Unsuitable
Indian Creek at Pine Nook	Douglas	National Forest and private	Fair/Poor
Bear Creek at Moonridge	Douglas	National Forest and private	Fair/Poor
South Platte River near Trumbull	Jefferson	National Forest and private	Poor
East Plum Creek north of Tomah	Douglas	Private	Satisfactory/Poor/Unsuitable
West Plum Creek at Bear Creek	Douglas	Private	Satisfactory/Fair/Unsuitable
East Plum Creek west of Hunt Mountain	Douglas	State and private	Poor/Unsuitable
West Plum Creek at Perry Park	Douglas	Private	Fair/Unsuitable
Wigwam Creek	Jefferson	National Forest and private	Poor
North Trout Creek	Douglas	National Forest and private	Poor
South Trout Creek	Douglas/Teller	National Forest	Satisfactory/Unsuitable
Cook Creek	Douglas	Private	Poor/Unsuitable
Carpenter Creek	Douglas	Private	Unsuitable
South Platte River at Oxyoke	Jefferson	National Forest and private	Poor
Kennedy Gulch	Jefferson	Private	Fair/Poor
Fountain Hydrologic Unit			
Monument Creek	El Paso	Air Force Academy, National Forest and private	Poor/Unsuitable
Beaver Creek	El Paso	Private	Unsuitable
Deadmans Lake	El Paso	Air Force Academy and National Forest	Satisfactory/Poor/Unsuitable
Lehman Run	El Paso	Air Force Academy and National Forest	Poor/Unsuitable
Kettle Creek	El Paso	Air Force Academy and private	Poor/Unsuitable
Stanley Creek	El Paso	Air Force Academy, National Forest and private	Poor/Unsuitable
North Monument Creek	El Paso	Private	Poor/Unsuitable

Table 5-2 (concluded)			
Current Occupied Site	**County**	**Site Owner**	**Aggregate Development Potential**
Kiowa Hydrologic Unit			
North Kiowa Creek	Elbert	Private	Satisfactory
South Kiowa Creek	Elbert	Private	Satisfactory/Unsuitable

Portions of all ten of the Big Thompson Hydrologic Unit currently occupied sites occur on geologic map units where aggregate quality is considered satisfactory or fair. However, seven of the current occupied sites occur, at least partially, on national forest lands where aggregate development is likely precluded (see Table 5-2). Only three sites in this hydrologic unit are located entirely on private lands.

Nine current occupied sites occur in the St. Vrain Hydrologic Unit on geologic map units with satisfactory or fair aggregate quality. However, two of the sites are located at least partially on City of Boulder or Boulder County Open Space lands where aggregate development is precluded. One site is located in Eldorado Canyon State Park, one on Jefferson County open space lands and one on Rocky Flats which is expected to become a national wildlife refuge. Only five sites with suitable or fair aggregate quality occur entirely on private lands in this hydrologic unit.

Only seven of the 16 current occupied sites in the Middle South Platte-Cherry Creek Hydrologic Unit are located on mapping units with satisfactory or fair aggregate quality and six of these sites are located entirely on private lands. The remainder of the sites in this hydrologic unit occur on unsuitable or poor geologic map units. In the Upper South Platte Hydrologic Unit, seven of the 22 current known occupied sites are located entirely on private lands with satisfactory or fair aggregate quality. The remainder of the sites are either poor or unsuitable aggregate quality or are likely precluded from aggregate development (national forest lands, Chatfield Lake State Recreation Area or Roxborough State Park).

Only one current known occupied Preble's site in the Fountain Hydrologic Unit occurs on a satisfactory or fair aggregate geologic unit – Deadmans Lake. However, the site is located on the Air Force Academy and on national forest lands and is likely precluded from development. The remaining six current occupied sites in this hydrologic unit are located on geologic map units considered poor or unsuitable. Both current known sites in the Kiowa Hydrologic Unit occur on suitable mapping units and entirely on private lands.

Of the 90 known sites in Colorado occupied by *Z. hudsonius* considered by the Service to be Preble's, 64 (about 71 percent) occur on geologic map units with poor or unsuitable aggregate quality or landownership of the site likely precludes development. Only 26 sites (or about 29 percent) occur entirely on private lands on geologic map units where aggregate quality is at least partially satisfactory or fair. Some of these 26 sites may have some probability of

being developed for aggregate at some point in the future. However, Wilburn and Langer (2000) noted that increased environmental awareness, public opposition and stricter zoning regulations make it difficult to obtain permits to develop new aggregate mines and expand existing operations. In fact, according to their report, preemptive land use has eliminated more aggregate resources in the Colorado Front Range than has depletion by mining.

The amount of aggregate development being permitted in the Colorado Front Range has steadily decreased over time. According to Wilburn and Langer (2000), available aggregate resources are becoming more expensive to recover and produce, due to longer transportation distances, poorer quality of locally available sources, more involved permitting requirements and the encroachment of other land uses on the potential resource. For instance, up until the mid-1970s, the majority of the aggregate within the Denver metropolitan area was locally produced from sand and gravel. However, during the mid-1970s, several crushed stone quarries began operating in the Denver metropolitan area which largely met the increased demand in the metropolitan area since the 1970s. Wilburn and Langer (2000) concluded that many of the remaining sand and gravel deposits in the Denver metropolitan area have been excluded from development because of conflicting land use, poor quality and citizen opposition.

At most, only about 20 percent of the currently known sites occupied by *Z. hudsonius* considered by the Service to be Preble's in Colorado and Wyoming could be subject to aggregate development in the foreseeable future. However, it is unreasonable to assume that aggregate development will occur all of the 26 sites or even a relatively large percentage of these sites. And, even if aggregate development does occur at some of these sites, there is no evidence to suggest that the temporary loss of these sites (until reclamation) would adversely affect the persistence of the species across its range at a level sufficient to justify listing the species as threatened pursuant to the Act. Because the potential for aggregate development in the foreseeable future is limited to the Colorado Front Range and because the majority of the currently known occupied sites along the Colorado Front Range occur on poor or unsatisfactory aggregate geologic map units or are already precluded from development by other land uses (i.e., national forests, state wildlife management areas, parks, etc.), the existing and potential effect from aggregate development is isolated to relatively few populations and does not rise to the level of threat specified by 50 CFR § 424.02(m). Unless the Service can demonstrate that the potential loss of a few populations would adversely affect the species persistence across its currently known range, there can be no present or threatened destruction, modification, or curtailment of habitat or range from aggregate development sufficient to justify listing.

Water Development and Management for Commercial and Residential Use. The Service provided no supporting information in the final listing rule to explain why water development and management activities is (or would in the future) adversely affecting the persistence of the species to a level sufficient to justify listing. In the final listing rule, the Service simply references two anecdotal statements suggesting there may have been or could be an effect. According to the Service, Fitzgerald *et al*. (1994) stated inundation of riparian areas to create reservoirs had decreased available meadow jumping mouse habitat. The Service also states that Compton and Hugie (1993) concluded that management of water for commercial and residential use tends to channelize and isolate water resources, and has reduced in size and fragmented riparian habitats used by the species. However, Pague and Grunau (2000) believe that "water users in Colorado and Wyoming have a demonstrated ability to manage PMJM-suitable riparian systems." And many researchers have pointed to the importance of water conveyance ditches as habitat for *Z. hudsonius* considered by the Service to be Preble's (Pague and Grunau, 2000; Gary Beauvais, WYNDD. pers. comm.; Renee Taylor, True Cos., pers. comm.).

The only water development project identified by Pague and Grunau (2000) in their Preble's conservation planning process recommendations for Colorado was a proposal to construct water storage on upper Cherry Creek in Douglas County. We were unable to identify any similar projects in Wyoming proximate to currently occupied sites. Because of their limited aerial extent, these types of projects would likely adversely affect only a single population of *Z. hudsonius* considered by the Service to be Preble's. As such, this type of project would not have a significant affect on persistence of the subspecies across its entire occupied range.

We also fail to understand how the general effect of riparian habitat fragmentation rises to the level of threat specified in 50 CFR § 424.02(m). There are 126 currently known extant populations of Preble's scattered across southeastern Wyoming and eastern Colorado (excluding populations recently identified in the Upper Laramie Hydrologic Unit). In addition, it is nearly certain that additional, yet-to-be-discovered populations, exist across the range. Post-listing survey results indicate there has not been a downward trend in populations across its currently known range. Without a demonstrable downward trend in populations, the Service's assumption that habitat fragmentation is "bad" for meadow jumping mice is not a significant demonstrable effect and does not justify listing the species as threatened pursuant to the Act. The widespread and ubiquitous distribution of *Z. hudsonius* considered by the Service to be Preble's contradicts the Service's assertion that there is present or threatened destruction,

modification, or curtailment of riparian habitat at a level sufficient to justify listing pursuant to 50 CFR § 424.02(m).

Highway, Road, Bridge, Trail and Other Linear Developments. The Service presents no information to demonstrate that linear developments are having or will have a significant demonstrable effect on the persistence of the species across its currently known range. While we agree that linear development may result in some localized effects, we do not agree that they represent a significant demonstrable effect that warrants listing. Even a cursory review of the CNHP and Service EORs and WYNDD POD show that *Z. hudsonius* considered by the Service to be Preble's occur at numerous sites bisected by roads, highways and bridges, pipelines, power lines, etc. (i.e., Little Bear, South Boulder and Smith creeks). In fact, in many areas the species exists directly adjacent to long stretches of roads and highways (i.e., Monument and East Plum creeks). Surveys for the WIC Pipeline in Wyoming found *Z. hudsonius* considered by the Service to be Preble's in a number of drainages crossed by an established pipeline corridor. Bakeman (1999) noted that the species is able to pass through some culverts and Pague and Grunau (2000) suggest that roads are probably acting more as filters than as barriers.

The trail effect postulated by the Service is also a localized insignificant effect. Pague and Grunau (2000) reported that surveys conducted by Meaney *et al.* (in prep) did not detect significant differences in numbers of meadow jumping mice adjacent to trails in Boulder County. Nor could Pague and Grunau identify any populations impacted by trails in Elbert, Jefferson, Weld, Douglas or El Paso counties. With the exception of Crow Creek, we are unaware of any trails proximate to known populations in Wyoming. Trails do not exist in a significant portion of the species' currently known range and there is no evidence to suggest that where trails do exist within or adjacent to occupied habitat that the trails are or will result in a significant demonstrable effect that warrants listing.

Invasive Weeds. In the final listing rule the Service was uncertain as to whether invasive weeds have a detrimental effect on populations of *Z. hudsonius* considered by the Service to be Preble's. The only non-anecdotal information describing the relationship with invasive weeds is Shenk and Eussen (1999) who reported "the mouse appears to tolerate weedy or exotic species in areas that are structurally diverse and species rich; nearly every successful site contained Canada thistle." F.E. Warren Air Force Base is heavily infested with invasive weeds. WYNDD captured the species in pure patches of Canadian thistle along Crow Creek in 1998 (Gary

Beauvais, WYNDD. pers. comm.). Pague and Grunau (2000) stated "we know of no cases where weeds currently exclude known populations of PMJM" and "weeds were not identified as high priorities in most areas where PMJM is known." In Wyoming it has been observed by one researcher that the probability of capturing specimens increased with the level of weed infestation (Renee Taylor, True Cos. pers. comm.). There is no evidence what-so-ever to suggest the present or threatened destruction, modification, or curtailment of habitat or range from invasive weeds is or will represent a significant demonstrable event sufficient to justify listing.

Residential, Commercial and Industrial Development. In the final listing rule, the Service states that the "Colorado Piedmont east of the Front Range and adjacent areas of southeastern Wyoming have changed from predominately prairie habitat intermixed with perennial and intermittent streams and associated riparian habitat." While admittedly these changes have taken place over a portion of the species' range, the Service provides no information to demonstrate that a significant demonstrable effect has or will occur from urbanization or that such effects have or will occur over a significant portion of the species' range.

We utilized several existing GIS coverages to determine the significance of urbanization on potential habitat in Colorado and Wyoming. All streams in hydrologic units currently known to be occupied by *Z. hudsonius* considered by the Service to be Preble's were buffered by 0.5-miles and current land use within the buffered areas was determined. Wyoming and Colorado GAP land cover GIS coverages were utilized to determine areas where "urbanization" occur within the 1-mile wide buffered stream polygons. The GAP land cover coverages were produced using Landsat TM imagery with an intended application at the state or ecoregion level. Although the GAP coverages are coarse, they are the best available information and are adequate to determine the relative level of urbanization occurring within the buffered stream polygons in each hydrologic unit. For purposes of this analysis, we used the GAP "human settlement" land cover type to represent areas currently affected by "urbanization." Table 5-3 shows the percentage of the buffered stream polygons within each hydrologic unit mapped by GAP as human settlement types.

As can be seen on the table, Wyoming hydrologic units which are currently occupied by *Z. hudsonius* considered by the Service to be Preble's have not been significantly affected by human settlement. In all cases, no more than 3 percent of the buffered stream polygons

overlap areas mapped as human settlement land cover type in Wyoming. As expected, the analysis shows that Colorado hydrologic units along the Front Range have been affected by urbanization more than those in Wyoming and more rural portions of Colorado. The most impact has occurred in the Clear and Fountain Hydrologic units where about 13 and 12 percent

Table 5-3
Percent of Buffered Stream Polygons Mapped as Human Settlement Land Cover Type

Hydrologic Unit	Percent of Buffered Stream Polygon Mapped as Human Settlement Land Cover Type
Middle North Platte-Casper	1.7
Glendo Reservoir	<1
Lower Laramie	<1
Horse	<1
Upper Lodgepole	2.1
Crow	2.9
Lone Tree-Owl	<1
Cache La Poudre	1.8
Big Thompson	<1
St. Vrain	4.5
Middle South Platte-Cherry Creek	7.6
Clear	13
Chico	<1
Upper South Platte	8.2
Fountain	12.3
Kiowa	<1
All Hydrologic Units Combined	3.3

of the buffered stream polygons currently overlap the human settlement land cover type, respectively. In the remainder of the Colorado hydrologic units the impact has been less than 10 percent. When all currently occupied hydrologic units are considered, the level of impact has been about 3.3 percent.

According to the final listing rule, urban development is a significant threat to the species. Yet, the Service provides no evidence to support this assumption. We question the Service's conclusion based on our estimate of less than 5 percent of the species' current known range being affected by "urbanization." Also, the Service failed to consider landownership and other mitigating factors that likely further diminish the effects of urbanization (see Table 5-2).

In Wyoming, except along Crow Creek, widespread urban development has not occurred in areas occupied by *Z. hudsonius* considered by the Service to be Preble's. In the final listing rule, the Service discusses urban development in southeastern Wyoming by briefly summarizing statements made by Compton and Hugie (1993) during the initial status review. According to the Service, Compton and Hugie (1993) discuss the effects of urbanization occurring from Colorado Springs to Cheyenne as a continuing threat to remaining populations.

However, with the exception of Crow Creek at Warren Air Force Base in Cheyenne, the currently known range of *Z. hudsonius* considered by the Service to be Preble's in Wyoming does not overlap areas of widespread urban development. All other sites currently occupied and proximate to Cheyenne occur west of the city in the upper portions of the Crow Hydrologic Unit at much higher elevations in the Laramie Range between Cheyenne and Laramie and well north of the city in the Lower Lodgepole and Horse Hydrologic units. Many of the records in the upper portion of the Crow Hydrologic Unit are on the Medicine Bow-Routt National Forest which likely precludes these sites from urban development. Widespread urbanization in and around Cheyenne or elsewhere in Wyoming is simply not a threat to the species. The issue of urban development is restricted to the Colorado Front Range because it is extremely unlikely that future persistence of the 36 currently known populations in Wyoming will be adversely affected by urbanization.

Larimer County contains a number of extant populations of *Z. hudsonius* considered by the Service to be Preble's, most of which were not discovered until after the final listing rule (Shenk and Eussen, 1999). The species is currently known to be widely distributed in both the Cache La Poudre and Big Thompson Hydrologic units in Larimer County (see Map 1). And, it is nearly certain that additional populations will be discovered in these hydrologic units in the future (see Section 4.8 of this petition for other sites which may contain the species in Larimer County).

Preble's populations in Larimer County were recently addressed by Pague and Grunau (2000) as part of CDOW's site conservation and planning recommendations for protecting the species in the county. In the report the authors identified the largest occupied areas in Larimer County as potential conservation zones. They concluded that the "threats to these streams are believed to be relatively low." According to Pague and Grunau (2000), historical populations of in the lower Poudre River appear to have been extirpated and relatively high levels of survey work have failed to find the species in Fort Collins, Timnath or Loveland. The authors stated there was an apparent correlation between urban development and disappearance of the species from these areas. However, they warned that the correlation did not demonstrate a cause-and-effect relationship.

However, outside the Fort Collins, Timnath and Loveland areas, Pague and Grunau (2000) concluded that *Z. hudsonius* considered by the Service to be Preble's were "relatively common" in the area around Livermore, based on captures on the North Fork Cache La Poudre

River, Meadow Creek, Dale Creek and in the Cherokee Park State Wildlife Area. According to the authors, the population in the vicinity of Livermore is among the largest known for the species. In fact, Pague and Grunau (2000) estimated there to be at least 50 miles of stream occupied in the vicinity of Livermore. Also, discovery of *Z. hudsonius* considered by the Service to be Preble's in Lory State Park and the Watson Fish Hatchery has suggested the possibility to the PMJM Science Team that the species could occur in a more widespread distribution in the narrow east-facing slope of the foothills. According to Pague and Grunau (2000), some members of the PMJM Science Team have speculated about a single dispersed population that extends from the vicinity of Horsetooth Reservoir west of Fort Collins north to the vicinity of Virginia Dale at the Wyoming border. However, without significant additional trapping, Pague and Grunau (2000) concluded that it was not possible to determine if the populations at Lory State Park (Arthurs Gulch Site) and the Watson Fish Hatchery (Cache La Poudre River northeast of La Porte Site) are relict or part of a more widespread population.

Most of the sites currently occupied in the Cache La Poudre and Big Thompson Hydrologic units in Larimer County are, at least partially, on publicly-owned lands (see Table 5-2). Seven of the ten currently known occupied sites in the Big Thompson Hydrologic Unit occur on the Roosevelt National Forest where urbanization is precluded. In the Cache La Poudre Hydrologic Unit, 13 of the 16 (over 80 percent) currently known sites occur on national forest, state recreation areas or state wildlife areas where urbanization is precluded. The currently occupied sites in this hydrologic unit which are located on private lands are located 15 to 30 miles north of Fort Collins along U.S. Highway 287. To date, this area has not experienced extensive urban growth and the landscape remains predominately rural. A few of the occupied sites may be negatively or positively affected by residential development in the future but it is impossible to predict (or demonstrate) where and to what level, if any, these impacts will occur. Pague and Grunau (2000) were probably correct in assuming the most likely development in this area is "ranchettes" which may or may not adversely impact the species. Any predictions as to how residential development in this area would affect *Z. hudsonius* considered by the Service to be Preble's is speculative. Such speculation is not a significant demonstrable effect.

Four sites are currently known in the Lone Tree-Owl Hydrologic Unit. The sites are located in extreme northeast Weld County and adjacent Laramie County in Wyoming. The sites are well removed from urbanization impacts occurring in and around Fort Collins and Cheyenne. The potential for impacts from urbanization in this hydrologic unit on currently known Preble's sites is very remote.

Twelve currently occupied sites are known from the St. Vrain Hydrologic Unit in Boulder County (see Table 5-2) and five occur, at least partially, on lands where urbanization is likely precluded. Pague and Grunau (2000) addressed populations in Boulder County as part of CDOW's site conservation and planning recommendations for protecting Preble's. Habitat conversion, hydrological impairment, increased predation or competition and disease concern ranked highest among conservation issues addressed in the report. However, they pointed out that no issues were ranked as very high concerns in Boulder County. The authors state "in fact, the scores of each high priority issue were quite low when compared to most other counties. This is probably explained by the relatively large amount of protection provided to many PMJM occurrences through Boulder's county, city, and mountain parks protection programs." Of the 12 currently occupied sites located in the St. Vrain Hydrologic Unit, three are at least partially located on open space lands (Jefferson and Boulder counties), one is located partially on Eldorado Canyon State Park and one is located on Rocky Flats which is expected to become a national wildlife refuge. We are unaware of any evidence that suggests that urbanization will adversely affect any of the current known sites in Boulder County given the present level of protection afforded to natural resources by the city and county of Boulder.

Eight of the 11 current known populations in Jefferson County are either on Rocky Flats, Jefferson County Open Space lands or national forest lands (see Table 5-2). Pague and Grunau (2000) state that although past habitat loss in Jefferson County has been problematic, several government programs are currently providing refuges for the species in the county. They suggest that soft land management practices at Rocky Flats has spared urbanization impacts to the species from adjacent metro Denver. Also, Pague and Grunau (2000) note that Jefferson County's Open Space Program has aggressively protected "much of the county's best open space land, including areas occupied by PMJM." Designating Rocky Flats as a national wildlife refuge will preclude future impacts to the populations of *Z. hudsonius* considered by the Service to be Preble's that occur at the site.

Although Chatfield Reservoir inundated habitat for the species, the state recreation area now provides occupied habitat along the South Platte River and in the Plum Creek drainage in Douglas County. Urban development is precluded from these sites. Seven other populations in Douglas County occur, at least partially, on State parks and/or national forest lands (see Table 5-2) where urbanization impacts are unlikely.

Douglas County likely has one of the largest populations of the species in Colorado. In discussing habitat conservation in the county, Pague and Grunau (2000) noted that efforts by Douglas County, several land trusts, Great Outdoors Colorado, and the State of Colorado are designed to conserve a "significant" amount of land for open space values with a particularly strong emphasis on riparian corridors which will greatly benefit *Z. hudsonius* considered by the Service to be Preble's. Douglas County and most of its associated towns presently give strong consideration to the values of riparian systems for multiple uses, including wildlife, in its planning process. The county's master plan addresses the need to protect riparian habitat and should eliminate or significantly reduce many future potential urbanization impacts to the species on private lands in the county.

Preble's in El Paso County occur in the Monument Creek drainage. Five of the seven currently known extant populations in the Fountain Hydrologic Unit occur on the U.S. Air Force Academy and adjacent national forest lands (see Table 5-2). The largest population in the county is located on the U.S. Air Force Academy. Pague and Grunau (2000) concluded that the soft land management at the academy has protected the species from urbanization. *Z. hudsonius* considered by the Service to be Preble's in the drainage are also protected by a conservation easement along Monument Creek.

The above discussion suggests three important conclusions. First, none of the currently occupied sites in Wyoming (except possibly Crow Creek) are subject to future significant impacts from urbanization. Second, not all the currently occupied sites in Colorado are subject to future significant impacts from urbanization – 45 of the 90 known sites occur on lands where urbanization is likely precluded. Third, to date urbanization has affected less than 5 percent of potential habitat range-wide. Given these conclusions, we question the Service's assumption that urbanization represents a significant demonstrable effect that warrants listing the species under the Act.

5.2.2 Overutilization for Commercial, Recreational, Scientific or Educational Purposes

We concur with the Service's conclusion that overutilization is not a threat.

5.2.3 Disease or Predation

The Service identifies two potential effects for this listing factor but in both cases fail to demonstrate how either effect justifies listing the species as threatened pursuant to the Act. The Service states it is uncertain whether plague affects meadow jumping mice populations and

concluded there is no evidence whether or not any epizootic disease has caused a significant impact to the species. Parasites do not seem to be a significant problem for meadow jumping mice (Whitaker, 1972). There is no information to suggest a significant demonstrable effect sufficient to justify listing. If the Service cannot demonstrate an adverse disease effect, it is unacceptable to use this effect to justify the listing – particularly in the absence of a downward population trend in the subspecies.

The Service also suggests free-ranging domestic cats may locally present a problem. We won't argue the Service's conclusion that cats eat mice. The PMJM Science Team recently concluded that under most circumstances, cats may not be a major predator in rural areas (Pague and Grunau, 2000). However, higher cat densities in more urban areas may be problematic. It is obvious that this effect, even if it was demonstrable, does not affect a significant portion of the species' range and does not justify listing the species in the absence of a downward population trend.

5.2.4 Inadequacy of Existing Regulatory Mechanisms

In the final listing rule the Service alleged that the decline of the species is partially due to the inherent weakness or non-application of the existing laws and regulations that could serve to protect the species and its habitat. Relevant Federal laws the Service believes are failing to protect the mouse include the Clean Water Act, Endangered Species Act, Federal Power Act, Fish and Wildlife Coordination Act, Food Security Act, and National Environmental Policy Act.

This statement directly contradicts other conclusions recently reached by the Service for other species. For the tidewater goby delisting proposed rule, the Service concluded that "little evidence exists to support the conclusion that existing regulatory mechanisms inadequately protect the species or are contributing to substantial or widespread population decline" (64 FR 33816). In the case of the tidewater goby, the Service initially listed inadequate regulatory mechanisms as one of the factors leading to the decline of the species. However, the Service concluded that this changed with the promulgation of environmental regulations "circa 1970." As examples, the Service points to the current review and permitting of projects by the Corps of Engineers under section 10 of the Rivers and Harbors Appropriation Act of 1899 and section 404 of the Clean Water Act (the same regulations the Service claims is failing to protect *Z. h. preblei*) as "unlikely to allow the extent of destruction and modification of … habitat that occurred prior to implementation of these regulations." They also discuss the avoidance of

impacts to wetlands as the first consideration given by the Corps of Engineers for projects requiring permits for dredge and fill activities.

The Service also fails to recognize other regulatory programs in place in portions of the species' range that provide protection. Throughout Colorado, counties have developed comprehensive zoning regulations and/or master plans that regulate construction activities and other disturbances adjacent to streams. Although not designed specifically to address any single species, these zoning regulations recognize the importance of riparian areas to overall wildlife diversity.

In the final listing rule the Service seems to imply that existing regulatory programs have somehow failed to protect meadow jumping mice along the Colorado and Wyoming Front Range. However, because there has been no demonstrable downward trend in populations, and species appears to be widespread and ubiquitous, this assumption is not valid.

5.2.5 Other Natural or Manmade Factors Affecting the Species Continued Existence

Two additional effects are included in the final listing rule under this category. According to the Service, use of pesticides and herbicides has undoubtedly increased across the species' known range as human land use has intensified. The Service believes these chemicals could directly poison individual jumping mice or may be ingested through contaminated food or water. However, the Service concludes that specific impacts from pesticides and herbicides are not currently known. The Service agrees that there is no significant demonstrable effect from pesticide use.

The Service also believes intensive human development creates a range of additional environmental impacts (including but not limited to noise, and the degradation of air and water quality) that could alter the mouse's behavior, increase the level of stress, and ultimately contribute to loss of vigor or death of individuals, and extirpation of populations. However, these effects are speculative and the Service has failed to provide evidence of a significant demonstrable effect over a significant portion of the currently known range. Again, in the absence of any downward trends in populations across its currently known range, it is inappropriate to suggest that these types of effects rise to the level of a threat specified in the Act. There can be no reasonable assumption of significant synergistic effects based on current distribution, abundance and trend information.

6.0 Previous Service Delisting and Reclassification Actions Based on New Distribution Information and Taxonomic Revision

Delisting factors are outlined in 50 CFR § 424.11(c) and (d) and specifically provide for delisting based on error in the original data used for classification[18] which can include discovery of previously unknown populations or habitat and taxonomic revision. To date, seven species have been delisted because of taxonomic revision alone.[19] As discussed below, not delisting *Z. h. preblei* (now known to be *Z. h. campestris*) would be inconsistent with previous delisting decisions made by the Service.

The Congressional Research Service (CRS) evaluated the Service's delisting process in 1998 (Noecker, 1998) and addressed a number of species that the Service delisted based on a determination that data used to list were incomplete or in error. Interestingly, according to the Service's regulatory summary web page for these species, no petitions were received that prompted delisting actions addressed in the CRS report.[20] Rather, the Service appears to have acted independently (and appropriately) based on review of better data, discovery of previously unknown populations or habitats and/or taxonomic revision. Unfortunately, for *Z. h. preblei* the Service has failed to follow the precedence it set when these species were delisted.

Some of the species which are addressed in the CRS report and additional more recent delisting and reclassification actions taken by the Service are discussed briefly below. The similarities and relevance of these previous Service delisting and reclassification actions to *Z. hudsonius* considered by the Service to be Preble's are described.

6.1 Pine Barrens Treefrog

In 1983, the Service removed the Florida population of the Pine Barrens treefrog (*Hyla andersonii*) from the List of Endangered and Threatened Wildlife and rescinded the critical habitat designation based on evidence that the species was much more widely distributed than originally known (48 FR 52740). The species was listed as endangered in 1977 (42 FR 58754) based primarily on its presumed limited distribution. However, at the time of listing very few surveys for the treefrog had been conducted. Similar to *Z. hudsonius* considered by the Service

[18] See specifically 50 CFR § 424.11(d)(3).
[19] See http://endangered.fws.gov/wildlife.html

[20] Petitions received by the Service are listed on the Service's web site (under the profile of each threatened and endangered species (see www.endangered.fws.gov).

to be Preble's, at the time of the 1977 listing the tree frog was thought to occur in only a few locations and breeding sites were thought to be limited to seven small areas in Okaloosa County, Florida.

After the 1977 listing, the Florida Game and Fresh Water Fish Commission began surveys for the species. Survey results for 1978, 1979 and 1980 revealed a number of new populations in Okaloosa, Walton, Holmes and Santa Rosa counties in Florida and Escambia and Covington counties in Alabama. The surveys expanded the number of documented breeding sites from the original seven thought to occur at the time of the listing to over 150 sites. In the delisting rule, the Service noted that although the species was limited to only four counties in Florida, it was widespread in these counties. During the delisting process for the treefrog, the Service recognized that a significant amount of potential treefrog habitat had not been surveyed and was very likely to harbor the species. The same situation currently exists for *Z. hudsonius* considered by the Service to be Preble's. Based on the large number of known and potential habitat sites, the Service concluded that the treefrog was relatively secure for the immediate future. As a result, the species was removed from the List of Endangered and Threatened Wildlife.

6.2 Dismal Swamp Southeastern Shrew

This shrew (*Sorex longirostris fisheri*) was listed by the Service as threatened in 1986 (51 FR 34422). At the time of the listing, this species was believed to occur in only two cities in Virginia and four counties in North Carolina coincidental with the historic boundaries of the Dismal Swamp, which is similar to the limited distribution of *Z. h. preblei* assumed by the Service during the final listing rule.

Prior to 1920, only 20 specimens of Dismal Swamp southeastern shrew were known. In 1980, 15 additional specimens were collected in Suffolk, Virginia from the Great Dismal Swamp National Wildlife Refuge. Between 1980 and 1982, additional specimens were collected in Currituck and Gates counties, North Carolina and the cities of Chesapeake, Suffolk and Virginia Beach and Isle of Wight and Surry counties, Virginia. The 1980-1982 trappings produced 24 specimens from 10 populations that at the time were classified as *S. l. fisheri*, 62 specimens from nine populations identified as integrades with *S. l. longirostris* and 30 specimens from

seven populations classified as *S. l. longirostris*. [21] This classification suggested that interbreeding of the two subspecies might be occurring, particularly on the national wildlife refuge. Potential interbreeding, coupled with habitat loss and alteration, lead to the 1986 listing of *S. l. fisheri*.

At the time of the listing, significant information on the Species' distribution was available for Virginia but little information was available for North Carolina – similar to the final listing rule for *Z. h. preblei* where the Service was unaware of the number of populations in Wyoming and northern Colorado (i.e., Cache La Poudre Hydrologic Unit). In 1994, shrew specimens collected in the 1990s throughout coastal North Carolina were compared with the voucher specimen for *S. l. fisheri* at the Smithsonian's National Museum of Natural History. This comparison indicated that specimens collected from southeastern North Carolina and Beaufort and Gates counties, North Carolina were of the same size as the voucher specimen for *S. l. fisheri* from Lake Drummond, the type locality for the subspecies. [22] Additional comparisons with specimens identified as *Sorex longirostris* (not identified to subspecies) at the North Carolina Museum of Natural Sciences also indicated that specimens from Jones, Craven and Carteret counties, North Carolina were also *S. l. fisheri*. Additional specimens from the Museum of Natural Sciences from Chowan, Balden and Brunswick counties, North Carolina were also assumed to be *S. l. fisheri* as were additional specimens collected in 1994 from Duplin County.

Similar to the current situation with *Z. hudsonius* considered by the Service to be Preble's, in 1995, questions were raised regarding the distribution and taxonomy of *S. l. fisheri*. Based primarily on additional field surveys and on morphologic and genetic analysis, the Service concluded that *S. l. fisheri* was much more widespread and ubiquitous than previously believed. The Service removed *S. l. fisheri* from the List of Endangered and Threatened Wildlife in 2000 (65 FR 10420) based on the conclusion that data supporting the original classification were incomplete. From a biogeographical standpoint, the history of our current understanding of the distribution *Z. hudsonius* considered by the Service to be Preble's is very similar to the circumstances that eventually led to the removal of *S. l. fisheri* from the List of Endangered and Threatened Wildlife.

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[21] *S. l. longirostris* is a subspecies of southeastern shrew which occurs in a range that extends through eastern Louisiana, eastern Oklahoma, and Missouri, then eastward through central Illinois and Indiana, southern Ohio and Maryland.

[22] Substantial size differences in anatomical measurements occur in southeastern shrews. *S. l. eionis* is significantly larger in four cranial measurements when compared with the other two subspecies; *S. l. fisheri* is significantly larger in one cranial and one external measurement; and *S. l. longirostris* has a relatively short palate and rostrum, narrow skull and short foot and tail.

6.3 Rydberg Milk-Vetch

Rydberg milk-vetch (*Astragalus perianus*) was listed as threatened in 1978 when it was known from only one type location in Piute County, Utah and one population in Garfield County, Utah (43 FR 17914). In the nine years following the listing, additional populations were discovered. Some of the new discoveries resulted from a review of specimens previously misidentified as *A. serpens* which closely resembles *A. perianus*. In addition, the U.S. Forest Service conducted inventories of potential habitat from 1984 through 1987 as part of its management plan for the listed plant. The U.S. Forest Service inventories identified 12 major populations covering approximately 2,000 acres in six Utah counties. Based on the discovery of the new populations and a reevaluation of threats to the species, the Service removed this plant from the List of Endangered and Threatened Plants in 1989 (54 FR 37941).

In the review of threats to the species, the Service recognized that mining and road construction remained a localized threat to small portions of the species' overall population, but because of the increase in numbers and range, they no longer constituted a significant threat to the species (54 FR 37941). The Service concluded that even a significant impact on one population would not affect the overall status of the species. From a persistence standpoint, the same conclusions reached by the Service for this plant hold true for *Z. hudsonius* considered by the Service to be Preble's.

6.4 Sicklefin Chub and Sturgeon Chub

Although much more widely distributed than the treefrog, shrew and milk-vetch described above, these species demonstrate how the Service has evaluated loss of overall range of a species in past listing decisions. These chubs are endemic to the Missouri River basin and the Mississippi River below St. Louis in the central United States. In 1993, the Service issued status reports for both species that indicated the range and populations of both chubs had been substantially reduced (U.S. Fish and Wildlife Service, 1993a and 1993b). The construction and operation of dams and reservoirs on the main stem Missouri River and channelization of the Middle and Lower Mississippi River were the principal factors impacting sicklefin (*Macrhybopsis meeki*) and sturgeon chub (*M. gelida*).

In 1994, the Service received a petition from a coalition of environmental groups requesting both species be listed as endangered. The petition concluded that severe impacts to habitat had adversely affected the ability of both species to survive. The Service published a positive 90-day finding in 1995 that concluded the petition (and data available from other sources) provided substantial information indicating that listing may be warranted and began a lengthy status review for both species. Similar to *Z. h. preblei* (now known to be *Z. h. campestris*) at the time of the 1995 positive 90-day finding, the distribution of both species was poorly known primarily because of inadequate sampling techniques historically used by fishery biologists.[23] The Service's status review was conducted over a five-year period and the 12-month finding was finally published on April 18, 2001 (66 FR 19910) as the result of a settlement agreement with the Montana Rivers Coalition over the Service's failure to act on the petition in the time frames established by the Act.

In its 12-month finding, published in 2001, the Service declined to list either species as threatened or endangered (66 FR 19910). The 12-month finding recognized that construction and operation of six Missouri River main stem dams had effectively isolated sturgeon chub populations and that both chubs had been extirpated from approximately 800 miles of the Missouri River that had been converted to reservoir habitat and from an additional 200 miles of free-flowing reaches below the dams. The 12-month finding also concluded that operations of the dams continued to impact the chubs.

When the Service declined to list these chubs it was well known that the historic range of both species had been significantly reduced. At the time of the Service's decision, sturgeon chub populations persisted in only 11 of the 30 tributaries to the Yellowstone and Missouri rivers where they were historically collected (U.S. Fish and Wildlife Service, 2001). After the 1995 positive 90-day finding, survey techniques for these minnows were modified which resulted in more abundant collections. Based on new survey information provided to the Service during the five-year long status review, the Service determined that the sicklefin chub occupied about 54 percent of its historic range in the Missouri River drainage and viable populations were known to occur in the Middle and Lower Mississippi River. The Service concluded that the sturgeon chub occupied approximately 55 percent of its historic range in the Missouri River and persisted in 11 of 30 tributaries to the Yellowstone and Missouri River. Additional populations of sturgeon chub

[23] The Service concluded that historic data documenting sicklefin and sturgeon chub populations were limited and provided incomplete information regarding the species' range and population levels. The Service also concluded that neither species received much attention from fishery biologists until the proposed listing (U.S. Fish and Wildlife Service, 2001). Similarly, Preble's were largely ignored by biologists until it was listed.

were documented in the Middle and Lower Mississippi River. Even though the chubs had been extirpated from about half of their historic habitat, the Service concluded that new information presented to the Service after the 1995 positive 90-day finding indicated that sicklefin and sturgeon chubs were more widespread and occurred in greater numbers than previously believed (i.e., during the positive 90-day finding). Based on the new information and absent any information demonstrating a downward trend in population, the Service determined that listing the chubs was not warranted. The historic range of *Z. hudsonius* considered by the Service to be Preble's has not been nearly as severely impacted as that of these chubs which the Service declined to list.

6.5 McKittrick Pennyroyal

This plant (*Hedeoma apiculatum*) is endemic to the Guadalupe Mountains in Culberson County, Texas and Eddy County, New Mexico. The Service listed McKittrick pennyroyal as threatened in 1982 (47 FR 30440). When the species was listed, the Service described threats to the species as limited distribution, low numbers and low reproductive potential, which the Service concluded made the species vulnerable to extinction from habitat disturbance.

After the listing, additional surveys were conducted that determined the species was more widespread and abundant than assumed at the time of the listing. A total of 13 Texas and 23 New Mexico occupied sites were known when the species was delisted in 1993 (58 FR 49244). These 36 known locations were scattered over a 65 square mile range. At the time of the listing, the Service estimated the number of plants to be about 1,100. The new surveys suggested that approximately 5,000 plants existed at the 36 known locations.

Similar to *Z. h. preblei*, when the pennyroyal was delisted, the Service concluded that only five to 10 percent of the plant's potential habitat had been surveyed and recognized that additional habitat was abundant within the known range. The Service concluded that it was likely that numerous groups of undiscovered plants would be found throughout the unsurveyed suitable habitat. As a result of the discovery of additional populations, McKittrick pennyroyal was removed delisted and its critical habitat designation was rescinded (58 FR 49244).

7.0 Closing

This petition provides substantive information that clearly demonstrates, using phylogenetic analysis, that *Z. h. preblei* is not a valid subspecies – it is not different from *Z. h. campestris* (which is not listed as threatened, endangered or a candidate species). The best available scientific information indicates the presence of habitat corridors suitable for *Z. h. campestris* between the Colorado and Wyoming Front Range and northeastern Wyoming, which precludes a reasonable argument that Front Range *Z. h. campestris* is a distinct population segment. And, the petition demonstrates that even if these suitable habitat corridors were not present, post-listing information regarding distribution, abundance, trends and threats clearly indicates that Front Range populations of meadow jumping mice fail to meet the criteria established in the Act for listing as threatened.

Based on the information contained in this petition, we request the Secretary to remove *Z. h. preblei* from the List of Endangered and Threatened Wildlife on the basis of data error and taxonomic revision. Delisting will relieve existing restrictions and will allow Federal agencies to minimize any further delays in project planning and implementation for actions that may affect *Z. h. preblei* (now known to be *Z. h. campestris*).[24]

Delay in delisting will cost government agencies staff time and monies on conducting Section 7 consultation for actions that may affect a species not in need of protection under the Act. Therefore, we request the schedule for delisting comply with the time frames outlined in 50 CFR § 424.14 and that the delisting rule rescind critical habitat designated for the species in 2003 (68 FR 37276).

[24] These are the reasons provided by the Service for making the 2000 delisting of the Dismal Swamp southeastern shrew immediately effective (65 FR 10420).

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