

**LITERATURE COMPILATION: PREBLE'S MEADOW JUMPING MOUSE (*Zapus hudsonius preblei*)
IN WYOMING, WITH ATTENTION TO POTENTIAL EFFECTS OF PETROLEUM DEVELOPMENT**

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This report, in its entirety, consists of 3 documents: (1) this summary overview; (2) a spreadsheet titled "Zapus_Literature_WYNDD_Oct2011_final.xlsx"; and (3) a zip file of .PDF documents titled "Zapus Literature.zip".

The attached spreadsheet "Zapus_Literature_WYNDD_Oct2011_final.xlsx" contains the results of a review of scientific literature pertaining to the Preble's meadow jumping mouse (*Zapus hudsonius preblei*; hereafter "PMJM") compiled by the Wyoming Natural Diversity Database (University of Wyoming; "WYNDD"). Documents were acquired from the WYNDD library, Colorado Natural Heritage Program, a data CD containing references used in the USFWS 2007 delisting decision, the collection of Completion Reports issued by the Wyoming Game and Fish Department Nongame Program 1988-2011, and internet-based literature searches. In the spreadsheet, each listed document is attributed as to full citation, short citation (also the file name of the .PDF file, if included), taxon discussed, subject keywords regarding document contents, and whether or not a .PDF file is included. Some articles are available as .PDFs; some could not be located; and some remain as paper copies on file in the WYNDD library.

The "Taxon discussed" attribute includes the following designations:

- ZHP = *Zapus hudsonius preblei*
- ZHC = *Zapus hudsonius campestris*
- ZHI = *Zapus hudsonius intermedius*
- ZHL = *Zapus hudsonius luteus*
- Zhud = *Zapus hudsonius*
- ZP = *Zapus princeps*
- ZT = *Zapus trinitatus*
- NZ = *Napaeozapus* spp.
- NA = not specifically about *Zapus* (i.e., general effects of grazing in riparian areas)

The "Subject Keywords" include:

range, status, appearance, description (general description of taxon), specimens (records of collection), taxonomy, genetics, history, trapping (methods/ effects of trapping), habitat, vegetation, population dynamics, survival, longevity, dispersal, immigration/emigration, home range, hibernation, nest sites, diet, predation, behavior, parasites, physiology, grazing impacts, human impacts, hydrology (stream flow modifications or preferences), agriculture, fire, climate (effects of climate change)

Best Management Practices for Petroleum Development

In addition to searching for, and listing, documents addressing PMJM in general, we also performed more specific searches targeting 10 topics of likely relevance for developing of Best Management Practices (BMP) for petroleum development actions within the range of PMJM in Wyoming. Two additional columns were added to the database: “Directly Relevant to BMP?” (if an article contained information on one of the topics; YES, NO, Possible, or Unknown/Not read) and “BMP Topics” (which of the 10 topics are discussed in the article). The 10 topics selected (by keyword):

- **Roads** – road mortality, road avoidance, road noise, other road impacts
- **Trails** – formal and social; paved vs. unpaved, use
- **Culverts** – use of culverts by mice, effects of run-off, storm water management, irrigation ditches, etc.
- **Movements** – patterns of movement and distances traveled by mice
- **Water** – distance from water that mice have been known to travel
- **Uplands** – use of uplands habitat and characteristics of these habitats
- **Vegetation** – plant species associated with PMJM
- **Structure** – structure of vegetation association with PMJM: height, density, % cover, diversity
- **Invasive** – impacts of invasive plants on habitat
- **Other** – any other factors possibly of relevance including herbicides, mitigation recommendations, soil preferences, etc.

Documents of Particular Relevance for BMP Development: Of the 390 total documents listed in the attached spreadsheet, 57 appear to be particularly relevant to BMP development (these are all attributed with “Directly Relevant to BMP?” = YES). Of these 57, we draw attention to 10 of potentially high importance:

Meaney, C.A., A. Ruggles, N.W. Clippinger, and B. Lubow. 2002. The impact of recreational trails and grazing on small mammals in the Colorado Piedmont. *The Prairie Naturalist* 34(3/4):115-136.

[Effect of Trails on PMJM. 2nd and 3rd year study exist as well, but do not have on file]

Ensign Technical Services. 1999. Report on Preble’s meadow jumping mouse movement assessment at Dirty Woman and Monument creeks, El Paso County, Colorado. 24 pp. + figures and tables.

Unpublished report to Colorado Department of Transportation.

[info on use of cover station in culverts and features that determine if a road is a filter or a barrier]

Ensign Technical Services. 2001. Preble’s meadow jumping mouse 2000 data summary for Dirty Woman Creek, Town of Monument, El Paso County, Colorado. Unpublished report to the Colorado Department of Transportation.

[effects of roads over streams with noise and vibration measurements]

Bakeman, M.E. (ed.) 1997. Conclusions and recommendations from the report on habitat findings of the Preble's meadow jumping mouse. 13 pp. + tables and figures. In Report on habitat findings on the Preble's meadow jumping mouse (ed. M. E. Bakeman). Unpublished report to the U.S. Fish and Wildlife Service and the Colorado Division of Wildlife. 91 pp.

[documentation of PMJM near trails and detailed vegetation analysis]

Meaney, C. A., M. Bakeman, M. Reed-Eckert and E. Wostl. 2007. Effectiveness of Ledges in Culverts for Small Mammal Passage. Report to Colorado Department of Transportation.

[focus on making culverts accessible to small mammals with emphasis on PMJM]

Bakeman, M.E., and C. Meaney. 2001. Preble's meadow jumping mouse issues within the I 25 project area in northern El Paso County, Colorado. Report by Ensign Technical Services to Wilson and Company. 62 pp.

[culverts as filters vs. barriers and suggestions for mitigating impact]

Dharman, A. T. 2001. Movement patterns of Preble's meadow jumping mouse. M.S. Thesis. Colorado State University, Fort Collins, Colorado. 52 pp.

[radio telemetry study accessing validity of 300 ft buffer]

Schorr, R. A. 2003. Meadow jumping mice (*Zapus hudsonius preblei*) on the U.S. Air Force Academy, El Paso County, Colorado: Populations, Movement and Habitat from 2000-2002. Colorado Natural Heritage Program unpublished report to the Natural Resources Branch, U.S. Air Force Academy. 25 pp.

[detailed movement info from radio-telemetry study]

Ryon, T.R. 1999. Travel distance and movement patterns of the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) at the Rocky Flats Environmental Technology Site. Journal of Colorado-Wyoming Academy of Science 31:12.

[largest documented movement]

Keinath, D.A. 2001. Habitat associations of Preble's meadow jumping mice in Wyoming: A GIS model and descriptive analysis. Unpublished report prepared for U.S. Fish and Wildlife Service. Wyoming Natural Diversity Database, Laramie, Wyoming. 18 pp.

[detailed vegetation information for WY]

Documents Outlining Existing Management Plans: Of the 390 total documents listed in the attached spreadsheet, at least 6 outline existing management or conservation plans for PMJM :

Pague, C.A., and L. Grunau. 2000. Conservation planning handbook for the Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Unpublished report to the Colorado Department of Natural Resources. 284 pp.

Shenk, T.M. 1998. Conservation assessment and preliminary conservation strategy for Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Unpublished report of the Colorado Division of Wildlife. 38 pp + appendix.

Schuerman, T.P. and C.A. Pague. 1997. Natural Heritage targeted inventory for the Preble's meadow jumping mouse: ZAPUS HUDSONIUS PREBLEI. Unpublished report prepared for FE Warren Air Force Base by the Colorado Natural Heritage Program, Ft. Collins, CO in cooperation with the Wyoming Natural Diversity Database, Laramie, WY.

Grunau, L., R. Schorr, J. Handwerk, B. Heidel, G.P. Beauvais, C. Pesenti, M. Carter, M. Jennings, and T. Abbott. 2004. Conservation and management plan for Colorado butterfly plant and Preble's meadow jumping mouse on F. E. Warren Air Force Base. Report prepared for the U.S. Air Force - F.E. Warren Air Force Base by the Colorado Natural Heritage Program - Colorado State University (Ft. Collins, Colorado) and the Wyoming Natural Diversity Database-University of Wyoming (Laramie, Wyoming).

Bakeman, M.E., and C. Meaney. 2001. Preble's meadow jumping mouse issues within the I 25 project area in northern El Paso County, Colorado. Report by Ensign Technical Services to Wilson and Company. 62 pp.

Grunau, L. Conservation and Management Plan For Preble's Meadow Jumping Mouse on the U.S. Air Force Academy. 1999. Colorado Natural Heritage Program.

Comments

Although recent genetics analyses have determined PMJM to be a valid subspecies, there remains considerable uncertainty as to the subspecies' actual distribution in Wyoming. Many older specimens were assigned to species and subspecies using techniques now known to be inconclusive, and thus most existing maps of PMJM locations in Wyoming contain an unknown degree of uncertainty. Ongoing work by the Wyoming Game and Fish Department - Nongame Program (see Thompson and Grenier 2010; Cudworth and Grenier 2011; Thompson et al. 2011; and Grenier 2011 *in preparation*) and the Wyoming Natural Diversity Database (see Bowe and Beauvais 2011 *in preparation*) is directly addressing this issue.