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Survey for Mountain Plover (*Charadrius montanus*)
on Federal Lands in the Powder River Basin

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Survey for Mountain Plover (*Charadrius montanus*) on Federal Lands in the Powder River Basin

Executive Summary

The Wyoming Natural Diversity Database (WYNDD) conducted a presence-absence survey for mountain plovers in Wyoming's Powder River Basin during the spring of 2001 under a contract to the Bureau of Land Management's (BLM's) state office in Cheyenne. The survey area consisted of a large portion of the basin for which the BLM is developing an environmental impact statement (EIS) to identify and quantify the potential biological consequences of coalbed methane development. WYNDD surveyed the eastern half of the EIS area, while Western Ecosystem Technologies, Incorporated (WEST) surveyed the western half. During this survey, WYNDD technicians documented 9 sightings of mountain plovers concentrated in two locations within their survey area, and a BLM employee documented one more sighting (Figures 3 and 6). Only 2 of these sightings fell within the EIS boundary, and both of these were on private land. Further, habitat quality on survey routes was documented and, although there appeared to be a fair amount of suitable plover habitat in the Powder River Basin, it seemed to be somewhat sparse and fragmented. This makes those limited areas with larger tracts of contiguous high-quality mountain plover habitat more valuable. In particular, large, flat, sparsely vegetated grasslands with active prairie dog towns are important. Finally, the limited documentation of plovers in this survey effort is not conclusive evidence that plovers do not occur in the areas we surveyed. Moreover, due to private landowner considerations, our surveys were restricted to publicly maintained roads, which greatly reduced the area we were able to effectively survey. In short, small numbers of mountain plovers appear to use portions of the Powder River Basin where highly suitable habitat exists, and our survey likely underestimated the extent of this use due to the fragmented distribution of such habitat in the basin and logistical restrictions placed on our survey effort.

Introduction

The mountain plover (*Charadrius montanus*) was proposed for listing as threatened under the U. S. Endangered Species Act (ESA) by the U.S. Fish and Wildlife Service (FWS) on February 16, 1999, based on evidence of large, range-wide declines in abundance. Mountain plovers breed in short-grass prairies and shrub-steppe landscapes of the Rocky Mountain states from Canada south to Mexico. The FWS noted in the proposal that most known breeding birds occurred in Montana and Colorado, although there is evidence that Wyoming may also contain sizable breeding populations,

primarily in the southeast and south-central portions of the state. These birds over-winter mainly on grasslands or similar landscapes in California, with fewer occurrences in Arizona, Texas, and Mexico. The FWS noted conversion of grassland habitat, agricultural practices, management of domestic livestock, and decline of native herbivores as factors likely contributing to the mountain plover's decline. Pesticides may also be a factor contributing to the decline of mountain plovers, but their effects are not completely understood.

The FWS encourages consideration of proposed taxa in local and statewide land used planning efforts and in federal environmental planning, such as Environmental Impact Analyses (EIA) conducted under the National Environmental Policy Act of 1969 (NEPA). As a result, the mountain plover became a management priority for the Wyoming BLM, which has subsequently attempted to incorporate mountain plover conservation practices into its multiple-use management practices. In the last few years, there has been extensive current and proposed development of land in Wyoming's Powder River Basin for the extraction of coalbed methane. Much of the surface ownership of land in the Powder River Basin is private (Figure 1), but the BLM still has significant land ownership in the area and owns most of the subsurface mineral rights. It is not clear to what extent mountain plovers occur in the Powder River Basin, so the BLM initiated a basin-wide survey effort to survey for mountain plovers and identify areas of potential plover occupation, of which this study is part.

Methods

Staff of the Wyoming Natural Diversity Database (WYNDD) surveyed portions of BLM's Casper, Buffalo, and Newcastle Field offices for mountain plovers from mid-April through June 5, 2001. Areas of potential plover occupation encompassed by the BLM's coalbed methane environmental impact statement (EIS) were identified based on a habitat model developed by WYNDD (Keinath, 2001; Beauvais and Smith, 1999), historic prairie dog town maps (Reeves, 1988; George Soehn, pers. comm.; Larry Gerard, pers. comm.; Gary Lebsack, pers. comm.), documented plover occurrence data from WYNDD (Figure 2). The main focus of efforts was within the boundary of the coalbed methane EIS, as established by BLM officials, but suitable habitat was investigated outside this range as time permitted.

The protocol used to conduct surveys was a modification of the official USFWS protocol (USFWS, 1999) involving the use of breeding call play-backs. Initial, cursory surveys were driven through much potential habitat to determine habitat suitability. Due to complex surface ownership and the difficulty of obtaining consent from private landowners, survey routes were limited to publicly maintained roads in all areas with private surface ownership. Formal

survey transects were located in habitat deemed to be at least marginally suitable for mountain plovers based on current knowledge of habitat use (e.g., UFWWS, 1999; Knopf, 1996). Transects were driven from dawn until 10 AM and from 5 PM until dusk. Stops were made every half-mile along each transect, at which points technicians played three or four cycles of the recorded plover breeding call (approximately 40 seconds of call) while scanning the area with the naked eye and 10X binoculars. They continued to scan the area with the naked eye and binoculars for 3-5 additional minutes, while listening for possible answering calls from mountain plovers. If a mountain plover was potentially sighted, the tape was played again for several cycles to draw birds closer to the observer and a few more minutes were spent to confirm identification.

In addition to standard data on transect points technicians also ranked the habitat suitability of each survey point on a three-tiered categorical scale and documented any evidence of recent or historical prairie dog activity (see Attachment 1). Incidental observations of species on the BLM species of concern list were also recorded on an opportunistic basis throughout the survey season.

Results and Discussion

During the survey period we observed a total of 11 mountain plovers, which were concentrated in 2 areas (Figures 3 and 6). One of these groups consisted of 6 sightings of 7 or 8 birds (one sighting may have been a of a previously seen bird) that clustered north and west of Casper near the town of Waltman (e.g., Figure 8). Although these sightings were within the Casper Field Office, they were outside the coalbed methane EIS boundary. The land in the vicinity of these sightings was of mixed federal, state, and private ownership. Three of the sightings appeared to be on BLM land and the remaining three were on private land. No plover nests were found during subsequent nest surveys in these locations (conducted in June), so we are unable to comment on breeding in this area.

The other group of sightings centered around known plover habitat in the Thunder Basin National Grasslands that immediately borders the southeastern edge of the EIS boundary (e.g., Figure 9). This group consisted of three sightings of individual mountain plovers (one of which was a potential re-sighting of a previously seen bird). One of these sightings fell within the EIS boundary (Figure 3). As with the previous group of sightings, no plover nests were found during subsequent nest surveys in these locations, so we are unable to comment on breeding in this area.

As noted in the methods, formal survey transects were established in areas that field personnel deemed to be at least marginally good habitat based on known habitat preferences and field reconnaissance. This determination was based

on the commonly held image of plover habitat being flat, with low, sparse vegetation (Knopf, 1996; USFWS, 1999). Points along transects were further given a ranking of high, medium or low suitability (Attachment 1), some examples of which are given in Figure 10. Of about 1000 survey points, 35 % were classified as being of low suitability, 31% of medium suitability, and only 6% were high suitability (Figures 4 and 6). The remaining 29% were classified as unsuitable habitat. Based on our limited plover sightings, the habitat that we classified as high suitability was used in excess of what we would expect based on the given proportions of habitat in the transects. Moreover, 6 out of 9 plovers were observed in highly suitable habitat and no plovers were seen in habitat that we deemed to be unsuitable or of low suitability. This suggests that our search image for plover habitat was accurate, and that habitat we classified as being highly or moderately suitable accurately represents those areas where plovers are more likely to be seen. Further, transects on which plovers were sighted contained 5 times more high-quality points than the mean of non-plover transects (see Figures 5 and 6). Therefore, in conducting future survey or monitoring efforts, it may be most productive to focus on those areas with concentrations of what we classified as high quality habitat.

We recorded evidence of past and present prairie dog habitation at 52 of about 1000 survey points (about 4%) and on 10 of the 38 transects that were over 5 miles long (Figure 7). We estimate that these 52 points represent about 28 prairie dog towns, with survey points separated by over 2 miles considered to be separate towns. Each survey point with evidence of prairie dogs was ranked based the level of prairie dog activity (see Attachment 1). Of these, 5 points (18%) were inactive and 13 (25%) had low activity (i.e., less than 10 prairie dogs were seen during a 5 minute observation period). Further, 25% of the points with evidence of prairie dogs had more than 30 prairie dogs and were therefore labeled as highly active.

The locations where we found mountain plovers matched very well with earlier occurrence data from WYNDD's database. The localities where we identified plovers in this survey were all within 10 miles of previous occurrences, and several were within 2 miles. Also, about half of our plover sightings occurred on recently active prairie dog towns and nearly all prairie dog towns we found were ranked as high-quality mountain plover habitat. This re-emphasizes the potentially important connection between prairie dogs and mountain plovers. The best location to find mountain plovers in otherwise marginal habitat continues to be large, active prairie dog towns on flat ground, generally in prairie grassland communities, but also in some short sage communities.

There were some limitations of this survey that preclude its use as conclusive evidence of plover absence in regions of Powder River Basin. The most severe restriction was that surveys were limited to publicly maintained roads.

This greatly limited the utility of surveys, since only a relatively small portion of suitable habitat was likely to fall sufficiently close to county and state roads to be effectively surveyed (i.e., within about 100 meters). For this reason, we were unable to survey large areas of land that were potentially suitable based on maps and vegetation models of the area (e.g., Figure 2). Also, active prairie dog towns are highly suited to mountain plover habitation, and there were several known prairie dog concentrations that were similarly out of our reach. Thus, the best use of the data generated by this report may be to guide more targeted inquiries in the future than to guide specific management actions over a broad area. Figures 2, 3, 6, and 7 and the associated GIS coverages highlight areas of potentially good habitat and likewise eliminate much habitat as unsuitable or of low quality.

Acknowledgements

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Literature Cited

- Beauvais, G. P. 1999. Occurrence of Breeding Mountain Plovers (*Charadrius montanus*) in the Wyoming Basins Ecoregion. Report prepared for the Bureau of Land Management, Rock Springs Field Office, Rock Springs, Wyoming by staff of the Wyoming Natural Diversity Database.
- Keinath, D.A. 2001. Survey for mountain plovers (*Charadrius montanus*) in the Henry's Fork area of the Great Basins Ecoregion. Report prepared for the Bureau of Land Management, Rock Springs Field Office, Rock Springs, Wyoming by staff of the Wyoming Natural Diversity Database.
- Knopf, F. L. 1996. Mountain Plover (*Charadrius montanus*), in The Birds of North America, Number 211. A. Poole and F. Gill, eds. The Academy of Natural Sciences, Philadelphia, Pennsylvania and The American Ornithologist's Union, Washington, D.C.
- United States Fish and Wildlife Service (USFWS). 1999. Mountain Plover Survey Guidelines.

Figures

Figure 1: Area covered by the BLM coalbed methane environmental impact statement (EIS) and its surface-ownership status.

Figure 2: Map of preliminary survey sites and selected input data.

Site Justification

- Input from BLM biologists
- WYND occurrences
- Remote sensing of habitat
- Historic prairie dog towns (WYGF, 1988)

Input Data

Historic prairie dog towns are denoted by pink polygons ( ).

Mountain plover occurrences in WYND's BCD database are denoted by red dots ( ).

Mountain plover occurrences in WYND's point observation database are denoted by blue squares ( ).

Figure 3: Map of mountain plover and sensitive species sightings during mountain plover surveys of the Powder River Basin in the spring of 2001.

Species Occurrences

- Mountain Plover
- Burrowing Owl
- Loggerhead Shrike
- Sage Grouse
- Sage Grouse Lek

Figure 4: Graph of used vs. available habitat by rank

Note: "Used" habitat was defined by survey points at which mountain plovers were seen. Available habitat was defined by points on all designated survey routes. Habitat rank categories are: High quality (H), Medium quality (M), and Low quality (L), as defined in Attachment 1. In addition, an unsuitable (U) rank was added for habitat that was so poor as to be unrankable.

Figure 5: Graph of habitat ranks of transects with plovers versus that of all transects

Note: "Plover transects" are those on which mountain plovers were seen during this survey. "Non-plover transects" are those at which a survey was conducted but where no mountain plovers were seen. Only transects greater than 5 miles long were included in this analysis. Habitat rank categories are: High quality (H), Medium quality (M), and Low quality (L), as defined in Attachment 1. In addition, an unsuitable (U) rank was added for habitat that was so poor as to be unrankable.

Figure 6: Survey transects, habitat ratings, and mountain plover occurrence from mountain plover surveys of the Powder River Basin in the spring of 2001.

Figure 7: Survey points with evidence of recent prairie dog activity documented during mountain plover surveys of the Powder River Basin in the spring of 2001.

Prairie Dog Activity

Prairie dog activity is defined in Attachment 1.

- High
- Medium
- Low
- None

Figure 8: Photos: Mountain plover observed southwest of Casper, Wyoming during surveys in May 2001.

Transect T43 (UTM 0336566E 4771620N) on May 23, 2001

Location: UTM 0317991E 4783465N; Date: May 23, 2001

Figure 9: Photos: Mountain plover observed in Thunder Basin National Grassland within the coalbed methane EIS boundary during surveys in April 2001.

Location: UTM 493141E 4805408N; Date: April 17, 2001

Figure 10: Photos: Examples of representative habitat deemed to be of medium or high quality based on the guidelines in Attachment 1.

High quality mountain plover habitat: Flat, low vegetation, with some bare ground and a prairie dog town. (Location: UTM 0342205E 4781627N)

Medium quality mountain plover habitat: Vegetation >4" with little bare ground. (Location: UTM 0341178E 4779387N)

Medium quality mountain plover habitat: Slope >5°, patch <160 acres, but with a prairie dog town. (Location: UTM 0341178E 4779387N)

Attachments

Attachment 1: Mountain Plover Habitat Ranking Procedures (including prairie dog activity).

For each survey point along each transect, and for opportunistic sightings of plovers, habitat was ranked on a three-level categorical scale, based on formal habitat information and survey guidelines (USFWS, 1999; Knopf, 1996) compiled by WEST, Inc, Cheyenne, Wyoming. Highly suitable habitat was defined as an area of about 160 acres or more with low vegetation ($\leq 4"$ tall) of grass or low shrubs, such as black sagebrush, Gardner's saltbush, etc. High-quality sites also had at least 25% bare ground (i.e., a total canopy cover of less than 75%) and flat topography (i.e., a slope of less than about 5%). Medium-quality sites generally met these criteria, but one or two of the negative habitat modifiers (Box 1) were applicable. A site was further downgraded from medium to low quality when three or more of the negative habitat modifiers were applicable. However, it is important to note that although modifier number 5 is the absence of prairie dogs, this was not used to downgrade sights. Rather, it was recorded as further evidence of habitat condition at previously downgraded sites. (In other words, an otherwise high-quality sight without prairie dogs was still classified as a high-quality site).

If habitat at a survey point was clearly very poor for mountain plovers the point was recorded as "unsuitable" or "skipped," codes were given from the negative modifier list (Box 1) for why the point was unsuitable, and that point was not formally surveyed. Examples of unsuitable sites included such habitat as forests, dense and tall stands of sagebrush, riparian areas, canyons and wetlands.

Also, at each survey site that contained prairie dog towns, the area of the town was estimated and a measure of activity was taken. Prairie dog activity was estimated by recording the number of prairie dogs seen in a 3-5 minute observation period and using that number to assign a categorical activity rank. The rank definitions pertaining to prairie dogs are noted in Box 2.

BOX 1: MOUNTAIN PLOVER HABITAT RANKING

Negative Habitat Modifiers

1. The average height of shrubs is greater than 4 inches (e.g., big sagebrush, greasewood, willows).
2. The average height of grass is greater than 4 inches.
3. The topography is not flat (e.g., slopes are $>5^\circ$ or overlooking hills are near the site).
4. The site contains less than 25% bare ground.
5. There are no prairie dogs present on the site (this is not used to downgrade an otherwise good site).
6. Water is present near the site.
7. Killdeer are present on the site.
8. The size of the patch is too small (i.e., < 160 contiguous acres).
9. Active agriculture is present (i.e., the site contains plowed or planted fields.)
10. Trees are present (e.g., cottonwoods).
11. There is human development (e.g., houses, barns).

BOX 2: PRAIRIE DOG TOWN INFORMATION

P-dog town Activity

High: greater than 30 prairie dogs
Medium: 10-30 prairie dogs
Low: less than 10 prairie dogs
None: no prairie dogs seen

P-dog town size

Very Large: more than 100 acres
Large: 50 - 100 acres
Medium: 20 - 50 acres
Small: 5 - 20 acres
Very Small: less than 5 acres

Attachment 2: ArcView GIS Shapefile Information

Attached to the inside, back cover of this report is a CD-ROM containing a set of ArcView shapefiles (generated with ArcView 3.2, Environmental Research Systems Institute, Inc., Redlands, California) that contain much of the data discussed in the report. Specifically, there are 5 shapefiles, documentation for each of which is given below. All files are projected into Zone 13 of the Universal Transverse Mercator (UTM) projection based on the North American Datum of 1927. Each shapefile has three constituent files (e.g., pdogs.dbf, pdogs.shp, pdogs.shx) and a readme file in Microsoft Word format that contains the same information printed below. Many thanks to Rhett Good of WEST, Inc. for helping to merge GIS information from WYNDD and WEST into one dataset and for drafting most of the following text.

1. Filename: mopl_observations

This is a point coverage of mountain plovers observed during call play-back surveys in the Powder River Basin during the spring of 2001. A few incidental observations are also included. Surveys were conducted by Western EcoSystems Technology, Inc. (WEST) and the Wyoming Natural Diversity Database (WYNDD). Observation locations were recorded with handheld Trimble GeoExplorer Global Positions Systems (GPS) and were not differentially corrected.

Transect:	Name of transect on which the mountain plover was detected
Date:	Date of observation
Odometer:	Odometer reading at which mountain plover was detected
Survey_inc:	(S) = Observed during scheduled survey and (I) = Observed during other Activities
Time:	Time of mountain plover observation
Hab_rating:	Rating of habitat quality for mountain plover occurrence. H = High, M = Medium
Easting:	Easting coordinate (UTM NAD 27 Zone 13)
Northing:	Northing coordinate (UTM NAD 27 Zone 13)
Trans_note:	General notes on transect, habitat, and observation
Z_mopl:	Number of mountain plovers detected
Sex:	Sex of mountain plover detected
Call_respo:	Did the mountain plover respond to the taped call (Y) = Yes, (N) = No. NOTE: Tapes were not played during incidental observations
Sight_dist:	Distance at which mountain plover was first detected (m)
Sight_dir:	Direction from observer at which mountain plover was first detected
Visual_aud:	The type of first detection (V) = visual and (A) = Auditory
Sighting_:	Sighting number recorded by WYNDD, not recorded by WEST.
Observer:	Company who made the observation.

2. Filename: sensitive_spp

This is a point coverage of BLM sensitive species detected in the Powder River Basin during surveys for mountain plovers. Surveys were conducted by Western EcoSystems Technology, Inc. (WEST) and the Wyoming Natural Diversity Database (WYNDD). Observation locations were recorded with handheld Trimble GeoExplorer Global Positions Systems (GPS) and were not differentially corrected.

Transect:	Name of transect on which the sensitive species was detected
Date:	Date of observation
Odometer:	Odometer reading at which the sensitive species was detected
Mopl_survey:	(S) = sensitive species was detected during schedule mountain plover survey and (I) = incidental observation made during other activities.
Pdog_prese:	(Y) = sensitive species detected on prairie dog town and (N) = sensitive species not detected on prairie dog town. This data was recorded for WEST observations only.
Pdog_size:	Ocular estimates of prairie dog town sizes made in the field.
Easting:	Easting coordinate (UTM NAD 27 Zone 13)

Northing: Northing coordinate (UTM NAD 27 Zone 13)
 Species: Species detected.
 Notes: General notes on the observations and habitat
 Observer: Company who made the observation.

3. Filename: pdogs

This is a point coverage of black-tailed (and white-tailed prairie dog towns southwest of Casper) detected at mountain plover survey points and incidental observations. In some cases, large prairie dog towns were detected at multiple points along transects. Surveys were conducted by Western EcoSystems Technology, Inc. (WEST) and the Wyoming Natural Diversity Database (WYNDDB). Observation locations were recorded with handheld Trimble GeoExplorer Global Positions Systems (GPS) and were not differentially corrected.

Transect: Name of transect on which the prairie dog town was detected
 Date: Date of observation
 Odometer: Odometer reading at which the prairie dog town was detected
 Mopl_surve: (S) = detected during scheduled mountain plover surveys. (I) = detected during other activities.
 Time: Time of observation
 Pdog_size: Ocular estimates of prairie dog town sizes made in the field.
 Pdog_acti: Rating of prairie dog activity. H = High (greater than 30 dogs). M = Medium (10-30 dogs). L = Low (less than 10 dogs). N = None (no prairie dogs seen).
 Hab_rating: Rating of habitat quality for mountain plover occurrence. H = High, M = Medium. This data was recorded for WEST observations only.
 Easting: Easting coordinate (UTM NAD 27 Zone 13)
 Northing: Northing coordinate (UTM NAD 27 Zone 13)
 Sens_spp1: Sensitive species detected on prairie dog towns. This data was recorded for WEST observations only
 Observer: Company who made the observation.
 Notes: General notes on the prairie dog town and associated species.

4. Filename: survey_points

This is a point coverage of locations used to survey for mountain plovers in the Powder River Basin, Wyoming. Surveys were conducted by Western EcoSystems Technology, Inc. (WEST) and the Wyoming Natural Diversity Database (WYNDDB). Observation locations were recorded with handheld Trimble GeoExplorer Global Positions Systems (GPS) and were not differentially corrected. Survey points were located on transects. Suitable mountain plover habitat along transects was patchy. Areas of unsuitable habitat along transects were not surveyed for mountain plovers. WYNDDB recorded positions of areas where unsuitable habitat was present and no surveys were conducted. WEST only recorded the positions at which suitable mountain plover habitat was present and where tape play-back surveys were conducted. Areas along transects where no survey points are located were evaluated in the field by WEST personnel as unsuitable, and are described in the habitat descriptions associated with the survey transect coverage.

Transect: Name of transect on which survey point was conducted
 Date: Date point was surveyed
 Odometer: Odometer reading at which survey point was conducted
 Time: Time survey point was completed recorded by WEST during the survey
 Hab_rating: A rating of potential for mountain plover occurrence at the survey point. (H) = High, (M) = Medium, (L) = Low, (unsuitable) = not suitable and no survey was conducted.
 Pdog_prese: (Y) = Prairie dogs present at survey point and (N) = Prairie dogs not present at survey point
 Pdog_size: Ocular estimates of prairie dog town sizes made in the field by WYNDDB
 Pdog_acti: Rating of prairie dog activity. H = High (greater than 30 dogs). M = Medium (10-30 dogs). L = Low (less than 10 dogs). N = None (no prairie dogs seen).

Easting: Easting coordinate (UTM NAD 27 Zone 13)
 Northing: Northing coordinate (UTM NAD 27 Zone 13)
 Notes: Notes made by WEST on habitat and species observed. (SB) = Sagebrush, (GW) = greasewood, (CR) = Cottonwood / Riparian, (SG) = short-grass, (MP) = milepost
 Observer: Company which conducted the survey point
 Reason: Reasons contributing to habitat being downgraded in the Habitat Rating field. For more explanation, see Attachment two of the report by WYNDD. 1 = The average height of shrubs is greater than 4 inches (e.g., big sagebrush, greasewood, willows). 2 = The average height of grass is greater than 4 inches. 3 = The topography is not flat (e.g., slopes are >50 or overlooking hills are near the site). 4 = The site contains less than 25% bare ground. 5 = There are no prairie dogs present on the site (this is not used to downgrade an otherwise good site). 6 = Water is present near the site. 7 = Killdeer are present on the site. 8 = The size of the patch is too small (i.e., < 160 contiguous acres). 9 = Active agriculture is present (i.e., the site contains plowed or planted fields). 10 = Trees are present (e.g., cottonwoods). 11 = There is human development (e.g., houses, barns).
 Pdog_size: Ocular estimates of prairie dog town sizes made in the field by WEST

5. Filename: survey_transects

This is a line coverage of transects used to survey for mountain plovers in the Powder River Basin. Surveys were conducted by Western EcoSystems Technology, Inc. (WEST) and the Wyoming Natural Diversity Database (WYNDD). Observation locations were recorded with handheld Trimble GeoExplorer Global Positions Systems (GPS) and were not differentially corrected.

Id: Id number of transect used by WYNDD
 Trans_name: Name of transect
 Date: Date transect was surveyed
 Observer: Company which surveyed the transect.
 Temp_c: Average temperature (C) recorded by WEST during the survey.
 Low_wind_s: Low wind speed (kph) recorded by WEST during the survey.
 High_wind_s: High wind speed (kph) recorded by WEST during the survey.
 Wind_dir: Average wind direction recorded by WEST during the survey.
 General_ha: A general habitat description of the transect recorded by WEST during the survey.
 Total_dist: Total distance of survey route (miles) recorded by WEST during the survey.
 Trans_type: (completed) = entire route was completed and (rejected) = survey route did not have suitable mountain plover habitat and was not surveyed.
 Weather: Descriptions of weather recorded by WYNDD during the survey.

Appendix B - Survey site characteristics and vertebrates observed during mountain plover surveys in the Henry's Fork area of Wyoming

Site	Location Notes	Survey Notes	Habitat Notes	Species Identified
BF1	The site lies south of Hwy-414 about 3.2 mi west from the junction of Hwy-1 and Hwy-414, near the town of Burntfork. (Located on BLM 100k map: Evanston T 12 R 112 S 14-15 N1/2)	Vehicle survey from road.	Habitat seems marginal, consisting of private pasture land and sagebrush.	killdeer (1)
BF3	Site access is via improved dirt road off Hwy-414, about 11.5 mi west of the junction of Hwy-1 and Hwy-414. This road ends in a gate and most of the site lies beyond the gate. (Located on BLM 100k map: Evanston T 13 R 113 S 26-27, 35-36)	Walking survey.	Fairly hilly with big sagebrush. (very similar to Appendix A, Pictures 1 and 2)	horned larks (several)
BF4	Site lies northeast of the junction of an improved dirt road and Hwy-414. This junction is about 11.5 mi west of the junction of Hwy-1 and Hwy-414. (Located on BLM 100k map: Evanston T 13 R 113 S 20-21, 28-29)	Vehicle survey from road followed by walking survey.	Fairly hilly with big sagebrush.. (see Appendix A, Picture 1)	horned larks (several)
Cedar1.1	Site consists of most of the east rim of Cedar Mountain.	Combination vehicle survey from road and walking survey of entire area.	60 m wide strip of subalpine grassland perennials around edge of cedar mountain.	Am. kestrels (1 pair w/ prey)
Cedar1.2	Small, unmapped pond. (Located on BLM 100k map: Firehole Canyon T 13 R 111 S 7, SE1/4)	Vehicle survey from road.	Unmapped pond surrounded by grasses and sagebrush.	Wilson's phalaropes (16); pintails (1 male, 1 female)
Cedar1.3	Small, unmapped pond. (Located on BLM 100k map: Evanston T 13 R 112 S 11, SW1/4)	Vehicle survey from road.	Unmapped pond surrounded by grasses and sagebrush.	Wilson's phalaropes (6); Am. widgeon (2 pairs); golden eagle (1)
FC1	Site encompasses the intersection of HWY 1 and Road 4315.	Driving survey along Road 4315 west of the intersection of HWY 1 and Road 4315. Walking surveys NE of Road 4315 and SE of the intersection.	Much bare ground and scattered shrubs. (see Appendix A, Picture 5)	horned larks (6+); Juvenile horned lizards (2)
FC3.1	Site is bout 2 mi east of Hwy-1 on road FS1, on the north side of the road. (Located on BLM 100k map: Firehole Canyon T 13 R 108 S 27, west center)	Vehicle followed by walking survey.	Small patches of marginal habitat consisting of sparse shrub cover.	horned larks (few)
FC3.2	Site is about 1.5 mi east of Hwy-1 on road FS1, on both sides of the road. (Located on BLM 100k map: Firehole Canyon T 13 R 108 S 28, SE1/4)	Vehicle followed by walking survey.	Small patches of marginal habitat consisting of sparse shrub cover.	horned larks (few); prairie dogs (few).
FC3.3	Site encompasses the intersection of road FS1 and road FS160. (Located on BLM 100k map: Firehole Canyon T 12 R 108 S 29, SE1/4)	Vehicle and walking surveys.	Relatively good habitat, consisting of sparse shrubs and grasses on flat ground.	horned larks (many)

Site	Location Notes	Survey Notes	Habitat Notes	Species Identified
FC3.4	Site is about 1 mi west of Hwy-530 on an unmarked road that is just under 1 mi south of road FS1. (Located on BLM 100k map: Firehole Canyon T 13 R 108 S 28, N1/2)	Walking survey.	Relatively good habitat, consisting of grasses and short, sparse, sagebrush.	horned larks (several)
FC3.5	Site is about 1.2 miles west of Hwy-530 on an unmarked road that is about 0.7 mi north of road FS1. (Located on BLM 100k map: Firehole Canyon T 12 R 108 S 5, center)	Walking survey.	Active prairie dog town with sparse shrubs up to 8" cm tall.	horned larks (many); brewers sparrows (3); sage thrasher (1); prairie dogs (several); badger (1); coyote (1); antelope (7 males).
FC3.6	Site is on road FS160 about one mile south of road FS1. (Located on BLM 100k map: Firehole Canyon T 13 R 108 S 33, center)	Vehicle and walking surveys.	Short sagebrush (<6") and much bare ground. Area is rather small, but there is some prairie dog activity.	horned larks (many); sage thrasher (1); prairie dogs (6)
FC3.7	Site is located less than 1 mi down dirt road that heads west off Hwy-530 about 10 mi south of the Buckboard Crossing Recreation Area. (BLM Cadastral survey marker: TRS: T13N, R108W, 1/4: s9/s19.)	Walking survey.	Flat land. Dried shrubs (<6" tall), short sagebrush (<6" tall) and grasses.	horned larks (several); prairie dogs (few)
FC7.1	Site is located about 0.5 miles east of Hwy-530 down FSroad-4 and includes land on both sides of the road. (Located on BLM 100k map: Firehole Canyon T 14 R 108 S 28, west-center.)	Walking survey.	Active prairie dog colony on relatively flat land.	horned larks (many); prairie dogs (many).
FC7.2	Site is located about 1 mi east of Hwy-530 down FSroad-4 and lies south of the road. (Located on BLM 100k map: Firehole Canyon T 14 R 108 S 28, SE1/4.)	Walking survey.	Active prairie dog colony on relatively flat land.	horned lizards (2); horned larks (many); prairie dogs (many).
HH3.1	Survey site located near the only credible mountain plover sitting in the area (Element Occurrence #20), about 5 mi south of McKinnon Junction along Hwy-1. (It was just outside of the Henry's Fork study area. Located on BLM 100k map: Firehole Canyon T 15 R 109 S 21, NW1/4.)	Vehicle survey from HWY-1 and walking survey SE of Hwy-1.	Relatively good plover habitat of short shrubs (see Appendix A: Picture 6).	horned larks (few); prairie dogs (several).
PDT1	Site is 0.2 mi west of Hwy-530 directly opposite site W4.1. It lies behind a fence which necessitates a walking survey. (Located BLM 100k map, Firehole Canyon: T15 R108 S19, NE1/2.)	Walking survey (no access road).	Relatively good plover habitat, although small and fairly isolated. Active prairie dog town with short shrub cover. (very similar to Appendix A, Picture 7)	horned larks (many); sage thrashers (2); female harrier (1); sage sparrows (10); prairie dogs (several); antelope (5).
SHR1	Site is about 1.5 miles northwest of Soaps Hole Reservoir. (Located BLM 100k map, Evanston: T14 R112 S17 NE1/4 and S16 NW1/4.)	Vehicle and walking survey.	Short, dense sagebrush.	adult horned lizards (2).

Site	Location Notes	Survey Notes	Habitat Notes	Species Identified
W1	Locating this site was difficult due to map inaccuracies and weak GPS signal. It lies just west of Hwy-1 on an unmarked dirt road and ends in a bluff overlooking W3. (Located BLM 100k map, Firehole Canyon: T13 R110 S7-8 S1/2 and T13 R111 S12 SE1/4.)	Vehicle and walking surveys.	Moderately tall sagebrush and grass on a wind-swept slope.	horned larks (several)
W2	Locating this site was difficult due to map inaccuracies and weak GPS signal. It lies just west of Hwy-1 on an unmarked dirt road and ends in a bluff overlooking W3. (Located BLM 100k map, Firehole Canyon: T13 R110 S7-8 S1/2 and T13 R111 S12 SE1/4.)	Vehicle and walking surveys.	moderate sagebrush and grass on a wind-swept slope.	horned larks (several)
W3	Locating this site was difficult due to map inaccuracies and no GPS signal. It lies about 4 mi west of Hwy-1 on an unmarked dirt road. (Located BLM 100k map, Firehole Canyon: T13 R110 S15 N1/2 and S10 S1/2.)	Vehicle survey from road.	Mixed sagebrush and greasewood shrubland.	horned larks (several)
W4	Site is 0.2 mi east of Hwy-530 on an un-marked dirt road that is about 1.2 miles north of entrance to Buckboard Crossing Recreation Area. (Located BLM 100k map, Firehole Canyon: T15 R108 S20, N1/2).	Walking survey.	Relatively good plover habitat, although a small patch. V. low sagebrush (<4' tall) with relatively large amount bare ground. (see Appendix A, Picture 7)	horned larks (>12); prairie dogs (~10); male harrier (1)
W5	Site lies along Hwy-1, about 2 miles SW of the Hwy1 and Hwy530 intersection. Site consists of land around and south of the pumping station and radio tower. (Just outside the study area. Located on BLM 100k map, Firehole Canyon: T15 R109 S10, center.)	Vehicle and walking surveys.	Very flat and grassy with widely spaced shrubs. Apparently groomed and/or grazed.	cattle; horned larks (many).
W7	Site is located where road FS11 reaches the west shore of Flaming Gorge Reservoir and turns south. (Located on BLM 100k map, Firehole Canyon: T15 R108 S13, NW1/4.)	Driving survey along FS11.	Moderately tall grasses and shrubs, but close to water. (see Appendix A, Picture 8)	gulls (several); cliff swallows (several).
W8	Coming south on Hwy 530, go 5.3 miles beyond the turnoff to the Buckboard Crossing Rec. Area. Turn left on a dirt road with a stop sign. Left at first major fork. Right at second major fork. Road drops down into a grassy peninsula. (Located on BLM 100k map, Firehole Canyon: T14 R108 S22, center.)	Vehicle and walking surveys.	Potentially good plover habitat, although likely a flood plain. Vegetation is mostly bunch grasses with a fair amount of bare ground. (see Appendix A, Picture 9)	horned larks (many); starlings (several); Cattle (many); antelope (20+).
W9	Site lies 0.2 mi down an unmarked, gated, dirt road that is 0.4 mi north of the turnoff to the Buckboard Crossing Recreation Area along Hwy-530. It is on the west side of the road. (Located on BLM 100k map, Firehole Canyon: T15 R108 S19, south-center and S30, north-center.)	Vehicle and walking surveys.	A smallish patch of short shrubs in a matrix of greasewood and sagebrush steppe.	horned larks (several); horned lizard (1); prairie dogs (several)
WB2	Site is located in a flat riparian area where road FS27 meets Flaming Gorge Reservoir, about 5 mi east of Hwy-530. (Located on BLM 100k map, Firehole Canyon: T17 R107 S35 and S3.)	Vehicle survey.	Poor habitat. Tall riparian grasses, tall sagebrush, near water and near a tall butte. (see Appendix A: Picture 4)	western grebes (several); r.w. blackbirds (several); sage thrasher (1); killdeer (2)

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Ehle, D.S. and G.P. Jones. 2002. Grand Teton National Park Vegetation Mapping Project; Progress Report, 2002 Field Season. Report prepared for the USDI National Park Service-Grand Teton National Park by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming. 97pp.

The Wyoming Natural Diversity Database, Grand Teton National Park, NatureServe, and the Bureau of Reclamation are collaborating to create an inventory of National Vegetation Classification System plant associations present in Grand Teton National Park, and an updated vegetation map of the park. Field work for the Grand Teton National Park Vegetation Mapping Project is to be conducted over 3 summers. The first two summers are dedicated to vegetation data collection, and the third summer will be on-the-ground accuracy assessment of the preliminary vegetation map created by Bureau of Reclamation photo interpreters. This report describes the results of the first summer of vegetation data collection.

[Download full report \(PDF file; 610 KB\)](#)

Ehle, D.S. and D.A. Keinath. 2002. Habitat Mapping of Lynx Analysis Units on Bureau of Land Management Lands and Surrounding Areas in Wyoming. Report prepared for the USDI Bureau of Land Management-Wyoming State Office by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.

Lynx analysis units (LAUs) are management areas that contain suitable lynx habitat and approximate the size of a female home range. General guidelines for creation of lynx analysis units are outlined in the Canada Lynx Conservation Assessment and Strategy, written by an interagency team of representatives from the USDA Forest Service, the USDI Bureau of Land Management, and the USDA Fish and Wildlife Service (Ruediger et al. 2000). A GIS coverage of Lynx analysis units on lands administered by the Bureau of Land Management was created following the guidelines in the Canada Lynx Conservation Assessment and Strategy. Over 153,000 ha of land administered by the Bureau of Land Management in Wyoming contains suitable lynx habitat. However, this land is highly fragmented and dispersed throughout the state. Only three areas are large enough (> 6,500 ha) to qualify as lynx analysis units. Two of these areas are at the southern end of, and adjacent to, the Bridger-Teton National Forest. The third lynx analysis unit is in the Green Mountain area in south-central Wyoming. The Green Mountain LAU is about 40 miles from the nearest Forest Service LAU, on the Shoshone National Forest, and 130 miles from the next nearest BLM LAU. A state-wide coverage of lynx habitat on managed lands was also created to gain a broader-scale view of lynx habitat in Wyoming. The majority of lynx habitat is in the northwestern corner of the state. Suitable habitat in the rest of the state is more fragmented and generally separated by large tracts of shrublands. Due to high mobility of lynx, such separation is likely not an absolute barrier to dispersal through these areas of suitable habitat, but large distances may reduce the likelihood of successful dispersal and colonization by lynx.

[Download full report, excludes GIS project \(PDF file; 739 KB\)](#)

Ehle, D.S. and D.A. Keinath. 2002. Mapping of Forested Areas Within the Pinedale BLM Field Office Management Area. Report prepared for the USDI Bureau of Land Management-Pinedale Field Office by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.

Polygons representing some forest stands in the Bureau of Land Management (BLM) Pinedale management area were digitized from (28) 1:24,000-scale topographic maps. The polygons were drawn by hand by a BLM employee between 1988-1990 based on field observations. Polygons were not drawn for all forest stands in the BLM Pinedale management area. Thus, these data may not be appropriate for some applications. Paper maps were scanned, scanned images were georeferenced using ARC 8.1, and polygons were digitized on-screen using ArcView 3.2. The tic registration error of 96 percent of the maps is less than 11 meters. Total area occupied by each species and by timber type was calculated. Area occupied by different size classes and stocking rates was calculated for all stands and coniferous stands. Total amount of forested area digitized is over 19,000 hectares

(47,000 acres).

Download full report, excludes GIS project (PDF file; 736 KB)

Ehle, D.S. and D.A. Keinath. 2001. Survey for Preble's meadow jumping mouse (*Zapus hudsonius preblei*) for the Bureau of Land Management, Casper Field Office, Wyoming, 2001. Report prepared for the USDI Bureau of Land Management-Casper Field Office by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.

The purpose of the survey was to determine the presence or absence of the Preble's meadow jumping mouse (*Zapus hudsonius preblei*) on BLM land with potentially favorable habitat. Based on minimum selection requirements that included habitat of mediocre quality, 12 discrete locations were sampled. Potential survey locations were excluded based upon the following negative habitat indicators: 1) short grass cover (less than 8 inches), 2) low vegetation density, 3) cattail (*Typha latifolia*) dominance, or 4) no water in the streambed accompanied by at least one of the other 3 negative habitat indicators. Four jumping mice (*Zapus* sp.) were captured at one location. No jumping mice were captured at the other locations. A total of 91 other small mammals were caught, including deer mice (*Peromyscus maniculatus*), voles (*Microtus* spp.), shrews (*Sorex* spp.), a harvest mouse (*Reithrodontomys* spp.), and a Bushy-tailed woodrat (*Neotoma cinerea*). The two successive dry years of 2000 and 2001 may be the cause of low capture rates of all small mammals by WYNDD personnel and other field workers trapping small mammals in eastern Wyoming.

Download report excluding color photos (PDF file; 393 KB)

Ehle, D.S. and D.A. Keinath. 2001. Survey for Preble's meadow jumping mouse (*Zapus hudsonius preblei*) on U.S. Forest Service land in the Douglas Ranger District of the Medicine Bow National Forest (T29N, R75W, Section 10, SE1/4SE1/4), September 6-14, 2001. Report prepared for the USDA Forest Service-Medicine Bow-Routt National Forest by the Wyoming Natural Diversity Database-University of Wyoming, Laramie, Wyoming.

The purpose of the survey was to determine the presence or absence of Preble's meadow jumping mice (*Zapus hudsonius preblei*) on US Forest Service land (T29N, R75W, Section 10, SE1/4SE1/4) in the Douglas Ranger District of the Medicine Bow National Forest. Roaring Fork Creek was trapped for 6 days and 1076 total trapnights. Traps were checked the mornings of September 6-7 and September 11-14. In order to comply with USFWS guidelines, no trapping was conducted after September 14. Snow fell the night of Friday, September 7, possibly causing any jumping mice present at the site to become dormant. No jumping mice were caught. A total of 95 small mammals was caught, including deer mice (*Peromyscus maniculatus*), voles (*Microtus* spp.), shrews (*Sorex* spp.), and Least chipmunks (*Eutamias minimus*).

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