2007 MOUNTAIN PLOVER MONITORING IN TAOS COUNTY, NEW MEXICO

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EXECUTIVE SUMMARY

A potentially sizeable Mountain Plover (*Charadrius montanus*) population exists on the Bureau of Land Management's (BLM) North Unit in northern Taos County, New Mexico. BLM contracted Hawks Aloft, Inc., to conduct population monitoring studies on the North Unit in 2001. Initial monitoring determined general distribution patterns for Mountain Plovers on the North Unit, but a standardized method of estimating density and population size was needed. From 2005-2007, we employed distance sampling at 245 roadside survey points along eight transects. Using DISTANCE 5.0, we calculated a density of 0.021 Mountain Plovers per ha (2.1 birds/km^2). To estimate population size, we projected the density on a portion of the North Unit considered to be occupied habitat (8,400 ha), as well as on the entire North Unit (about 50,000 ha). By projecting Mountain Plover density on occupied habitat, we estimate a population size of 176 Mountain Plovers. If the entire North Unit is occupied, the population estimate could approximate 1,000 Mountain Plovers. We suspect that the true population size currently resides between those figures. Although Mountain Plover density on the North Unit is less than densities reported for populations in other regions, the large size of the North Unit makes this a valuable site for Mountain Plover conservation in New Mexico.

To complement our Mountain Plover research, we also monitored any Burrowing Owls (*Athene cunicularia*) found opportunistically or by revisiting previously occupied burrows. In 2007, we found a minimum of 12 adult owls in 9 locations in the North Unit, and these owls produced a minimum of 11 young. Our 2007 totals were similar to 2006, but our annual total of owl observations has greatly increased since 2005.

INTRODUCTION

Mountain Plovers (*Charadrius montanus*) inhabit short-grass prairies and rangeland in the western Great Plains and the Colorado Plateau (Knopf 1996). Due to concerns over habitat loss and negative population trends (Knopf 1994), the U.S. Fish and Wildlife Service proposed to list Mountain Plover as threatened (U.S. Department of Interior 1999). Because data indicated that the degree of threats was not significant enough to endanger the species in the future, they withdrew the proposed listing (U.S. Department of Interior 2003). This decision was based, in part, on research documenting widespread use of cultivated fields by Mountain Plovers (Knopf and Rupert 1999).

Recent population studies in Colorado (Wunder et al. 2003) and Wyoming (Plumb et al. 2005) indicate that the North American population might be 11,000 to 14,000 birds, greater than the 8,000 to 10,000 birds estimated before the proposal to list Mountain Plover (Knopf 1996). Although much of the research contributing to status decisions has focused on core breeding populations, relatively little is known about populations along the periphery of the breeding range, such as in New Mexico (but see Tolle 1976, Sager 1996). Monitoring Mountain Plover population sizes and trends in New Mexico can improve global estimates and assist future status decisions.

A potentially sizeable Mountain Plover population exists in Taos County, New Mexico, on land managed by the Bureau of Land Management (BLM). In 2001 and 2003, BLM contracted Hawks Aloft, Inc., to conduct Mountain Plover surveys on the approximately 50,000-ha North Unit. Results from these surveys indicated general plover distribution, as well as probable breeding status for at least some individuals; however, the surveys were not designed to estimate population size or trends. Beginning in 2004,

we attempted to estimate population size using distance sampling techniques. Our methods evolved after the 2004 season; initially, off-road driving transects were our preferred method (see Wunder et al. 2003), but we switched to roadside point counts in 2005. We found that roadside surveys improved our sample size by allowing us to cover a greater portion of the North Unit and navigate through the network of grazing allotment fences. We decided that in addition to providing density information, point counts would ensure a standardized, repeatable framework for monitoring population changes over time. In this report, we present Mountain Plover density and population estimates on the North Unit, based on distance sampling at survey points from 2005-2007; we also evaluate potential population changes on the North Unit during those years.

In previous years, we complemented Mountain Plover studies with monitoring for two associated species, Burrowing Owl (*Athene cunicularia*) and Gunnison's prairie dog (*Cynomys gunnisoni*). Because of funding limitations, we did not continue monitoring prairie dog colonies in 2007. We did, however, continue searching for Burrowing Owls and documenting nest burrow productivity; we provide 2007 results in this report.

STUDY AREA

We conducted fieldwork on BLM's North Unit, a short-grass plain and rangeland in northern Taos County, New Mexico, about 20 km north of Tres Piedras (Fig. 1). The approximately 50,000-ha study site extends from Highway 285 east to the Rio Grande gorge, and from Cerro de la Olla north to the Colorado border. The North Unit is grazed by cattle, sheep, elk (*Cervus elaphus*), and pronghorn antelope (*Antilocapra americana*). Vegetation at the site primarily consisted of low stature (<0.25 m tall) blue grama

(*Bouteloua gracilis*), prickleaf dogweed (*Thymophylla acerosa*), rabbitbrush (*Chrysothamnus* spp.), winterfat (*Eurotia lanata*), snakeweed (*Gutierrezia sarothrae*), four-winged saltbush (*Atriplex canescens*), and western wheatgrass (*Agropyron smithii*). Although a relatively flat landscape, the terrain of the North Unit includes a labyrinth of shallow depressions and crests with scattered volcanic rock.

METHODS

We conducted point counts using Mountain Plover survey guidelines suggested by Williams (1997) and the U.S. Fish and Wildlife Service (1999). Point counts are used to survey a variety of species and habitats (Bibby et al. 2000). This method can work well with Mountain Plovers, because birds are relatively easy to detect in their open habitat when they are present. In 2005, we established 245 survey points along eight roadside transects on the North Unit at 0.3-mile intervals (Fig. 2), as recommended by Williams (1997). We were satisfied with this distance, because we considered that 0.3 miles was far enough to prevent the same individuals from being counted at multiple points, yet close enough to survey an adequate sample of points in one morning.

In each year from 2005-2007, we visited the same 245 survey points, relocating them using Universal Transverse Mercator (UTM) coordinates (Appendix 1). Coverage of all points required eight survey mornings (one transect per morning, 25-35 points each). Each year, we surveyed four transects in late April, three in late May, and one in June. April surveys were conducted after the usual spring migration period (see Knopf 1996); therefore, most, if not all, observed plovers were summer residents of the North Unit. We began surveys within 20 minutes after sunrise and finished within four hours.

To conduct point count surveys, the observer drove to each point and recorded all Mountain Plovers detected in three minutes. Upon arriving at a point, the observer noted the time and quickly scanned the immediate vicinity before leaving the vehicle. The observer then stepped out of the vehicle and thoroughly scanned every direction. Three minutes were usually enough to complete visual coverage of surrounding habitat; at some points, we needed (and took) more time to complete our scans. We used one observer, as recommended by the U.S. Fish and Wildlife Service (1999), and this observer was the same for all points from 2005-2007.

We detected Mountain Plovers either by sight or by sound. No conspecific tape playback was used. When a plover was detected, we recorded the distance (in meters) of the bird from the survey point. This distance was an estimation, based on training and practice exercises. We attempted to use a laser rangefinder to improve our distance estimation, but we dispensed with this equipment after finding it difficult to consistently obtain precise readings of our target in the rather flat, sparsely-vegetated terrain. We recorded a UTM coordinate for each plover observed. If a plover changed locations during a point count survey, we recorded only its distance and location when first observed. We recorded plovers first observed in flight as flyovers, unless we strongly suspected that we flushed them from surveyed habitat. In that case, we recorded the distance to where we thought they were disturbed. We also noted any additional species observed during point counts and list them in Appendix 2.

We used program DISTANCE 5.0 (Thomas et al. 1998) to calculate Mountain Plover density, based on 2005-2007 point count data and a model of detection probability as a function of distance. We considered the six models suggested by Buckland et al.

(2001), and used in Mountain Plover population studies by Wunder et al. (2003) and Plumb et al. (2005) in Colorado and Wyoming, respectively. These models included the uniform key function with cosine and simple polynomial expansion series (models 1 and 2), the half-normal key function with cosine and hermite polynomial expansion series (models 3 and 4), and the hazard-rate key function with cosine and simple polynomial expansion series (models 5 and 6). All models were based on data stratified by year. We selected the best model based on Akaike's Information Criterion (AIC). Because AIC only evaluates the strength of competing models relative to each other, we considered goodness-of-fit P values to determine if the models fit the data well. We used continuous distances and truncated the outer 3% of distances from the data (Wunder et al. 2003). We present a density estimate as the number of birds per ha.

To estimate population size for the North Unit, we projected our density estimate on a portion of the site considered to be occupied habitat. Consistent with Wunder et al. (2003) and Plumb et al. (2005), we determined the extent of occupied habitat based on a map of local Mountain Plover distribution and the average plover home range size (56 ha, Knopf 1996). We used ArcGis to generate a grid of 56-ha cells overlaid on a map with plotted location coordinates for all Mountain Plovers observed on the North Unit from 2001-2007. We added the number of cells containing a Mountain Plover location, and we considered the product of the number of cells and the area of each cell (56 ha) to be the amount of occupied habitat. We recorded 321 Mountain Plover locations from 2001-2007 (Fig. 3), and these locations intersected 150 cells (12 were added in 2007). We multiplied plover density by the resulting estimate of occupied habitat (8,400 ha) to acquire an estimate of potential population size for Mountain Plovers in occupied portions of the

North Unit. Because this area represents only 17% of the North Unit, and we can not be certain that the remaining portion is unoccupied, our result is probably a conservative estimate of population size for the North Unit. As a potential upper boundary, we also projected plover density on the entire 50,000-ha site.

We used detection rates to evaluate a potential population trend from 2005-2007. Detection rates do not measure absolute numbers of birds, but they can be useful as a relative measure for comparison among years. We define detection rate as the number of plovers observed divided by the number of points surveyed (245). Mountain Plovers observed between survey points, but not during the point counts, were not included in detection rates. We included these observations in the map of Mountain Plover locations used for estimating occupied habitat (Fig. 3). We compare detection rates among years (2005-2007), using 95% confidence intervals.

We found Burrowing Owls opportunistically during Mountain Plover surveys and by revisiting each active burrow documented in 2006. For each Burrowing Owl observed, we attempted to locate any burrows used by the owl. We subsequently revisited active burrows approximately once per month to monitor nesting activity. We present the number of locations where owls were found, the number of different Burrowing Owls observed, and the minimum number of young observed.

RESULTS

Using DISTANCE 5.0, we calculated a Mountain Plover density of 2.1 birds/km^2 or 0.021 birds per ha (95% confidence interval = 0.014-0.033) on the North Unit, based on 84 detections during point count surveys from 2005-2007. The uniform key function

with cosine series expansion provided the best fit to the detection function among competing models, based on lowest AIC. A goodness of fit test indicated that this model fit the data (P=0.60). Projecting a density of 0.021 birds per ha over 8,400 ha of occupied habitat, we estimate a population size of 176 Mountain Plovers in documented habitat (95% confidence interval = 118-277). Projecting over the entire North Unit (50,000 ha) yields a potential upper boundary estimate of 1,050 Mountain Plovers.

The Mountain Plover detection rate in 2007 (0.09 ± 0.04 birds/pt, 22 detections) was similar to the rate in 2006 (0.10 ± 0.05 birds/pt, 24 detections), but the rates for both years were considerably less than in 2005 (0.16 ± 0.05 birds/pt, 38 detections). We found a similar pattern for our annual total of Mountain Plover observations (i.e., point count detections plus incidental observations) among years. We observed 50 Mountain Plovers in 2007 (Fig. 3) and 46 in 2006, both totals fewer than the 69 observed in 2005.

We observed a minimum of 12 adult Burrowing Owls in 9 different locations, or apparent territories (Fig. 4). Our total included seven locations on the North Unit and two locations on the adjacent Ute Mountain property, east of the Rio Grande gorge. Four of the nine locations were consistent with locations documented in 2006 (0-50 m away). We observed a minimum of 11 young, representing three active burrows. In 2006, we reported the destruction of a burrow, presumably by a vehicle (Hawks Aloft 2006). In 2007, we found a pair of owls using a burrow under a concrete slab near a water tank, approximately 30 m from the destroyed burrow. This pair produced at least 5 young. Two other successful territories produced four and two young each. Our 2007 totals of at least 12 adult and 11 juvenile Burrowing Owls were similar to our 2006 totals (14 adults and 11 juveniles) but greater than our cumulative total of five owls from 2003 to 2005.

We observed this Mountain Plover on a nest on 29 May 2007.

DISCUSSION

Mountain Plover density on the North Unit is less than reported densities from other regions, but the large size and relative accessibility of the North Unit makes this an important site for continued population monitoring and conservation in New Mexico. Our density estimate of about two plovers per square kilometer is lower than estimates of 7.9 plovers/km^2 in South Park, Colorado (Wunder et al. 2003), 6.0 plovers/km^2 in the Pawnee National Grasslands (Graul and Webster 1976), and 4.5 plovers/km^2 in Wyoming (Plumb et al. 2005). Although Mountain Plovers are locally common elsewhere in New Mexico, mostly on private rangeland in the northeast plains (M. Wunder, pers. comm.),

the North Unit, covering nearly 50,000 ha, likely contains the largest population in New Mexico under a single management authority.

Our population estimate depends greatly on the portion of the North Unit used to project the calculated density. We considered 8,400 ha to be occupied habitat, based on locations documented from 2001-2007; however, we can not be confident that the remainder of the nearly 50,000-ha North Unit was unoccupied. If Mountain Plovers occupy the entire North Unit at the same density we calculated at survey points (0.021 birds/ha), our population estimate would approximate 1,000 birds. The eight transects might be fairly representative of the entire North Unit, because they covered a range of potential habitat types, including areas of apparent abundance and consistent absence. If the transects are representative, the actual population size might be closer to what could be projected for the entire North Unit (about 1,000 plovers) than to what is projected for documented habitat (176 plovers). We suggest that the true population size currently resides between those figures.

Our North Unit Mountain Plover density and population estimates changed little from what we reported in 2006, but the additional data in 2007 allowed a more robust analysis. We compiled more than 80 observations from 2005-2007, thereby meeting the standard of 60-80 observations recommended by Buckland et al. (2001) as a minimum for calculating density. Our density calculation might still be affected by possible bias associated with roadside surveys. Because Mountain Plovers use sparsely vegetated open areas, and have been seen on roads, roadside bias could be positive or negative, if indeed there is a bias. Conducting off-road surveys would remedy any bias, but the rough terrain and the network of allotment fences in the North Unit greatly reduce spatial coverage,

thereby limiting the sample of Mountain Plover observations, as we discovered in 2004. We considered that roadside point count surveys were our best option for determining density on the North Unit, but we acknowledge the success of off-road survey techniques used at other sites (Wunder et al. 2003, Plumb et al. 2005). Although our 2005-2007 sample was sufficient for determining Mountain Plover density on the North Unit, we still recommend continuing annual roadside point count surveys, because they offer an efficient and standardized method of identifying population changes, as well as the flexibility to re-evaluate plover density at any time in the future.

Because of the recent attempt to list Mountain Plover as a threatened species (U.S. Department of Interior 1999), and the lack of evidence cited in the withdrawal of the proposed rule (U.S. Department of Interior 2003), it is important to monitor and identify population changes over time. Population changes that occur on the North Unit can reveal much about population changes in New Mexico, although monitoring and management opportunities are not necessarily limited to public lands (e.g., Rocky Mountain Bird Observatory, www.rmbo.org/conservation/partners). Since 2001, BLM has demonstrated a commitment to monitoring the population and managing the North Unit in a manner compatible with Mountain Plover conservation. We encourage that commitment to continue with the realization that BLM's impact extends beyond the North Unit, helping biologists evaluate Mountain Plover status in New Mexico and elsewhere. In 2007, we presented information about Mountain Plovers on the North Unit at two regional events: the Mountain Plover Partner meeting in Fort Collins, Colorado (February 26th) and the New Mexico Ornithological Society meeting near Carlsbad, New Mexico (May 5th).

We observed a similar number of Burrowing Owls in 2006 and 2007, despite discontinuing systematic prairie dog monitoring, a project which prompted the discovery of several active owl burrows in 2006. An increase in owl observations occurred from 2005 to 2006 and appeared to coincide with an increase in spatial prairie dog coverage (Hawks Aloft 2006). Although we discontinued prairie dog monitoring, we suspect that the prairie dog population continued a positive trend in 2007. We noticed an obvious increase in the number of prairie dogs visible in colonies; multiple individuals were often present at a single burrow. Our prairie dog observations were subjective and not necessarily indicative of actual colony sizes (Powell et al. 1994); however, the apparent abundance of prairie dogs in 2007 is a promising indication that Burrowing Owls might increase on the North Unit. A healthy prairie dog population also holds promise for maintaining the Mountain Plover population on the North Unit.

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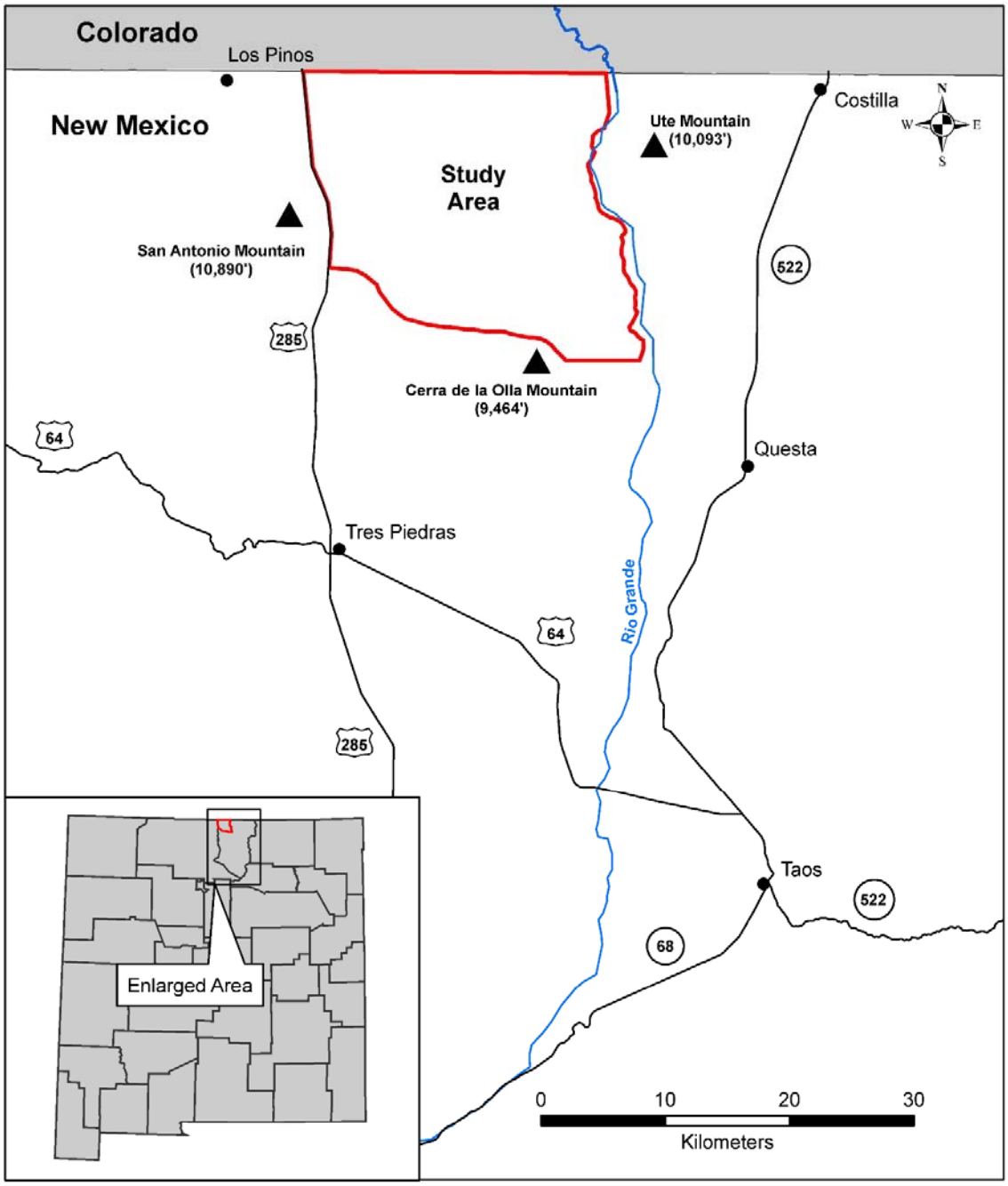

Figure 1. Location of the North Unit Mountain Plover study site, managed by the Bureau of Land Management, in Taos County, New Mexico.

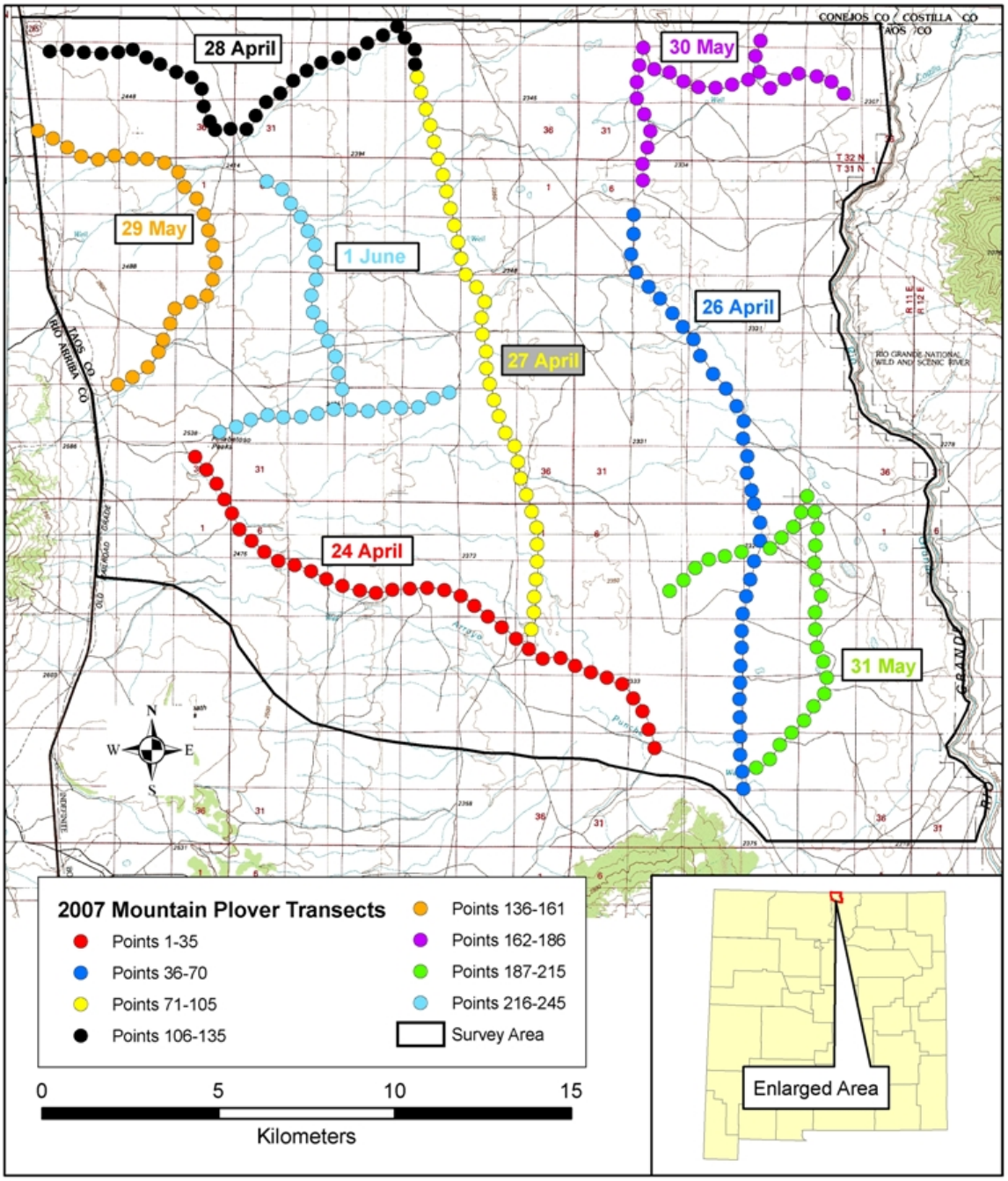

Figure 2. Location of 245 Mountain Plover point counts surveyed on the Bureau of Land Management's North Unit, Taos County, New Mexico from 2005 to 2007. We indicate 2007 survey dates.

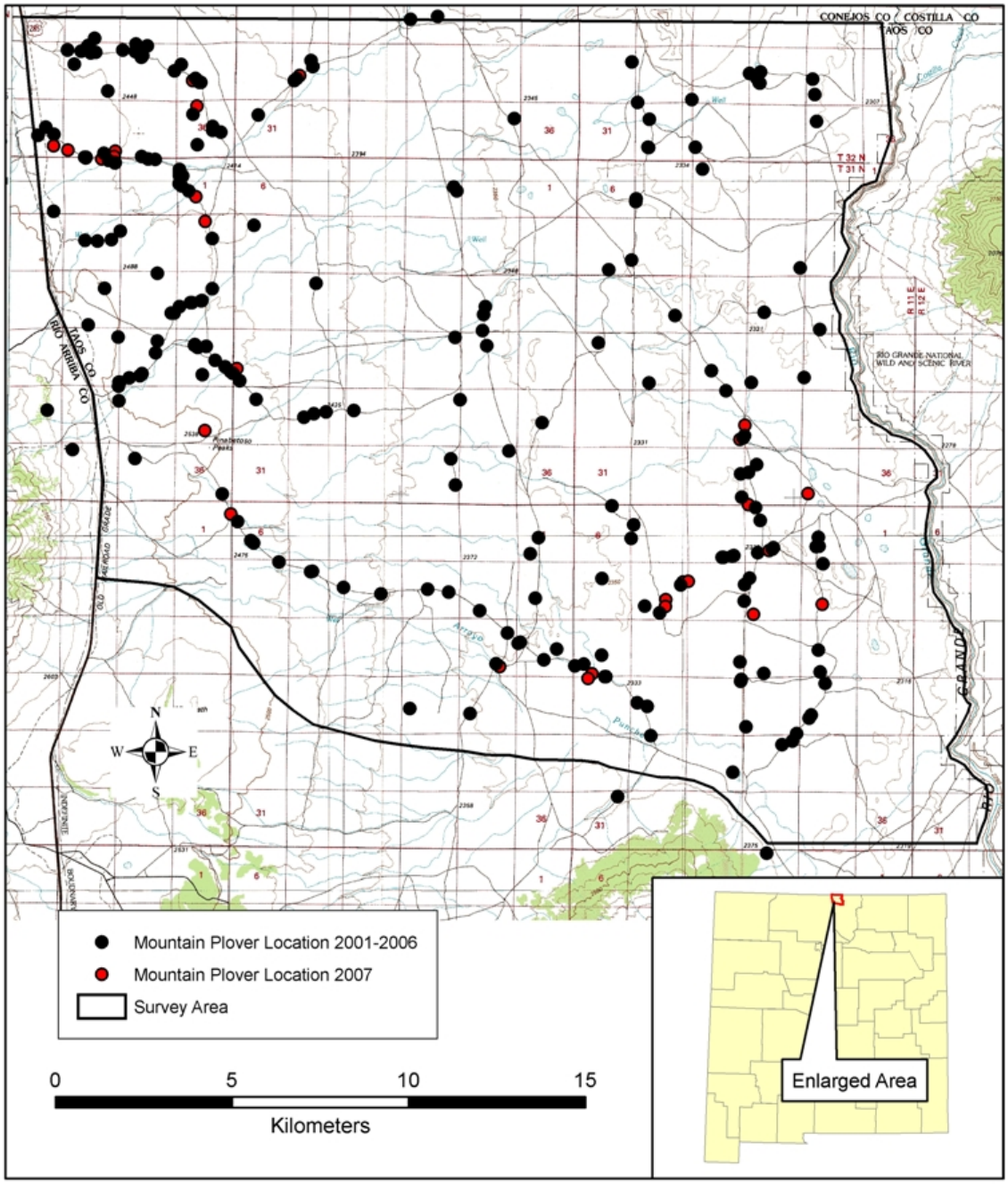

Figure 3. Locations of Mountain Plovers observed in 2007 (in red) and in previous years (in black) on the North Unit, Taos County, New Mexico.

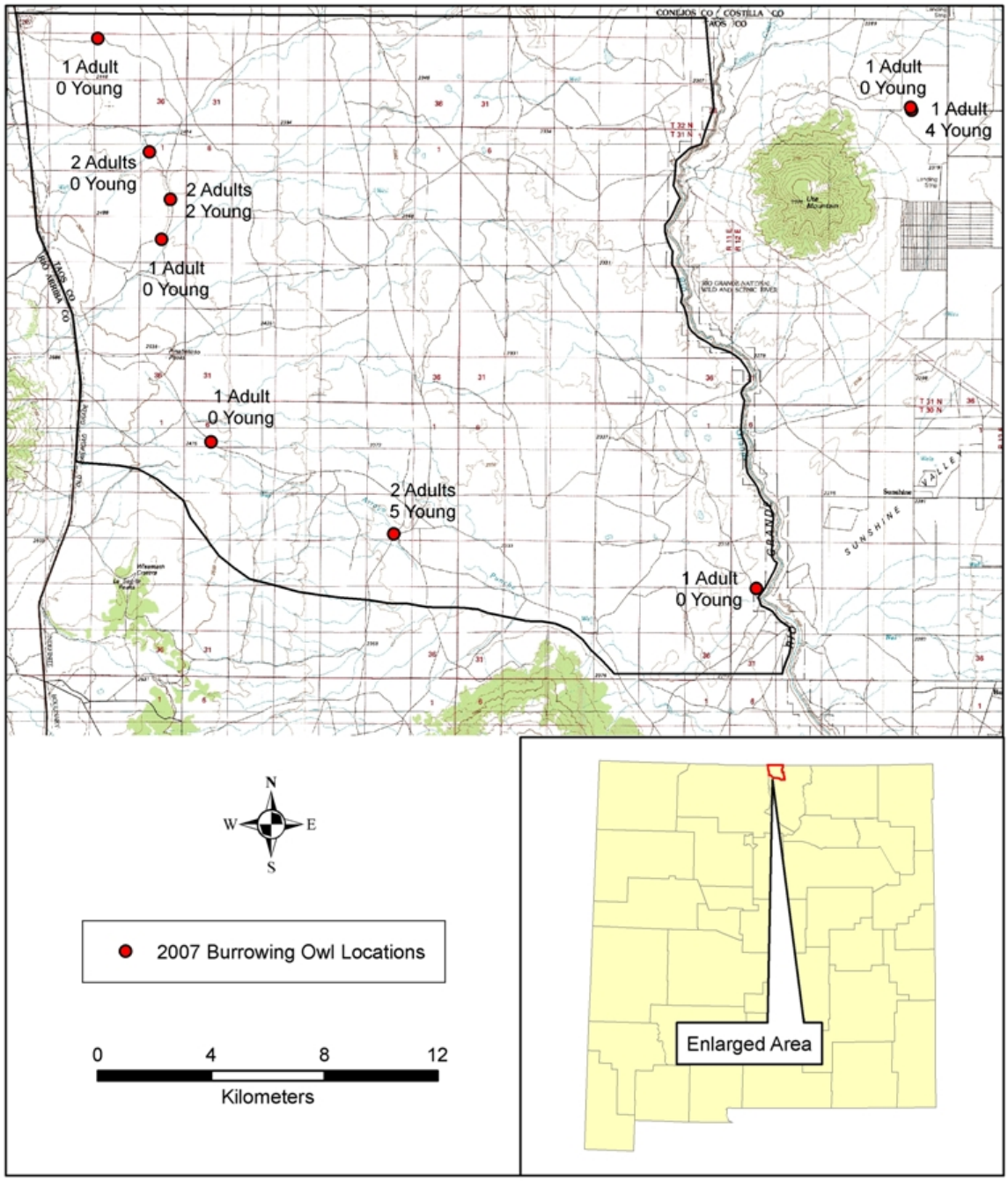

Figure 4. Locations of Burrowing Owl observations and the minimum number of adults and young found on the North Unit and Ute Mountain in 2007.

Appendix 1. Universal Transverse Mercator coordinates (North American Datum 27) of Mountain Plover survey points and 2007 results on the North Unit, Taos County, New Mexico.

Transect	Point	Easting	Northing	Survey Date	# Plovers	Distance (m)
1	1	429270	4073948	April 24, 2007	0	-
1	2	429098	4074477	April 24, 2007	0	-
1	3	428933	4074992	April 24, 2007	0	-
1	4	428666	4075356	April 24, 2007	0	-
1	5	428352	4075761	April 24, 2007	0	-
1	6	427918	4075940	April 24, 2007	0	-
1	7	427465	4076092	April 24, 2007	1	200
1	8	427023	4076272	April 24, 2007	0	-
1	9	426610	4076502	April 24, 2007	0	-
1	10	426103	4076482	April 24, 2007	0	-
1	11	425707	4076747	April 24, 2007	0	-
1	12	425346	4077044	April 24, 2007	0	-
1	13	424936	4077364	April 24, 2007	0	-
1	14	424548	4077668	April 24, 2007	0	-
1	15	424161	4077971	April 24, 2007	0	-
1	16	423772	4078253	April 24, 2007	0	-
1	17	423313	4078422	April 24, 2007	0	-
1	18	422830	4078480	April 24, 2007	0	-
1	19	422329	4078461	April 24, 2007	0	-
1	20	421840	4078425	April 24, 2007	0	-
1	21	421369	4078337	April 24, 2007	0	-
1	22	420913	4078407	April 24, 2007	0	-
1	23	420427	4078537	April 24, 2007	0	-
1	24	419966	4078730	April 24, 2007	0	-
1	25	419535	4078952	April 24, 2007	0	-
1	26	419070	4079128	April 24, 2007	0	-
1	27	418608	4079244	April 24, 2007	0	-
1	28	418211	4079496	April 24, 2007	0	-
1	29	417849	4079816	April 24, 2007	0	-
1	30	417504	4080132	April 24, 2007	0	-
1	31	417288	4080586	April 24, 2007	0	-
1	32	417081	4080988	April 24, 2007	0	-
1	33	416858	4081433	April 24, 2007	0	-
1	34	416570	4081821	April 24, 2007	0	-
1	35	416254	4082189	April 24, 2007	0	-
2	36	431792	4072801	April 26, 2007	0	-
2	37	431755	4073290	April 26, 2007	0	-
2	38	431700	4073763	April 26, 2007	0	-
2	39	431699	4074276	April 26, 2007	0	-
2	40	431686	4074820	April 26, 2007	0	-

Transect	Point	Easting	Northing	Survey Date	# Plovers	Distance (m)
2	41	431681	4075332	April 26, 2007	0	-
2	42	431695	4075798	April 26, 2007	0	-
2	43	431711	4076277	April 26, 2007	0	-
2	44	431740	4076796	April 26, 2007	0	-
2	45	431734	4077266	April 26, 2007	0	-
2	46	431770	4077752	April 26, 2007	1	270
2	47	431871	4078247	April 26, 2007	0	-
2	48	431975	4078725	April 26, 2007	0	-
2	49	432090	4079233	April 26, 2007	0	-
2	50	432266	4079815	April 26, 2007	0	-
2	51	432264	4080330	April 26, 2007	0	-
2	52	432086	4080860	April 26, 2007	1	230
2	53	432023	4081234	April 26, 2007	0	-
2	54	431893	4081729	April 26, 2007	0	-
2	55	431901	4082203	April 26, 2007	0	-
2	56	431780	4082705	April 26, 2007	1	125
2	57	431794	4083193	April 26, 2007	1	90
2	58	431598	4083616	April 26, 2007	0	-
2	59	431291	4084112	April 26, 2007	0	-
2	60	430932	4084526	April 26, 2007	0	-
2	61	430563	4085048	April 26, 2007	0	-
2	62	430376	4085506	April 26, 2007	0	-
2	63	430067	4085865	April 26, 2007	0	-
2	64	429782	4086247	April 26, 2007	0	-
2	65	429426	4086664	April 26, 2007	0	-
2	66	429105	4086993	April 26, 2007	0	-
2	67	428747	4087402	April 26, 2007	0	-
2	68	428602	4087918	April 26, 2007	0	-
2	69	428681	4088487	April 26, 2007	0	-
2	70	428672	4089034	April 26, 2007	0	-
3	71	425775	4077304	April 27, 2007	0	-
3	72	425850	4077790	April 27, 2007	0	-
3	73	425857	4078224	April 27, 2007	0	-
3	74	425904	4078724	April 27, 2007	0	-
3	75	425934	4079226	April 27, 2007	0	-
3	76	425943	4079710	April 27, 2007	0	-
3	77	425930	4080184	April 27, 2007	0	-
3	78	425786	4080637	April 27, 2007	0	-
3	79	425638	4081115	April 27, 2007	0	-
3	80	425474	4081577	April 27, 2007	0	-
3	81	425392	4082044	April 27, 2007	0	-
3	82	425298	4082490	April 27, 2007	0	-
3	83	425041	4082861	April 27, 2007	0	-
3	84	424855	4083333	April 27, 2007	0	-

Transect	Point	Easting	Northing	Survey Date	# Plovers	Distance (m)
3	85	424721	4083792	April 27, 2007	0	-
3	86	424596	4084245	April 27, 2007	0	-
3	87	424507	4084687	April 27, 2007	0	-
3	88	424497	4085171	April 27, 2007	0	-
3	89	424392	4085646	April 27, 2007	0	-
3	90	424364	4086116	April 27, 2007	0	-
3	91	424456	4086571	April 27, 2007	0	-
3	92	424219	4086987	April 27, 2007	0	-
3	93	423919	4087338	April 27, 2007	0	-
3	94	423788	4087795	April 27, 2007	0	-
3	95	423698	4088254	April 27, 2007	0	-
3	96	423597	4088737	April 27, 2007	0	-
3	97	423485	4089208	April 27, 2007	0	-
3	98	423375	4089692	April 27, 2007	0	-
3	99	423270	4090152	April 27, 2007	0	-
3	100	423144	4090610	April 27, 2007	0	-
3	101	423023	4091098	April 27, 2007	0	-
3	102	422916	4091561	April 27, 2007	0	-
3	103	422789	4092014	April 27, 2007	0	-
3	104	422647	4092486	April 27, 2007	0	-
3	105	422543	4092926	April 27, 2007	0	-
4	106	412131	4093647	April 28, 2007	0	-
4	107	412625	4093684	April 28, 2007	0	-
4	108	413102	4093619	April 28, 2007	0	-
4	109	413592	4093589	April 28, 2007	0	-
4	110	414070	4093628	April 28, 2007	0	-
4	111	414485	4093704	April 28, 2007	0	-
4	112	414862	4093478	April 28, 2007	0	-
4	113	415265	4093287	April 28, 2007	0	-
4	114	415716	4093065	April 28, 2007	0	-
4	115	416152	4092918	April 28, 2007	1	96
4	116	416437	4092590	April 28, 2007	0	-
4	117	416490	4092098	April 28, 2007	1	220
4	118	416660	4091667	April 28, 2007	0	-
4	119	416812	4091430	April 28, 2007	0	-
4	120	417254	4091458	April 28, 2007	0	-
4	121	417707	4091454	April 28, 2007	0	-
4	122	417970	4091831	April 28, 2007	0	-
4	123	418259	4092217	April 28, 2007	0	-
4	124	418665	4092472	April 28, 2007	0	-
4	125	419032	4092819	April 28, 2007	1	260
4	126	419413	4093110	April 28, 2007	0	-
4	127	419831	4093327	April 28, 2007	0	-
4	128	420309	4093474	April 28, 2007	0	-

Transect	Point	Easting	Northing	Survey Date	# Plovers	Distance (m)
4	129	420756	4093584	April 28, 2007	0	-
4	130	421131	4093881	April 28, 2007	0	-
4	131	421573	4094104	April 28, 2007	0	-
4	132	421982	4094361	April 28, 2007	0	-
4	133	422190	4094033	April 28, 2007	0	-
4	134	422475	4093705	April 28, 2007	0	-
4	135	422479	4093293	April 28, 2007	0	-
5	136	414058	4084222	May 29, 2007	0	-
5	137	414476	4084439	May 29, 2007	0	-
5	138	414905	4084720	May 29, 2007	0	-
5	139	415210	4085155	May 29, 2007	0	-
5	140	415338	4085500	May 29, 2007	0	-
5	141	415539	4085953	May 29, 2007	0	-
5	142	415679	4086381	May 29, 2007	0	-
5	143	416134	4086562	May 29, 2007	0	-
5	144	416585	4086744	May 29, 2007	0	-
5	145	416742	4087199	May 29, 2007	0	-
5	146	416830	4087674	May 29, 2007	0	-
5	147	416750	4088167	May 29, 2007	0	-
5	148	416620	4088593	May 29, 2007	0	-
5	149	416503	4089049	May 29, 2007	0	-
5	150	416295	4089491	May 29, 2007	0	-
5	151	415943	4089809	May 29, 2007	0	-
5	152	415779	4090240	May 29, 2007	1	60
5	153	415380	4090504	May 29, 2007	0	-
5	154	414898	4090607	May 29, 2007	1	115
5	155	414453	4090623	May 29, 2007	0	-
5	156	413964	4090703	May 29, 2007	2	63, 125
5	157	413503	4090590	May 29, 2007	1	100
5	158	413022	4090685	May 29, 2007	0	-
5	159	412621	4090939	May 29, 2007	2	65, 90
5	160	412218	4091184	May 29, 2007	1	230
5	161	411796	4091413	May 29, 2007	0	-
6	162	428936	4090000	May 30, 2007	0	-
6	163	428933	4090473	May 30, 2007	0	-
6	164	429074	4090931	May 30, 2007	0	-
6	165	429147	4091399	May 30, 2007	0	-
6	166	428977	4091871	May 30, 2007	0	-
6	167	428771	4092316	May 30, 2007	0	-
6	168	428772	4092780	May 30, 2007	0	-
6	169	428837	4093257	May 30, 2007	0	-
6	170	428946	4093757	May 30, 2007	0	-
6	171	429263	4093142	May 30, 2007	0	-
6	172	429694	4093056	May 30, 2007	0	-

Transect	Point	Easting	Northing	Survey Date	# Plovers	Distance (m)
6	173	430087	4092801	May 30, 2007	0	-
6	174	430520	4092646	May 30, 2007	0	-
6	175	430998	4092626	May 30, 2007	0	-
6	176	431465	4092713	May 30, 2007	0	-
6	177	431930	4092858	May 30, 2007	0	-
6	178	432244	4093063	May 30, 2007	0	-
6	179	432132	4093520	May 30, 2007	0	-
6	180	432272	4093954	May 30, 2007	0	-
6	181	432539	4092612	May 30, 2007	0	-
6	182	432945	4092862	May 30, 2007	0	-
6	183	433339	4093023	May 30, 2007	0	-
6	184	433861	4092949	May 30, 2007	0	-
6	185	434269	4092792	May 30, 2007	0	-
6	186	434623	4092459	May 30, 2007	0	-
7	187	432152	4073394	May 31, 2007	0	-
7	188	432525	4073644	May 31, 2007	0	-
7	189	432810	4074039	May 31, 2007	0	-
7	190	433145	4074389	May 31, 2007	0	-
7	191	433500	4074734	May 31, 2007	0	-
7	192	433763	4075130	May 31, 2007	0	-
7	193	434073	4075489	May 31, 2007	0	-
7	194	434138	4075946	May 31, 2007	0	-
7	195	434040	4076393	May 31, 2007	0	-
7	196	433858	4076800	May 31, 2007	0	-
7	197	433815	4077311	May 31, 2007	0	-
7	198	433804	4077794	May 31, 2007	0	-
7	199	433980	4078254	May 31, 2007	1	215
7	200	433850	4078714	May 31, 2007	0	-
7	201	433791	4079189	May 31, 2007	0	-
7	202	433818	4079682	May 31, 2007	0	-
7	203	433884	4080161	May 31, 2007	0	-
7	204	433802	4080633	May 31, 2007	0	-
7	205	433588	4081070	May 31, 2007	2	110, 120
7	206	433412	4080625	May 31, 2007	0	-
7	207	433191	4080208	May 31, 2007	0	-
7	208	432859	4079898	May 31, 2007	0	-
7	209	432533	4079595	May 31, 2007	0	-
7	210	431735	4079498	May 31, 2007	0	-
7	211	431265	4079382	May 31, 2007	1	125
7	212	430812	4079284	May 31, 2007	0	-
7	213	430428	4079048	May 31, 2007	0	-
7	214	430086	4078698	May 31, 2007	2	73, 105
7	215	429700	4078398	May 31, 2007	0	-
8	216	416934	4082892	June 1, 2007	0	-

Transect	Point	Easting	Northing	Survey Date	# Plovers	Distance (m)
8	217	417411	4083030	June 1, 2007	0	-
8	218	417826	4083236	June 1, 2007	0	-
8	219	418298	4083370	June 1, 2007	0	-
8	220	418745	4083304	June 1, 2007	0	-
8	221	419253	4083318	June 1, 2007	0	-
8	222	419719	4083408	June 1, 2007	0	-
8	223	420179	4083526	June 1, 2007	0	-
8	224	420660	4083522	June 1, 2007	0	-
8	225	421152	4083477	June 1, 2007	0	-
8	226	421609	4083576	June 1, 2007	0	-
8	227	422092	4083568	June 1, 2007	0	-
8	228	422571	4083592	June 1, 2007	0	-
8	229	423000	4083838	June 1, 2007	0	-
8	230	423452	4084000	June 1, 2007	0	-
8	231	420408	4084097	June 1, 2007	0	-
8	232	420298	4084552	June 1, 2007	0	-
8	233	420219	4085021	June 1, 2007	0	-
8	234	420010	4085460	June 1, 2007	0	-
8	235	419813	4085856	June 1, 2007	0	-
8	236	419594	4086282	June 1, 2007	0	-
8	237	419545	4086750	June 1, 2007	0	-
8	238	419678	4087198	June 1, 2007	0	-
8	239	419661	4087692	June 1, 2007	0	-
8	240	419636	4088189	June 1, 2007	0	-
8	241	419446	4088574	June 1, 2007	0	-
8	242	419240	4088971	June 1, 2007	0	-
8	243	418960	4089346	June 1, 2007	0	-
8	244	418716	4089757	June 1, 2007	0	-
8	245	418280	4089972	June 1, 2007	0	-

Appendix 2. List of 39 bird species detected during Mountain Plover surveys and area searches on the North Unit, Taos County, New Mexico in 2007. Species are listed in taxonomic order, according to the American Birding Association, Checklist 6.7.

Common Name	Scientific Name
Turkey Vulture	*Cathartes aura*
Northern Harrier	*Circus cyaneus*
Ferruginous Hawk	*Buteo regalis*
Golden Eagle	*Aquila chrysaetos*
American Kestrel	*Falco sparverius*
Prairie Falcon	*Falco mexicanus*
Mountain Plover	*Charadrius montanus*
Mourning Dove	*Zenaida macroura*
Western Screech-Owl	*Megascops kennicottii*
Burrowing Owl	*Athene cunicularia*
Common Nighthawk	*Chordeiles minor*
Broad-tailed Hummingbird	*Selasphorus platycercus*
Northern Flicker	*Colaptes auratus*
Gray Flycatcher	*Empidonax wrightii*
Say's Phoebe	*Sayornis saya*
Loggerhead Shrike	*Lanius ludovicianus*
Pinyon Jay	*Gymnorhinus cyanocephalus*
Common Raven	*Corvus corax*
Horned Lark	*Eremophila alpestris*
Violet-green Swallow	*Tachycineta thalassina*
Cliff Swallow	*Petrochelidon pyrrhonota*
Mountain Chickadee	*Poecile gambeli*
Juniper Titmouse	*Baeolophus ridgwayi*
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
Rock Wren	*Salpinctes obsoletus*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Western Bluebird	*Sialia mexicana*
Mountain Bluebird	*Sialia currucoides*
Townsend's Solitaire	*Myadestes townsendi*
Sage Thrasher	*Oreoscoptes montanus*
Black-throated Gray Warbler	*Dendroica nigrescens*
Spotted Towhee	*Pipilo maculatus*
Chipping Sparrow	*Spizella passerina*
Brewer's Sparrow	*Spizella breweri*
Vesper Sparrow	*Pooecetes gramineus*
Lark Bunting	*Calamospiza melanocorys*
Western Meadowlark	*Sturnella neglecta*
Brewer's Blackbird	*Euphagus cyanocephalus*