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FIRST BREEDING RECORD OF A MOUNTAIN PLOVER IN NUEVO LEON, MEXICO

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ABSTRACT.—We document the first breeding record of Mountain Plovers (*Charadrius montanus*) in the state of Nuevo Leon, Mexico. On 9 July 2004, we located a nest with two eggs and one chick in a colony of Mexican prairie dogs (*Cynomys mexicanus*). Mean height of vegetation near the nest was 7.1 cm, and bare ground cover was 41.2% (30 m^2 sampled). Although this record represents the second nesting for this species in Mexico, it is the first to document successful breeding. *Received 21 January 2005, accepted 5 November 2005.*

The Mountain Plover (*Charadrius montanus*) is a species of North America's grasslands. It is classified as vulnerable on the IUCN Red List (Birdlife International 2004), endangered in Canada (Committee on the Status of Endangered Wildlife in Canada 2004), and threatened in Mexico (Diario Oficial de la Federación 2002). In the United States, the Mountain Plover was proposed for listing as a threatened species in 1999 (U.S. Fish and Wildlife Service 1999), but the proposal was withdrawn in 2003 (U.S. Fish and Wildlife Service 2003). The U.S. Shorebird Conservation Plan rates the species as highly imperiled (Brown et al. 2001). Between 1966 and 1991, the entire population of Mountain Plovers declined by 63% (Knopf 1994); currently, the population is estimated at 11,000–14,000 individuals (Plumb et al. 2005). The population decline has been attributed to loss of nesting habitat due to cultivation, urbanization, livestock management, and declines in native herbivores, mainly black-tailed prairie dogs (*Cynomys ludovicianus*) and North American bison (*Bison bison*; Wiersma 1996, BirdLife International 2004).

The Mountain Plover's primary breeding range includes eastern Colorado, central Wyoming, eastern Montana (Graul and Webster 1976), northeastern New Mexico, and the Oklahoma and Texas panhandles (Knopf 1996). An isolated breeding population, which may be resident year-round, occurs in the Davis Mountains, Texas (Knopf 1996). In the United States, the plover's winter range extends from Sacramento, San Joaquin, and the Imperial Valley in California east to the Lower Colorado River Valley, and from Yuma east to Phoenix and the Chandler area in southern Arizona (Rosenberg et al. 1991, Knopf and Rupert 1995). In Mexico, the winter distribution has not been well studied, but it is believed to extend along the U.S./Mexico border south through Baja California, Sonora, Chihuahua, and Tamaulipas into Zacatecas and San Luis Potosí (Phillips et al. 1964, Wilbur 1987, Howell and Webb 1995, Gomez de Silva et al. 1996). More surveys are needed to document wintering as well as year-round resident populations.

Mountain Plovers nest in shortgrass and mixed grass prairies (Graul and Webster 1976, Knowles et al. 1982, Knopf and Miller 1994, Knopf and Rupert 1999b). They typically occur in areas characterized by short vegetation (<8 cm high; Graul 1975) and ≥30% bare ground (Knopf and Miller 1994), and they are commonly associated with prairie dog colonies (*Cynomys* spp.; Knowles et al. 1982). Vegetation at nest sites varies throughout the breeding range, but is usually dominated by blue grama (*Bouteloua gracilis*), buffalograss (*Buchlöe dactyloides*), needle-and-thread (*Stipa comata*), and sagebrush (*Artemisia* sp.; Finzel 1964, Graul 1975, Knowles et al. 1982, Knopf and Miller 1994). Plovers often nest near cow manure, rocks, or clumps of vegetation (Graul 1975, Olson and Edge 1985, Knopf and Miller 1994).

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During the breeding period, Mountain Plovers have been observed in colonies of Mexican prairie dogs (*Cynomys mexicanus*) around San Juan del Prado, Galeana, Nuevo Leon. These observations have included individuals in breeding plumage and birds exhibiting reproductive behavior (calls, displays, etc.; Knopf and Rupert 1999a). On 5 July 1994, observers found six widely spaced pairs and one single individual; on 16 June 1997, seven individuals (including a pair) were detected in three unspecified prairie dog colonies in the same area; and on 24 April 1998, seven more individuals (including two pairs) were observed. Mountain Plovers were also detected on 25 April 1998 at Galeana between El Cristal and La Paz (two pairs and two territorial males) and on 26 April 1998 at La Hediondilla (one pair and one single) and Llano La Soledad (two pairs), where unsuccessful attempts were made to document nesting (Knopf and Rupert 1999a). During 5–11 May 1999, Desmond and Chavez-Ramirez (2002) observed 30 Mountain Plovers, including eight pairs and two groups of three individuals each at Rancho Los Angeles and La India, in Saltillo, Coahuila de Zaragoza, and at La Casita in Galeana, Nuevo Leon. On 9 May 1999, Desmond and Chavez-Ramirez (2002) found a nest with three eggs near La India, the only previous nest documented in Mexico. The La India nest was not monitored and therefore, its outcome is unknown. Previous nest searches conducted in Mexico during the plover's known reproductive period (based on observations in the Great Plains) yielded no other nesting records; however, Desmond and Chavez-Ramirez (2002) suggested that the breeding season in northeastern Mexico might be later than it is farther north so that hatching coincides with the rainy season and the period of greatest insect availability (June–July).

On 9 July 2004, around 17:00 CST, we observed a Mountain Plover pair at Llano La Soledad, a gypsophile grassland (7,607 ha) within ejido San Rafael, Galeana, Nuevo Leon (24° 48′ 50″ N, 100° 41′ 54″ W). Llano La Soledad contains the largest known colony of Mexican prairie dogs (Treviño-Villarreal and Grant 1998). As we approached the pair, one individual feigned wing injury, while the other emitted alarm calls and flew around us. After a few minutes, one individual "squatted" on the ground, placed its bill under its body, and remained motionless. When we approached within 2 m of what appeared to be a nest, the bird again feigned wing injury. We subsequently located the nest, which contained two eggs and one chick. The chick remained motionless while the adults called (as described by Graul 1974).

Relative to the plover's nest, the nearest Mexican prairie dog burrow was approximately 15 m away. There was also a small cluster of *Atriplex* shrubs (n = 28; estimated mean height = 60 cm) 40 m from the nest. Livestock (cattle, goats) were nearby, but the area was not overgrazed, nor was cow manure found near the nest. We photographed and video-recorded the nest. This record represents the first Mountain Plover nest in Nuevo Leon, and the first record of successful nesting for Mountain Plovers in Mexico.

As part of another study at Llano La Soledad, we had characterized the vegetation a few days prior to finding the plover nest. After finding the nest, we selected three of our 1 × 10-m quadrats that were closest to the nest—200, 1,000, and 1,500 m away—to characterize the vegetation. We recorded height, cover diameter, and species of each plant. We then calculated mean height, relative density (RD = number of individuals of a given species as a proportion of the total number of individuals of all species), relative frequency (RF = frequency of a given species as a proportion of the sum of the frequencies for all species), relative coverage (RC = coverage for each species expressed as a proportion of the total coverage for all species), and importance value of each species (IV = RD + RF + RC, which provides an overall estimate of the influence or importance of a plant species in the community; Brower et al. 1990; Table 1). We identified 11 plant species, with a mean height of 7.1 cm. The most common forbs were summer bluet (*Hedyotis purpurea*; n = 725, RD = 37, RF = 15.9) and McVaugh's bladderpod (*Leonsquerella mcvaughiana*; n = 273, RD = 13.9, RF = 15.9); *Muhlenbergia* sp. (n = 654, RD = 33.3, RF = 15.9) and Karwinski's grama (*Bouteloua karwinskii*; n = 140, RD = 7.1, RF = 10.5) were the most common grasses. *Muhlenbergia* sp. had the greatest RC (43.3%) and IV (92.3), and the IV of summer

TABLE 1. Vegetation composition and structure in three 1 × 10-m quadrats, placed 200, 1,000, and 1,500 m away from a Mountain Plover nest, in the grassland at Llano La Soledad, Galeana, Nuevo Leon, Mexico, July 2004.

Species	No.	H[a] (cm)	RD[b] (%)	RF[c] (%)	RC[d] (%)	IV[e]
Forbs						
Summer bluet (*Hedyotis purpurea*)	725	2.5	37.0	15.9	12.4	65.2
McVaugh's bladderpod (*Lesquerella mcvaughiana*)	273	3.3	13.9	15.9	19.0	48.8
Desert zinnia (*Zinnia acerosa*)	80	4.5	4.0	5.3	5.7	15.0
Woody crinklemat (*Tiquilia canescens*)	47	5.8	2.4	5.2	3.7	11.3
Houston machaeranthera (*Machaeranthera aurea*)	35	5.1	1.7	5.2	0.5	7.4
Texas sundrops (*Calylophus tubicula*)	5	8.6	0.3	10.5	0.7	11.5
Slimpod fiddleleaf (*Nama stenophyllum*)	1	3.0	0.1	5.2	0.1	5.4
Grasses						
Muhly (*Muhlenbergia* sp.)	654	5.3	33.3	15.9	43.3	92.3
Karwinski's grama (*Bouteloua karwinskii*)	140	1.7	7.1	10.5	13.0	30.6
Havard's threeawn (*Aristida havardii*)	1	25.0	0.1	5.2	1.2	6.5
Buffalograss (*Buchloë dactyloides*)	1	13.0	0.1	5.2	0.4	5.7

[a] H = mean height.
[b] RD = relative density (number of individuals of a given species as a proportion of the total number of individuals of all species).
[c] RF = relative frequency (frequency of a given species as a proportion of the sum of the frequencies for all species).
[d] RC = relative coverage (coverage for each species expressed as a proportion of the total coverage for all species).
[e] Importance value = RD + RF + RC (Brower et al. 1990).

bluet was 65.2. The sampled area comprised 41.2% bare ground.

The continued documentation of Mountain Plover nests in northeastern Mexico further confirms that a breeding population of Mountain Plovers exists in northeastern Mexico (Knopf and Rupert 1999a, Desmond and Chavez-Ramirez 2002). Desmond and Chavez-Ramirez (2002) proposed that the breeding season in northeastern Mexico may be later than that known for northern populations, but a more accurate hypothesis might be that the breeding period in northeastern Mexico is protracted because the earliest observation of pairing occurred in late April (Knopf and Rupert 1999a) and the latest nest with eggs was observed in early July.

Vegetation characteristics near the nest we found corresponded with those reported by Graul (1975; height <8 cm), Knopf and Miller (1994; bare ground ≥30%), and Desmond and Chavez-Ramirez (2002; height = 2.3 cm, bare ground = 86.4%). The presence of a shading element near the nest is considered important in nest-site selection (Graul 1975, Olson and Edge 1985, Knopf and Miller 1994); the nearest shade we found was 40 m from the nest (a cluster of *Atriplex* sp.). Dominant plant species differed from those reported in association with Mountain Plover nest sites: blue grama, buffalograss, needle-and-thread, and sagebrush (Finzel 1964, Graul 1975, Knowles et al. 1982). In Llano La Soledad, however, *Muhlenbergia* sp. and Karwinski's grama were the dominant grasses, and summer bluet and McVaugh's bladderpod were the dominant forbs; buffalograss occurs in the area but was not common (RD = 0.1, RF = 5.2; Table 1).

The presence of a disjunct Mountain Plover breeding population in northeastern Mexico—and its association with colonies of Mexican prairie dogs—has strong conservation implications for grasslands in that region. However, the last remnants of northeastern Mexico's native grasslands and Mexican prairie dog habitats are being lost, which could have negative effects on the region's population of Mountain Plovers. Other avian species that commonly occur in association with Mexican prairie dog colonies include Long-billed Curlew (*Numenius americanus*), Ferruginous Hawk (*Buteo regalis*), Burrowing Owl (*Athene cunicularia*), and an endemic, Worthen's Sparrow (*Spizella wortheni*); they, too, could be at risk of declines due to habitat loss.

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