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Cover Page Footnote
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The San Quintín Kangaroo Rat is Not Extinct

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The range of the San Quintín kangaroo rat (*Dipodomys gravipes*) is restricted, so far as known historically, to a stretch of coastal habitat less than 150 km in length and a few kilometers in width (Best and Lackey 1985) at the southern end of the California Floristic Province—a global biodiversity hotspot and one of the most critically endangered ecosystems on earth (Myers et al. 2000). This rodent was described in 1925 by Laurence M. Huey, who reported it from the coastal plains from San Telmo south to El Socorro and on the floodplain of the Arroyo El Rosario along the Pacific coast of northern Baja California, Mexico. The area between El Socorro and El Rosario is largely unsuitable.

Huey asserted that the "mother lode of this species is found near Mesa Agua Chiquita, with 1,000 individuals in 10 acres" (field notes archived at the San Diego Natural History Museum). He described the habitat in this area as hard [clay] soils covered with grasses. Little is known about the broader habitat requirements for *D. gravipes*, but it appears similar in its niche requirements to Stephen's Kangaroo rat *D. stephensi* which occupies areas with high disturbance, open conditions and weedy forbs (Tremor et al. 2017). Burrow entrances were closed but connected by visible runways up to 75 m long (Fig. 1). Previously, Nelson (1922) had written that in this area "the vegetation is so low and insignificant that the plain has the appearance of an open prairie". Both descriptions could refer to areas recovering from wheat cultivation years earlier, and the grasses could be non-native annual species (e.g., *Bromus* spp.).

Agriculture in the San Quintín area began in 1891 when British farmers converted parts of the landscape to wheat cultivation, built a dam for irrigation, and installed a flour mill (Taylor 1996). The settlement was abandoned in 1917 (Phelts-Ramos 2004). Subsequently, only four ranches persisted in the San Quintin Valley, until 1947, when Title 3050 (which granted agricultural lands to families from other regions of Mexico as a cession by the government) led to a massive expansion of agriculture in the valley (Ramírez-Velarde 2004). However, full expansion of agriculture in the area was restricted by the lack of roads allowing for export of produce from the area, until 1973 when the road connecting it with Ensenada was paved.

In 1972, before the building of the transpeninsular highway, "the broad open areas 8.5 miles N of San Quintín were dotted with *D. gravipes* burrows" (Best 1983). Eight years later this area was converted to cropland. In 1980, the population had shrunk, and Best trapped only two individuals in >1000 trap nights. Likewise, the area 9.6 km east of El Rosario, where he had collected 35 specimens in 1972, was in 1980 covered by the paved transpeninsular highway (Best 1983). The Arroyo del Rosario area still produced 7 specimens in 1989 (Troy L. Best *in litt*. to EM, 20 July 1989).

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Fig. 1. *Dipodomys gravipes* habitat at Mesa Agua Chiquita. Note the long and visible runways. Photo by S. Vanderplank.

Dipodomys gravipes has a high affinity for flat terrain and is intolerant of cultivation. Between April 1989 and September 1990, Mellink surveyed all habitats where the species had been previously found, including coastal scrub, fallow fields, and river wash. Yet this effort totaling more than 800 trap-nights, spread over 12 cycles of trapping events within the historical range, failed to yield any kangaroo rats other than *D. simulans*. As a result of extensive and profound habitat alteration by agriculture, *D. gravipes* has been listed as endangered by the Mexican government since the publication of its first list of species at risk (Instituto Nacional de Ecología 1994). Since then, and given the lack of further captures, biologists and conservationists have feared the species could be extinct (Ceballos and Navarro, 1991; Mellink 1992[1], 1996[2]; Mellink and Luévano 2005).

[1] Mellink, E. 1992. Status de los heterómidos y cricétidos endémicos del estado de Baja California. Comunicaciones Académicas. CICESE. Ensenada, B. C. 10pp.

[2] Mellink, E. 1996. Problemas de conservación de la fauna silvestre en el estado de Baja California. Conferencia magistral. XIV Simposio sobre Fauna Silvestre. Facultad de Medicina Veterinaria y Zootécnia. Universidad Nacional Autónoma de México. México, D. F.

Fig. 2. *Dipodomys gravipes* from Mesa Agua Chiquita. Note the rear foot measurement of 46 mm and thin white lateral tail stripe. Photo by S. Vanderplank.

On 4 July 2017, Tremor and Vanderplank during routine trapping and general inventory, placed traps in the vicinity of San Telmo and the vicinity of San Quintin. Sherman traps (30.5 cm) were set from sundown (approximately 20:00 PM) to dawn (approximately 05:30 AM) and baited with rolled oats. They set 13 traps along runways and burrow entrances on a disturbed embankment adjacent to a fallow agricultural field 5.6 km east of San Quintín, on Mesa Agua Chiquita (near the "mother lode" described by Huey). Runs were visible in the non-native vegetation, which included *Mesembryanthemum crystallinum*, *Brassica tournefortii*, *Salsola tragus*, and *Hirschfeldia incana,* with individuals of the native species *Ambrosia chenopodiifolia* and *Malosma laurina* nearby. Three female and one male *D. gravipes,* all adults, were trapped. Other species trapped were three individuals of the pocket mouse *Chaetodipus fallax* and one woodrat (*Neotoma bryanti*). The pocket mice appeared to be sharing the burrows of *D. gravipes*. Traps were set at three additional nearby locations and at San Telmo, but no *D. gravipes* were caught there.

Identification of *D. gravipes* was based, among other characters, on measurements of females, greater than the range of values of *D. simulans* (Table 1). Five toes on its hind feet distinguish *Dipodomys gravipes* from sympatric *D. merriami*, which have four toes. Also, diagnostic was the width and pattern of the tail which in *D. gravipes* is thicker than in *D. simulans*, with the white lateral tail stripe narrow and indistinct where it merges with black dorsal and ventral tail stripes (Best and Lackey 1985). The feet were also thick, as described by Huey (1925). The adults captured were unusually feisty for the genus *Dipodomys*

Table 1. Body measurements (mm) of *D. gravipes* females captured (2017) and females only specimen data from the San Diego Natural History Museum (SDNHM) from the same species and its closest congeneric species, *D. simulans.* All measurements in millimeters. Ear length excluded as historic methods of taking these measurements differs from current methods.

	Dipodomys gravipes						*D. simulans*
	Three captures 2017				SDNHM specimens from San Quintin region	Best 1983	SDNHM specimens from San Quintin region
	1	2	3	Mean	(n = 35)	Mean	(n = 51)
Total length	295	290	300	295	280-320	300	247-292
Tail	175	185	188	183	161-187	173	145-175
Hind foot	46	42	40	43	41-45	44.1	38-42

and difficult to handle; the adult male escaped before being measured, though it appeared significantly larger than the females.

Data from the live captures were tabulated and later compared to specimens housed at the San Diego Natural History Museum (SDNHM), which houses extensive collections of this species. Museum collections of *D. simulans* from the local region were compared to *D. gravipes* in order to provide a more accurate comparison, since *D. simulans* has a wide range and can be highly variable. Ear measurements were not included because they have historically been recorded using differing techniques and therefore cannot be used for accurate comparison.

The presence of this species adjacent to fallow agricultural land suggests that the recent drought and subsequent fallowing may have increased available habitat and favored the recovery of *D. gravipes*. If this is true, concern should be elevated for this species in the event of increased intensity of agriculture in future, if and when the drought abates. It is not clear whether this discovery represents a rebound of this species or a last remnant population. Surveys have begun throughout the broader region in an attempt to guide future efforts to recover the species.

This discovery is a note of hope for the species and of great importance to regional conservation. Nevertheless, the primary threats of habitat destruction and agricultural expansion (Álvarez-Castañeda et al 2008)[3], which cause fragmentation and reduced genetic vigor, in addition to direct habitat loss, leave this species highly threatened. The human population in the range of *D. gravipes* also continues to increase, presumably increasing pressures such as artificial lighting, application of rodenticides, predation by domestic pets and overgrazing by livestock. Additional data on range and abundance are needed, and genetic studies in areas previously occupied are recommended in the absence of voucher specimens. Our finding is undeniably good news, but no conservation strategy can be proposed until the current status and distribution of *D. gravipes* is better understood.

[3] Álvarez-Castañeda, S.T., Castro-Arellano, I. & Lacher, T. 2008. *Dipodomys gravipes*. The IUCN Red List of Threatened Species 2008: e.T6676A12794061. Downloaded on 02 October 2017.http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T6676A12794061.en.

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Literature Cited

Best, T.L. 1983. Morphologic variation in the San Quintin kangaroo rat (*Dipodomys gravipes* Huey 1925). Am. Midl. Nat., 109:409–413.

Best, T.L. and Lackey, J.A., 1985. Dipodomys gravipes. Mamm. Species, (236), pp. 1–4.

Ceballos, G. and D. Navarro. 1991. Diversity and conservation of Mexican mammals. Pp. 167–198 in Latin American mammalogy: history, biodiversity, and conservation. (M.A. Mares and D.J. Schmidly, eds.). University of Oklahoma Press.

Huey, L.M. 1925. Two new kangaroo rats of the genus *Dipodomys* from Lower California. Proc. Biol. Soc. Wash., 38:83–84.

Instituto Nacional de Ecología. 1994. NORMA Oficial Mexicana NOM-059-ECOL-1994, que determina las especies y subespecies de flora y fauna silvestres terrestres y acuáticas en peligro de extinción, amenazadas, raras y las sujetas a protección especial, y que establece especificaciones para su protección. Diario Oficial de la Federación 16 May 1994.

Mellink, E. and J. Luévano. 2005. *Dipodomys gravipes*. Pp. 613–615 in G. Ceballos and G. Oliva (coord). Los mamíferos silvestres de México. Fondo de Cultura Económica – CONABIO. México, D.F.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., Da Fonseca, G.A. and Kent, J. 2000. Biodiversity hotspots for conservation priorities. Nature, 403(6772): 853.

Nelson, E.W. 1922. Lower California and its natural resources. Mem. Natl. Acad. Sci., 16:1–194.

Phelts-Ramos, S. 2004. El antiguo molino de trigo de San Quintín y su gradual desmantelamiento: voces de la Península: San Quintín, entre la tierra y el mar: una historia compartida. Revista de Geografía e Historia de Baja California 2:8–12.

Ramírez-Velarde, D. 2004. Ranchos de San Quintín: Voces de la península: San Quintín, entre la tierra y el mar: una historia compartida. Revista de Geografía e Historia de Baja California, 2:16–19.

Taylor, L.D. 1996. Gunboat diplomacy's last fling in the new world: the British seizure of San Quintín, April 1911. The Americas, 52:521–543.

Tremor, S., D. Stokes, W. Spencer, J. Diffendorfer, H. Thomas, S. Chivers, and P. Unitt (eds) 2017. San Diego County Mammal Atlas. Proceedings of the San Diego Society of Natural History 46. 438p.