

## NOTES

# REDISCOVERY OF THE COLUMBIA PLATEAU POCKET MOUSE (*PEROGNATHUS PARVUS*) AT THE NORTHERN EXTENT OF THE RANGE OF THE SPECIES

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**Abstract.**—Peripheral populations are frequently exposed to marginal conditions; however, adaptations to these suboptimal conditions makes these populations important for genetic diversity and conservation. We detected the Columbia Basin Pocket Mouse (*Perognathus parvus*) at the extreme northern extent of their range, in a valley where they were last reported in 1949. If the species persists in this valley, aridification of the area due to climate change may allow *P. parvus* to eventually replace the Western Deer Mouse (*Peromyscus sonoriensis*) as the dominant cricetid rodent in the semi-arid grasslands of British Columbia.

**Key Words.**—British Columbia; grassland; Great Basin Pocket Mouse; Heteromyidae; *Perognathus parvus*; population; range.

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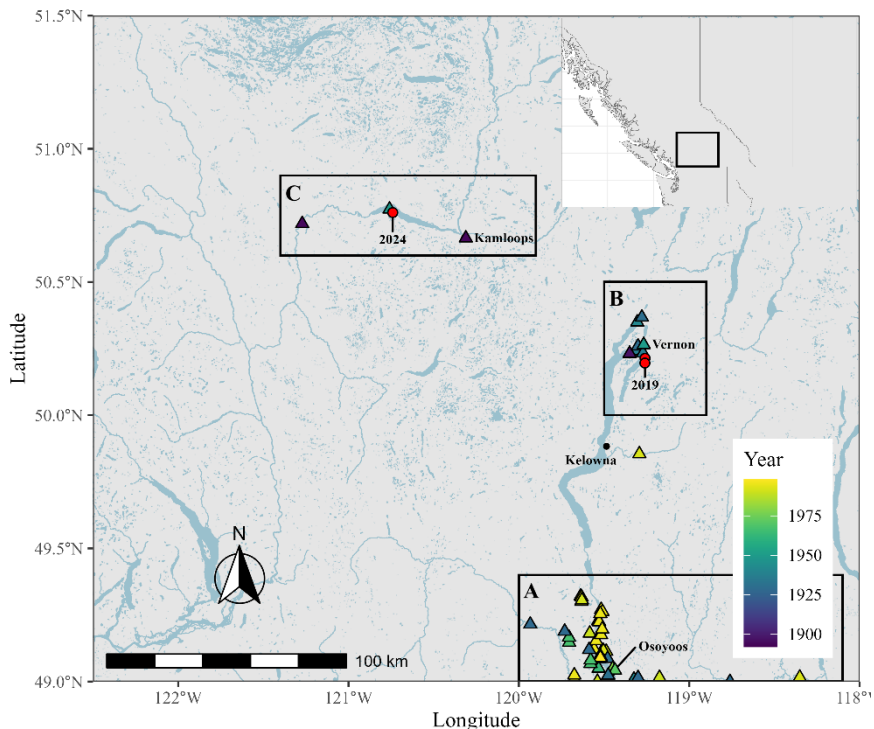
The Columbia Plateau Pocket Mouse (*Perognathus parvus*; previously the Great Basin Pocket Mouse) ranges from southeastern California northwards through Nevada, Utah, Idaho, Oregon, and Washington, USA, before reaching its northern limit in southern British Columbia, Canada (Nagorsen 2005). At the northern limits, these mice are restricted to threatened arid grassland habitats (<https://a100.gov.bc.ca/pub/eswp/esr.do?id=16091>). They require dry, sandy soils for burrowing and sandbathing (Kritzman 1974) and tend to be replaced by Western Deer Mice (*Peromyscus sonoriensis*, previously *P. maniculatus*) at higher altitudes (O'Farrell 1975). In British Columbia, the species is considered Special Concern (Ramsay and Nagorsen 2024) although it has not yet been assessed at the federal level. Historic records show *P. parvus* in three principal areas in the province (Fig. 1): (1) in the south Okanagan Valley, which continues east to the Kettle Valley and west to the Similkameen Valley; (2) in the north Okanagan Valley; and (3) in the Thompson River Valley.

The arid grasslands in southern British Columbia are contiguous with grasslands in Washington, and some species associated with this ecosystem have been shown to have gene flow across the U.S.-Canada border (Schmidt 2019). The north Okanagan and Thompson regions, however, are more isolated. The arid grassland habitat in the north Okanagan is bordered to the south by the urban sprawl of Kelowna, which is suspected to segregate this population from those of the south Okanagan (Nagorsen 2005). To the west of the Okanagan lies the Thompson Valley that also contains arid grasslands. The two valleys are geographically isolated from one another, and the Thompson Valley ecosystem likely has existed as a habitat island since the Holocene Climate Optimum

(about 5,500 years before present), when mid to high elevation grasslands transitioned to forest, blocking habitat corridors in the region (Mathewes and King 1989). Many of the species in the Thompson Valley reach their northern limit here and so are more limited by marginal climatic conditions than populations in more southern habitats. This combination of genetic isolation and marginal conditions leaves fringe populations with increased risk of extirpation from these areas (McDonald and Brown 1992; Williams et al. 2010). The conservation value of these populations, however, often is high due to their strong contribution to the overall genetic diversity of a species, as fringe populations tend to have experienced differing selection pressures than central populations within the range of a species (Lesica and Allendorf 1995; Williams et al. 2010).

Until our study, the last records of pocket mice in the Thompson Valley and the north Okanagan were 1949 and 1951, respectively (Nagorsen 2005). A small mammal live-trapping program in the grasslands surrounding the city of Kamloops (1997-present) has failed to detect pocket mice, along with several other short-term studies overlaid on the long-term sites (unpubl. data). Additional trapping in the valley also has been undertaken in communities outside of Kamloops with similar results (Hales 2011).

In the summer of 2019, a small mammal live-trapping inventory (Pereira 2019) captured 20 individual Columbia Plateau Pocket Mice in Kalamalka Lake Provincial Park, in the North Okanagan just outside the city of Vernon (Latitude 50.207895, Longitude -119.256038) within grassland and dry, open forest habitat. These captures were 4.2 km from the nearest known capture location (1937) and 7.7 km from a specimen caught in 1951.



**FIGURE 1.** Known locations of the Columbia Plateau Pocket mouse (*Perognathus parvus*) in British Columbia, Canada. Populations are defined by three primary areas: (A) the south Okanagan Valley, near the town of Osoyoos, (B) the north Okanagan Valley, near the town of Vernon, and (C) the Thompson Valley, near the city of Kamloops. Until recently, *P. parvus* had remained undetected in the Thompson and north Okanagan Valleys since 1949. Recent trapping (red points) in the north Okanagan (2019) and the Thompson Valley (2024) re-establishes the presence of the animal in these historic locations.

One of these two historic capture locations has since been developed and now consists of residential and commercial developments (pers. obs.).

On 28 August 2024, we caught a single Columbia Plateau Pocket Mouse during a short-term live trapping study within an isolated habitat patch near Kamloops Lake, close to the community of Savona (Latitude 50.751280, Longitude -120.840732). The individual was a non-reproductive adult female (Fig. 2) with a mass of 19.0 g, a zygomatic width of 12.45 mm, a pes length of 22.5 mm, and an ear length of 7 mm. The trapping session consisted of three nights of pre-baiting with sunflower seeds, whole oats, and apple pieces followed by three consecutive nights of trapping. The trapping grid consisted of 40 Longworth-style traps spaced 15 m apart in a 4 × 10 grid. Earlier in the same summer (18–20 June), an identical trapping session that we conducted at the same location failed to produce any captures of pocket mice. Other animals we caught in the same trapping session as the pocket mouse at this location were 18 Western Deer Mice and four Yellow Pine Chipmunks (*Neotamias amoenus*).

Our 2024 capture location was within 2 km of the 1949 pocket mouse observation (specimen CM 46420 in the Carnegie Museum of Natural History Collection, Pittsburgh, Pennsylvania). The trap location was on a south-facing slope, situated in a shrub-grassland ecosystem with an historic average annual precipitation of 320 mm (Wang et al. 2016). Common plant

species at the site included Bluebunch Wheatgrass (*Pseudoroegneria spicata*), Needle-and-Thread Grass (*Hesperostipa comata*), Big Sagebrush (*Artemisia tridentata*), Rubber Rabbitbrush (*Ericameria nauseosa*), and Prickly Pear Cactus (*Opuntia fragilis*). Bluebunch Wheatgrass has been noted as a dominant species in Columbia Plateau Pocket Mouse habitat in the Okanagan (Sullivan and Sullivan 2008).

The southern interior of British Columbia is expected to become hotter and drier in coming years (Smith 2011; Prugh et al. 2018; Xu et al. 2021). Research has shown that the ubiquitous Western Deer Mouse tends to be outcompeted in hot, dry valley bottoms by pocket mice (O’Farrell 1975; Maida 2020; Melaschenko and Hodges 2020). As a result, pocket mice may benefit from both the climatic shifts and the reduced competition from the Western Deer Mouse. This pattern is supported by several studies suggesting that rare species may benefit from climate change, as they become more competitive against current dominant generalists (Jiang et al. 2013; Prugh et al. 2018).

The persistence of the pocket mouse in a *Peromyscus*-dominated community at the periphery of its range suggests the potential for range expansion into the arid valley bottoms in the Thompson Valley, mirroring their distribution in the South Okanagan and Washington (O’Farrell 1975; Maida et al. 2020; Melaschenko and Hodges 2020). Previous inventory work in the south Okanagan indicates that pocket mice reach much higher

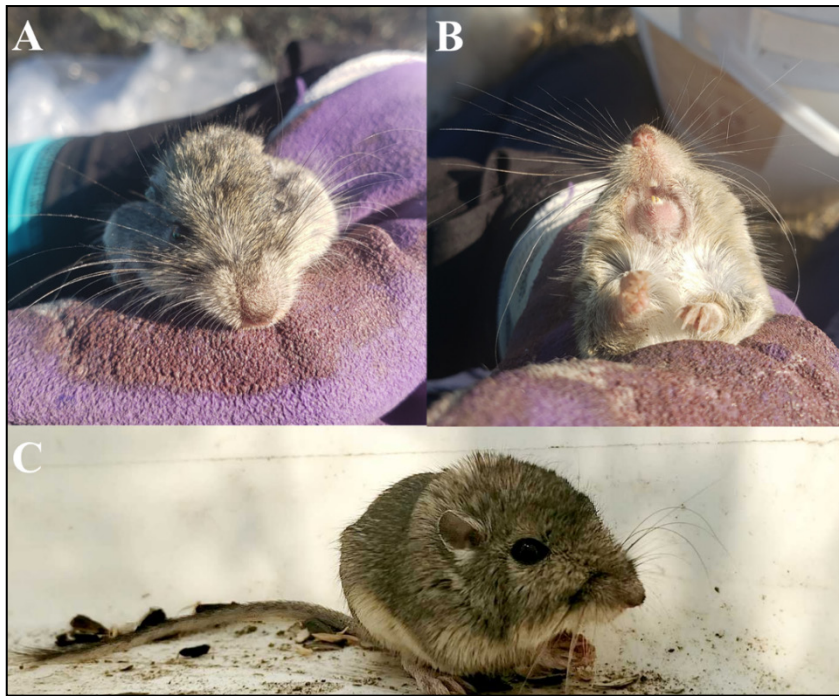


FIGURE 2. Photographs displaying (A and B) the cheek pouches and body and (C) tail shape of the individual Columbia Basin Pocket Mouse (*Perognathus parvus*) caught south of Kamloops Lake, British Columbia, Canada, 29 August 2024. (Photographed by Kara Atkinson).

density in natural arid grassland/sagebrush habitat than in dry forests (e.g., Ponderosa Pine, *Pinus ponderosa*) or abandoned fields and tends not to be present in agricultural land, such as orchards (Sullivan and Sullivan 2006, 2008). These authors also observed that pocket mice have poor dispersal success and highly specific habitat requirements (Sullivan and Sullivan 2008), suggesting that disturbed habitat could present significant barriers for the conservation and success of this species, as it has for other species within this genus (Brehme 2023).

The site of our recent observation re-establishes and verifies the presence of the Columbia Plateau Pocket Mouse in the Thompson Valley. This now represents the most northern known location of this species, 180 km north of the nearest published observation records. Our observation, along with the recent detections of the species in the North Okanagan, will significantly change the estimated range of these animals in Canada, a metric important to the assessment of a species at risk (Committee on the Status of Endangered Wildlife in Canada [COSEWIC] 2015; IUCN Standards and Petitions Committee. 2024. Guidelines for Using the IUCN Red List Categories and Criteria. Version 16. Available from: <https://www.iucnredlist.org/> [Accessed 27 November 2024]). Additional inventory work is required in southern British Columbia to determine whether connectivity exists between the Thompson Valley population and the known locations of the animal in the south and north Okanagan. The arid grassland ecosystem of southern British Columbia is itself considered threatened (Austin et al. 2008; Williams 2015), and with increased pressure

through human development, obtaining a clearer picture of the distribution of the Columbia Plateau Pocket Mouse is warranted.

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