ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract **Element Code:** AMAFD03024
Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Dipodomys microps leucotis*
COMMON NAME: Houserock Valley Chisel-toothed Kangaroo Rat; Arizona Chisel-toothed Kangaroo Rat; House Rock Valley Kangaroo Rat; Marble Canyon Kangaroo Rat.
SYNONYMS:
FAMILY: Heteromyidae

AUTHOR, PLACE OF PUBLICATION: Goldman, E. A. 1931. Proc. Biol. Soc. Washington 44:133-136.

TYPE LOCALITY: Six miles west of Colorado River Bridge (=Navajo Bridge), Houserock Valley, north side of Marble Canyon, Coconino County, Arizona, 3700 feet.

TYPE SPECIMEN: U.S. National Museum 250036 (adult male), E. A. Goldman, October 17, 1931. Original collector's specimen number 23570.

TAXONOMIC UNIQUENESS: In North America, there are 16 species of *Dipodomys*, and thirteen subspecies of *Dipodomys microps* . Two subspecies of this taxon are found in Arizona, including *D. m. leucotis* and *D. m. celsus*.

DESCRIPTION: Small, but medium-sized compared to other kangaroo rats. Body length 4-5 inches (10.16-12.7 cm); tail 5.5-7.5 in (13.97-19.05 cm); weight 2.5-3.2 oz (72-91 g). This subspecies has a pale hip stripe, long striped tufted tail, small forepaw in comparison to the well-developed hind legs, five toes on its hind feet, and a kangaroo-like gait with bipedal hopping. It has grayish brown fur on its upper parts, white fur below, and external brownish fur-lined cheek pouches. Their eyes are large and luminous which aid in their nocturnal lifestyle. Lateral enlargement or flange extends from the maxilla above the anterior base of the zygomatic arch. As in all *Dipodomys*, the papery thin skull is distinctive. The skull has exceptionally inflated auditory bullae, which considerably broadens the posterior part of the skull, making it noticeably triangular. They have 16 cheek teeth and 4 incisors, which are unrooted and grow throughout life. (Hoffmeister 1986, Spicer and Johnson 1988).

AIDS TO IDENTIFICATION: *D. m. leucotis* can be easily distinguished from all non-*Dipodomys* within its range by its long tufted tail, long and well-developed hindlegs, and bipedal locomotion. The only other species of *Dipodomys* found within the range of *D. m. leucotis* is *D. ordii* (Ord's kangaroo rat). *D. m. leucotis* is easily distinguished from *D. ordii* by its lower incisors, which are flat-fronted and chisel-shaped in cross-section. The incisors of *D. ordii* are rounded and awl-shaped in cross-section. *D. m. leucotis* is also larger and

darker than *D. ordii* and has a dark ventral tail stripe extending to the tail tip rather than stopping just short of it, as it does in *D. ordii*. The dark tail stripes of *D. m. leucotis* are usually wider and narrower than the white tail stripes, and the cheek pouches is lined with dusky, rather than white fur (Spicer and Johnson 1988).

ILLUSTRATIONS:
Line drawing of skull (Hoffmeister 1986: Fig. 5.156)
Line drawing of *D. microps* skull and entire animal (Ingles 1954)

TOTAL RANGE: Endemic to Arizona. Found only in Houserock Valley, on the north and west side of the Colorado River, Coconino County, Northern Arizona (Hafner et al. 1998). Only one specimen has been captured on the east side of the Colorado River. This specimen, captured by Hardy just east of Navajo Bridge in 1949, appears to be a straggler (Spicer and Johnson 1988).

RANGE WITHIN ARIZONA: See "**Total Range.**"

SPECIES BIOLOGY AND POPULATION TRENDS

BIOLOGY: *Dipodomys microps leucotis* is mostly a nocturnal animal, and like other kangaroo rats, they are solitary. They are active above ground all year long, with most activity occurring during the early hours of the night. Their above ground activities become shorter and shorter as temperatures cool in the fall and winter (Kenagy 1973). Typically, they rest during the daytime and burrow, forage, socialize and sand bathe at night. They have sharp, chisel-like lower incisors that help strip epithelium from leaves of perennial shrubs to expose inner, moisture-rich tissues. Their life span is four to five years (Whitaker 1996). Common predators of the chisel-tooth include rattlesnakes, gopher snakes, owls, and less commonly coyotes, bobcats, house cats and various raptors.

Although questioned in the past, Chisel-toothed kangaroo rats are known to form mounds associated with a concentration of burrow entrances (Hayssen 1991 in O'Farrell 1997). Mounds may range from 30 to over 67 cm (11.8-26.4 in) high, and may be 2 to 4 m (6.56-13.12 ft) in diameter. Burrows are typically built in sand or in the natural dirt mounds at the base of shrubs. The burrows descend at least 25 centimeters, to avoid fluctuations in daytime temperatures, and entrances are plugged in the daytime. At two Houserock Valley sites, occupied complexes averaged 2.45 per acre; no single complex yielded more than one adult chisel-tooth (Spicer and Johnson 1988).

D. microps has shown to have less capacity for physiological water conservation than some other species of *Dipodomys*. Lower, more stable soil temperatures and higher humidity levels are found in their burrows. Because of their cool, humid burrow, the seeds stored in their caches, absorb water vapor from the burrow air. This water retention aids in their water requirements during times of food scarcity. Movements inside their network of burrow levels enable this species to maintain desired body temperatures and conserve water (Spicer and Johnson 1988). Kangaroo rats in general have specialized kidneys, which allow them to

dispose of waste materials with very little output of water; another mechanism in conserving water.

REPRODUCTION: No reproduction studies have been done for *D. m. leucotis*. For kangaroo rats in general, births in California occurred from March to mid-April or sometimes later, and in Nevada, from April-June. Gestation lasts 30-34 days with a single litter of 1-4 pups (most often 2) produced, though under exceptionally good conditions a few may produce two litters per year. Juveniles typically do not mature sexually in season of their birth. Specimens of immature *D. m. leucotis* captured in late July and early August were probably born in late May (Hoffmeister 1986). O'Farrell (1995) captured estrous and pregnant females in August, providing evidence of the production of second litters. Based on studies of other subspecies of *D. microps*, it is probable that *D. m. leucotis* breeds every year (Kenagy 1973). Reproduction is possibly triggered by vitamins in perennial shrub leaves, or in winter annuals (Johnson 1988).

FOOD HABITS: They are generally granivores, although known to feed extensively on saltbush leaves. Seeds are stored in burrows when plentiful, and relied on during extremely dry periods, and where saltbush is less common or absent (Csuti 1979). Kenagy (1973) found caches of shadscale leaves in storage chambers but did not find any major caches of seeds.

HABITAT: Shrub dominated Great Basin desertscrub communities with relatively high shrub cover and sparse grass cover. According to O'Farrell (1995), the preferred soils have a rocky or gravelly component and are moderate to deep. Spicer and Johnson (1988) collected *D. m. leucotis* in areas with shallow to deep sandy soils.

Chisel-toothed kangaroo rats require good shrub cover, in contrast to Merriam's kangaroo rats (*D. merriami*) which require much less cover. If the shrub cover is removed or destroyed, Merriam's kangaroo rat replaces the chisel-toothed species. (Hoffmeister 1986).

ELEVATION: Found from 3,500 - 6,500 feet (1068-1983 m). Spicer and Johnson (1988) report ranges from 3,200 - 5,500 ft (976-1678 m).

PLANT COMMUNITY: This subspecies occurs primarily in shrub dominated Great Basin desertscrub communities. They are particularly fond of areas dominated by shadscale (*Atriplex confertifolia*) and four-wing saltbush (*Atriplex canescens*). To a lesser degree they occur in blackbrush (*Coleogyne ramosissima*) dominated areas. Shadscale dominated communities also contain galleta (*Hilaria jamesii*), indian ricegrass (*Achnatherum hymenoides*), prickly pear (*Opuntia sp.*), and fluffgrass (*Erioneuron pulchellum*). Four-wing saltbush dominated communities also contain blue grama (*Bouteloua gracilis*), green rabbitbrush (*Chrysothamnus viscidiflorus*), snakeweed (*Gutierrezia sarothrae*), sand dropseed (*Sporobolus cryptandrus*), mormon tea (*Ephedra sp.*), winterfat (*Krascheninnikovia lanata*), prickly pear, and indian ricegrass. Blackbrush dominated communities also contain scattered narrow-leaved yucca (*Yucca angustissima*), ephedra, and indian ricegrass (O'Farrell 1995).

POPULATION TRENDS: The relative abundance of *D. m. leucotis* throughout the occupied portion of Houserock Valley appears to be low and generally patchy. Approximately 73,624

acres of habitat is occupied, out of a total of about 150,000 acres in Houserock Valley. Based on past collection information and recent trapping efforts, it appears that this species is now absent from part of its former range (O'Farrell 1995).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: SC (USDI, FWS 1996)
[C2 USDI, FWS 1985, 1989, 1991, 1994]

STATE STATUS: 2 (AZGFD, AWCS 2022)
[1B (AGFD SWAP 2012)]
[WSC (AGFD, WSCA 1996 in prep)]
[Candidate (TNW, AGFD 1988)]

OTHER STATUS: Bureau of Land Management Sensitive (USDI, BLM AZ 2008, 2010, 2017)
[Not Bureau of Land Management Sensitive (USDI, BLM AZ 2005)]
[Bureau of Land Management Sensitive (USDI, BLM AZ 2000)]
Forest Service Sensitive (USDA, FS Region 3 2007, 2013)
Group 4, full species level (NNDFW, NESL 2000, 2001, 2005, 2008)
LC at full species (IUCN, Cassola 2016)

MANAGEMENT FACTORS: Areas with high degrees of past livestock and agricultural disturbances have been found to be absent of *D. m. leucotis*. This is especially true around livestock water sources and areas where shrubs were removed for agricultural purposes. The majority of occupied habitat is privately owned and will not be developed in the future. However, this species can be considered a sensitive taxon due to its limited distribution, low general abundance, and the intense past and present grazing practices in the area (O'Farrell 1995).

Threats include: excessive concentrations of browsing livestock; feral and free-ranging cats (Felis catus) may also be a local problem in developed areas near Glen Canyon Recreation Area (AGFD in prep).

PROTECTIVE MEASURES TAKEN: None

SUGGESTED PROJECTS: Areas that have had intense past livestock and agricultural disturbances have shown to be free of *D. m. leucotis* (O'Farrell 1995). Limits should be put on grazing in those areas to allow natural recruitment of saltbush and other important shrubs. Range conditions should be monitored in the occupied portion of Houserock Valley.

Per O'Farrell (1997): 1) A reduction in livestock use or a more frequent shift of use on existing pastures within the blackbrush, shadscale, and four wing saltbush habitats, would

increase the carrying capacity for *D. m. leucotis*; 2) Periodic monitoring of kangaroo rat population levels would provide trends that allow remedial action should there be a precipitous decline in kangaroo rat numbers; 3) detailed studies of demography and spatial use by *D. m. leucotis* are needed to gain a better perspective on critical aspects of the biology of the species and to allow a better opportunity to provide suitable management for the long-term protection of this isolated taxon; 4) Avoid placement of new livestock water sources in the blackbrush, shadscale, and four wing saltbush habitats; 5) When possible, the response of vegetation and subsequent kangaroo rat response in areas where livestock use has declined, especially around water sources, should be studied in detail. It is critical to understand the dynamics of habitat recovery in areas no longer used intensively. Surveys for current population distribution, and monitoring for trends is needed.

LAND MANAGEMENT/OWNERSHIP: Bureau of Land Management, Arizona State Land Department, U. S. Forest Service, and National Park Service.

SOURCES OF FURTHER INFORMATION

REFERENCES:

Arizona Game and Fish Department. 1988. Threatened native wildlife in Arizona. Arizona Game and Fish Department Publication, Phoenix, Arizona. p. 26.

Arizona Game and Fish Department. 1996, in prep. Wildlife of special concern in Arizona. Arizona Game and Fish Department Publication. Phoenix, Arizona. p. 26.

Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan 2012-2022. Arizona Game and Fish Department, Phoenix, Arizona. 233 pages.

Arizona Game and Fish Department. 2022. Arizona Wildlife Conservation Strategy: 2022-2032. Arizona Game and Fish Department, Phoenix, Arizona. 378 pages.

Biota Information System of New Mexico. 2017. BISON Species Account 050632: Houserock Valley Chisel-toothed Kangaroo Rat (*Dipodomys microps leucotis*). New Mexico Game & Fish, Available: https://www.bison-m.org/booklet.aspx?SpeciesID=050632.

Cassola, F. 2016. *Dipodomys microps*. The IUCN Red List of Threatened Species 2016: e.T42603A22227645. http://dx.doi.org/10.2305/IUCN.UK.2016-2.RLTS.T42603A22227645.en

Csuti, B. A. 1979. Patterns of adaptation and variation in the Great Basin kangaroo rat (*Dipodomys microps*). University of California Publications in Zoology III:viii+73.

Goldman, E. A. 1931. Three new rodents from Arizona and New Mexico. Proceedings of the Biological Society of Washington. 44:133- 136.

Hall, E. R. 1981. Mammals of North America. Second Edition, Vol. I. John Wiley & Sons, New York, New York. p. 572.

Hoffmeister, D. F. 1986. Mammals of Arizona. University of Arizona Press, Tucson, Arizona. p. 305.

Ingles, L. G. 1954. Mammals of California and its coastal waters. Stanford University Press, Stanford, CA. p. 205.

Johnson, T. B. 1988. Nongame Field Note: Houserock Valley Chisel-toothed Kangaroo Rat. Arizona Game and Fish Department, Phoenix, Arizona. pp. 1-4.

Kenagy, G. J. 1973. Daily and seasonal patterns of activity and energetics in a heteromyid community. Ecology 54:1201-1219. https://doi.org/10.2307/1934184

Navajo Nation, Department of Fish and Wildlife. 2000. Endangered Species List for The Navajo Nation. The Navajo Nation, Window Rock, Arizona. p. 3.

Navajo Nation, Department of Fish and Wildlife. 2001. Endangered Species List for The Navajo Nation. The Navajo Nation, Window Rock, Arizona. p. 3.

Navajo Nation Department of Fish and Wildlife. 2005. Endangered Species List for the Navajo Nation. The Navajo Nation, Window Rock, Arizona. p. 3.

Navajo Nation Department of Fish and Wildlife. 2008. Endangered Species List for the Navajo Nation. The Navajo Nation, Window Rock, Arizona. p. 3.

O'Farrell, M. J. 1995. Distribution of the Houserock Valley chisel-toothed kangaroo rat (*Dipodomys microps leucotis*) Goldman). Arizona Game and Fish Heritage Fund report. Report prepared for the Bureau of Land Management, St. George, Utah and Arizona Game and Fish Department, Phoenix Arizona. O'Farrell Biological Consulting, Las Vegas, Nevada. 22 pages + appendices

O'Farrell, M. J. 1997. Densities and habitat affinities of the chisel-toothed kangaroo rat (*Dipodomys microps leucotis* Goldman). IIPAM #I95025. Report prepared for the Bureau of Land Management, St. George, Utah and Arizona Game and Fish Department, Phoenix Arizona. O'Farrell Biological Consulting, Las Vegas, Nevada. 23 pages + appendices.

Spicer, R. B. and T. B. Johnson. 1988. Status of the Houserock Valley chisel-toothed kangaroo rat (*Dipodomys microps leucotis* Goldman). Report prepared for the Office of Endangered Species, U.S. Fish and Wildlife Service, Albuquerque, New Mexico. Arizona Game and Fish Department, Phoenix, Arizona. 29 pages.

USDA, Forest Service Region 3. 2007. Regional Forester's list of sensitive animals. U.S. Forest Service. 39 pages.

USDA, Forest Service Region 3. 2013. Regional Forester's sensitive species: animals - 2013. U.S. Forest Service. 5 pages.

USDI, Bureau of Land Management. 2000. Arizona BLM sensitive species list. Instruction memorandum No. AZ-2000-018. Bureau of Land Management, Arizona State Office, Phoenix, Arizona.

USDI, Bureau of Land Management. 2005. Arizona BLM sensitive species list. Bureau of Land Management, Arizona State Office, Phoenix, Arizona.

USDI, Bureau of Land Management Region 2. 2008. Arizona BLM sensitive species list. Bureau of Land Management, Arizona State Office, Phoenix, Arizona.

USDI, Bureau of Land Management Region 2. 2010. Arizona BLM sensitive species list. Instruction memorandum No. AZ-IM-2011-005. Bureau of Land Management, Arizona State Office, Phoenix, Arizona.

USDI, Bureau of Land Management. 2017. Arizona BLM sensitive species list. Instruction memorandum No. AZ-IM-2017-009. Bureau of Land Management, Arizona State Office, Phoenix, Arizona. 6 pages.

USDI, Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants: review of vertebrate wildlife; notice of review. Federal Register 50(181):37958-37967.

USDI, Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants; animal notice of review; notice of review. Federal Register 54(4):554-579.

USDI, Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants; animal candidate review for listing as endangered or threatened species; notice of review. Federal Register 56(225):58804-58836.

USDI, Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; animal candidate review for listing as endangered or threatened species; notice of review. Federal Register 59(219):58982-59028.

USDI, Fish and Wildlife Service. 1996. Endangered and threatened widlife and plants; review of plant and animal taxa that are candidates for listing as endangered or threatened species; notice of review. Federal Register 61(40):7596-7613.

Whitaker, Jr., J. O. 1996. National Audubon Society field guide to North American mammals. Alfred A. Knopf, Inc., New York, New York. p. 556-557.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

Donald Hoffmeister - retired professor, University of Illinois, Urbana, IL.

Michael J. O'Farrell - O'Farrell Biological Consulting, Las Vegas, NV.

Robert B. (Barry) Spicer - private consultant, former Arizona Game and Fish Dept. employee, Phoenix, AZ.

ADDITIONAL INFORMATION:

D. m. leucotis occurs at the southeastern edge of the range for *microps*, and is isolated geographically from all other *microps*. It is separated from the nearest population of *D. microps* (*D. m. celsus*) by the Kaibab Plateau, which was uplifted 50 million years ago. The distance separating these two subspecies is approximately 40 miles (Spicer and Johnson 1988).

Revised: 1999-06-07 (SLF)
1999-07-07(DJG)
2001-03-01 (SMS)
2023-02-24 (MBL)