

Interim Report
New Mexico Department of Game and Fish, Share with Wildlife Program

Year 2

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Project Title:

Foraging habitat restoration and eDNA surveys for nectar bats on the Double E WMA

Bat Conservation International

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Project Need

The Mexican long-nosed bat (*Leptonycteris nivalis*; federally endangered, IUCN 'Endangered'), Lesser long-nosed bat (*Leptonycteris yerbabuenae*), and Mexican long-tongued bat (*Choeronycteris mexicana*) are identified as Species of Greatest Conservation Need (SGCN) in the New Mexico Department of Game and Fish (NMDGF) State Wildlife Action Plan (NMDGF, 2016). Each year, these bats follow a "nectar corridor" of blooming columnar cacti and agaves as they migrate from central Mexico to the southwestern United States (Cockrum, 1991). All three species co-occur in southwestern New Mexico, where they seasonally share common roosts and agave food sources (Bogan and Cryan, 2006). Increasingly, *L. yerbabuenae* is being observed in the Gila Region feeding on residential hummingbird feeders, with observations ranging from White Signal in 2010 to frequent observations in Silver City and Piños Altos, the Gila Cliff Valley, and as far north as Glenwood (Ramsey and Whiteman, 2011; Geluso and Geluso, 2021; Laws et al., 2023). Poor body condition has been reported in *L. yerbabuenae* individuals captured late in the season that appear to be relying solely on hummingbird feeders for food (M. Davies; personal communication). Recently, a biological consultant documented a new *L. yerbabuenae* roost near Redrock (M. Davies and M. Ramsey; personal communication). These extralimital observations could suggest that a range expansion by nectar bats is anthropogenically induced. However, after Jennifer D'Annibale, NMDOW Habitat Biologist for the Southwestern Region of New Mexico, posted an observation of a patch of *Agave palmeri* on the Double E Wildlife Management Area (WMA) on iNaturalist in 2021, she and Rachel Burke monitored nectar bats at the site and recorded high *Leptonycteris* activity during peak flowering from late July to September in 2021 (R. Burke, unpublished data). These recordings are likely to be the only detections of nectar bats in their natural foraging grounds in an area that is otherwise dominated by anthropogenic resource use, emphasizing the importance of the area for providing high-quality food sources for these bats prior to their fall migration. With climate change, the Gila region is predicted to become even more important for both nectar bats and agaves (Piccioli Cappelli et al., 2021; Gomez-Ruiz and Lacher, 2019). However, the Gila region is also at risk of dramatic environmental change, as exemplified by several catastrophic wildfires that

took place over the past two decades. *Agave palmeri* can withstand low-intensity fire, but less is known about the impacts of high-intensity fire (Slauson, 2002). At the Double E WMA, the isolated nature of the agaves and the dense woody vegetation in which they occur may increase the agaves' susceptibility to high-intensity fire, with dense woody vegetation a likely result of past heavy grazing (NMDGF, 2017). In 2023, the high-severity Turkey Fire perimeter was within 1.5 miles of the Double E WMA (USFS, 2024). Under current management, the uplands of the Double E WMA are undergoing a transition back to more reference plant communities as the WMA recovers from a legacy of heavy livestock use in the past (NMDGF, 2017). Given that *A. palmeri* is susceptible to long-term impacts from livestock (Widmer, 2002), there is now an opportunity to establish a robust and resilient agave metapopulation in the absence of livestock. Enhancing *A. palmeri* habitat at the Double E WMA will benefit nectar bats in the face of increasing habitat degradation elsewhere. This action aligns with Double E Ranch Management Plan priorities and will enable NMDOW to further improve habitat for SGCN bats. This work will build upon our increasing knowledge of nectar bats in the region, the potentially-disproportionate importance of the Double E WMA for these bats, and the need to mitigate potential fire risks. We will address Habitat Topic 1 (Nectar-feeding bat habitat improvement on the Double E WMA) with the Tasks outlined below.

Project Activities

Task 1: Using Bat Conservation International's nursery-grown *Agave palmeri* stock from regionally-appropriate seed previously collected in the Peloncillo Mountains, plant 150 agave seedlings in previously identified, ecologically-appropriate sites on the Double E Wildlife Management Area (Double E WMA) in 2026. Coordinate with the Agency's archaeologist to ensure completion of all necessary Section 106 compliance paperwork and any on-the-ground archaeological surveys prior to planting nursery-grown agaves. For each agave planting, dig a hole approximately 15.24 cm x 15.24 cm in area. Limit total ground surface disturbance associated with planting agave seedlings to 3.5 square meters across the Double E WMA. Mulch planted seedlings with onsite rock materials and partially shade them with burlap to improve plant survivorship.

Task 2: Conduct environmental DNA (eDNA) surveys of agave patches on the Double E WMA and the following locations on Gila National Forest Lands (all outside of the Gila Wilderness): Burro Mountains, Emory Pass, and Pifios Altos Range. Use eDNA samples to test for the presence of three (3) nectar bat species (Mexican long-nosed bat [*Leptonycteris nivalis*], lesser long-nosed bat [*L. yerbabuenae*], and Mexican long-tongued bat [*Choeronycteris mexicana*]). Visit *A. palmeri* patches shortly after sunrise up to four (4) times during the peak flowering season in 2026 and collect up to one hundred sixty (160) samples for eDNA analysis by swabbing open flowers with a sterile swab. Send samples to the Bat Ecology & Genetics Lab at Northern Arizona University for genetic analysis.

Task 3: Create a comprehensive map of existing agave stands on the Double E WMA. Coordinate field work with Agency biologists to determine when access is permitted and the best access points. Prioritize areas within Hills Ecological Sites ([R038XB103NM](#))

and conduct all surveys in upland habitat outside of the riparian zone. Record agave presence as waypoints, delineate clusters using polygons, and record relative density. Produce a map of agave habitat suitability based on existing models, ecological sites, and soil map units data. Access all locations for agave mapping and field activities described in Tasks 1) and 2) above by using vehicles on established roads or, where established roads are not available, on foot. If camping or motorized travel in areas not visited in Year 1 is necessary, ensure that Contractor's archaeologist accompanies biologists during their first field visit to the Double E WMA and clears all new camping sites and ingress/egress pathways used for any motorized travel, and share locations of these activities with the Agency. Minimize disturbance to sites by camping where allowed by the Agency and primarily on already-disturbed ground (e.g., trails) and at least 25 feet away from any flowering agaves. Do not camp in riparian areas.

Summary of Progress

Task 1: Plant 150 regionally-appropriate *Agave palmeri* seedlings from nursery-grown stock on the Double E WMA.

Planting of 150 *Agave palmeri* is planned to occur in December 2026. Planning will resume upon return of Rachel Burke (Agave Restoration Coordinator) from leave in late September.

Task 2: Conduct environmental DNA (eDNA) surveys of agave patches on the Double E WMA and the Gila National Forest Lands to test for the presence of 3 nectar bat species (Mexican long-nosed bat [*Leptonycteris nivalis*], Lesser long-nosed bat [*L. verbabuena*], and Mexican long-tongued bat [*Choeronycteris mexicana*]).

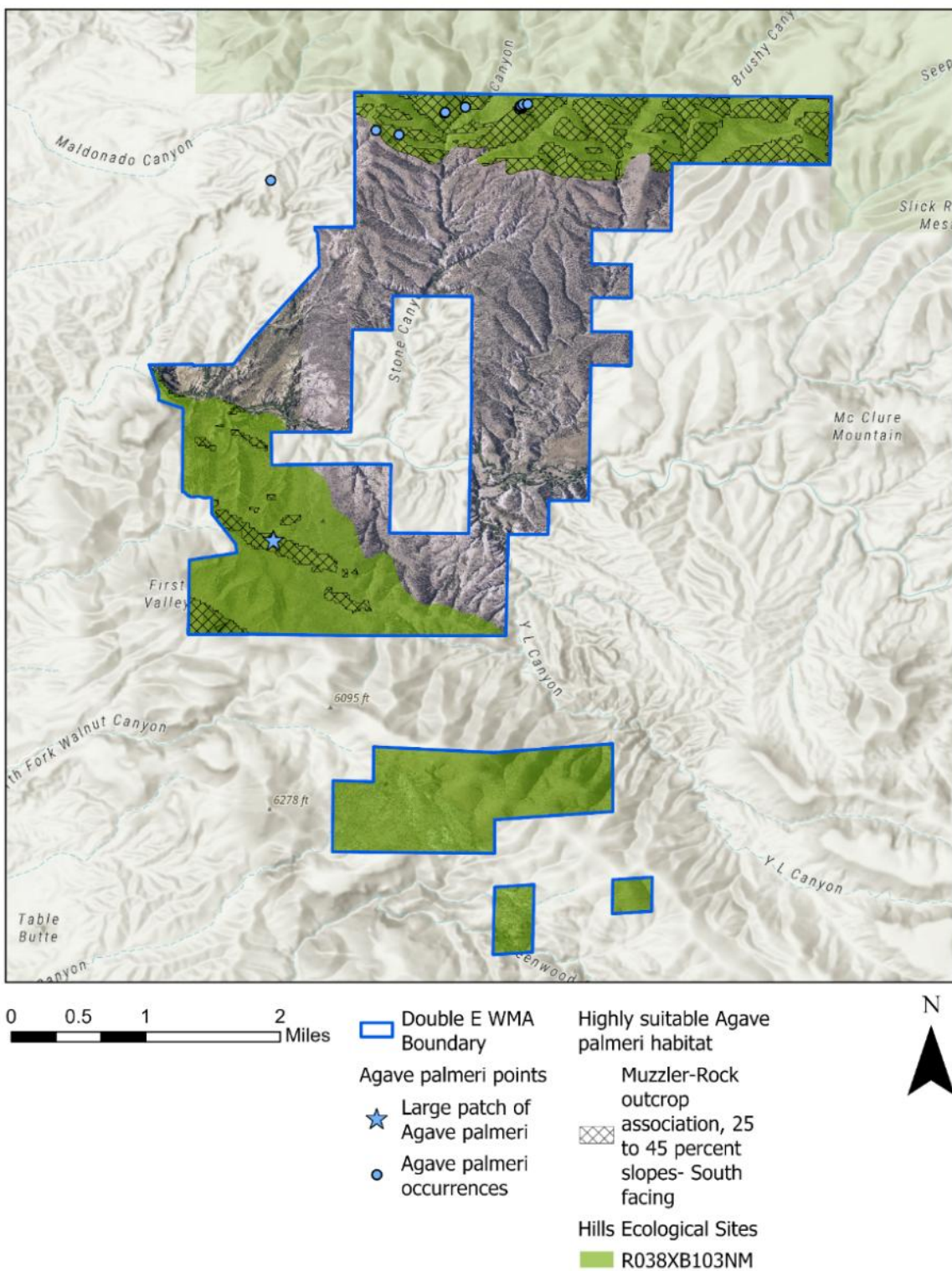
We are working to establish a study plan for conducting eDNA surveys in the existing agave patch on the Double E WMA and surrounding Gila National Forest Lands throughout August 2026. We have scheduled Brianna Mann (Restoration Specialist) and Devin Robbins (Agave Restoration Crew Supervisor) to conduct a scouting trip on July 13th to identify flowering agave locations and assess flowering status, after which the study plan for August will be finalized. Repeat sampling trips are tentatively scheduled for August 3rd-7th, August 10th-14th, August 17th-21st, and August 24th-28th.

We have secured a Nominal Effects Waiver from the Forest Service for sampling on the Gila National Forest.

Task 3: Create a comprehensive map of existing agave stands on the Double E WMA.

A map of existing agave stands on the Double E WMA (Figure 1) was completed in January 2026 and provided with the Year 1 report, along with a supporting geodatabase containing shapefiles of survey routes, agave presence records, and polygons with relative agave densities.

Figure 1. *Agave palmeri* mapping results and associated habitat suitability.



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Literature Cited

Bogan, M.A., and Cryan, P.M. (2006). Roosts and Nocturnal Movements of Long-nosed bats (*Leptonycteris curasoae* and *L. nivalis*) in Southwestern New Mexico. Final administrative report, submitted to BLM Las Cruces District Office.

Cockrum, E.L. (1991). Seasonal distribution of northwestern populations of the long-nosed bats, *Leptonycteris sanborni* family Phyllostomidae. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología. 62:181–202.

Geluso, K., and Geluso, K.N. (2021). Lesser long-nosed bat (*Leptonycteris yerbabuenae*) range expansion into northern Grant County, New Mexico. Western North American Naturalist. 81(2):273-279.

Gómez-Ruiz, E.P., and Lacher Jr., T.E. (2019). Climate change, range shifts, and the disruption of a pollinator-plant complex. Scientific Reports 9:14048.
<https://doi.org/10.1038/s41598-019-50059-6>

Laws, J., Hill, H.T., and Frey, J.K. (2023). Note: Northernmost record of the long-nosed bat (*Leptonycteris* sp.) in New Mexico: Conservation Implications. Western Wildlife. 10:6-10.

New Mexico Department of Game and Fish (2016). State Wildlife Action Plan for New Mexico. New Mexico Department of Game and Fish, Santa Fe, New Mexico, USA

New Mexico Department of Game and Fish (2017). Double E Ranch Management Plan. Prepared by Mark L., Watson, Terrestrial Habitat Specialist, Ecological and Environmental Planning Division.

Piccioli Cappelli, M., Blakey, R.V., Taylor, D., Flanders, J., Badeen, T., Butts, S., Frick, W.F., and Rebelo, H. (2021). Limited refugia and high velocity range-shifts predicted for bat communities in drought-risk areas of the Northern Hemisphere. Global Ecology and Conservation. 28:e01608, ISSN 2351-9894.

Ramsey, M., and Whiteman, K. (2011). Range extension for Lesser long nosed bats in New Mexico. Western Bat Working Group News. 7(1):9.

Slauson, L. (2002). Effects of Fire on the Reproductive Biology of *Agave palmeri* (Agavaceae). Madroño. 49(1):1-11.

USFS R3 Geospatial Gateway. Fire History Perimeters.
<https://www.fs.usda.gov/detailfull/r3/landmanagement/gis/?cid=stelprdb5201889>.
Accessed May 14, 2024.

Widmer, K.A. (2002). The relationship between *Agave palmeri* flower stalk herbivory and livestock management in southern Arizona. Thesis, University of Arizona, Tucson, USA.