Mexican Long-nosed Bat
(Leptonycteris nivalis)
5-Year Status Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Austin Ecological Services Field Office
Austin, TX
August 27, 2024

5-YEAR REVIEW

Mexican long-nosed bat (*Leptonycteris nivalis)*

1.0 GENERAL INFORMATION

1.1 Reviewers:

Lead Regional or Headquarters Office:
Gary Pandolfi, Fish and Wildlife Biologist, Southwest Regional Office, Albuquerque, New Mexico, gary_pandolfi@fws.gov

Lead Field Office:
Dr. Jade Florence, Fish and Wildlife Biologist, Austin Ecological Services Field Office, Austin, Texas, jade_florence@fws.gov

Cooperating Field Office(s):
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Cooperating Regional Office(s):
Not applicable.

1.2 Purpose of 5-Year Reviews:

The U.S. Fish and Wildlife Service (USFWS) is required by section 4(c)(2) of the Endangered Species ESA (ESA) to conduct a status review of each listed species once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review). Based on the 5-year review, we recommend whether the species should be removed from the list of endangered and threatened species, be changed in status from endangered to threatened, or be changed in status from threatened to endangered. Our original listing as endangered or threatened is based on the species' status considering the five threat factors described in section 4(a)(1) of the ESA. These same five factors are considered in any subsequent reclassification or delisting decisions. In the 5-year review, we consider the best available scientific and commercial data on the species and focus on new information available since the species was listed or last reviewed. If we recommend a change in listing status based on the results of the 5-year review, we must propose to do so through a separate rule-making process including public review and comment.

1.3 Methodology used to complete the review:

The Service conducts status reviews of species on the List of Endangered and Threatened Wildlife and Plants (50 CFR 17.12) as required by section 4(c)(2)(A) of the ESA (16 U.S.C. 1531 et seq.). The Service provides notice of status reviews via the *Federal Register* and requests new information on the status of the species (e.g., life history, habitat conditions, and threats). Data for this status review were solicited from interested parties through a

Federal Register notice announcing this review on January 25, 2024 (89 FR 4966). The Austin Ecological Services Field Office conducted this review and considered both new and previously existing information from federal and state agencies, municipal and county governments, non-governmental organizations, academia, and the public. The primary sources of information used in this analysis was an species status assessment completed in December 2018 and a revised recovery plan completed in July 2024 (USFWS, 2018, entire; 2024, entire). Additionally, research published in scientific journals and unpublished reports were also used.

1.4 Background:

1.4.1 FR Notice citation announcing initiation of this review:

89 FR 4966, January 25, 2024

1.4.2 Listing history:

Original Listing
FR notice: 53 FR 38456
Date listed: September 30, 1988
Entity listed: Species, Mexican long-nosed bat (*Leptonycteris nivalis*)
Classification: Endangered

1.4.3 Associated Rulemakings:

Not applicable.

1.4.4 Review History:

5-year status review, September 12, 2019

1.4.5 Species' Recovery Priority Number at start of 5-year review:

5

1.4.6 Recovery Plan or Outline

Name of plan or outline: Revised Recovery Plan for the Mexican long-nosed bat (*Leptonycteris nivalis*)
Date issued: July 22, 2024
Dates of previous plans/amendment or outline, if applicable: 1994 Mexican Long-nosed Bat *(Leptonycteris nivalis*) Recovery Plan

2.0 REVIEW ANALYSIS

Section 4 of the ESA (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of

"endangered species" or "threatened species." The ESA defines an "endangered species" as a species that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The ESA requires that we determine whether a species meets the definition of "endangered species" or "threatened species" due to any of the five factors described below.

Section 4(a) of the Act describes five factors that may lead to endangered or threatened status for a species. These include A) the present or threatened destruction, modification, or curtailment of its habitat or range; B) overutilization for commercial, recreational, scientific, or educational purposes; C) disease or predation; D) the inadequacy of existing regulatory mechanisms; or E) other natural or manmade factors affecting its continued existence.

The identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In assessing whether a species meets either definition, we must evaluate all identified threats by considering the expected response of the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The USFWS recommends whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

2.1 Distinct Population Segment (DPS) policy (1996):

The 1996 DPS policy does not apply to the Mexican long-nosed bat (hereafter referred to as "MLNB").

2.2 Updated Information and Current Species Status

2.2.1 Biology and Habitat

2.2.1.1 New information on the species' biology and life history:

Food resources

MLNB's per-bat visitation rate is positively associated with the number of umbels with open flowers on *Agave* species (Lear, 2020, p. 8). These results suggest that *Agave* species with higher numbers of umbels that have simultaneously blooming flowers could enhance their attractiveness by foraging bats and could be targeted for planting in conservation programs aimed at increasing foraging resources for MLNB (Lear, 2020, p. 8).

Parasites

A new parasitic mite (*Periglischrus calcariflexus*) was described in association with MLNB in Mexico. The presence of *P. calcariflexus* on MLNB in different studied localities suggests a monoxenous species, meaning a parasite that lives on only one kind of host throughout its life cycle (Morales-Malacara and López-Ortega, 2023, p. 85). This specificity implies the existence of close links from the origin of the host–parasite association, which in turn has led to reproductive success and the dispersion of these mites in the host population throughout its distribution (Morales-Malacara and López-Ortega, 2023, p. 85). At present, we do not know the impact this parasite has on the MLNB.

2.2.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, birth rate, seed set, germination rate, age at mortality, mortality rate, etc.), or demographic trends:

A recent publication summarized size observations at Emory Cave in Big Bend National Park, Brewster County, Texas from 2008–2023 (Ammerman et al., 2024, entire). Despite observations being conducted in the first week of July each year, the maximum colony size fluctuated widely (Ammerman et al., 2024, p. 31). Further, there was no significant positive or negative population trend (Ammerman et al., 2024, p. 13). The lowest colony size was 294 individuals, recorded on 3 July 2008, while the highest was 3,360 individuals recorded on July 2021 (Ammerman et al., 2024, p. 13).

In 2009 and 2021, the colony size exceeded 3,000 bats (Ammerman et al., 2024, p. 13). Mean MLNB colony size over the 14 census years was 2,156 individuals (SD = 796) (Ammerman et al., 2024, p. 13). Previous estimates of colony size at Emory Cave have also featured wide fluctuations, ranging from 5,000 bats to 13,650 (Easterla, 1972, p. 288). Future work is needed to identify variables that best explain the fluctuations in colony size and how that relates to the range-wide population status for MLNB (Ammerman et al., 2024, p. 19).

2.2.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

A recent genetic study found no significant genetic variation and no substructure between MLNB in two roost sites separated by more than 1,200 kilometers (km) (746 miles (mi)) (Pourshoushtari & Ammerman, 2021 pp. 211–212). Further, researchers recovered evidence of a close relationship (parent–offspring) in nine pairs of juveniles captured at the northern roost and adults from the southern roost, confirming a connection between the two locations (Pourshoushtari & Ammerman 2021, pp. 211–212). For this endangered species, the level of variation detected, the lack of a recent bottleneck, and estimates of effective

population size, are encouraging for future recovery (Pourshoushtari & Ammerman, 2021, pp. 211–212).

A study focused on addressing the hypothesis of female philopatry for MLNB—a breeding tactic for mammals where females remain close to their birthplace for life, while males disperse. The absence of MLNB female- or male-mediated population genetic subdivision provided evidence against this hypothesis (Ammerman et al., 2019, p. 178). Genetic evidence suggested that MLNB individuals form a panmictic population over a large geographic area with a moderate level of genetic diversity (Ammerman et al., 2019, p. 178). Further, several lines of evidence support the idea that MLNB has undergone a historical population expansion (Ammerman et al., 2019, p. 178).

2.2.1.4 Taxonomic classification or changes in nomenclature:

No new information.

2.2.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, pollinator availability, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

Roosts in Mexico

We were unable to obtain updates about the current status of roosts in Mexico (i.e., relating to the abundance of MLNB in roosts, enforcement of regulations, or the condition of roosts). The disturbance concerns outlined in the recovery plan are still of concern at present (USFWS 2024, entire). Efforts to annually obtain updates from partners in Mexico would be beneficial for future 5-year reviews. Currently, the most up-to-date information about the status of the MLNB in Mexico is provided in the species' species status assessment and recovery plan (USFWS 2018, entire; 2024, entire).

Updates within the known range

While Romney Cave in Hidalgo County, New Mexico is a documented maternity roost for the MLNB, the last confirmed detection of the species at the roost was in 2005 (Bogan et al., 2017, p. 323). Following this, there was a 15-year period when the cave was not entered (Burke, pers. comm., 2024). In 2022, a research expedition was conducted. *Pseudogymnoascus destructans* (Pd), the causal agent of White-nose Syndrome, was not detected in the roost (Bain, pers. comm., 2024). However, genetic evidence of MLNB was discovered (Burke, pers. comm., 2022). A small room of the cave was swabbed and pooled samples from one of its walls indicated the presence of MLNB, suggesting that the species is not just using the cave incidentally (Burke, pers. comm., 2022).

Three known roosts occur in the area of influence of the federally protected, Sierra La Mojonera in Mexico (USFWS 2024, pp. 24–25). These roosts include El Durazno mine, La Montaña mine, and Todos los Santos mine (USFWS 2024, pp. 24–25). A study published in 2022 analyzed the approximately 850 square kilometers (km^2) (247 acres (ac^2)) area of influence surrounding Sierra La Mojonera and detected the presence of colonies with more than 200 MLNB individuals (Elizalde-Arellano et al., 2022, pp. 238, 245). It is unknown whether these colonies were reported from known or unknown roosts.

New species detections and roosts

MLNB has also been detected in Arizona for the first time since 1995. In 1995, three MLNB individuals were recorded in Arizona, as the result of mist netting work in the Chiricahua Mountains, which lie northwest of Big Hatchet Roost/Romney Cave (McIntire, pers. comm., 2024). Bat Conservation International conducted eDNA citizen science work in 2023 and confirmed two MLNB detections from swabs of hummingbird feeders at private residences in the area of Portal, Cochise County, Arizona (Lear, pers. comm., 2024). These samples were collected on Aug 29, Sept 3, and Sept 6, 2023 (Lear, pers. comm., 2024). These sites are approximately 10 km and 21 km (6 and 13 mi) from the Arizona-New Mexico border (Lear, pers. comm., 2024). Verifications were produced by Faith Walker's Bat Ecology & Genetics Lab at Northern Arizona University (Lear, pers. comm., 2024). Aside from being the first observation of these bats in Arizona in 29 years, these detections are also important as they confirm that MLNB does feed from hummingbird feeders, at least to some extent.

In Mexico, a new roost was discovered in the State of Mexico, which may be a potential mating roost. Caves that were ecologically similar to Cueva del Diablo were identified and within one cave — "La Cueva de los Coyotes"—eighteen individuals were captured, including a pregnant female (Torres Knoop et al., 2023, pp. 69–70). Additional research to determine the population size and recruitment potential for this newly discovered roost is required.

Historical distribution

Research on the interactions between *Agave* species and MLNB suggest that the Tehuacán-Cuicatlán and Metztitlán regions of Mexico were historical refuge zones for both *Agave* and MLNB and may even represent a coevolution hot spot for the interaction between them (Trejo-Salazar et al., 2023, p. 16).

Species distribution

When assessing species distribution, food plants were more important than climatic and topographic variables in shaping the distribution of MLNB. Species richness of food plants was the most consistently important variable, with

MLNB being influenced solely by *Agave* species (Burke et al., 2019, pp. 1409–1410). Elevation was also a strong contributor to the species distribution model, supporting the hypothesis that the Mexican long-nosed and lesser long-nosed (*L. yerbabuenae*) bats are separated by elevation (Burke et al., 2019, p. 1409).

Climate change projections

Projections of range shifts for the overlapping distribution of MLNB and *Agave* species under various climate change future scenarios were investigated by Gómez-Ruiz and Lacher Jr. (2019, entire). When the distribution range maps for all *Agave* species were overlain, the overlap with the suitable area map for MLNB under current climatic conditions is 26.2% (Gómez-Ruiz & Lacher Jr., 2019, p. 2). Under all the future scenarios, there was at least a 75% decrease in overlap between MLNB and *Agaves* relative to current distributions (Gómez-Ruiz & Lacher Jr., 2019, p. 2).

2.2.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

The first confirmed detection of Pd was recorded in Brewster County, Texas in the winter of 2022-2023 (Athens, pers. comm., 2024). This is the same county that contains Emory Cave, one of only two roosts for the species located in the U.S. In 2024, Pd was detected on fringed myotis bat (*Myotis thysanodes)* within this cave—the first detection in the park (Athens, pers. comm., 2024). The infection of MLNB with Pd—in this cave or any other—has not been documented to date. White-nose Syndrome generally affects hibernating bats (which this species is not), but use of cold caves and use of torpor for long periods could make this species susceptible to the disease (Verant et al. 2012, pp. 2–3).

2.2.1.7 Other:

Not applicable.

2.2.1.8 Conservation Measures:

Prospective roost identification
An Euclidian multidimensional distances analysis was used to identify ecologically similar regions to “La Cueva del Diablo”, the only known mating roost for the species (Torres Knoop et al. 2023, pp. 64–65). Using these tools, researchers may be able to locate additional mating roosts, thus furthering conservation measures for the protection of the species.

Understanding foraging behavior

Northern Arizona University’s genetics lab developed two eDNA detection methods (DNA metabarcoding and qPCR) to assess whether MLNB DNA could

be detected by sampling *Agave* flowers (Walker et al., 2022, p. 11). They found that both methods were highly successful (Walker et al., 2022, p. 12). Moving forward, these detection methods may be useful for identifying nectar corridors and foraging grounds for MLNB (Walker et al., 2022, p. 11). Further, MLNB has been closely linked to the species richness of *Agave* species in particular when compared to other plants. Conservation of these bats should focus on management for species richness of *Agave* (Burke et al., 2019, p. 1410).

In addition to detecting the location of nectar corridors, researchers are beginning to understand what draws MLNB to specific nectar plants. MLNB per-bat visitation rate is positively associated with the number of umbels with open flowers, and that visitation rate is strongly positively associated with the relative position of umbels with open flowers, suggesting that early-stage flowering plants are preferred by MLNB (Lear et al., 2024, p. 8). These findings can be used to target habitat restoration aimed at increasing foraging resources for MLNB (Lear et al., 2024, p. 8).

Advancements in MLNB Detection Methodology

Identifying features of the echolocation call of MLNB was characterized (Rivera, 2020, pp. 32–33). This study contributes to the knowledge of bat ecology by providing guidelines for the improvement of an acoustic population monitoring technique (Rivera, 2020, p. 39).

MLNB Monitoring

The Revised Recovery Plan for the MLNB states the need for a standardized monitoring program for all roosts and foraging grounds (USFWS 2024, p. 19). A research study demonstrated progress toward addressing this recovery action by testing ThruTracker— a free software platform for automated two- and three-dimensional video-based animal tracking—with MLNB colony census data (Ammerman et al., 2024, p. 15).

2.2.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms):

2.2.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

No new information.

2.2.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

No new information.

2.2.2.3 Disease or predation:

At Emory Cave, the first confirmed detection of Pd was found on fringed myotis bat in 2024 (Athens, pers. comm., 2024). The infection of MLNB with Pd has not been documented, but the species could be at risk. Throughout the range, a new parasitic mite was described in association with MLNB (Morales-Malacara & López-Ortega, 2023, p. 85). We do not know the risk associated with these mites.

2.2.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.2.2.5 Other natural or manmade factors affecting its continued existence:

No new information.

2.3 Synthesis

When the MLNB was originally listed, it was assumed that the species was migratory, mating in Mexico with only females' migrating north, a theory which is supported by genetic evidence (Ammerman et al. 2019, p. 180). Additionally, genetic research supports the assumption that the MLNB consist of a single population range wide (Pourshoushtari and Ammerman 2021, pp. 211-212). Recent eDNA results provide unequivocal evidence of the species presence in Arizona (Lear, pers. comm., 2024); however, there does not appear to be a large, self-sustaining population in that state based on available data. Additional research is needed to determine whether the species is roosting in Arizona or if it is simply foraging there from the known roost in New Mexico. Significant effort surveying for the species has yielded considerably more trend data for Emory Cave, the roost with the highest abundance of MLNB in the U.S. (Ammerman et al. 2024, entire).

The 2018 MLNB species status assessment (USFWS 2018, entire) provides an in-depth overview of the species needs, life-history, updated research, and our assessment of the species current and future viability utilizing the 3Rs (resiliency, redundancy, and representation) framework. Additionally, the 2024 revised Recovery Plan and Recovery Implementation Strategy for the MLNB sets forth an updated vision for species recovery and the required steps. At present, the primary threat affecting the species' viability remains the same—habitat destruction.

Additionally, research conducted in the past five years has provided evidence that climate change will become a major threat due to the projected effects on Agave food resources (Gómez-Ruiz and Lacher Jr. 2019, p. 2). While the two known roosts in the U.S. are protected, the roosts in Mexico are not satisfactorily regulated to protect the bat colonies (USFWS 2024, pp. 10-11). Specifically, Cueva Del Diablo has had buildings constructed on top of it recently, along with a high number of visitors to the cave (USFWS 2018, p. 25). As the only confirmed mating cave in the range, this cave is key to the persistence of the species (USFWS 2018, pp. 23-26, 54, 64, 73, 82). Human disturbance, combined with the

threats climate change poses, leads us to the conclusion that the Mexican long-nosed bat's current listing status of endangered remains appropriate.

3.0 RESULTS

3.1 Recommended Classification:

No change recommended.

3.2 New Recovery Priority Number (indicate if no change; see 48 FR 43098):

No change recommended.

Brief Rationale:

The MLNB is currently assigned a recovery priority number of 5, which indicates a species that faces a high degree of threat and has a low recovery potential. The threats to the species remain high as habitat loss, *Agave* species loss, and roost degradation continue across the range. The species recovery potential remains low as only one documented maternity roost (Cueva del Diablo) is known to exist for the species rangewide. Therefore, we conclude the existing recovery priority number is still appropriate.

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Enforce existing laws in Mexico to halt further development and construction of buildings on land directly on top of the Cueva del Diablo maternity roost (as described in the 2024 recovery plan).

- Grant state and federal protection status in Mexico to the Todos Santos roost and habitat buffer (as described in the 2024 recovery plan).

- Protect any additional roosts identified across the species range.

- Conduct *Agave* replanting and bat-friendly management practices in areas where cultivated and wild *Agave* species are harvested for human consumption.

- Project and adapt restoration and management plans in response to climate change projections for all roosts and along the migratory pathway.

- Develop a fire management plan for Emory Cave in Big Bend National Park (as described in the 2024 recovery plan).

- Conduct surveys for MLNB in Arizona to identify the potential for additional populations in that state.

- Conduct further surveys of La Cueva de los Coyotes in Mexico, in addition to the recommendations previously made in the species' recovery plan.

5.0 REFERENCES

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U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW of Mexican long-nosed bat (*Leptonycteris nivalis*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

No change needed.

Appropriate Listing/Reclassification Priority Number, if applicable:

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service, Austin Ecological Services Field Office, Austin, Texas

Approve KAREN MYERS Digitally signed by KAREN MYERS Date: 2024.08.27 21:16:09 -04'00' _____