

DISTRIBUTION AND HABITAT USE OF THE MEXICAN WHIP-POOR-WILL IN SOUTHWEST NEW MEXICO

MEGAN RUEHMANN

609 N Cooper St., Silver City, NM 88061

Abstract—Surveys for Mexican Whip-poor-will (*Antrostomus arizonae*) were conducted in May and June 2015 across the Gila region of New Mexico. Believed to be experiencing a population decline, this nocturnal species is not easily monitored by existing long-term survey efforts; therefore, little baseline information exists. This targeted study was implemented to better understand status, distribution, and habitat preferences of Mexican Whip-poor-wills in the forested mountains of southwest New Mexico. Of the 155 point count locations surveyed in 2015, a total of 38 individual Mexican Whip-poor-wills were detected at 31 locations. Mexican Whip-poor-wills were widespread throughout the Gila region and predictably found according to habitat characteristics, with 87% found in mesic canyons and 79% near surface water.

The Mexican Whip-poor-will (*Antrostomus arizonae*) is a migratory nightjar, breeding across the southwestern United States and wintering from Mexico to northern Central America. In 2010 it was taxonomically split from the Eastern Whip-poor-will (*Antrostomus vociferous*) (AOU 2010). It is widely understood that the nightjar family (*Caprimulgidae*) is experiencing population declines (Sauer et al. 2014), believed to be largely due to loss of forested habitat and change of vegetative structure (Reese 1996). The Mexican Whip-poor-will was placed on the 2016 State of the Birds Watch List (NABCI 2016), identifying it as a species of high conservation concern and at risk of extinction if conservation action is not taken. A major contributing factor for this conservation concern is their small and restricted range in the United States. Southwest New Mexico and particularly the Gila region, holds a vast area of potential breeding habitat for the Mexican Whip-poor-will and may serve as a stronghold for their persistence.

The Center for Conservation Biology developed the volunteer-based Nightjar Survey Network in order to track the status of nightjars across the country; however, very few routes in southwest New Mexico are regularly surveyed (Nightjar Survey Network 2012). The males' repetitive calling on moonlit nights enables easy identification of this cryptic species. Additionally, their high detectability rate of 96% means they can be easily surveyed by point count survey techniques (Nightjar Survey Network 2012). Through a research grant from the New Mexico Ornithological Society, I initiated an additional survey effort to better understand status and distribution of the Mexican Whip-poor-will throughout the Gila region, while adding to the natural history knowledge of this species' habitat preferences specific to this area.

METHODS

This study focused on the Gila region of southwestern New Mexico, defined by the Gallo Mountains to the north, Black Range to the east, Burro Mountains to the south and San Francisco Mountains to the west (Figure 1). This large area is characterized by rugged mountains and canyons, ranging in elevations of 1,300 to nearly 3,350 meters. It includes Wilderness Areas, land administered by the U.S. Forest Service and Bureau of Land Management (BLM), as well as scattered, smaller portions of private land. Survey efforts were spread as evenly as possible across the majority of mountain ranges within the Gila region. No randomization was used when selecting routes; instead, as many kilometers of roads as possible were surveyed in potential breeding habitat for the species. Potential habitat was considered mid-elevation mesic canyons and densely wooded, mixed coniferous and deciduous forests (D. Krueper, personal communication, Marshall 1957, Ligon 1961).

A mixture of roadside routes and single-point backcountry sites was surveyed. Roadside routes followed the protocol of the Nightjar Survey Network (Nightjar Survey Network 2012), with ten six-minute point count stops, each separated by approximately 1.6 km. Backcountry points were surveyed at least 30 minutes at a single location; however, by camping at some sites nightjars were able to be heard throughout the night. Habitat descriptions were recorded during each survey including vegetation composition, elevation, and presence of water if known. Habitat type at each point count location was categorized into six broad habitat types: mesic canyons, piñon-juniper woodland, piñon-juniper/oak woodland, ponderosa pine forest, mixed coniferous forest, and montane riparian (Table 1). Additionally, distances to drainages were verified using GIS and Google Earth. Surveys were conducted entirely auditorily, listening for spontaneous song, with no spotlighting or play call-back included.

Because nightjars are most active on bright, moonlit nights, surveys were conducted during specified lunar windows, approximately 10 days when the moon is at its brightest phase during the month. Additionally, the protocol required that the moon was visible over the horizon and not continuously obscured by cloud cover. Surveys began 30 minutes after sunset and ended no later than 15 minutes before sunrise.

RESULTS

During May and June 2015, 15 roadside surveys and six remote surveys were completed (Figure 1), totaling 155 point count locations. Fifty-six point count locations were located in mesic canyons, forty-four in ponderosa pine forest, twenty-two in piñon-juniper/oak woodland, twenty in piñon-juniper woodland, nine in mixed coniferous forest, and four in montane riparian habitats. Of the 155 point count locations, 31 had detections, several with multiple individuals. A total of 38 individual Mexican Whip-poor-wills were detected (Table 2).

Survey locations ranged from 1,463 to 2,804 meters in elevation, and Mexican Whip-poor-wills were detected from 1,463 to 2,473 meters. Birds were detected in four habitat types: mesic canyon habitat comprised 87% of detections (33 individuals); 8% were in piñon-juniper and oak woodland (three individuals); and 2.5% each in piñon-juniper woodland (one individual) and montane riparian (one individual) (Table 2). No birds were detected in ponderosa pine or mixed coniferous forest. It was estimated that 79% of detection locations had surface water close to where the bird was heard, while 10.5% were in areas that were dry at the time but sometimes held water (intermittent drainages). Another 10.5% of detections were in locations where water sources or mesic drainages were greater than 500 meters away.

DISCUSSION

Distribution and Habitat Preferences

Mexican Whip-poor-wills were widespread throughout the Gila region and predictably found according to habitat characteristics. Most important were mesic canyons, since 84% of all detections fell within this category. Areas were classified as mesic canyon when drainages contained enough moisture to support at least a small amount of riparian vegetation, and had steep-sided slopes or rocky canyon walls. Though there was variation within this habitat type, the best examples had a mixture of tall, mature ponderosa pine (*Pinus scopulorum*), various oak species (*Quercus* spp.), narrow leaf cottonwood (*Populus angustifolia*), Arizona walnut (*Juglans major*), Arizona alder (*Alnus oblongifolia*), and other deciduous trees within the canyon bottom, with more arid hillsides of shorter piñon-juniper and oak woodlands. Vegetation structure was highly varied, with patches of moderate to dense under, mid, and overstory layers.

Due to the rugged landscape of the Gila, very few roads are found within these mesic canyons; the most representative example being Cherry Creek, which also had the most Mexican Whip-poor-will detections. The first six point count locations along this roadside route occurred in the bottom of a steep-sided canyon hosting an array of deciduous and coniferous trees, paralleling an intermittent stream with several hillside springs. Seven individuals were detected in the first six point count locations. Approaching the seventh point count, the road climbs out of steep-sided mesic canyon habitat into more gently rolling ponderosa pine forested hills; no additional whip-poor-wills were detected from the remaining four stations. These points fell in more homogenous vegetation structure with less plant diversity: even-aged ponderosa pine forest and scattered oaks with a sparse or absent lower and mid-canopy layer.

Within the arid environment of the southwestern US, mesic drainages such as Cherry Creek are often diversity hotspots that host a rich concentration of plant and insect life, and consequently abundant avian life when compared to surrounding areas (Krueper et al. 2003, Bock and Bock 2005, Zwartjes et al. 2005). What specific characteristics of this landscape Mexican Whip-poor-wills require for breeding habitat is not fully understood, but it is likely a combination of conditions created by the presence

of relatively greater moisture and humidity. Areas with mature, tall trees are preferred (Marshall 1957), while the thick and varied canopy heights may allow both concealment and flight corridors while foraging from perches. Thick understory vegetation cover bolsters insect prey base, while also providing roost site and nest concealment (Zwartjes et al. 2005).

The Mexican Whip-poor-will range in New Mexico includes most of the southern and central mountain ranges such as the Sacramento, Magdalena, and Guadalupe Mountains (Parmeter 2002). They also appear to be expanding northward within New Mexico, having been documented in the northern mountains of the Jemez, Sangre de Cristo, and Zuni ranges (Williams 2010). Based on eBird data (www.ebird.org), there are fewer records in these northern mountains, but locations where they have been found suggest they are selecting a similar habitat type to the mesic canyons of the Gila region. While the Mexican Whip-poor-will appears to be well distributed throughout the Gila region, it would be worthwhile to better understand distribution and habitat preferences in other portions of the state, particularly the northern mountain ranges.

A broad range of habitat associations are given for the Mexican Whip-poor-will in existing literature and thus, keying in on a specific habitat association may be the most useful result of this study. In the 2010 revision of the species, the AOU cited “pine and pine–oak forest” as the preferred habitat (AOU 2010), while the New Mexico Conservation Plan (2007) identifies ponderosa pine as the primary breeding habitat, followed by mixed conifer forest and Madrean pine–oak woodland. Howell and Webb (1995) touch on the moisture factor identifying humid to semi-arid pine and pine–oak. Most compatible with this study, Marshall (1957) discusses the importance of mesic canyons, stating “tall riparian timber attracts the species down canyon bottoms through encinal.” While these descriptions are all associated (and may have overlap), omitting the mesic characteristic leaves room for error when interpreting preferred breeding habitat; therefore, this information would aid when identifying and addressing specific conservation issues. Given the predictability of detections within this habitat type, at least in the Gila region, “mixed pine–oak mesic canyons of the southwest” is a more precise description of Mexican Whip-poor-will preferred breeding habitat.

Threats of Habitat Loss

As a forest-dwelling species, Mexican Whip-poor-wills are undoubtedly impacted by wildfire in southwest New Mexico. Approximately 1.8 million acres of the Gila National Forest have been impacted by fire in the last 10 years, and the trend for large-scale fires of over 100,000 acres is increasing (Region 3 Geospatial Data, www.fs.usda.gov). For this region, habitat loss due to wildfire may be this species’ most significant threat.

Fortunately, there were several locations where Mexican Whip-poor-wills were detected near recent wildfires—near Gila Cliff Dwellings, Emory Pass, and Black Canyon. These wildfires all occurred within the last five years and exhibited a similar pattern, containing patches of unburned habitat and robust vegetation regrowth, especially near the canyon bottoms within riparian habitat. An illustrative example of a patchy burned area was at the Gila Cliff Dwellings parking lot, where one Mexican Whip-poor-will was detected. At this location, the steep hillsides on either side of the canyon are heavily burned, but the riparian corridor along the West Fork Gila River is largely intact.

Managing wildfires to avoid or limit burning riparian canyon bottoms, as well as maintaining a mixed forest structure would seemingly help safeguard this species' breeding habitat.

While large-scale fires may pose a significant threat to whip-poor-will breeding habitat, it has been found that Eastern Whip-poor-wills may benefit from patches of open canopy (Mills 1986, Wilson and Watts 2008, Akresh and King 2016). In a study on the effects of forest management practices on Eastern Whip-poor-wills, Wilson and Watts (2008) found a greater abundance of birds near forest edges, likely because they offered preferred foraging habitat. While this information is specific to more closed-canopy forests in the eastern US, it is notable that mesic canyons often exhibit a varied canopy structure to begin with, including forest edges at the transition of canyon bottom to arid hillsides.

An effort to maintain the dense and mixed forest structure within mesic canyons is an important consideration for conservation of the Mexican Whip-poor-will. Additionally, survey and monitoring in other regions of the state would greatly enhance our understanding of this species' status in New Mexico.

Table 1. Habitat types surveyed for Mexican Whip-poor-will, 2015

Habitat Type	General Characteristics
Mesic Canyon	Drainages carrying enough moisture to support some amount of riparian vegetation, mixed coniferous trees and deciduous trees, steep-sided slopes or canyon walls. Hillsides are most commonly arid piñon-juniper or piñon-juniper/oak woodland
Ponderosa Pine Forest	Continuous ponderosa pine overstory, sometimes with scattered oak or piñon-juniper in midstory layer. Often has grassy understory and occasional meadows
Piñon-juniper/Oak Woodland	Piñon-juniper with large oak component, often with mixed shrubs in understory
Piñon-Juniper Woodland	Drier piñon-juniper woodland with minimal understory
Mixed Coniferous Forest	Higher elevation forest of mixed coniferous species, such as spruce, firs, pines
Montane Riparian	Higher elevation forest of mixed coniferous and aspen trees, mesic valleys and moist meadows hosting riparian vegetation

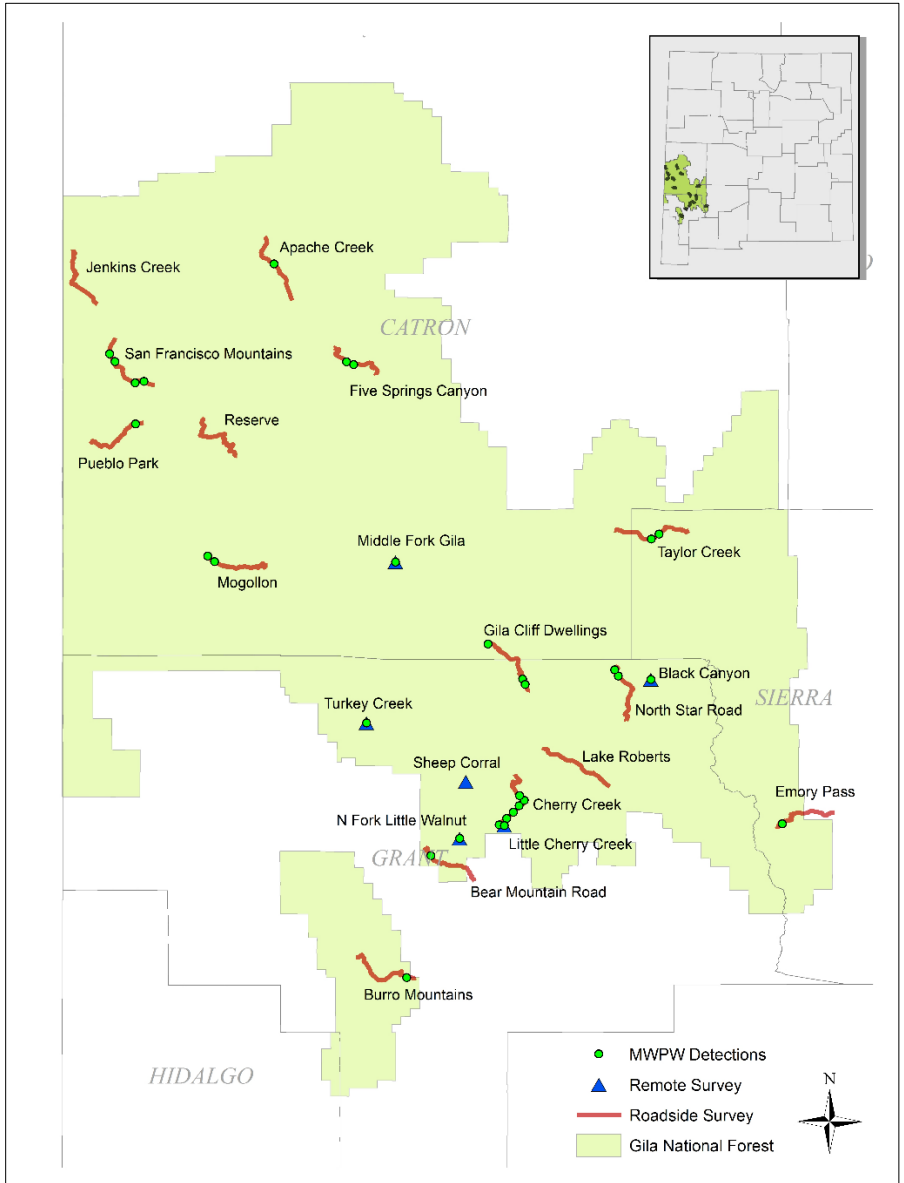


Figure 1. Mexican Whip-poor-will survey locations in the Gila region of New Mexico, 2015

Table 2. Mexican Whip-poor-will (MWPW) detections and habitat characteristics, 2015

Survey Location	Survey Type	# MWPW Detected	Elevation (m)	Habitat Characteristics	Water Presence in Area
Apache Creek 5	Road	1	2,069	Mesic canyon with dense coniferous and deciduous tree species	Perennial stream
Bear Mountain Road 3	Road	1	2,056	Mesic canyon with piñon–juniper and oak woodland, scattered ponderosa pine. Heard far below towards drainage	Intermittent stream – (unknown if water was present at time, likely dry)
Black Canyon	Remote	4	2,199	Mesic canyon with ponderosa pine, oak and cottonwoods. Open grassy areas in canyon bottom	Perennial stream
Burro Mountains 9	Road	1	1,990	Mesic canyon with piñon–juniper and oak woodland, scattered ponderosa pine and few deciduous trees	Intermittent stream–(dry at time)
Cherry Creek 1	Road	1	2,049	Mesic canyon with diverse and varied vegetation structures	Intermittent stream & springs
Cherry Creek 2	Road	2	2,063	Mesic canyon with diverse and varied vegetation structures	Intermittent stream & springs
Cherry Creek 3	Road	1	2,101	Mesic canyon with diverse and varied vegetation structures	Intermittent stream & springs
Cherry Creek 4	Road	1	2,171	Mesic canyon with diverse and varied vegetation structures	Intermittent stream & springs

Survey Location	Survey Type	# MWPW Detected	Elevation (m)	Habitat Characteristics	Water Presence in Area
Cherry Creek 5	Road	1	2,266	Mesic canyon with diverse and varied vegetation structures	Intermittent stream & springs
Cherry Creek 6	Road	1	2,272	Mesic canyon with diverse and varied vegetation structures	Intermittent stream & springs
Emory Pass 9	Road	1	1,646	Mesic canyon. Piñon–juniper and oak woodland, various shrubs and scattered ponderosa pine at survey point. Heard far below in mesic drainage	Intermittent stream
Five Springs Canyon 4	Road	1	2,419	Mesic canyon with ponderosa pine and oak woodland	Intermittent stream –(dry at time)
Five Springs Canyon 5	Road	1	2,473	Montane riparian with mixed coniferous, oak and aspen	Intermittent stream –(dry at time)
Gila Cliff Dwellings 1	Road	1	1,769	Mesic canyon with dense riparian vegetation	Perennial stream
Gila Cliff Dwellings 8	Road	1	1,877	Piñon–juniper woodland, scattered ponderosa pine. Heard far downslope in mesic drainage	Perennial and Intermittent stream
Gila Cliff Dwellings 9	Road	1	1,877	Piñon–juniper woodland ridgetop. Heard on ridgetop	Not nearby. Intermittent stream >600m away

Survey Location	Survey Type	# MWPW Detected	Elevation (m)	Habitat Characteristics	Water Presence in Area
Little Cherry Creek	Remote	2	2,018	Mesic canyon with diverse and varied vegetation structure	Perennial stream
Middle Fork Gila	Remote	1	2,288	Mesic canyon with ponderosa pine and oak hillsides	Perennial stream
Mogollon 1	Road	2	2,065	Mesic canyon with ponderosa pine and oak woodlands	Perennial stream
Mogollon 2	Road	1	2,191	Mesic canyon with mixed coniferous, oak, and deciduous species	Perennial stream
North Fork Little Walnut	Remote	1	1,937	Mesic canyon with ponderosa pine and oak woodland, mixed shrubs	Intermittent stream
North Star Road 8	Road	1	2,065	Mesic canyon with ponderosa pine, juniper and mixed oak and shrub hillsides	Perennial stream
North Star Road 9	Road	1	2,191	Mesic canyon with piñon–juniper and oak woodland with scattered ponderosa pine	Perennial stream
Pueblo Park 9	Road	1	1,873	Shallow mesic canyon with ponderosa pine and scattered cottonwoods in drainage.	Intermittent stream
San Francisco	Road	1	2,134	Mesic canyon with diverse and varied vegetation structures	Intermittent stream

Survey Location	Survey Type	# MWPW Detected	Elevation (m)	Habitat Characteristics	Water Presence in Area
Mountains 2					
San Francisco Mountains 3	Road	1	2,206	Mesic canyon with diverse and varied vegetation structures	Intermittent stream
San Francisco Mountains 7	Road	1	2,351	Mesic canyon with diverse and varied vegetation structures	Intermittent stream
San Francisco Mountains 8	Road	1	2,251	Mesic canyon with diverse and varied vegetation structures	Intermittent stream
Taylor Peak 5	Road	1	2,398	Piñon-juniper and oak woodland with scattered ponderosa pine and shrubs	Not nearby. Intermittent to Ephemeral stream >600m away
Taylor Peak 6	Road	2	2,348	Piñon-juniper and oak woodland with scattered ponderosa pine and shrubs	Not nearby. Intermittent to Ephemeral stream >800m away
Turkey Creek	Remote	1	1,463	Mesic canyon with diverse and varied vegetation structures	Perennial stream

Survey Location	Survey Type	# MWPW Detected	Elevation (m)	Habitat Characteristics	Water Presence in Area
*Items in bold denote dry stream at time of survey or water source far from area. All others had surface water in vicinity.					

ACKNOWLEDGEMENTS

I would like to thank the New Mexico Ornithological Society for the funding and opportunity to study this species, as well as Dave Krueper and Mike Wilson for encouragement and advice. Many thanks to Dale Stahlecker, Zach Wallace, and Dave Krueper for providing comments on this manuscript. I also thank my husband, John Moeny, for assistance and continued inspiration.

LITERATURE CITED

- Akresh, M. E., and D. I. King. 2016. Eastern whip-poor-will breeding ecology in relation to habitat management in a pitch pine–scrub oak barren. *Wildlife Society Bulletin* 40: 97–105.
- American Ornithologists' Union (AOU). 2010. Fifty-first supplement to the American Ornithologists' Union Checklist of North American Birds. *Auk* 127: 726–744.
- Bock, C. E., and W. M. Block. 2005. Fire and birds in the southwestern United States. *Studies in Avian Biology* 30:14.
- Howell, S. N., and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press.
- Krueper, D., J. Bart, and T. D. Rich. 2003. Response of vegetation and breeding birds to the removal of cattle on the San Pedro River, Arizona (USA). *Conservation Biology* (2), 607–615.
- Ligon, J. S. 1961. New Mexico birds and where to find them. University of New Mexico Press.
- Marshall, J. T. 1957. Birds of pine-oak woodland in southern Arizona and adjacent Mexico. *Pacific Coast Avifauna* 32.
- Mills, A. M. 1986. The influence of moonlight on the behavior of goatsuckers (*Caprimulgidae*). *Auk* 370–378.
- New Mexico Partners in Flight. 2007. New Mexico Bird Conservation Plan Version 2.1. C. Rustay and S. Norris, compilers. Albuquerque, NM.
- "Nightjar News." Nightjar Survey Network. 12 April 2012. <http://www.nightjars.org/survey-news/nightjar-survey-focuses-monitoring-on-the-mexican-whip-poor-will/>. (Accessed 1 February 2015.)
- North American Bird Conservation Initiative (NABCI). 2016. The State of North America's Birds 2016. Environment and Climate Change Canada: Ottawa, Ontario. 8 pgs. Cat. No.: CW66-527/2016E ISBN: 978-0-660-05104-8.
- Parmeter, J., B. Neville, and D. Emkalns. 2002. New Mexico bird finding guide. New Mexico Ornithological Society, Albuquerque, NM.
- Reese, J. G. 1996. Whip-poor-will. Pp. 194–195 *in* Atlas of the breeding birds of Maryland and the District of Columbia (C. S. Robbins, ed.). Univ. of Pittsburgh Press, Pittsburgh, PA.
- Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966–2013. Version 01.30.2015 [USGS Patuxent Wildlife Research Center](https://www.fws.gov/patuxent/), Laurel, MD.
- Williams, S.O. III. 2010. Recent AOU check-list changes affecting the New Mexico bird list: The 51st Supplement. *NMOS Bulletin* 38:3.
- Wilson, M. D., and B. D. Watts. 2008. Landscape configuration effects on distribution and abundance of Whip-poor-wills. *The Wilson Journal of Ornithology* 120(4):778–783.
- Zwartjes, P. W., J. E. Cartron, P. L. L. Stoleson, W. C. Haussamen, T. E. Crane. 2005. Assessment of native species and ungulate grazing in the southwest: terrestrial wildlife. USDA Forest Service General Technical Report RMRS–142.