



Movement Patterns, Survivorship, and Home Range Size of LeConte's Thrasher (*Toxostoma lecontei*) on the Barry M. Goldwater Range

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INTRODUCTION

The LeConte's Thrasher (LCTH) is a species of conservation concern included on the Red Watch List of Partners in Flight. This non-migratory species' distribution range consists of sparsely vegetated Sonoran Desert landscapes (Lower Colorado Subdivision) across the southwest and northwestern Mexico.

In southwestern Arizona, the Department of Defense (DoD) manages 1,032,965 ha [2,552,512 ac] of Sonoran Desert in large tracts of habitat on the Barry M. Goldwater Range (BMGR) and Yuma Proving Ground (YPG). These areas are primarily used for air-to-ground military training by the Marine Corps Air Station (MCAS) and the U.S. Air Force (USAF).

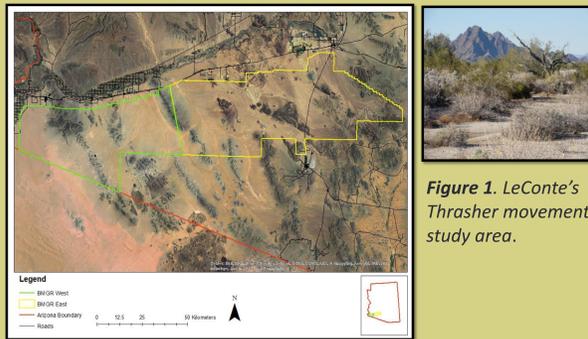
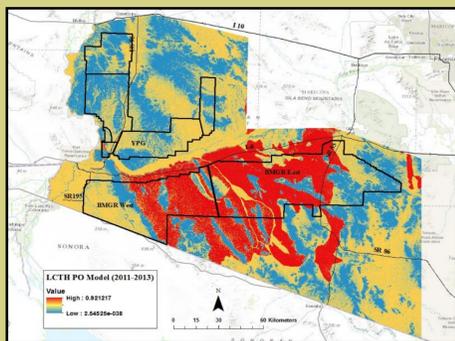


Figure 1. LeConte's Thrasher movement study area.

Given the scale of the BMGR and YPG, DoD installations play a major role in the conservation of this ecoregion. The Arizona Game and Fish Department (AGFD) conducted occupancy surveys (point-count with playback) during the 2011-2013 breeding seasons on the BMGR and YPG to better understand species distribution and identify potential habitat relationships. Survey results were used to develop detection probabilities across the DOD installations, and a Prediction of Occurrence model (PO) was built (figure 2) to generate a predictive index of the species habitat. In addition to occupancy surveys, active nest searches were conducted in the 2013 breeding season to identify fledglings for monitoring. From the nest search effort, fourteen birds were radio-tracked from the nestling to post-fledgling dispersal periods.

Figure 2. Occurrence classes: Red = high probability, Blue = low probability.



OBJECTIVES

1. Determine the dispersal patterns of juvenile LCTH.
2. Determine and map the minimum habitat patch size used by fledgling LCTH.
3. Provide specific habitat management recommendations to aid in maintaining long-term persistence of the LCTH.

METHOD

- **Nest locations** were used from the 2013 survey effort, along with opportunistic detections (Figure 3). Nests were monitored every three to five days to determine nestling ages and estimated fledging dates.



Figure 3. Nest sites where LeConte's Thrashers were captured and fitted with VHF transmitters.

- **VHF transmitters** were affixed a few days before the projected fledging date using a leg-loop harness constructed of an elastic cotton-nylon blend material and placed around each leg to allow for the bird's growth. Transmitters were glued (with a permanent eyelash glue) above the synsacrum and the antenna was oriented down the tail.
- **Radio-marked birds** were tracked multiple times per day with a R-1000 receiver and three element Yagi antenna (Advanced Telemetry Systems, Isanti, Minnesota). We captured from one to six locations between sunrise and sunset using the homing method, which involved tracking individuals until a visual confirmation was obtained. Locations were collected at least two hours apart to ensure juveniles had sufficient time to move and to prevent autocorrelation of points (Blackman 2015).
- **Fledging survival** was calculated with the Kaplan-Meier method in SPSS v20 (Blackman 2015). We calculated the cumulative survival probability for the study period by censoring birds with unknown fates and omitting juveniles that were depredated before fledging (Berkeley et al. 2007).
- **Average distance of movement** from the nest was calculated using the maximum distance recorded for each fledgling per day. To calculate the average successive movements we used the total recorded distance moved by fledglings per days.
- **Home range** was defined as the extent of area with a defined probability of occurrence during a specified time period (Kernohan et al. 2001) and considered all post-fledgling locations to be part of their post-fledgling home range. The fixed kernel method was used to estimate juvenile home range and core areas for all fledglings with at least 30 telemetry locations (Seaman et al. 1999).



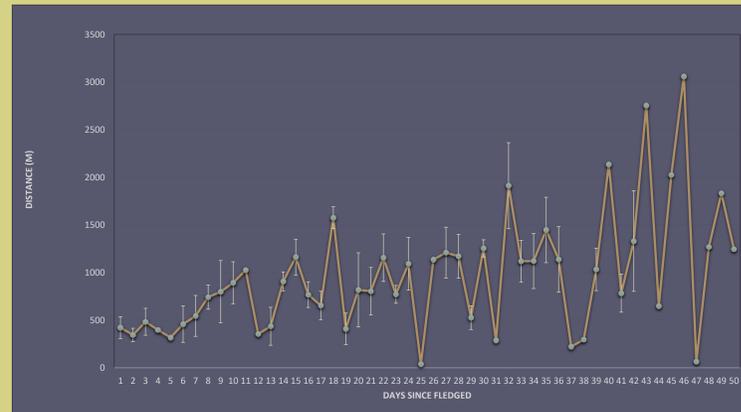
RESULTS

MOVEMENT PATTERNS.

During our study, fledglings did not disperse as we hypothesized. All available telemetry data was used to summarize the post-fledgling movement, rather than dispersal. Fledglings made dynamic movements during the study period, moving large distances away from and back toward their nest site (Figure 4). Average distance between fledglings and their nest site was 678.94 m (SD \pm 150.03, median 721.89; range 441.91-825.17). Though older fledglings consistently made longer movements, two birds from different nests moved >900 m shortly after fledging. Maximum movement distance between fledglings and their respective nests averaged 1732.87 m (SD \pm 420.05; median 1584.0; range 1321.77-2353.06).

Figure 4 (right).

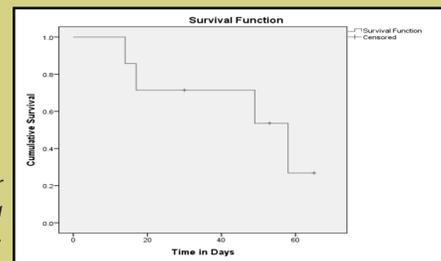
The daily average distance fledglings (n=14) moved during the first 49 days (Bars represent standard errors).



SURVIVORSHIP.

Survival probability was inversely related to fledgling age, as survivorship decreased with greater time spent out of the nest. Mean survival of seven post-fledgling juveniles was 46.13% (SE +7.69).

Figure 5 (right). Survival rate estimates for seven juvenile LeConte's Thrashers during the first 58 days of the post-fledgling period.



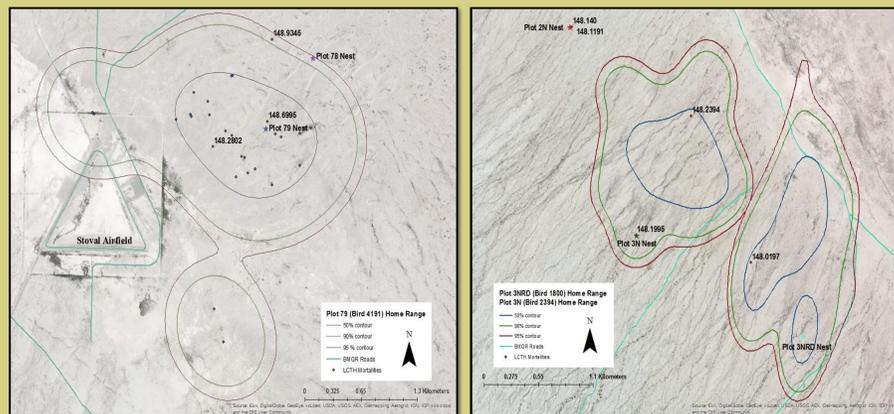
HOME RANGE SIZE.

Our data reveals this species maintains larger territories and uses more space during the post-fledgling period than previously reported.

Plot	Radio Frequency	Home Range 95% Fixed Kernel (Ha)	Home Range 50% Fixed Perimeter (Km)	Core Area 50% Fixed Kernel (Ha)	Core Perimeter (Km)
78	148.0987	385.10	7.78	114.02	5.96
79	148.2802	222.37	7.16	48.30	2.92
79	148.4191	747.47	13.64	145.47	4.45
3N	148.2394	236.35	6.05	62.44	2.94
3NRD	148.1800	232.75	6.83	66.18	4.65
Average		364.61 (SD \pm 224.35)	8.29 (SD \pm 40.88)	87.28 (SD \pm 40.88)	4.19 (SD \pm 1.29)
Median		235.35	7.16	66.18	4.45

Table 1 (left). Home range (95% fixed kernel contour) and core area (50% fixed kernel contour) of five juvenile LeConte's Thrashers obtained from 2013 telemetry data.

Figure 6 and 7 (below). The home range model of individual fledglings monitored at plot 79 and 3N. Plot 79 had the largest movements creating an above normal home range of 747.47 ha. Plot 3N demonstrates the average home range of the monitored birds.



CONCLUSION

Most of our knowledge regarding LCTH population biology originates from an intensive banding study conducted by Sheppard (1996) within the San Joaquin Valley of California. Fletcher (2009) used a multi-model approach to identify important environmental and ecological characteristics of this species in Nevada. In 2010, Blackman studied microhabitat characteristics associated with LCTH detection locations in the San Cristobal Valley at BMGR East and continued in 2012 with the addition of predictive habitat modeling (Blackman 2015). Jongsomjit et al. (2012) also used occupancy and predictive habitat modeling to study LCTH distribution in the Carrizo Plain National Monument, CA. Although much uncertainty remains, these studies have all contributed to our understanding of LCTH across its range in the southwestern U.S.

This was the first radio-telemetry study to examine the survival, movements and home range of post-fledgling LCTH. This effort, along with the refined LCTH PO model and predictive index will assist in setting guidelines for long-term management decisions for this species.

These results will assist military installations in conserving habitat for this species; while maintaining mission readiness. With the ultimate goal of keeping common species common and helping to avoid future listings.



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