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# Department of Defense Legacy Resource Management Program

PROJECT NUMBER (15-631)

**Status and Distribution Modeling of Golden Eagles  
on Southwestern Military Installations and  
Overflight Areas: Assessing “Take” for this  
Sensitive Species at Risk  
Fact Sheet**



# Status and Distribution Modeling of Golden Eagles on Southwestern Military Installations and Over Flight Areas: assessing "take" for this sensitive species at risk

Project # 15-631



Figure 1. Golden eagle nesting on a ledge outcrop.

### Background:

This Department of Defense (DoD) Legacy Program project (15-631) continued to refine and increase the precision of the status and distribution of nesting golden eagle (*Aquila chrysaetos*; GOEA) within and adjacent to DoD managed lands in the southwestern United States (U.S.) to inform acceptable GOEA “take” limits in compliance with the Bald and Golden Eagle Protection Act (BGEPA). Identifying GOEA nesting habitat on a landscape scale has been a challenge (Figure 1), but we built upon the models developed in the previous years’ efforts (2014, 2015). Our challenge from our first year’s models was to reduce variation across such a wide geographic range and improve predictive performance. We did this by using the delineation of Bird Conservation Regions (BCR) to develop suitable models. This is the same management unit used by the U.S. Fish and Wildlife Service (USFWS) which has identified a net-zero take threshold of GOEA under the BGEPA.

### Objective:

Objectives of this project were to develop GOEA nesting distribution and status models with improved predictive power for application across southwestern military installations and their over-flight areas (a.k.a. Military Training Routes [MTRs]; Figure 2). We conducted surveys across the landscape within each BCR, and completed repeated visits to collect demographic parameters

associated with nest occupancy and nesting success. These data can improve information derived from nesting habitat models to help inform both natural resource managers and military personnel on spatial, temporal, and demographic contexts of GOEA status across the southwestern United States.

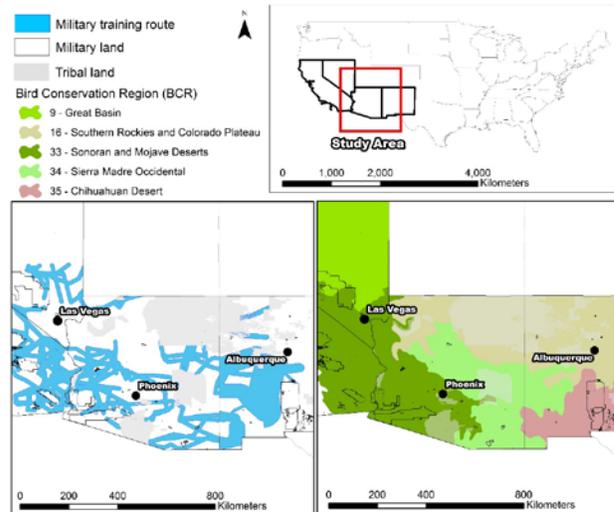


Figure 2. Study area for GOEA surveys on military lands (black outline) in the southwestern United States. MTRs (lower left) and BCR (lower right) are shown. Tribal lands (gray fill; excluded from project) are displayed for reference.

### Summary of Approach:

Using a combination of three survey techniques (Figure 3) to maximize efforts, we examined areas in previously under- or non-surveyed areas to identify GOEA nests. We used fixed-wing aircraft to revisit a subset (521) of the 914 nests identified to track demographic parameters. We partitioned our data by BCR to develop more precise and refined nesting habitat models for GOEA at the same scale as the USFWS assesses take thresholds. We then compared the time an eagle spent on the nest across BCR and MTR by year. We also developed logistic regression models using all 914 nesting territories and assessed accuracy using un-surveyed nest on White Sands Missile Range (WSMR).



Figure 3. Three survey methods (ground, helicopter, and fixed-wing) used.



### Benefit:

Documented strengths and limitations of various survey techniques will allow military installations to make informed decisions on rapid assessments of GOEA status and distribution within specific landscapes. The use of the improved, BCR-specific models will allow natural resource managers to refine and/or prioritize potential GOEA nesting habitats and direct future efforts while maintaining flexibility in military activities with BGEPA compliance.

### Accomplishments:

In the course we developed robust GOEA nest habitat models of the four BCRs in our study area. Our surveys consisted of nearly 8,000 km of potential habitat documenting and monitoring 914 nesting territories across the Southwestern U.S. (Figure 4). Along with collaborative efforts we monitored 521 nest territories with repeated visits to compare time eagles spent within territories across BCR and MTR\*year

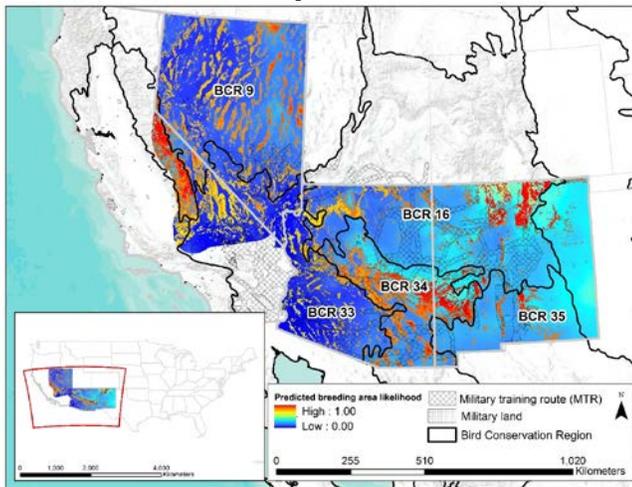


Figure 4. Modeled GOEA breeding habitat quality in Arizona, southeastern California, southern Nevada, and New Mexico.

By leveraging our data with concurrent, non-duplicated efforts, we identified potential and non-nest sites across the study area and developed BCR-specific predictive models across the southwestern U.S. using covariates describing potential GOEA nesting habitat (Figure 4). Demographic parameters resulting from revisited nest locations detected no significant difference in GOEA nest occupancy between lands designated as MTR and non-MTR airspace (Figure 5). These results suggest compliance with the BGEPA and allude to potential benefits of designating airspace routes.

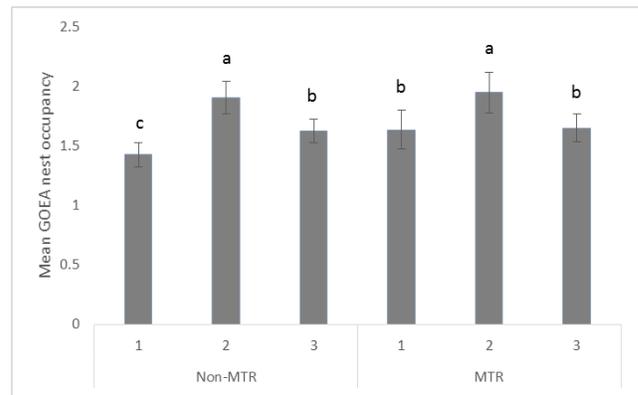


Figure 5. Comparison of calculated occupancy across year and status as an MTR or non MTR. Letters indicate statistical significance ( $F=2.29$ ;  $p=0.0473$ ) Fishers protected LSD ( $p < 0.05$ ).

As current military activities appear not to adversely impact breeding GOEAs under MTRs and supports BGEPA compliance, our management recommendations include: 1) continued monitoring of known and suspected GOEA nests, 2) coordinate with local authorities on current distribution and status, 3) development of avoidance zones around known GOEA nests during the breeding season, and 4) avoid disturbance of suspected GOEA nests and high likelihood nesting habitat during the early breeding season.

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