



Status and Distribution Modeling of Golden Eagles on Southwestern Military Installations and Over Flight Areas: assessing "take" for this sensitive species at risk – Year 1

Project # 12-631



Figure 1. Golden eagle nesting on a ledge outcrop.

Background:

This Department of Defense (DoD) Legacy Program project (12-631) was designed to determine the status and distribution of golden eagle [(*Aquila chrysaetos*) (GOEA)] nesting habitat within and adjacent to DoD managed lands in the southwestern United States to assess acceptable GOEA "take" limits. Identifying GOEA nesting habitat on a landscape scale has been a challenge (Figure 1) and current methods for most southwestern states have been to use remotely sensed data to identify potential cliff structures (e.g., slope). Use of specific information on nest sites and new terrain evaluation techniques can help improve current model predictions.

Objective:

The overall objective of this project was to develop a model with improved predictive power for application across southwestern military installations and their over-flight areas (a.k.a. Military Training Routes [MTRs]; Figure 2) to identify GOEA distribution. To achieve this objective, surveys needed to be completed across landscapes that had previously not been surveyed or had been under-surveyed in the past. Additional surveys and demographic data on nest status and success will improve this model and refine delineation of potential nesting habitat across the southwestern United States.

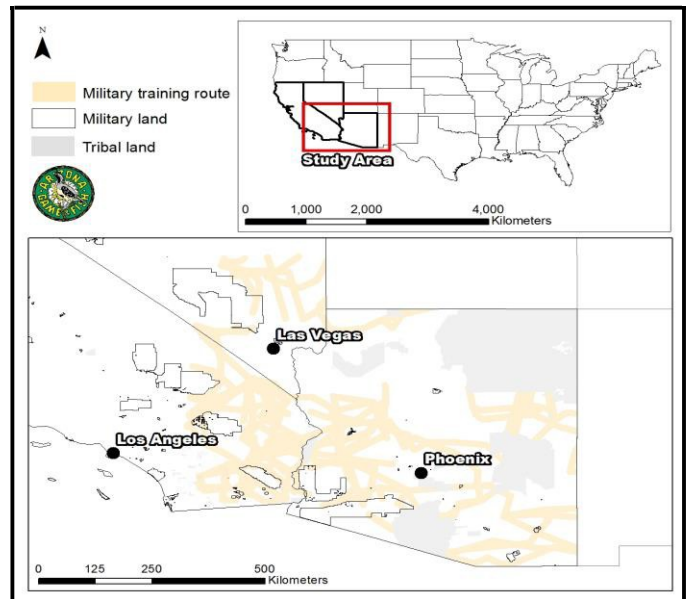


Figure 2. Study area for golden eagle surveys on military lands (gray outline) and training routes (pink) in the southwestern United States, 2013. Tribal lands (gray fill) are included for reference.

Summary of Approach:

We used three survey strategies to maximize survey efforts across the landscape (Figure 3). These included ground, helicopter, and fixed-wing surveys. Ground surveys consisted of the use of spotting scopes and high-powered binoculars to locate and identify potential nest structures from the ground. Helicopter and fixed-wing surveys used aircraft while maintaining safe flying conditions respective to the type of aircraft and terrain being surveyed. By using three survey strategies, we are able to frame first-time assessments of the status and distribution of GOEA across this landscape and inform management recommendations for southwestern military installations.



Figure 3. Three survey methods (ground, helicopter, and fixed-wing) used for identifying golden eagle nests during 2013 in the southwestern United States.

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 specified regions. Secondly, the development of a modern modeling exercise can direct future survey efforts to the highest likelihood areas and reduce financial costs associated with surveying larger areas. Finally, the use of experienced observers and fixed-wing aircraft will reduce financial costs even further in areas where safe application of this survey strategy exists.

Accomplishments:

In 2013, we augmented our surveys with additional GOEA surveys taking place elsewhere throughout Arizona. We used all three survey strategies to identify and monitor GOEA nests throughout Arizona (Table 1).

Table 1. Summary of golden eagle nest surveys throughout military lands and MTRs in Arizona, 2013.

METHOD	SURVEY MTR (KM)	SURVEY NON-MTR (KM)	NUMBER OF FLIGHTS	TIME (PERSON-DAYS ¹)	ACTIVE NESTS ²	SUSPECTED NESTS ³
Training Fixed-wing	224	294	2	3	0	3
Training Helicopter	462	1,349	4	6	16 ⁴	3 ⁵
Fixed-wing	1,946	1,481	7	14	10	21
Helicopter	406	1,702	4	4	35 ⁶	30
Ground	525	425	NA	55	3	29
Total	3,563	5,251	17	82	64	86

¹Person-day ≈ 8 hours

²Training helicopter surveys for bald eagles.

³Active nests were defined as nests with golden eagles demonstrating breeding behavior on or adjacent to nest (e.g., nest building, copulating, incubating, etc...)

⁴Suspected nests were defined as nests suitable in size, location, and material for golden eagles, but lacked golden eagle presence at site.

⁵Nests reported in McCarty et al. (2013).

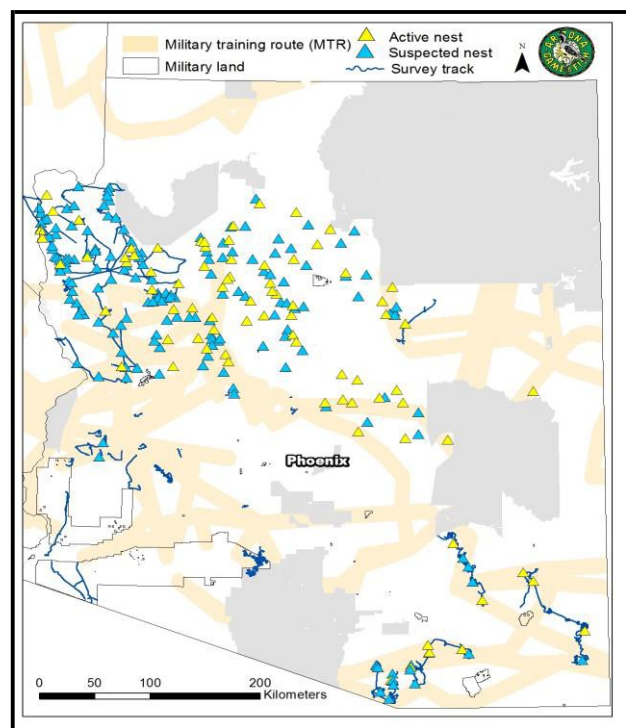


Figure 4. Summary results of golden eagle nest surveys in Arizona, 2013. Active nests defined by nesting behavior while suspected nests are defined by historic activity.

Between surveys from this project and supporting surveys completed in-kind with the Arizona Game and Fish Department Nongame Branch, we identified 114 active GOEA breeding areas in 2013 (Figure 4). We combined these data along with unoccupied breeding areas to develop a predictive model across the southwestern United States using four significant covariates describing potential GOEA nesting habitat (Figure 5).

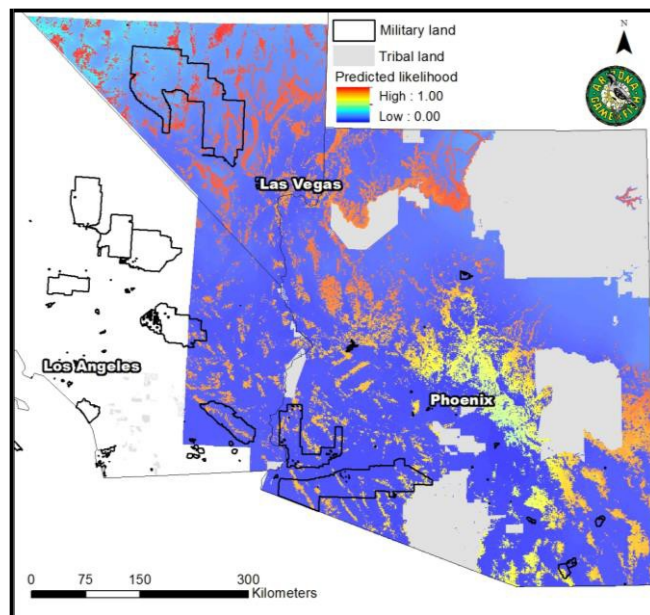


Figure 5. Predicted golden eagle nesting likelihood in the southwestern United States, 2013.

We recommend use of this model (Figure 5) to identify high likelihood areas to best direct future nest surveys and inventories for GOEAs. The application and use of this model will allow military installations to rapidly assess areas of high likelihood GOEA nesting habitat for complementary military activities or for future survey efforts to track breeding activity in compliance with Federal regulations.

Contact Information:

Martin D. Piorkowski
 Senior Research Biologist
 Arizona Game and Fish Department
 5000 W. Carefree Highway
 Phoenix, AZ 85086
 Phone: (623) 236-7273
 Fax: (623) 236-7918
 Email: mpiorkowski@azgfd.gov

