Department of Defense
Legacy Resource Management Program

PROJECT NUMBER (14-758)

Renewable Energy Development on Department of Defense Installations in the Desert Southwest: Identifying Impacts to Species at Risk – Fact Sheet

Renewable Energy Development on Department of Defense Installation in the Desert Southwest: Identifying Impacts to Species at Risk

Project # 14-758

Background:

Biodiversity is extremely high in the Mohave and Sonoran Deserts, and is subject to potential conflicts with land use such as solar and other energy development. A part of the Net Zero Energy concept put forth out our military installation, solar energy development is gaining considerable ground as part of installation land use yet there is nearly no information on potential wildlife interactions. Considering the potential limitations that possible ESA listing may impose on mission readiness, we designed a study to assess the extent of disturbance solar development may pose on the surrounding landscape. We implemented this study at three military installations in the southwestern U.S. (Figure 1A).

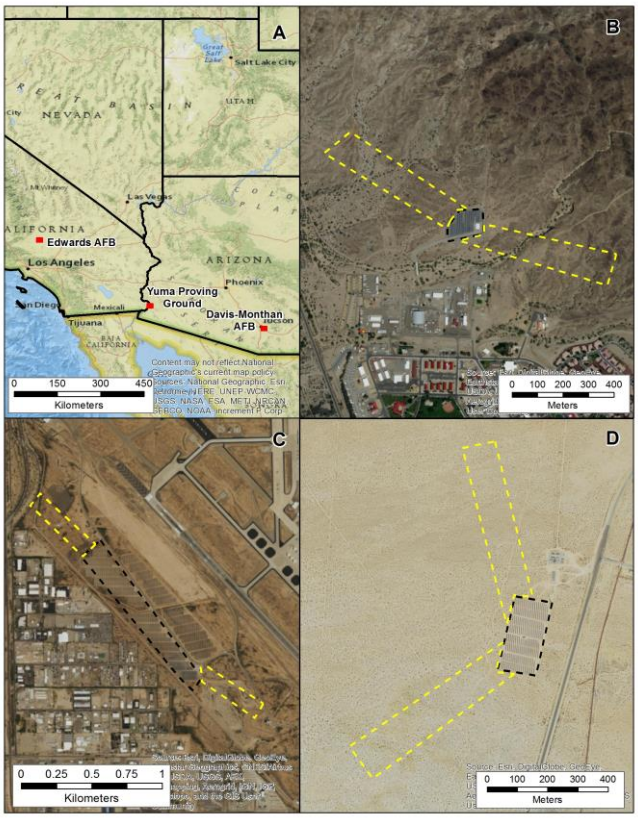

Figure 1. Overview of each military installation within our study area of the Desert Southwest (A). Solar arrays are depicted in black hash line for Yuma Proving Ground (B), Davis-Monthan Air Force Base (C) and Edwards Air Force Base (D). Trapping occurred within the general areas depicted by the yellow hash line in 2014-2015.

Objective:

During this study, we focused on four primary objectives with determining potential solar development impacts on wildlife: 1) Quantify differences in reptile and small-mammal diversity and abundance between solar development sites and un-impacted sites on DoD installations; 2) Identify the spatial extent of solar development impacts on wildlife communities with application to Species at Risk; 3) Evaluate the mitigation value of "soft-footprint" solar development when compared to standard "hard-footprint" development; and 4) Provide management recommendation to mitigate and monitor impacts of current and future solar development projects on DoD installations in the desert southwest.

Summary of Approach:

We developed a robust study design targeted at assess small mammal and reptile communities in and adjacent to each installations solar array (Figure 1; B,C,D). We trapped small mammals with a 50-trap grid (Figure 2) and reptiles with an 18 trap grid (Figure3).

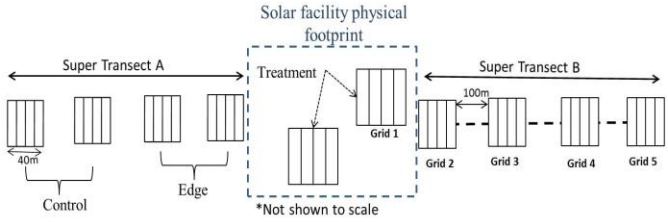

Figure 2. Schematic of sampling design for small mammals in proximity to solar development. Blue hashed line (encompassing "treatment") represents the solar facility as outlined by a physical fence barrier, black hashed line represents super-transects and boxes represents grids.

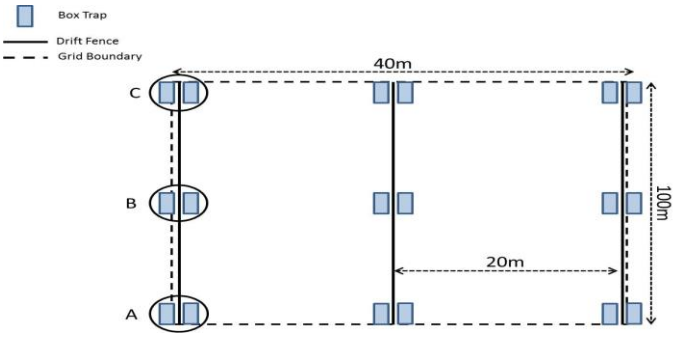

Figure 3. Example of reptile grid design to follow the sampling design depicted in Figure 2. The drift fence was staked for support with the bottom piled with dirt to prevent movement under the fence line. Box traps were paired into trap stations A, B, and C. (Figure not to scale)

We sampled at each base three times for both taxa. From our efforts, we calculated species richness, species diversity, and relative abundance between control and treatment for each taxon. In addition, we evaluated the footprint design (i.e., soft, intermediate, and hard) based on these metrics. The footprint design was characterized by the type of surface maintenance at the solar array. From these metrics and their evaluations we developed management recommendations for natural resource managers to consider when developing solar at an installation.

Benefit:

Results from this project will provide resource managers with initial baseline information on the extent of potential impacts that solar development may have on the surrounding landscape including species at risk. Sustaining and conserving suitable habitats and resources for sensitive species allow military installations to manage potential risk and maintain compliance with Federal regulations such as the Endangered Species and Sikes Acts. Although many small mammal and reptile species on military lands are not currently protected under the ESA, they represent species that could affect DoD actions in the future. Meeting Federal compliance is vital to mission implementation and to maintaining military training activities across installations. We provide the first look at the potential implications solar development may have on the immediate small mammal and reptile communities. We provide evidence of areas most affected by solar development and provide data-driven management recommendations that may minimize these impacts. This will allow military installations the flexibility to assess future solar development and make informed decisions on the level of benefit that solar development can have for military missions.

Accomplishments:

Our trapping efforts resulted in 68,120 trap-nights with 245 captures of 10 species for small mammals and 1,440 trap-nights with 286 captures of 15 species for reptiles. Analysis between treatment areas (solar arrays) and controls suggest that construction of the solar array displaces these species with similar results for both taxa. We calculated species diversity and relative abundance at all sites as a factor of distance. Figures 4 and 5 show that intermediate distances are generally the most diverse with the highest relative abundance. Furthermore, we found no difference between the three footprints maintained at the different military installations. In other words, there were few captures at any of the solar arrays regardless of how the areas were maintained. We conclude that at these sites the construction of the solar array displaced small mammal and reptile communities and created unsuitable or low quality habitat.

From these results we developed five potential management recommendations as follows: 1) prioritization of proposed solar development towards disturbed or previously disturbed areas; 2) an initial survey be conducted at all proposed solar development sites; 3) monitoring the immediate and adjacent landscapes (up to 400 m from proposed facility) if at risk species are identified; 4) trap and relocate individuals within the physical footprint of the facility to beyond 400 m; and 5) installing low to the ground openings within fenced enclosure around the constructed facility.

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