
Robert L. Bezy and Kathryn Bolles

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

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

Martin D. Piorkowski, Joel M. Diamond, PhD, R. Nathan Gwinn, and Haley Nelson
Arizona Game and Fish Department, Wildlife Contracts Branch
5000 W. Carefree Highway
Phoenix, Arizona 85086

Introduction

- High Small Vertebrate Biodiversity
- Mojave and Sonoran Deserts
- Net Zero Energy Concept
- Solar Development
- Mission Readiness


RB Forbes


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Objectives

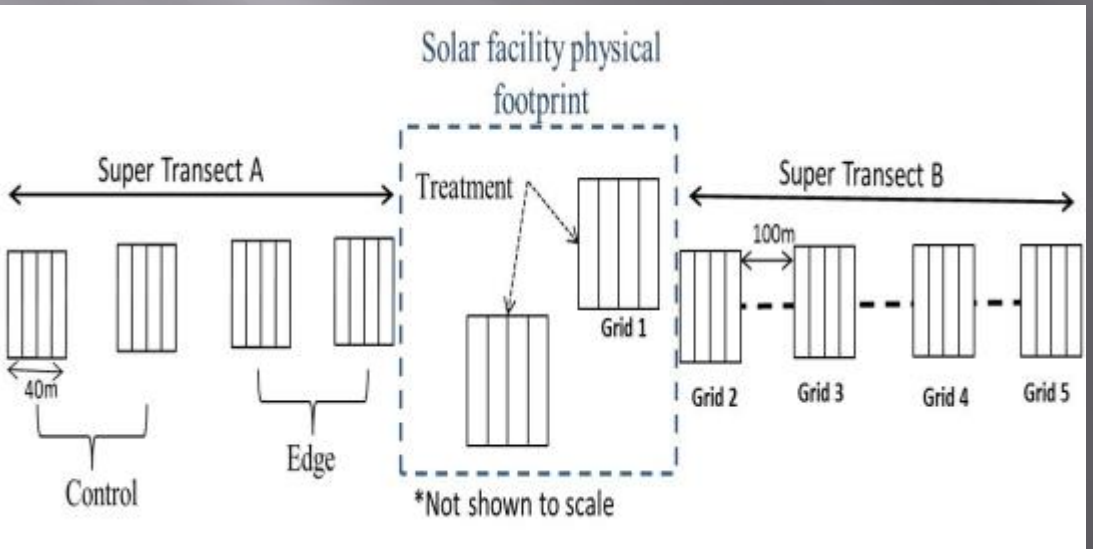
1. Quantify differences in reptile and small mammal diversity and abundance between solar development sites and un-impacted sites on DoD installations
2. Identify the spatial extent of solar development impacts on wildlife communities with application to Species at Risk
3. Evaluate the mitigation value of “soft-footprint” solar development when compared to standard “hard-footprint” development

Study Area

- Davis Monthan AFB
- Yuma Proving Ground
- Edwards AFB

Methods
Sampling Design

- Three strata
  - Treatment
  - Edge
  - Control
- Two Super transects
- Nested sampling
- Mammal trapping
- Reptile trapping
- Three footprint intensities



Methods
Objective 1

- Pool data between two super-transects to generate species diversity indices, species richness, and relative abundance estimates using mark-recapture methods

Methods
Objective 2

- Calculate changes across each super-transect to the treatment estimates
- Compare rate of change across this gradient
- Identify the extent of impact as defined by the “edge”

Methods
Objective 3

- Identify installations with different solar construction and maintenance
- Evaluate species diversity and abundance based on the physical construction of each solar facility

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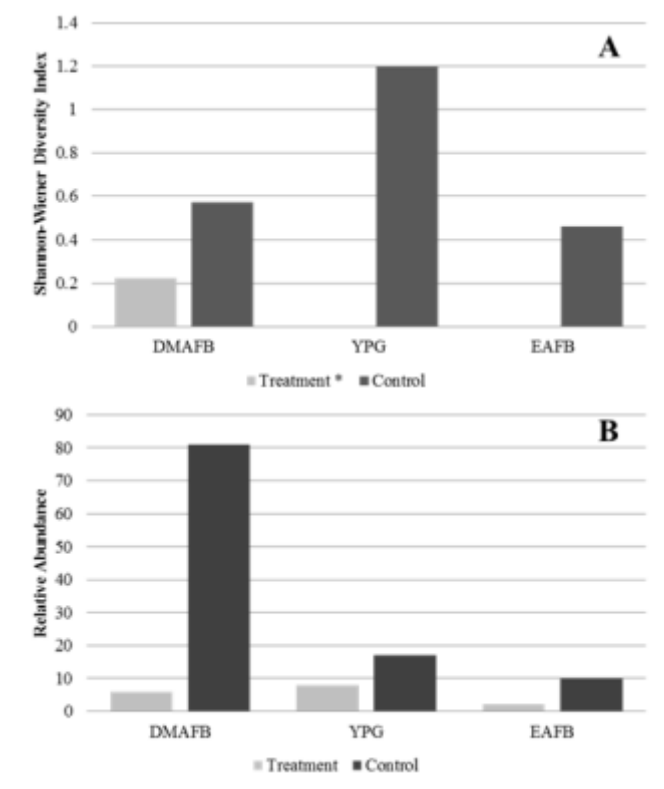
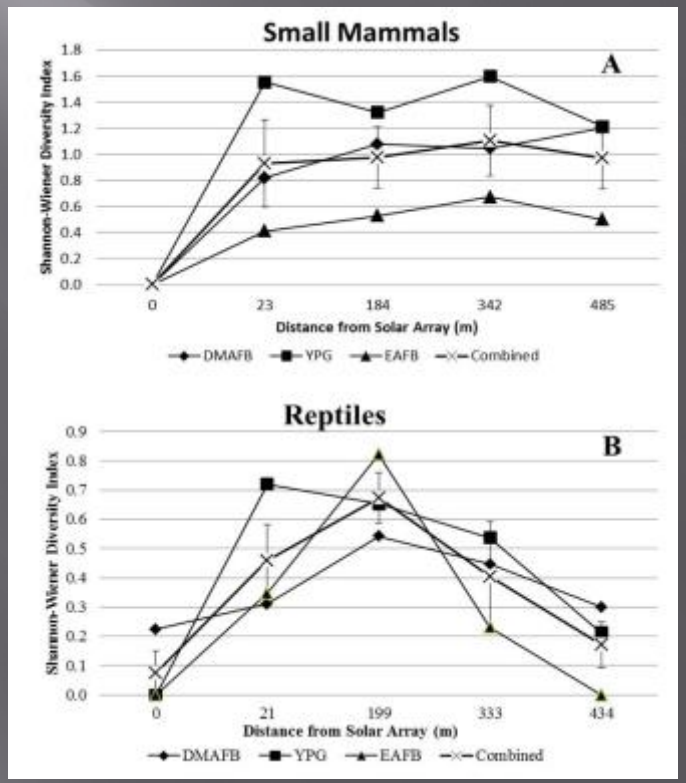
Results
Objective 1

- Low to no capture events inside solar array
- Highest abundance at Yuma Proving Ground
- Highest diversity at Davis Monthan AFB



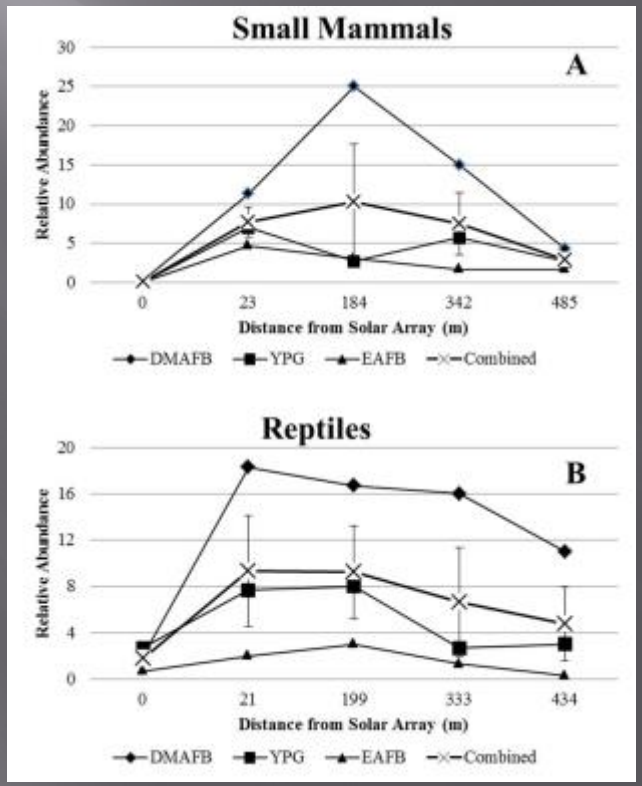
Results
Objective 2

- Diversity of small mammal species using the Shannon-Wiener Diversity Index resulted in indices of H = 1.21, 1.77, and 0.52



Results
Objective 2

- Relative abundance for each installation was highest at DMAFB and lowest at EAFB.



Results
Objective 3

- A combined total of 17 individuals were captured within the solar arrays (1 mammal; 16 reptiles)

- Only intermediate type of footprint captured any individuals within the solar array

Discussion Objective 1

- Solar arrays in this study have been established for several years (or multiple species generations), yet these areas have not been recolonized. This suggests that solar development removes an area's potential habitat for small mammals and reptiles

Discussion Objective 2


Douglas Moore

- Bell-shaped pattern of species richness, diversity, and abundance across each of the three installations with the solar array at one end and the control area at the other end.
- Highest recorded measurements at intermediate distances. This may be a result of displacement and subsequent dispersal of these communities to the immediately surrounding landscape.
- Disturbance from construction may have altered the carrying capacity in the adjacent landscape.

Discussion Objective 3

- Results contradict previously held perceptions of “soft-footprint” design and potential benefits for at-risk species.
- It is possible that due to the construction of solar arrays in these environments, the disturbance and displacement effects may be permanent regardless of the surface maintenance.

Discussion

- Several unique situations possibly impacted the level of disturbance that the presence and operations of a solar array might have on the surrounding landscape, ultimately affecting potential monitoring and mitigation strategies.
  - Extreme drought
  - An unexpected scavenger (raven)
  - Habitat alteration beyond the physical footprint

Management Recommendations

- Prioritize proposed development of solar arrays towards disturbed or previously disturbed areas.
- Conduct initial survey on proposed development sites to identify any potential at-risk species.
- If at-risk species are identified, monitor the immediate and adjacent areas to determine if any mitigation measures are warranted.
- Have a wildlife biologist document any active burrows within the proposed solar development area, and relocate individuals found.
- Install low to the ground openings to allow wildlife to move through the fence.


M Piorkowski