Distribution and habitat of Elf Owls in lowland riparian and adjacent upland environments, southern and western Arizona

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Elf Owl

Micrathene whitneyi

- Nocturnal
- Tiny (13-14 cm, ~40 g)
- Small home range size
- Migratory
- Mostly insectivorous
- Catch insects on wing
- Cavity nester

Elf Owl

Micrathene whitneyi

Nest in saguaro cavity

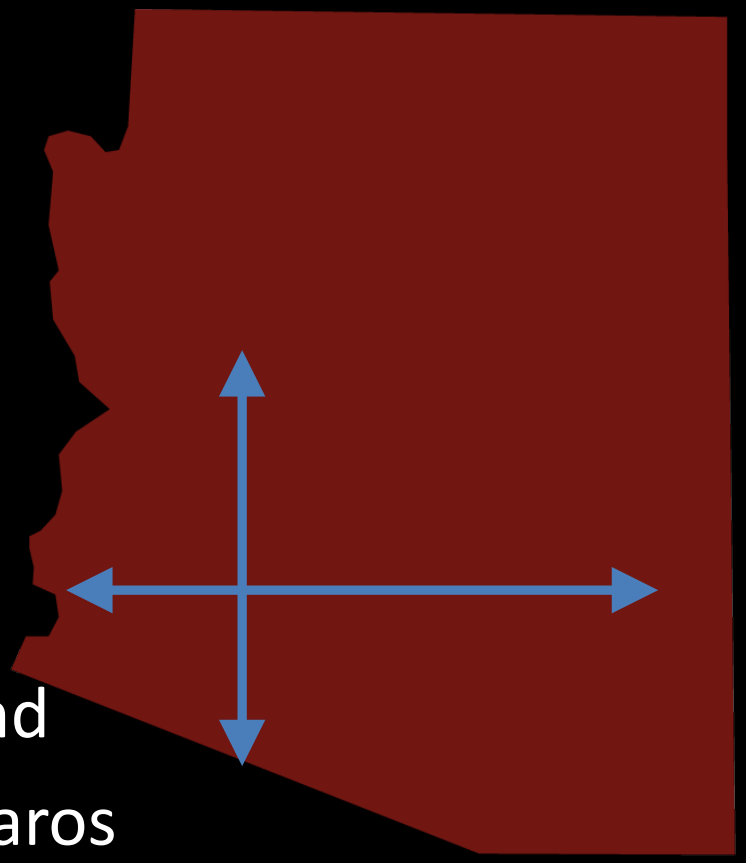
- North edge of range
- Declining regionally, but..
- Locally common

LCR MSCP Elf Owl Project Goals

- Determine patterns of occurrence in riparian and adjacent uplands areas across wide area
- Identify and characterize nesting territories
- Finalize a survey protocol based on patterns of detectability

Gradient Sampling

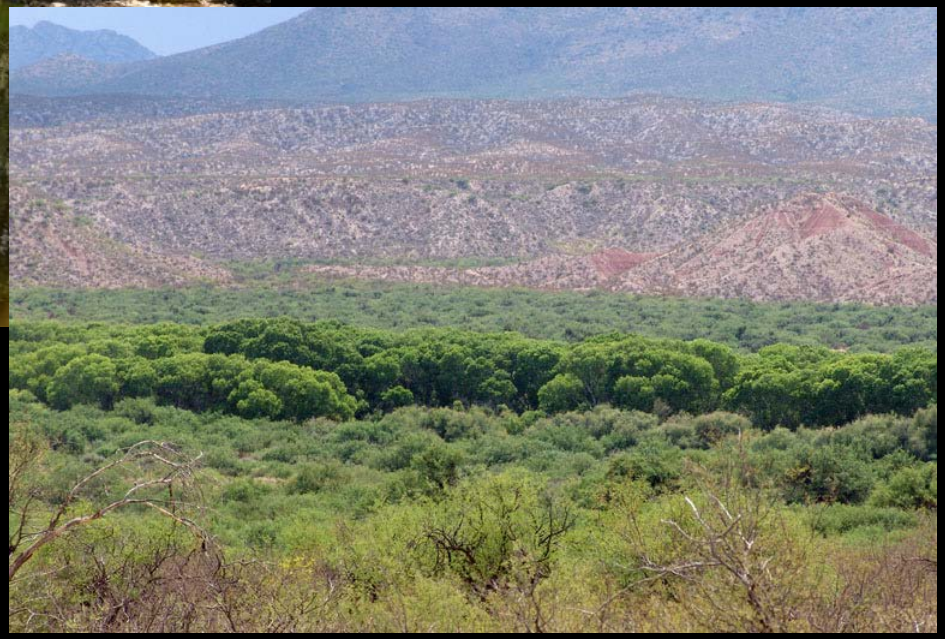
- Geographical
- Elevational
- Vegetation
  - Riparian-ecotone-upland
  - With and without saguaros



Stratification Targets

Saguaro Yes / No	Mesic Riparian	Exotic Riparian	Xeric Riparian
Desert Woodland	11.1% / 11.1%	2.8% / 2.8%	2.8% / 2.8%
Arborescent Desert Scrub	11.1% / 11.1%	2.8% / 2.8%	2.8% / 2.8%
Desert Shrubland	11.1% / 11.1%	2.8% / 2.8%	2.8% / 2.8%

Mesic Riparian



Exotic Riparian

Xeric Riparian

Desert Woodland

Arborescent (Mixed) Desert Scrub

Desert Shrubland

Discovery Surveys

- Point-based call broadcast
  - 5 min. / point
- Points arrayed along transects
- Transect layout:
  - Points random distances from riparian / upland edge
  - Riparian and 75 m into uplands
  - minimal set up time

Transect Layout

Rapid Environmental Assessments

- Vegetation type
- Distance to edge
- Corridor width
- Cover in riparian and upland veg. (within 75 m)
  - Structural category
  - Average height
- Dominant species
- Distance to nearest snag
- Distance to nearest saguaro in each quarter

Analyses

- Detections among strata
  - Mesic riparian without saguaros
- Modeling – Factors that explain occurrence
  - GLMM (Generalized linear mixed models)
  - Response = detected/undetected
  - Scale = station level
  - Random effect = transect ID

Analyses

- Two modeling strategies
  - Design variables only
    - Does occurrence vary among veg. types?
  - Continuous variables
    - Does occurrence vary with veg. height, species composition, etc.?

2015 Effort & Detections

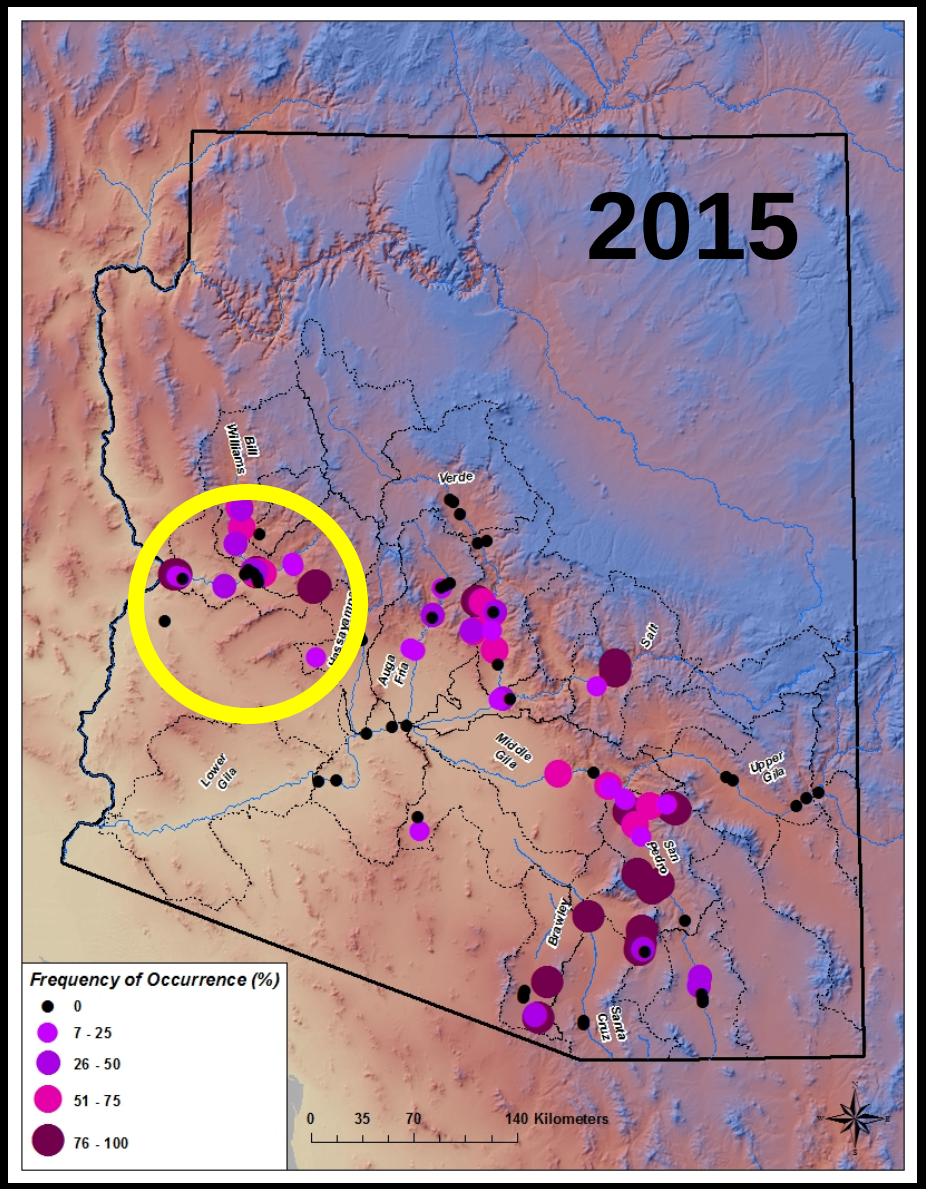
Effort

- 112 transects (193 km)
- 1,397 stations

Detections

- 855 detections; ~553 individuals
- 33% of stations, 43% of transects occupied
- Median detection distances = 83 m

Distribution and Survey Coverage

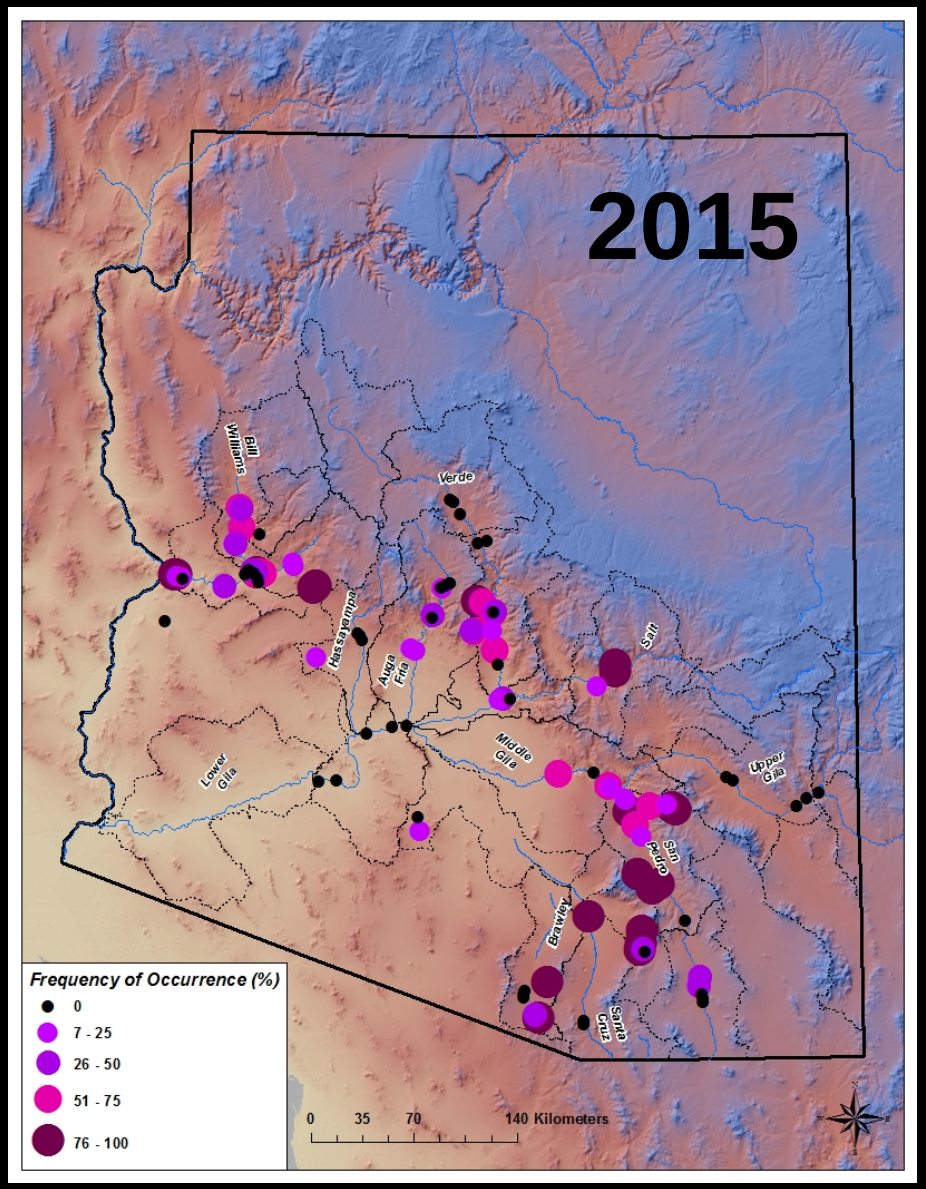


- 9 major watersheds, 38 drainages

Effort

- Highest - Bill Williams (25%)
- Moderate - San Pedro, Verde, Gila (18-14%).
- Low - elsewhere (7-4%)

Distribution and Survey Coverage

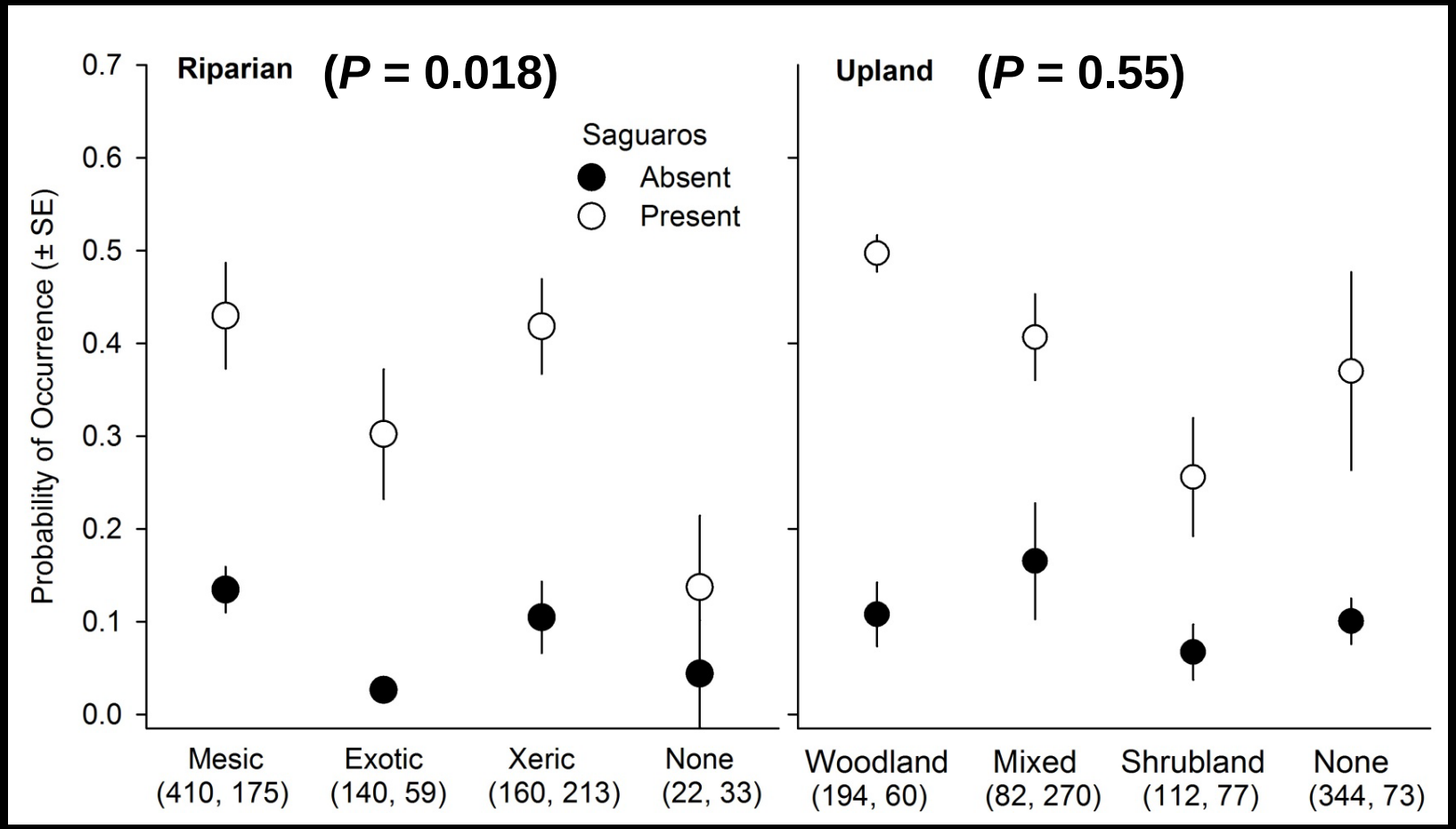


Effort

- 78% in Riparian or ecotone
- 51% in Mesic Riparian

Occurrence by Vegetation Type

GLMM with design variables



Saguaros - $P < 0.001$; effect on prob. = 0.09 to 0.33

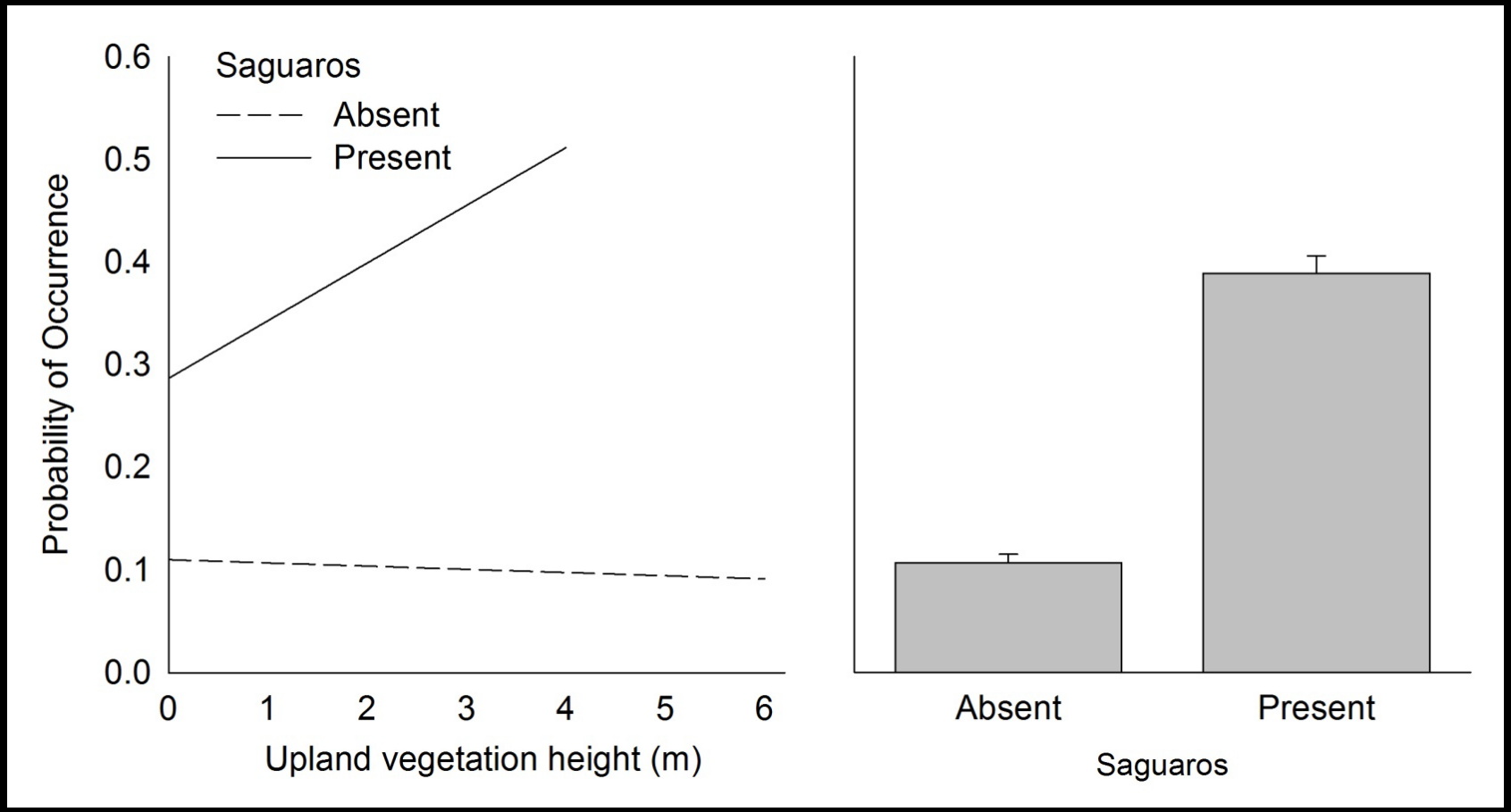
Important Habitat Attributes

GLMM with continuous variables

	Estimate	*P*
Riparian - broadleaf deciduous tree cover	+	0.0040
- willow tree cover	–	0.052
- mesquite tree cover	+	0.0004
Upland - mesquite tree cover	+	0.012

Important Habitat Attributes

GLMM with continuous variables



Conclusions

- Lots of occupied sites in riparian areas outside LCR MSCP for inferences
- Good basis for selecting 2016-2017 focal sites
- Strong saguaro effect but…
- Mesic riparian vegetation alone provides habitat

Acknowledgements

Sponsors:
U.S. BOR: Beth Sabin, Carolyn Ronning, Michelle Reilly, Steve Farinella, Todd Baribault, James Knowles, Sonya Kokos, Nathan Rudd

Administration :
Susan Meredith, GBBO
School of Natural Resources and the Environment, UAZ

Field Work: Alicia Arcidiacono, Keith Brennan, Carlos Gonzalez Sanchez, Vince Murphy, Robert Villa, Kelly Urban, Geoff Bland, Diane Wong-Kong
Field Support: TNC, BLM, USFS, USFWS, NPS, Pima County.

Other Support: Elisabeth Ammon, Ralph Phenix

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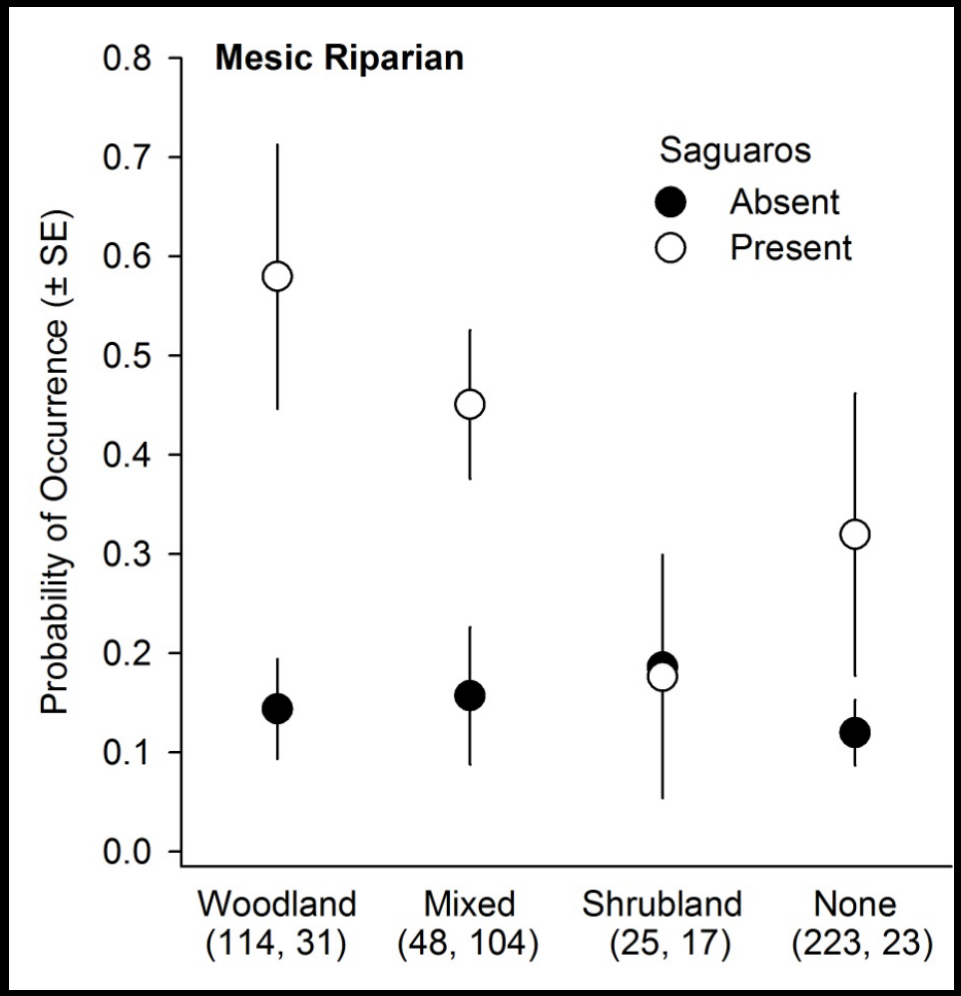
Elf Owl Occurrence by Habitat Type

GLMM with design variables