MSCP Conservation Area and System Wide Acoustic Monitoring

Ronald J. Mixan
Arizona Game and Fish Department
Wildlife Contracts Branch
Benefits of Acoustic Monitoring

- Can Detect Greater Species Diversity and Activity Than Traditional Methods
- O'Farrell and Gannon 1999, 86.9% Acoustically vs. 63.5% Captures.
- Allows for Cost Efficient Long Term Monitoring
- Detect Occupancy and Activity Patterns
- Monitor Temporal and Spatial Activity
Project Objective

- Acoustically Assess Nightly Bat Activity Patterns and Proportion of Nights Occupied at Eight MSCP Conservation Areas and Six System-Wide Areas Along the LCR
MSCP Covered Bat Species

Western Red Bat

Western Yellow Bat

California Leaf-Nosed Bat

Townsend’s Big-Eared Bat
Study Area

- Bullhead City, AZ to Border with Mexico
- 260km
- 9 Conservation Area Sites
- 5 Existing Habitat Sites
Conservation vs. Existing Habitat Sites

- Large Tracts Cottonwood/Willow
- Mesquite, Marsh and Backwater
- More complexity and Edge Habitat

- Stringers of Cottonwood/Willow
- Mixed Native/Non-Native Understory
- Less Riparian Area than Conservation Areas
Methods

- Record Calls Nightly From Sunset to Sunrise June through August.
- Noise Filter
- Apply Species Specific Filters
- ManuallyVerify Calls (over 1 million to date)
- Kaleidoscope
Manual Verification

- Why?
  - Similar foraging niche, similar call characteristics
  - Foraging Search Phase Calls vs. Social Calls
Acoustic Analysis

- Verified Calls Go Through a Call Minute Analysis
  - Measure of Relative Activity
  - Eliminates Bias of Over-Estimating or Under-Estimating Abundance
Acoustic Analysis

- Verified Calls Go Through an Occupancy Analysis
  - Presence/Absence Per Night Proportion of Nights Occupied
  - Determine Trends Between Stations and Across Months
  - Proportion of Nights Occupied More Representative
Past Results

- 2010-2014 Year-Round Monitoring
- 2015-Present Summer Residency
- Migration timing *Lasiurus* species
- Western Red Bats Conservation Area v. System-Wide
- Western Yellow Bats Conservation Area v. System-Wide
- Hoary Bats Conservation Areas
Temporal Activity LACI

- **Hoary Bat**
  - Little Activity Existing Habitat
  - Migration Pulses at Conservation Areas
  - Fall Migration largely driven by 2 sites
Temporal Activity LACI

- Hoary Bat
  - CVCA 1
  - PVER 1 (10 Days)
  - Where do they go?
System-Wide Western Red Bat Relative Activity

**Western Red Bat - All Stations (8)**

- **Occupancy/Call Minutes**
  - 2015: 0.10
  - 2016: 0.20
  - 2017: 0.15
  - 2018: 0.20
  - 2019: 0.15

- **Occupancy**
  - Blue bars

- **Avg. Call Minutes**
  - Red bars

**Western Red Bat - Original Stations (5)**

- **Occupancy/Avg. Call Minutes**
  - 2010: 0.30
  - 2011: 0.50
  - 2012: 0.30
  - 2013: 0.40
  - 2014: 0.30
  - 2015: 0.20
  - 2016: 0.10
  - 2017: 0.10
  - 2018: 0.10
  - 2019: 0.05

- **Occupancy**
  - Blue bars

- **Avg. Call Minutes**
  - Red bars
System-Wide Western Yellow Bat Relative Activity

Western Yellow Bat - All Stations (8)

Western Yellow Bat - Original Stations (5)
System-Wide California Leaf-Nosed Bat Relative Activity
Western Red Bat Conservation Area Results

- PVER 1, CVCA 1 and BLCA
- Stable Activity and Occupancy year to year.

**Western Red Bat Occupancy 2015-2018**

**Western Red Bat Yearly Comparison All Stations**
Western Yellow Bat Conservation Areas

- CVCA 1, PVER 1 and YEW 1
- 2015
- Little Occupancy Variation 2015-2017

Western Yellow Bat Occupancy 2015-2018

Western Yellow Bat Yearly Comparison All Stations
California Leaf-Nosed Bat Conservation Areas

- CVCA 2, Crane’s Roost and BLCA 1
- 2017 and 2018
- Close Proximity to Roosts

![California Leaf-Nosed Bat Conservation Areas](image-url)
Pale Townsend’s Bat Conservation Areas

- Kaleidoscope Results
- CVCA 1, YEW 1 and BLCA 1
- 2015 and 2016
Conservation Area Relative Activity

- CVCA 1: 52%
- CVCA 2: 5%
- HHCA: 1%
- PVER 1: 26%
- PVER 2*: 1%
- AKTP*: 4%
- YEWE*: 9%
- BLCA: 1%
- CNU1: 1%
System-Wide Non-Conservation Area Relative Activity

System-Wide Relative Activity

- PTSL* 12%
- BWRNWR* 18%
- PSRA 17%
- CNWR* 17%
- MLWA* 36%
Discussion

Conservation vs. System-Wide Areas
- Greatest Activity MSCP Conservation Areas (Area, Vegetation and Palms)
- System-wide migratory pulses
- Fluctuation across years.

Future Consideration
- Age
- Composition
- Plant Spacing
Acknowledgements

Carrie Ronning: Bureau of Reclamation
Jeff Hill: Bureau of Reclamation
Allen Calvert: National Park Service
Susan Broderick: Bureau of Reclamation (Retired)