



Acoustic Monitoring at Non-Restoration Sites Along The LCR

Ronald J. Mixan

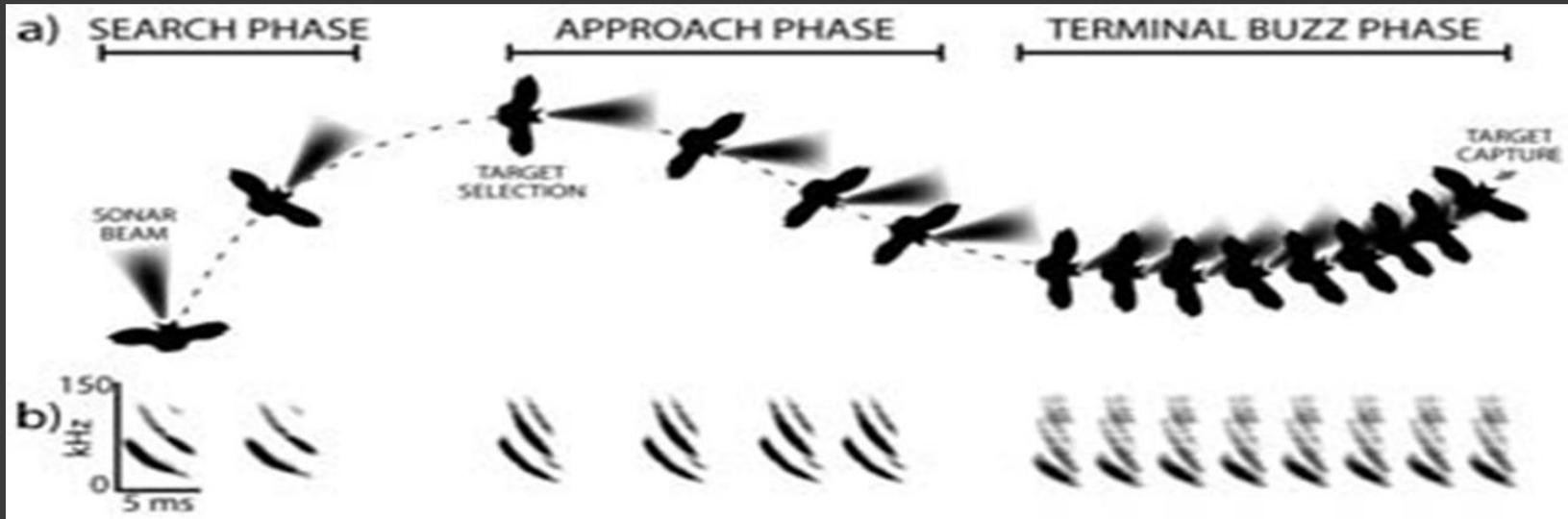
Arizona Game and Fish Department

Wildlife Contracts Branch



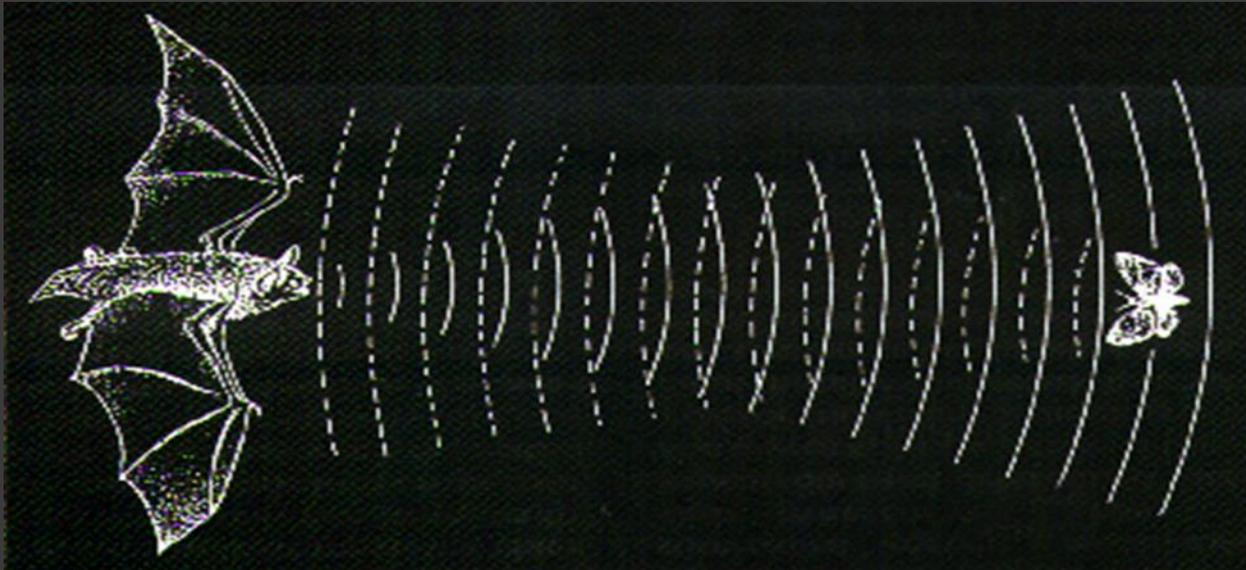
Echolocation

- Bats (Function) Vs. Birds (Unique ID)
- Identify Calls by Several Parameters (Freq, Dur, Slope, etc).
- Search Phase
- Approach Phase
- Feeding Buzz



Mostly Pros but Some Cons of Acoustic Monitoring

- Can Detect Greater Species Diversity and Activity Than Traditional Methods
- Insects, Whispering Bats, Station Maintenance
- Allows for Long Term Monitoring
- Detect Population and Activity Fluctuations
- Monitor Temporal and Spatial Activity and Occupancy



Project Objective

- Acoustically Assess Seasonal and Nightly Bat Activity Patterns at Five Non-Restoration Areas Along the LCR



MSCP Covered Bat Species

Western Red Bat



Western Yellow Bat



California Leaf-Nosed Bat

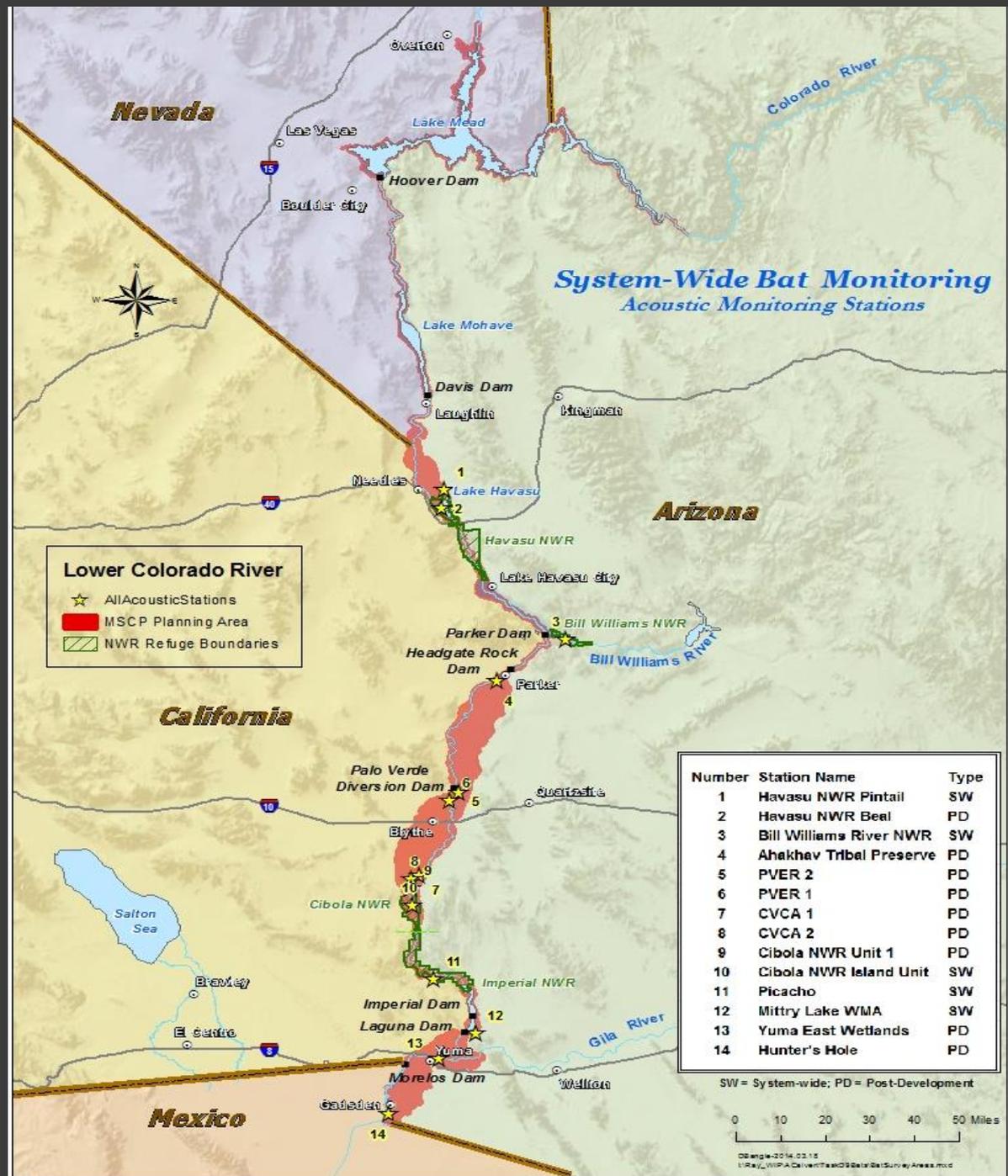


Townsend's Big-Eared Bat



Study Area

- 1) Pintail Slough HNWR
- 2) BWRNWR
- 3) CNWR
- 4) PSRA
- 5) MLWA



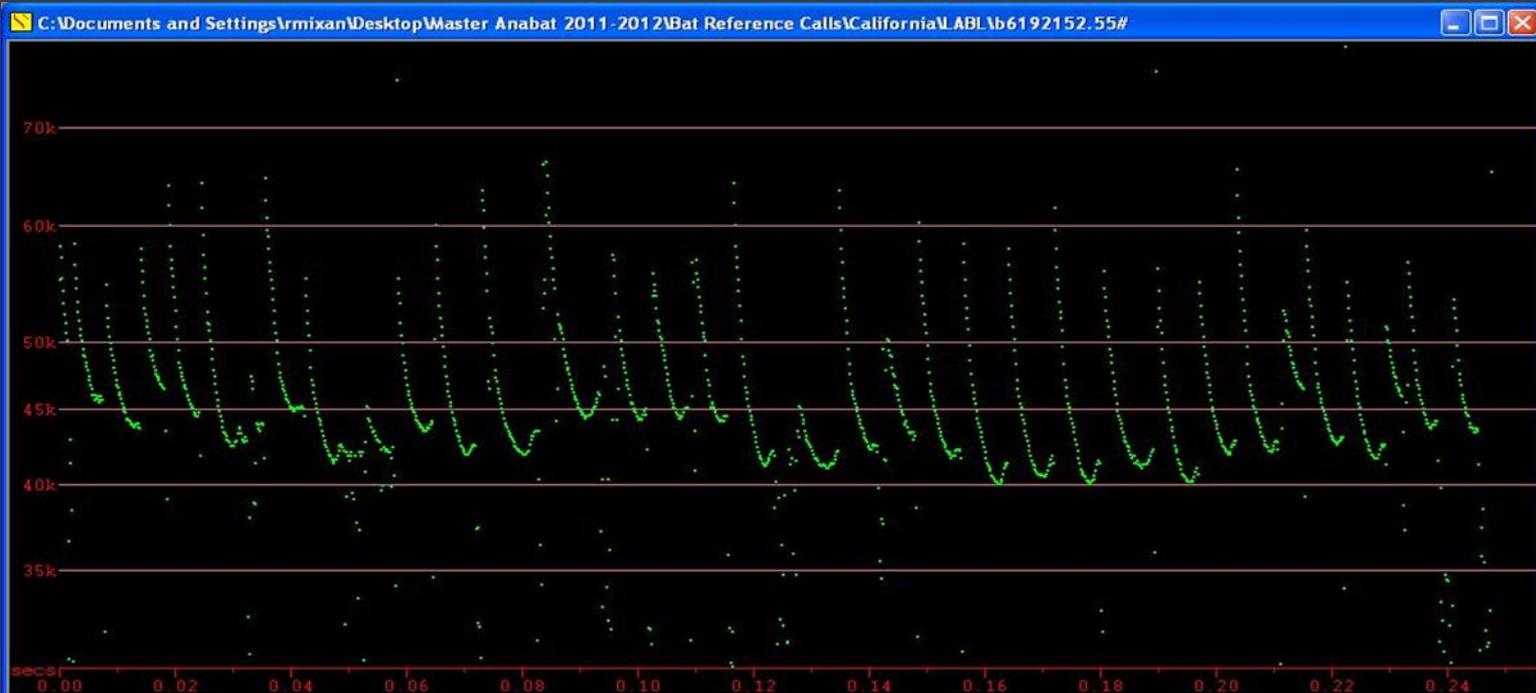
Methods

- We Record Calls Nightly From Sunset to Sunrise
- Download Data and Perform Station Maintenance 4-6 Weeks
- Apply Noise Filter
- Apply Species Specific Filters
- Manually Verify Calls (~430,000)
- Collect Weather Data (Temperature, Wind, Humidity, etc).



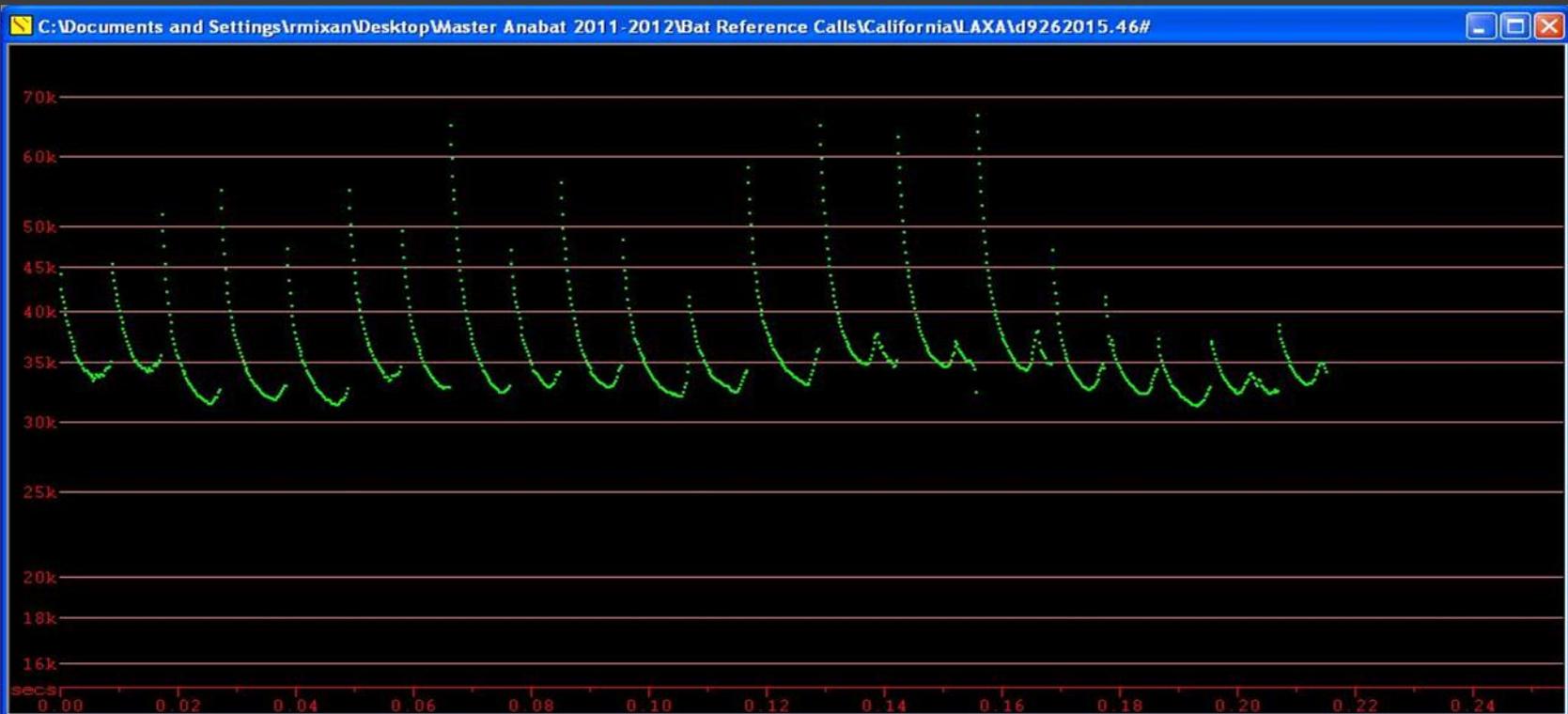
Acoustic Analysis

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



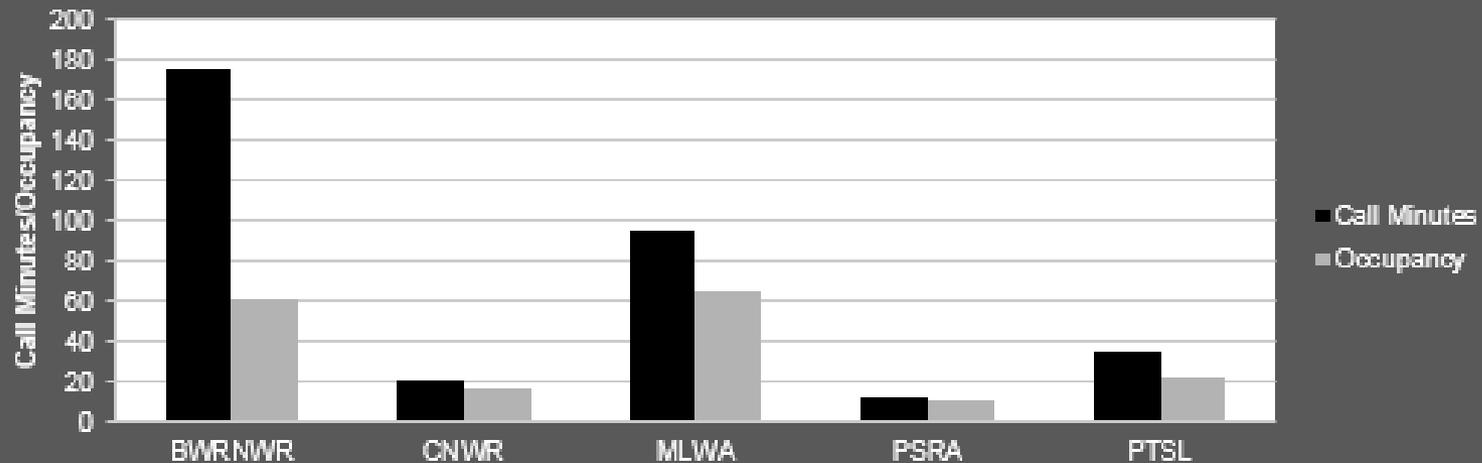
Acoustic Analysis

- Verified Calls Go Through an Occupancy Analysis
 - Presence/Absence Per Night
 - Determine Significant Differences Between Stations and Years

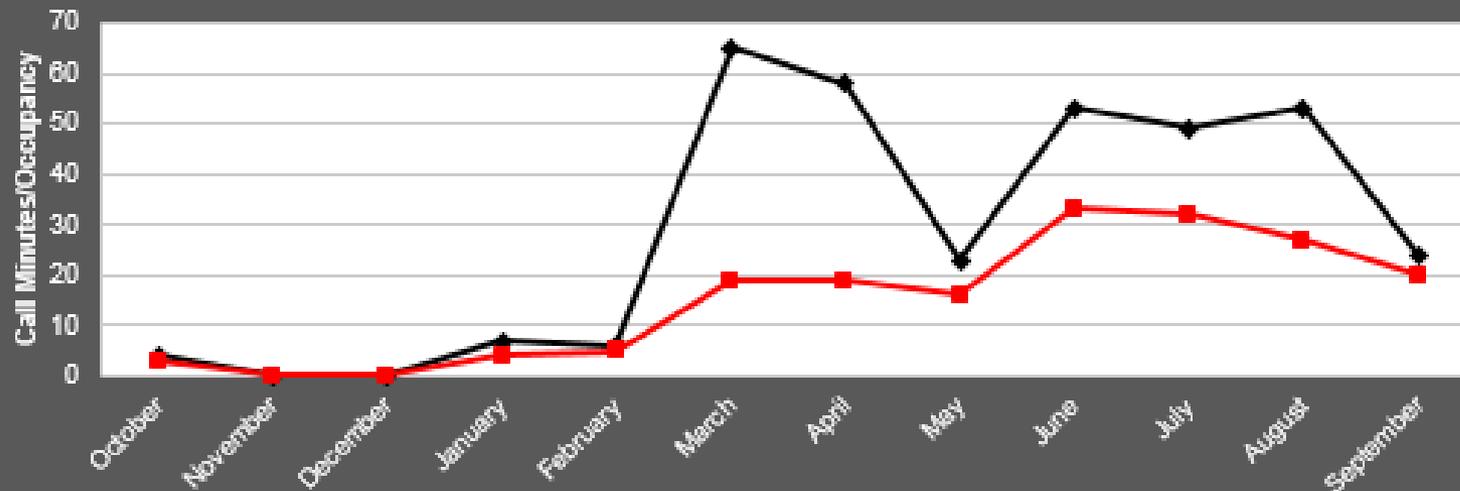


Results

Western Red Bat 2014

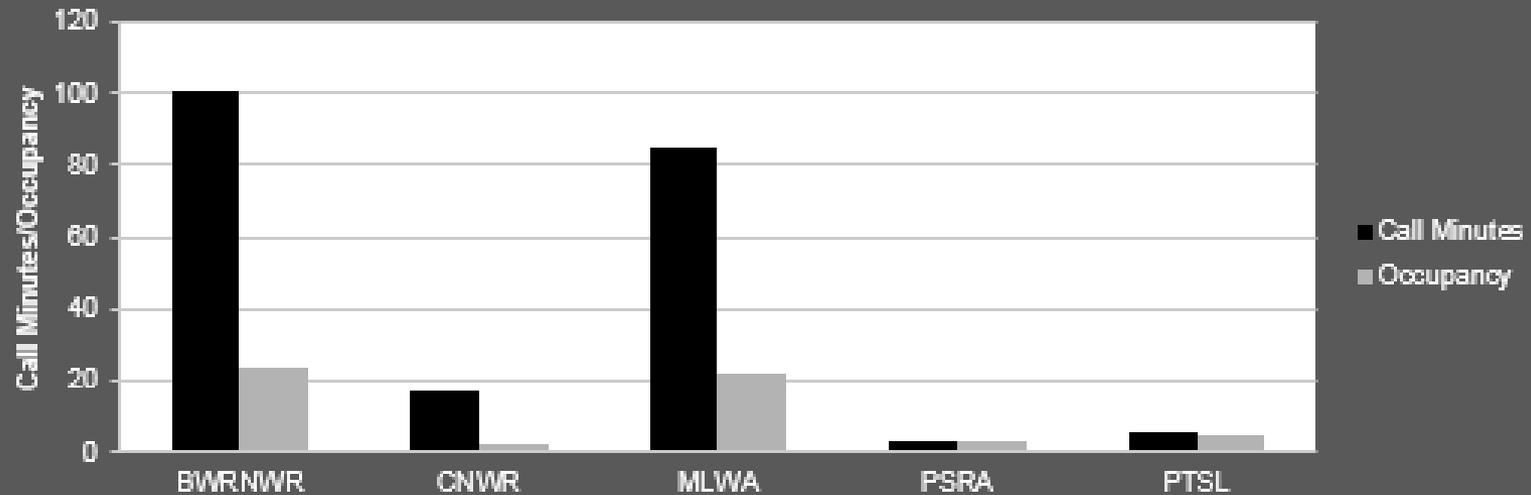


Western Red Bat 2014

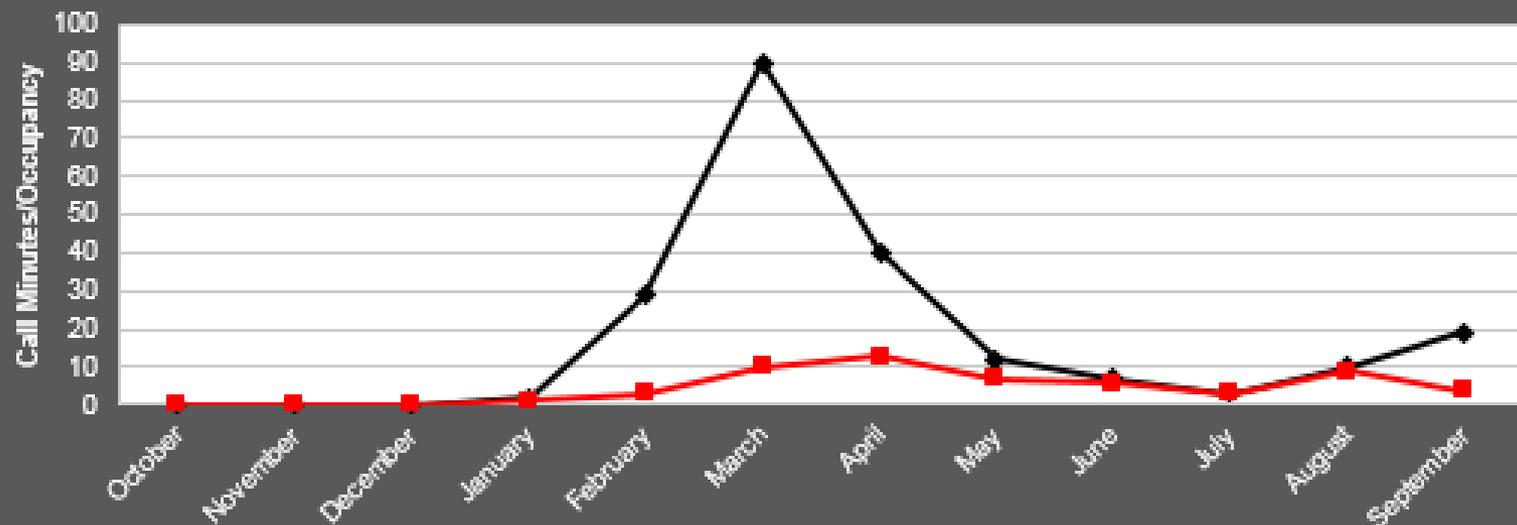


Results

Western Yellow Bat 2014

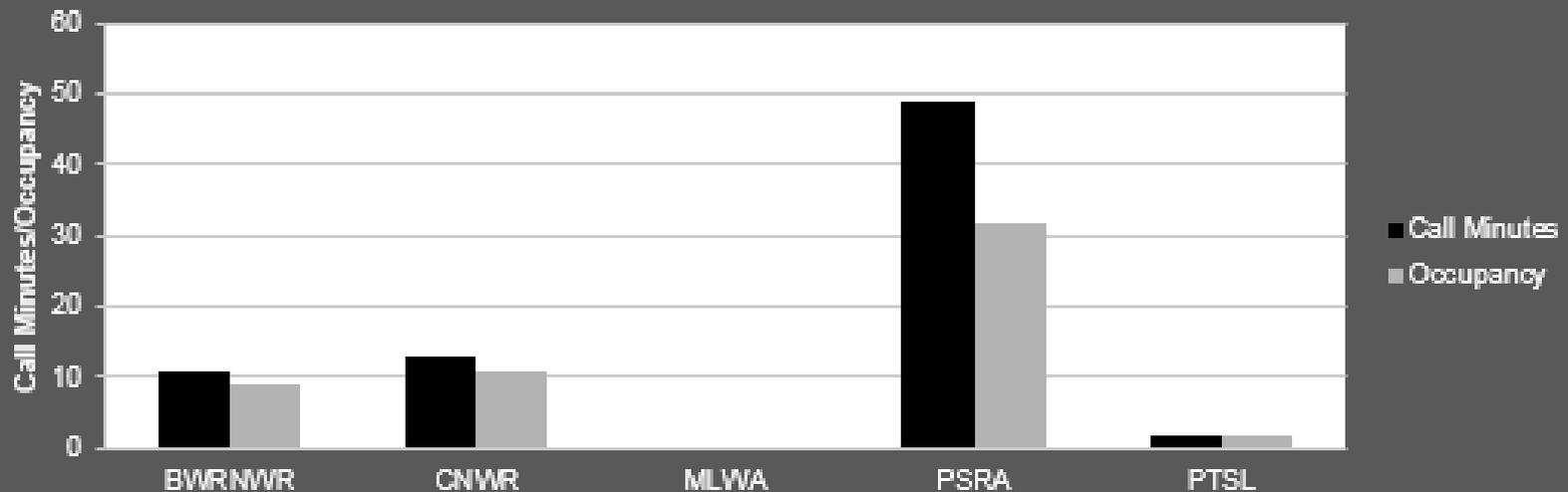


Western Yellow Bat 2014

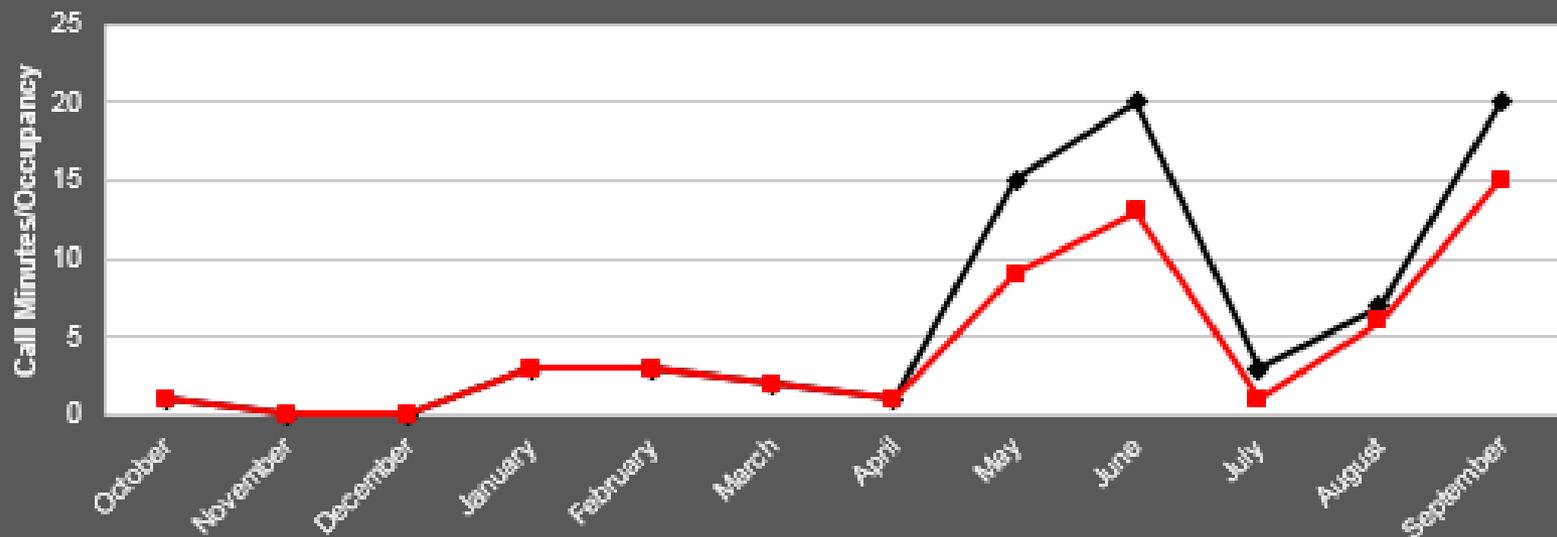


Results

California Leaf-Nosed Bat 2014

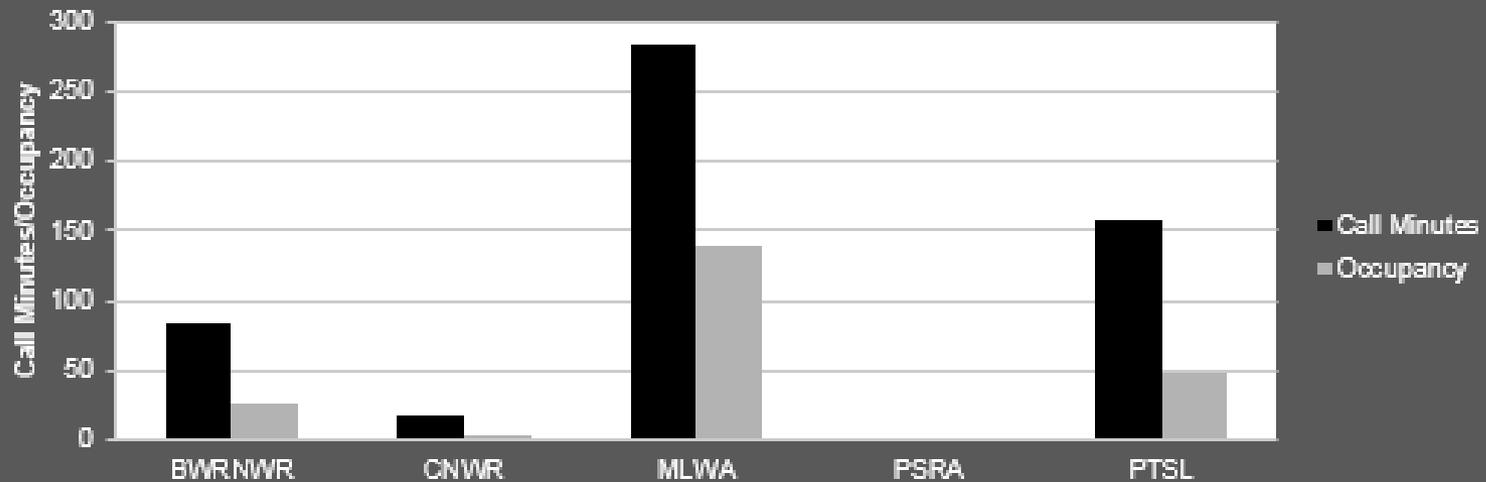


California Leaf-Nosed Bat 2014

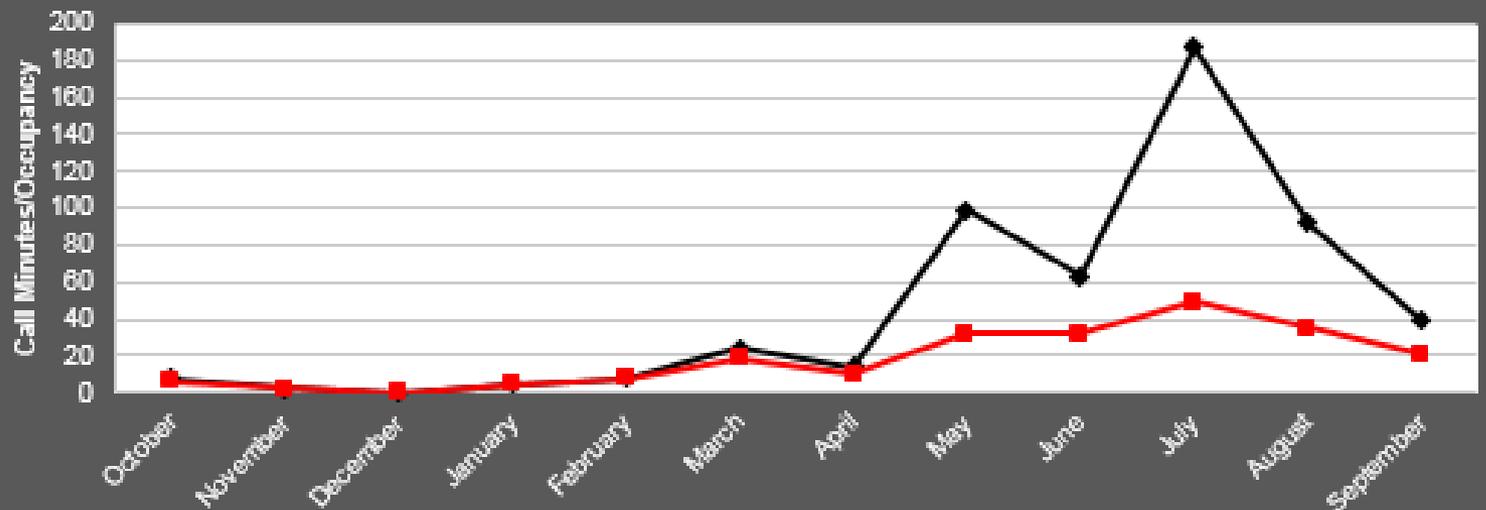


Results

Western Mastiff Bat 2014

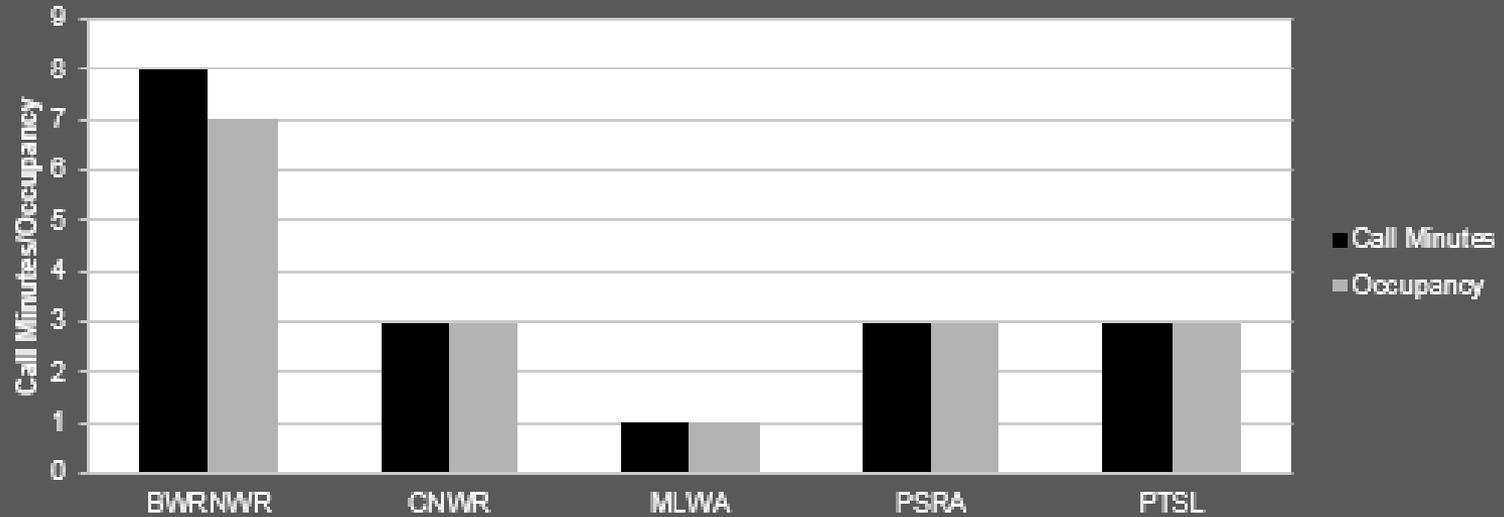


Western Mastiff Bat 2014

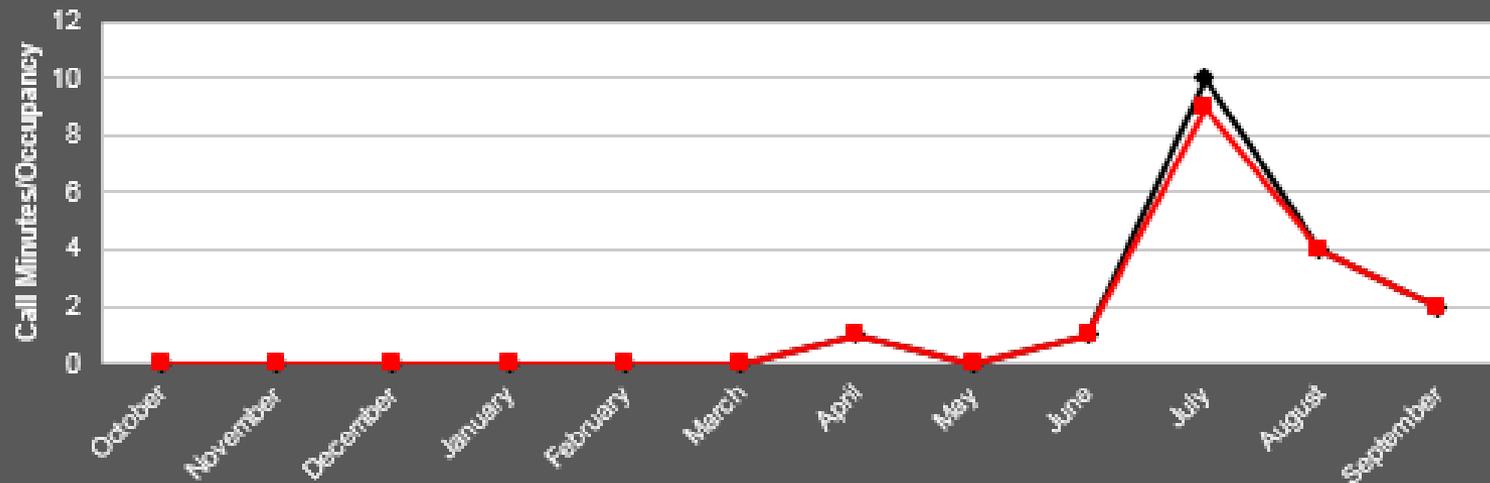


Results

Arizona Myotis 2014



Arizona Myotis 2014

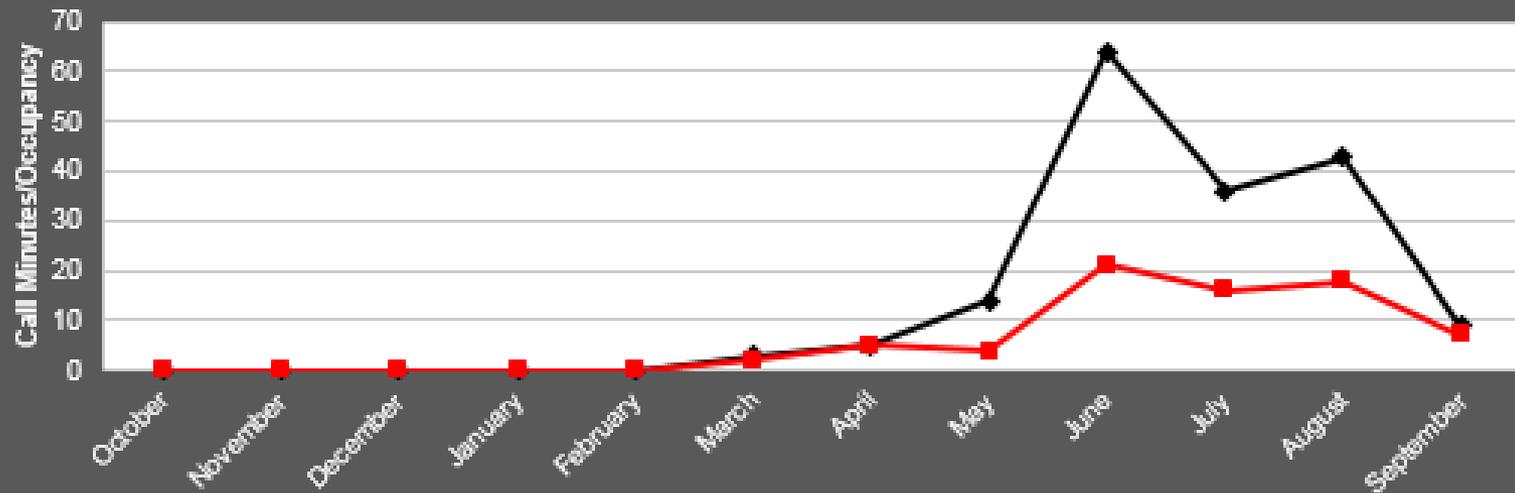


Results

Cave Myotis 2014

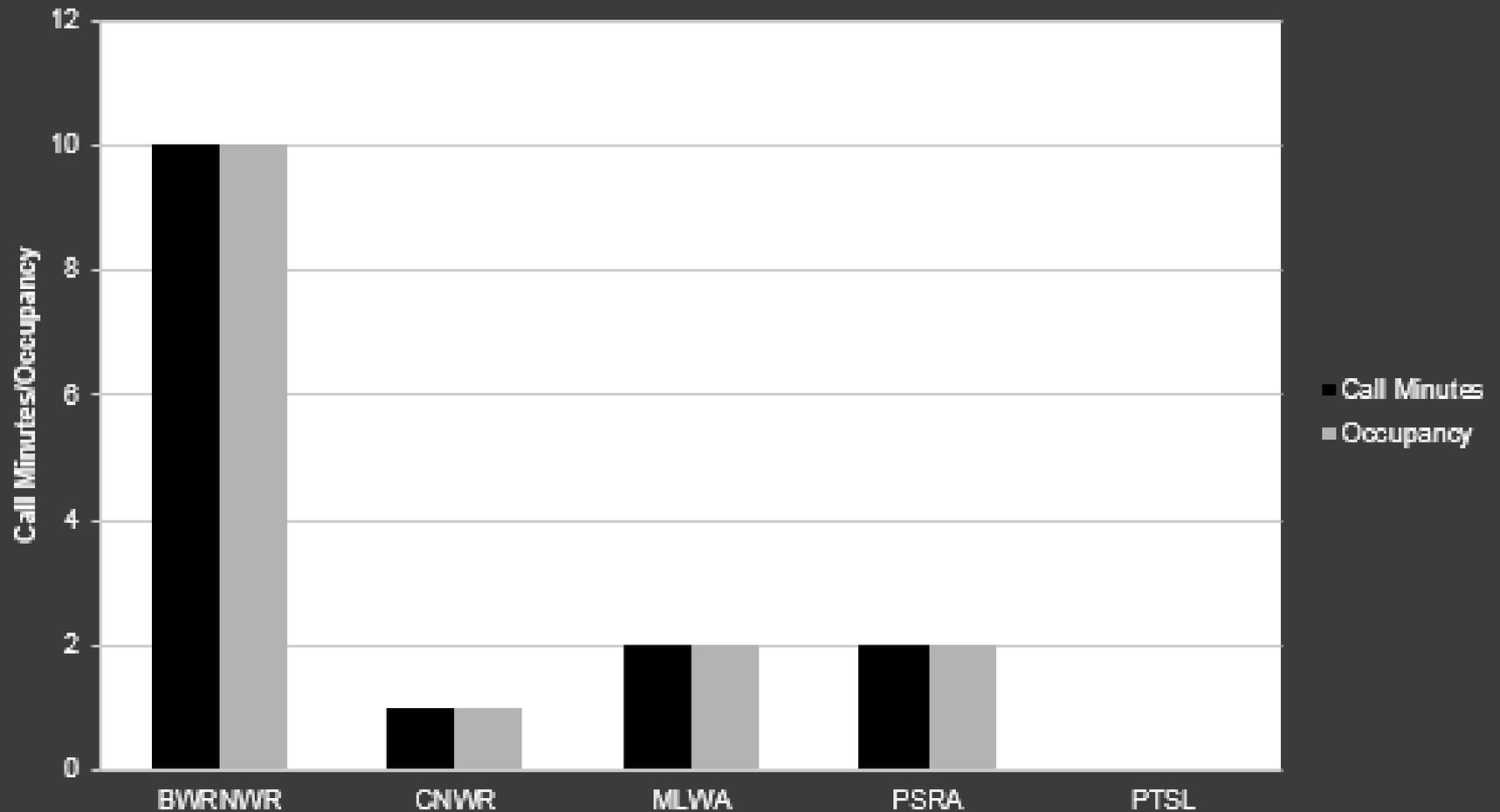


Cave Myotis 2014

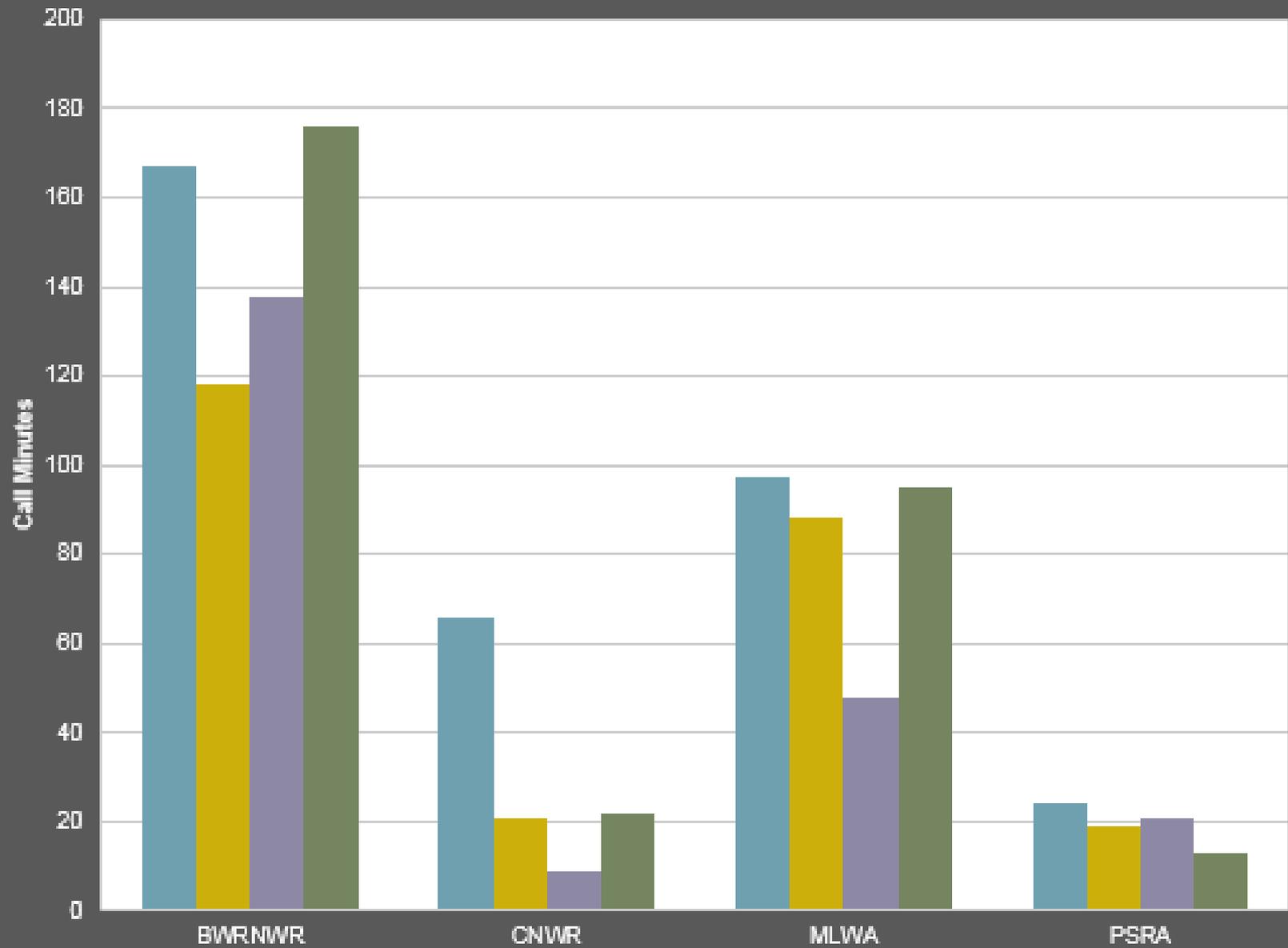


Results

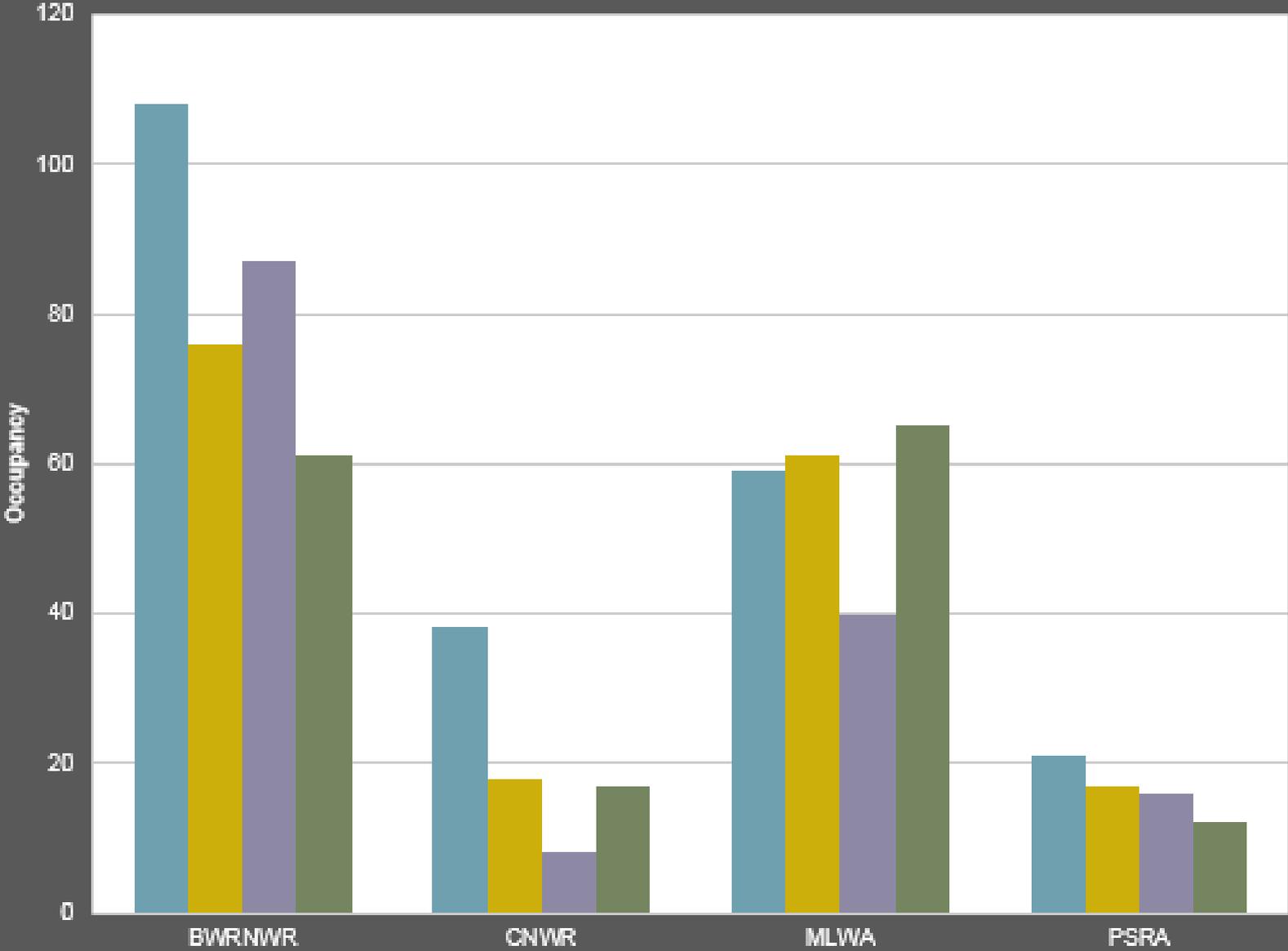
Townsend's Big-Eared Bat 2011-2014



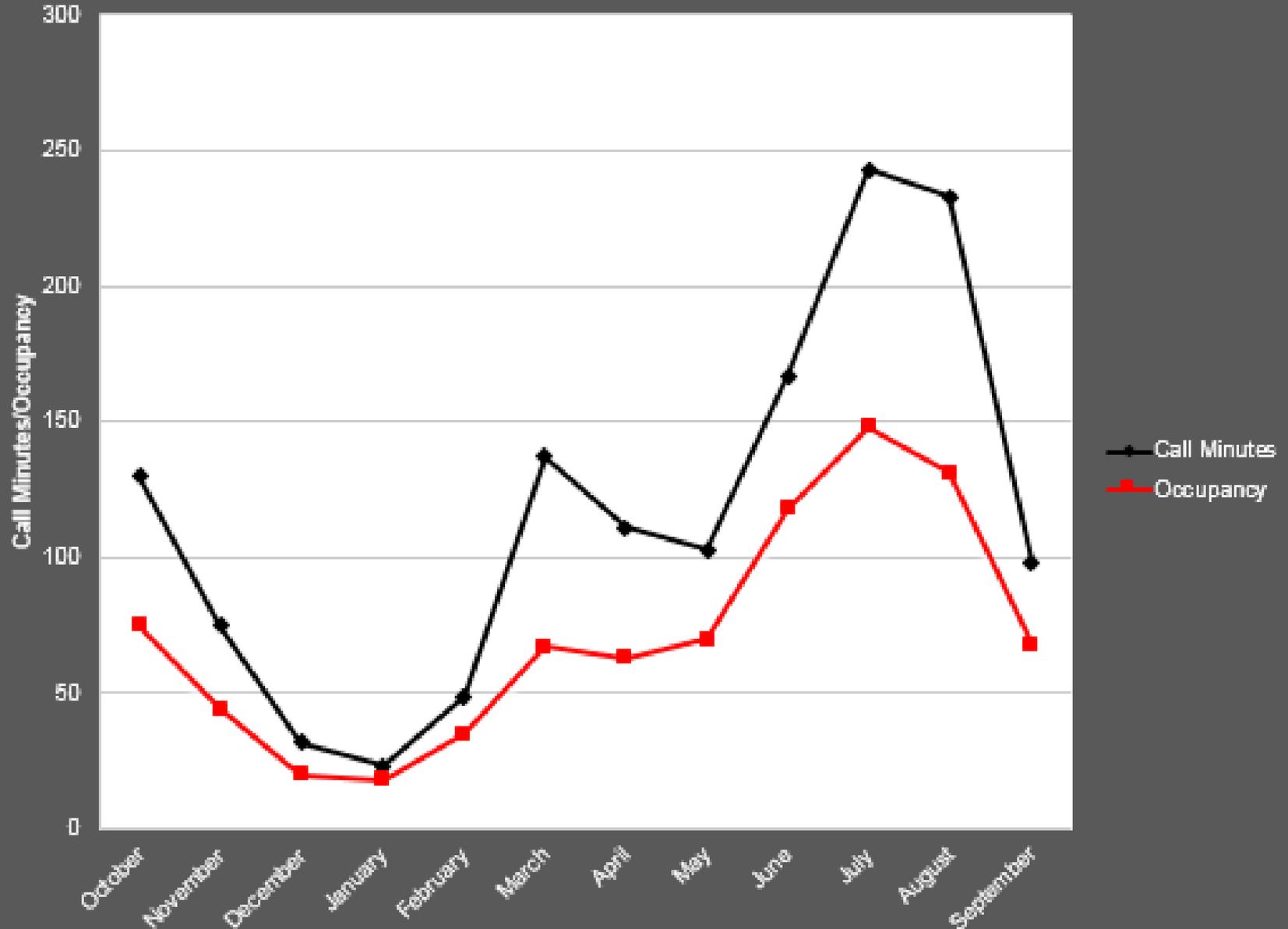
Western Red Bat Call Minutes 2011-2014



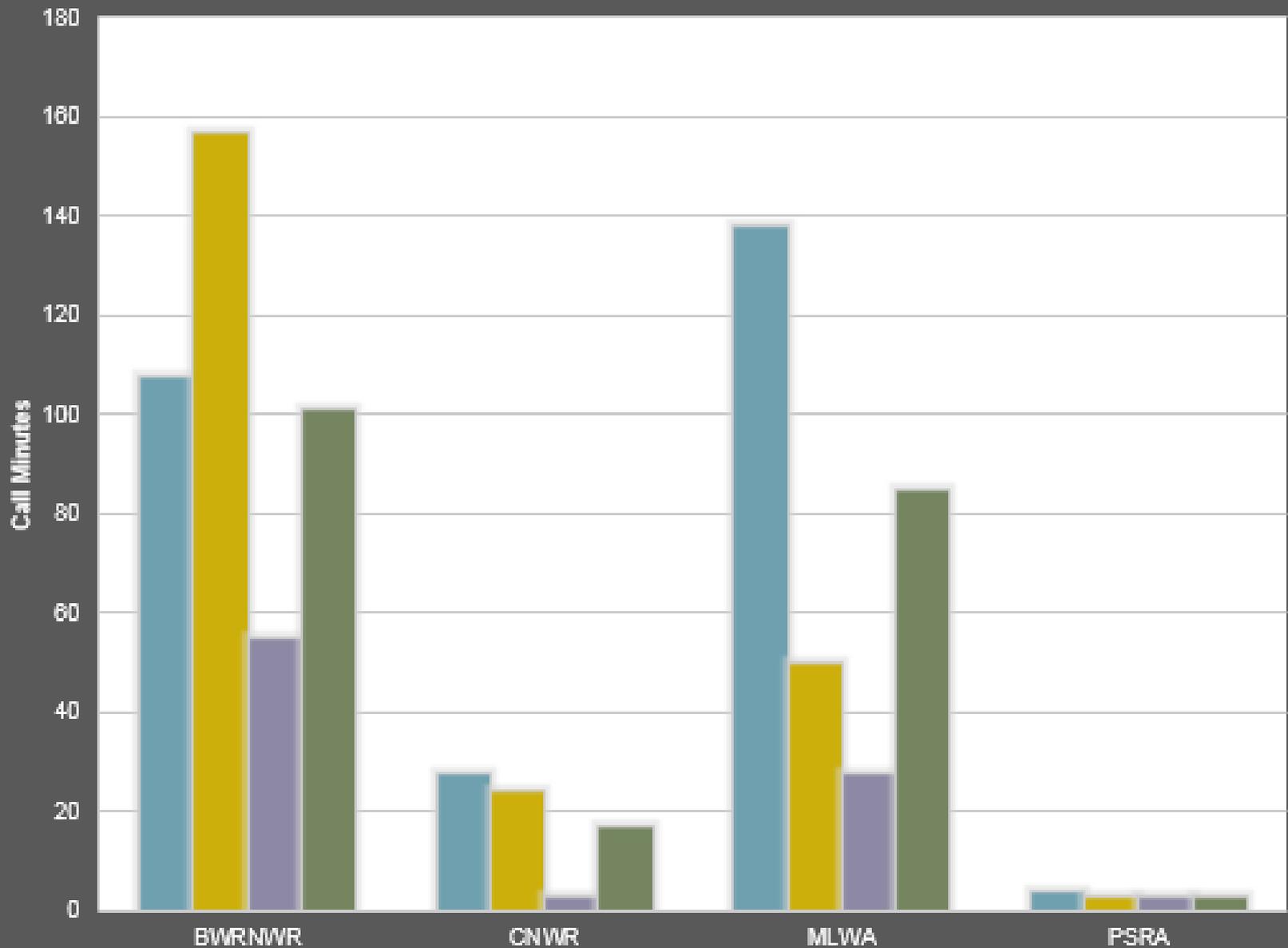
Western Red Bat Occupancy 2011-2014



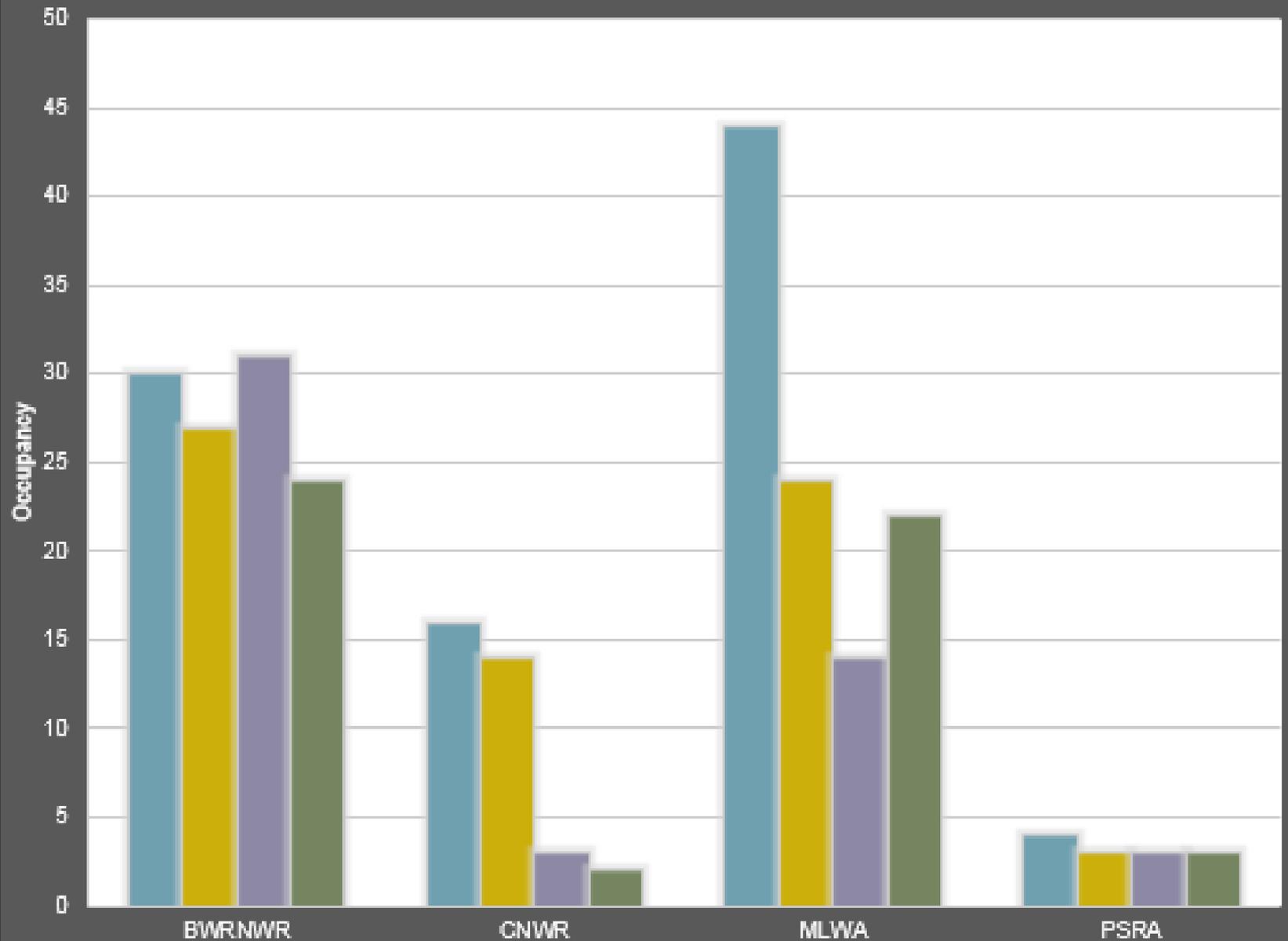
Western Red Bat Call Minutes/Occupancy 2010-2014



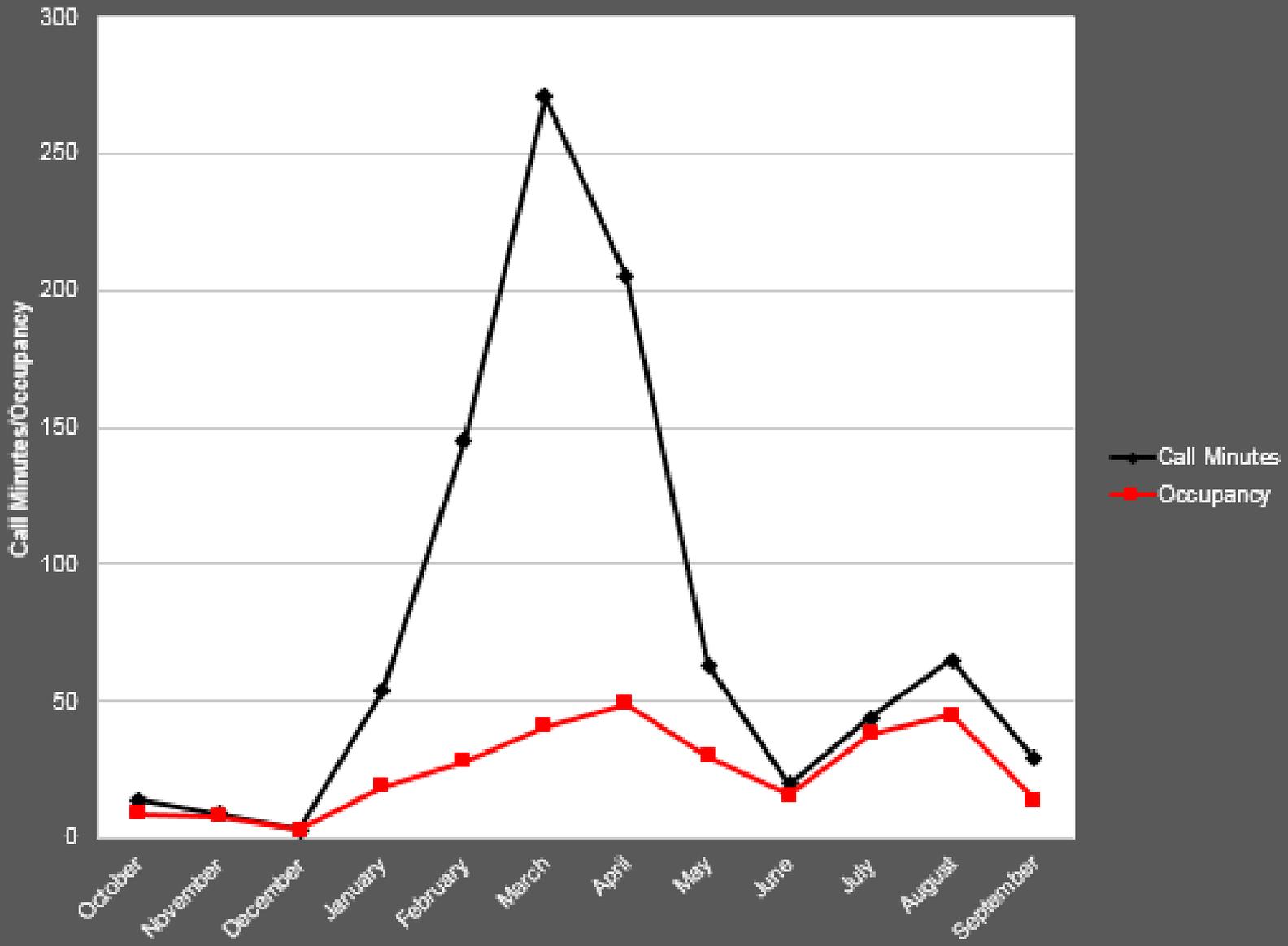
Western Yellow Bat Call Minutes 2011-2014



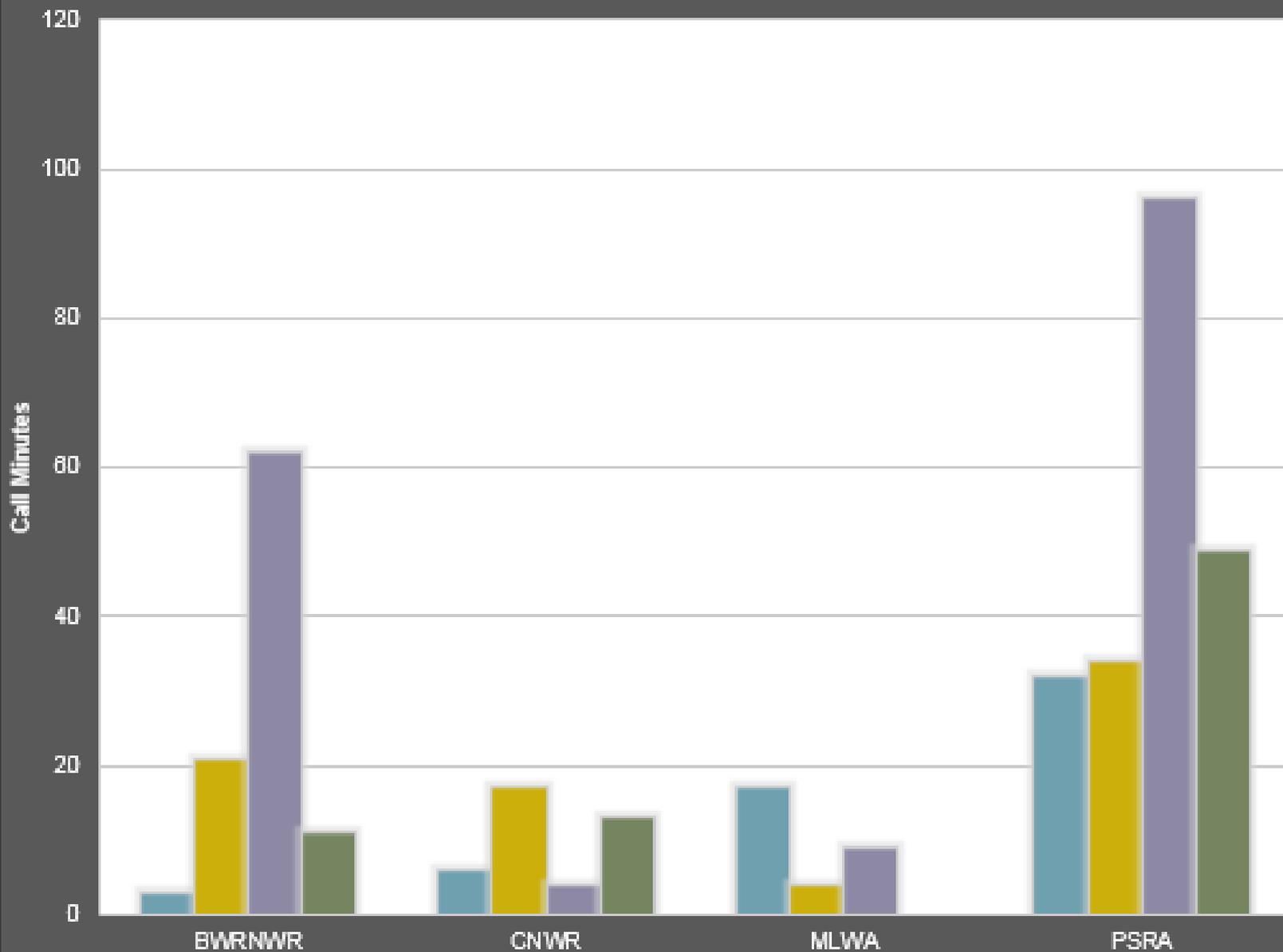
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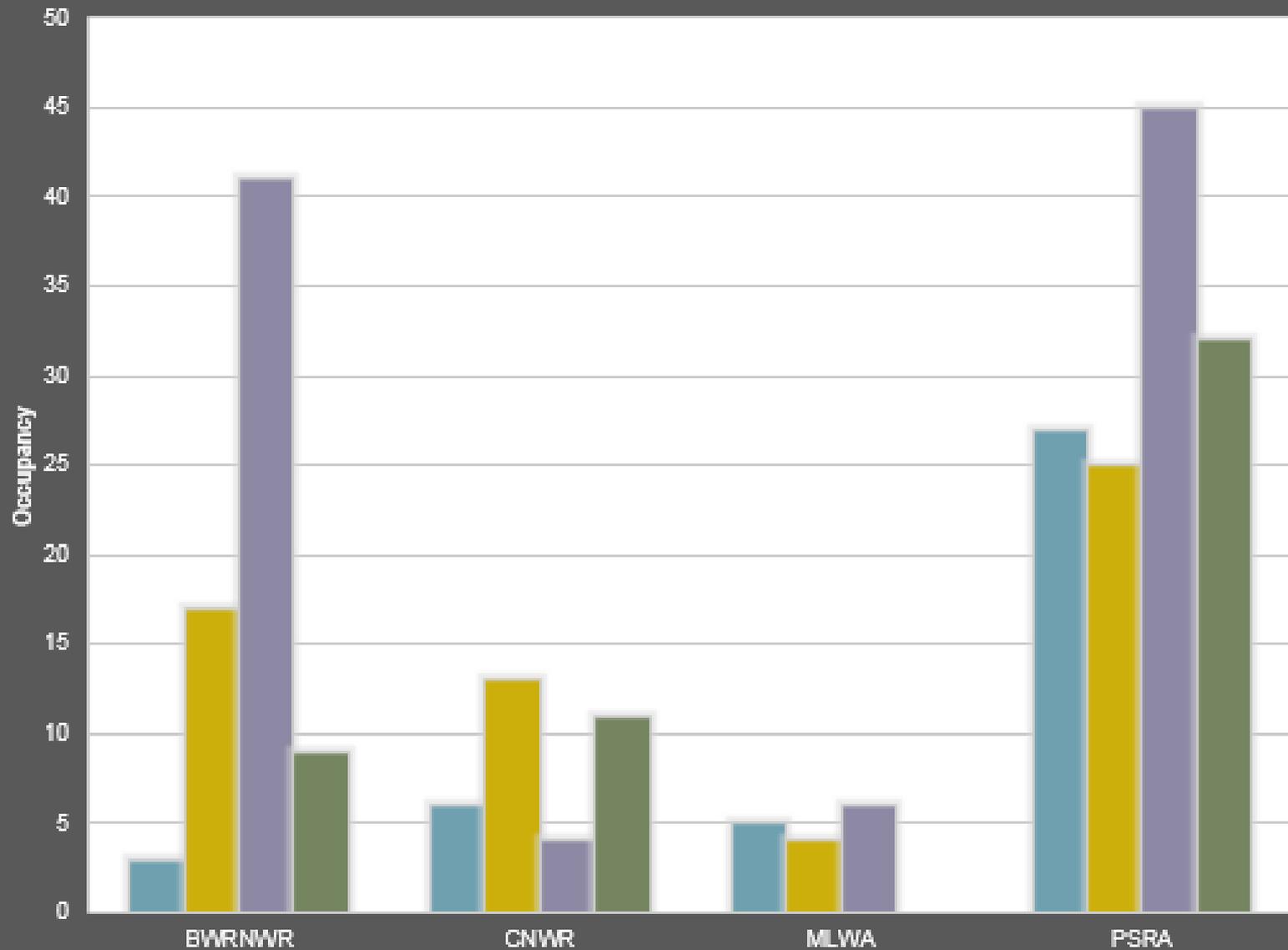
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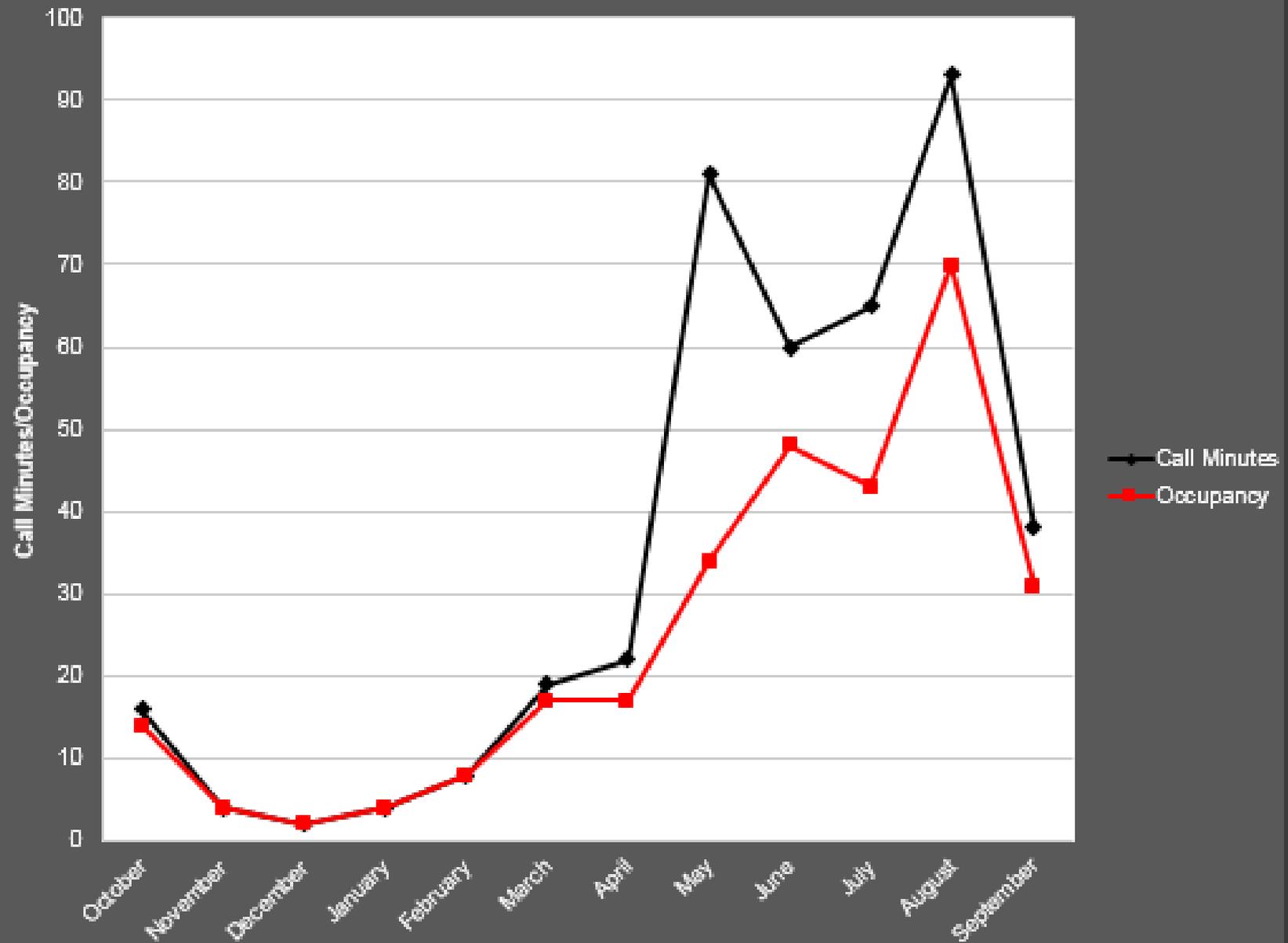
California Leaf-Nosed Bat Call Minutes 2011-2014



California Leaf-Nosed Bat Occupancy 2011-2014

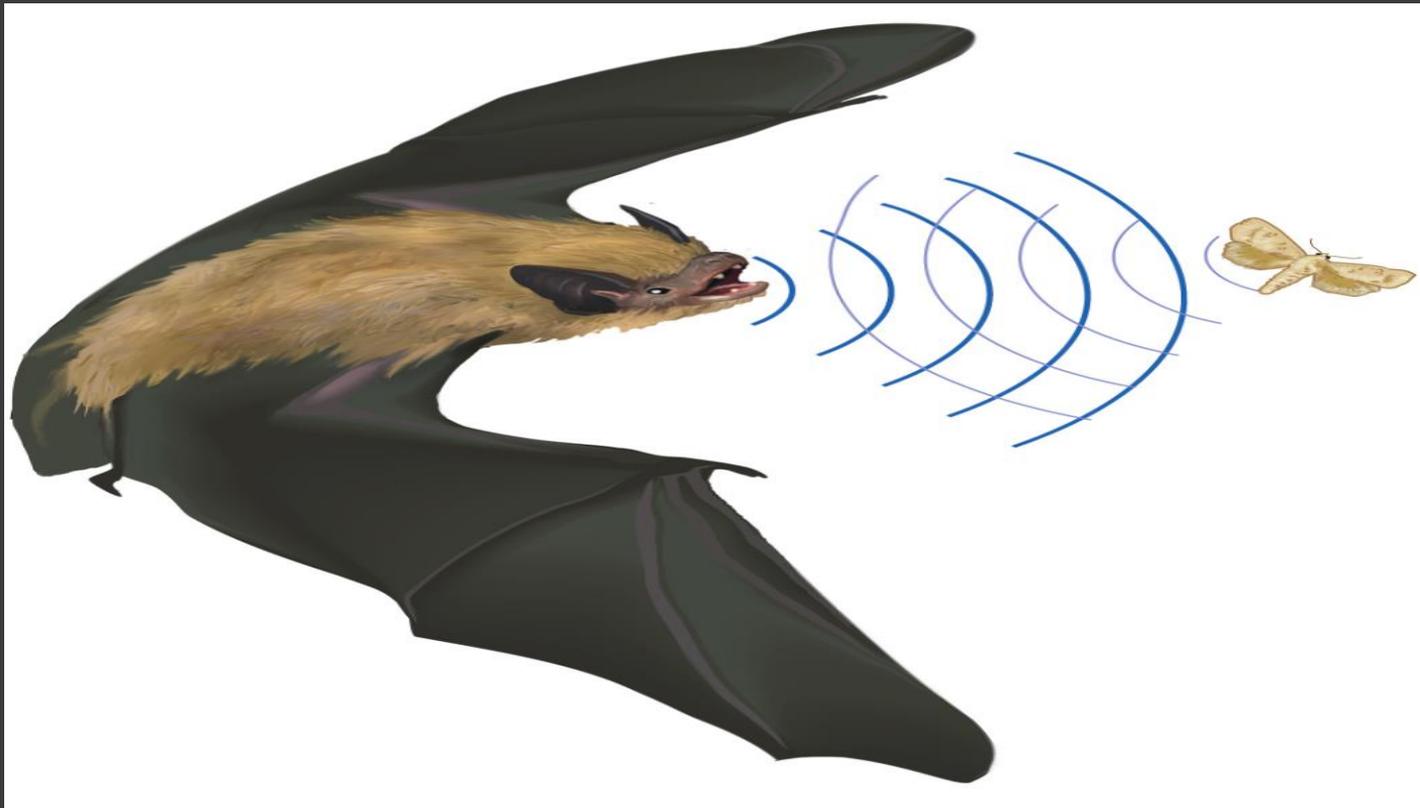


California Leaf-Nosed Bat Call Minutes/Occupancy 2010-2014



Discussion

- ◉ Consistent Activity and Occupancy
- ◉ Merge Restoration and Non-Restoration Data Sets (System Wide Analysis)
- ◉ Determine Significant Temporal and Spatial Changes (Stations/Species)



Acknowledgements

- ◉ Allen Calvert: Bureau of Reclamation
- ◉ Susan Broderick: Bureau of Reclamation
- ◉ Nathan Rudd: Bureau of Reclamation
- ◉ Lin Piest: AZ Game and Fish Department



Questions

