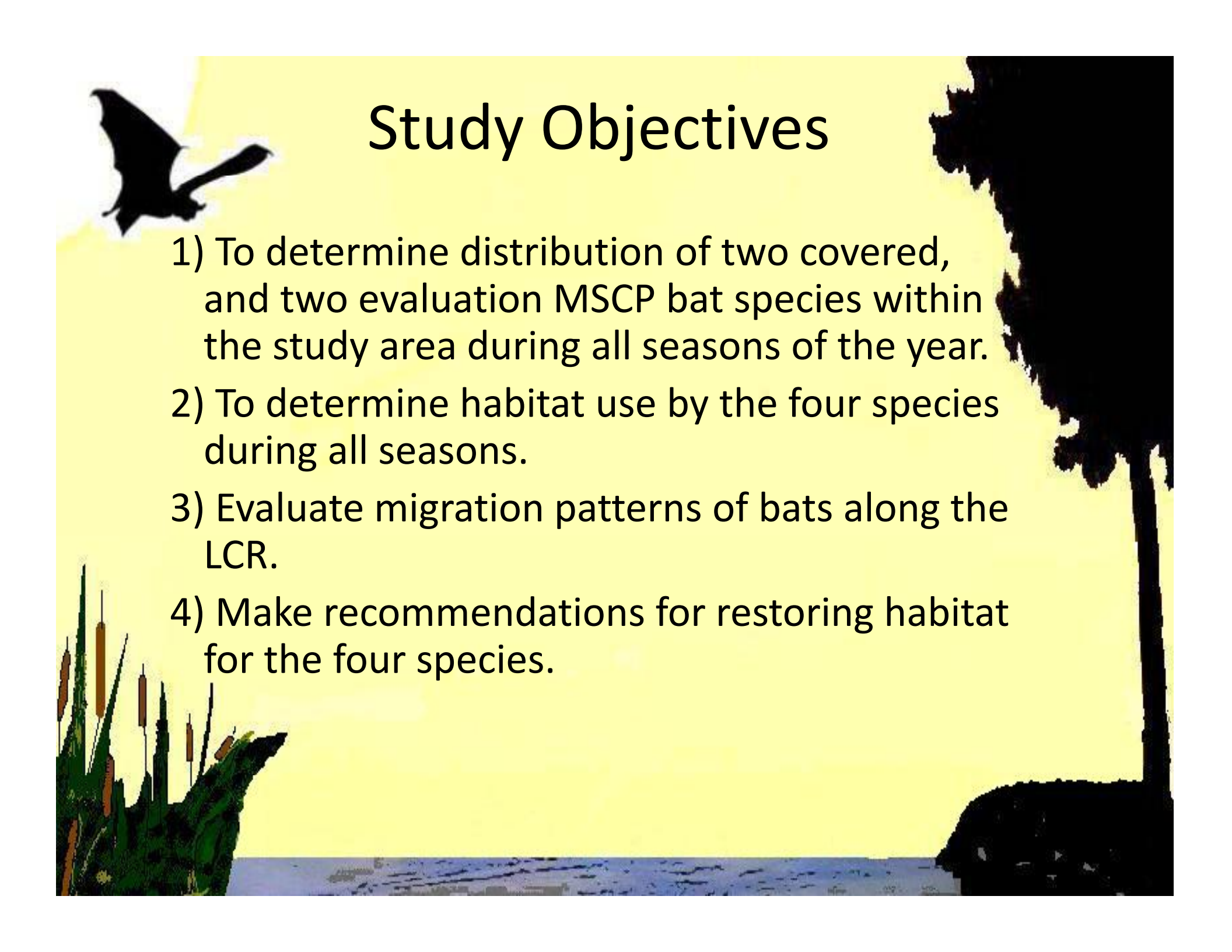




Monitoring Bats of the Lower Colorado River

By: Beatriz Vizcarra



The background of the slide features a sunset over a body of water. In the upper left, a black silhouette of a bat is shown in flight. On the right side, a large black silhouette of a tree stands against the sky. In the lower left corner, there are silhouettes of green reeds with brown seed pods. The sky is a gradient of yellow and orange, and the water at the bottom is a dark blue-grey.

Study Objectives

- 1) To determine distribution of two covered, and two evaluation MSCP bat species within the study area during all seasons of the year.
- 2) To determine habitat use by the four species during all seasons.
- 3) Evaluate migration patterns of bats along the LCR.
- 4) Make recommendations for restoring habitat for the four species.



Laguna Dam 1906



Figure 4A. Laguna Damsite, California, 26 July 1906; note continuous riparian zone of Fremont cottonwood and willows. U. S. Bureau of Reclamation. Photograph 115-P-35-303-9A.

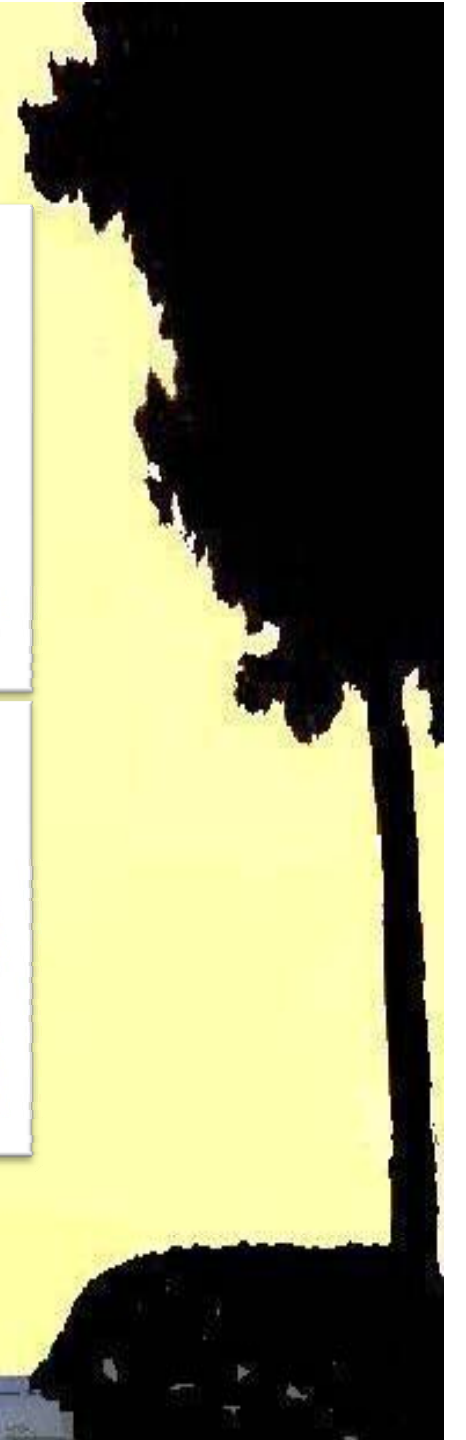


Laguna Dam 100 years later



Pictures provided by BLM

MSCP Species



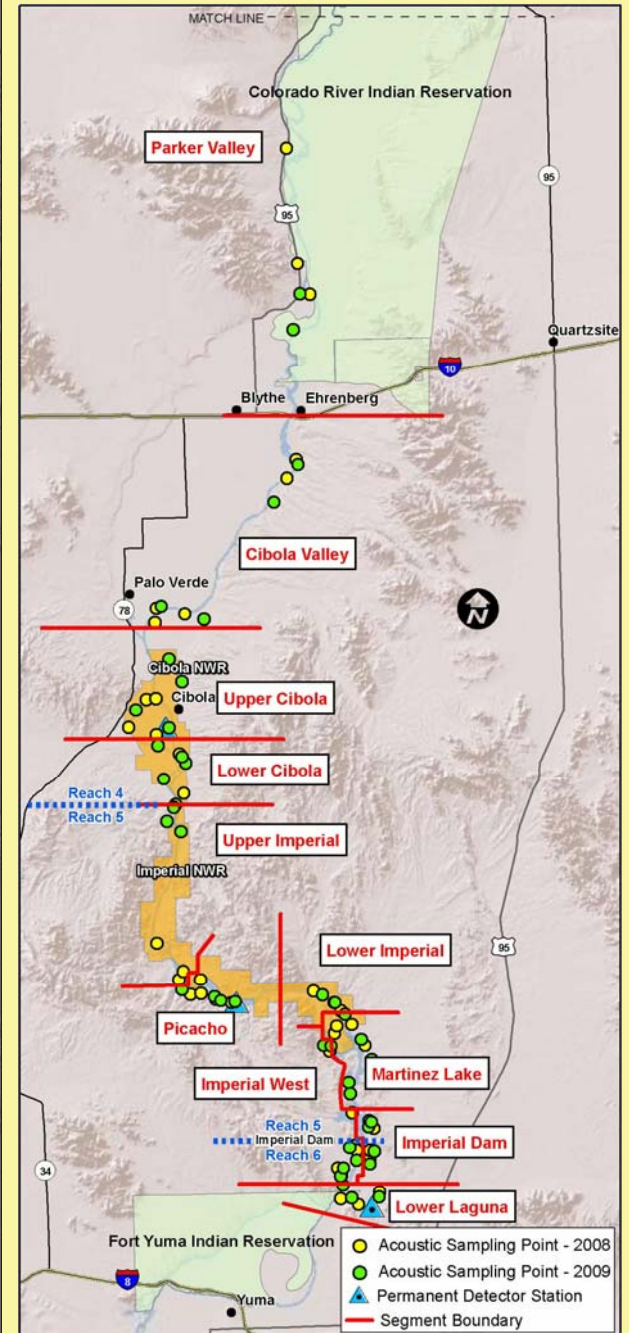
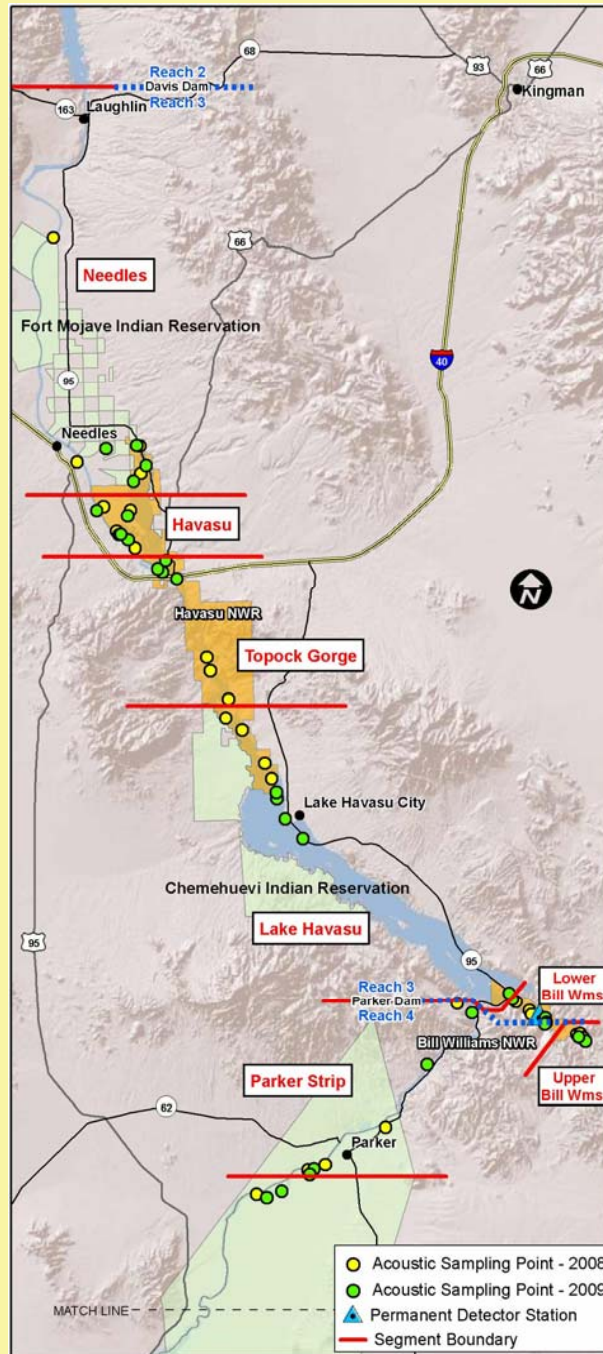


Study Area



METHODS

we have established a sampling point within each of four target vegetation types



Vegetation Types



Salt cedar



Marsh

Vegetation Types



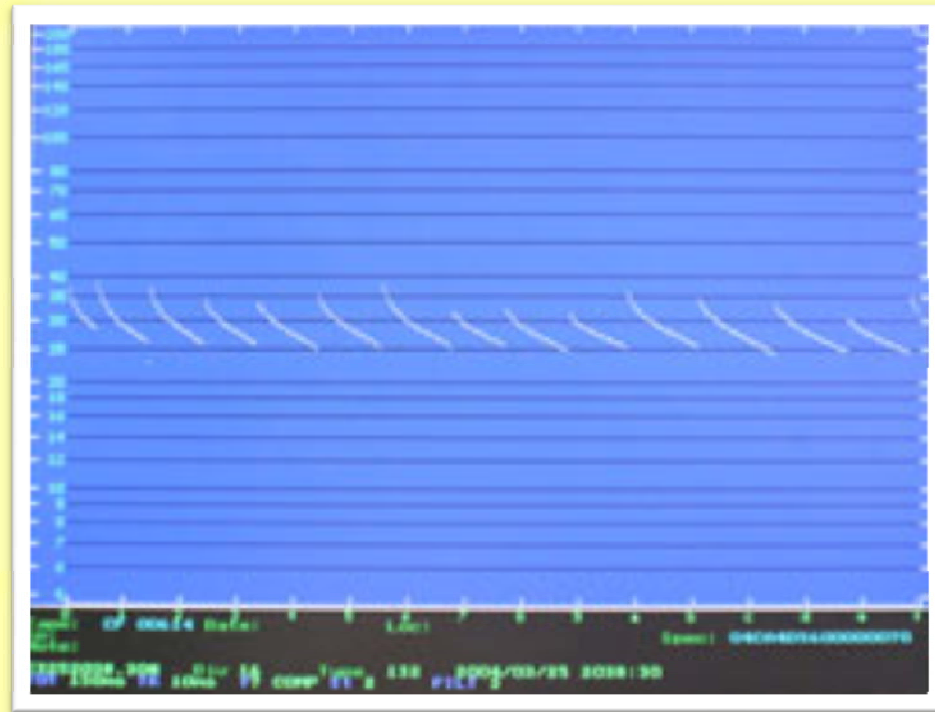
Cottonwood



Mesquite

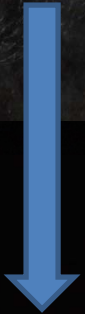
METHODS

Acoustic Sampling



Acoustic Sampling is non invasive

BAT TRAPPING



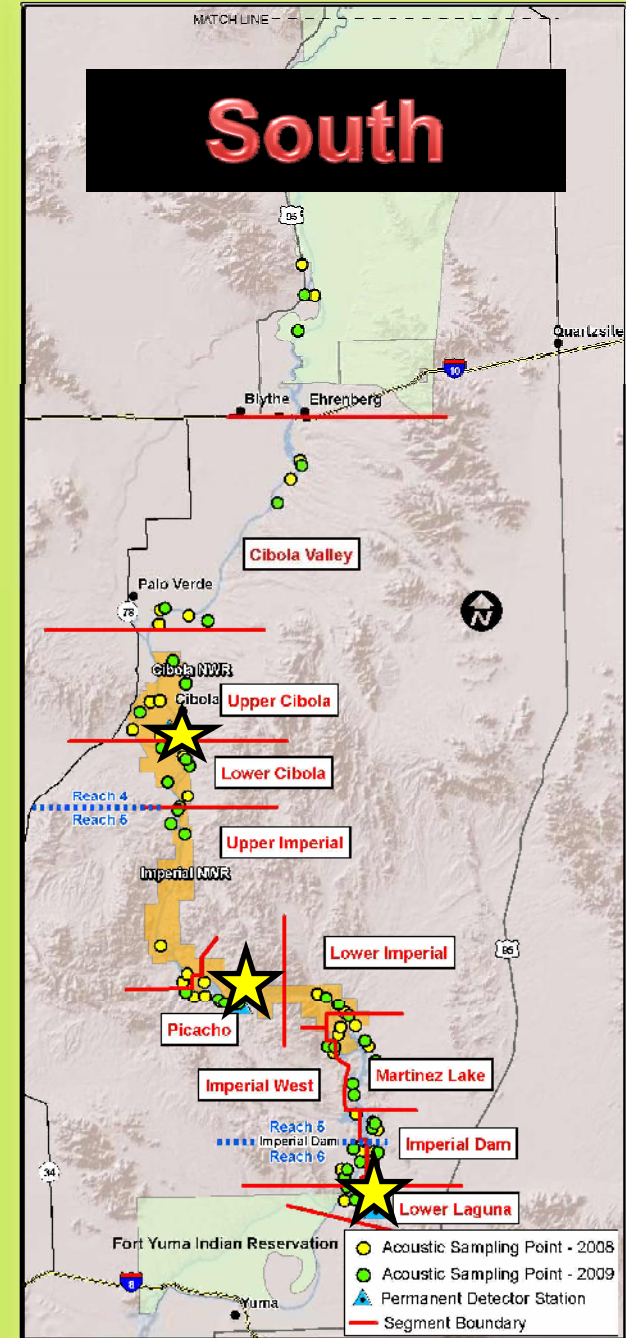
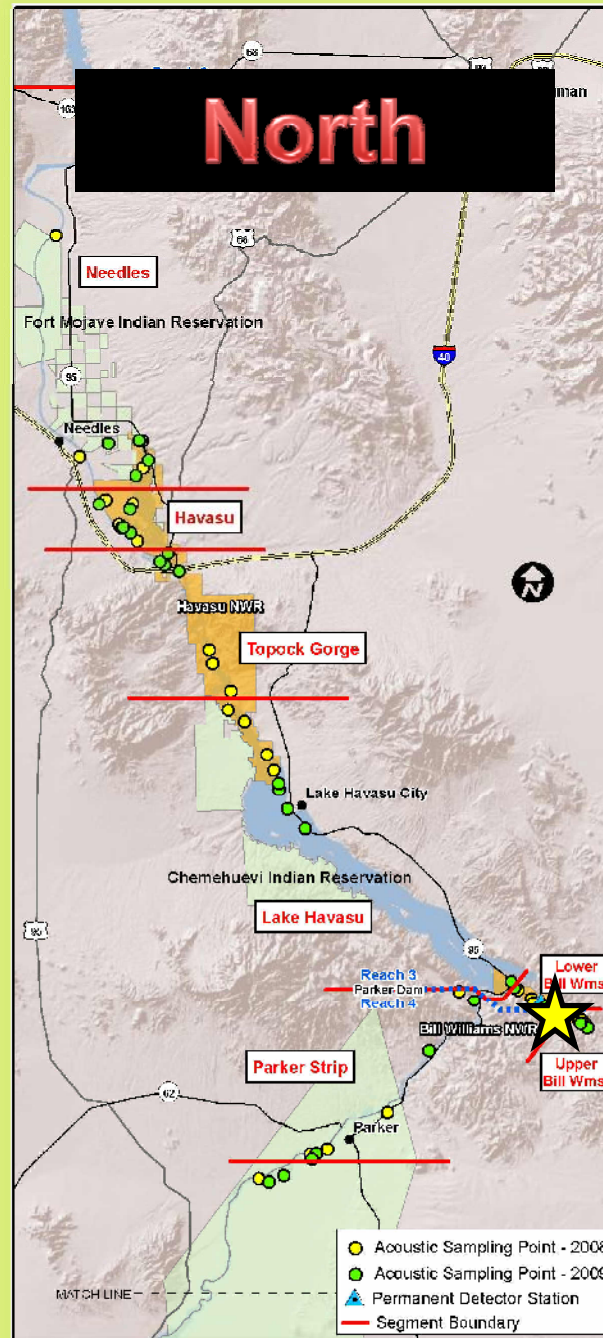
METHODS

Acoustic Permanent Stations



- Picacho State Recreation Area
- Mitty Lake Wildlife Area
- Cibola National Wildlife Refuge
- Bill Williams River National Wildlife Refuge

Permanent Stations





Results ...

In general the number of call minutes we recorded for the focal species was very low compare to other species along the river

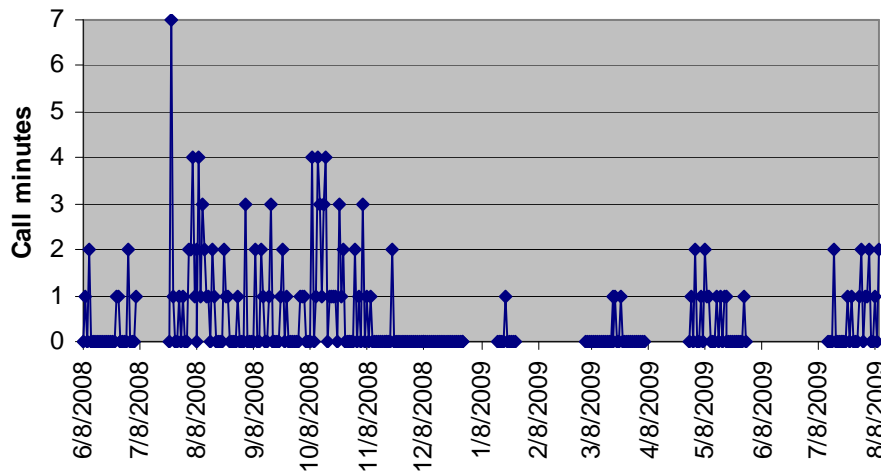
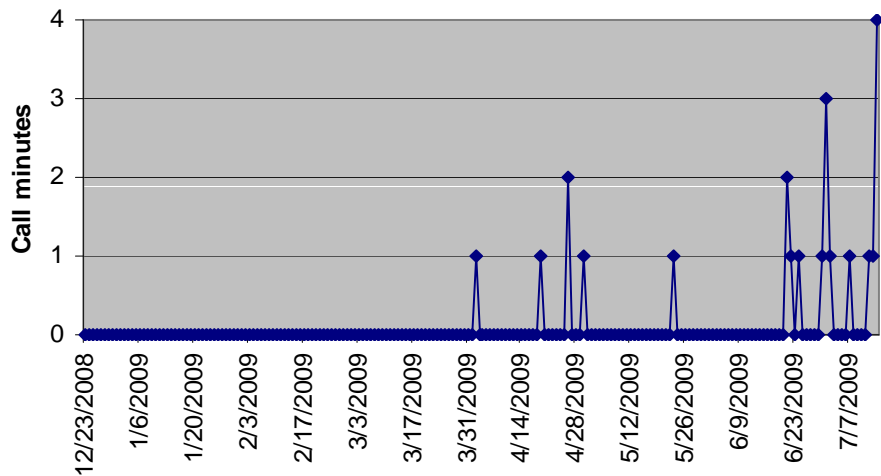
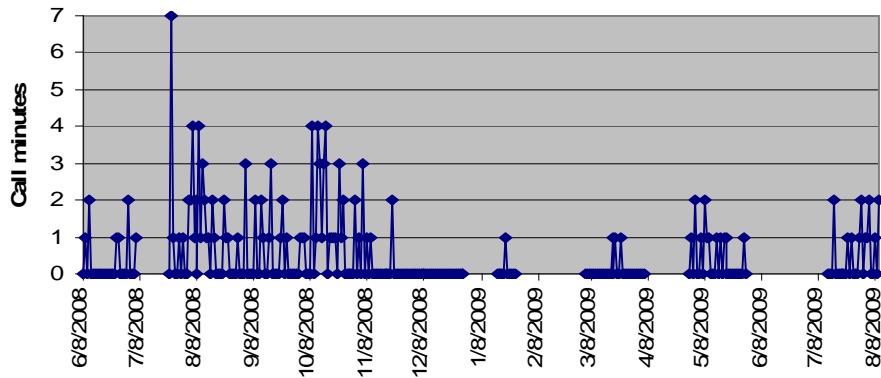


Number of Call Minutes Recorded for Western Red Bats at Permanent Stations

Bill Williams River NWR

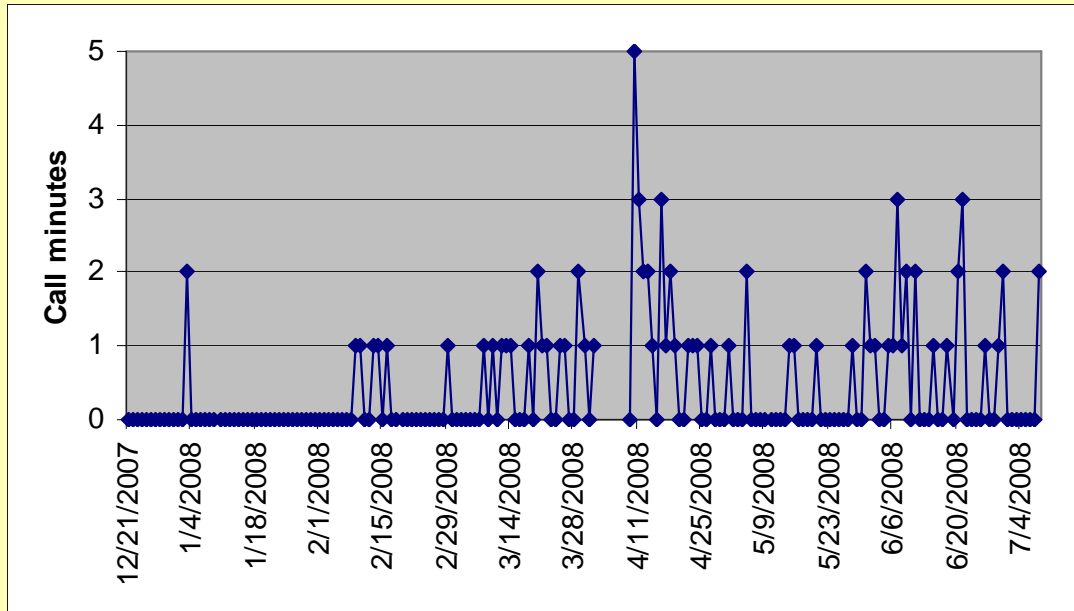
Cibola NWR

Picacho State Recreation Area

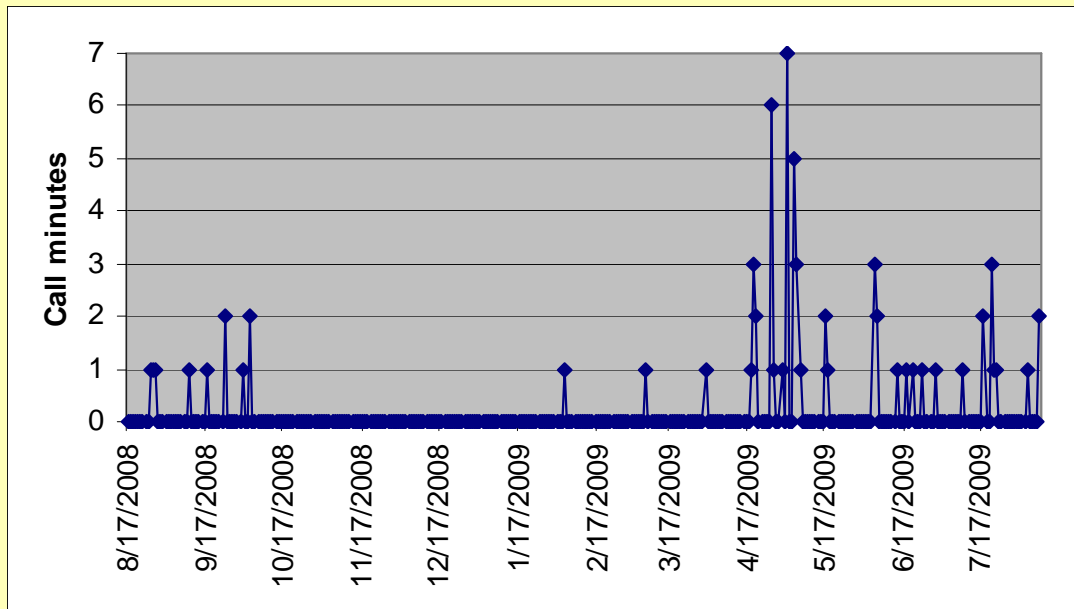


Call minutes are the number of minutes during which a bat call is recorded

Number of Call Minutes Recorded for Western Red Bats at Permanent Stations



Imperial NWR



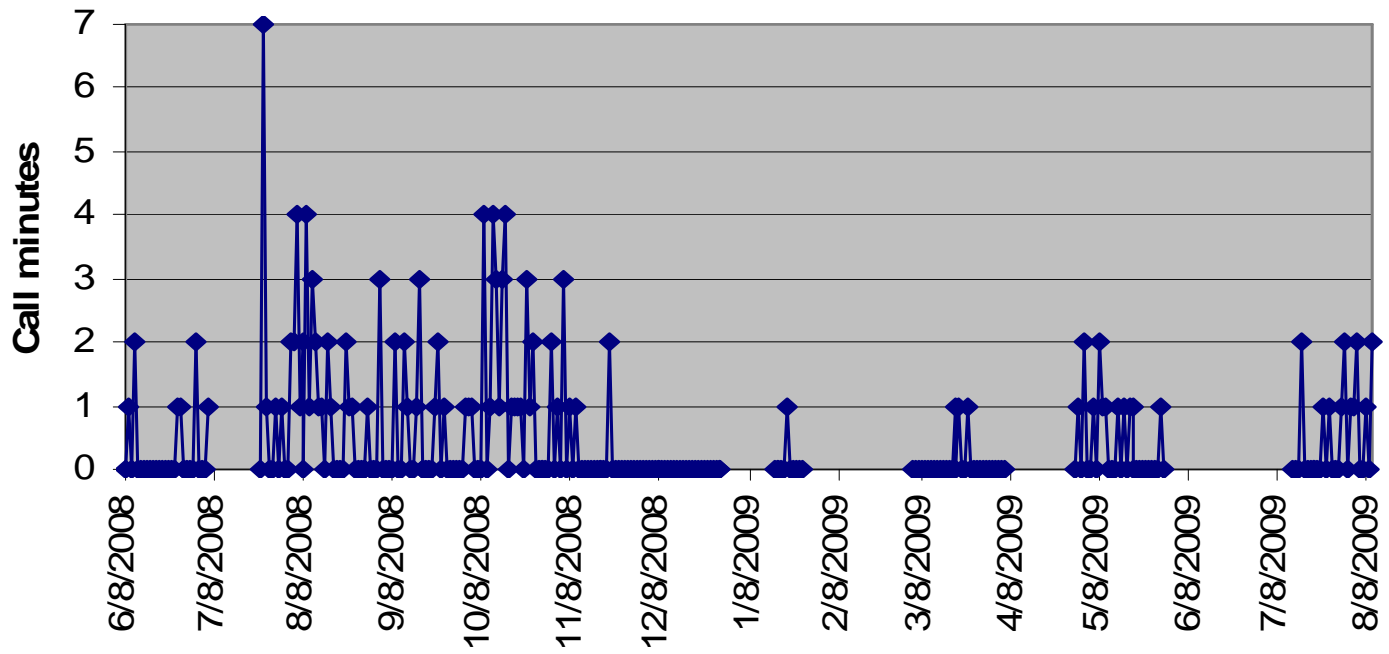
Mittry Lake Wildlife Area

Call minutes are the number of minutes during which a bat call is recorded

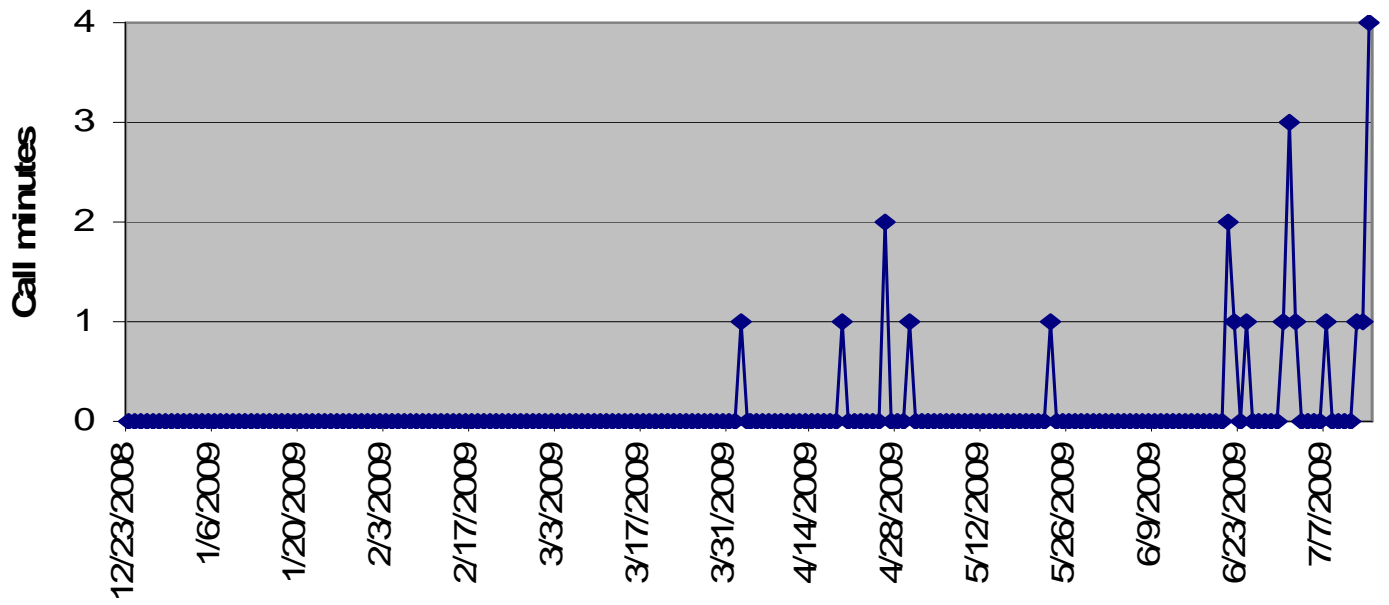
Western Red Bat



The red bat was recorded most frequently in the spring and fall and less frequently in the winter.



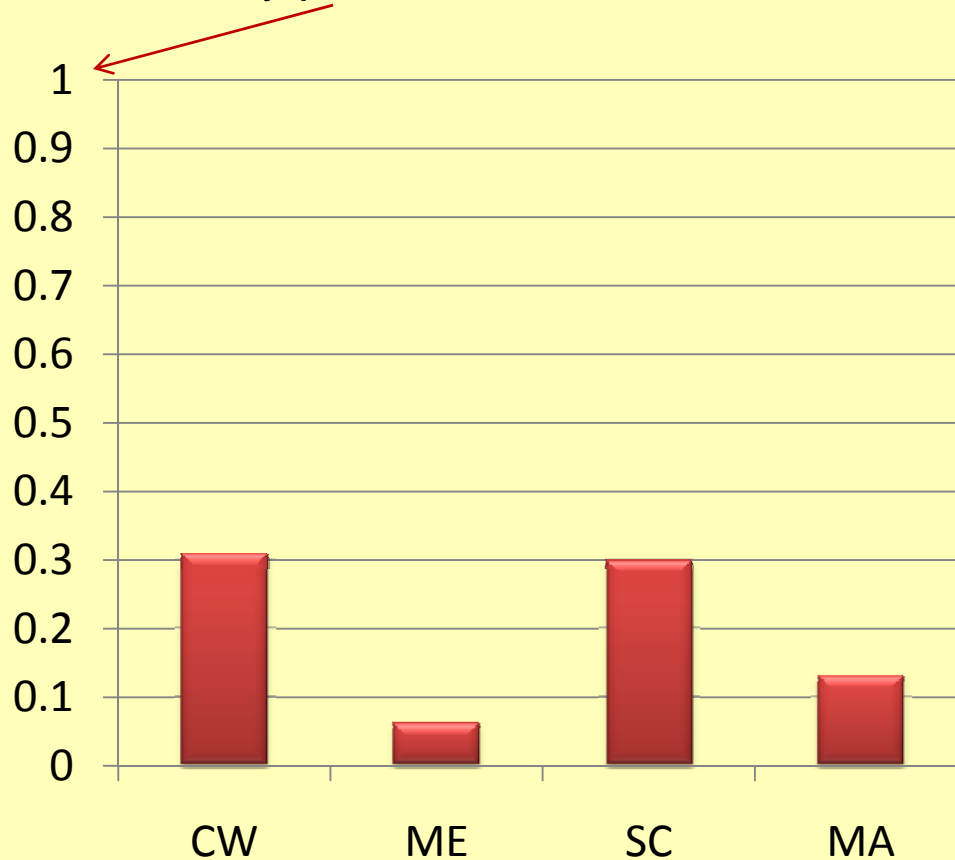
Bill
Williams



Cibola

Occupancy Rates by Vegetation Types

A rate of 1 indicate that these species occur at every point



Western Red Bat



Occupancy rates is the estimated occurrence at a survey point

Occupancy models incorporate detection probabilities to account for miss detection there by increasing the accuracy of the models.

Western Yellow Bat



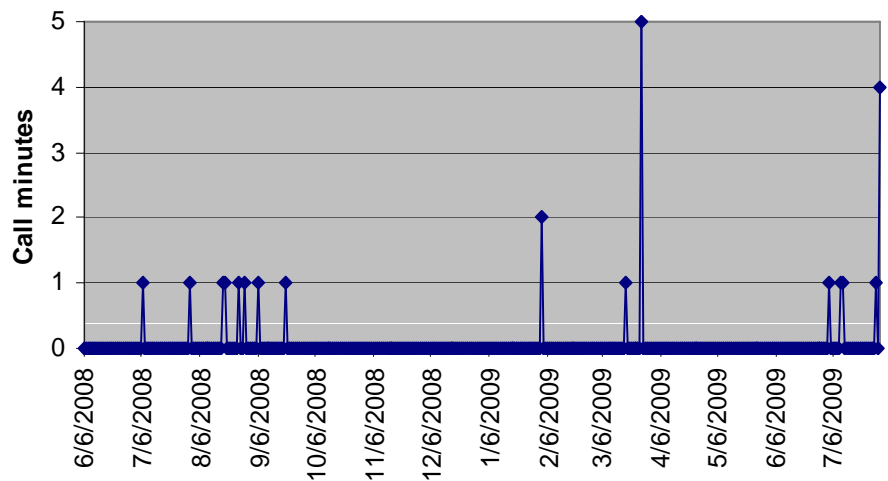
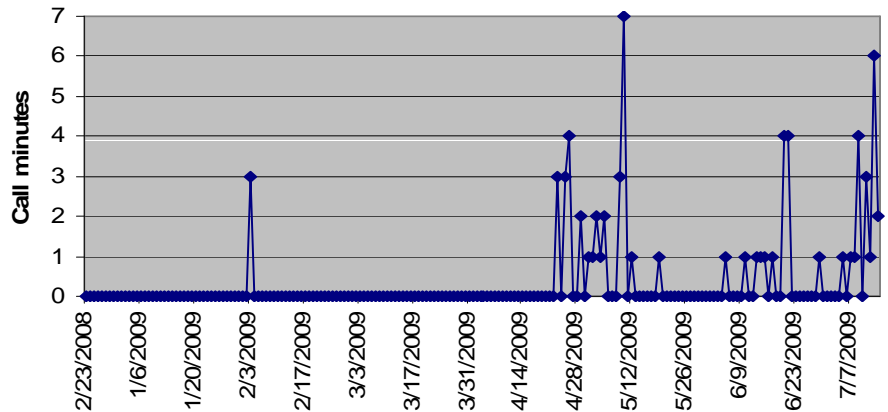
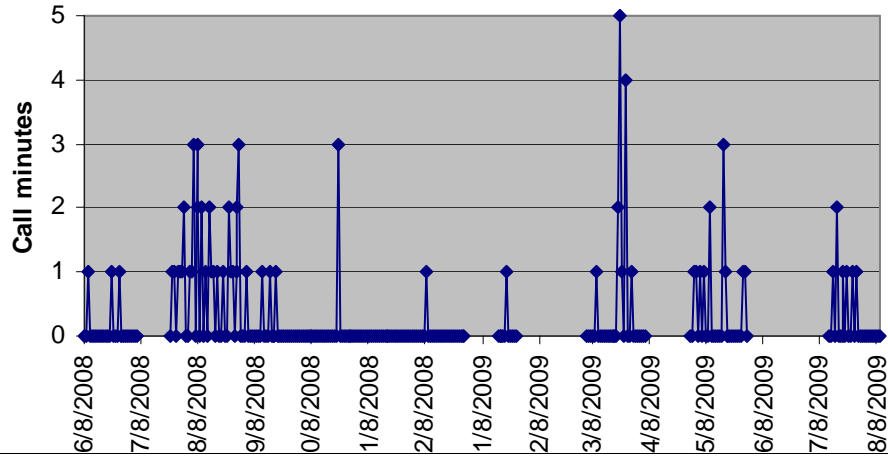
Generally lower activity in the winter and higher but sporadically thru the rest of the yr

Number of Call Minutes Recorded for Western Yellow Bats at Permanent Stations

Bill Williams River NWR

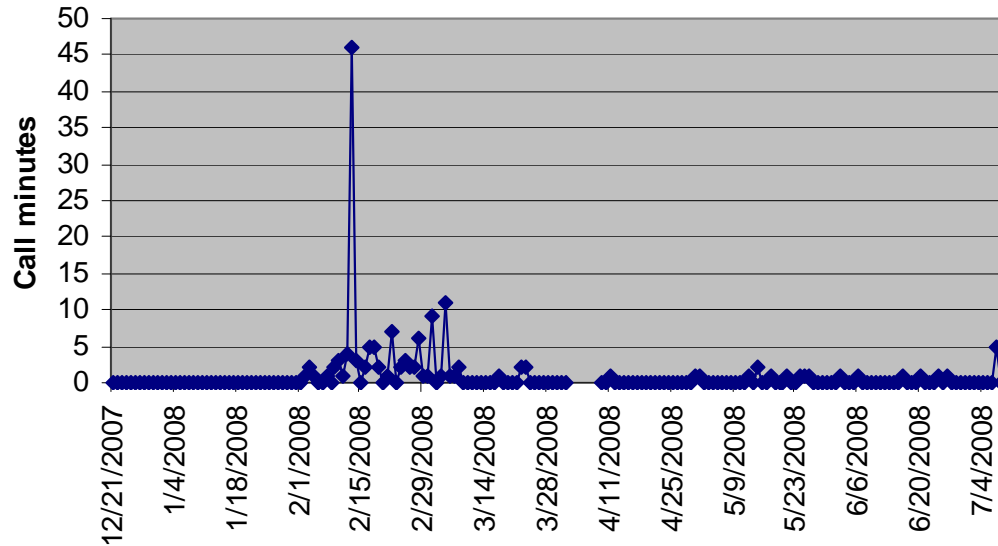
Cibola NWR

Picacho State Recreation Area

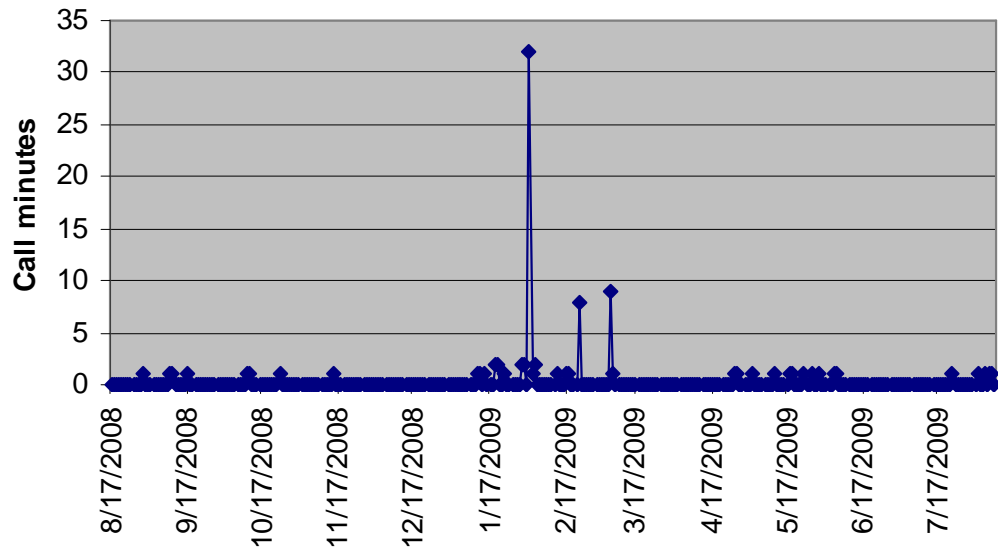


Call minutes are the number of minutes during which a bat call is recorded

Number of Call Minutes Recorded for Western Yellow Bats at Permanent Stations

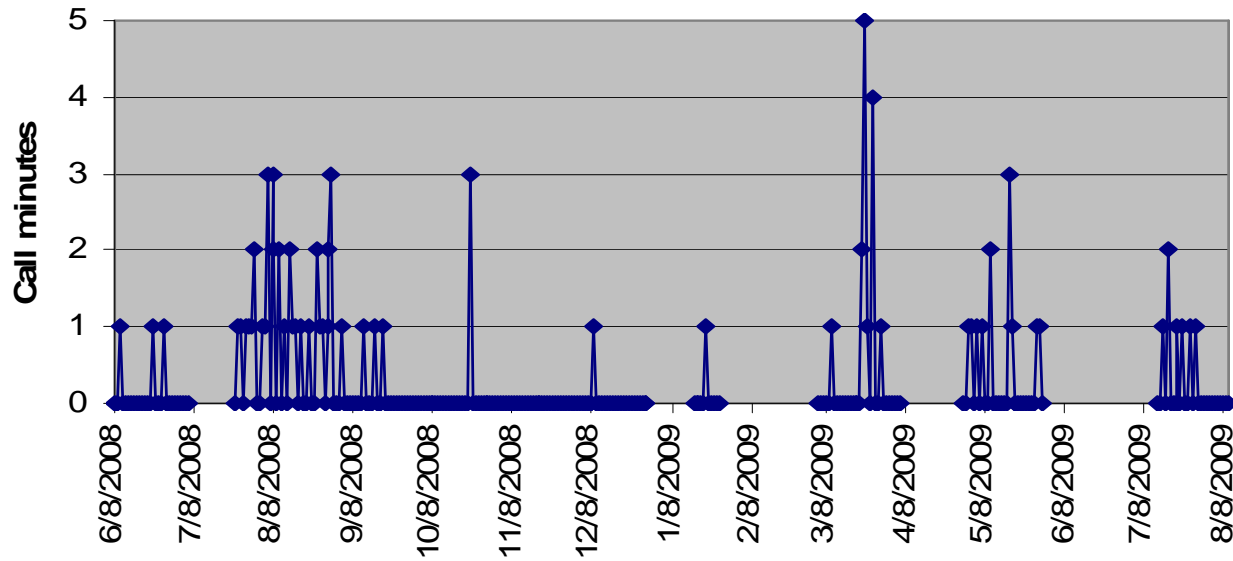


Imperial NWR

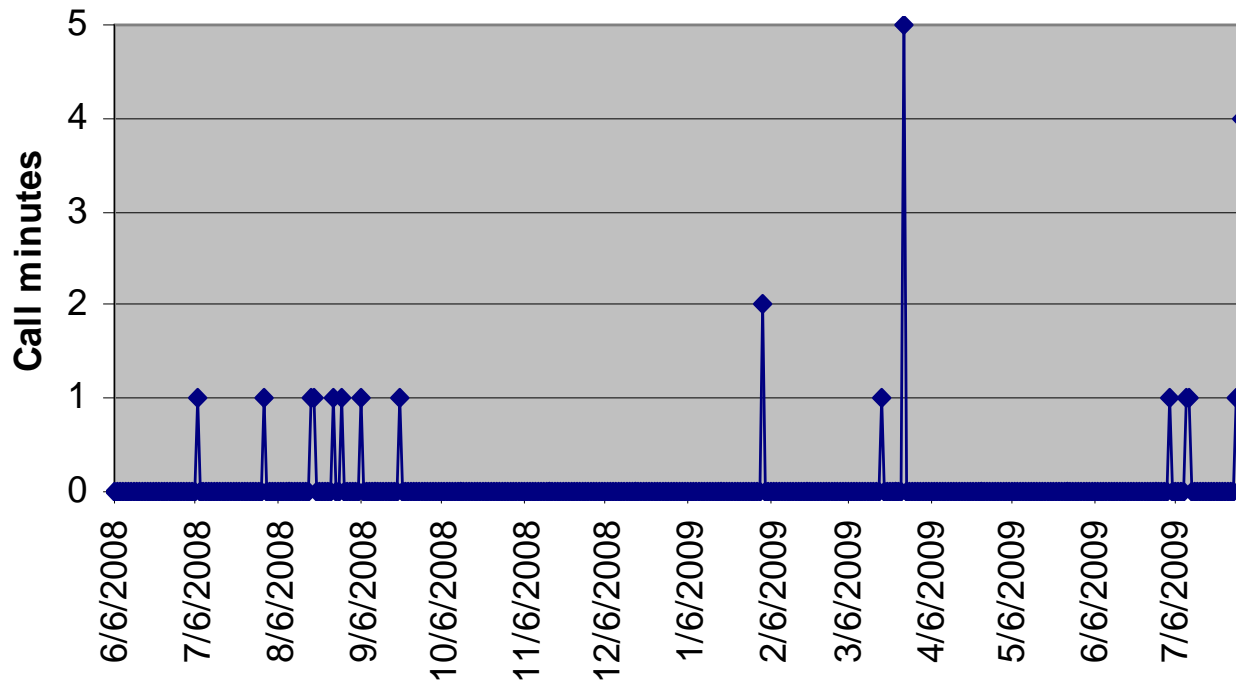


Mittry Lake Wildlife Area

Call minutes are the number of minutes during which a bat call is recorded



Bill Williams



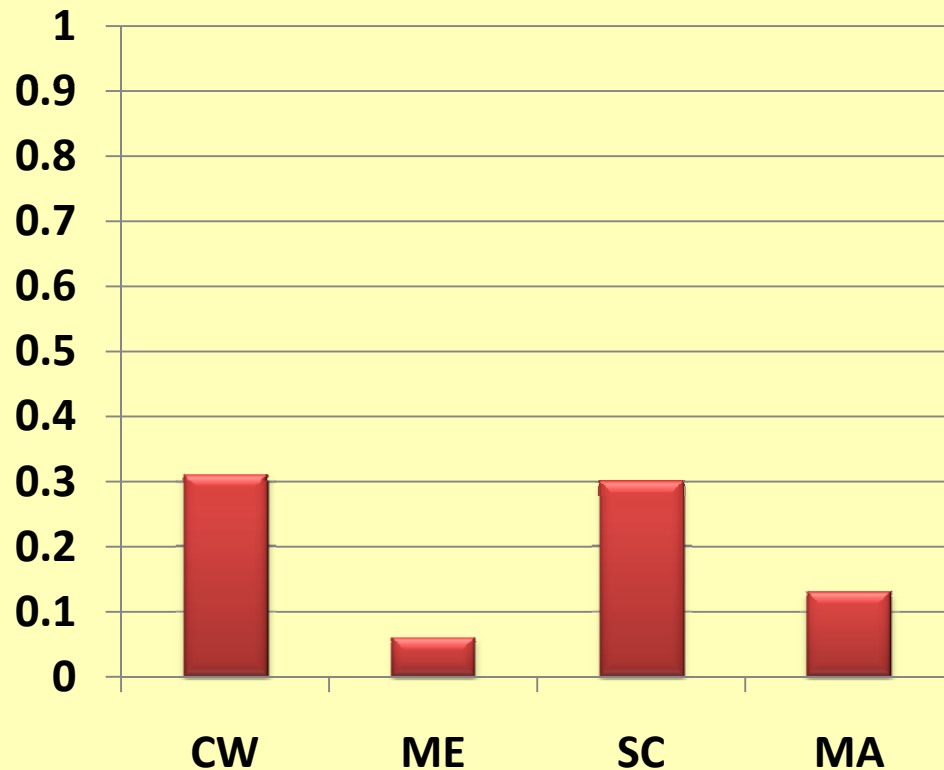
Picacho

Occupancy Rates by Vegetation Types

Western Yellow Bat



Occupancy rates is the estimated occurrence at a survey point



California Leaf nosed Bat



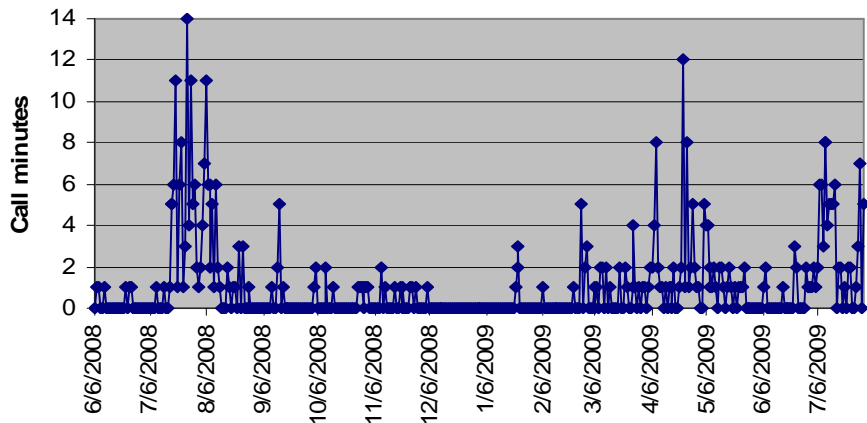
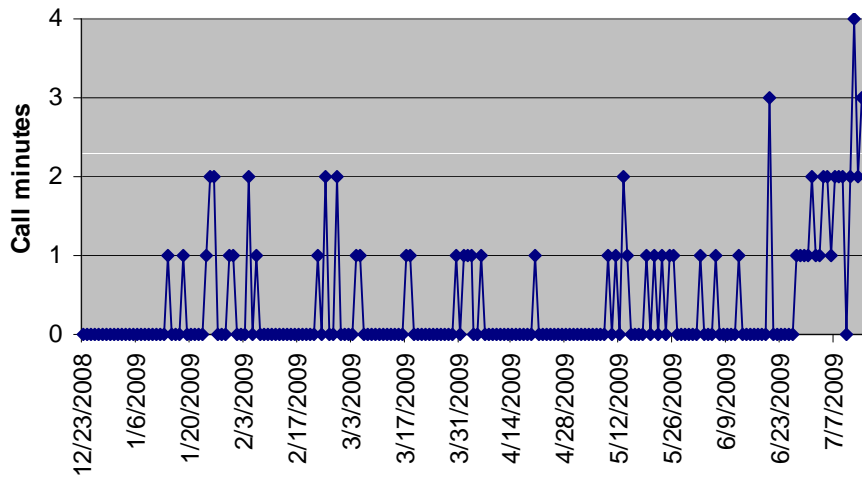
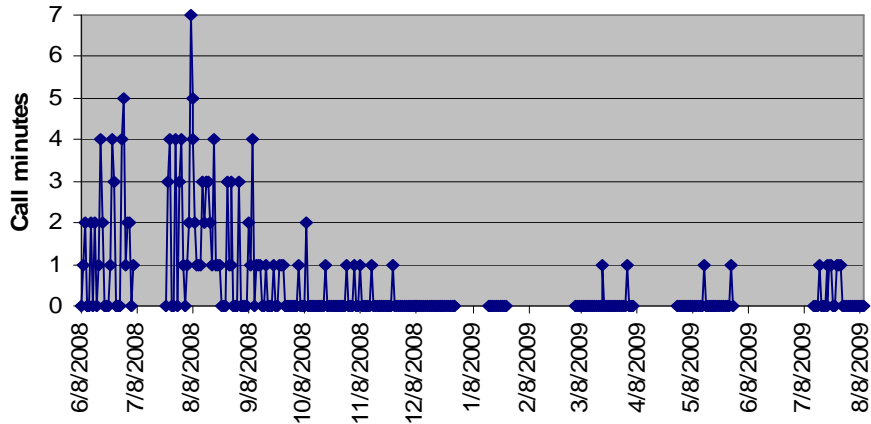
Compare to the other three focal species we recorded CA leaf nose much more frequently. Highest activity in summer and lowest in the winter.

Number of Call Minutes Recorded for California leaf-nosed Bats at Permanent Stations

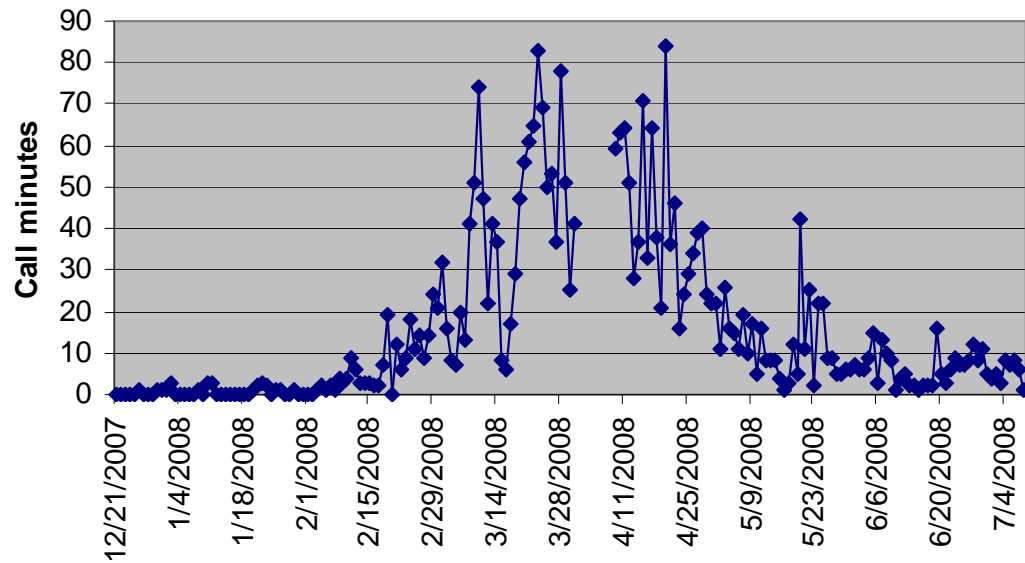
Bill Williams River NWR

Cibola NWR

Picacho State Recreation Area

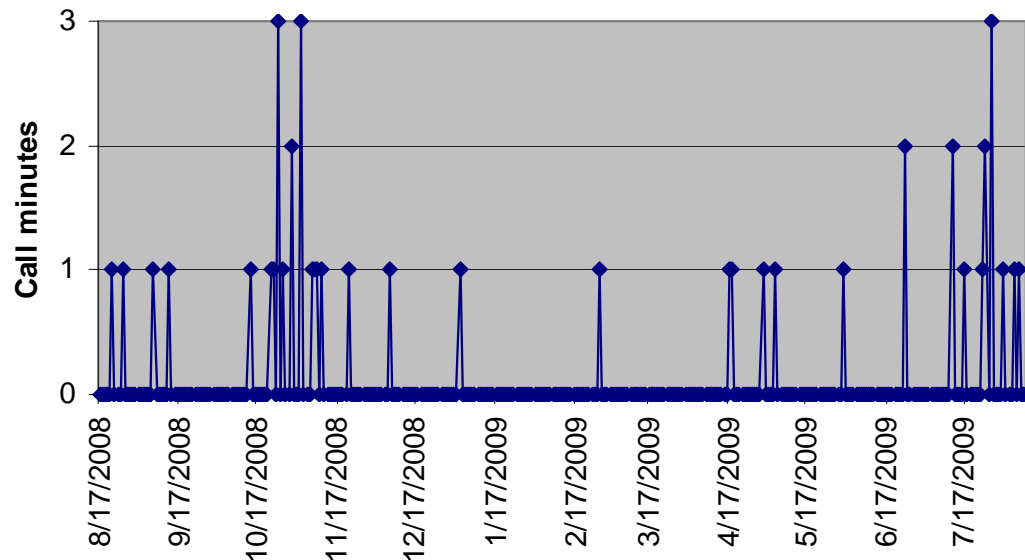


Call minutes are the number of minutes during which a bat call is recorded



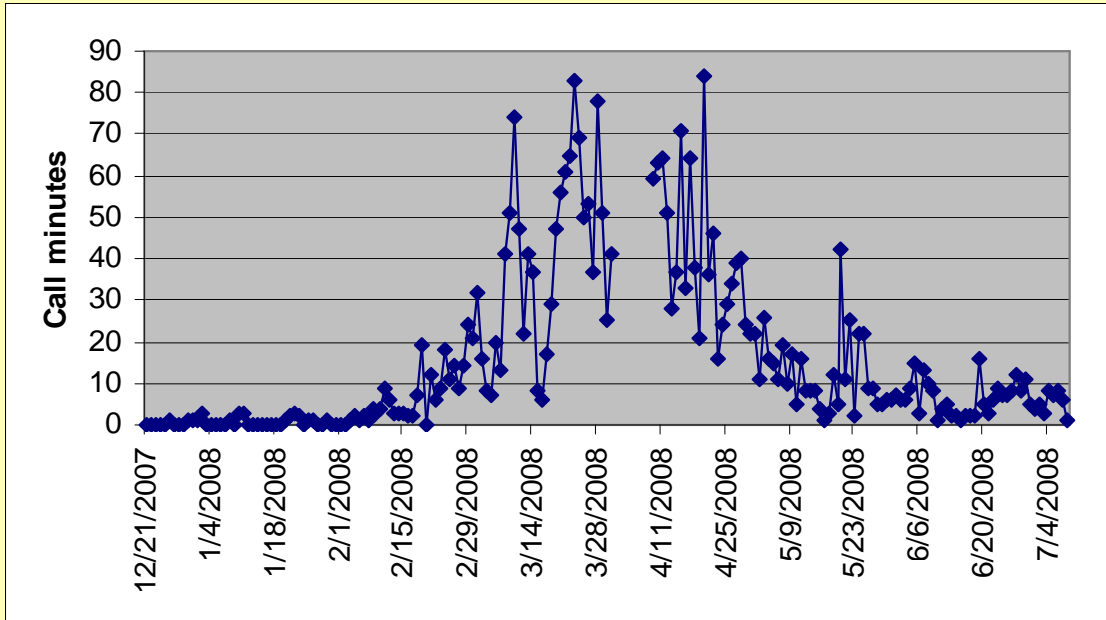
Number of Call Minutes Recorded for California leaf-nosed Bats at Permanent Stations

Imperial NWR

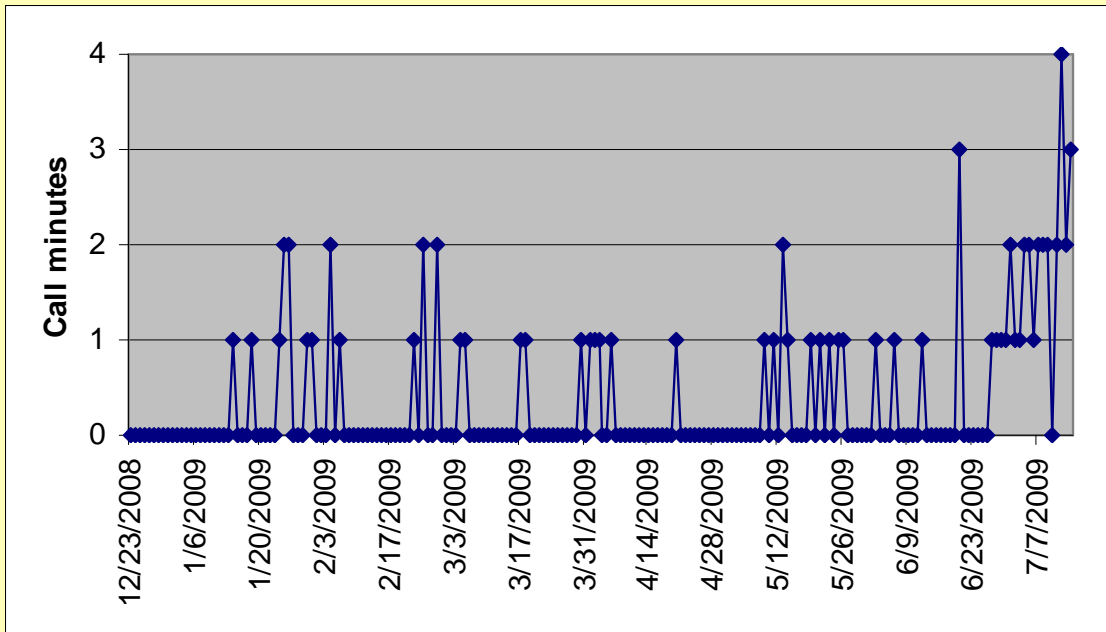


Mittry Lake Wildlife Area

Call minutes are the number of minutes during which a bat call is recorded



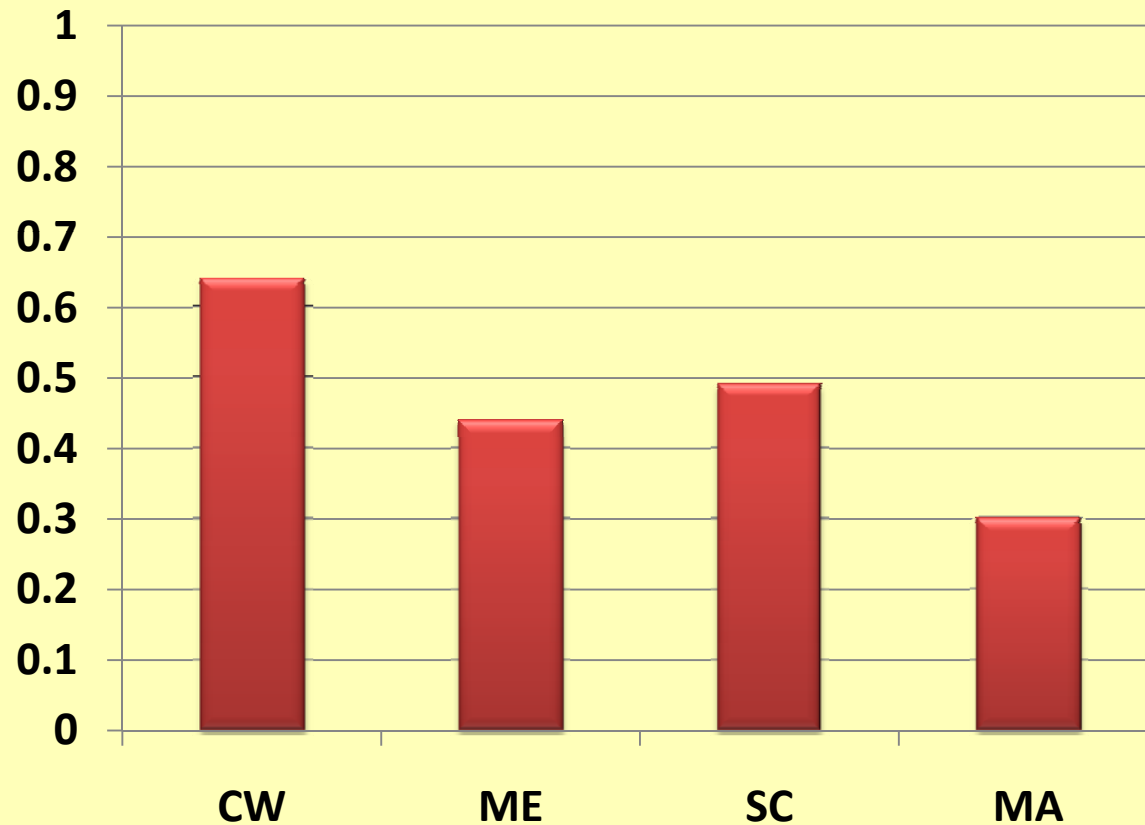
Imperial



Cibola

Occupancy Rates by Vegetation Types

California leaf-nosed bat



Townsend's big-eared Bat

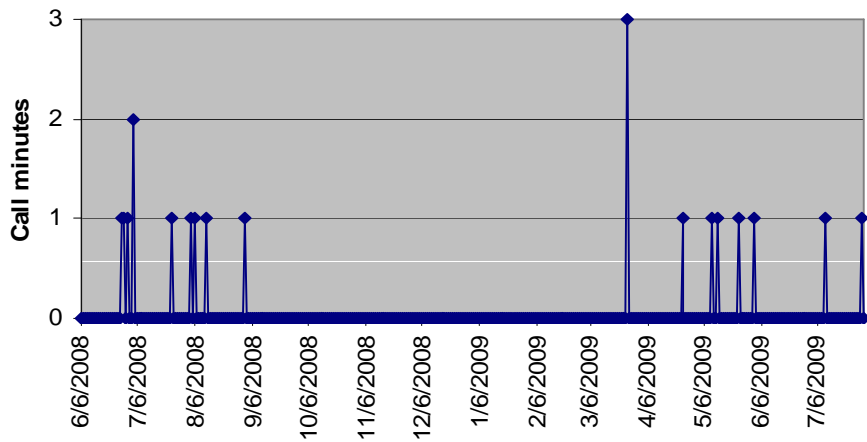
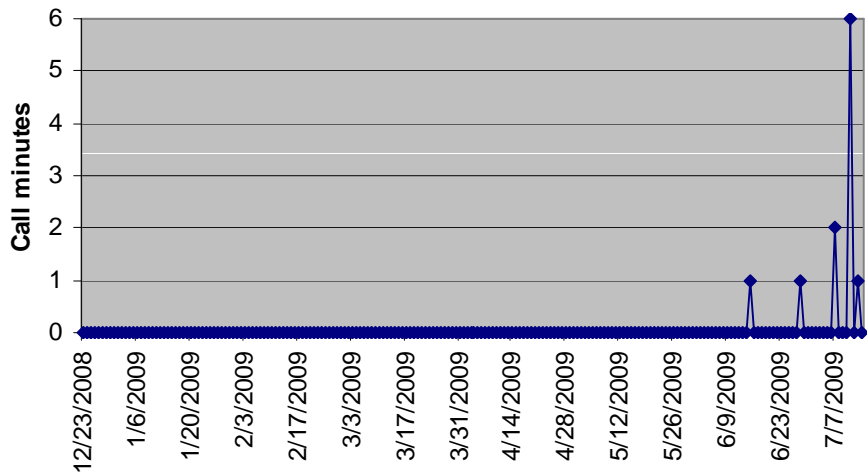
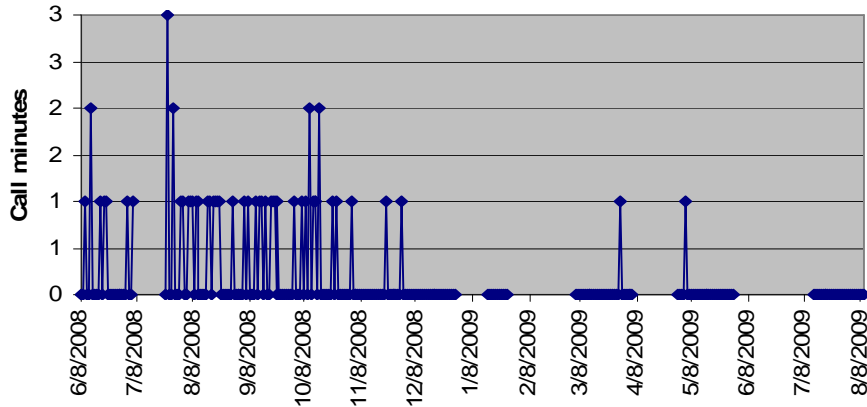


Number of Call Minutes Recorded for Townsend's big-eared Bats at Permanent Stations

Bill Williams River NWR

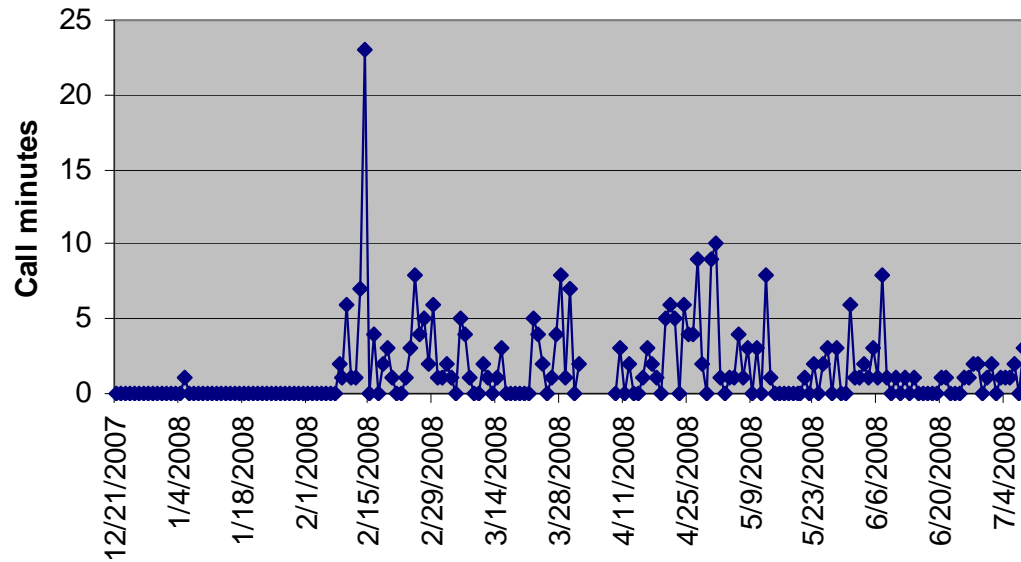
Cibola NWR

Picacho State Recreation Area

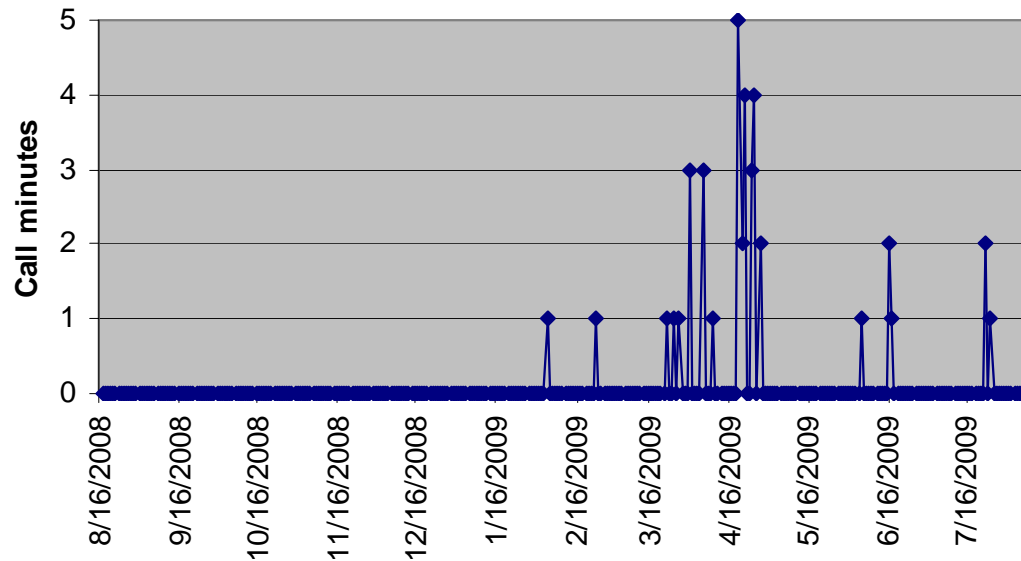


Call minutes are the number of minutes during which a bat call is recorded

Number of Call Minutes Recorded for Townsend's big-eared Bats at Permanent Stations

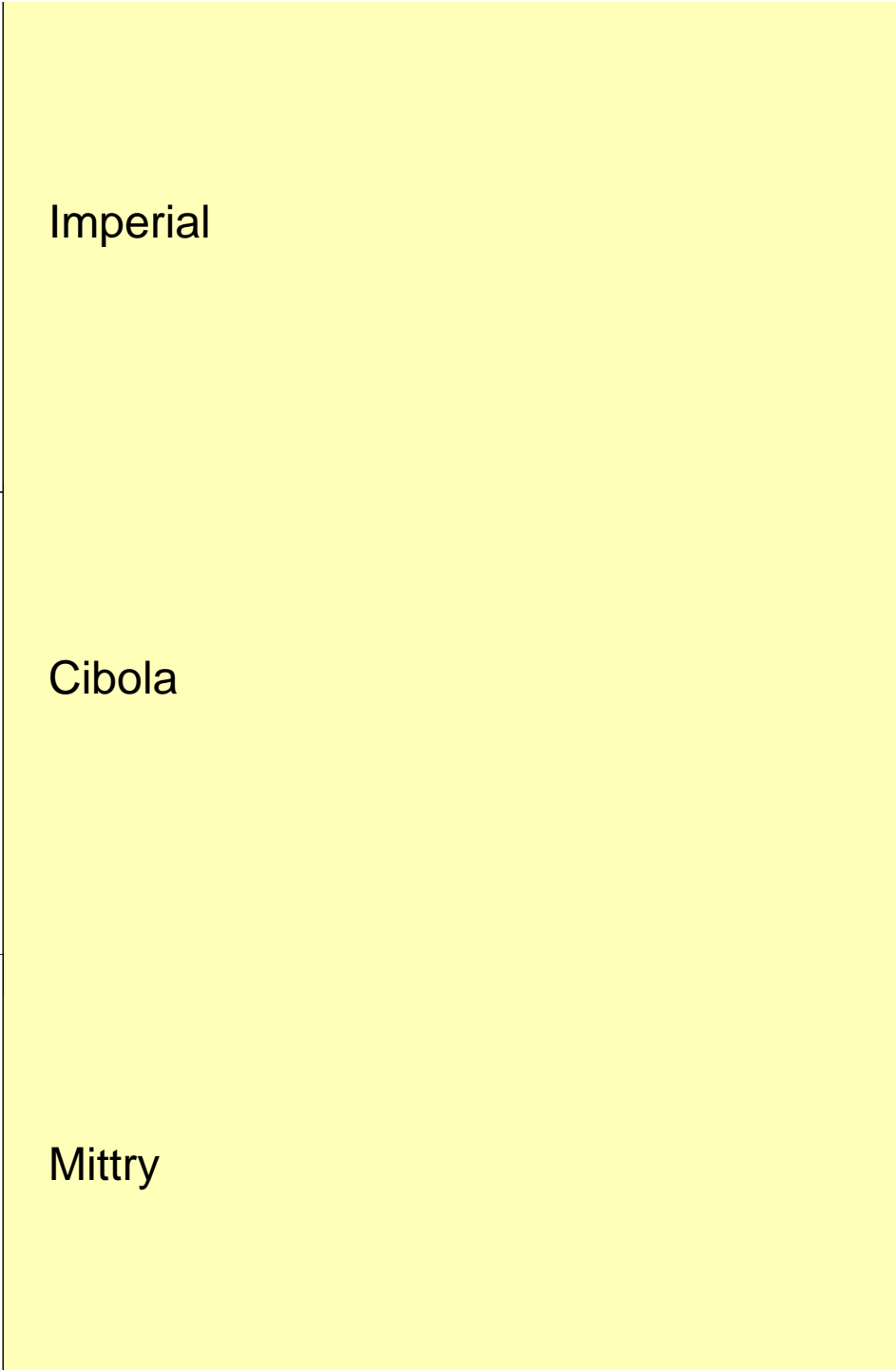
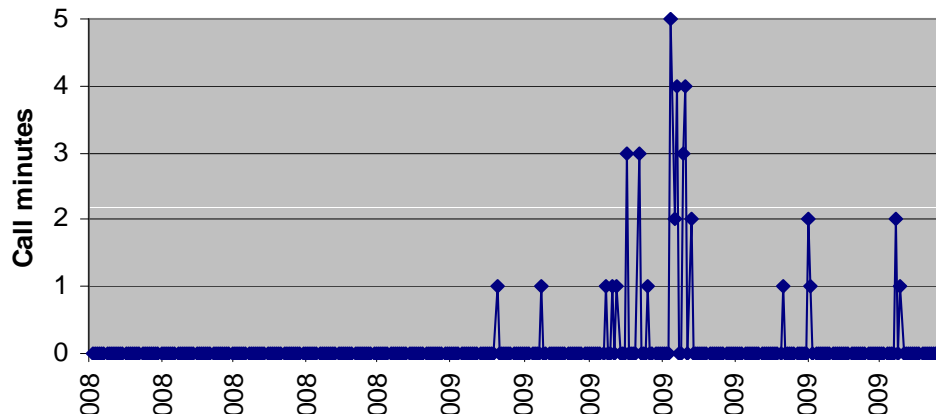
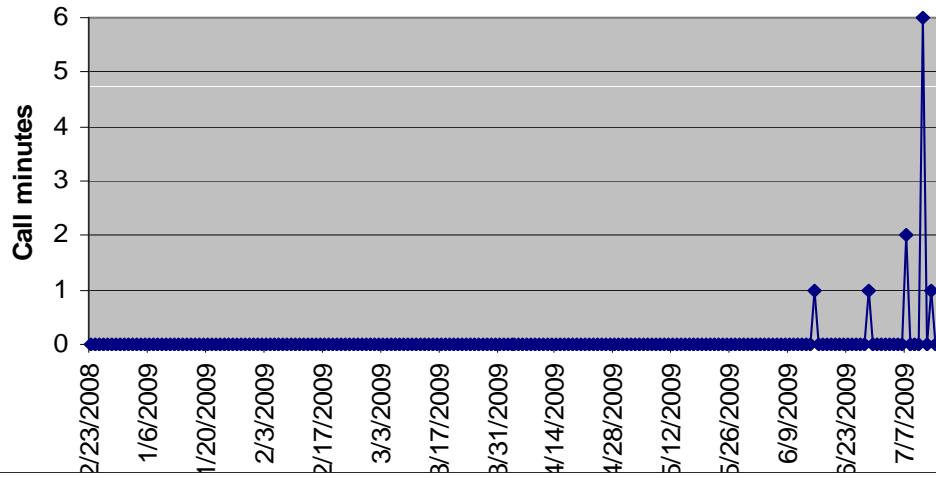
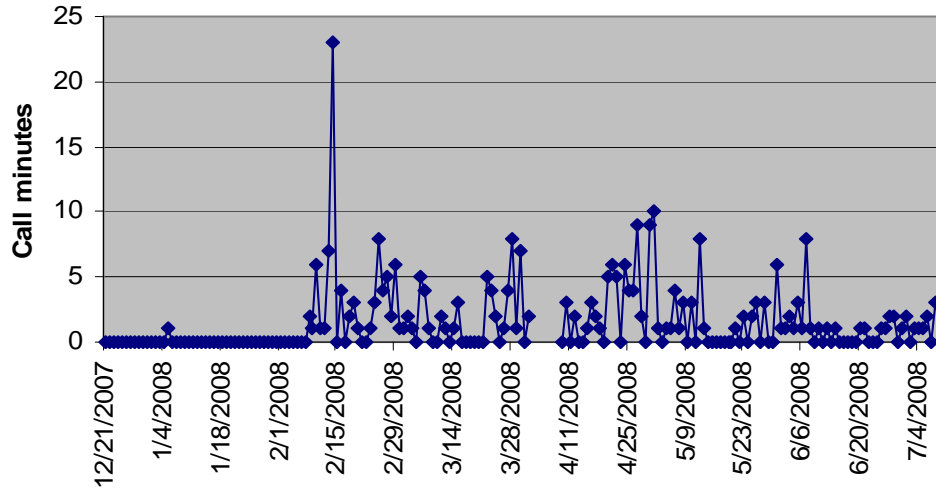


Imperial NWR

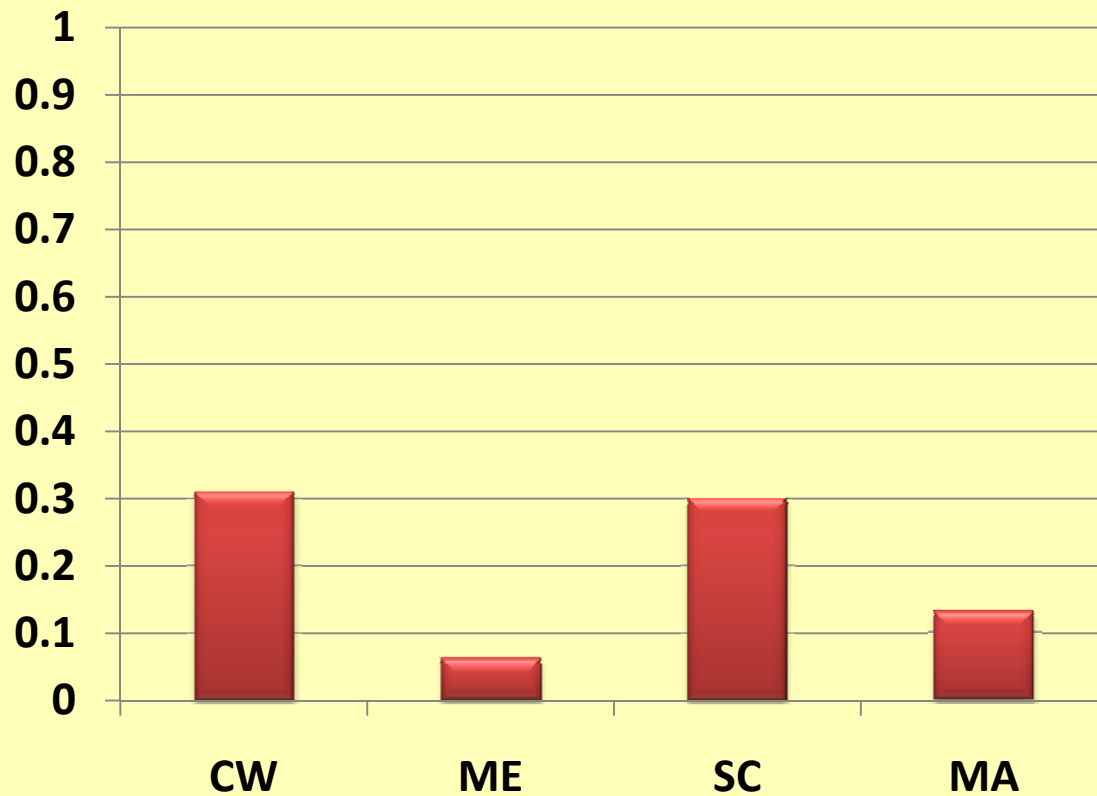


Mittry Lake Wildlife Area

Call minutes are the number of minutes during which a bat call is recorded



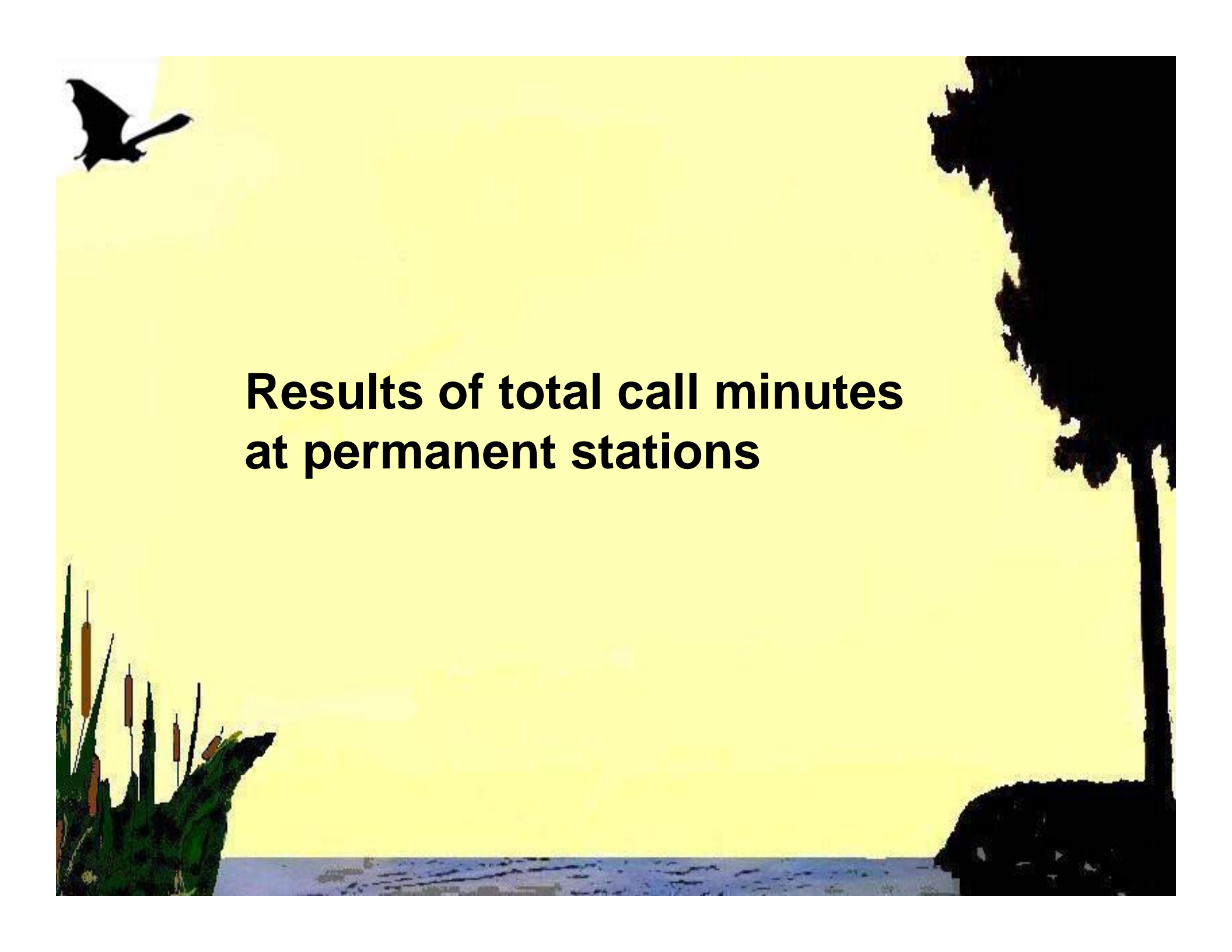
Occupancy Rates by Vegetation Types



Townsend's big-eared bat



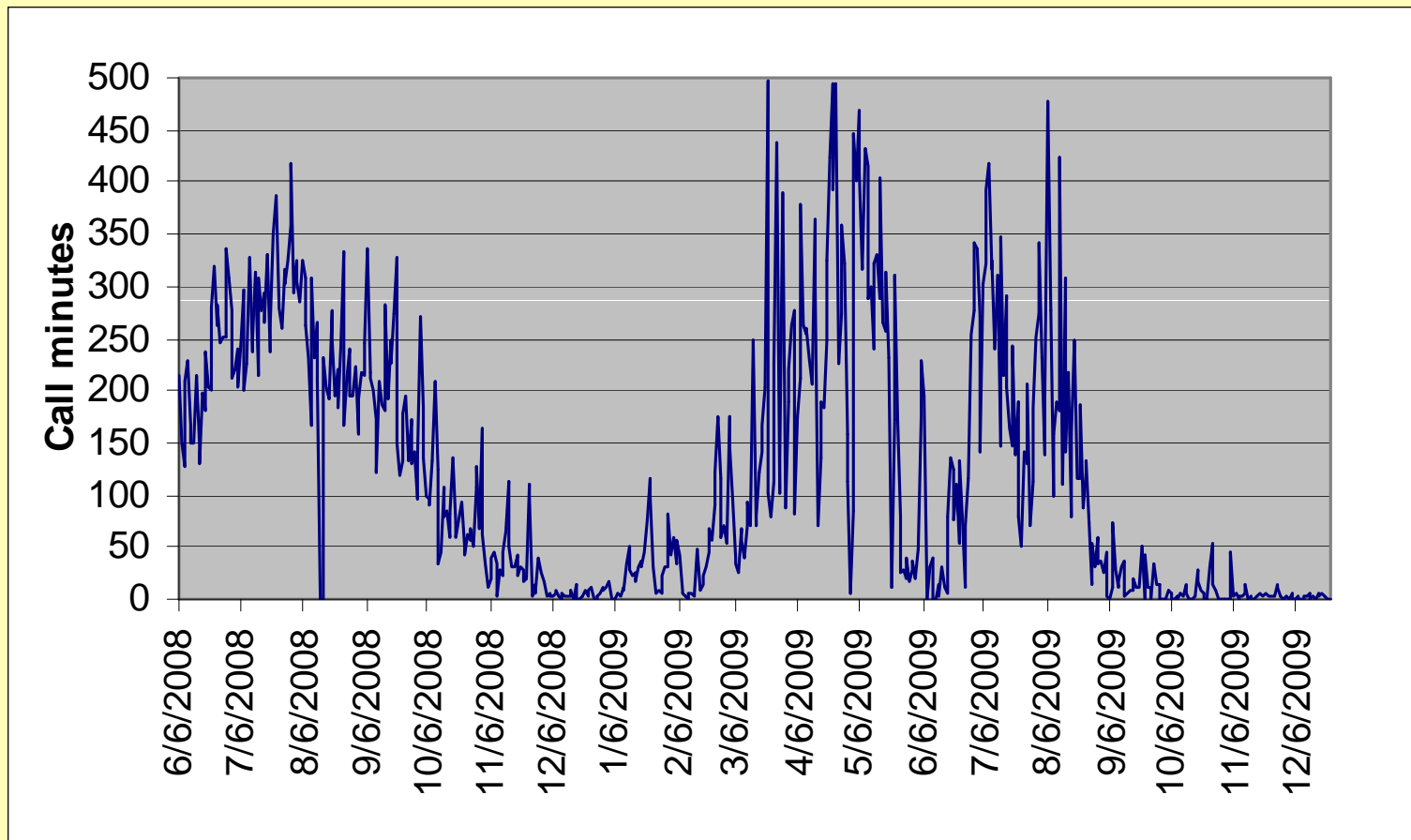
Occupancy rates is the estimated occurrence at a survey point



**Results of total call minutes
at permanent stations**

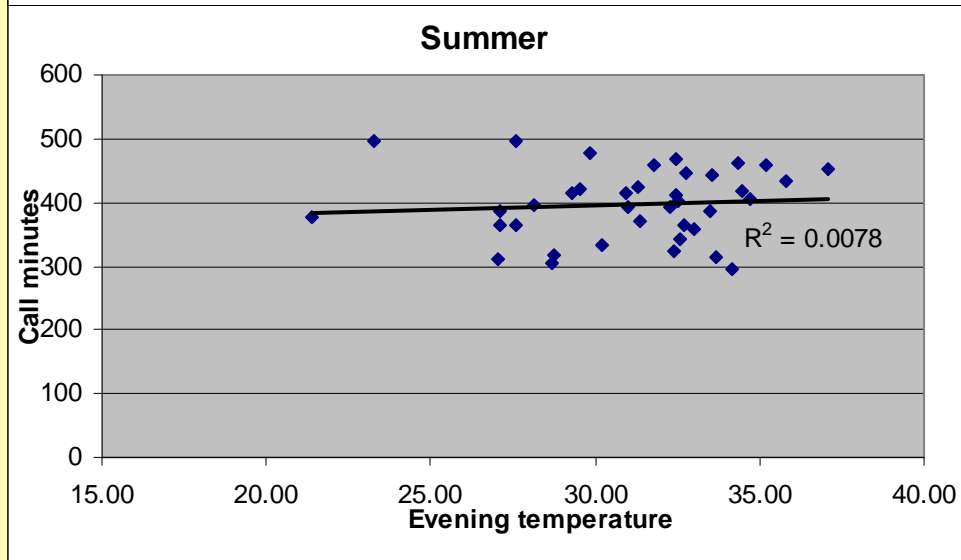
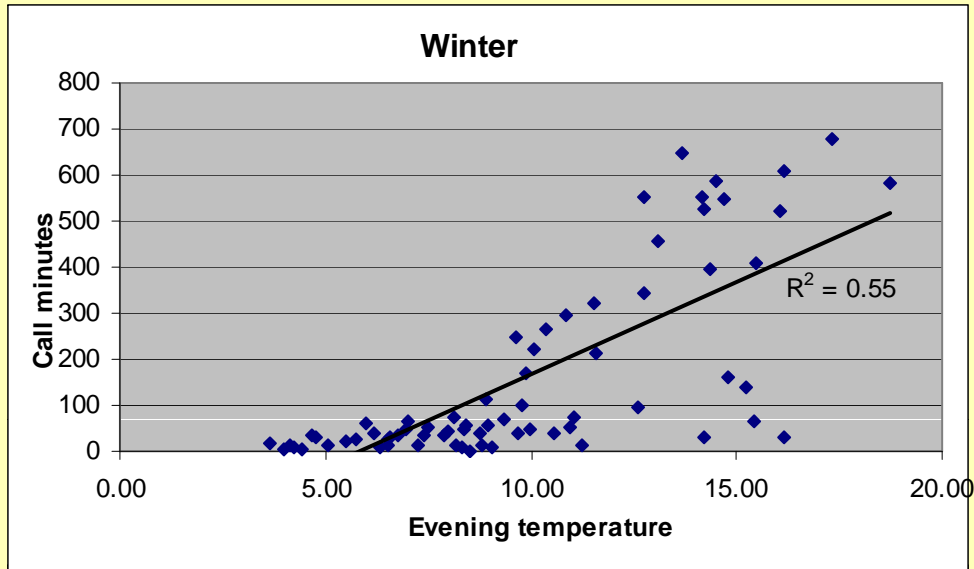
Preliminary Results For Permanent Stations

P
I
C
A
C
H
O



Bat activity was high during the summer and it decreases thru the fall, with very low activity in the winter.


Imperial Station






During most of the year bat activity is high during warmer nights but we lose this correlation in the summer when all nights are warm

$$r^2 = 0.55$$

$$r^2 = 0.0078$$



Future plans...

- Analyze distribution and migration of 4 MSCP species
 - Construct occupancy models and correlate these with specific habitat characteristics
 - Continue sampling
 - Develop recommendations for future habitat restoration
- 
- 
- 



Thanks to:

- Dr. Carol Chambers (NAU)
- Drs. Patricia Brown and
- Steven McQueen (AZGFD)
- Lin Piest (AZGFD)
- Vincent Frary (AZGFD)
- Theresa Olson (LCR-BR)
- Allen Calvert (LCR-BR)
- Dr. Cecilia Vigil (AWC)





In memory of Bob Berry