Comparing Bat Capture Surveys across Four Habitat Creation Areas

Allen Calvert

Covered and Evaluation Bat Species

Western Red Bat
(*Lasiurus blossevillii*)

Townsend's Big-Eared Bat
(*Corynorhinus townsendii*)

Western Yellow Bat
(*Lasiurus xanthinus*)

California Leaf-Nosed Bat
(*Macrotus californicus*)

Background

- Capture surveys started in 2007 at two habitat creation sites
- CVCA was added in 2009
- PVER was added in 2010
- ‘Ahakhav was reestablished in 2011

- Cibola Nature Trail was planted in 1999
- ‘Ahakhav was planted in 2001
- CVCA was planted in 2006 (Phase 1)
- PVER was planted in 2006 (Phase 1) and 2009 (Phase 4)

Methods

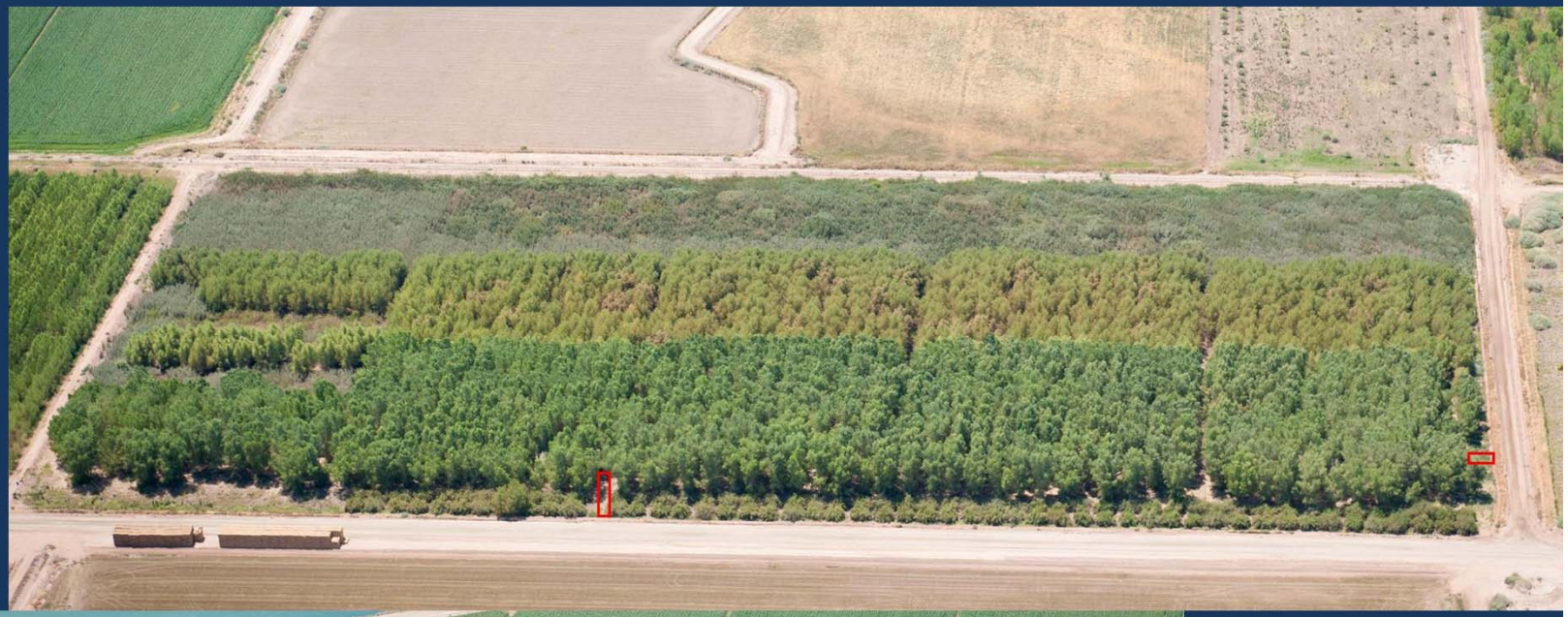
- Each site was surveyed once per month from May-September
- Surveys started at sunset and continued for 4.5 hours (weather permitting)
- Three triple high mist-nets (over 8 meters high) were used at all sites
- Net length varied from 6-18 meters

Triple highs were usually set within potential flyways where bats would be “funneled” into a smaller area where the net could cover the entire area

Edges were also surveyed at PVER and CVCA

‘Ahakhav Tribal Preserve Netting Areas

PVER Netting Areas



CVCA Netting Areas

Cibola Nature Trail Netting Areas

Results

‘Ahakhav Tribal Preserve

- 405 net hours of effort (# of hours x # of 6-m nets)
- 272 bats of 9 species were captured
- Three MSCP species captured

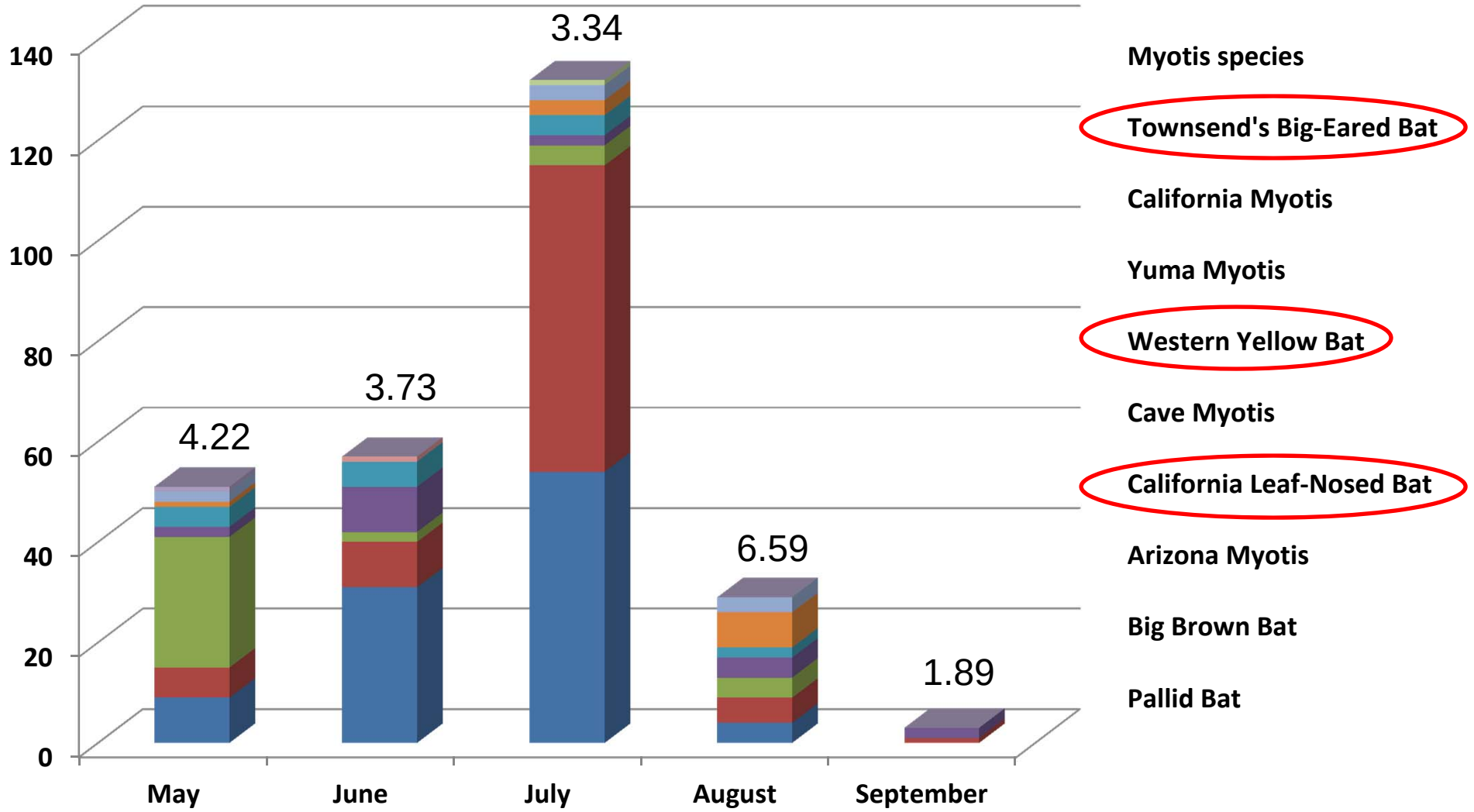
California Leaf-Nosed Bat

Townsend’s Big-Eared Bat

Western Yellow Bat

Species Diversity and Composition

‘Ahakhav Tribal Preserve



Results

Palo Verde Ecological Reserve

- 405 net hours of effort (# of hours x # of 6-m nets)
- 136 bats of 10 species were captured
- Three MSCP species captured
- One new LCR species captured

Western Red Bat

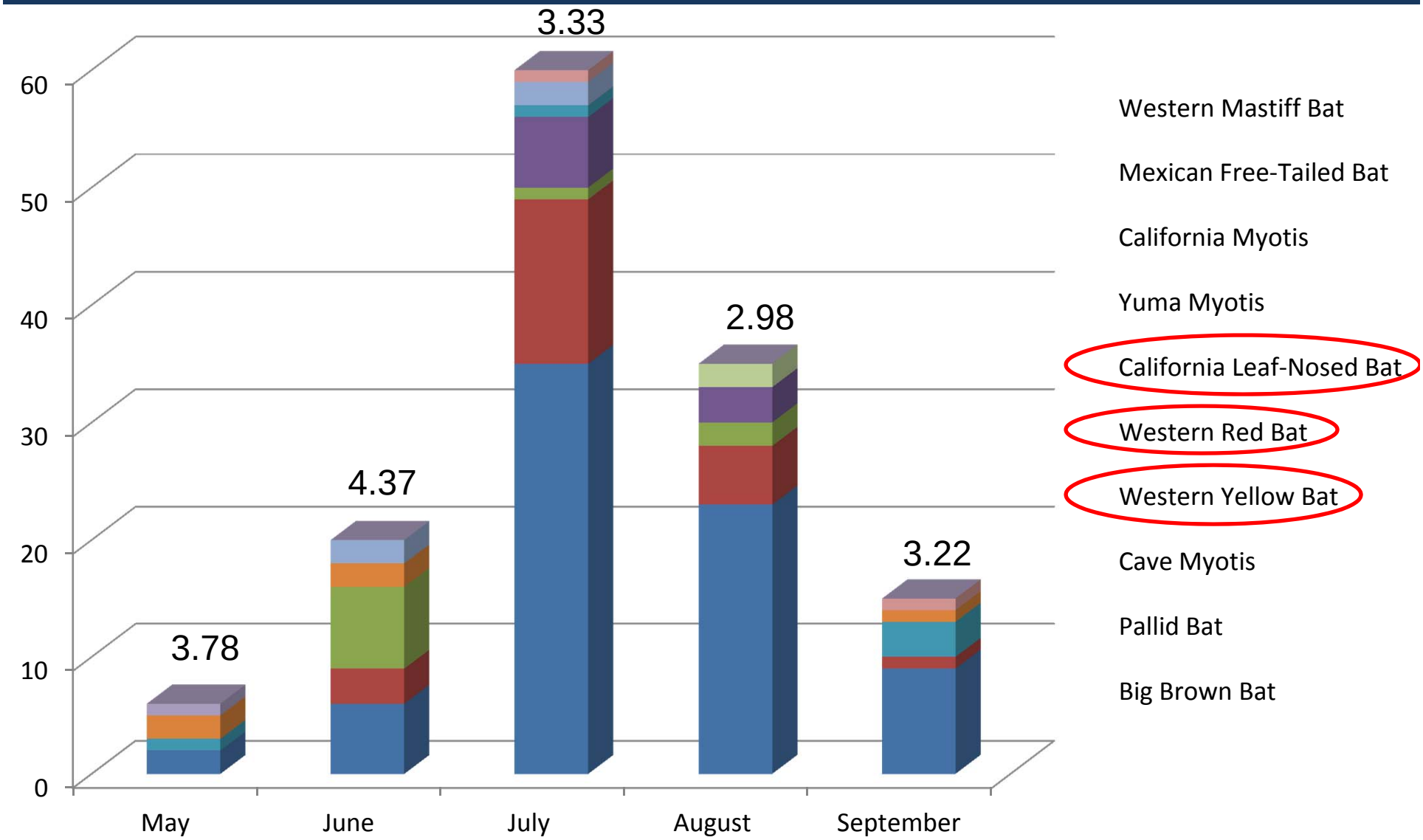
Western Yellow Bat

California Leaf-Nosed Bat

Western Mastiff Bat

Species Diversity and Composition

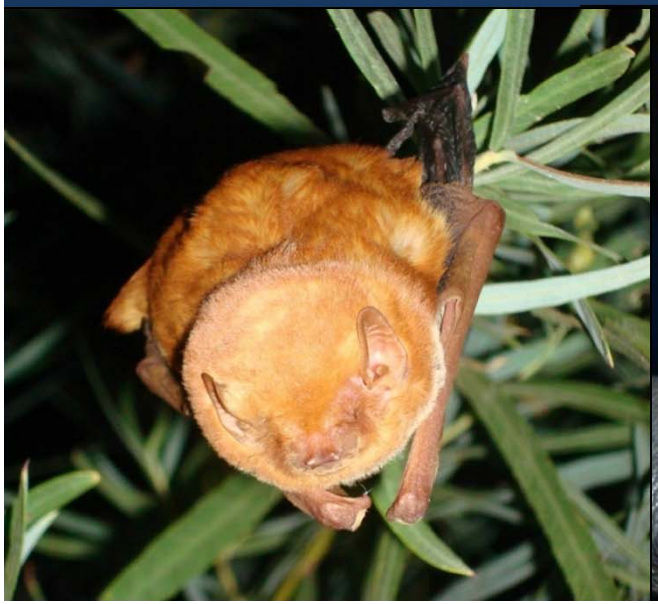
Palo Verde Ecological Reserve



Results

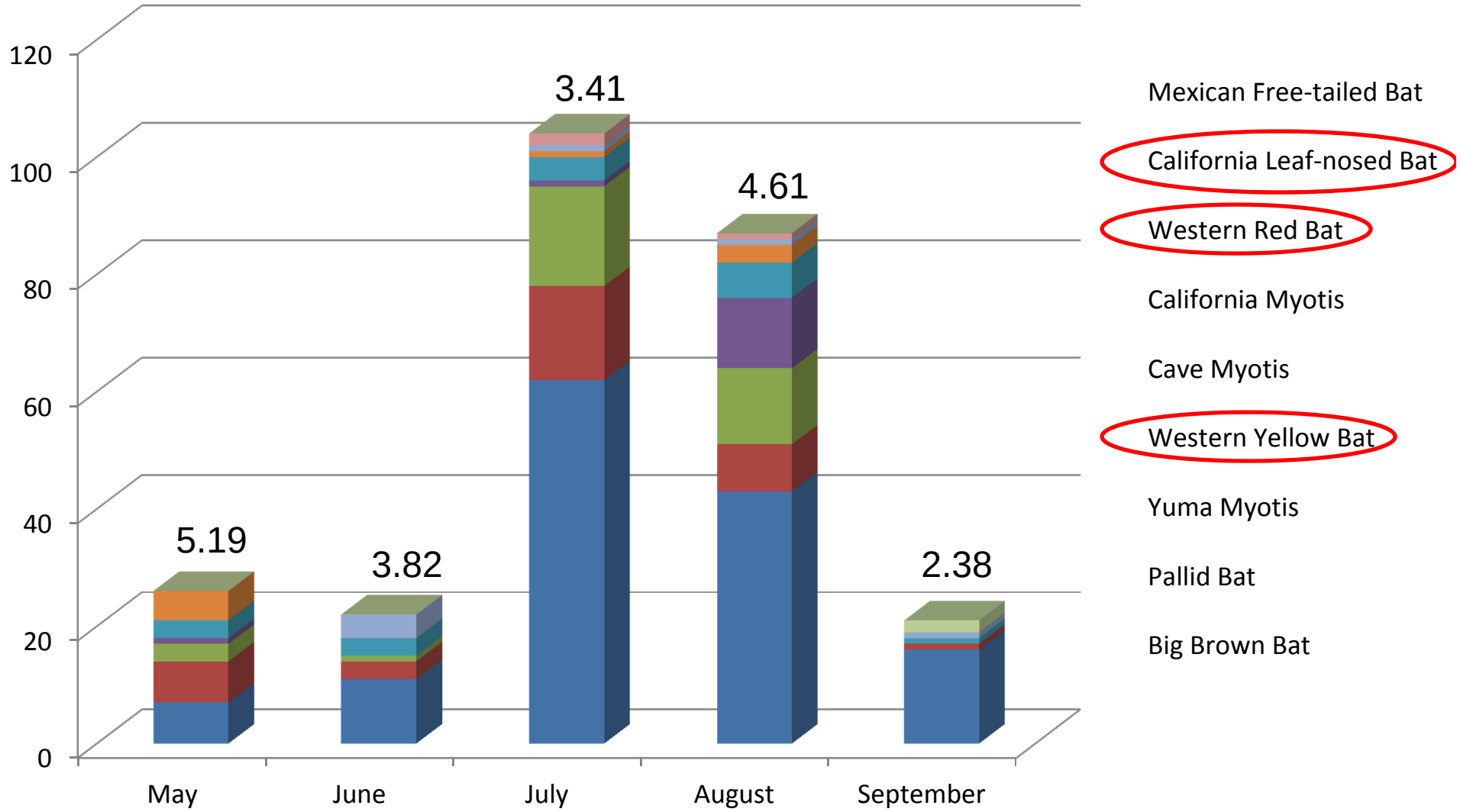
Cibola Valley Conservation Area

- 303.75 net hours of effort
- 260 bats of 9 species were captured
- Three MSCP species captured



Species Diversity and Composition

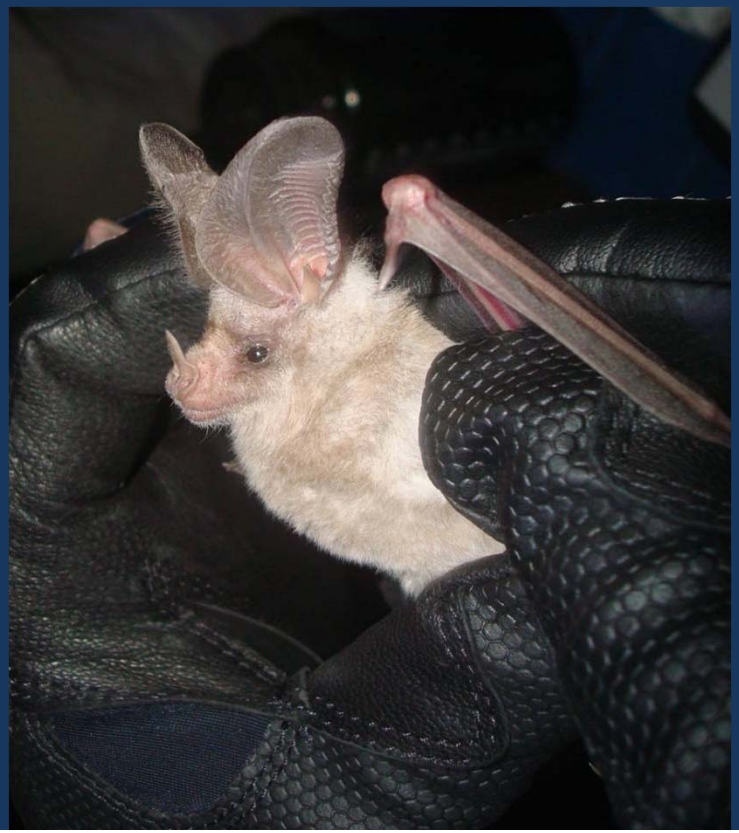
Cibola Valley Conservation & Wildlife Area



Results

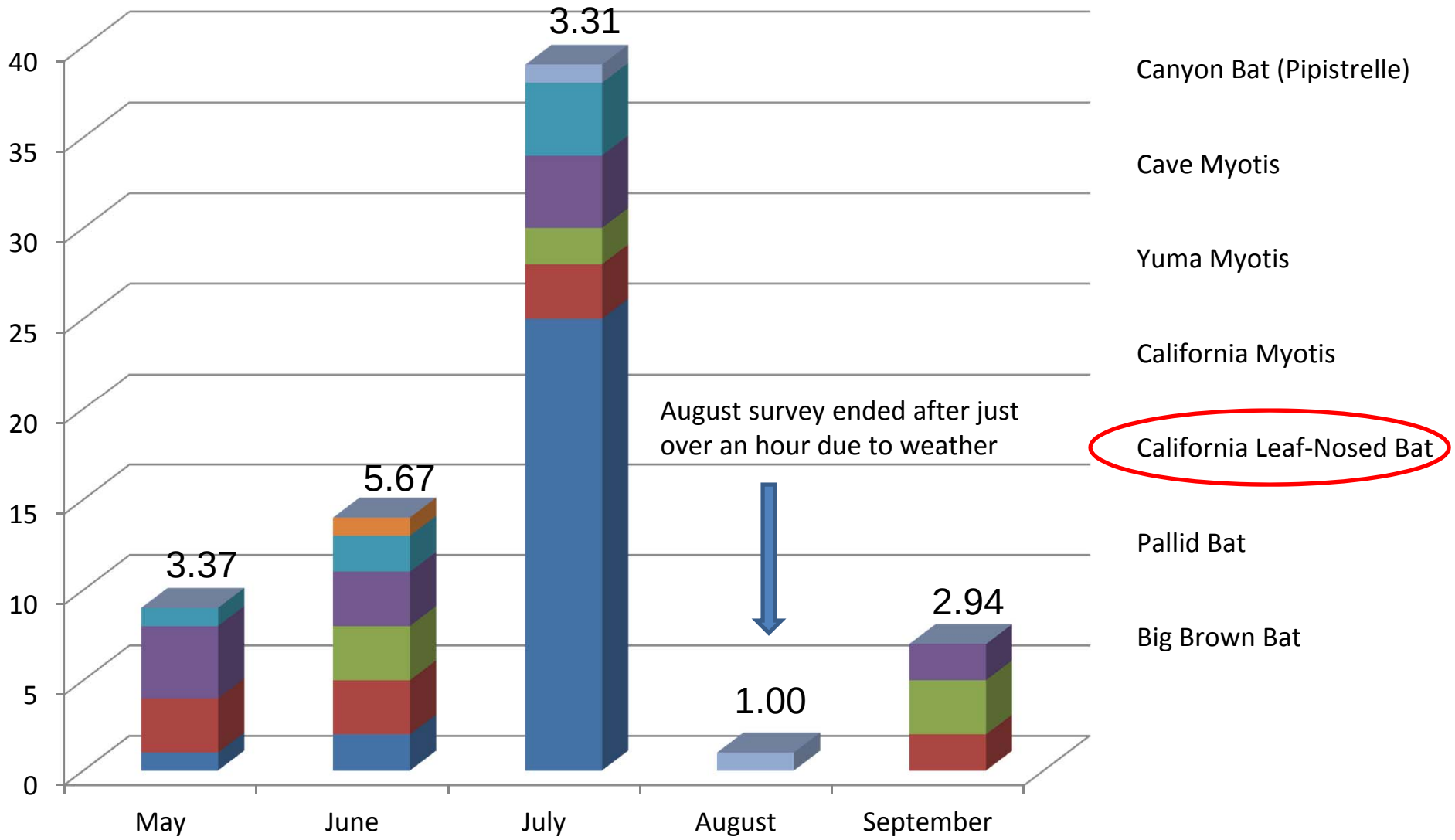
Cibola NWR Nature Trail

- 286.8 net hours of effort (# of hours x # of 6-m nets)
- 70 bats of 7 species were captured
- One MSCP species captured



Species Diversity and Composition

Cibola NWR Nature Trail



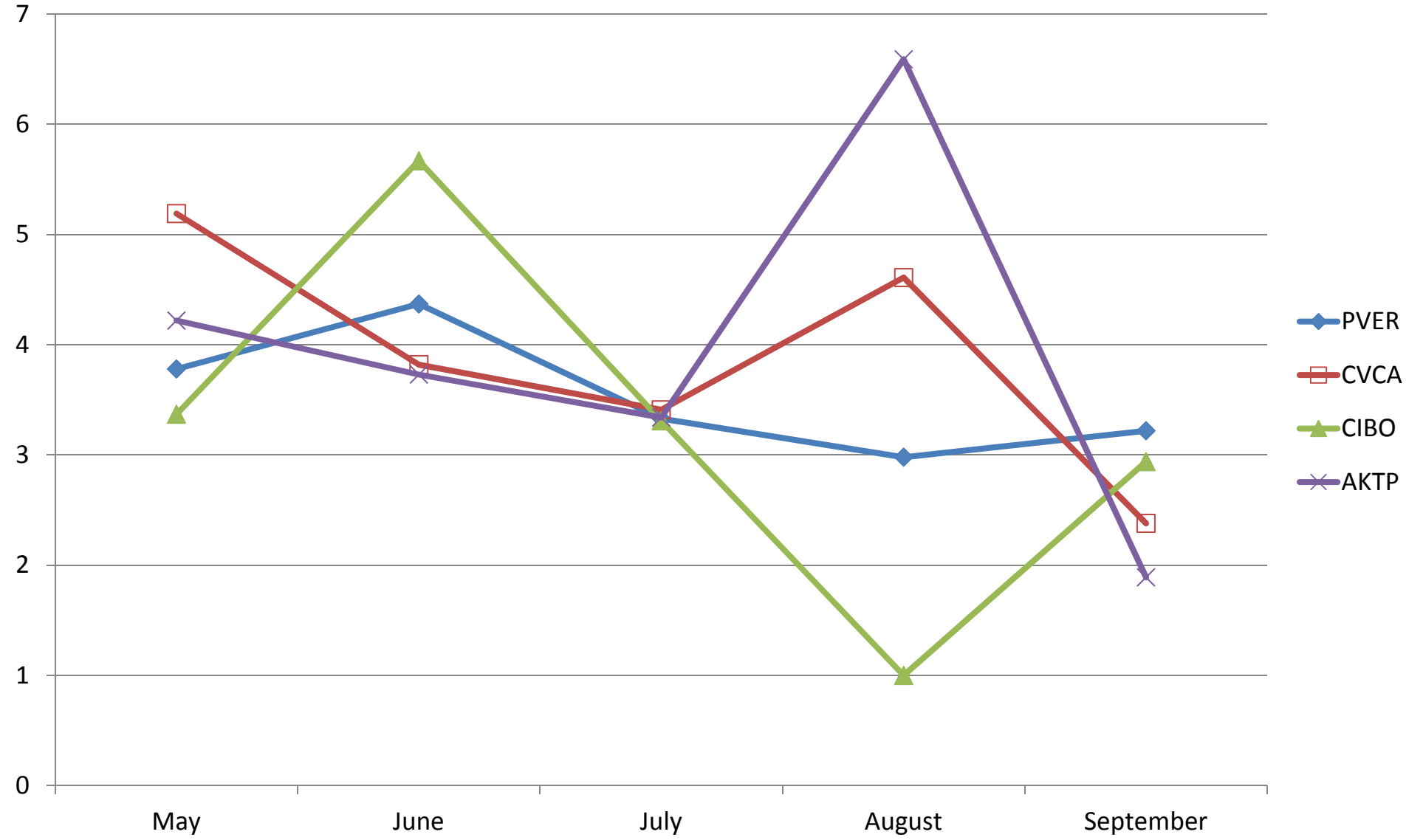
Results

All Sites

- 1400.55 net hours of effort (# of hours x # of 6-m nets)
- 737 bats of 13 species were captured
- 35 California leaf-nosed bats captured (all 4 sites)
- 34 western yellow bats captured (3 sites)
- 12 western red bats captured (2 sites)
- 1 Townsend's big-eared bat captured (1 site)

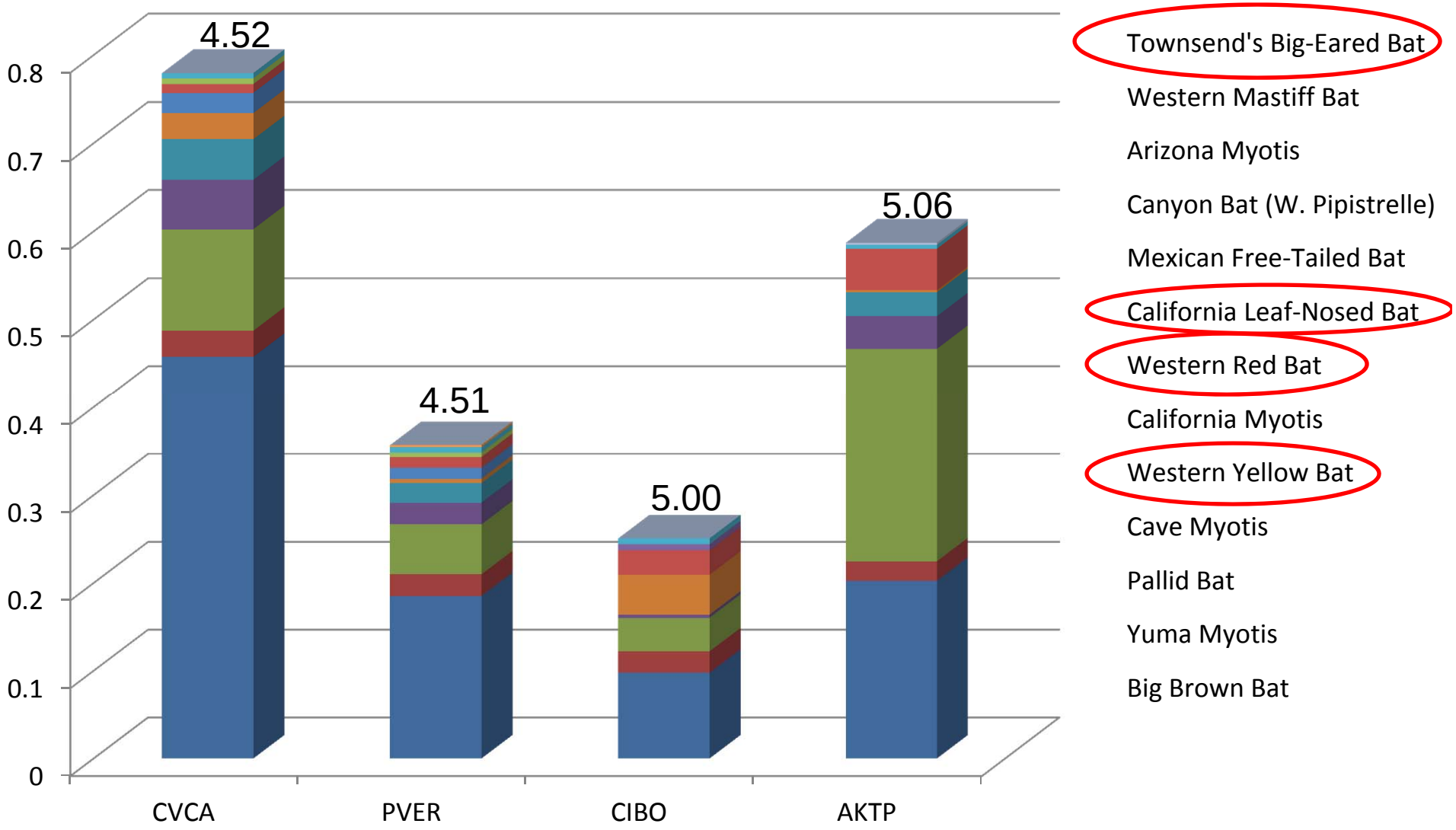
Monthly Species Diversity

All Sites



Species Diversity and Composition

All Sites (captures per net hour)



Statistical Comparisons

- Species diversity calculations were compared using a bootstrap procedure with Program PAST[1] version 2.05
- Nine different diversity indices were compared
- Each site was compared to every other site
- Only five indices produced significant results

[1] Hammer, Ø., Harper, D.A.T., and P. D. Ryan, 2001. PAST: Paleontological Statistics Software Package for Education and Data Analysis. Palaeontologia Electronica 4(1): 9pp.

Diversity Indices

- **Simpson**: Measures 'evenness' of the community from 0 to 1. 1-dominance.
- **Dominance**: Ranges from 0 (all taxa are equally present) to 1 (one taxa dominates the community completely). 1-Simpson index.
- **Evenness** e^H/S: Evenness value based on the H value from Shannon index.
- **Equitability J**: Shannon index divided by the logarithm of number of taxa. This measures the evenness with which individuals are divided among the taxa present.
- **Berger-Parker** dominance: The number of individuals in the dominant taxa relative to the total number of individuals

Statistical Results

Index	PVER vs. CVCA	PVER vs. CIBO	PVER vs. AKTP	CVCA vs. CIBO	CVCA vs. AKTP	CIBO vs. AKTP
Dominance	0.736	0.088	**0.003**	0.129	**0.003**	0.862
Evenness	0.429	**0.008**	0.195	**0.016**	0.328	0.087
Simpson	0.736	0.088	**0.003**	0.129	**0.003**	0.862
Equitability J	0.549	**0.013**	0.132	**0.020**	0.224	0.103
Berger-Parker	0.728	**0.040**	**0.000**	**0.043**	**0.000**	0.412

Take Home Message: PVER and CVCA have a higher dominance of a single species (big brown bat) compared to CIBO and AKTP

Note: There was no significant differences between sites using the Shannon index.

Why the differences?

- CIBO and AKTP are older more mature sites compared to CVCA and PVER
- Sample size
- Differences in insect abundance/diversity
- Big brown bat roosts may be closer to the younger sites
- Or, big brown bats just really like CVCA and PVER better

Conclusions?

- Does it matter? Red and yellow bat captures are highest at PVER and CVCA
- As PVER and CVCA mature, species diversity may increase (dominance may decrease)
- While patch size appears to affect species richness (total number of species), it does not affect species diversity at this scale
- More data!

What's next?

- The same four sites will be surveyed in 2012
- Red and yellow bats may be PIT tagged to help determine site fidelity
- Your invited!

Questions?

acalvert@usbr.gov