

Habitat Use of MSCP Bat Species at Riparian Restoration Areas - Results of 3 Years of Intensive Acoustic Monitoring



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- ▶ Acoustic bat monitoring conducted using remotely deployed Anabat bat detectors
- ▶ Began in 2007 with a pilot sampling program. In 2008 a BACI study design (Before-After-Control-Impact) was implemented
- ▶ 9 – 15 detectors deployed simultaneously in up to 5 habitat types within a habitat creation area: ICW, SCW, MESQ, AG, SC

- ▶ Each habitat creation area monitored during October, February, April and July
- ▶ Over a half million bat call files were recorded and identified to species or species group
- ▶ # bat minutes provides a measure of bat activity -- is not population estimate

Purpose:

-Determine how Western Red Bats and Western Yellow Bats are responding to the newly created habitats.



Study Area

Beal Riparian Restoration Project

Palo Verde Ecological Reserve

Cibola Valley Conservation Area

Cibola NWR Unit 1

Imperial Ponds Conservation Area

Measures:

1. Year-to-year comparisons of bat minutes for “treatment sites” vs “control sites” using July 2010 data (the maximum extent of habitat growth monitored thus far)
2. Compare bat activity in each habitat type to test these hypotheses:

H_0 = No difference in bat activity between the 5 habitat types

H_A = Habitat types vary significantly in bat activity

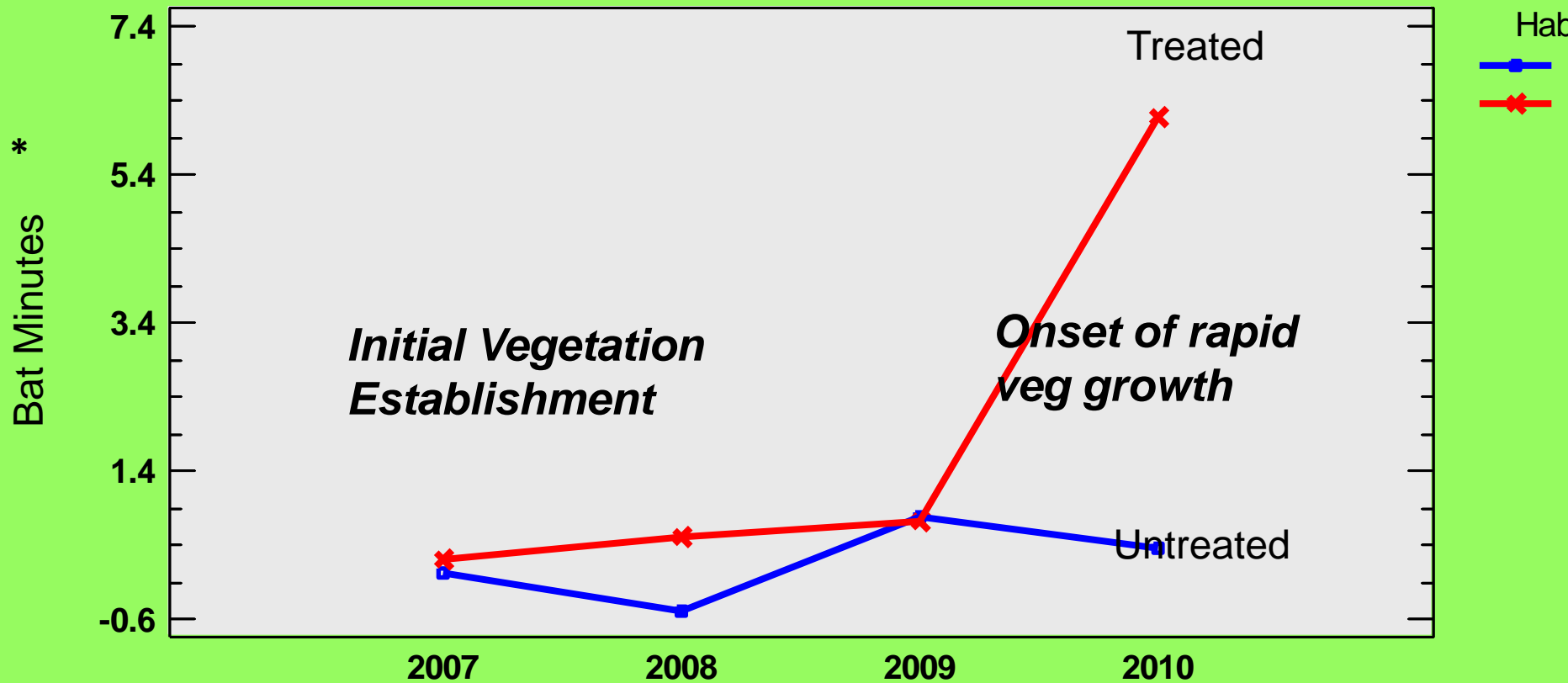
Results

Cibola Valley Conservation Area



Year to Year Comparison of Bat Activity In Treated vs Untreated Habitats - Red and Yellow Bats

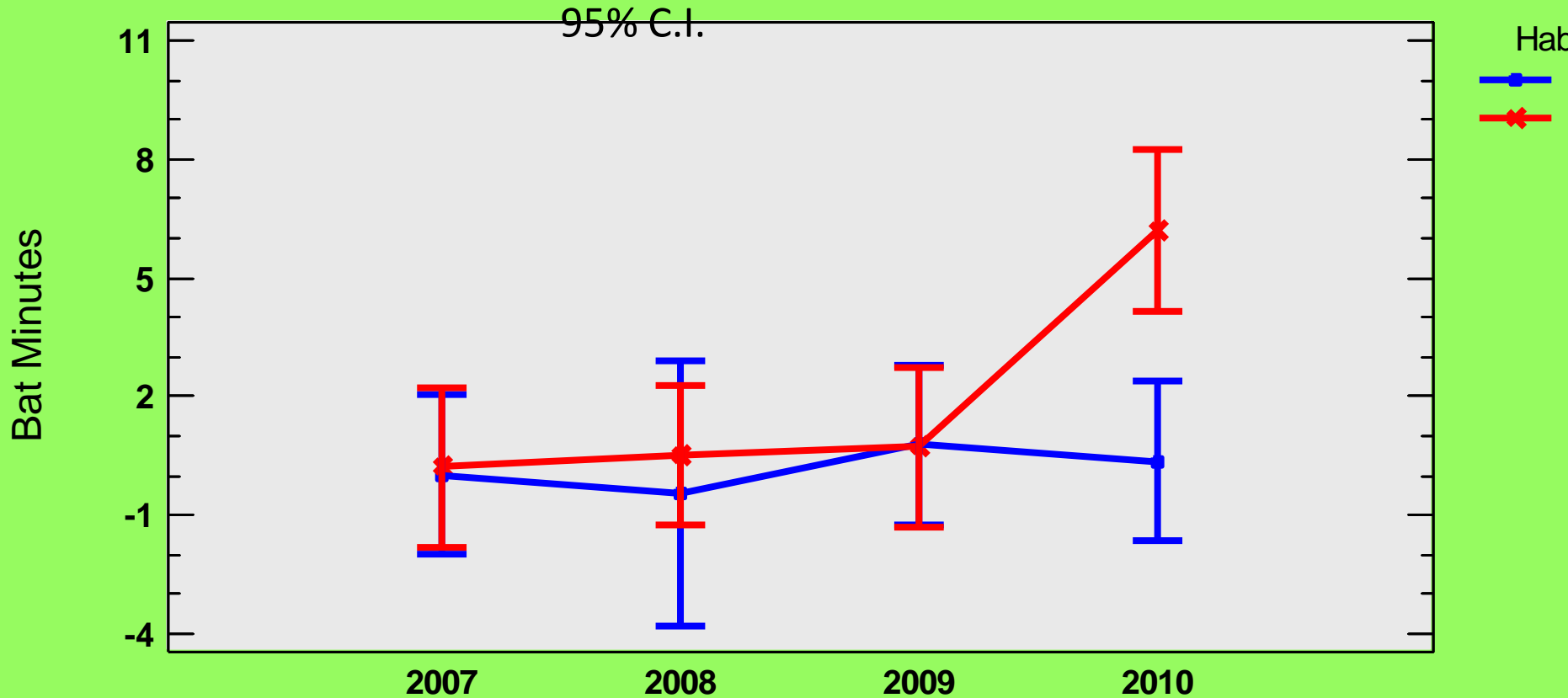
Cibola Valley Conservation Area



* Least Squares Means

Year to Year Comparison of Bat Activity In Treated vs Untreated Habitats – Red and Yellow Bats

95% Confidence Intervals



* Least Squares Means

2007



2010



July 2010 Habitat Comparisons — Kruskal Wallis
(Non Parametric)

Species

Habitat Significance:

W. Red Bat

ICW significantly higher than SCW or Ag; $p = 0.0355$

W. Yellow Bat

No differences in bat activity; $p = 0.0865$

CA Macrotus

ICW significantly higher than SCW;
 $p = 0.0482$

Myotis velifer

ICW significantly higher than SCW, SCW
higher than Ag; $p = 0.0015$

Myotis occultus

ICW significantly higher than SCW & AG;
 $p = 0.0026$

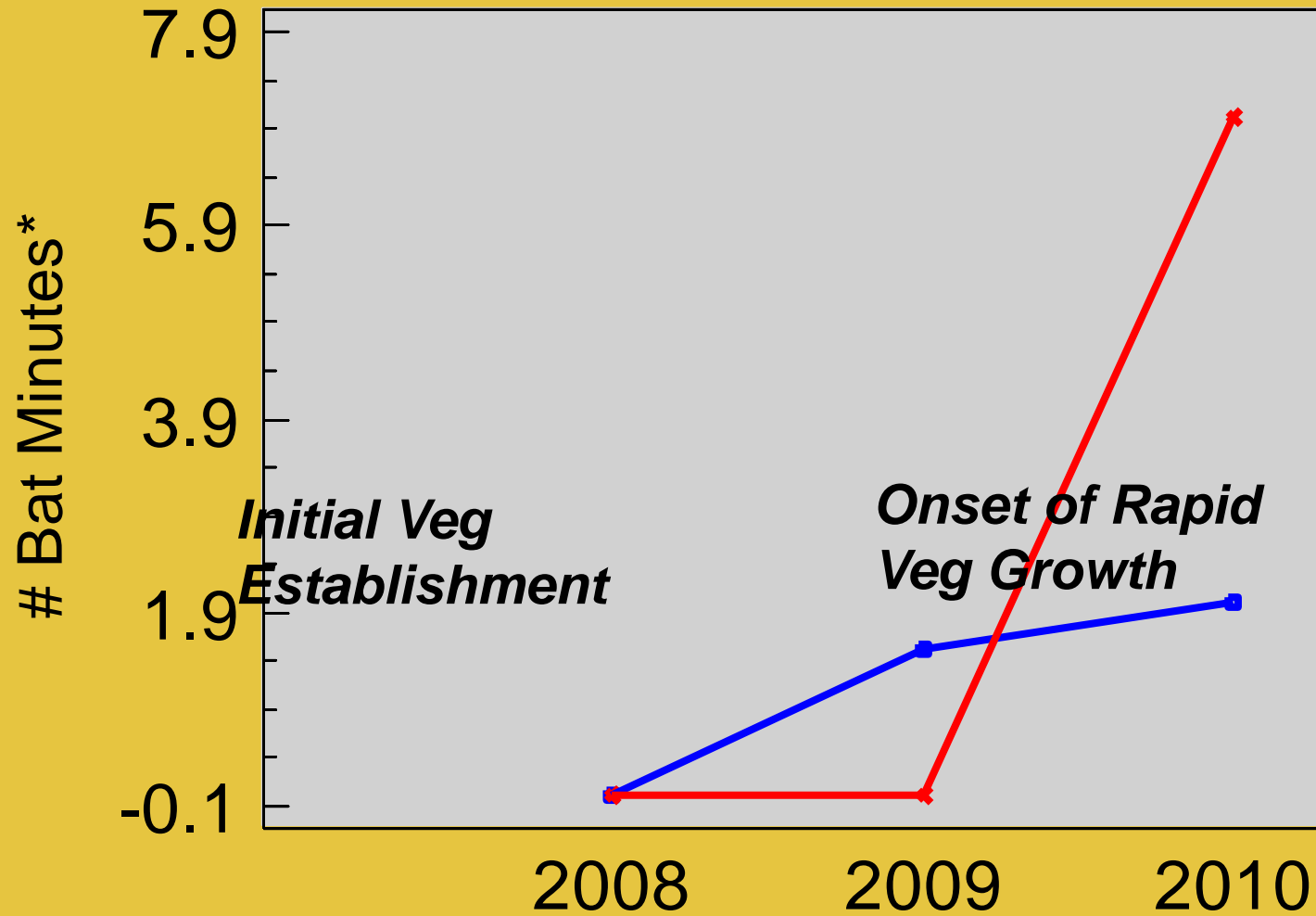
Canyon Bat

No differences in bat activity; $p = 0.4304$

Palo Verde Ecological Reserve

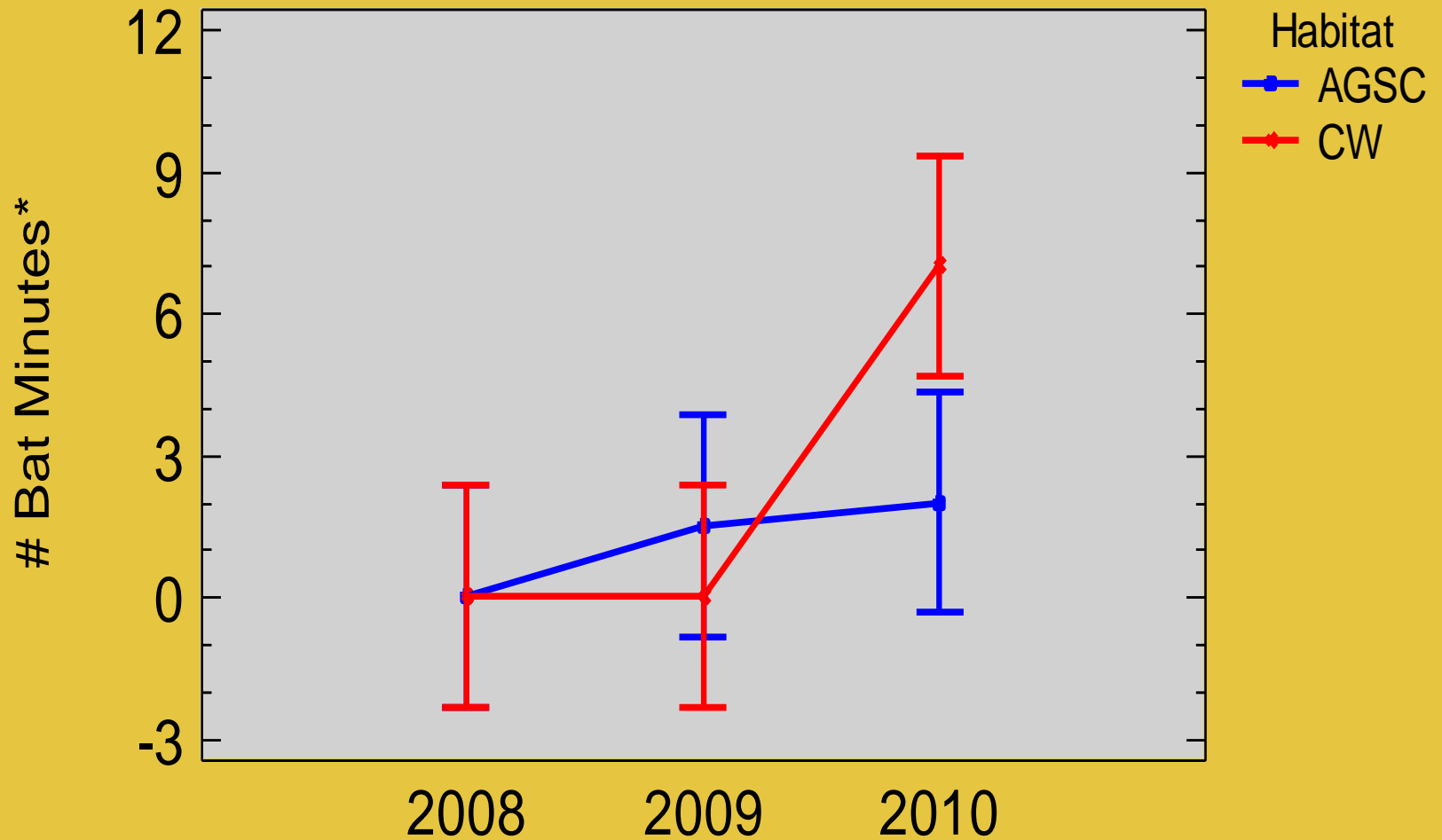


Year to Year Comparison of Bat Activity In Treated vs Untreated Habitats – Red and Yellow Bats



* Least Squares Means

Year to Year Comparison of Bat Activity In Treated vs Untreated Habitats – Red and Yellow Bats



* Least Squares Means



**PVER Nursery
2006**



**PVER Nursery
2010**

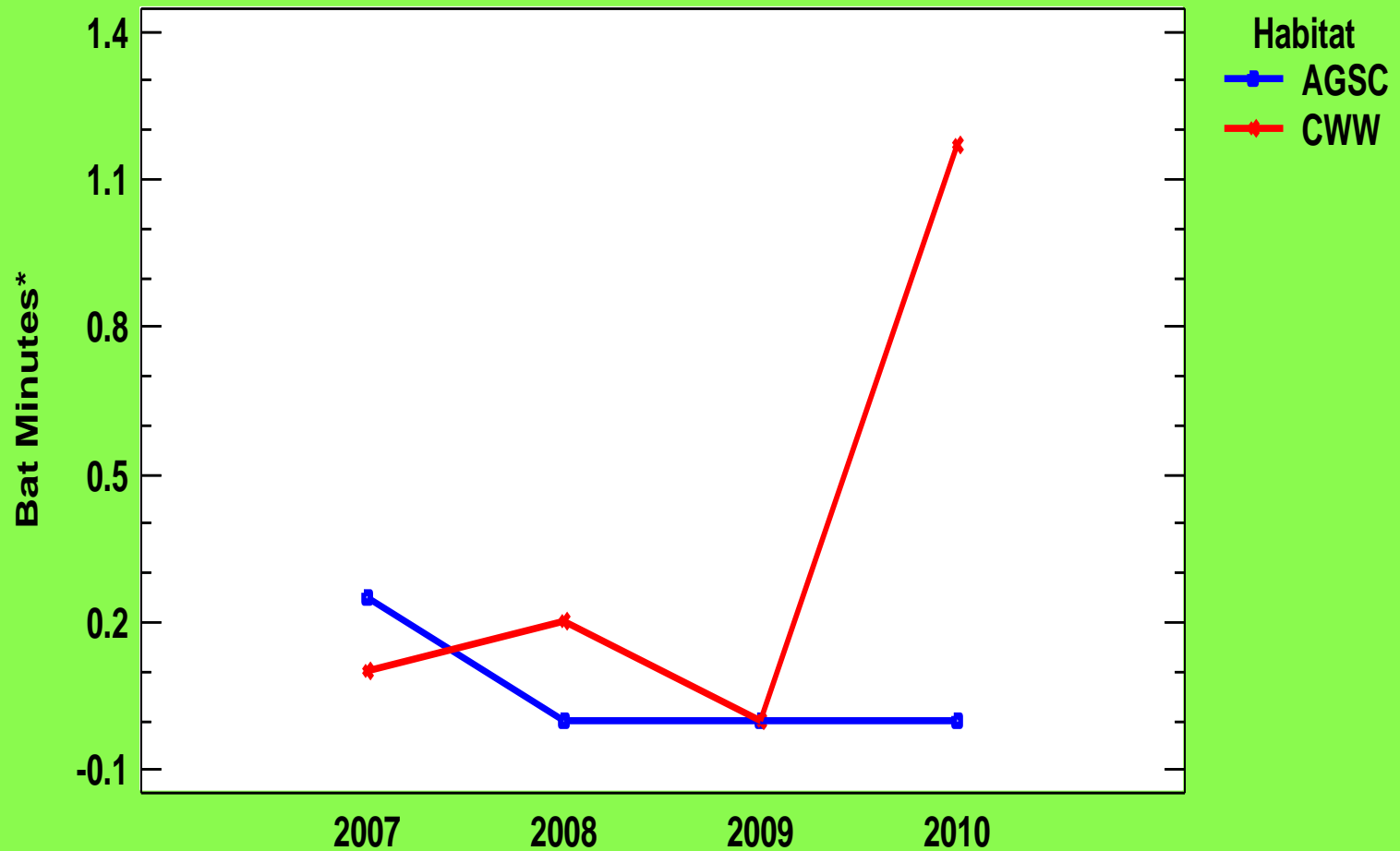
July 2010 Habitat Comparisons — Kruskal Wallis
(Non Parametric)

Species	Habitat Significance:
W. Red Bat	SCW significantly higher than SC, AG; $p = 0.0090$
W. Yellow Bat	No differences in bat activity; $p = 0.8506$
CA Macrotus	ICW significantly higher than SCW; $p = 0.0086$
Myotis velifer	ICW significantly higher than SCW, SCW higher than Ag & SC; $p = 0.0015$
Myotis occultus	ICW significantly higher than SCW, MESQ, SC & AG; $p = 0.02476$
Canyon Bat	No differences in bat activity; $p = 0.0745$

Beal Riparian Restoration Project

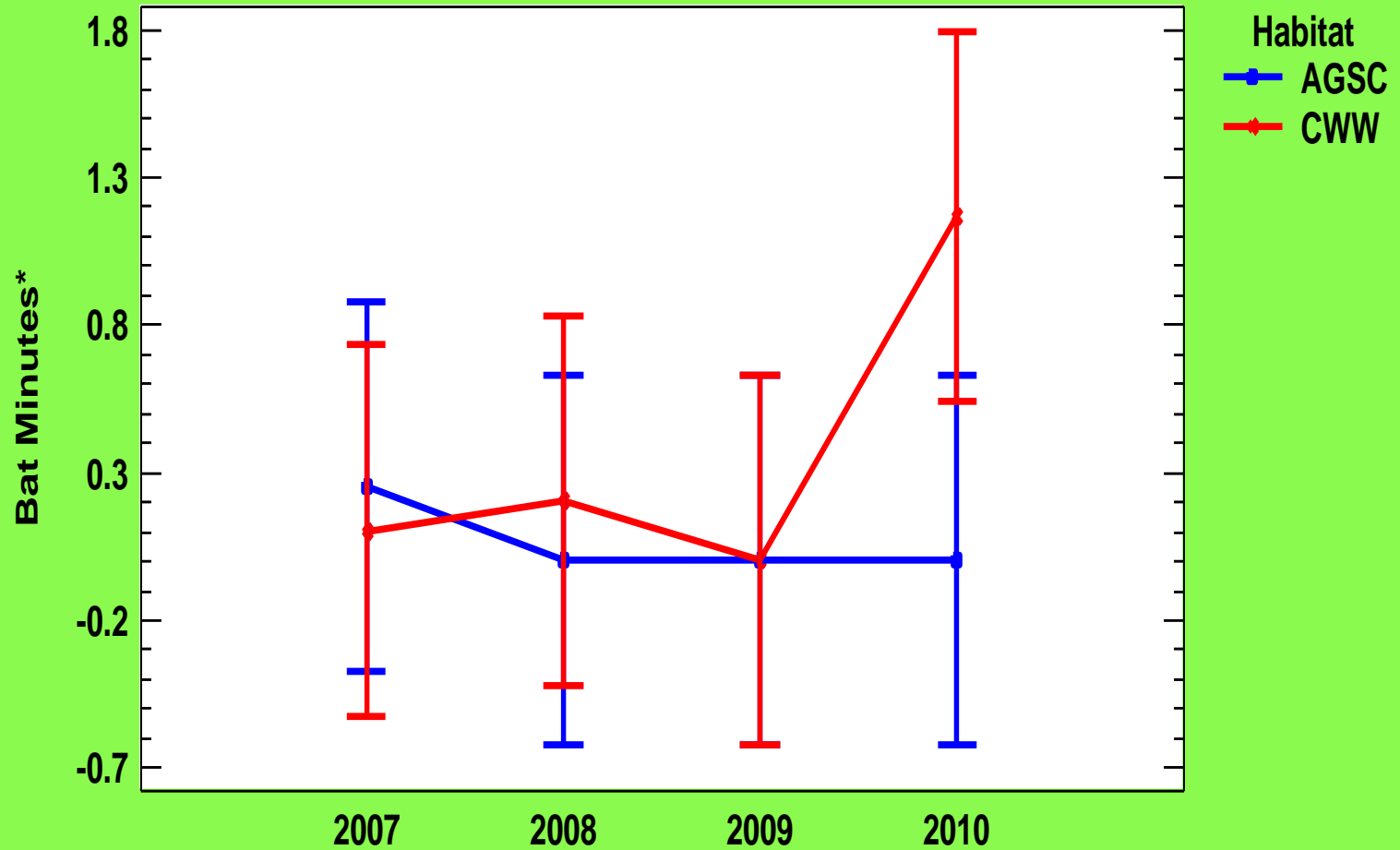


Year to Year Comparison of Bat Activity in Treated vs. Untreated Habitats – Red and Yellow Bats



* Least Squares Means

Year to Year Comparison of Bat Activity in Treated vs. Untreated Habitats – Red and Yellow Bats



July 2010 Habitat Comparisons — Kruskal Wallis
(Non Parametric)

Species

Habitat Significance:

W. Red Bat

No difference in bat activity; $p = 0.3281$

W. Yellow Bat

No differences in bat activity; $p = 0.1203$

CA Macrotus

No difference in bat activity; $p = 0.0773$

Myotis velifer

SCW significantly higher than MESQ & SC
 $p = 0.0057$

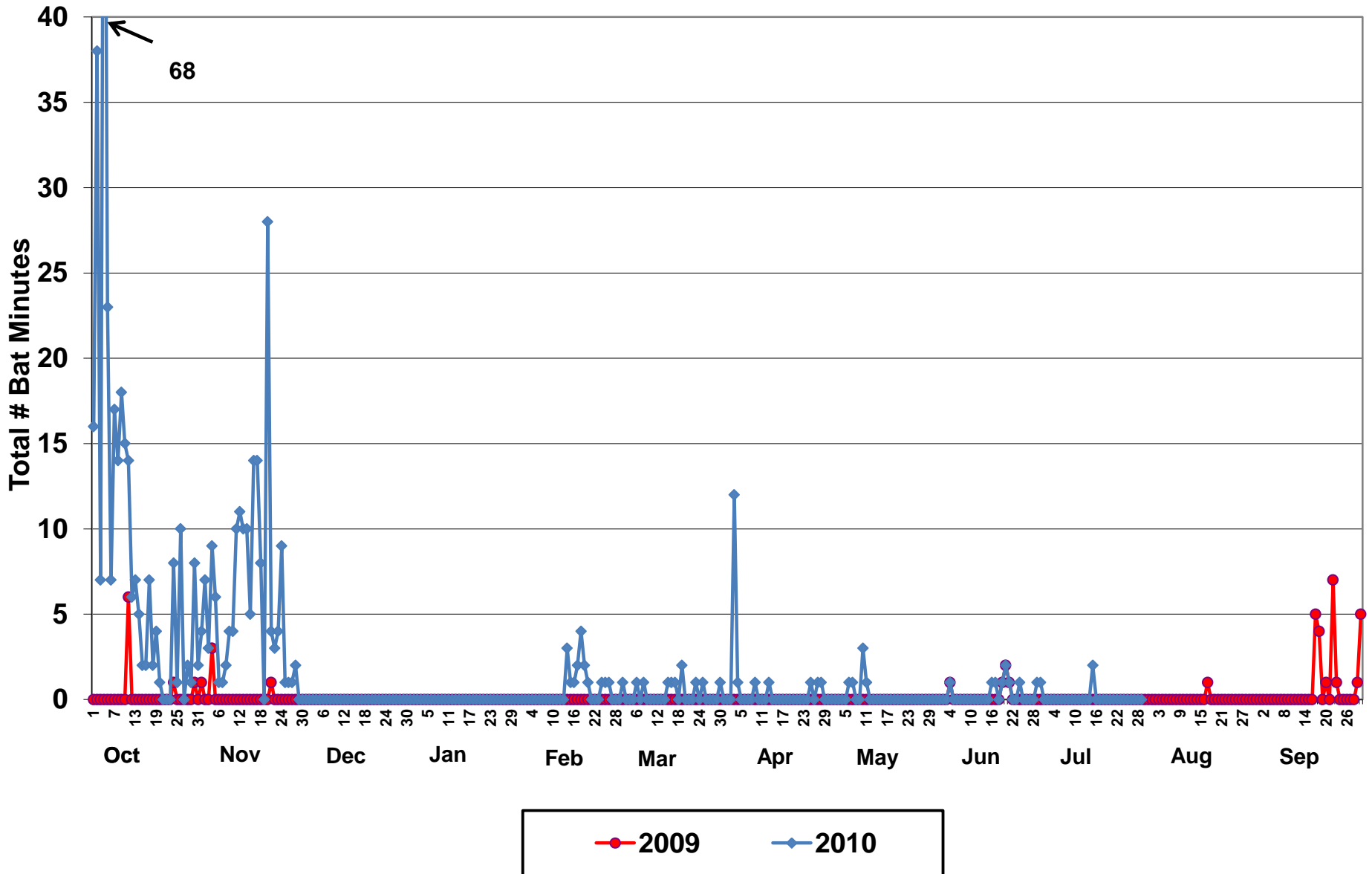
Myotis occultus

No differences in bat activity; $p = 0.6351$

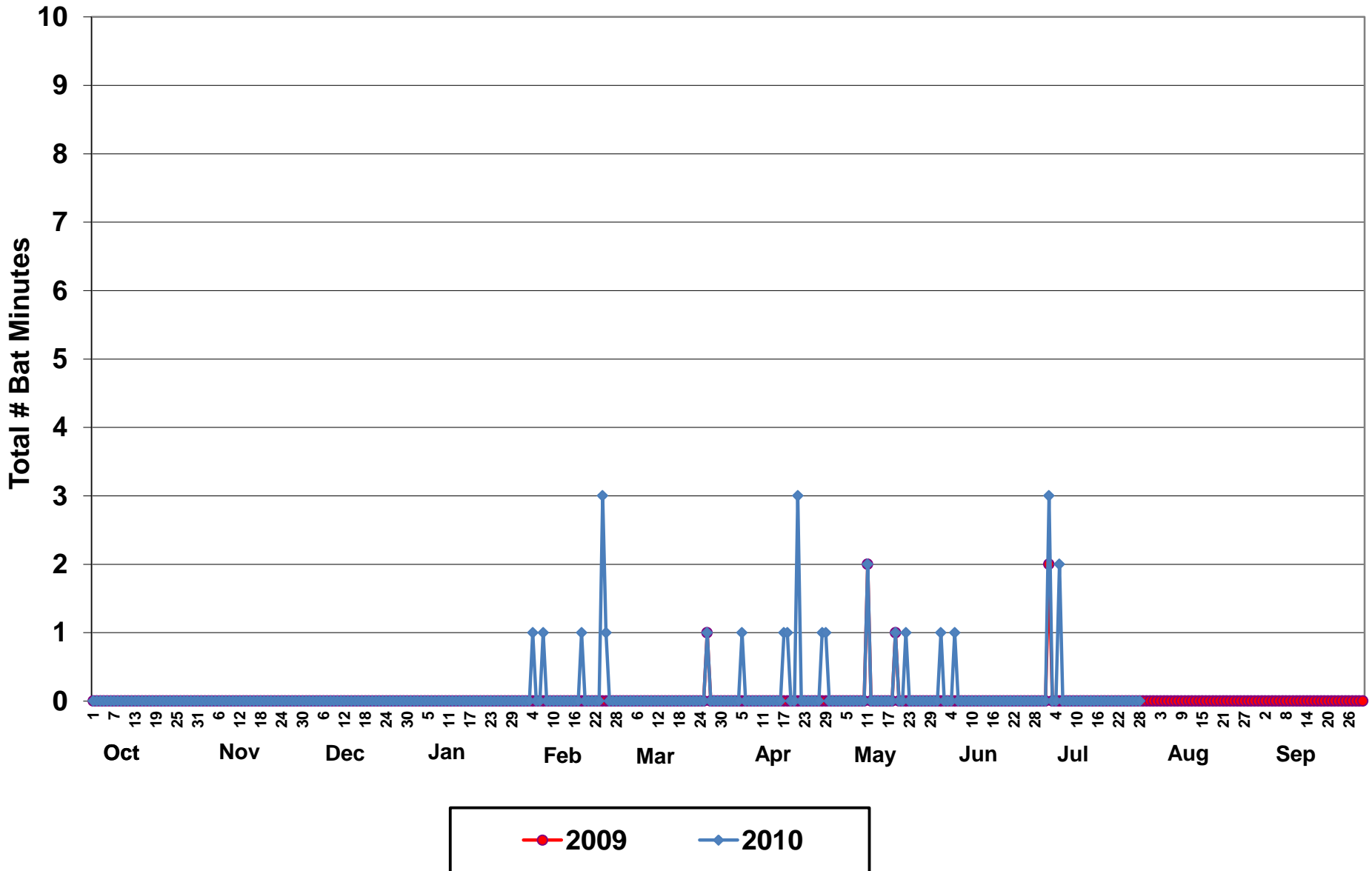
Canyon Bat

No differences in bat activity; $p = 0.0772$

Beal Permanent Bat Monitoring Station 2009 & 2010 Western Red Bat



Beal Permanent Bat Monitoring Station 2009 & 2010 Western Yellow Bat



CNWR#1 and Imperial Ponds:

-Year to Year Comparisons show increase in Bat Activity in CWW Habitats from 08 to 09, but not significant

-Habitat Comparisons: No significant differences in bat activity among any habitats at CNWR#1. MESQ habitat has significantly higher bat activity for Laxa at Imperial Ponds

Summary

- ▶ Rapidly developing CWW habitats at CVCA and PVER show significant increases in Red and Yellow Bat activity from 2009 to 2010 as habitat matures & grows more complex
- ▶ ICW habitat has significantly higher number of bat minutes for Labl, Maca, Myve, Myoc at CVCA & PVER
- ▶ SCW habitat has significantly higher numbers of bat minutes for Labl @ PVER; Myve @ Beal

- ▶ MESQ Habitat has significantly higher number bat minutes for Laxa @ Imperial ponds
- ▶ Consideration should be given to adding Myve and Myoc to evaluation species – excellent riparian habitat indicators
- ▶ Phasing into Permanent Monitoring Stations at each HCA
- ▶ Pilot Program for Mobile Bat Monitoring Surveys 2011