Measuring Habitat Improvement Along the Las Vegas Wash Using Bat Dietary Analysis

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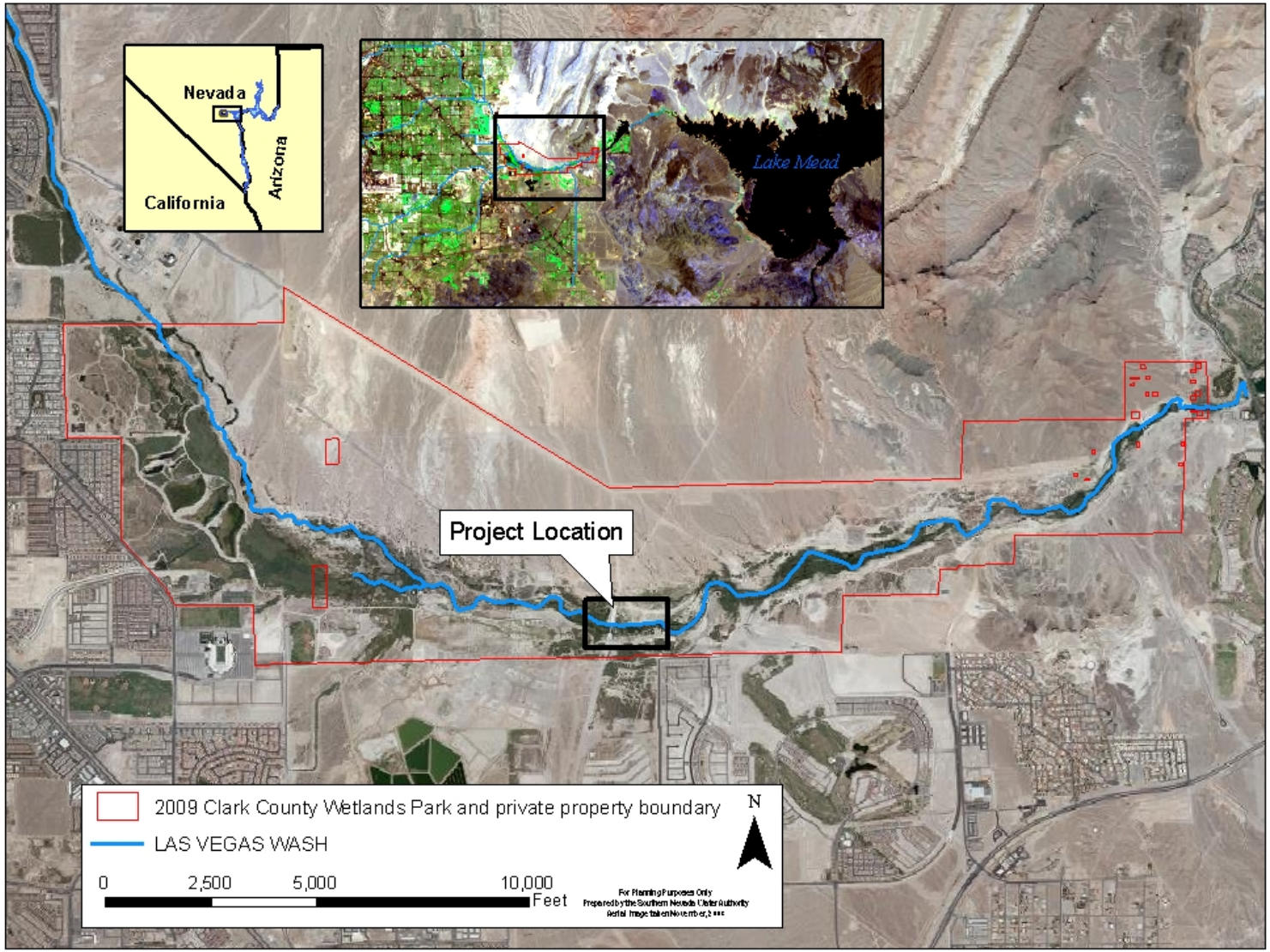
Las Vegas Wash



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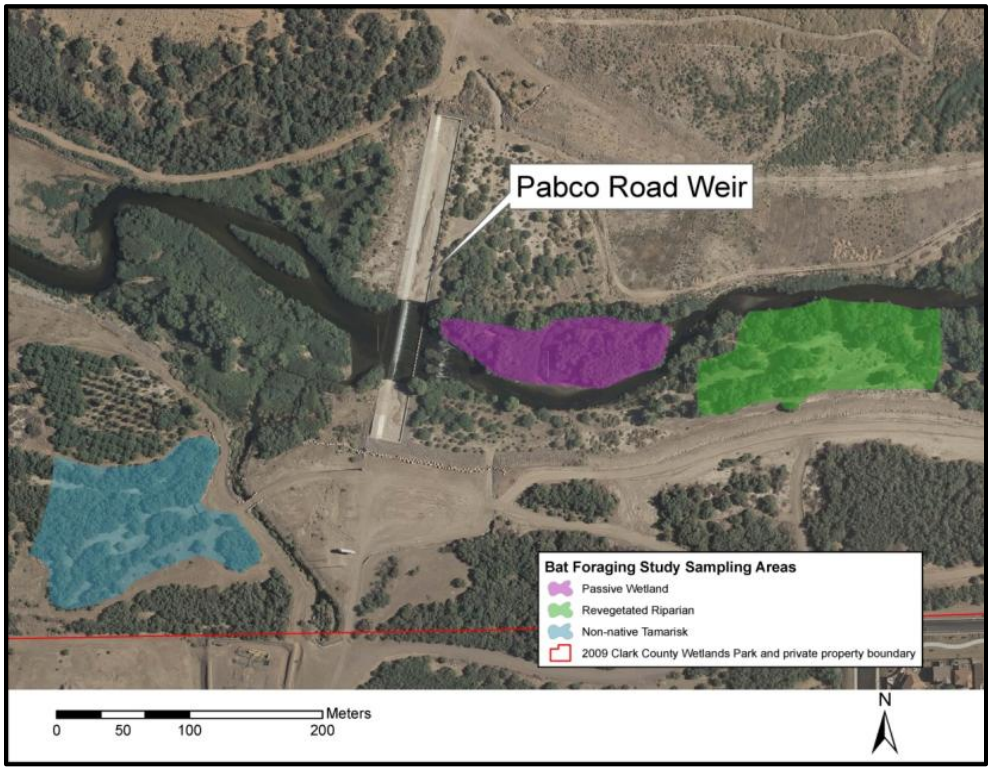
Background

- As of this study, 280 acres had been revegetated along the Wash (today almost 370)
- Prior to 2004, bats at the Wash were known through rare mist netting or shooting
- From 2004 -2009 we conducted an acoustic monitoring survey
  - 18 bat species were identified
- From 2008-2010 we conducted a capture study
  - 8 bat species previously picked up on acoustic units were confirmed
- We wanted to know: Does restoration at the Wash improve bat habitat?

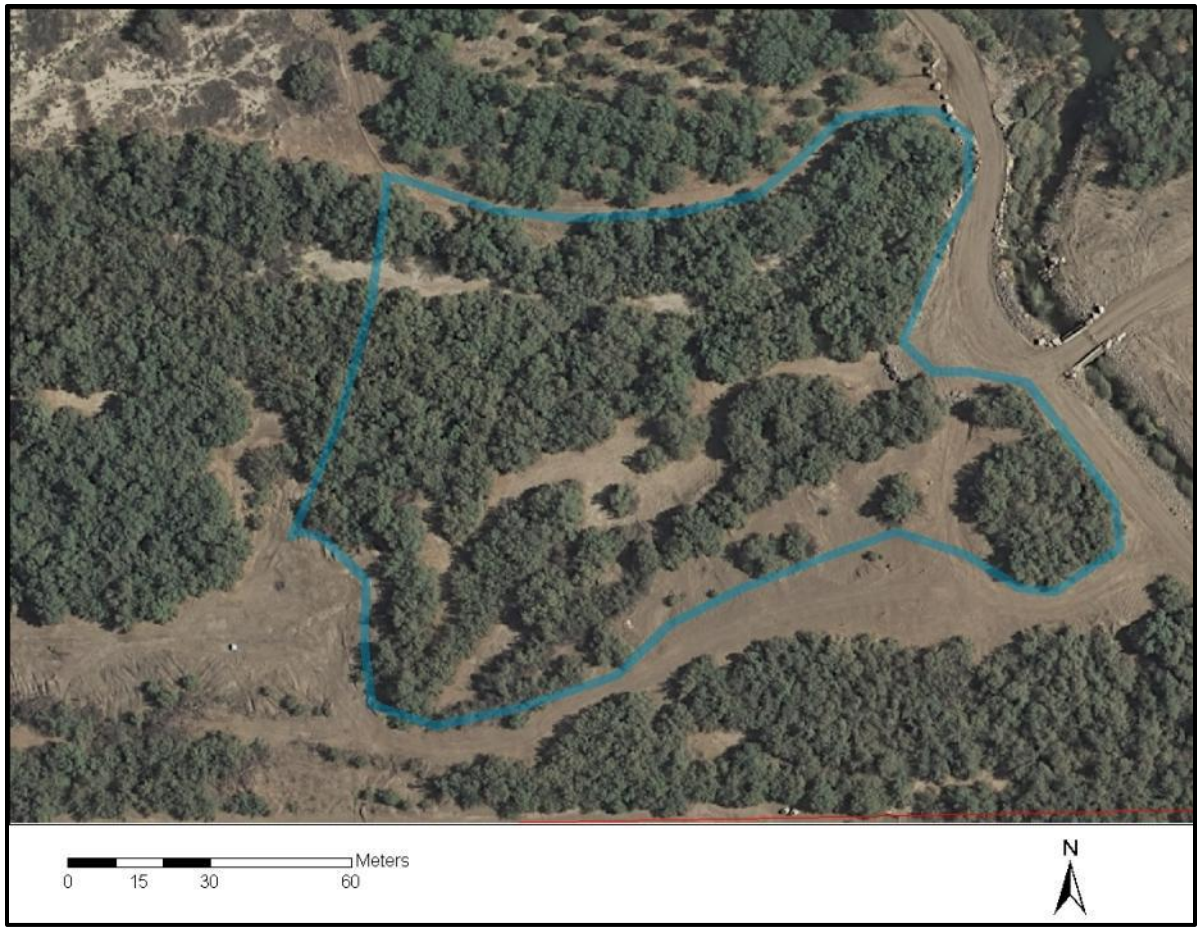
Site Selection

- Three sites with different habitat types were chosen in close proximity to each other. This gave each area an equal opportunity to be chosen by bats for foraging.
- The three sites were located in a tamarisk stand, a riparian revegetation area and a passively created wetland
  - The riparian area had multiple captures in previous study



Methodology - Site Selection

– **Tamarisk**
  - **Mature stand that is around 50 years old**
  - **Exclusively Tamarisk (*Tamarix ramosissima*)**
  - **Approximately 175m from the main Wash channel**
  - **Good flight corridor from abandoned dirt road through site**
  - **Represents a pre-restoration state**

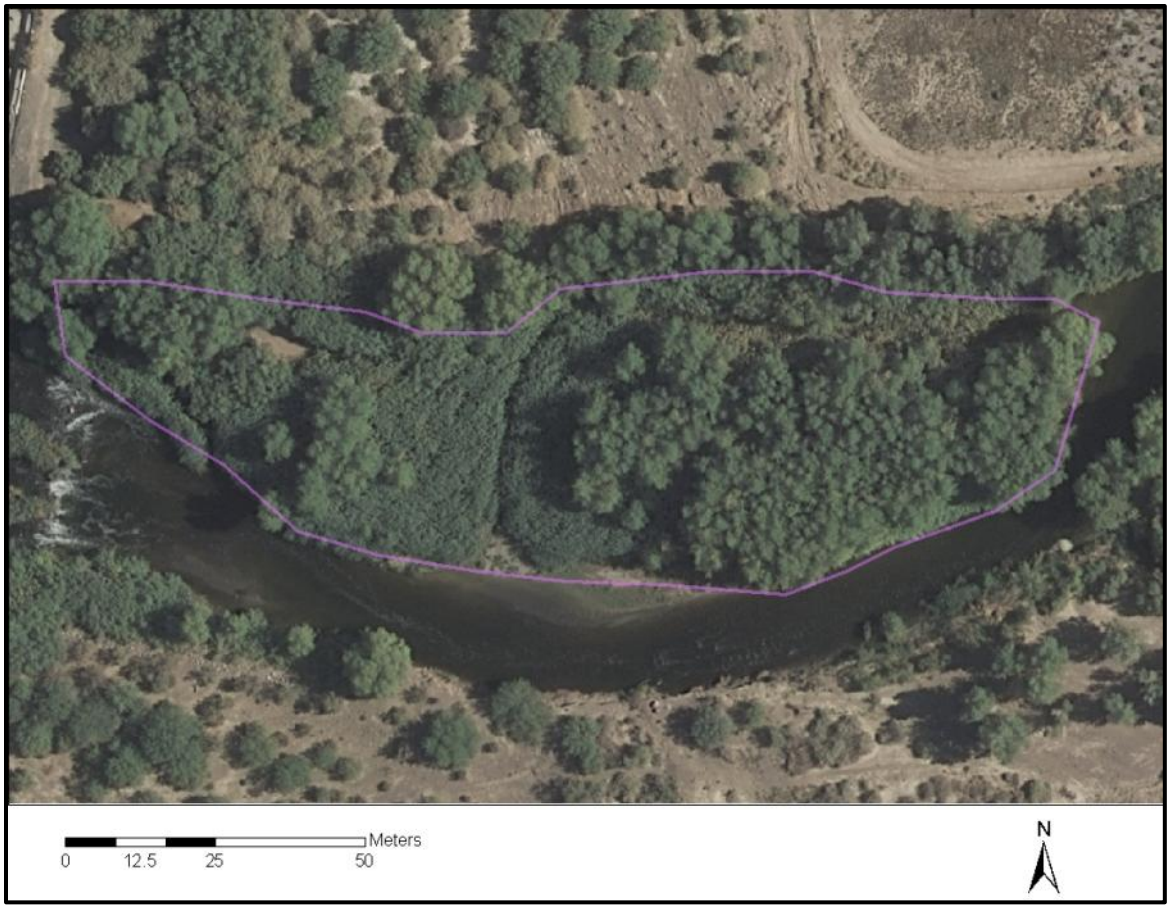


Methodology - Site Selection

– **Riparian Revegetation**
  - **Planted with native species in 2001**
  - **Dominated by Cottonwoods (*Populus fremontii*)**
  - **Approximately 30m from the Wash channel**
  - **Good flight corridor naturally formed by tree growth**

Methodology - Site Selection

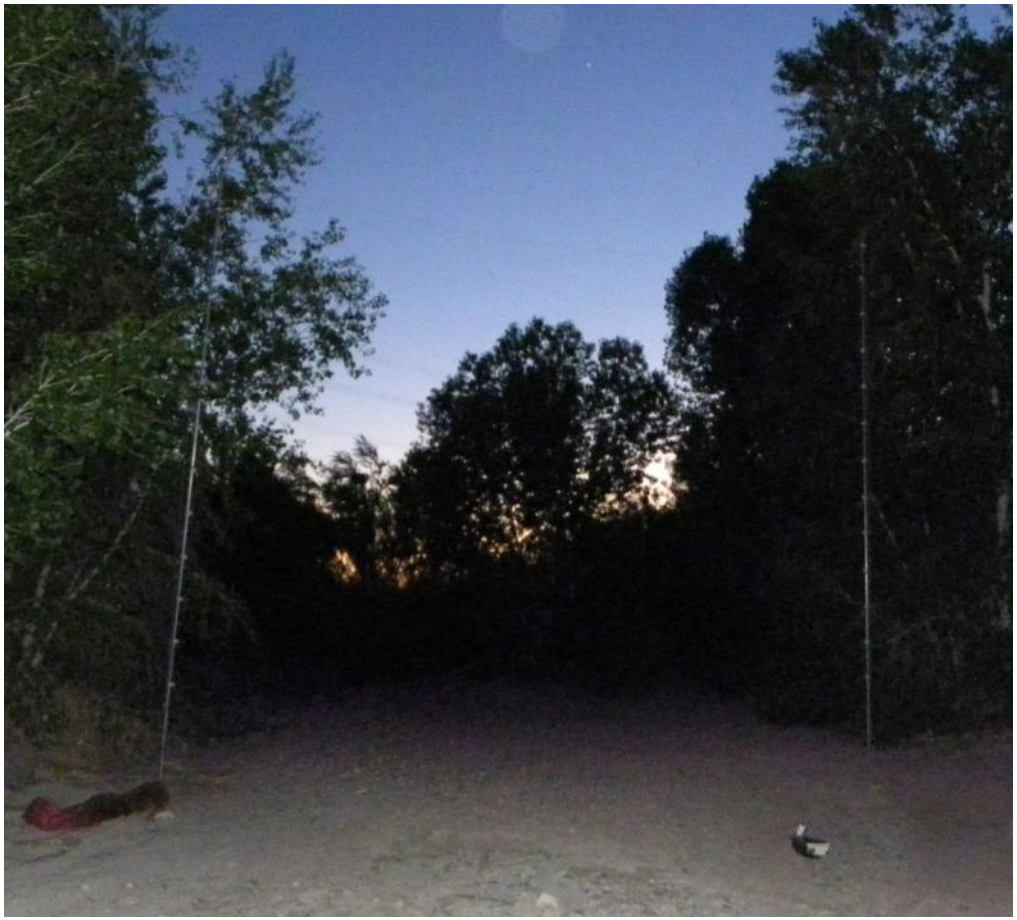
- Passively Created Wetland
  - Less than 5 years old
  - Dominated by Common Reed (*Phragmites australis*) and Goodding's Willow (*Salix gooddingii*)
  - Back water arm created a flight corridor and slow moving water to drink and glean from



Methodology - Bat Monitoring

- One high net was placed in the flight corridor at each site
  - Nets were 6-9m wide and mature vegetation blocked both sides

Methodology - Bat Monitoring

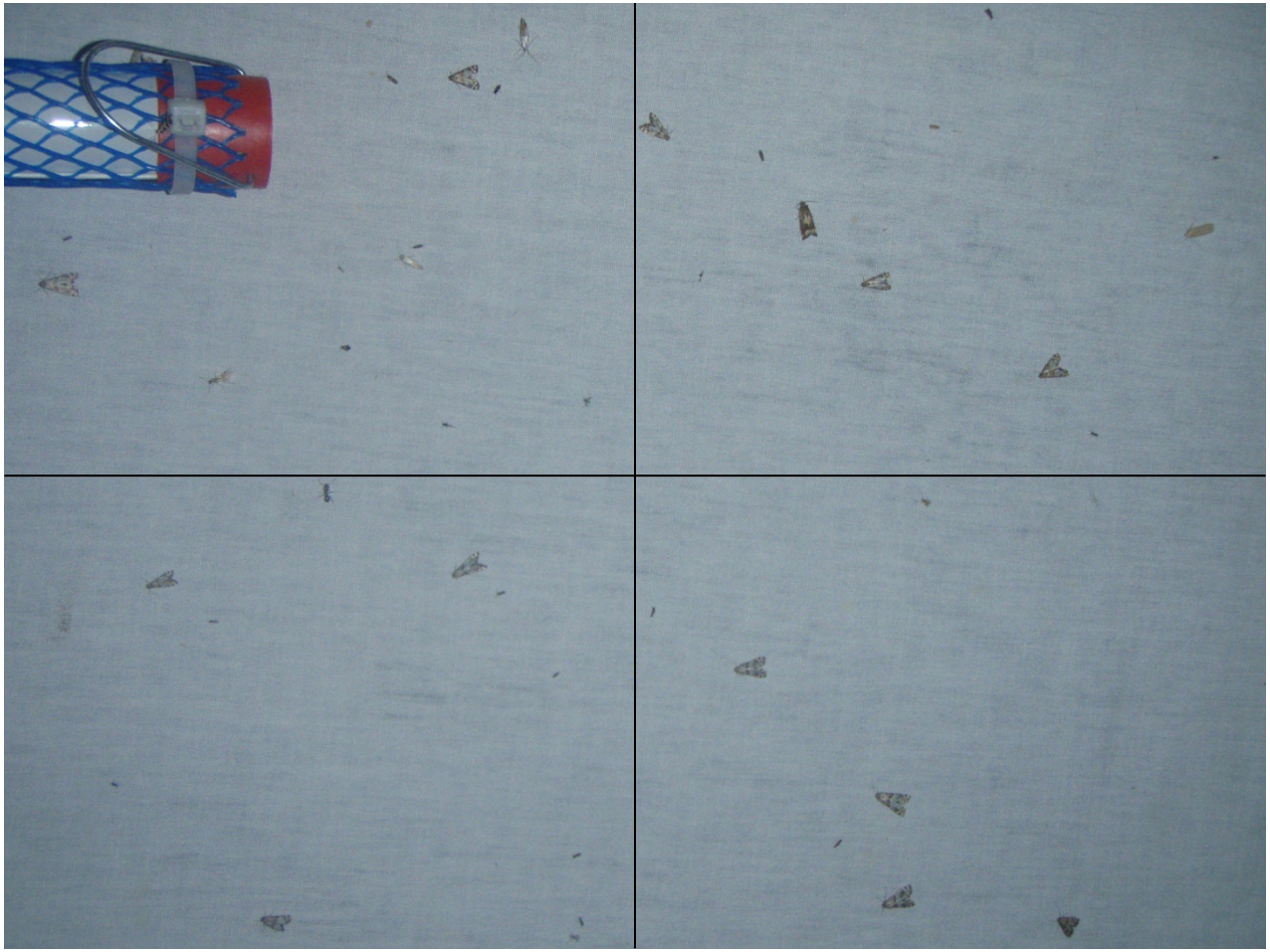


Methodology - Bat Monitoring

- Acoustic units were placed close to the net to record bat activity at each net
- Acoustics were recorded onto an SD card and transferred to a computer for analysis

Methodology - Insect Monitoring

Methodology - Insect Monitoring



Methodology - Guano

- Guano Analysis
  - Guano was analyzed under a stereo microscope
  - Each pellet was teased apart
  - Insect parts were identified to order
  - Insect sample specimens were used to help in identification

Results – Bats Acoustics

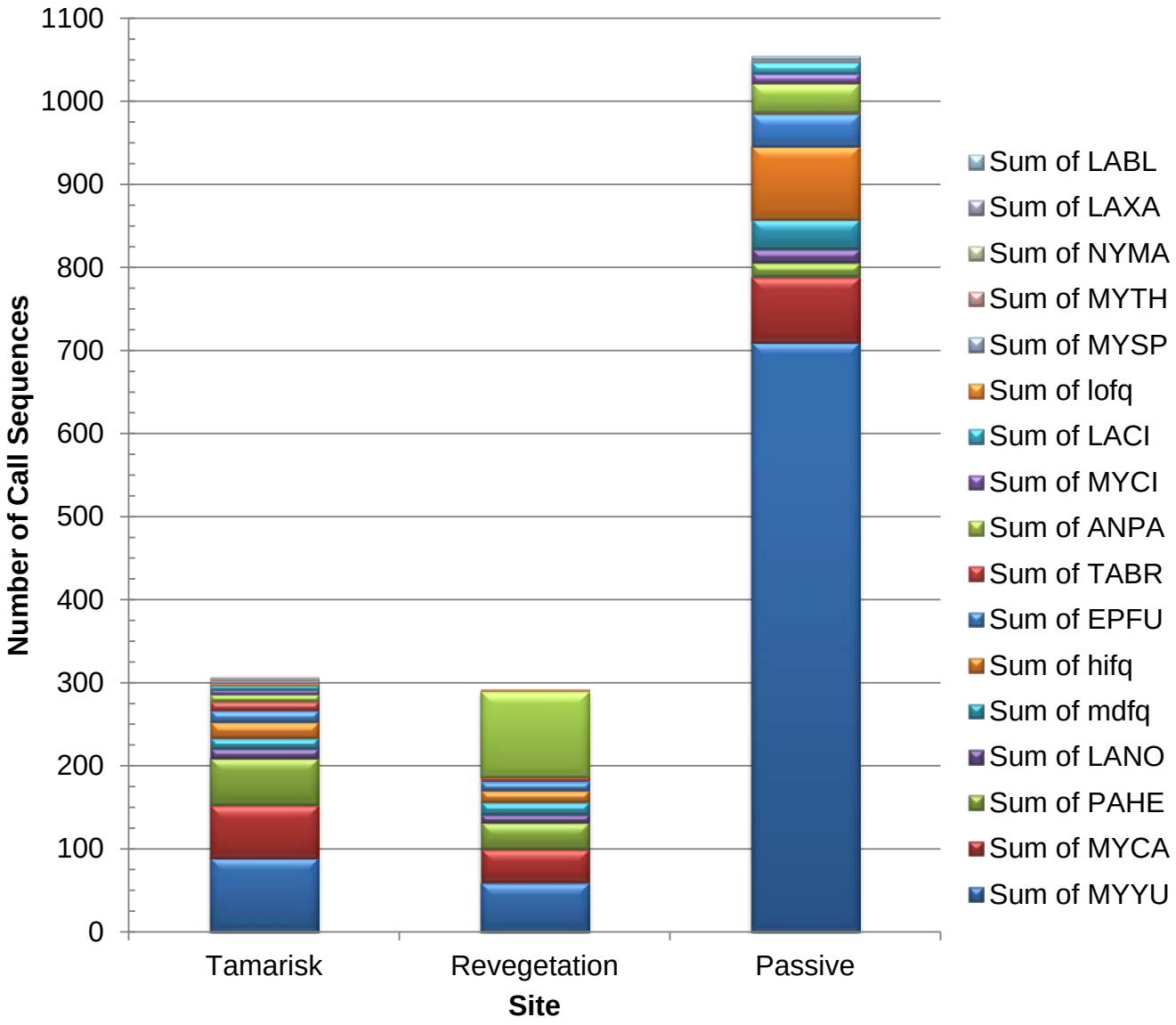
Call Sequences

Month	Tamarisk	Revegetation	Passive	Grand Total
May	16	49	68	133
June	7	31	73	111
July	58	23	63	144
August	144	95	167	406
September	55	44	533	632
October	27	50	151	228
Total	307	292	1055	1654

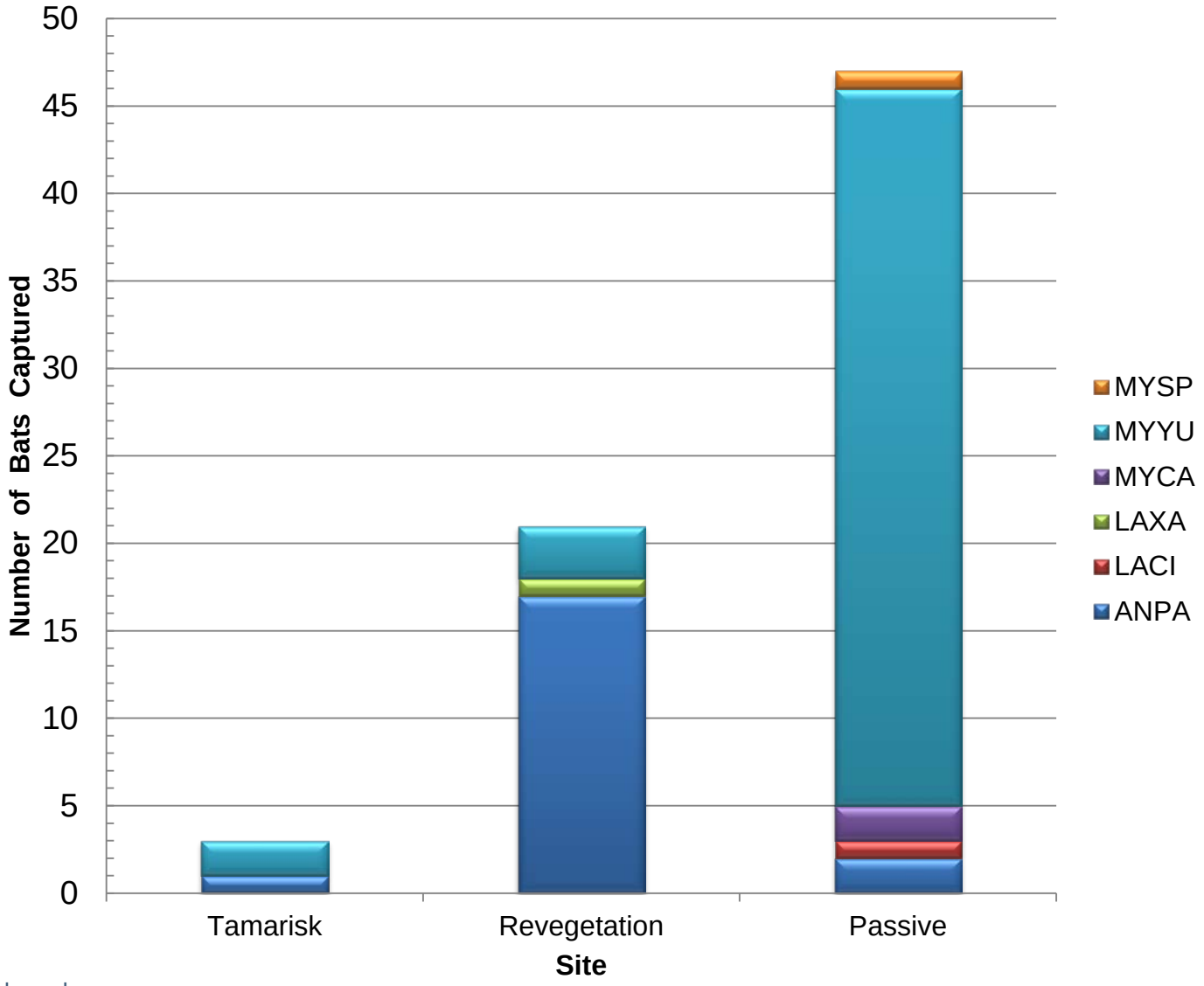
Feeding Buzz

Month	Tamarisk	Revegetation	Passive	Grand Total
May	1	0	1	2
June	0	1	0	1
July	7	0	0	7
August	17	1	1	19
September	5	5	0	10
October	4	0	1	5
Total	34	7	3	44

Results – Bat Acoustic



Results – Bat Captures



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Antrozous pallidus – Pallid Bat

Myotis yumanensis – Yuma myotis

Results - Insects

- Number of individual insects collected at UV light by month
  - * No UV light collection in August, listed species were collected on the mist net

Order	May	June	July	August*	September	October	Grand Total	% of Total
Hemiptera	1782	7914	1035		2	2	10735	59.12%
Diptera	244	759	111		427	848	2389	13.16%
Lepidoptera	191	432	445	4	508	471	2051	11.29%
Unknown		192	950		213	46	1401	7.72%
Trichoptera		905	61		93	11	1070	5.89%
Coleoptera	5	268	76		17	4	370	2.04%
Neuroptera	5	44	16		5	1	71	0.39%
Hymenoptera	4	19	14		3		40	0.22%
Odonata			2	4	1	2	9	0.05%
Orthoptera	2		5			2	9	0.05%
Blattodea	1		1		3		5	0.03%
Mantodea				2	1	1	4	0.02%
Aranae	1				2	1	4	0.02%
Isopoda	1						1	0.01%
Grand Total	2236	10533	2716	10	1275	1389	18159	

Results - Insects

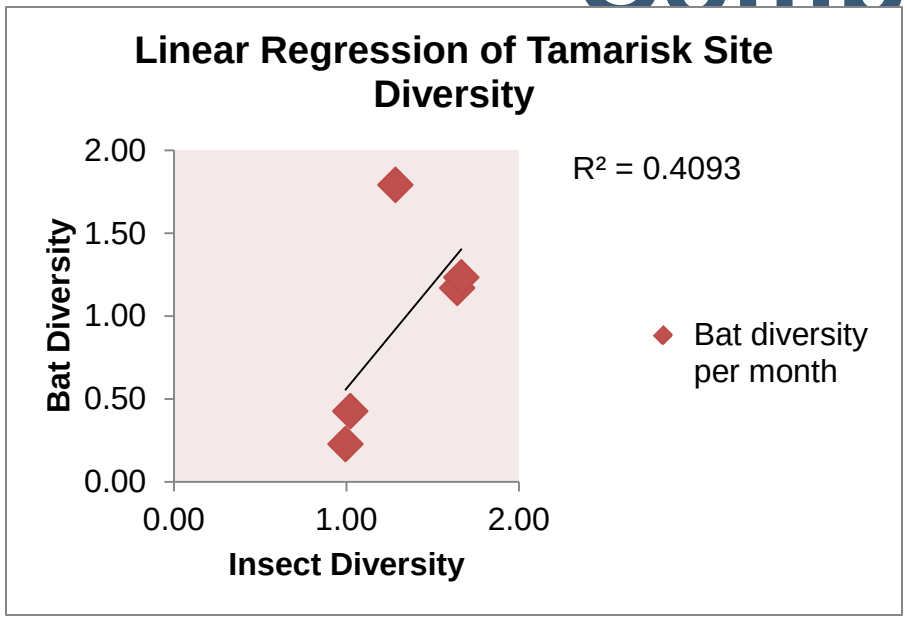
– **Hemiptera and 1 Coleoptera (lady beetle)**

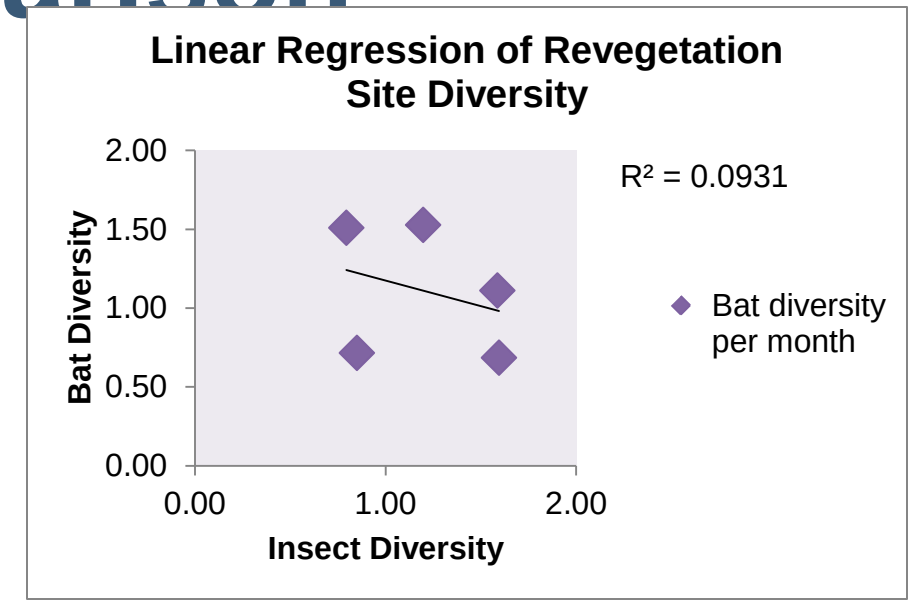
Results – Bat Guano Analysis

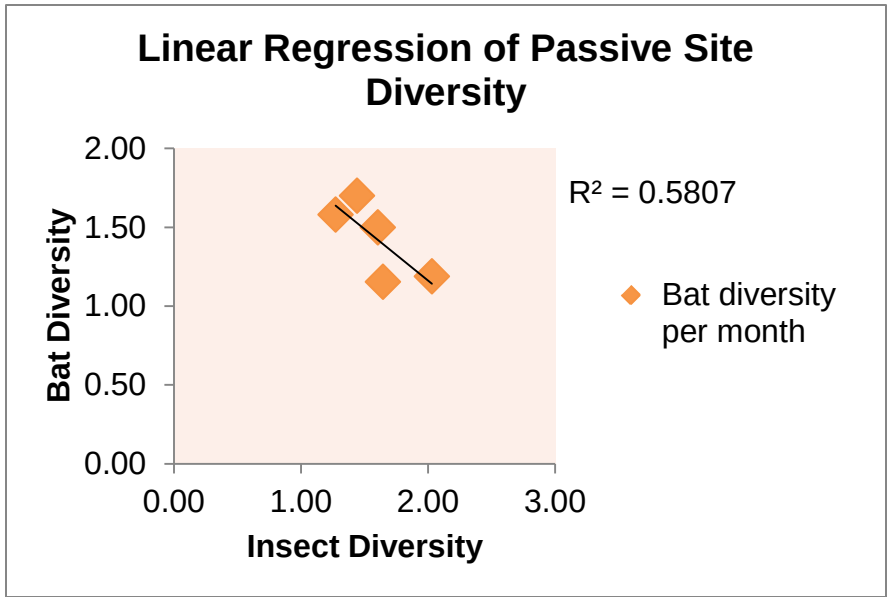
- **Number of guano pellets containing insect order parts per species per site**
  - ***Antrozous pallidus* and *Myotis yumanensis* only species found on all three sites**
  - ***Lasiurus cinereus*, *Lasiurus xanthinus* and *Myotis californicus* were excluded**

	Tamarisk		Revegetation		Passive		Grand Total
	Antrozous pallidus	Myotis yumanensis	Antrozous pallidus	Myotis yumanensis	Antrozous pallidus	Myotis yumanensis	
Coleoptera	0	4	37	8	5	39	93
Diptera	0	0	28	0	0	4	32
Hemiptera	0	0	0	0	0	6	6
Hymenoptera	2	2	2	1	0	42	49
Lepidoptera	0	10	4	3	0	43	60
Unknown	0	0	10	2	0	60	72

Results – Diversity Comparison







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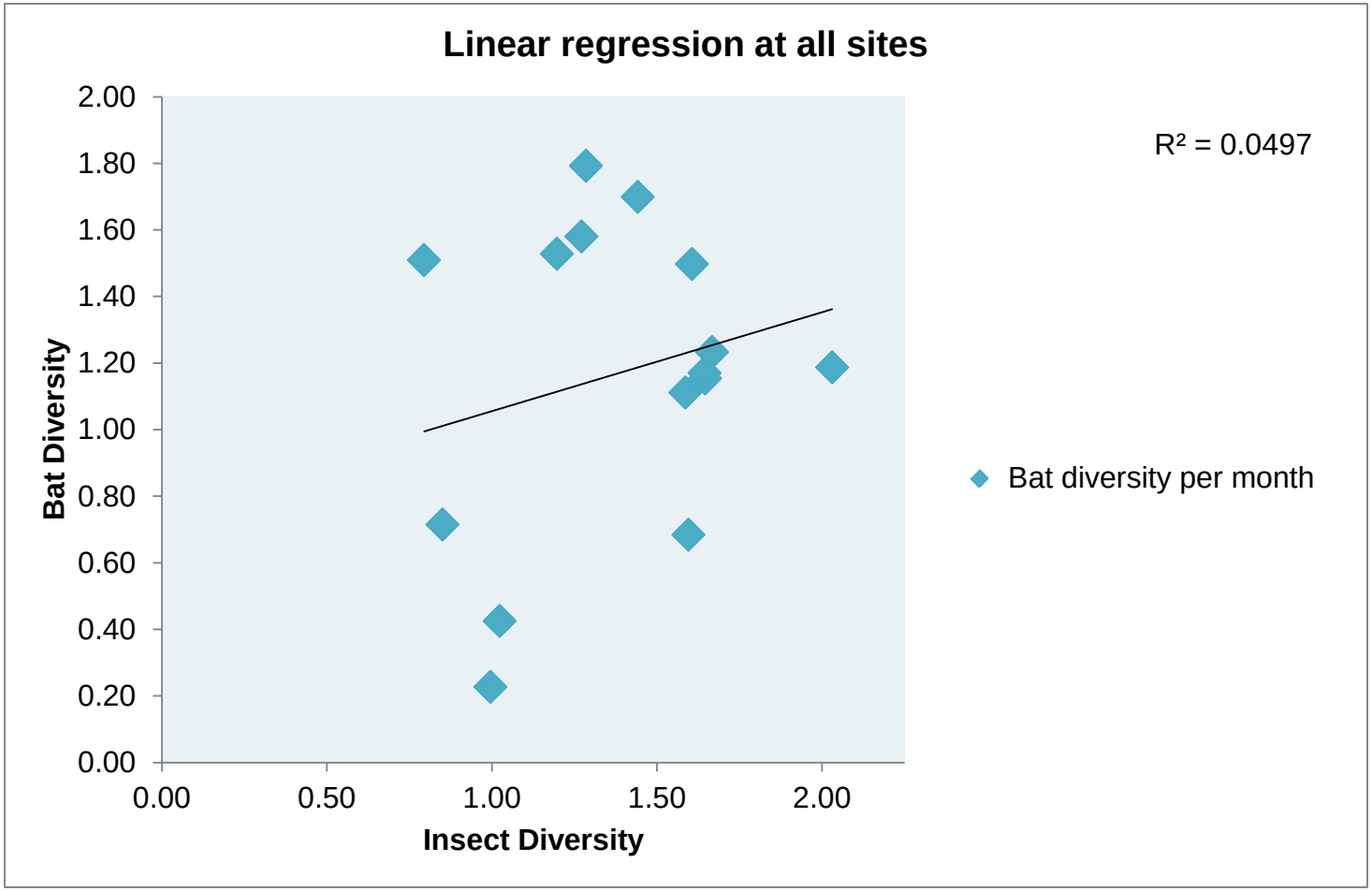
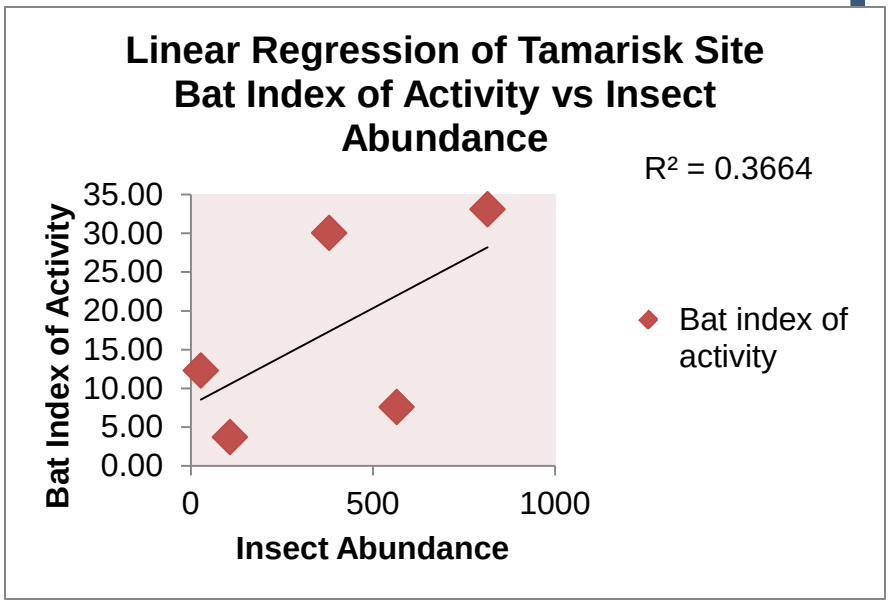
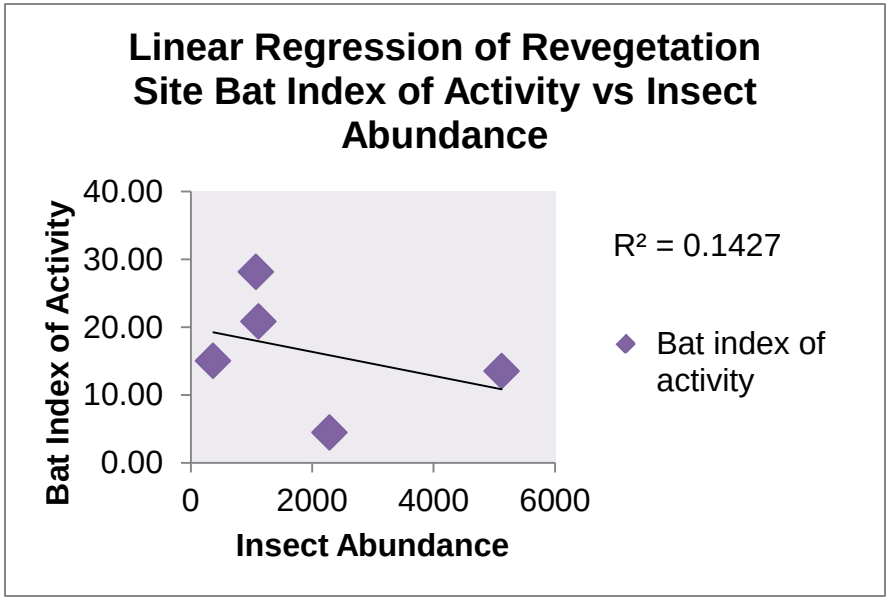
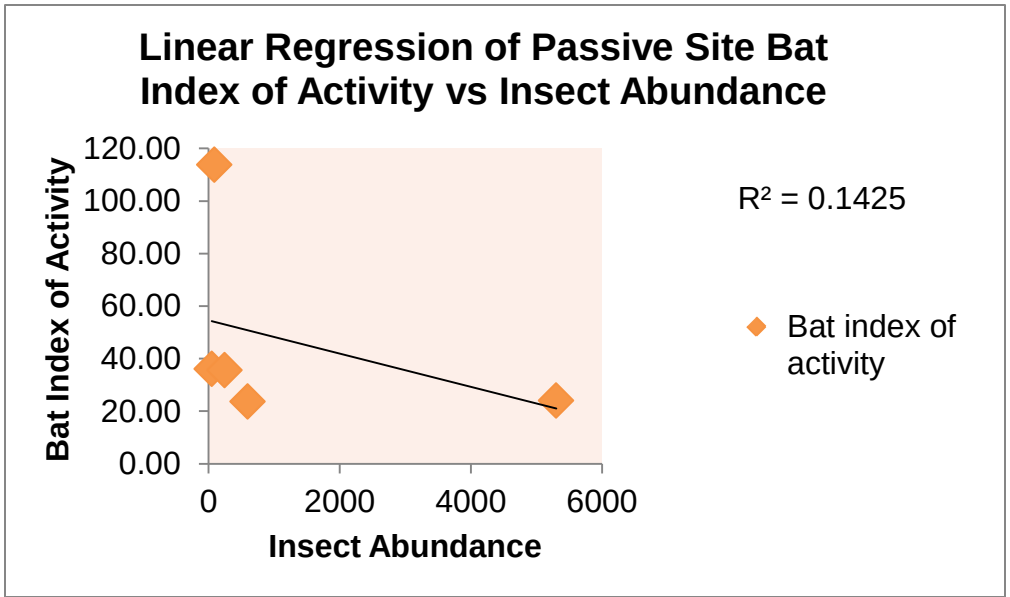


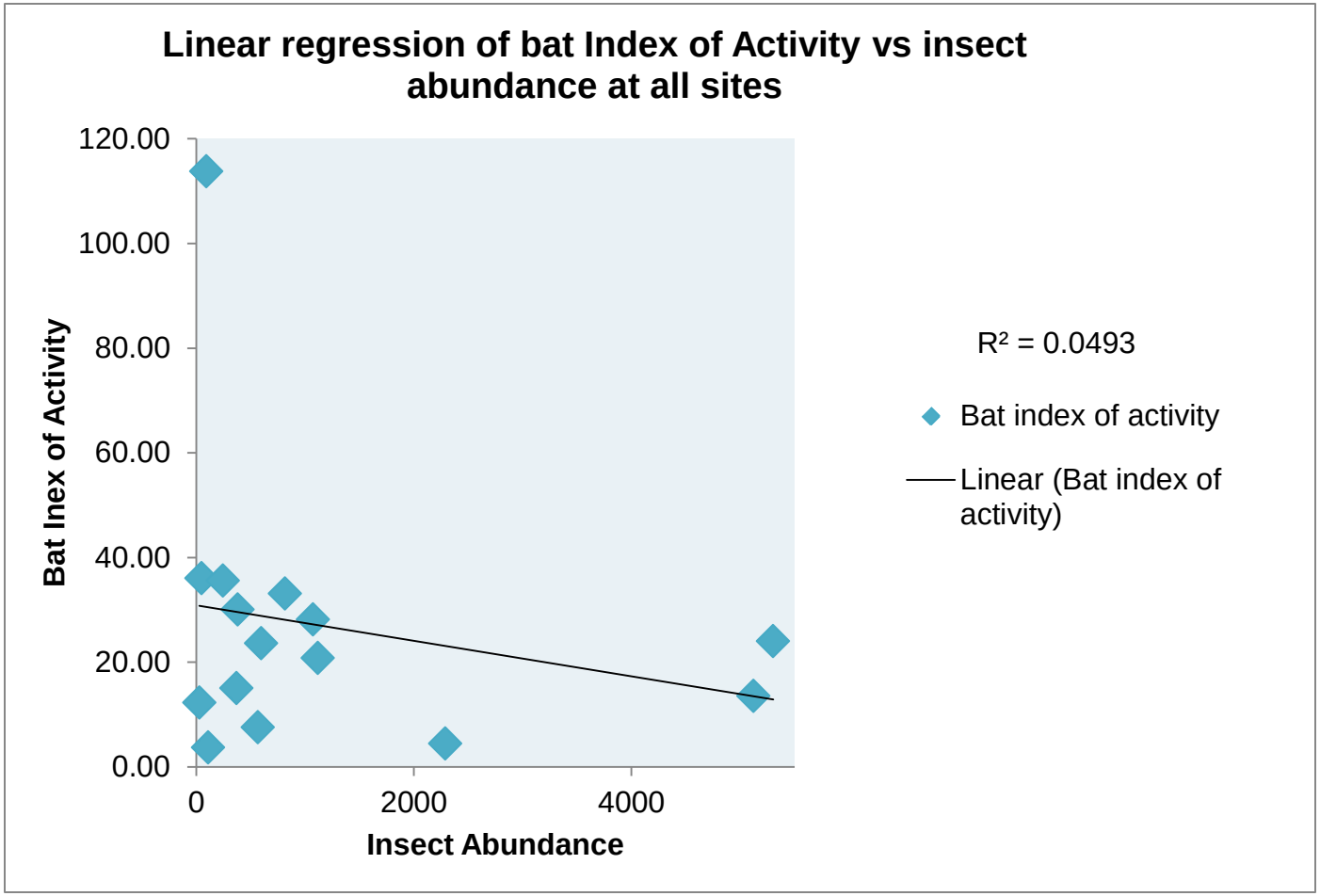
Results – Abundance Comparison







Results – Index of Activity Comparison



Conclusions – Site Summary

- Tamarisk had very few captures but also had highest species richness on acoustic units
  - Also highest number of feeding buzzes
- Bat activity at the revegetation site was at expected levels, similar to the two previous capture years
  - There were less acoustic calls than the passive site and tamarisk site
  - There were more captures than the tamarisk site but less than the passive site
- The passive site had the greatest number of captures and acoustic calls
  - This site was over a back channel of the Wash so we think this was a drinking area

Conclusions – Overall

Did revegetation help bat habitat?

- **NO!**
  - **A conclusion can't be made based on this study**

- **None of our comparisons between bat and insect activity indicated a significant correlation**
- **Same holds true for comparisons between bat activity and vegetation characteristics**
- **When *Yuma myotis* (majority of activity) are removed all sites had a similar amount of acoustic activity**

Discussion

- *A. Pallidus* preferred revegetation site, dominated by cottonwoods
- *M. Yumanensis* preferred passive site
  - Both consistent with previous bat acoustic information and literature
- Hemiptera was predominant invertebrate at passive and revegetation sites, mostly *Atomoscelis onustus* – 1-2mm in size
  - Too small to be adequate food source

Discussion

- Coleopterans were preferential food choice for *A. pallidus*.
  - Opportunistic feeder
  - Gleans prey
    - All invertebrates in higher numbers were aerial
- M. yumanensis
  - Evenly distributed prey
    - Lepidoptera, Coleoptera, Hymenoptera

QUESTIONS?

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