

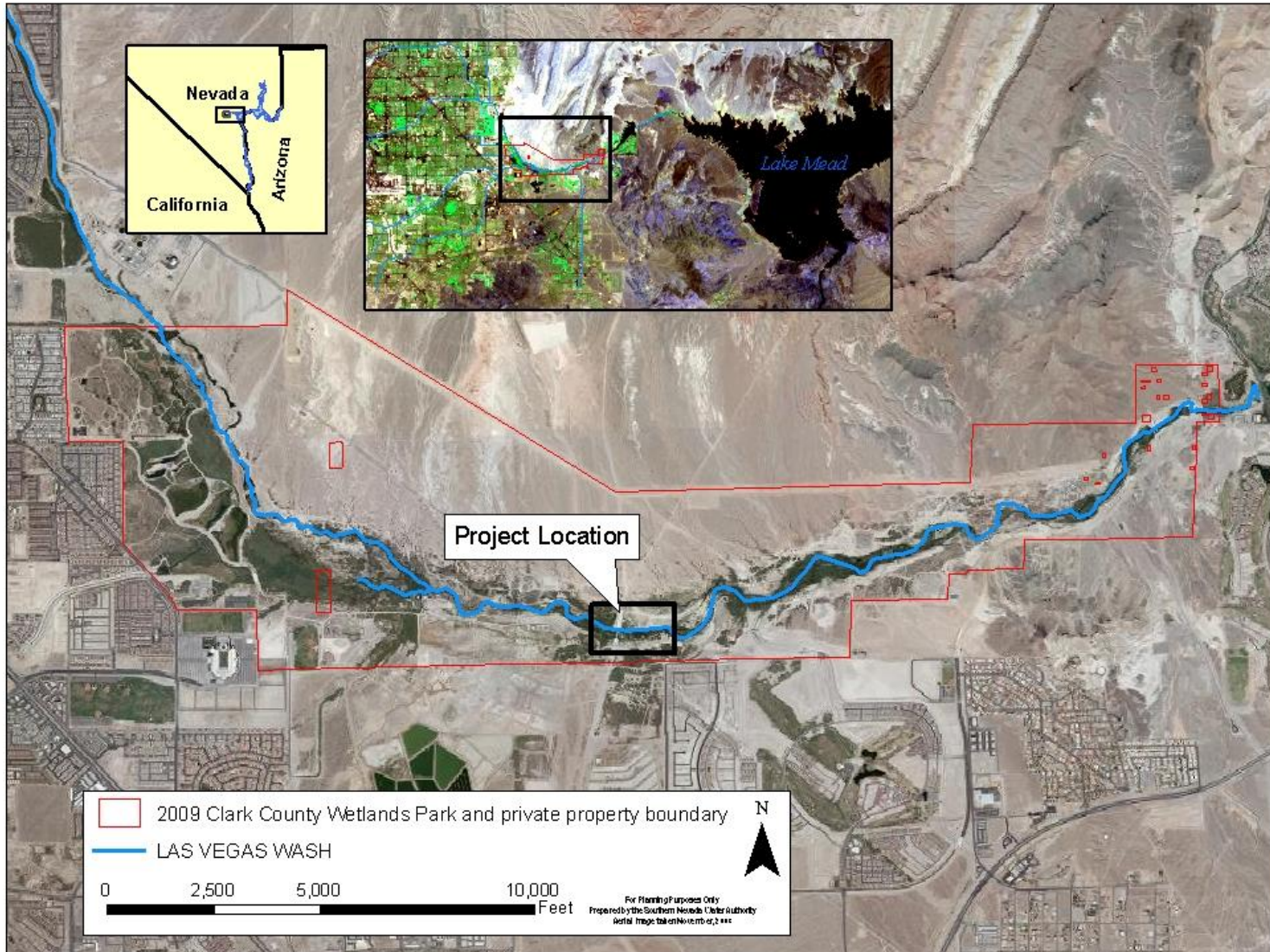
Measuring Habitat Improvement Along the Las Vegas Wash Using Bat Dietary Analysis

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Las Vegas Wash Coordination Committee
Southern Nevada Water Authority**



Las Vegas Wash



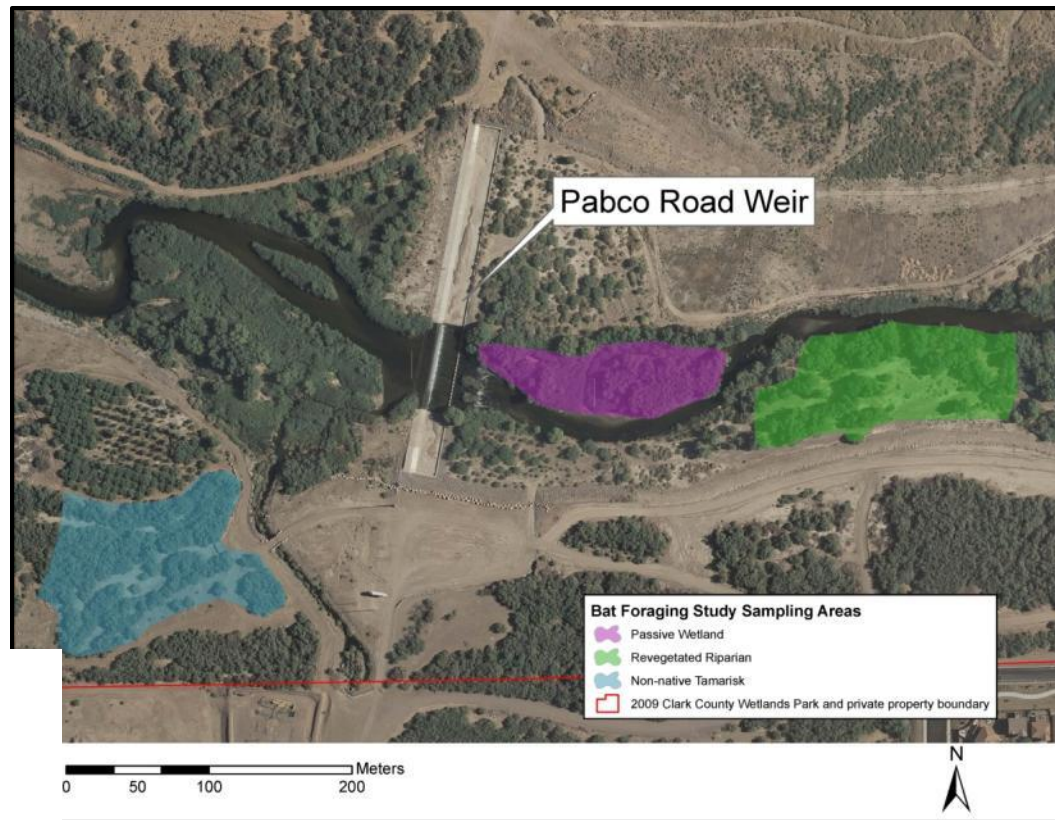
Background

- Since 2000, over 280 acres have been revegetated along the Wash
- Prior to 2004, bats at the Wash were known through rare mist netting or shooting
- In January 2004 we started our first acoustic monitoring survey
 - 18 bat species were identified
- In 2008 we started our first 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

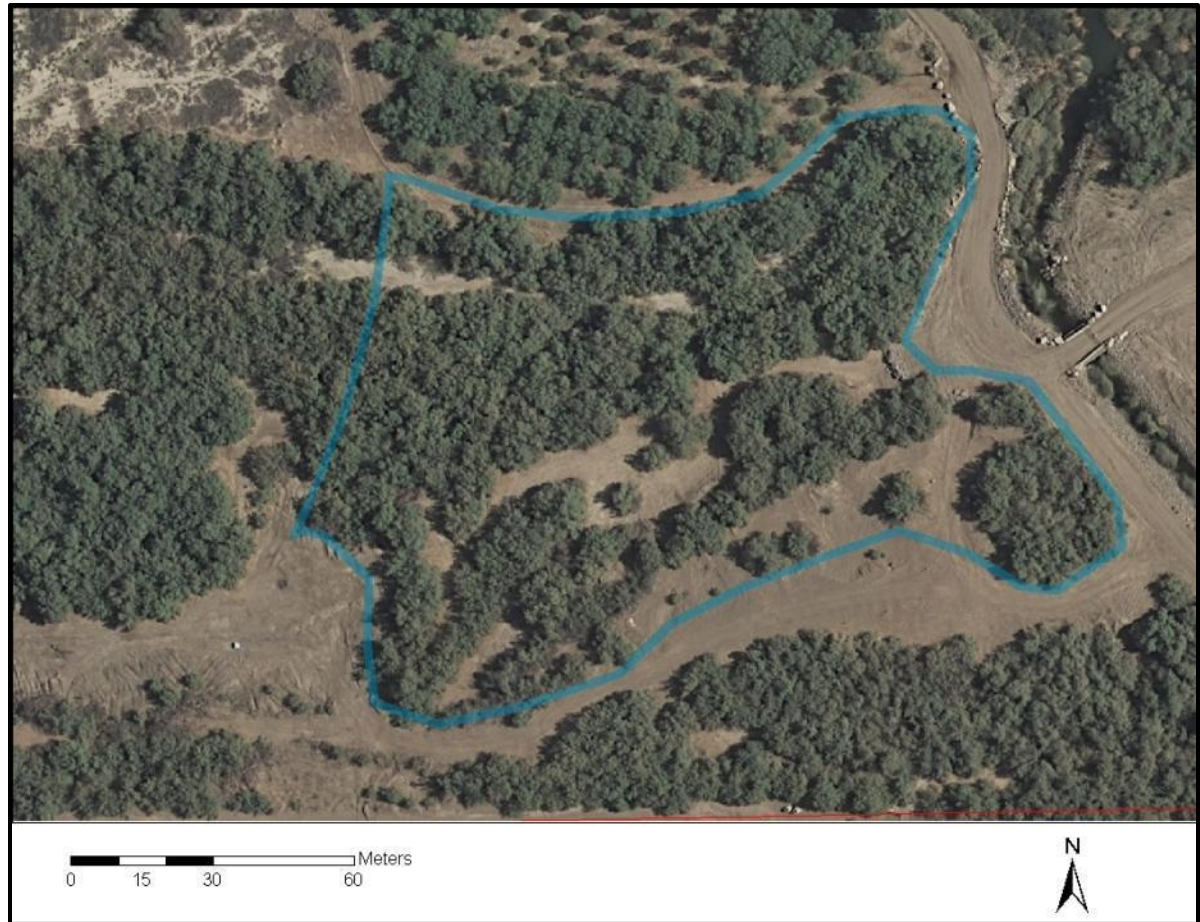
- Three sites were chosen because all were different habitats that were in close proximity. This gave each area an equal opportunity to be chosen for bat foraging.
- The three sites were located in a tamarisk stand, a riparian revegetation area and a passively created wetland



Methodology - Site Selection

– Tamarisk

- Mature stand that is over 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 clean from



Methodology - Insect Monitoring



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 - 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 - 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 - Insects

- Buprestidae - *Prasinalia cuneata*
- State Record



Results - Insects

- Splendid Tamarisk Weevil (*Coniatus splendidulus*)
- State Record, first scientifically documented account in US (in review)



Results – Bat Guano Analysis

- Number of guano pellets containing insect order parts per species per site (N=402)
 - *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
	<i>Antrozous pallidus</i>	<i>Myotis yumanensis</i>	<i>Antrozous pallidus</i>	<i>Myotis yumanensis</i>	<i>Antrozous pallidus</i>	<i>Myotis yumanensis</i>	
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 – Bats Acoustics

Scientific Name	Common Name	Species Code
<i>Antrozous pallidus</i> ¹²	Pallid bat	ANPA
<i>Eptesicus fuscus</i>	Big brown bat	EPFU
<i>Lasionycteris noctivagans</i>	Silver-haired bat	LANO
<i>Lasiurus blossevillii</i> ²³	Western red bat	LABL
<i>Lasiurus cinereus</i> ¹	Hoary bat	LACI
<i>Lasiurus xanthinus</i> ¹	Western yellow bat	LAXA
<i>Myotis californicus</i> ¹	California myotis	MYCA
<i>Myotis ciliolabrum</i>	Western small-footed myotis	MYCI
<i>Myotis thysanodes</i>	Fringed myotis	MYTH
<i>Myotis yumanensis</i> ¹	Yuma myotis	MYYU
<i>Nyctinomops macrotus</i>	Big free-tailed bat	NYMA
<i>Parastrellus hesperus</i>	Canyon bat	PAHE
<i>Tadarida brasiliensis</i> ²	Brazilian free-tailed bat	TABR

¹Captured in mist nets as well as on acoustic units

²State of Nevada protected species

³State of Nevada sensitive species

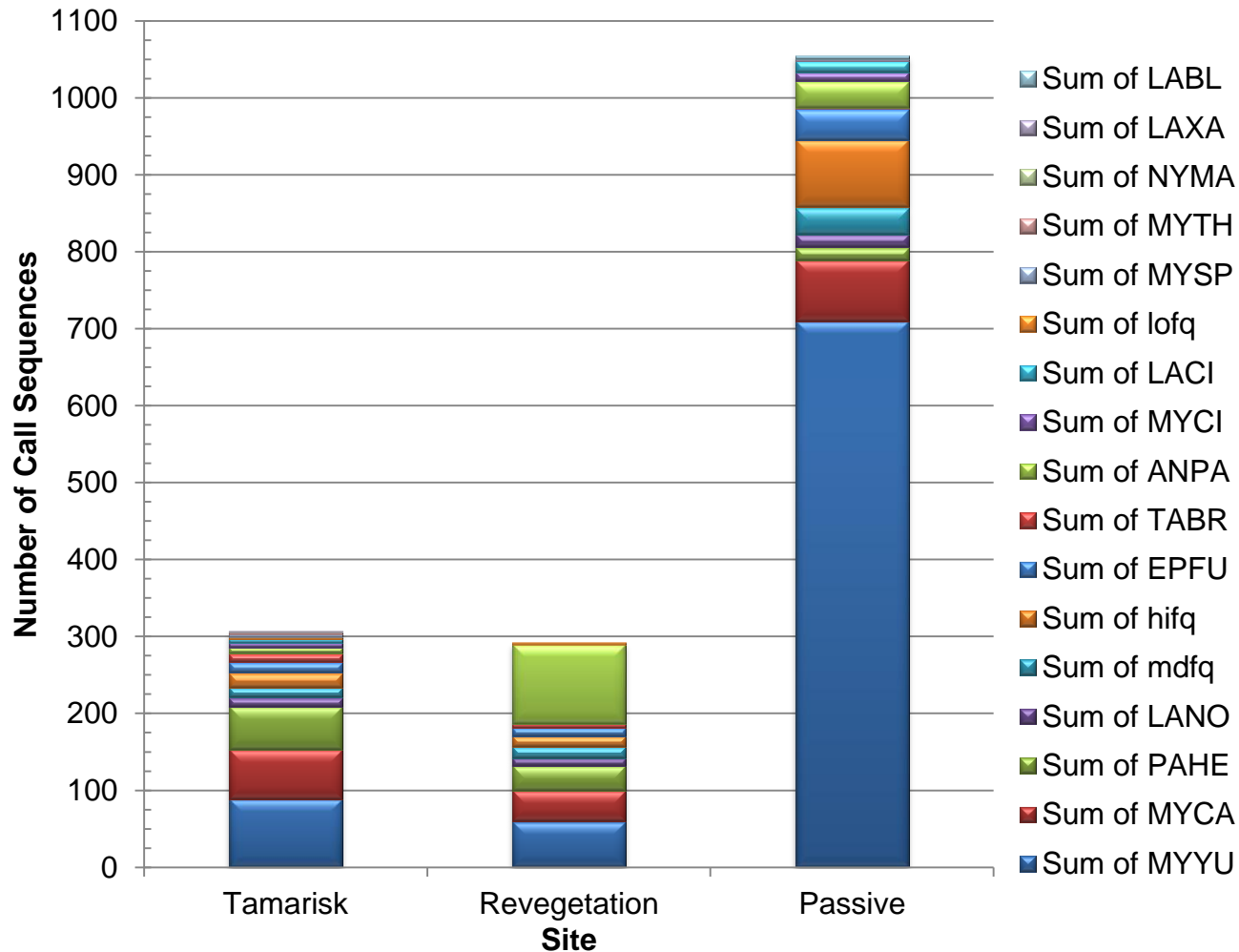
Results – Bats Acoustics

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

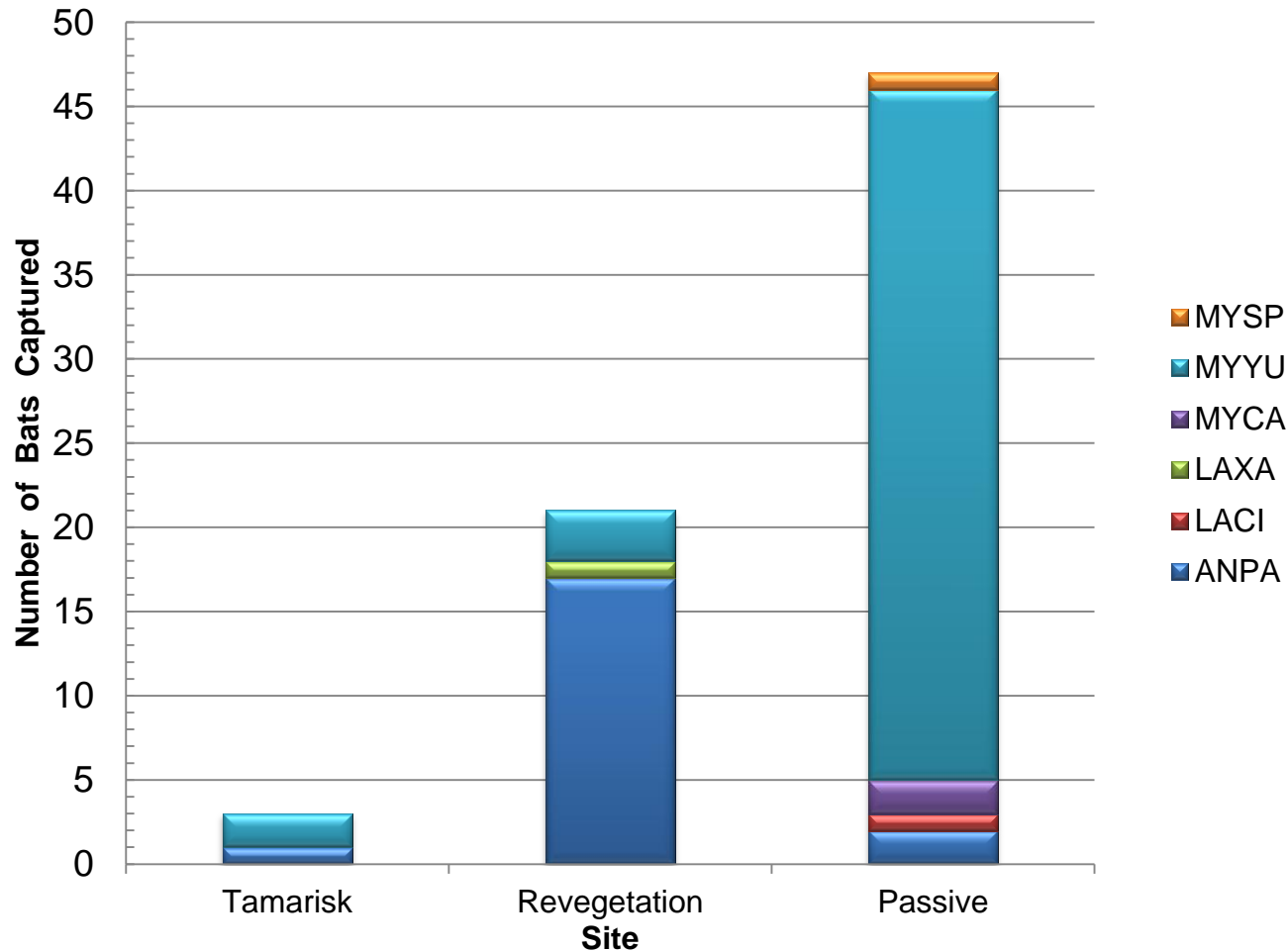
Results – Bat Acoustic

- 3700 monitoring minutes
- 1063 minutes of bat activity
- 1666 calls able to ID to species (N=13)



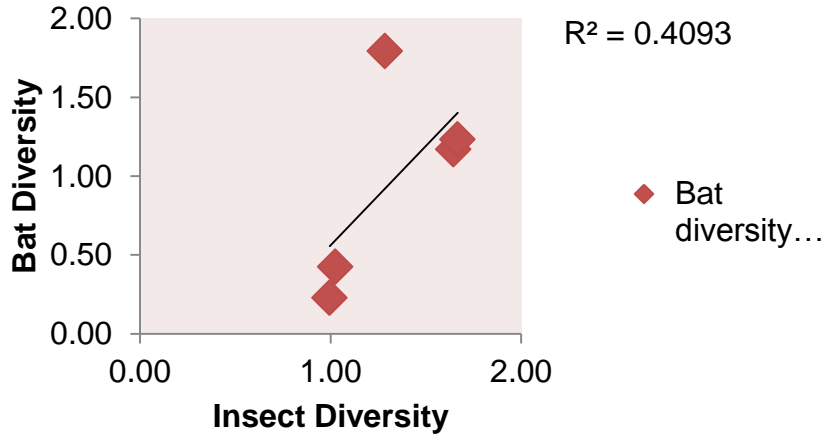
Results – Bat Captures

- 70 total captures (5 species)

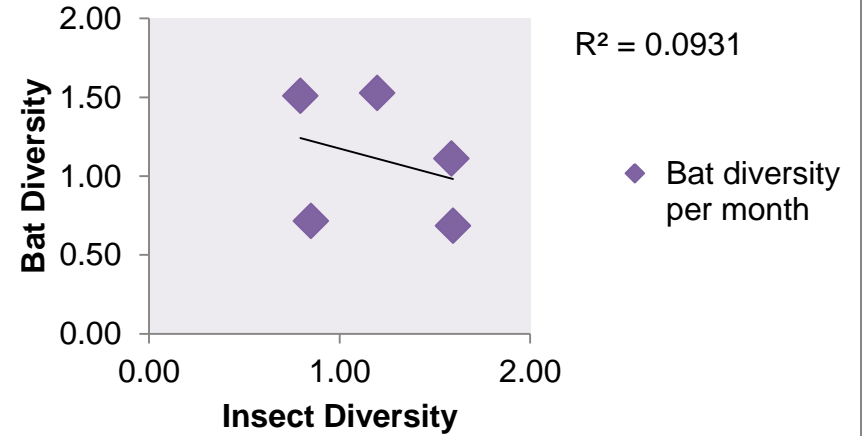


Results – Diversity Comparison

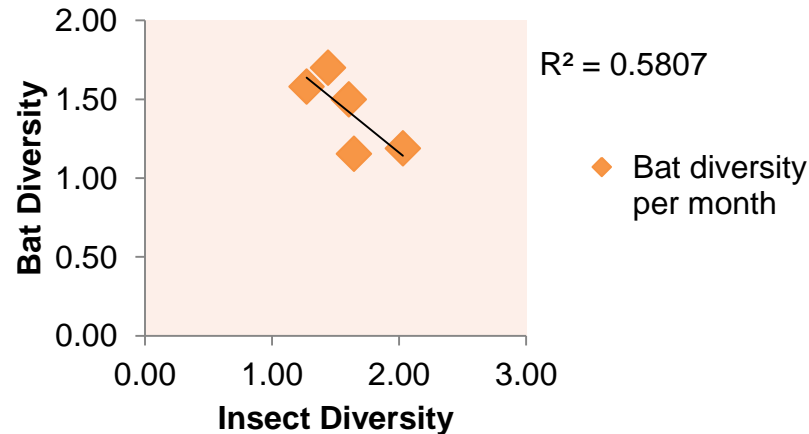
Linear Regression of Tamarisk Site Diversity



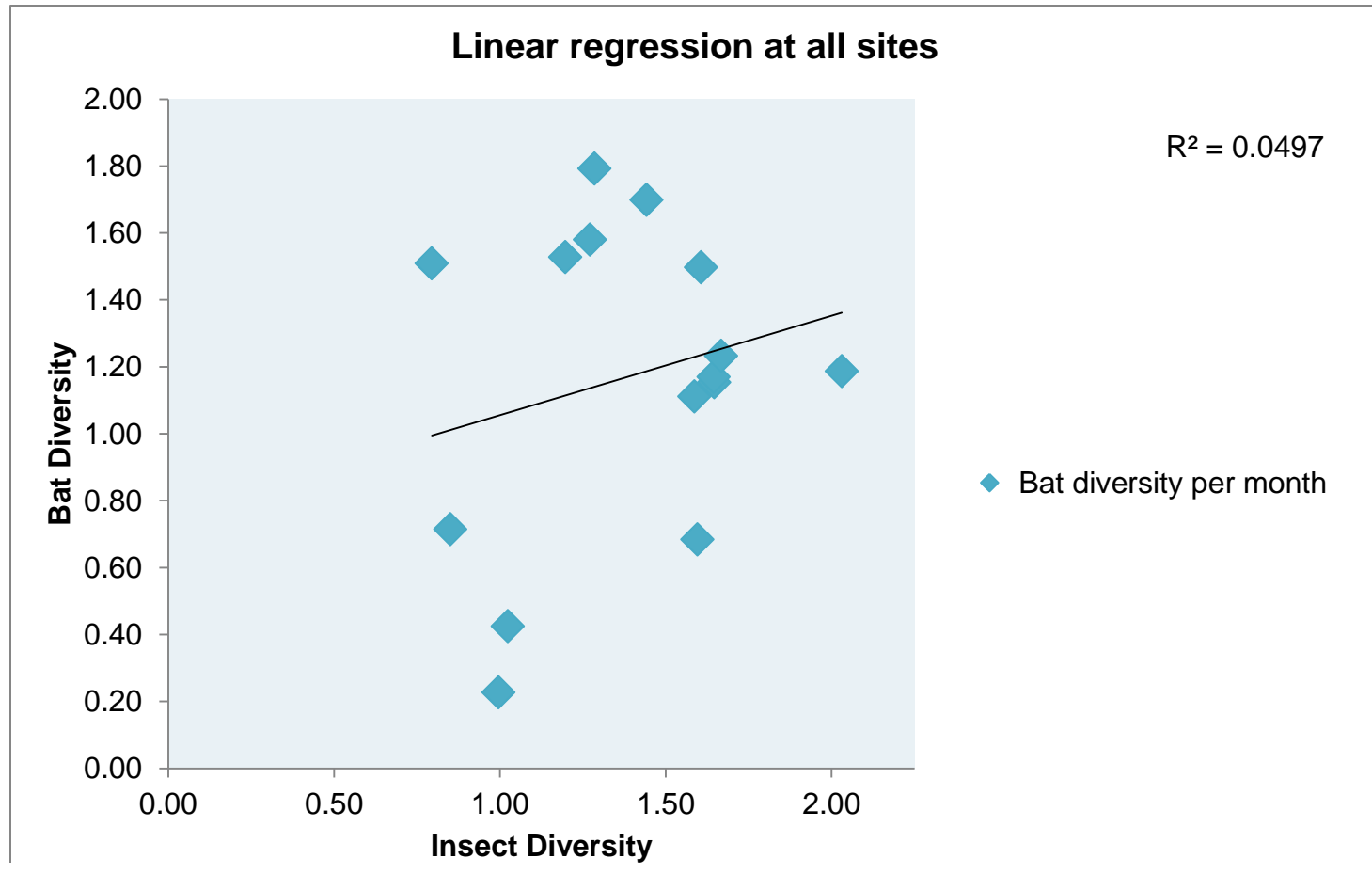
Linear Regression of Revegetation Site Diversity



Linear Regression of Passive Site Diversity



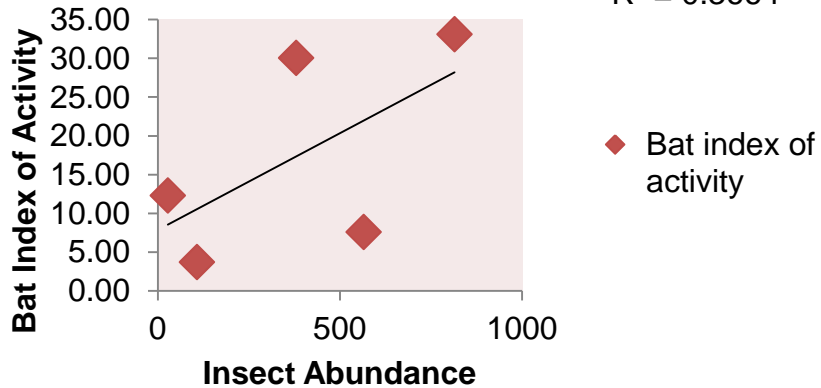
Results – Diversity Comparison



Results – Abundance Comparison

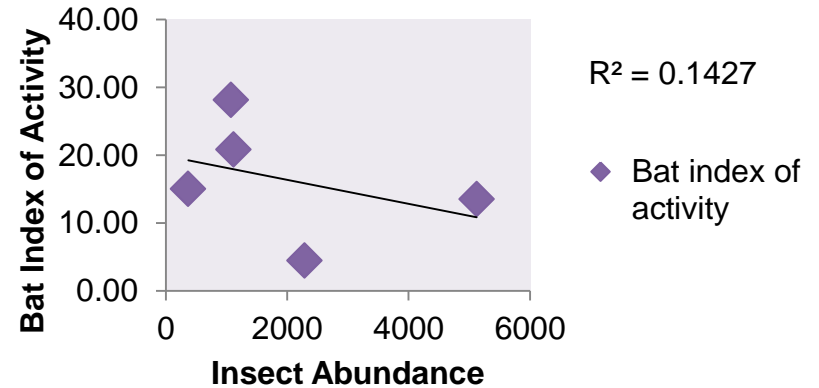
**Linear Regression of Tamarisk Site
Bat Index of Activity vs Insect
Abundance**

$R^2 = 0.3664$



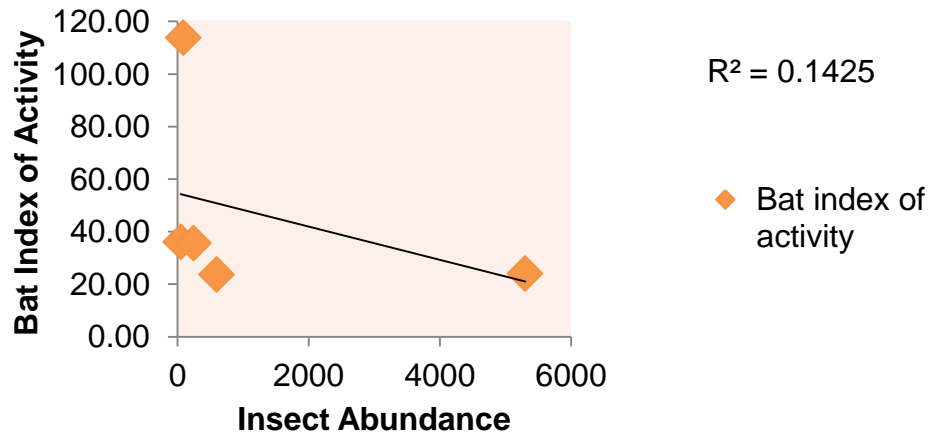
**Linear Regression of Revegetation
Site Bat Index of Activity vs Insect
Abundance**

$R^2 = 0.1427$

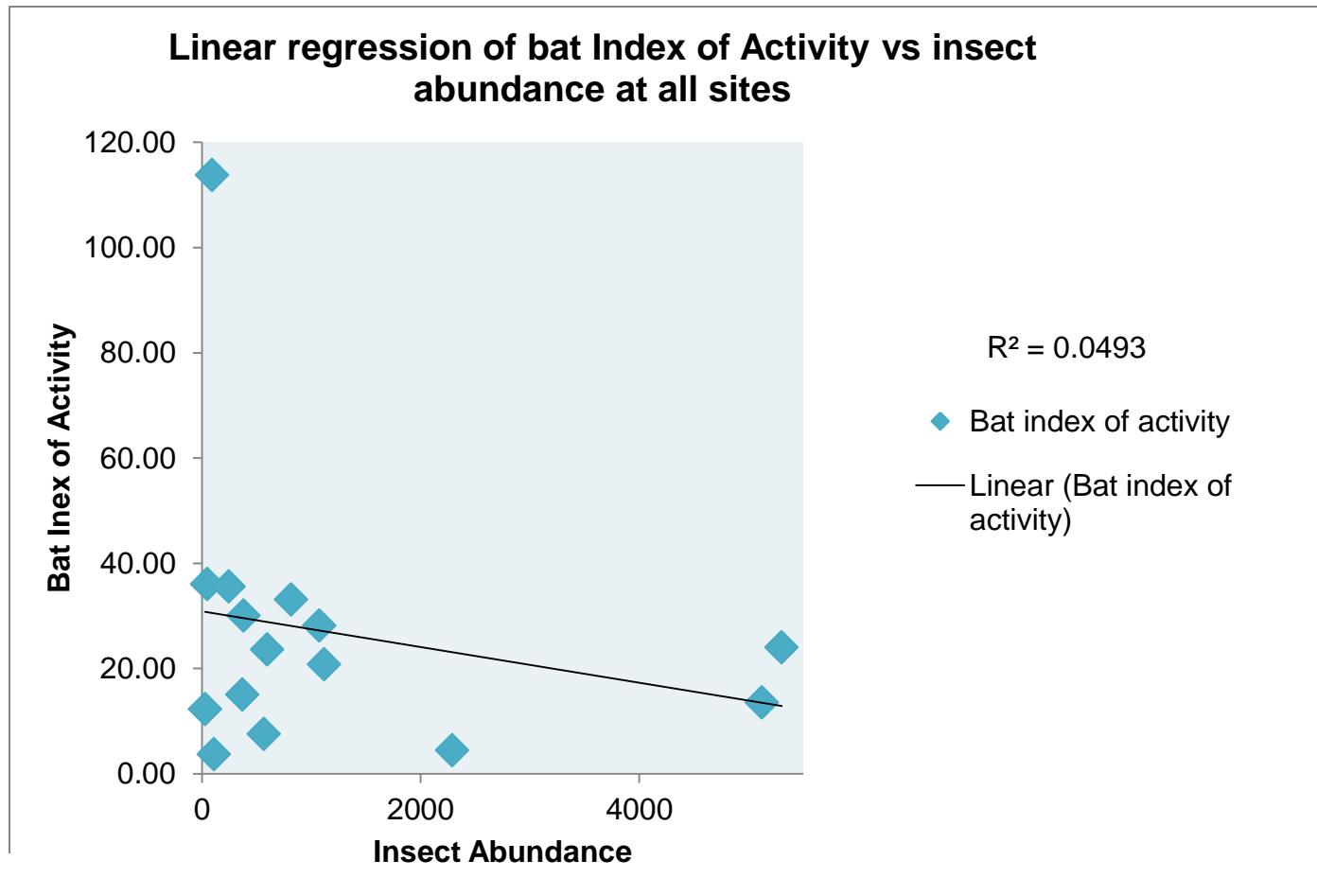


**Linear Regression of Passive Site Bat
Index of Activity vs Insect Abundance**

$R^2 = 0.1425$



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**

QUESTIONS?



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