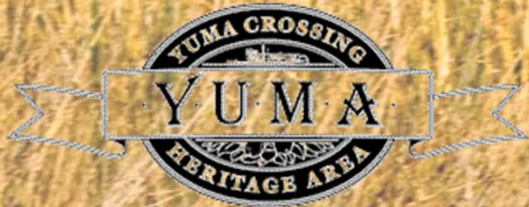


# Bird and Butterfly Recovery at the Yuma East Wetlands

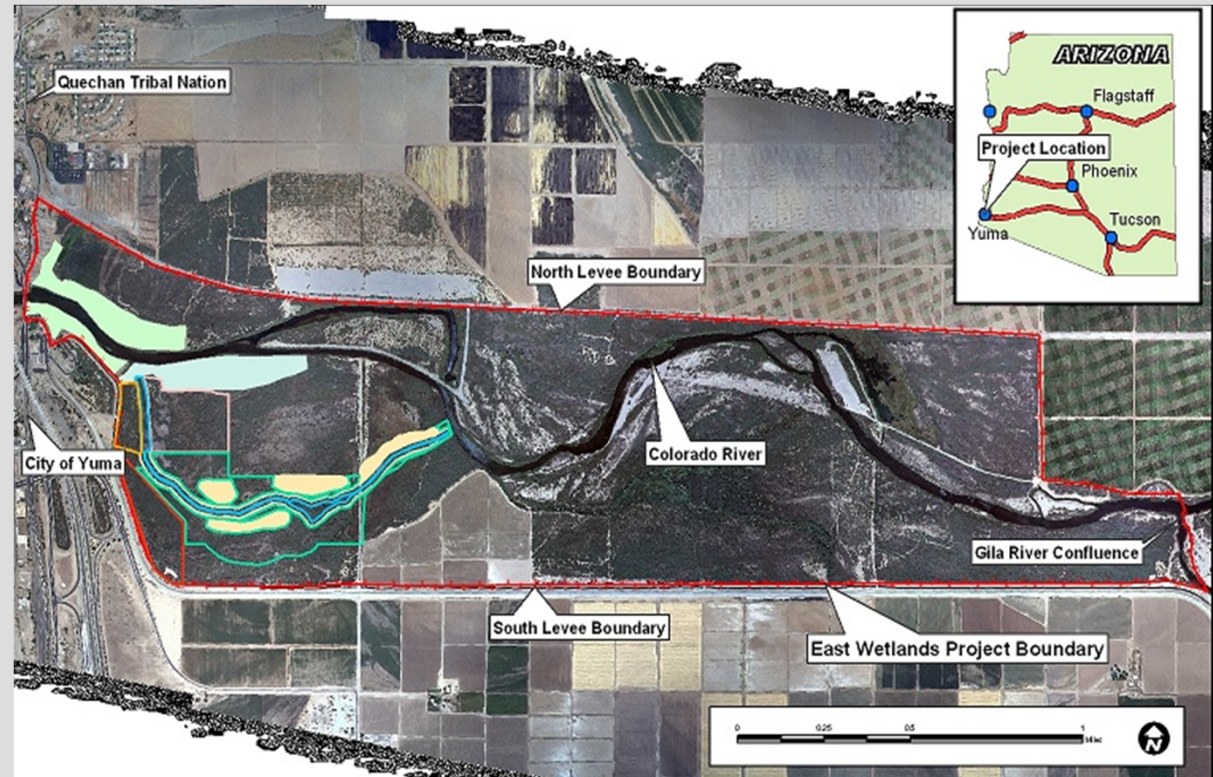
By:

Heidi Trathnigg  
Fred Phillips Consulting, LLC



# Yuma East Wetlands Restoration

- 936 acres proposed
- Goal to restore wildlife habitat
- Evaluate wildlife recovery
  - Birds
  - Invertebrates
  - Mammals
  - Amphibians & Reptiles
  - Fish



# Baseline Research (2007-2008)

## Birds

- Reference sites had significantly higher richness and abundance
- No difference between immature restored and control sites

## Invertebrates

- Ag and reference sites had highest richness
- Some butterfly species only found in reference and mature riparian habitats
- Large scope not enough detail

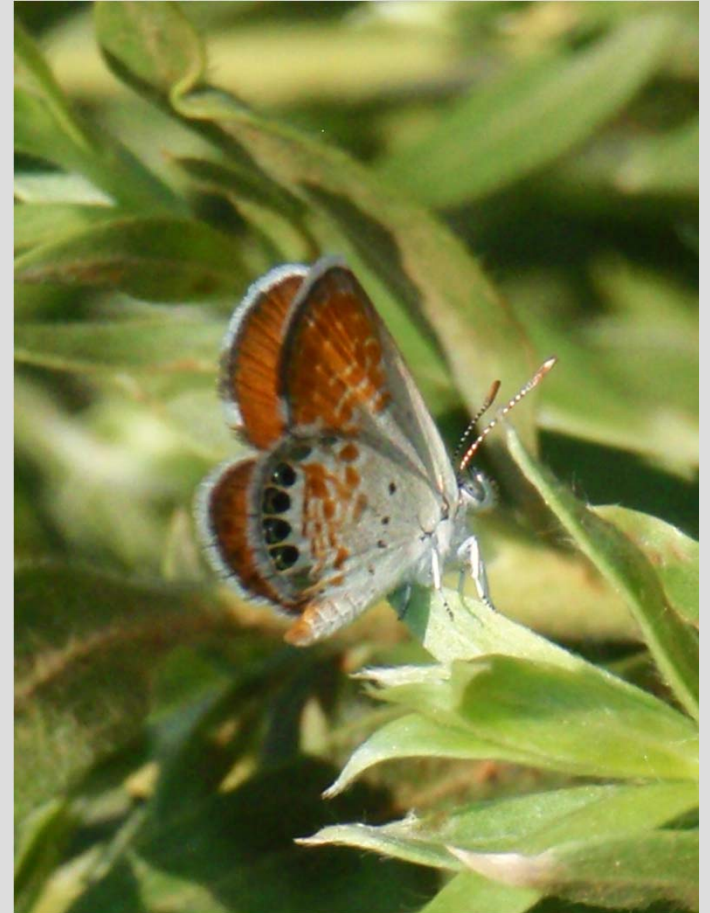
## Herpetofauna and Mammals

- Need more time to re-colonize site



# Rational and Hypothesis

- Bird Community
  - Quickly re-colonize restored areas (Passell 2000, Gardali et al. 2006)
  - Habitats have matured
- Butterfly Community
  - Quickly re-colonize restored areas
  - Good indicators of herbaceous community health (Scoble 1992)
  - Easy to identify quickly



**Hypothesis: Bird and butterfly richness and abundance will be different in restored verses control sites.**

# Bird Surveys

- Intensive Area Searches  
(Great Basin Bird Observatory 2010 and Bart et al. 2010)
  - 10 Riparian Plots
  - 1-3 h/plot
  - 6 surveys during April- June
- Variable circular plots  
(Reynolds et al. 1980)
  - 16 Marsh Plots
  - 10 m increment bands up to 100 m
  - Marsh bird monitoring protocol

2011 Yuma East Wetlands Riparian Bird Area Search/Spot-Mapping Datasheet  
(Modified from Nevada Bird Count: Intensive Area Searches and Spot-Mapping Great Basin Bird Observatory 2010)

Plot Name: RR 5  
Surveyor(s): C. Hays, J. Ross, J. D. O'Neil

	Date 1:	Date 2:	Date 3:	Date 4:	Date 5:	Date 6:	In/Out
Time	Start: 07:40	08:00	08:30	08:20	08:40	08:00	
	End: 08:05	08:29	08:46	08:18	08:17	08:01	
Temp	Start: 74.6	80	64	64	63	72.0	
	End: 84.4	72	72	71.5	70	61.0	
% Cloud Cover	33-25	0-0	5-3	0-0	0-0	0-0	
Wind (mph)	11-3.0	2.2-7.0	1-0	0-2.0	1-5	2.3-2.0	
Species Full Name	Terr./Ind. Code						
Bullock's Oriole	BUR-1 m						IN
Verdita	VER-1 P	P	NY	P(U)			"
Verdita	VER-2 P			U			"
Rufous-crowned Hummingbird	RCHU-1 U						"
Anna's Hummingbird	ANHU-1 P-P?						"
Song Sparrow	SOSP-1 U						"
Common Ground Dove	CGD-1 m						"
Western Mockingbird	WMOD-1 P	P	2 U?	U	P	P	"
Carulek's Quail	CAQU-1 P-4						"
White-winged Dove	WWD-1 P-5						"

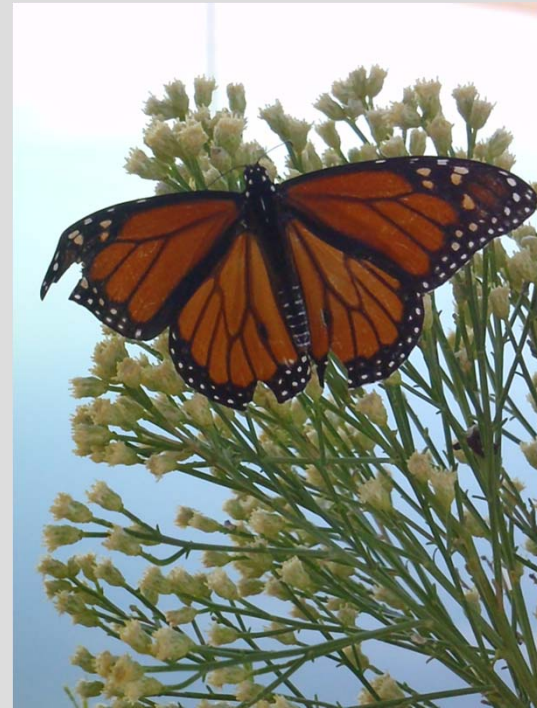
Fair (F): mixed pair/parents  
 Nest building (NB): (evidence: nest material carried or construction observed)  
 Egg (E): Nest being incubated or nest with eggs found  
 Nestling (N): Young present in nest (evidence: food carried to nest, begging calls, young seen)  
 Singing (S): (S): individual bird singing or observed silent  
 fledging (F): dependent young present outside the nest  
 Distraction display (DD): territorial display  
 Nest guarding (NG): repeated calling and bird does not leave  
 Occupied Nest (ON)

Probable Nest (PN): adult flies to same area, likely nest, but can't see structure  
 Male (M) or Female (F): observed calling, other sex not detected  
 Unknown sex (U): sexual dimorphism is not apparent  
 Group #: Record # of individuals in group for migrants  
 Dependent young (DY) or Juvenile (J): number of dependent young dependent or juveniles  
 not dependent  
 Terr./Ind. Code: Territory and individual code (YIRD 1, YIRD 2)  
 In/Out: In nest or center of territory inside or outside area search plot



# Butterfly Surveys

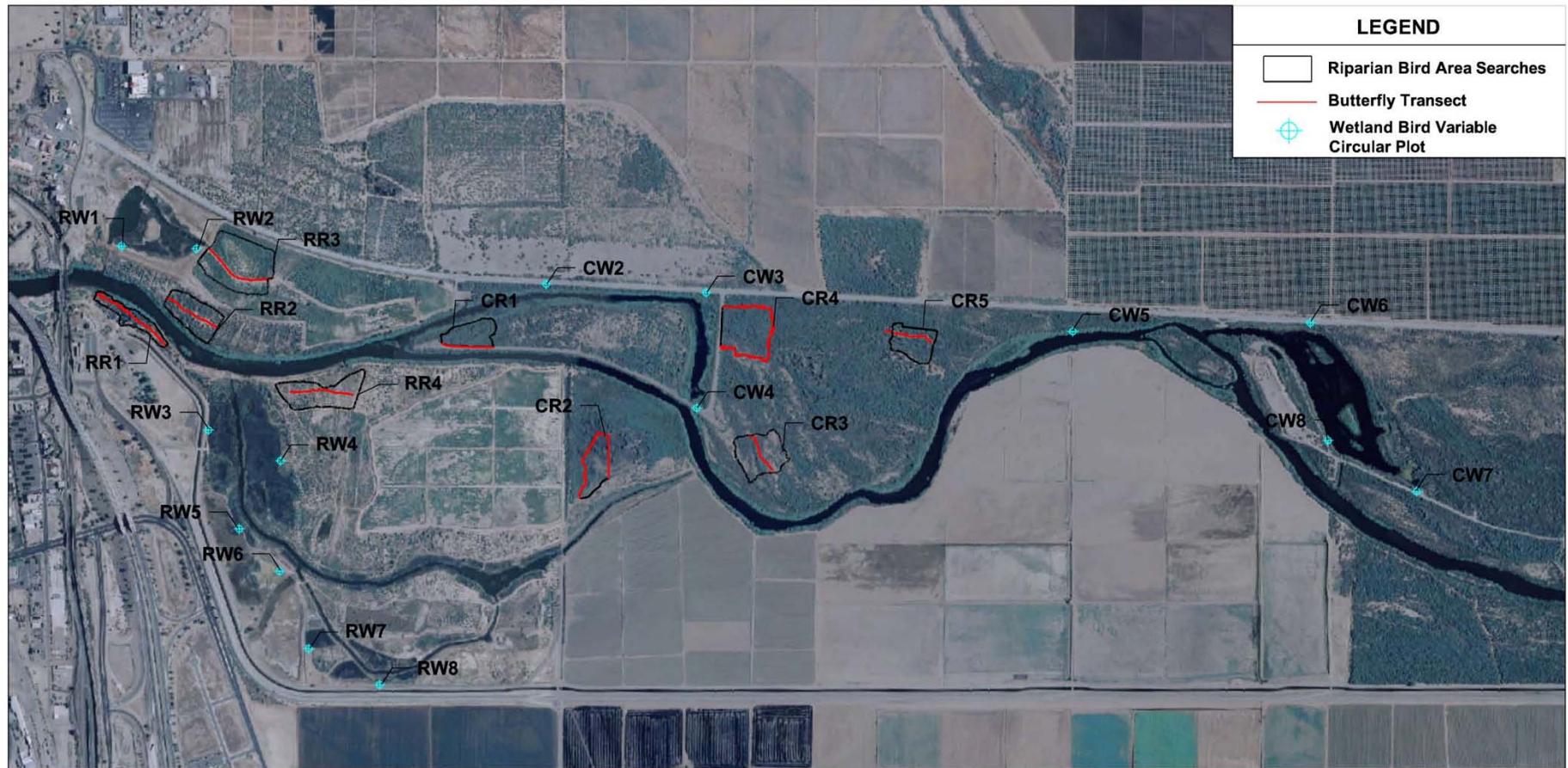
- 10 transects through riparian plots
- Surveyed 4 times (April, May, June, & Sept.)
- Timed searches (1 min/20m), not including pursuit time
- Behavior was recorded



# Habitat and Nectar Resource Sampling

- Habitat Characteristics
  - 1 time per plot (July and September)
  - 30 plots in riparian and 20 plots in wetland
  - TVV and cover (3m radius circle) recorded
  - Butterfly host plant frequency and abundance; bird habitat
- Nectar Resources
  - 4 times (after butterfly sampling)
  - 3m diameter plots every 10m along transect
  - Tally blooming flowers by species
  - Number of inflorescence tallied







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 TEL 928 773 1530  
 FAX 928 774 4166  
 Ecosystem Restoration Land Planning

DESIGNED FOR:  
**Yuma Crossing National  
 Heritage Area**  
 180 West First Street,  
 Suite E Yuma, AZ 85364



**YEW Monitoring Locations**  
 11-172 WPF Research Proposal Avifauna and Butterfly  
 (Lepidoptera) Recovery in Restored Wetland and  
 Riparian Habitats  
**YUMA, ARIZONA**

Aerial Map  
 Scale: 1" = 1000'  

 NORTH

DATE: APRIL 4, 2011  
 JOB NO.: 11005-2  
 DRAWN BY: KI  
 DESIGNED BY: HT  
 CHECKED BY:

**FIGURE 1**







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**YWW Monitoring Locations**  
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 YUMA, ARIZONA

Aerial Map  
 Scale: 1" = 500'  
  


DATE: APRIL 4, 2011  
 JOB NO.: 11005-2  
 DRAWN BY: KI  
 DESIGNED BY: HT  
 CHECKED BY:

FIGURE 2

# Bird Results

- 72 resident and migrating species detected in riparian and wetland sites

## Riparian

- 15 resident species in restored
- 9 resident species in control

## Wetland

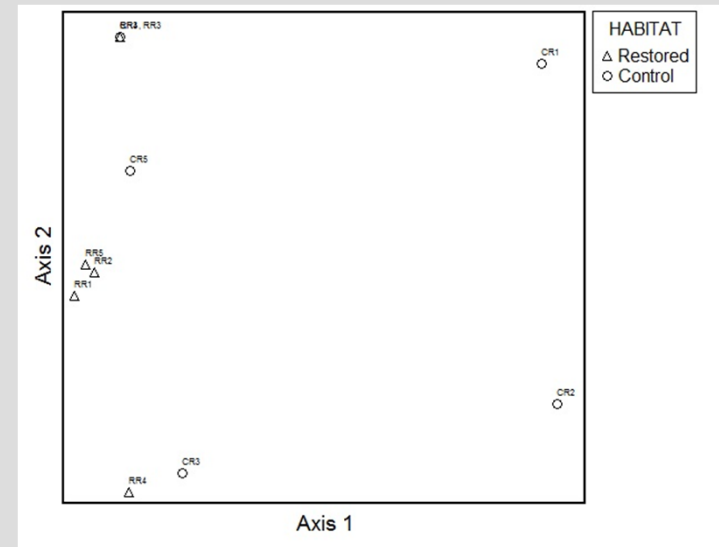
- 14 species in restored
- 10 species in control



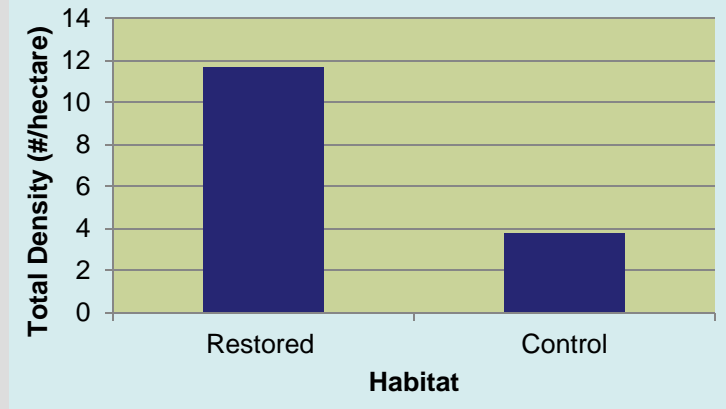
# Resident Riparian Birds

Genus species	Common Name	Density (#/hectare)	
		Restored Riparian	Control Riparian
<i>Pipilo aberti</i>	Abert's Towhee	1.0331	0.0000
<i>Calypte anna</i>	Anna's hummingbird	0.2066	0.0000
<i>Myiarchus cinerascens</i>	Ash throated flycatcher	0.0000	0.2604
<i>Vireo bellii</i>	Bell's vireo	0.1033	0.0000
<i>Poliopitila melanura</i>	Black-tailed gnatcatcher	0.2066	0.3906
<i>Geothlypis trichas</i>	Common yellowthroat	0.1033	0.0000
<i>Toxostoma crissale</i>	Crissal thrasher	0.1033	0.0000
<i>Callipepla gambelii</i>	Gambel's quail	0.9298	0.0000
<i>Melanerpes uropygialis</i>	Gila woodpecker	0.3099	0.0000
<i>Quiscalus mexicanus</i>	Great-tailed grackle	0.2066	0.0000
<i>Carpodacus mexicanus</i>	House finch	1.1364	0.2604
<i>Picoides scalaris</i>	Ladder-backed woodpecker	0.2066	0.0000
<i>Chordeiles acutipennis</i>	Lesser nighthawk	0.0000	0.2604
<i>Zenaida macroura</i>	Mourning Dove	2.6860	0.7813
<i>Mimus polyglottos</i>	Northern mockingbird	0.3099	0.0000
<i>Melospiza melodia</i>	Song sparrow	0.0000	0.1302
<i>Auriparus flaviceps</i>	Verdin	3.7190	0.7813
<i>Tyrannus verticalis</i>	Western kingbird	0.0000	0.2604
<i>Zenaida asiatica</i>	White winged dove	0.4132	0.6510

No difference in species richness (MWU=7, p=0.242)



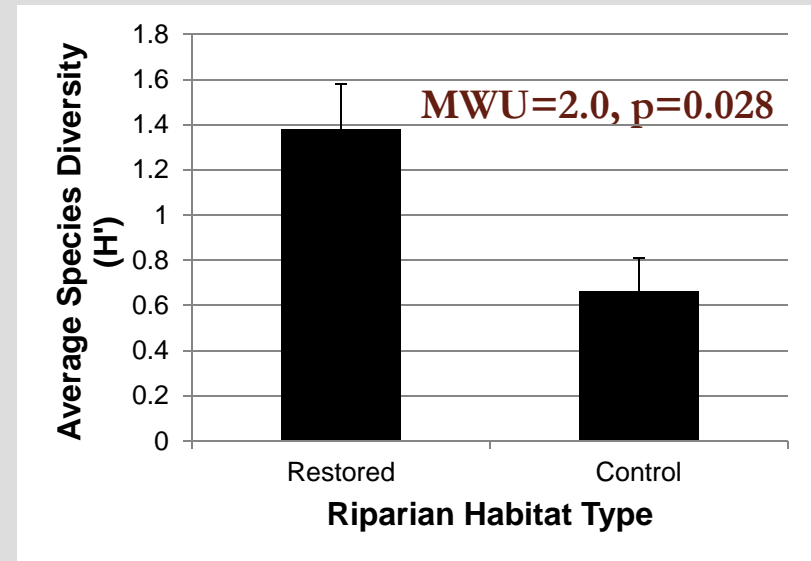
NMS Ordination; MRPP test,  $T = -0.1545$ ,  $p = 0.389$ ,  $A = 0.004$



MWU = 0.175, p = 0.175

# Riparian Vegetation

- Higher species diversity in restored versus control sites
- Higher % herbaceous cover in restored versus control
- No correlations with resident riparian birds and vegetation characteristics



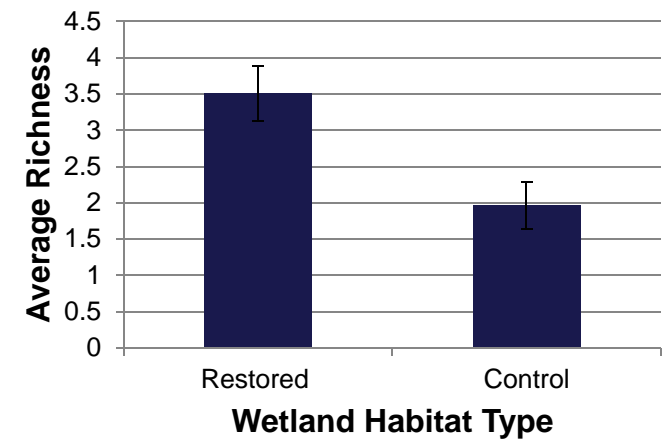
# Marsh Birds

Genus species	Common Name	Total Number Detected	
		Restored Wetland	Control Wetland
<i>Fulica americana</i>	American coot	6	39
<i>Himantopus mexicanus</i>	Black-necked Stilt	4	0
<i>Aythya valisineria</i>	Canvasback	0	1
<i>Anas cyanoptera</i>	Cinnamon teal	12	0
<i>Rallus longirostris</i>	Clapper rail	6	0
<i>Gallinula chloropus</i>	Common Moorhen	0	6
<i>Geothlypis trichas</i>	Common yellowthroat	12	8
<i>Ardea herodias</i>	Great blue heron	1	1
<i>Charadrius vociferus</i>	Killdeer	10	0
<i>Ixobrychus exilis</i>	Least bittern	1	1
<i>Cistothorus palustris</i>	Marsh wren	22	4
<i>Podilymbus podiceps</i>	Pied-billed grebe	0	2
<i>Agelaius phoeniceus</i>	Red-winged blackbird	1	0
<i>Egretta thula</i>	Snowy egret	3	0
<i>Melospiza melodia</i>	Song Sparrow	10	0
<i>Porzana carolina</i>	Sora	1	3
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed blackbird	54	19

No difference in abundance (MWU=210.5, p=0.108)



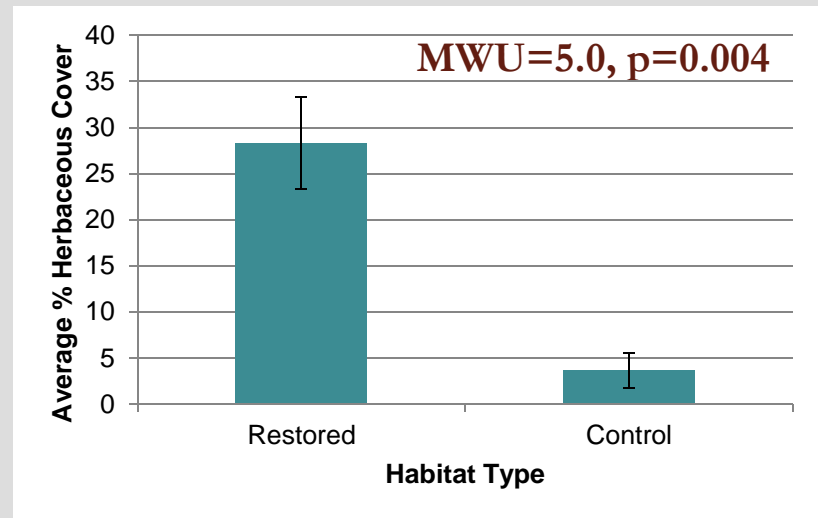
NMS Ordination, MRPP test,  
 $T=3.486$ ,  $p=0.00048$ ,  $A=0.063$



MWU=156.5, p=0.006

# Marsh Vegetation

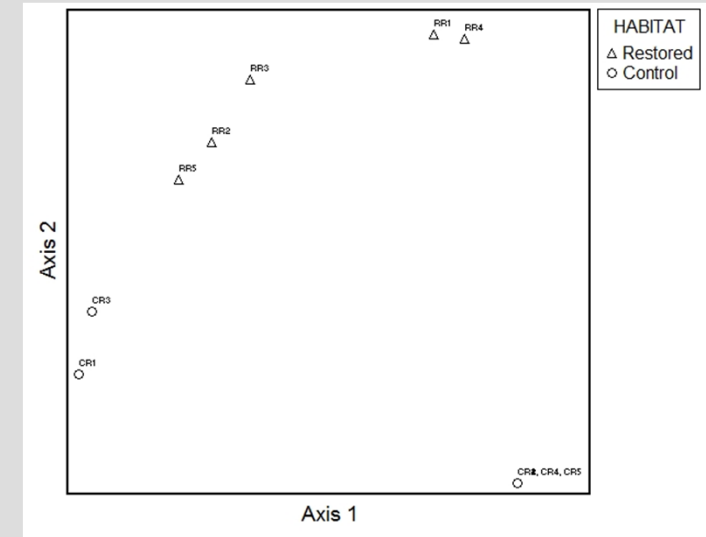
- Higher % herbaceous cover in restored versus control
- Higher % open water in control versus restored
- No correlations with marsh birds and vegetation characteristics



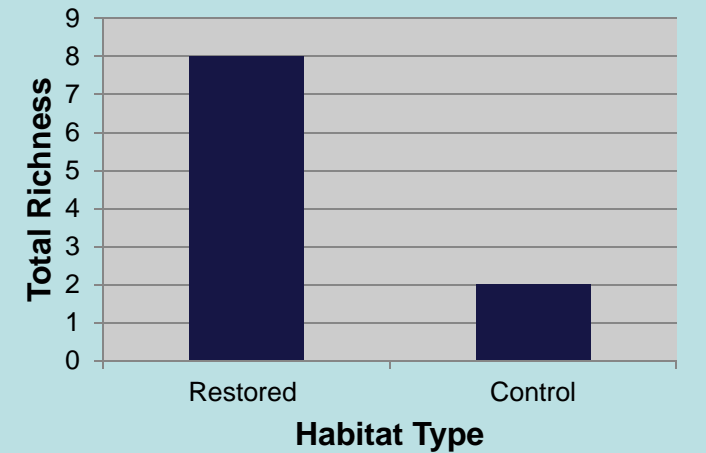
# Butterflies

Family	Genus species	Host plant family	Restored observations	Control Observations
Hesperiidae	<i>Pyrgus communis</i>	Malvaceae	1	0
Lycaenidae	<i>Brephidium exile</i>	Chenopodiaceae	245	0
Lycaenidae	<i>Hemiargus ceraunus</i>	Fabaceae	26	0
Lycaenidae	<i>Leptotes marina</i>	Fabaceae	1	0
Lycaenidae	<i>Strymon melinus</i>	Fabaceae and Malvaceae	1	0
Pieridae	<i>Pieris rapae</i>	Brassicaceae	1	1
Pieridae	<i>Nathalis iole</i>	(Tagetes)	5	0
Pieridae	<i>Colias eurytheme</i>	Fabaceae	6	5

48 times higher abundance in restored verses control sites (MWU=44,  $p < 0.0001$ )



NMS Ordination; MRPP test,  $= -2.527$ ,  $p = 0.0234$ ,  $A = 0.17$



MWU=48,  $p < 0.0001$

# Host Plant and Nectar Resource

- No difference in host plant abundance or frequency in restored verses control
- Host plants adjacent to riparian plots: agriculture and upland
- Four times higher flowering species richness in restored verses control
- No significant difference in flowering species abundance and inflorescence abundance
- Primary nectar sources in restored habitats: western sea purslane, screwbean mesquite, wild heliotrope, and four-wing saltbush





# Butterfly and Habitat Correlations

- Butterfly species richness was correlated with ( $\alpha=0.10$ ):
  - Flowering species richness
  - Flowering species abundance
  - Vegetation species diversity
  - % herbaceous vegetation
- Butterfly abundance was not correlated with environmental variables



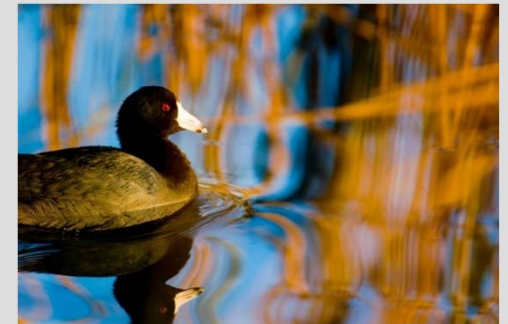
Variable	Pearson Correlation	p-value
Flowering species richness	0.611	0.061
Flowering species abundance	0.639	0.047
Vegetation species diversity	0.581	0.078
% herbaceous vegetation	0.621	0.055

# Discussion

- Birds prefer restored over control riparian and wetland habitats.

## Riparian

- Mourning doves and verdins had highest density of resident species in restored riparian habitats.
- MSCP species of concern:
  - Residents: Gila woodpecker and Arizona Bell's vireo
  - Migrating: Southwestern willow flycatcher and yellow warbler
- Compare results on a regional scale



## Wetland

- Yellow-headed black birds and marsh wrens were most abundant in restored marsh habitats.
- American coots were most abundant in control habitats.
- MSCP species of concern: Yuma clapper rail and least bittern

# Discussion

- Butterflies prefer a diversity of flowering herbaceous species in restored habitats.
- Western pygmy blue (*Brephidium exile*) was most abundant species in restored habitats
  - Associated with alkali soils
  - Host plants in the Chenopodiaceae family
- Many species associated with agricultural crops:
  - Cabbage white (*Pieris rapae*)
  - Orange Sulfur (*Colias eurytheme*)
  - Common hairstreak (*Strymon melinus*)
  - Marine blue (*Leptotes marina*)
- Need to sample butterflies in future to distinguish patterns



**Thanks to Arizona Water Protection Fund,  
Yuma Crossing National Heritage Area,  
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Arizona Western College, Chase Choate and  
Lin Piest**

