USE OF MATURE AND REVEGETATED WOODLANDS BY BREEDING BIRDS IN THE LOWER RIO GRANDE VALLEY OF TEXAS

Timothy Brush and John S. Brush, Department of Biology, University of Texas Rio Grande Valley, Edinburg, TX

Current email: timothy.brush@utrgv.edu

Avian Diversity in the Lower Rio Grande Valley

- Over 500 species of birds, about 185 of which have bred. **Riparian woodlands** support a mixture of forest, scrub, and wetland species of temperate, subtropical, and tropical distribution. Some have declined greatly due to habitat loss and deterioration—**especially forest and wetland birds**. Our research focused on **woodland species**.

FOREST COVER

Riparian woodland is quite limited and highly fragmented. Most is along the Rio Grande, with some along the Arroyo Colorado and elsewhere

Project Need

- Habitat loss and fragmentation of an estimated 95% of the Rio Grande riparian corridor has left isolated fragments surrounded by agricultural land (Jahrsdoerfer and Leslie 1998).

Jahrsdoerfer, S. E., Leslie, D. M., Jr (1988). Tamaulipan Brushland of the Lower Rio Grande Valley of South Texas: Description, Human Impacts, and Management Options, *Biological Report (U.S. Fish and Wildlife Service - Oklahoma Cooperative Fish and Wildlife Research Unit)*, 88(36).

Several bird species of conservation concern breed in riparian woodlands

- **Hook-billed Kite** S2
- **Gray Hawk** S2
- **Red-billed Pigeon** S3B
- **Buff-bellied Hummingbird** S3B
- **Northern Beardless-Tyrannulet** S3
- **Rose-throated Becard** *extirpated as breeder*
- **Tropical Parula** S3
- **"Brownsville" Common Yellowthroat*** S1B
- **"Sennett's" Hooded Oriole** S3B
- **Audubon's Oriole** S3B
- **Altamira Oriole** S3B

- **NatureServe status**
- S1 = critically imperiled
- S2 = imperiled/very vulnerable
- S3 = vulnerable
- B = breeding season
- * wetland species; limited occurrence in riparian woodlands

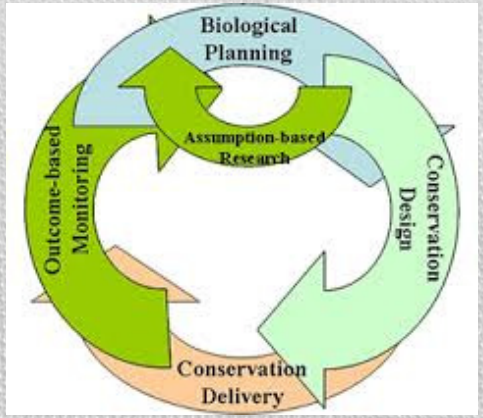
Areas allowed to revegetate on their own may have problems with abundant grass and incomplete canopy cover

Active efforts to combat habitat loss have involved the community

Image taken from USFWS

- The US Fish and Wildlife Service and other agencies have undertaken efforts to restore habitats along the Rio Grande, with the goal of creating additional habitat, to allow for dispersal of various organisms and overall increases In population size of birds.

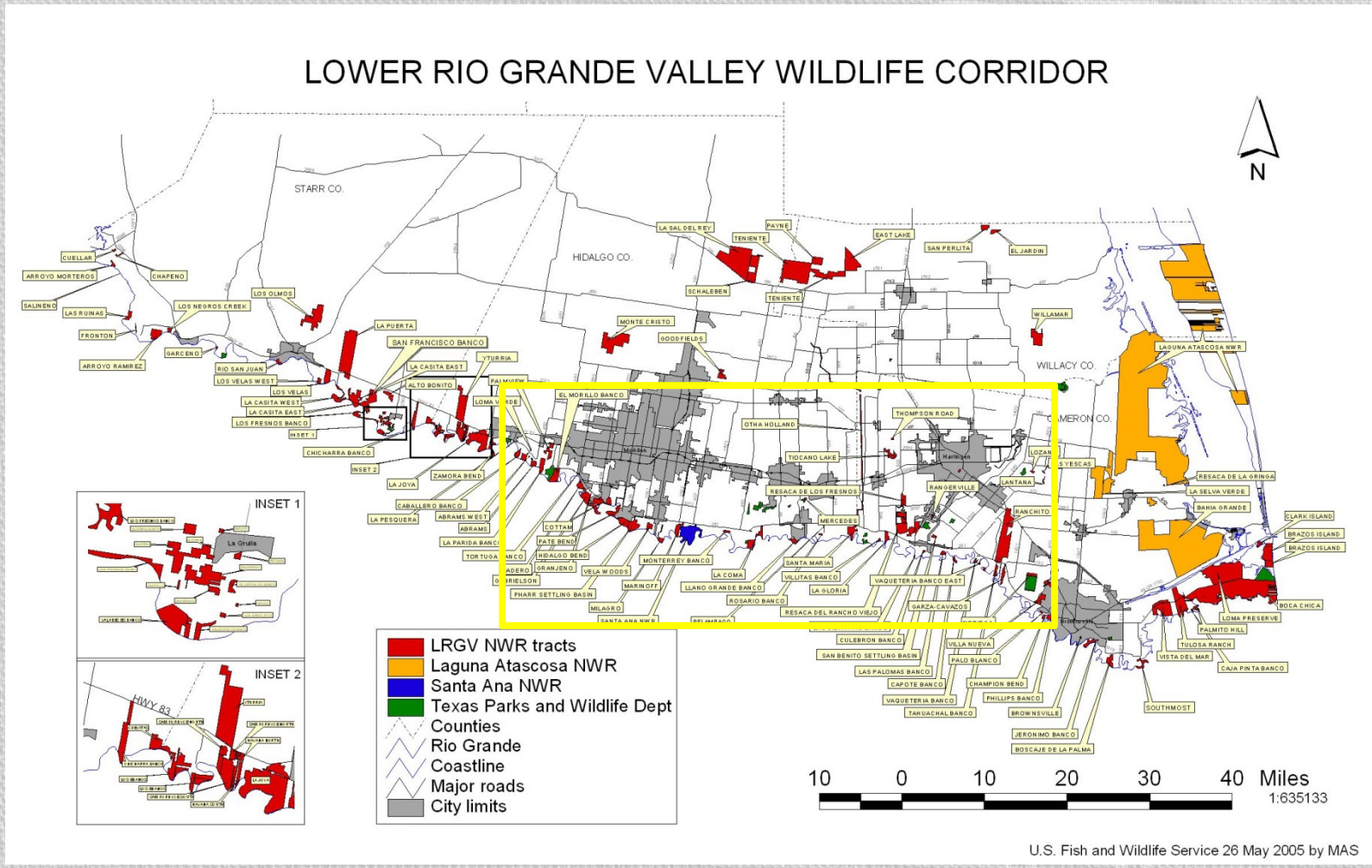
Goals



- The main goal of this monitoring project was to compare bird use of existing **mature** riparian habitats with those that have been **revegetated.**

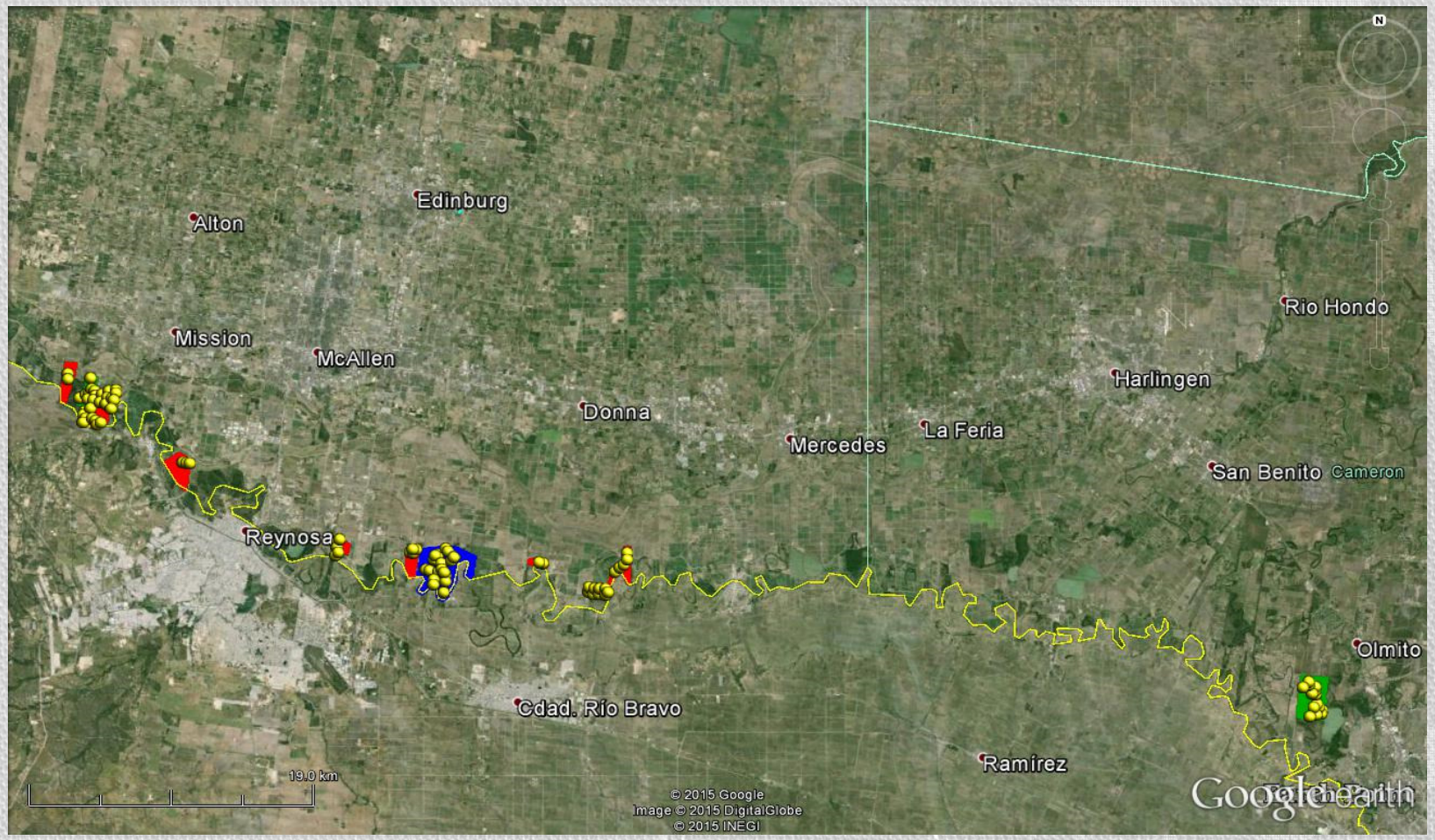
- We gathered bird data via point counts and vegetation data via the pole (foliage profile) and quadrat methods.

STUDY AREA



- We established study points in the boxed area, which contains most of the remaining riparian woodland habitat in the Lower Rio Grande Valley.

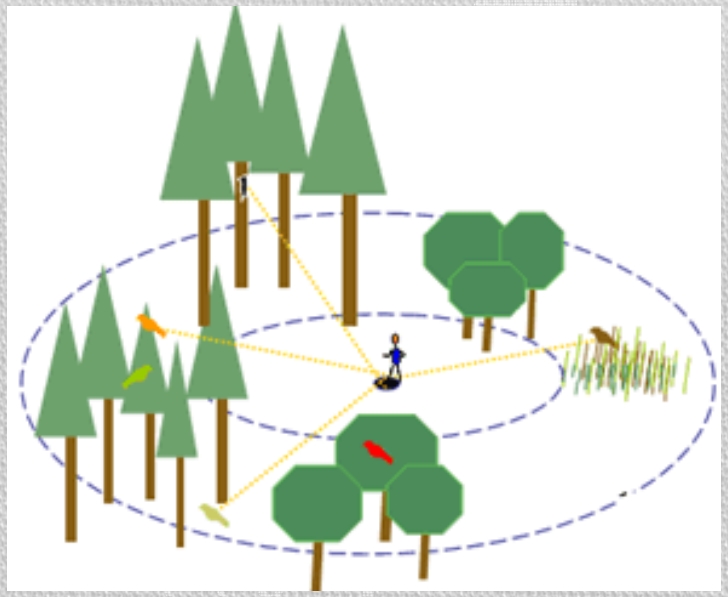
CENSUS LOCATIONS



- 92 census points were selected in mature and revegetated woodlands—49 mature and 43 revegetated.
- Points in revegetated habitats were placed in proximity to mature areas, to control for environmental factors as much as possible--all were within 10 km of mature habitat.

POINT COUNT METHOD

- We followed standard point count methodology (Ralph et al. 1993)
- At each point we conducted a total of 4 ten-minute bird counts during May and June of 2013 and 2014, between 0700-1000.
- We recorded birds in distance bands of 0-25 m, 25-50 m, 50-100 m, and >100 m using sight and sound
- Only birds detected within 100 m were used for frequency analysis, to allow for determination of habitat associations
- Birds seen flying over or through the habitat were recorded at >100 m distance



Visualization of point count methodology. Taken from USGS.

Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. Handbook of field methods for monitoring landbirds. U.S. Forest Service Gen. Tech. Rep. PSW-GTR-144.

MULTIVARIATE ANALYSES

- Principal component analysis was used to study associations of birds and habitat features.
- Partial least squares regression was used to identify key habitat features best explaining bird occurrence.

Examples of mature and revegetated habitats

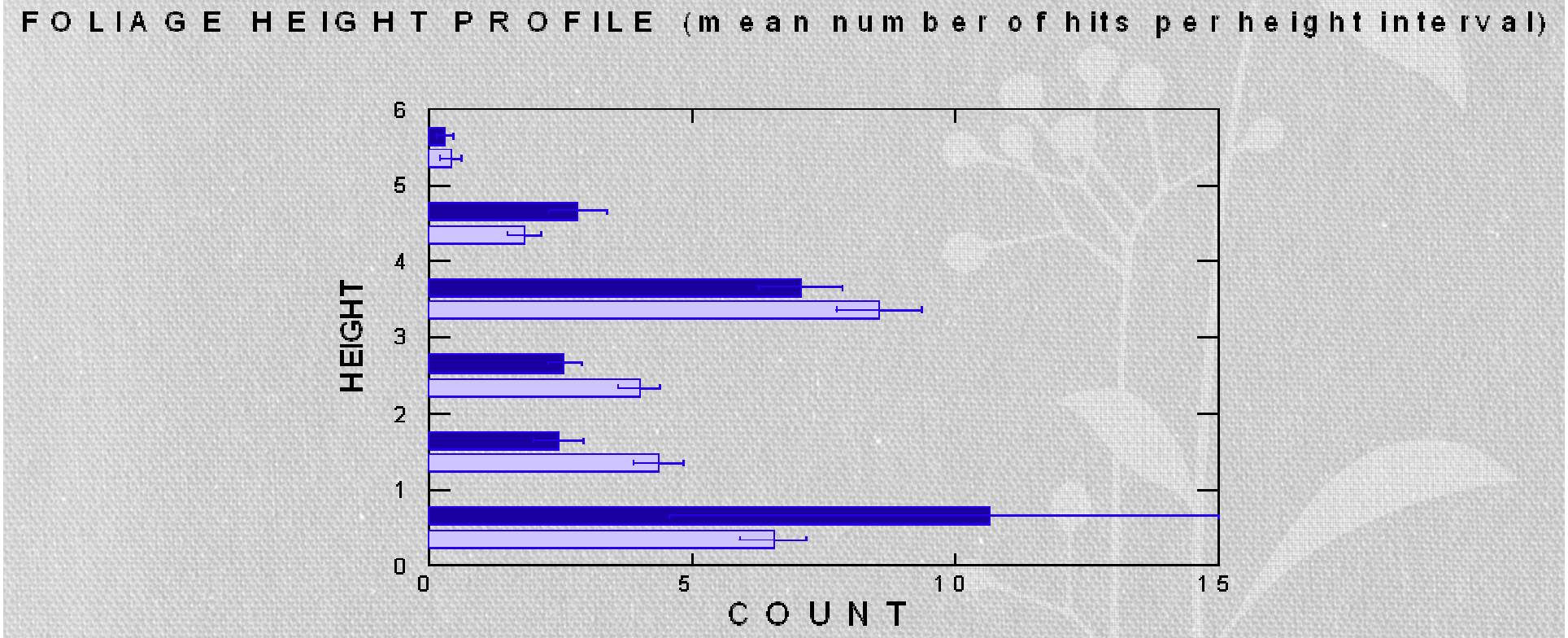
Mature habitat was dense, including thorn-forest with a closed canopy and well-developed leaf litter.

The best revegetated habitat approached mature habitat in structure, but other areas were more open.

A complicating factor was the extended **2010 flood**, after 6 years of drought, that killed mature trees in low spots. It probably did not change our overall conclusions but "reset" vegetation to earlier stages.

Vegetation data: foliage profiles.

Mature habitat (lighter blue) was denser at 1-4 m and revegetated (darker blue) was dense and variable at 0-1 m.



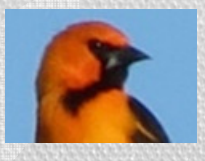
Mills, G.S., J.B. Dunning, and J.M. Bates. 1991. On the relationship between bird density and vegetation volume. Wilson Bull. 61:290-302.

Bird data--overview

- We found 38 bird species on at least 2% of mature censuses, and 42 species on at least 2% of reveg censuses.
- **Frequency** = # of times detected on points in *x* habitat / total # of surveys done in *x* habitat.
- For example, Long-billed Thrasher occurred on 50.5% of 196 mature surveys, but only on 28.5% of 172 reveg surveys


Olive Sparrow


Ladder-backed Woodpecker


Altamira Oriole


Yellow-billed Cuckoo


Mourning Dove


Northern Mockingbird


Golden-fronted Woodpecker


Brown-crested Flycatcher


Black-crested Titmouse


Red-crowned Parrot


White-winged Dove


White-tipped Dove


Long-billed Thrasher


Plain Chachalaca


Great Kiskadee


Clay-colored Thrush


Northern Beardless Tyrannulet


Gray Hawk

At the community level, mature and revegetated habitats were quite similar, as these "top 10%" lists show.

Mature		Revegetated	
OLIVE SPARROW	88.3%	OLIVE SPARROW	89.0%
NORTHERN CARDINAL	80.6%	NORTHERN MOCKINGBIRD	80.2%
GOLDEN-FRONTED WOODP.	77.0%	MOURNING DOVE	75.0%
WHITE-WINGED DOVE	73.0%	YELLOW-BILLED CUCKOO	69.8%
WHITE-TIPPED DOVE	63.8%	NORTHERN CARDINAL	66.3%
COUCH'S KINGBIRD	63.3%	GOLDEN-FRONTED WOODP.	54.7%
YELLOW-BILLED CUCKOO	62.2%	COUCH'S KINGBIRD	52.9%
MOURNING DOVE	60.2%	BROWN-CRESTED FLYCATCHER	48.8%
NORTHERN MOCKINGBIRD	58.2%	LADDER-BACKED WOODP.	46.5%
BROWN-CRESTED FLYCATCHER	56.1%	WHITE-WINGED DOVE	44.8%

Frequency of species of greatest local conservation concern

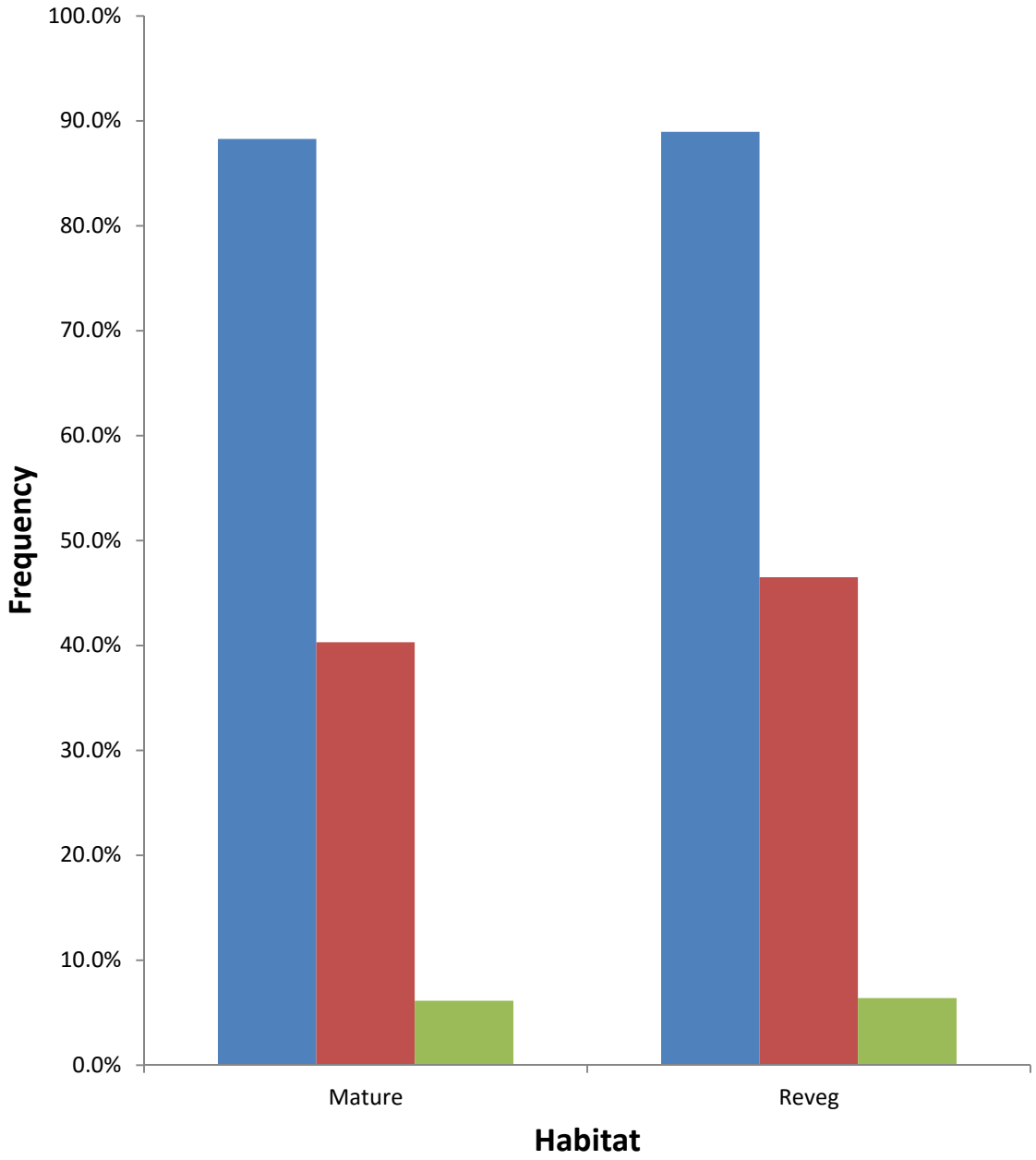
- **Hook-billed Kite**--0%
- **Gray Hawk**--4.3%
- **Red-billed Pigeon**--0% (one flyover at Santa Ana NWR)
- **Buff-bellied Hummingbird**--5.2%
- **Northern Beardless-Tyrannulet**--6.8%
- **Rose-throated Becard**--0%
- **Tropical Parula**--0%
- **"Brownsville" Common Yellowthroat**--5.4%
- **"Sennett's" Hooded Oriole**--0%
- **Audubon's Oriole**--0%
- **Altamira Oriole**--6.2%

Some species made little distinction between mature and revegetated habitats.

OLIVE SPARROW

LADDER-BACKED WOODPECKER

ALTAMIRA ORIOLE

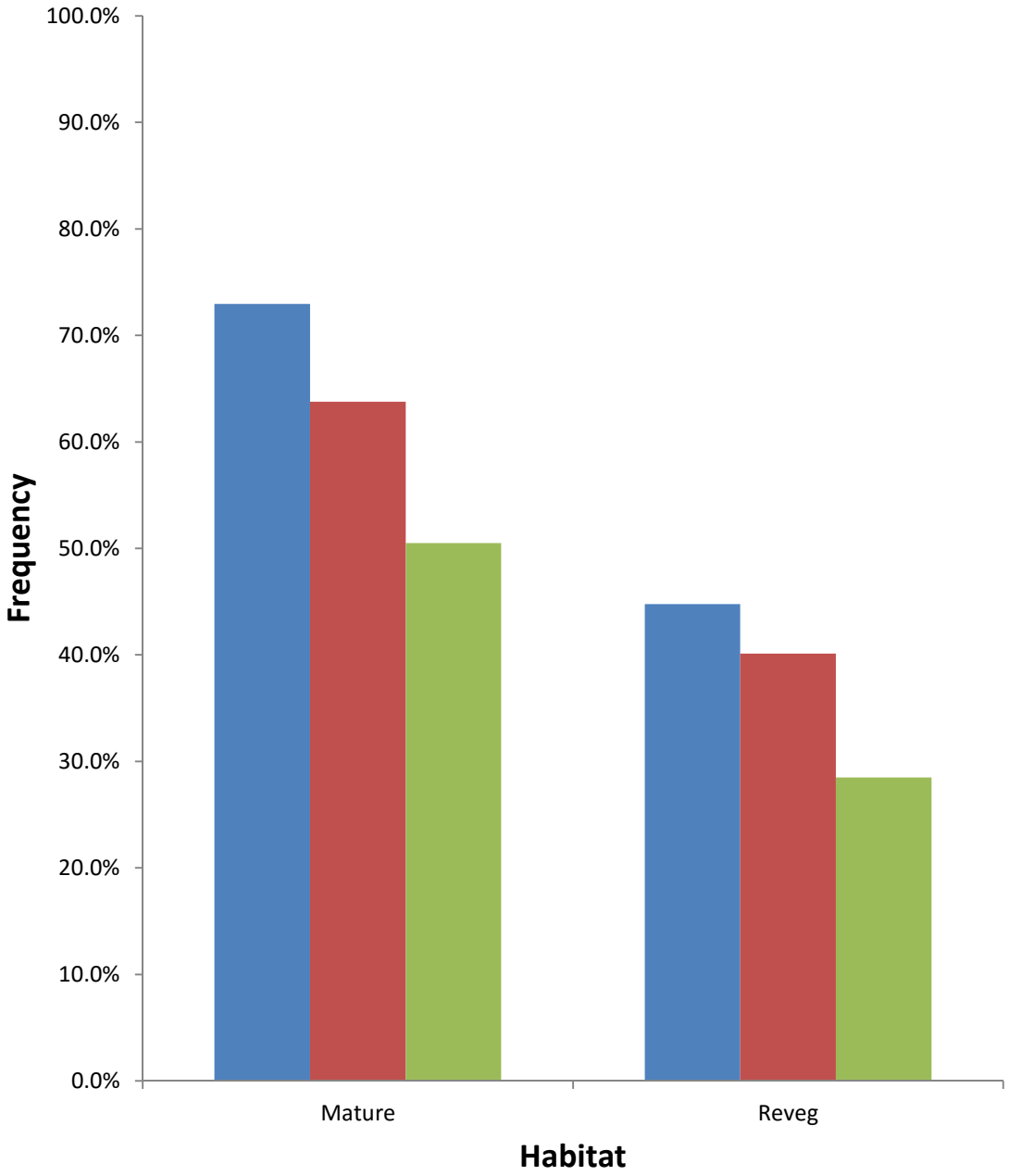


Some species preferred mature habitats over revegetated

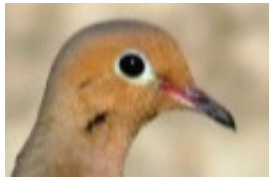
WHITE-WINGED DOVE

WHITE-TIPPED DOVE

LONG-BILLED THRASHER



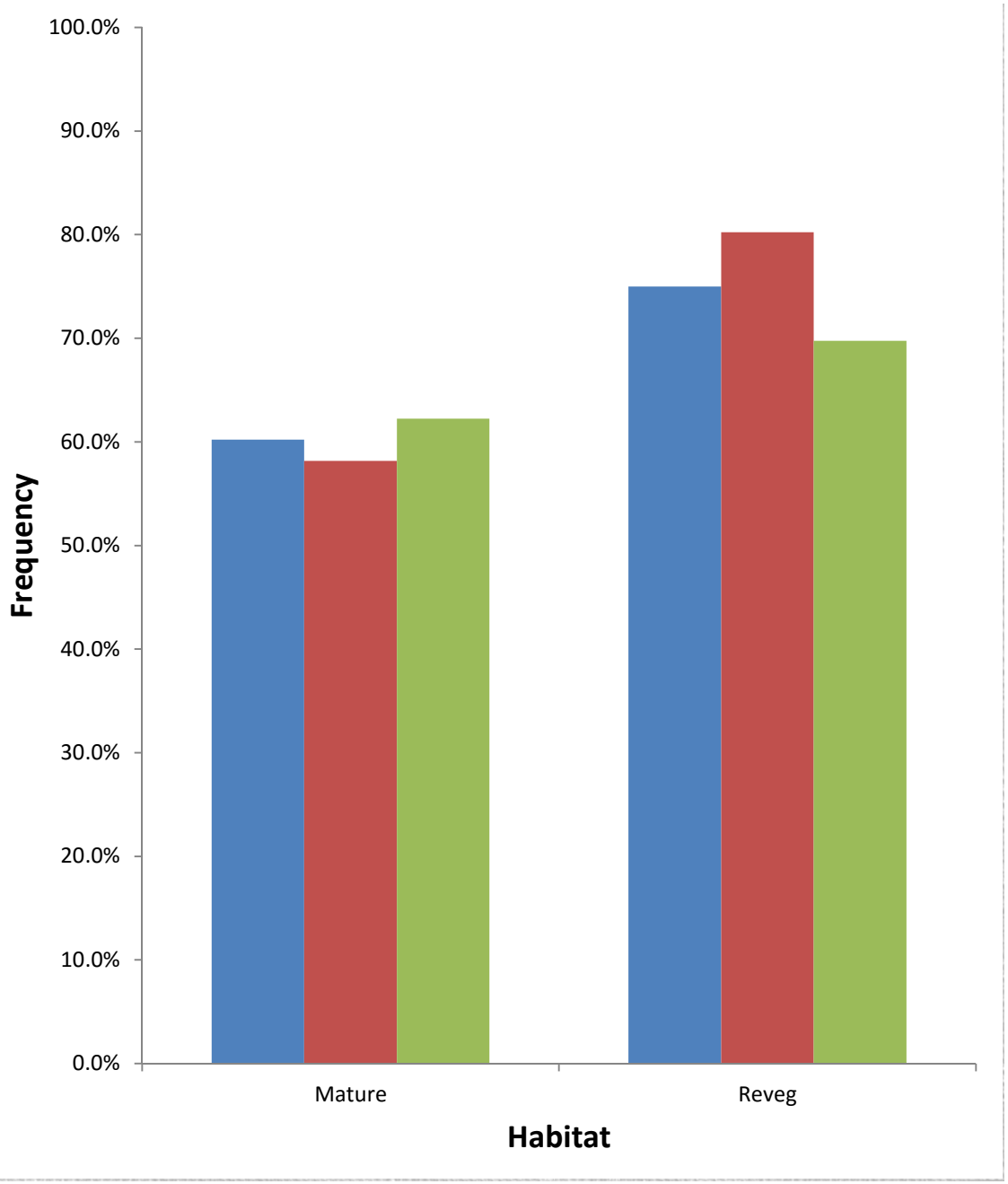
Others made greater use of revegetated habitats



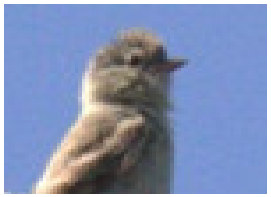
MOURNING DOVE

NORTHERN MOCKINGBIRD

YELLOW-BILLED CUCKOO



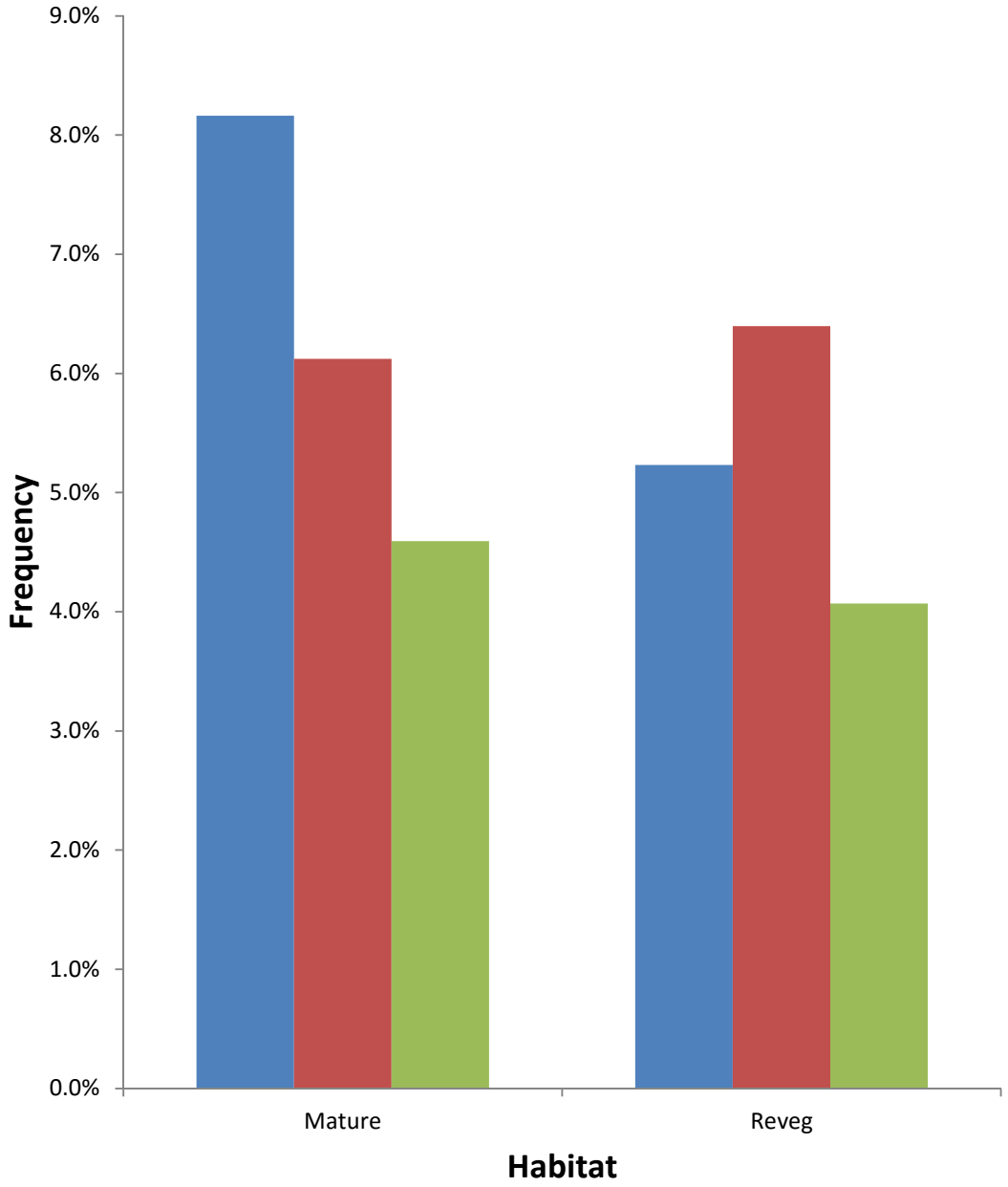
Some species of conservation concern were more widespread than expected.



NORTHERN BEARDLESS-TYRANNULET

ALTAMIRA ORIOLE

GRAY HAWK



Principal components analysis revealed groups of birds that responded similarly to particular habitat features

1) Mature thorn-forest: *high litter quality and canopy* cover, *Texas ebony foliage and foliage density at 1-4 m (mostly in mature habitat)*---***White-winged Dove, White-tipped Dove, Plain Chachalaca, Long-billed Thrasher, and Altamira Oriole***

2) Semi-open woodlands (mature and reveg): high tree diversity (*mature and reveg*)—***Golden-fronted Woodpecker and Yellow-billed Cuckoo***

3) Tall, mesic riparian forest: *most foliage at 4-6 m, cedar elms and other tall trees; often adjacent to wetlands or scrub*—**Carolina Wren, Common Yellowthroat, Lesser Goldfinch [small patches/narrow strips]**

4) Dense, low thorn-forest: *mixed wooded and grass (mature and reveg)*—**Verdin, Common Ground-Dove**

Partial least squares regression revealed a variety of responses—overall similarity to PCA

Mature habitat: *Plain Chachalaca, White-winged Dove.*

Revegetated habitat: *Mourning Dove, Brown-crested Flycatcher, Black-crested Titmouse, Great-tailed Grackle, Brown-headed Cowbird*

High canopy cover: *Common Ground-Dove, Yellow-billed Cuckoo, White-eyed Vireo, Carolina Wren, Long-billed Thrasher*, Lesser Goldfinch*

Low canopy cover: *Brown-crested Flycatcher, Verdin*

* *avoided habitat edges*

Conclusions

Mature thorn forest (Texas ebony, high canopy cover, good litter quality, little grass invasion) and its birds were widespread in areas not damaged by flooding. **Tall riparian forest** (cedar elm, ash) only exists as small fragments in the study area. Areas of mature forest impacted by **flooding** will need to be monitored.

Revegetated habitats supported many of the common breeders of the LRGV. These tracts (often 15-25 years old) hosted a similar bird community to mature tracts: thus, revegetation can be considered successful for many species. In the future, these reveg tracts should more closely resemble mature habitats.

Some **species of conservation concern** may be benefitting from revegetation and may further spread. Others remain absent from the study area, which may not longer support enough suitable habitat. Further study is needed.

Again, here is mature thorn-forest habitat with woody leaf litter and no grass invasion, plus high tree diversity

Continued studies in riparian habitats will focus on analyzing habitat needs of species of conservation concern and ways to increase habitat suitability at low cost.

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- Personnel of the **US Fish and Wildlife Service, Texas Parks and Wildlife Department**, and **private landowners** allowed access to study areas
- **Edwin Quintero** assisted with habitat (vegetation) data collection
- The **Wildlife Management Institute** and personnel of the former **University of Texas-Pan American** handled financial aspects.
- Special thanks to **Mary Gustafson** for her interest and assistance!