



# Lower Colorado River Multi-Species Conservation Program

*Balancing Resource Use and Conservation*

## Fall Migration Monitoring at the Cibola Nature Trail, Pratt Restoration, and Havasu Banding Sites 2005



August 2007

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National Park Service  
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Bureau of Indian Affairs  
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Lower Colorado River  
Multi-Species Conservation Program Office  
Bureau of Reclamation  
Lower Colorado Region  
Boulder City, Nevada  
<http://www.usbr.gov/lc/lcrmscp>

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# Abstract

As part of a year-round avian monitoring program along the Lower Colorado River (LCR), the Bureau of Reclamation initiated a fall migration constant-effort mist-netting project in the fall of 2002 at two demonstration restoration sites along the lower Colorado River: the Cibola Nature Trail restoration site and the Pratt restoration site. Overall, the Cibola and Pratt sites had lower capture rates compared to rates from previous years; however, capture rates for three individual species increased. In 2005, the Havasu banding site was added as a third site. With the introduction of the Havasu site, a comparison was made between all three sites for the 2005 fall migration period. There was an increase in overall species diversity in 2005, perhaps because the Havasu site was added. Similarities and differences in species composition were found between sites. The Havasu site had a higher number of species that were only captured one time. Three LCR Multi-Species Conservation Program covered species were captured at the sites. Willow flycatchers and yellow warblers were both caught at the Cibola and Pratt sites, while the summer tanager was captured at the Havasu site. Because sampling during migration is limited, changes in diversity and capture rate cannot be analyzed. It is suggested that mist-netting days be spaced throughout the fall migration period to better sample birds that are using the sites.

# Introduction

The Lower Colorado River (LCR) travels from Lees Ferry, south of Glen Canyon Dam, to the Gulf of California in Mexico. Flowing through the Mohave and Sonoran deserts, the LCR provides a large expanse of riparian vegetation in an arid environment (American Bird Conservancy 2003). Riparian areas in the Southwest support disproportionately high bird diversity and abundance, yet form less than 0.5% of the land area (Powell and Stiedl 2000). The LCR is part of the Pacific Flyway migration route for neotropical birds that migrate between wintering grounds south of the United States and breeding grounds north of the Mexican border, and provides crucial stopover habitat for migrating avian species. The decline in size and quality of this habitat has negatively affected the riparian specialists that breed along the LCR (Szaro 1980, Rosenberg et al. 1991, Powell and Stiedl 2000). Much of this habitat has decreased due to habitat destruction, agricultural land conversion, urban development, mining, overgrazing, river regulation, and climate change (U.S Bureau of Reclamation 1996, Powell and Stiedl 2000). Avian species are good indicators of ecosystem health due to their sensitivity to environmental change regarding a variety of physical and biological factors (Elliot et al. 2004).

The LCR Multi-Species Conservation Program (MSCP) is a cooperative Federal-Lower Basin States-Tribal-Private effort to conserve species that are listed under the Endangered Species Act (ESA) or considered sensitive by cooperating states, and provide regulatory relief for the operation of the LCR. To fulfill its duties as lead implementing agency, the Bureau of Reclamation (Reclamation) plans to establish large-scale habitat creation projects. Reclamation's goal is to create habitat for MSCP covered species. To accomplish this, Reclamation needs to increase its understanding of restoration science through an adaptive management approach; therefore, monitoring of current restoration sites is crucial.

In the fall of 2002, Reclamation initiated a fall migration constant-effort mist-netting operation at two riparian vegetation restoration sites along the LCR. In 2005, a third site was added that is considered more typical of habitat currently found along the LCR. Fall migration data for the restoration projects will be used in conjunction with data collected from other times of the year as a guide to habitat requirements for specific species, particularly those covered under the LCR MSCP. Avian species diversity and richness numbers collected from this project will be used as an indicator of bird use that may be expected in future restoration projects conducted along the LCR.

## Study Areas

Cibola National Wildlife Refuge is located along the LCR in Cibola, Arizona, south of Interstate 10 near Blythe, California. The refuge was established in 1964 to provide habitat for wildlife. More than 200 species of birds can be seen at the refuge (U.S Fish and Wildlife Service 2003). The Cibola Nature Trail restoration site (CIBO) contains three distinct areas: 1) a 5.5-ha mixture of honey mesquite (*Prosopis glandulosa*) and screwbean mesquite (*Prosopis pubescens*), 2) a 2.6-ha area of Goodding's willow (*Salix gooddingii*), and 3) a 1-ha area of Fremont cottonwood

(*Populus fremontii*). The mesquite species range in height from 6 to 8 m, the willows range from 7 to 9 m, and most cottonwoods at the site are greater than 12 m in height. *Baccharis* spp. grows throughout the entire site, exceeding 3 m in height in some areas. Exotic Johnsongrass (*Sorghum halepense*) invaded as an understory in each of the three areas, and serves as a ground cover reaching up to 2 m in height.

The Pratt restoration site (PRAT) is located north of Interstate 8, near Yuma, Arizona, on land administered by the Bureau of Land Management (BLM). The site is north of Laguna Dam and south of Mittry Lake, and is surrounded by farm fields and *Tamarix* spp. In the fall of 2003, *Tamarix* spp. was removed; this area will be restored with native vegetation by the BLM. A leaseholder has farmed the 4.9-ha site since 1949. In 1999, Reclamation established six planting regimes with Fremont cottonwoods, Goodding's willows, and coyote willows (*Salix exigua*) using potted plants, seeds, and poles. Reclamation planted potted plants and poles from 1 to 3 m apart. Seeded areas contained cottonwood and willow seeds collected locally and broadcast by hand over wet soils. One cottonwood plot contains a thick 4-5 m understory of *Baccharis* spp., which was independently established after the initial plantings. *Tamarix* was also established in small numbers in the seeded areas, as well as new individuals of coyote willow in the potted coyote willow area (U. S. Bureau of Reclamation 2003). Most of the cottonwoods range in height from 8 to 14 m, Goodding's willows range from 6 to 10 m, and coyote willows range from 3 to 6 m.

In 2005, the Havasu banding site (HAVA) was monitored during fall migration for the first time. This site is located on the Havasu National Wildlife Refuge at the southern end of Topock Marsh approximately 1.5 km north of the town of Topock, Arizona. The nets are located on either side of the dirt road that follows the new south dike just off Arizona Route 95. A large portion of the area is covered in *Tamarix* spp. and arrowweed (*Pluchea sericea*) with some large (greater than 14 m in height) mature cottonwoods forming an overstory over roughly half the site. The cottonwoods are the remaining trees from a planting in 1988 where most of the trees planted did not survive. The south side of the dike consists of a monotypic stand of *Tamarix* spp. ranging in height from 6 to 8 m, while the north side comprises *Tamarix* spp., with some areas having an overstory of cottonwoods. The northern edge of the site is bordered by marsh vegetation. This site is more typical of the vegetation now found along the LCR.

## Methods

Reclamation conducted a 4-day period of constant-effort mist netting at each site during the fall migration period (August-September). All sites were operated with standard nylon mist nets with 30-mm mesh, a height of 2.6 m, and a length of 6 or 12 m.

At the Cibola site, nine 12-m net lanes and two 6-m net lanes were used. Six 12-m nets were located in the Goodding's willows, three 12-m nets in the Fremont cottonwoods, and two 6-m nets in the mesquite habitat. Each net lane was chosen in order to sample the three distinct habitats and produce the maximum amount of captured birds. Banding occurred from August 30 to September 2, 2005.

For the Pratt site, ten 12-m nets were used and scattered throughout the site in order to sample all areas and capture the maximum number of birds. Banding occurred from September 13 to 16, 2005.

At the Havasu site, ten 12-m nets were used. Three nets were located in areas with an overstory of Fremont cottonwood and seven nets were located in areas dominated by *Tamarix* spp. mixed with arrowweed and Fremont cottonwood. These locations were chosen in order to evenly sample the vegetation found at the site. Banding occurred from September 13 to 16, 2005.

The Institute for Bird Populations established a protocol for Monitoring Avian Productivity and Survivorship (MAPS) station operations, which Reclamation used at all times (DeSante et al. 2002). Nets were set up one-half hour before sunrise and closed 5 hours later, or when the temperature exceeded 37.8° C. The nets were checked every 30 to 50 minutes depending on the temperature. All data were recorded on a standardized data sheet (DeSante et al. 2002). A metal, numbered USFWS leg band was placed on all captured birds, with the exception of game species and hummingbirds. Each bird was identified to species, aged, sexed, measured for wing chord and body fat, weighed, and released. Time, date, and net location were recorded for each captured bird as well as total hours of net operations. Birds were identified to species using Pyle (1997) and National Geographic (1999). Birds were aged and sexed using Pyle (1997).

## Results

Reclamation produced 176.33 net hours during the 4-day period at the CIBO site. A total of 106 birds, from 22 different species, were captured (Figure 1; see Appendix 1 for a list of species codes used in figures). The three most captured species were blue grosbeak (*Passerina caerulea*), yellow warbler (*Dendroica petechia*), and orange-crowned warbler (*Vermivora celata*). Capture rate for 2005 was lower than for the three previous years (60 birds per 100 net hours; Figure 2). Blue grosbeaks did have a higher capture rate compared to rates from previous years. Two LCR MSCP covered species were captured at CIBO. The willow flycatcher (*Empidonax traillii*) had a capture rate of 1.7 birds per 100 net hours and the yellow warbler had a capture rate of 9.1 birds per 100 net hours. Reclamation cannot determine whether the individuals were southwestern willow flycatchers (*E. t. extimus*), or Sonoran yellow warblers (*D. p. sonora*) because subspecies identification cannot be performed in the field.

Reclamation produced 200 net hours during the 4-day period at the PRAT site. A total of 66 birds, from 22 different species, were captured (Figure 3). Wilson's warbler (*Wilsonia pusilla*) was by far the most captured species at PRAT, with a 32% capture rate. MacGillivray's warbler (*Oporornis tolmiei*) was the second most captured species, with a 9% capture rate. Known migrants that were captured a single time each were warbling vireo (*Vireo gilvus*), green-tailed towhee (*Pipilo chlorurus*), lazuli bunting (*Passerina amoena*), gray flycatcher (*Empidonax wrightii*), and dusky flycatcher (*Empidonax oberholseri*). Capture rates for 2005 were lower than for the three previous years (33 birds per 100 net hours; Figure 4). Wilson's warblers and MacGillivray's warblers both had higher capture rates in 2005. Two LCR MSCP covered species

were captured at PRAT. The willow flycatcher had a capture rate of 2 birds per 100 net hours and the yellow warbler had a capture rate of 0.5 birds per 100 net hours.

Reclamation produced 200 net hours during the 4-day period at HAVA. A total of 88 birds, from 26 species were captured (Figure 5). Capture rate for 2005 was 44 birds per 100 net hours. The four most captured species were Lincoln's sparrow (*Melospiza lincolnii*), Wilson's warbler, common yellowthroat (*Geothlypis trichas*), and Bewick's wren (*Thryomanes bewickii*). The summer tanager (*Piranga rubra*) was the only LCR MSCP covered species captured at HAVA. According to summer banding data, summer tanagers are known to breed in the area (Dodge 2006).

Because this is the first year fall migration banding occurred at this site, there are no data from previous years. However, a comparison was made between all three sites for 2005 (Figure 6). The HAVA site had more single species captures than the CIBO and PRAT sites. Species with single captures for HAVA included: Anna's hummingbird (*Calypte anna*), ash-throated flycatcher (*Myiarchus cinerascens*), Brewer's sparrow (*Spizella breweri*), black-throated gray warbler (*Dendroica nigrescens*), crissal thrasher (*Toxostoma crissale*), grasshopper sparrow (*Ammodramus savannarum*), Gambel's white-crowned sparrow (*Zonotrichia leucophrys gambelli*), summer tanager, and verdin (*Auriparus flaviceps*).

Figure 1: Species composition at CIBO, Fall Migration 2005

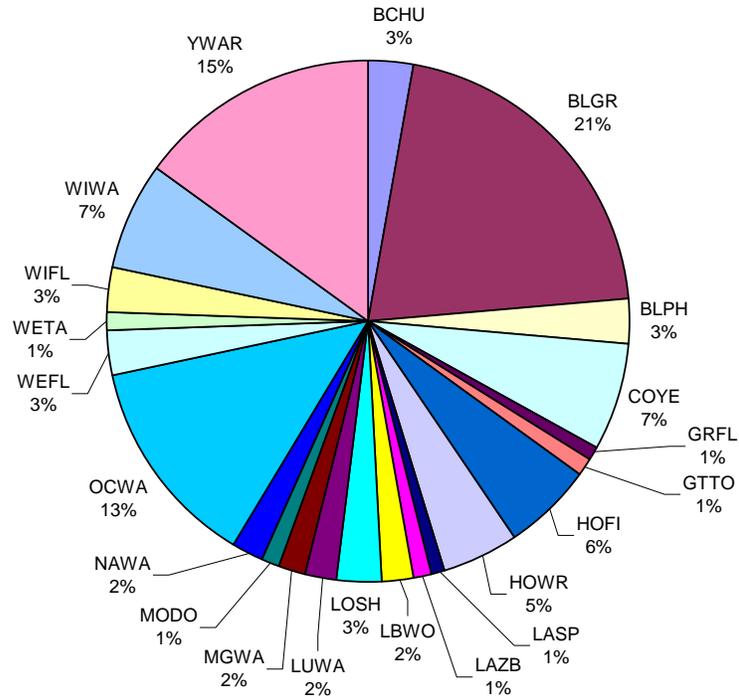


Figure 2: Capture rate of the most abundant species captured at CIBO during migration from 2002-2005

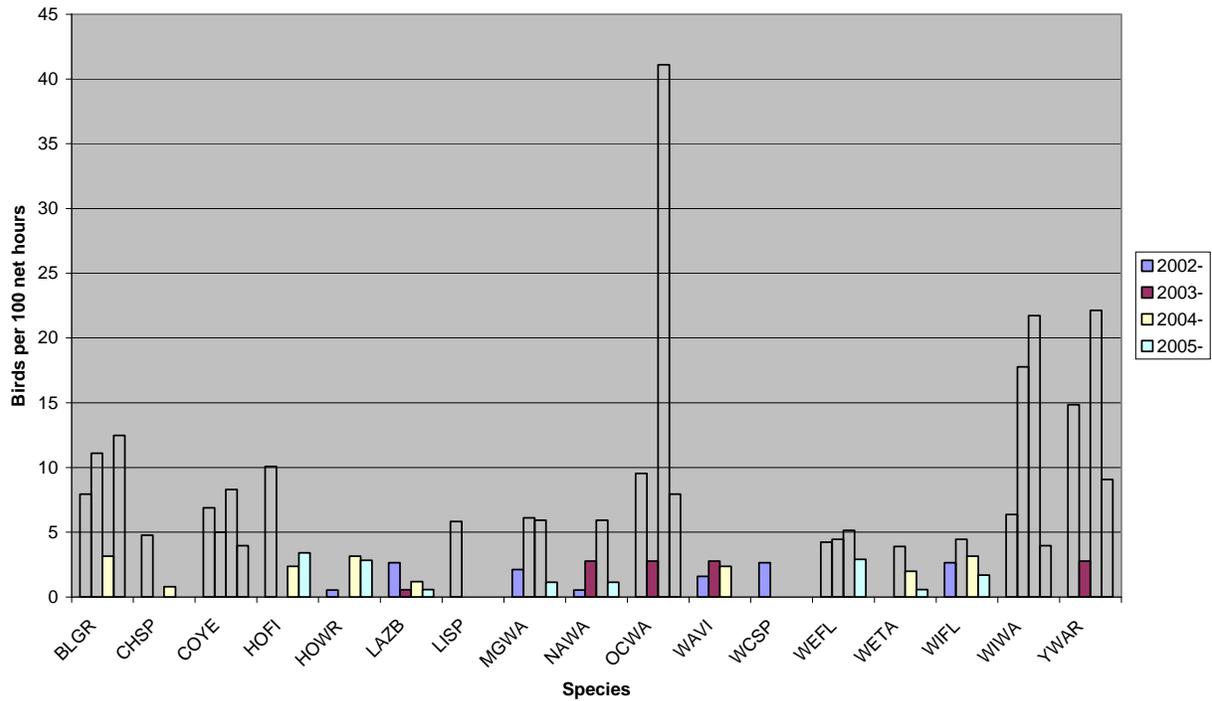


Figure 3: Species composition at PRAT, Fall Migration 2005

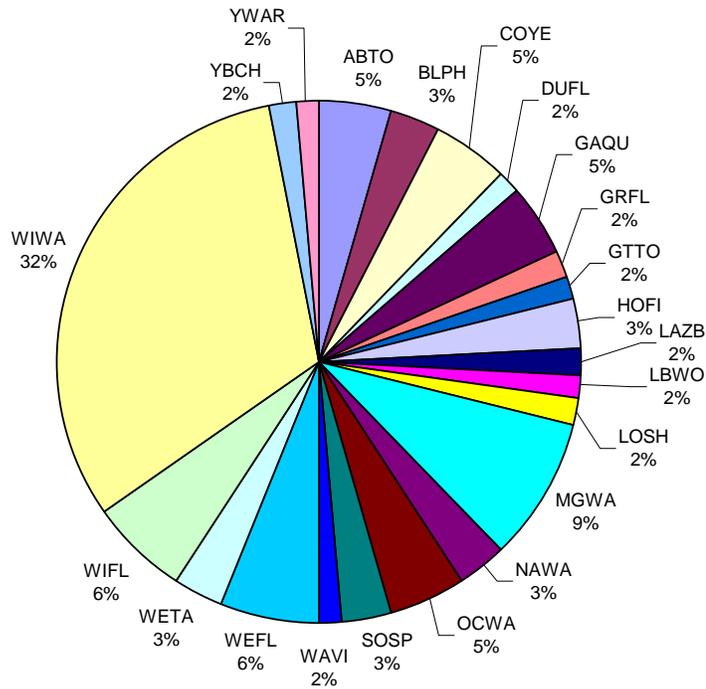


Figure 4: Capture rate of the most abundant species captured at PRAT per year during migration from 2002-2005

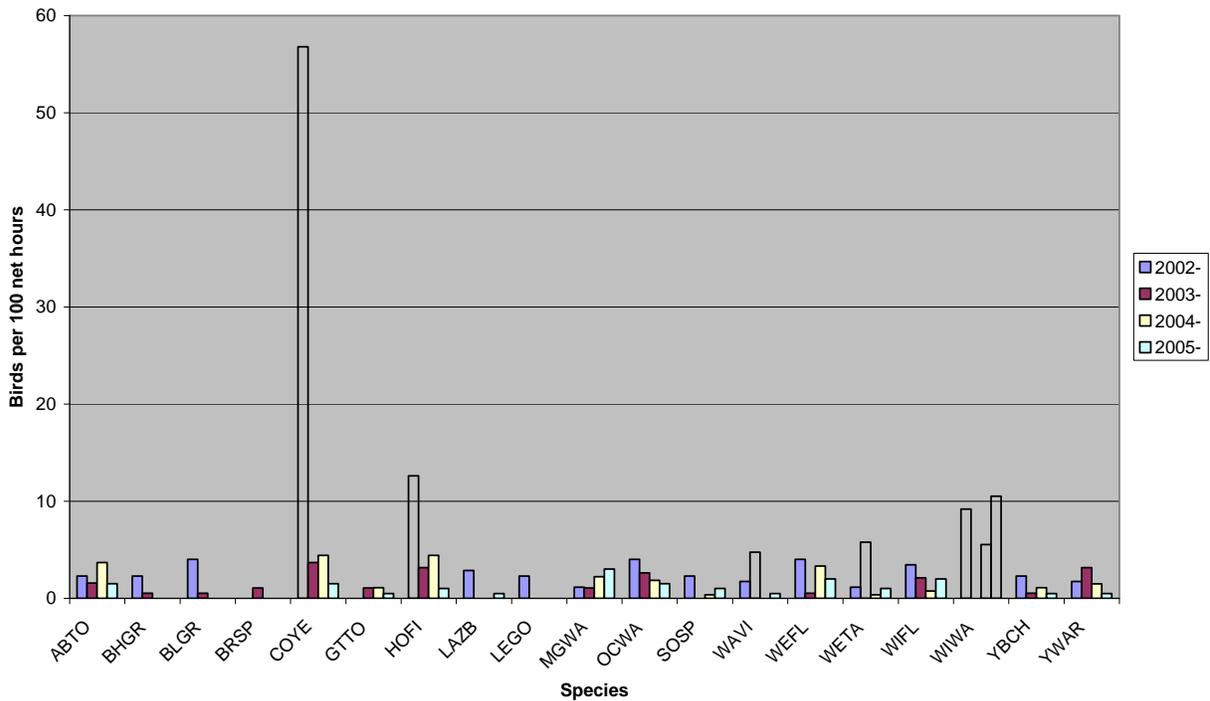


Figure 5: Species Composition at HAVA, Fall Migration 2005

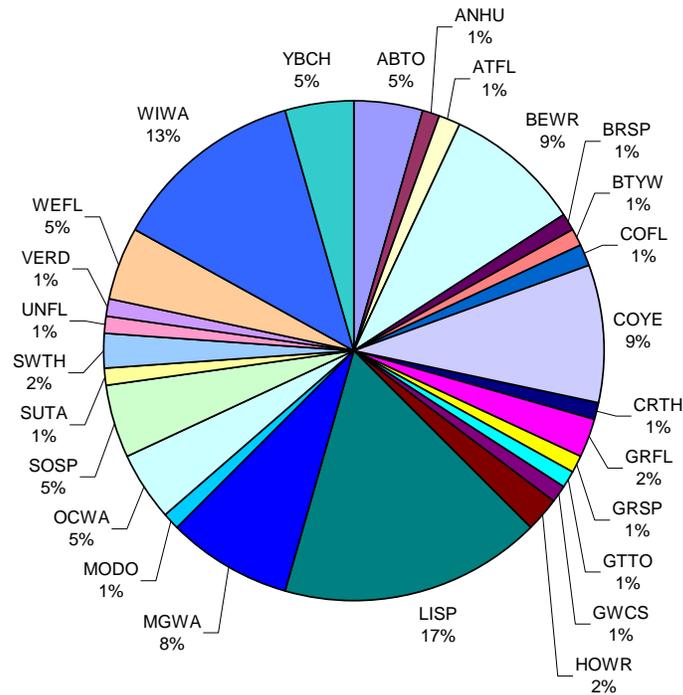
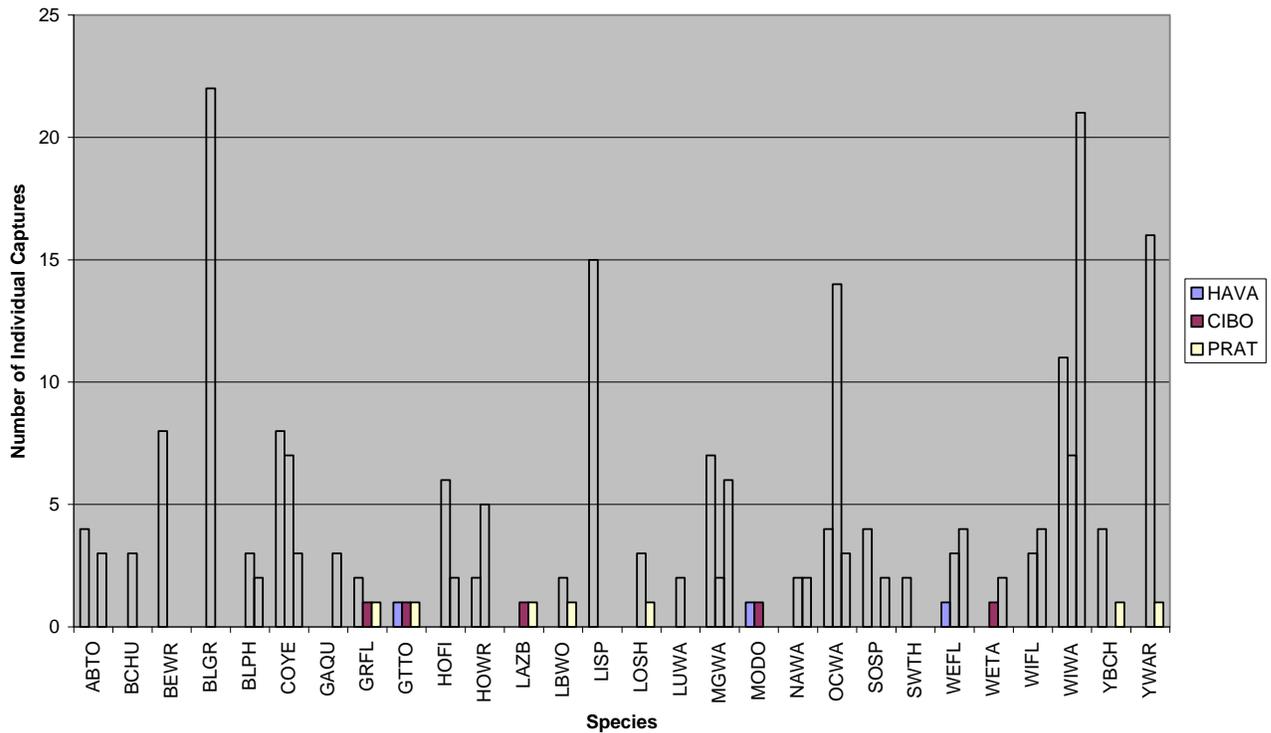


Figure 6: Comparison of Species between sites, Fall Migration 2005  
Species with only one individual capture omitted



## Discussion

Approximately 70% of North American migratory bird species have occurred along the LCR; one-third of these species are found utilizing the habitat of the LCR only during migration (Rosenberg et al. 1991). Reclamation's fall migration monitoring has been a valuable component in efforts to measure the success of each restored site. Reclamation has detected 53 different species at the CIBO, PRAT, and HAVA sites over the 4-year period that the migration mist-netting effort has been conducted, including three MSCP covered species (yellow warbler, summer tanager, and willow flycatcher). Fourteen species listed in the Partner's in Flight North American Landbird Conservation Plan (Rich et al. 2004) were detected at the sites (willow flycatcher, dusky flycatcher, gray flycatcher, Bell's vireo (*Vireo bellii*), Brewer's sparrow, Lucy's warbler (*Vermivora luciae*), Abert's towhee (*Pipilo aberti*), Nashville warbler (*Vermivora ruficapilla*), black-throated gray warbler, green-tailed towhee, Gambel's quail (*Callipepla gambelii*), verdin, Lincoln's sparrow, and crissal thrasher), five more species than in 2004, which may be due to the addition of a third site.

Species composition at each site varied between years, not uncommon during migration (Reclamation 2006). The intent of this project is to acquire an understanding of potential use of riparian habitat creation sites by migratory birds and to determine if breeding or resident individuals persist in this habitat during fall migration. Intensive migration surveys require daily sampling throughout the prolonged migration period (July-November) (Hussell and Ralph 1998). Due to the low number of days mist netting is conducted, only a small number of migrants that use these sites are detected each year, which causes greater variation in the data from year to year. The PRAT site will no longer be monitored during fall migration after 2005.

Capture rates for all species varied between sites and years. The reasons for this variation are unknown. The difference in capture rates may be due to site-specific factors (e.g., vegetation characteristics, site irrigation) or other factors (e.g., weather, sample period and intensity).

Reclamation has now gathered information about fall bird migration for 3 years at habitat creation sites. These data will be used in the planning and development of future habitat creation sites.

## Recommendations

For the year 2005, 4-day periods of mist netting occurred at each site during the fall migration period. Because mist-netting efforts that occur in adjacent days often yield similar results, mist-netting days should be spaced apart. For example, if Reclamation conducts mist netting at each site on back-to-back days during each week of the migration period, each site would be sampled for 1 day each week for 5 weeks. This will yield more representative data for the whole fall migration period.

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**Appendix 1: Common names, scientific names, and standard AOU (American Ornithological Union) codes for all species detected during fall migration at the Cibola Nature Trail, Pratt Restoration, and Havasu banding sites.**

<u>Code</u>	<u>Common Name</u>	<u>Scientific Name</u>
GAQU	Gambel's quail	<i>Callipepla gambelii</i>
COGD	common ground-dove	<i>Columbina passerina</i>
ANHU	Anna's hummingbird	<i>Calypte anna</i>
BCHU	black-chinned hummingbird	<i>Archilochus alexandri</i>
LBWO	ladder-backed woodpecker	<i>Picoides scalaris</i>
WWPE	western wood-peewee	<i>Contopus sordidulus</i>
WIFL	willow flycatcher	<i>Empidonax trailii</i>
DUFL	dusky flycatcher	<i>Empidonax oberholseri</i>
GRFL	gray flycatcher	<i>Empidonax wrightii</i>
WEFL	western flycatcher	<i>Empidonax difficilis/occidentalis</i>
COFL	cordilleran flycatcher	<i>Empidonax occidentalis</i>
UNFL	unknown flycatcher	<i>Empidonax spp.</i>
BLPH	black phoebe	<i>Sayornis nigricans</i>
ATFL	ash-throated flycatcher	<i>Myiarchus cinerascens</i>
WEKI	western kingbird	<i>Tyrannus verticalis</i>
LOSH	loggerhead shrike	<i>Lanius ludovicianus</i>
BEVI	Bell's vireo	<i>Vireo bellii</i>
CAVI	Cassin's vireo	<i>Vireo cassinii</i>
WAVI	warbling vireo	<i>Vireo gilvus</i>
VERD	verdin	<i>Auriparus flaviceps</i>
BEWR	Bewick's wren	<i>Thryomanes bewickii</i>
HOWR	house wren	<i>Troglodytes aedon</i>
SWTH	Swainson's thrush	<i>Catharus ustulatus</i>
HETH	hermit thrush	<i>Catharus guttatus</i>
CRTH	crissal thrasher	<i>Toxostoma crissale</i>
OCWA	orange-crowned warbler	<i>Vermivora celata</i>
NAWA	Nashville warbler	<i>Vermivora ruficapilla</i>
LUWA	Lucy's warbler	<i>Vermivora luciae</i>
YWAR	yellow warbler	<i>Dendroica petechia</i>
BTYW	black-throated gray warbler	<i>Dendroica nigrescens</i>
AMRE	American redstart	<i>Setophaga ruticilla</i>
MGWA	Macgillivray's warbler	<i>Oporornis tolmiei</i>
COYE	common yellowthroat	<i>Geothlypis trichas</i>
WIWA	Wilson's warbler	<i>Wilsonia pusilla</i>
YBCH	yellow-breasted chat	<i>Icteria virens</i>
SUTA	summer tanager	<i>Piranga rubra</i>
WETA	western tanager	<i>Piranga ludoviciana</i>
GTTO	green-tailed towhee	<i>Pipilo chlorurus</i>
ABTO	Abert's towhee	<i>Pipilo aberti</i>
GRSP	grasshopper sparrow	<i>Ammodramus savannarum</i>
LASP	lark sparrow	<i>Chondestes grammacus</i>
CHSP	chipping sparrow	<i>Spizella passerina</i>
BRSP	Brewer's sparrow	<i>Spizella breweri</i>
SOSP	song sparrow	<i>Melospiza melodia</i>
LISP	Lincoln's sparrow	<i>Melospiza lincolnii</i>
WCSP	white-crowned sparrow	<i>Zonotrichia leucophrys</i>
GWCS	Gambel's white-crowned sparrow	<i>Zonotrichia leucophrys gambelli</i>
BHGR	black-headed grosbeak	<i>Pheucticus melanocephalus</i>
BLGR	blue grosbeak	<i>Passerina caerulea</i>
LAZB	lazuli bunting	<i>Passerina amoena</i>
INBU	indigo bunting	<i>Passerina cyanea</i>

GTGR  
HOFI  
LEGO

great-tailed grackle  
house finch  
lesser goldfinch

*Quiscalus mexicanus*  
*Carpodacus mexicanus*  
*Carduelis psaltria*