



COMMUNITY SCIENCE BIRD MONITORING AT BIG BEND RESTORATION AREA

2021 Project Report

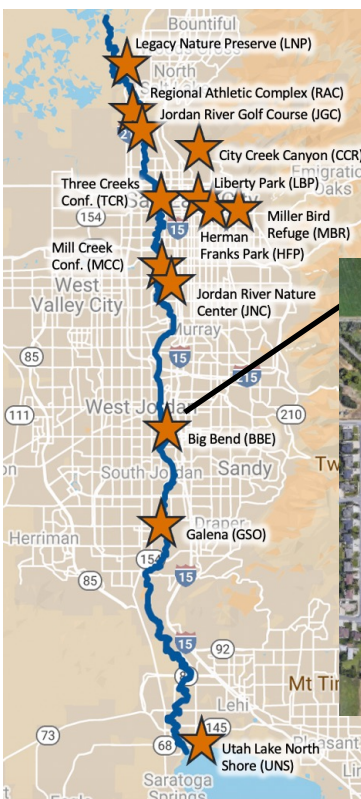
PROJECT OVERVIEW

Big Bend is an 80 acre restoration area situated along the Jordan River in the city of West Jordan. Plans for restoration of the Big Bend site include ambitious habitat alteration which will involve hydrologic restoration of the mile of river through the project area, removal of exotic vegetation, re-vegetation with native trees and shrubs to create 40 acres of floodplain gallery forest, and various amenities for human use and recreation. Several aspects of the planned restoration are currently underway, including the addition of a fishing pond, river bank restoration at the north end of the site, and vegetation work. Since 2013, Tracy Aviary has conducted a community science bird monitoring project in Big Bend Restoration Area. Here, we summarize results from our 2021 field season.

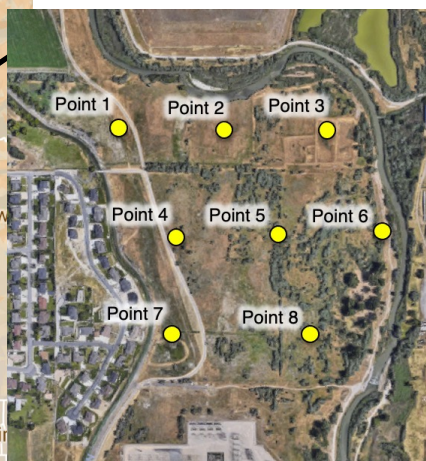
STUDY SITES

We generated eight sampling points across the Big Bend site where we conducted bird and vegetation surveys. These surveys are part of a larger community science bird monitoring program that includes twelve other study sites in the Salt Lake region. Using information from other study sites, we can gain inference about larger scale patterns and trends in urban and riparian birds communities.

Bird Monitoring Sites



Big Bend Sampling Points



BIRD SURVEY METHODS

Breeding season point count surveys



During May – July of 2021, 9 community scientists and Tracy Aviary staff conducted 6 breeding season point count surveys at Big Bend. Point count surveys were conducted by pairs of community scientists between dawn and 10am. The ‘observer’ identified all birds seen and heard during six minutes, and noted the number of individuals, distance, and direction. The ‘recorder’ wrote all of the observations on the datasheet, and also noted weather and site variables, such as wind speed and cloud cover.

Non-breeding season group surveys

Information from point count surveys was supplemented by non-breeding group surveys conducted at each site in January, March, August, September, November, and December 2021. During non-breeding surveys, groups of volunteers led by a trained Tracy Aviary staff person walked a transect through the site and noted all birds seen and heard in the area.

Owl survey

Because owls are less likely to be detected by traditional survey methods, we also conducted two owl surveys at Big Bend during 2021. During March, when owls are most likely to be vocalizing, groups of volunteers led by a trained Tracy Aviary staff person walked the site in the evening listening for owls, stopping periodically to play owl calls and listen for responses.

2021 SURVEY SUMMARY

During 6 breeding season surveys at Big Bend in 2021, we had 1,580 bird observations and detected 59 species. During 6 non-breeding season surveys, we had 5,746 bird observations and detected 90 species. We had no owl detections during the owl survey. With our combined surveys, we had a total species list of 98 species at Big Bend in 2021.

Since we began monitoring in 2013, we've detected 144 total species of birds that use habitat in the Big Bend Restoration Area.



Song Sparrows are one of the bird species that use habitat at Big Bend.

BREEDING SEASON COMMUNITY COMPOSITION ACROSS BIG BEND

We examined the composition of bird communities across sampling points at Big Bend by comparing relative proportions of bird families and habitat guilds for species detected within 125m of each point during the breeding season.



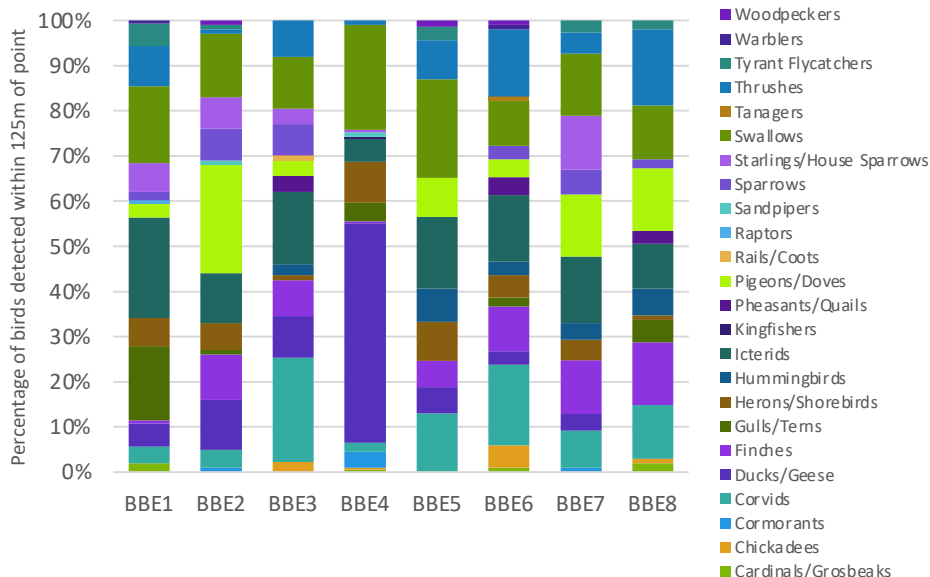
Families

Overall, the bird community at Big Bend has a high proportion of swallows, icterids, finches, and corvids. Point BBE01 had a higher proportion of gulls and terns, and BBE04 had a higher proportion of ducks and geese.

Habitat Guilds

We documented a high proportion of birds that use primarily open woodland habitat, urban habitat at Big Bend. We also documented a high proportion of birds that use wetland or water habitat, especially at point BBE04.

Families



Habitat Guilds

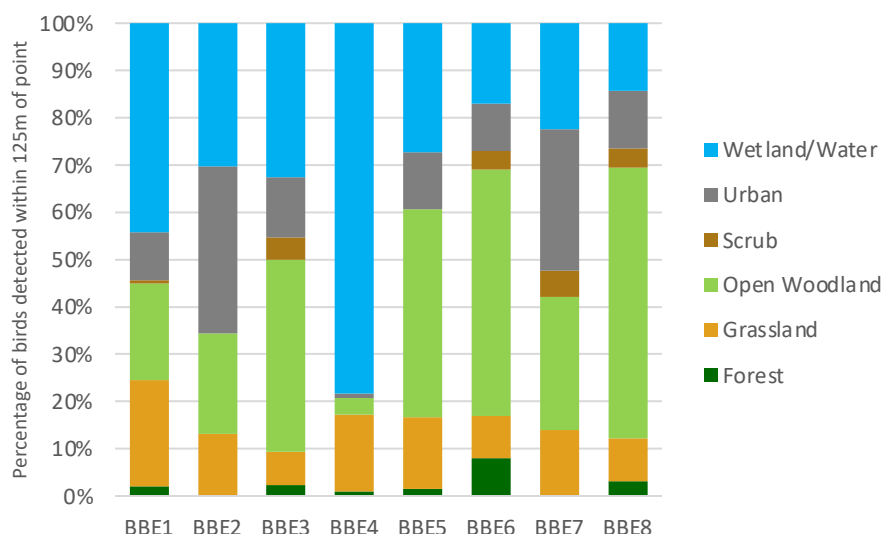


Figure 1. Graphs the community composition of birds within different family groups and habitat guilds at each of three sampling points within Big Bend during 2021 breeding season surveys.

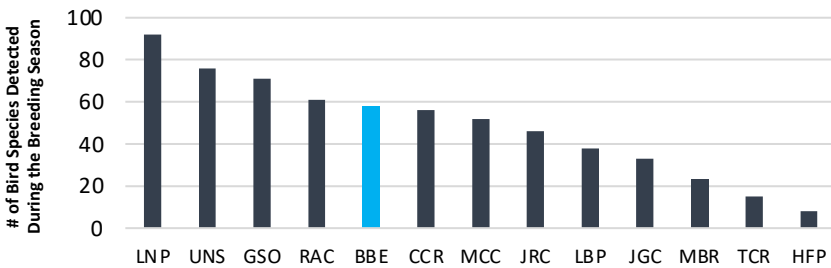
BIG BEND - 2021 RESULTS

COMPARISON TO OTHER LOCAL BIRD MONITORING SITES

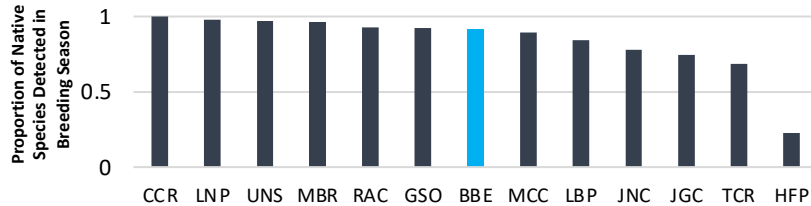
Species Richness, native, urban-sensitive, and riparian species

We can measure the health of an urban riparian site such as Big Bend by looking at several metrics, including species richness (the number of species detected), and the proportion of native, urban-sensitive, and riparian-associated birds that use the site. When comparing Big Bend (light blue) to other monitoring sites (dark blue), we found mid- high breeding season species richness, average native and urban bird species, and slightly lower riparian-associated birds.

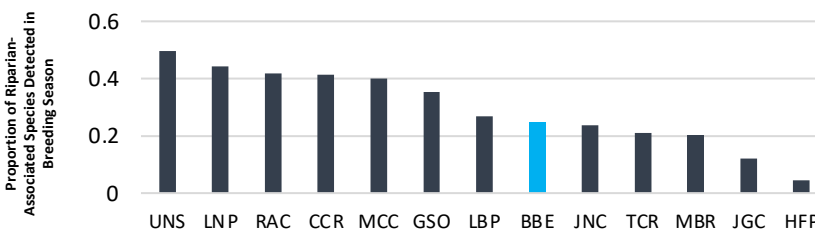
Species Richness



Native Bird Species



Riparian-Associated Bird Species



Urban-Sensitive Bird Species

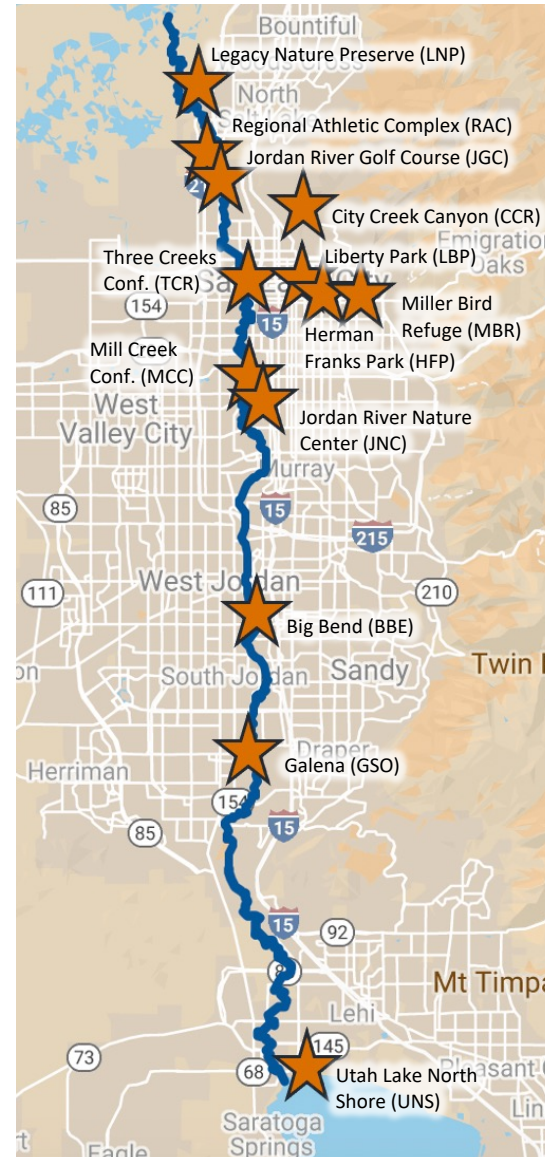
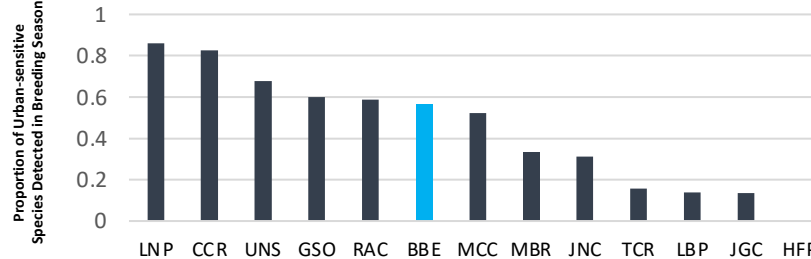


Figure 2. Graphs showing a comparison of species richness and the proportion of native, riparian-associated, and urban-sensitive bird species at Big Bend (light blue) and other bird monitoring sites (dark blue).

BIG BEND - 2021 RESULTS

BIRD HABITAT USE PATTERNS THROUGHOUT THE JORDAN RIVER

We use breeding season data to help understand the how habitat features and landscape attributes impact where different bird species are found; information that could help with land management and restoration decisions that create, protect, or enhance healthy bird habitat for target species. A preliminary occupancy modeling analysis using bird survey data from 2020 identified the most important factors influencing habitat use by 12 species across the 12 bird monitoring sites. We selected 8 species that were considered target species (i.e., native, riparian-associated, and urban-sensitive), and 4 species that were considered non-target species (i.e., non-native and/or urban-associated). Our analysis examined which habitat or landscape attributes (Table 1) influenced the probability that these species would use an area within our sampling sites.

Occupancy Analysis: Overall Habitat Use Patterns

Canopy Cover was found to be an important factor for habitat use by **50%** of the target species examined. All but Western Kingbird positively associated with canopy cover.

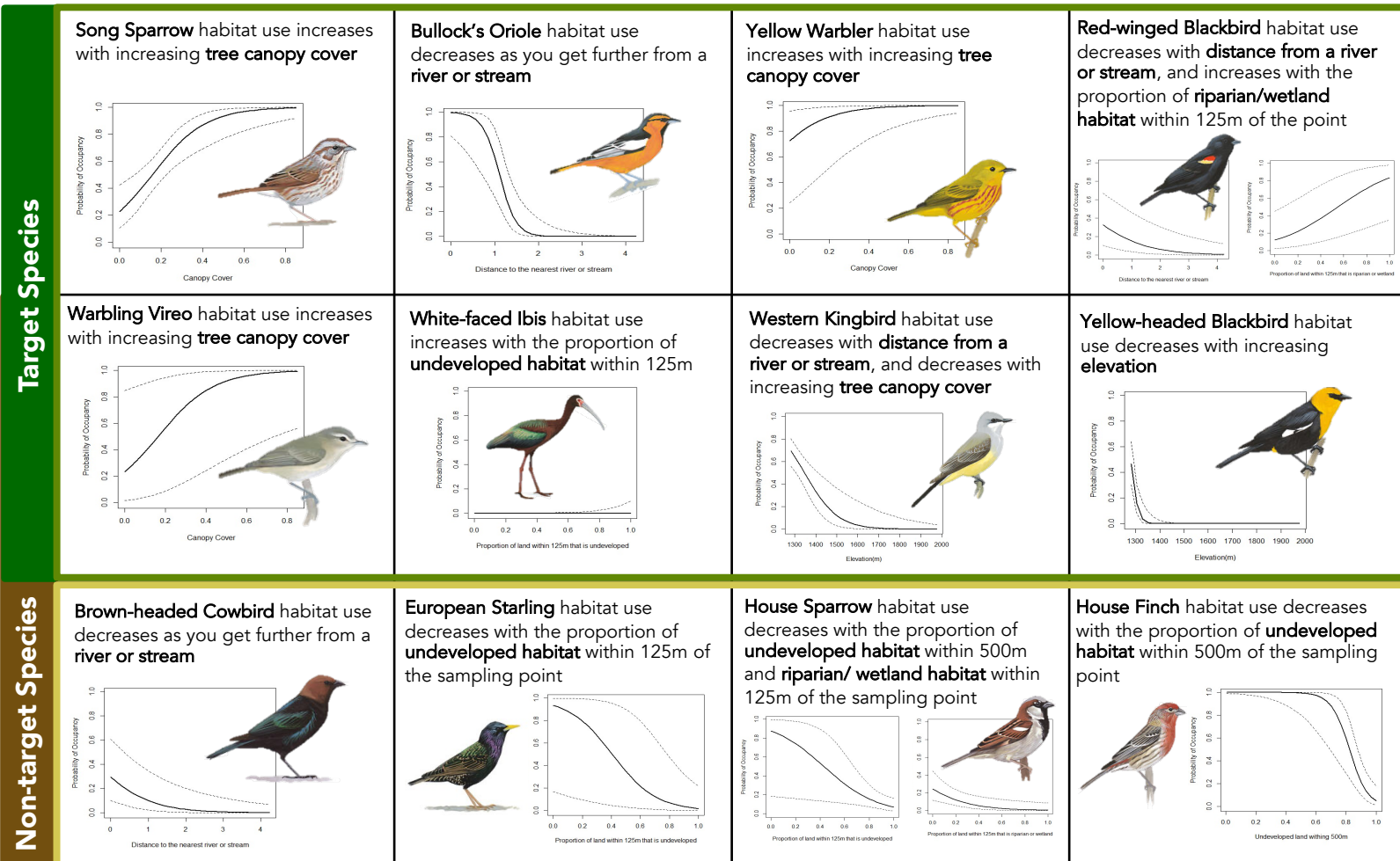
Distance to River or Riparian/Wetland habitat within 125m was found to be an important factor for habitat use by **37.5%** of the target species examined. All species had decreased habitat use as distance from river increased and riparian/wetland habitat decreased.

Undeveloped Habitat was found to be an important factor for habitat use by **75%** of the non-target species examined, with decreasing habitat use in areas with more undeveloped habitat.

Table 1. Habitat and landscape attributes included in occupancy analysis.

Variable	Measurement (unit)
Canopy	Tree canopy cover within 50m (%)
Shrub	Shrub cover within 50m (%)
Herb	Herbaceous cover within 50m (%)
Water	Cover of water within 50m (%)
DistRiver	Distance to the river or stream (m)
Elevation	Elevation (m)
Riparian125	Riparian or wetland habitat within 125m (%)
Undeveloped125	Undeveloped habitat within 125m (%)
Undeveloped500	Undeveloped habitat within 500m (%)

Occupancy Analysis: Species Results

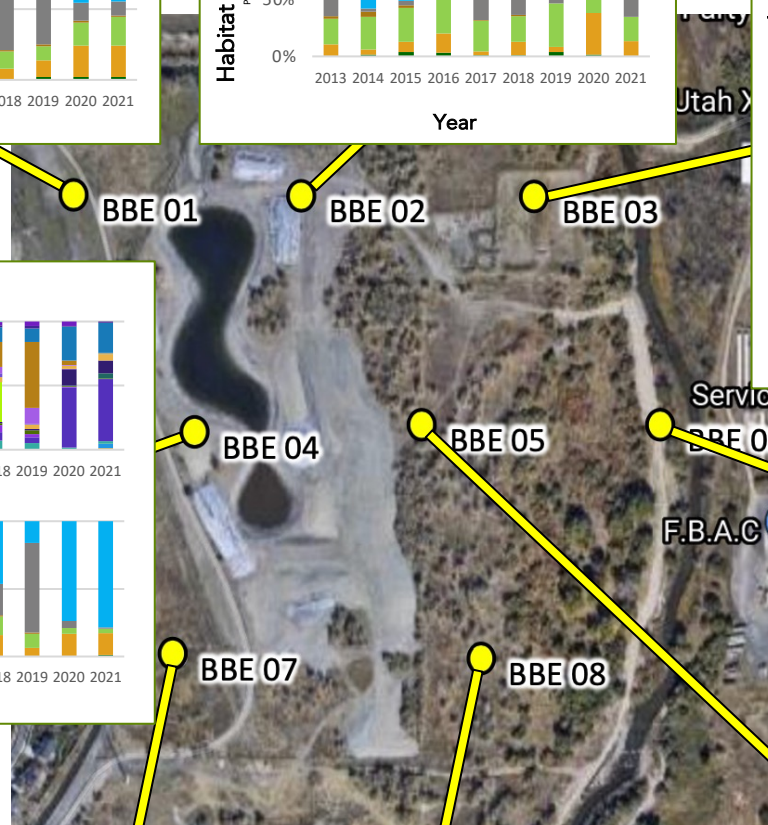
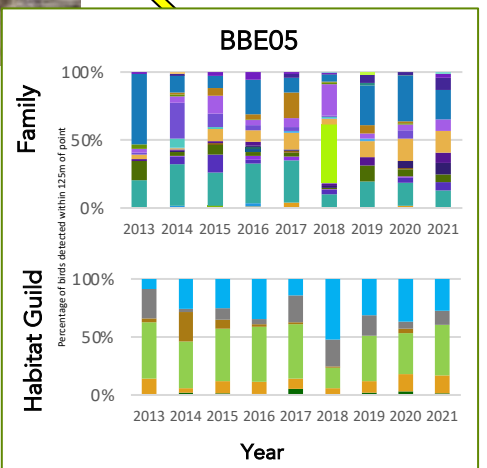
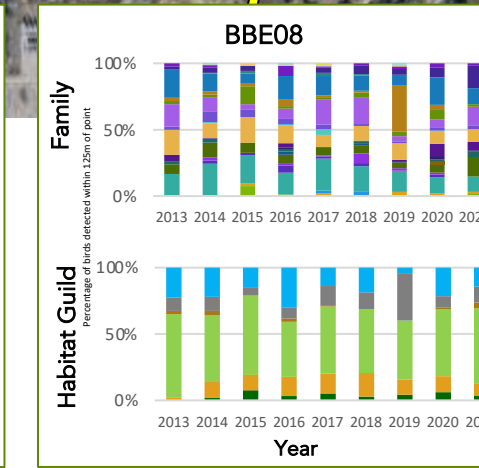
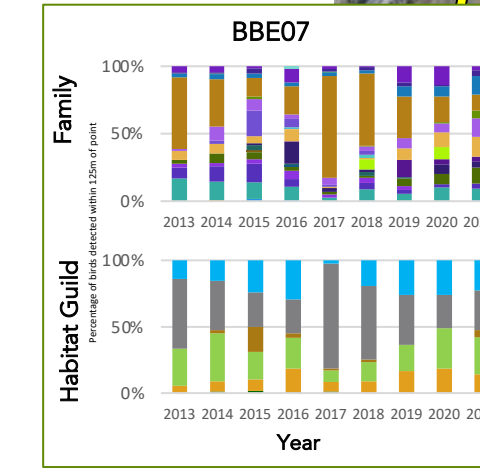
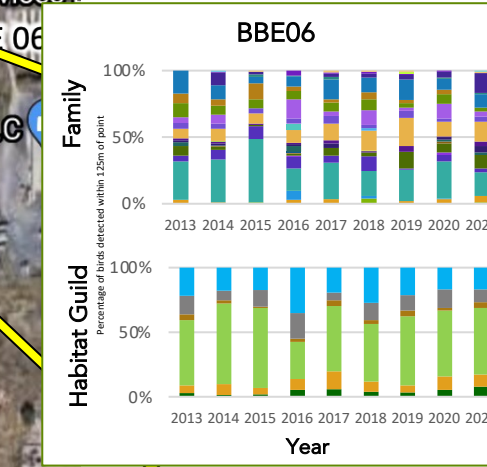
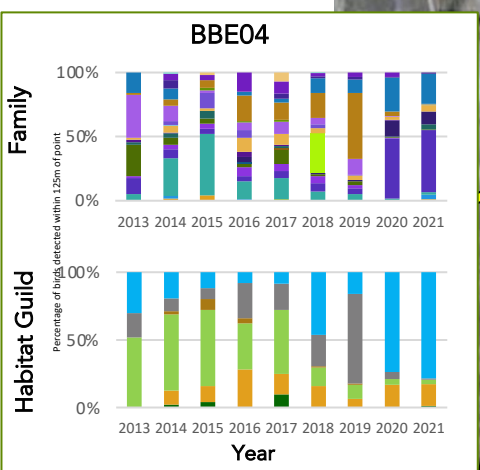
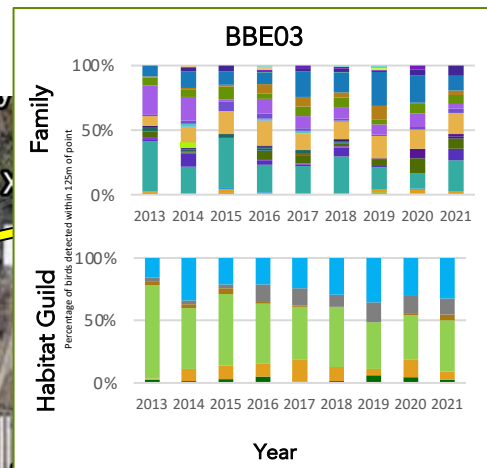
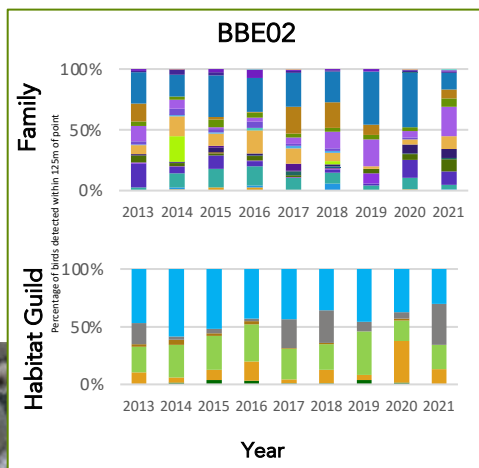
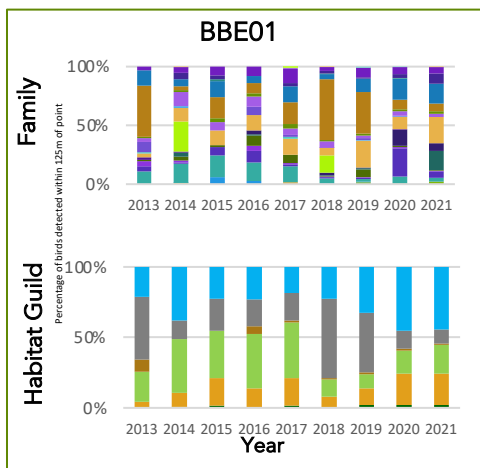
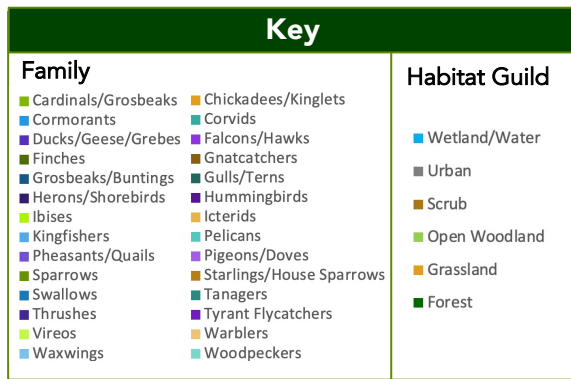


Bird images from Audubon.org

BIG BEND - 2021 RESULTS

BIG BEND HABITAT USE TRENDS AND CHANGES DURING RESTORATION

Below we show changes in the breeding season bird community by family type and habitat guild type over the years of our monitoring effort. During the later years of our monitoring, restoration work at the site began, including construction of a fishing pond and changes to the river bank.



RECOMMENDATIONS TO ENHANCE AND PRESERVE BIRD HABITAT

- **Promote vertical structure** and canopy cover throughout the site by protecting existing trees and/or replacing trees that are removed. This will enhance habitat for riparian-associated birds such as warblers, flycatchers, and orioles.
- **Plant and maintain** trees, shrubs, and other native vegetation over a large footprint of the site. This vegetation will enhance the contiguous habitat along the Jordan River corridor and provide a buffer from the surrounding roads and residential development.
- **Add and enhance wetland and ephemeral water elements.** On the east side of the property where the river will be able to keep a more natural meandering path, enhancing ephemeral water components and adding wetland vegetation could enhance habitat for species such as Red-winged and Yellow-headed Blackbirds, Virginia rails and Sora, Marsh Wrens, and Common Yellowthroats.
- **Maintain standing dead trees** to provide habitat for cavity-nesting species, such as chickadees, nuthatches, screech-owls, and woodpeckers. Avoid complete removal if possible; cutting them to a height of 10ft can mitigate safety concerns while still providing cavity habitat.
- **No tree removal** or thinning activities should take place during the breeding and nesting season (April – July).
- **If trees are to be removed**, mature trees should be thinned out slowly while they are replaced so vertical structure and fruiting resources are maintained throughout the restoration process.



BIG BEND

COMPLETE LIST OF BIRDS DETECTED DURING BREEDING SEASON SURVEYS (BSS) AND NON-BREEDING SEASON SURVEYS (NBS) 2013-2021

Species	Number of Observations (detections/survey)																	
	2013		2014		2015		2016		2017		2018		2019		2020		2021	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
European Starling	21.4	204	13.3	466.4	13	295.5	6	141.1	51	1118	71	213.7	44.8	863.1	23.3	337.4	6.2	418.3
Black-billed Magpie	28.6	31	49.9	23	57.3	37.3	20	30.3	37.3	39	27.1	26.4	25.8	22.4	25.7	29.4	24	22.5
Franklin's Gull	1.2	0	1.1	0	12.5	0	0.2	1.6	10.8	0.2	0.3	0	0.2	0	0.1	0	8.3	27.5
Northern Rough-winged Swallow	9.2	0	9.1	0	11.5	0.5	7.2	1.4	9.8	2.2	16.1	0.7	9.6	2.1	6.1	0.6	5.2	0
Red-winged Blackbird	3.6	13	11.6	146.1	6.8	309.4	6.7	176.3	7.7	55	5.6	53	9.8	74	9	125.5	16	21.7
Rock Pigeon	0.4	0	2.9	43.5	31.5	33.9	2	32.9	6.8	141	11.1	43.3	2	18.8	5.4	15	4	21.7
Bullock's Oriole	4.6	0	5.8	0	5	0.4	7.2	0	6.3	0.2	6.6	0.4	7.6	0.3	8.3	0	6.3	0.3
Mourning Dove	15.4	21	20.4	38	4.8	35.3	4	24.4	5.8	30.3	9.3	19.9	6	19.3	5.6	31.1	4.7	16.7
Song Sparrow	5.2	3	5.6	4.1	10	6.9	4.5	4.9	4.8	7.3	5.4	5.3	3.4	5.4	5.4	4.1	3.5	5.5
Barn Swallow	2.8	0	4.3	3.3	1.3	11.9	2.3	3.3	4.5	5.5	6.7	23.9	3.6	14.9	4	5.4	8.8	10
American Robin	1	73	10.7	41	4.8	60.1	4.5	24.9	4.3	89	5.6	45	8.2	90.6	6.4	34.3	13.2	49.5
American Kestrel	0.4	1	2	1.5	2	2.6	3.2	2.7	4.2	5.2	5.3	4.3	0.6	3.6	1.9	3.1	0.3	2.3
Western Kingbird	3.2	0	4.3	0	3.8	1.1	5.3	0.6	4	0.8	4.3	0.4	6.8	2.3	6.3	1	3.3	0.3
Mallard	2.6	11	6.7	43.9	15.5	75.4	4.5	65.8	3.8	52.3	5	69.5	4.4	48.4	23.4	49	17.8	53.2
Lesser Goldfinch	2.8	0	1.7	1.8	1.3	2.8	2	3.3	3.7	2.7	1.3	1.3	1	9.6	1.7	8.1	1.5	4.2
California Quail	3.6	5	12	25	9.5	10.8	4.2	9.6	3.3	23.5	2.4	5.6	3.2	11.5	2.7	2	4.8	10.5
Brown-headed Cowbird	2	0	1.8	0	4.8	0	3.5	0	2.5	0	4.4	0	2.2	1.3	1.9	0.3	2.8	0
Cliff Swallow	0.4	0	6.2	0	0	0	0.3	0	2.5	0	1.1	0.1	1.4	0.1	8.1	0	9.5	0
Double-crested Cormorant	0.8	0	5.9	0.5	5.3	0.6	2.3	1.7	2.3	0.7	8	3.3	2.2	0.1	1.7	2.5	3.2	0.5
Canada Goose	7.2	104	10.4	61.4	7.3	97.1	1.3	100	2	69.8	7.9	78.3	6.4	76	31.1	114	17.8	56.2
House Finch	7.6	8	4.2	36.9	2.5	27.1	2	6.4	2	15.3	2.3	19.6	7.6	20.6	5.6	28.9	7.8	32.5
Killdeer	0.2	0	0.8	0	2.3	1.4	1.8	1.4	2	2.7	3.9	1.3	1	7.8	10.1	1.5	10.5	2.5
Red-tailed Hawk	1.6	1	1.2	0.9	1.5	1.5	1.5	1.3	2	2.7	1	1.6	1.6	1.1	0.9	1.1	0.7	1.5
Black-chinned Hummingbird	1.2	0	0.8	0.4	2.5	0.4	1.5	0.9	1.8	1.2	1	0.9	1.6	1.8	3.7	2.6	3.2	2.3
Black-capped Chickadee	1.4	1	1.4	2.9	1.5	4.4	1.5	1.7	1.7	1.8	0.6	2.3	1.4	2.3	2.3	3.8	2.2	2
Ring-necked Pheasant	0.2	2	2.7	0.4	4.8	0.3	3.8	0.1	1.5	0.2	2.4	0	1.8	0.4	1.6	0.4	0.5	0.2
Caspian Tern	0	0	0.8	0	1	0	0.7	0.3	1.3	0	0	0.3	0.4	0	1	0	0.8	0.3
Eurasian Collared-dove	0	0	0.6	1.8	1.3	16.4	1	5.4	1.3	20.3	6	45	5.4	27.4	4.4	50.8	5.8	52.2
American Goldfinch	0	3	1.6	2.3	0.5	7.4	1.3	1.4	1.2	4.2	1	1.3	1.4	1.9	2	3.4	0.8	1
American White Pelican	1.4	0	2.6	0	6	0.5	1.3	0	1.2	0	1.9	0	0.4	0	0.4	0	0	0
Western Tanager	0	0	0.6	0.4	1	0	0.3	0	1.2	0.3	0.6	0.4	0.2	0.1	1	0	0.2	0
Yellow-rumped Warbler	0	0	0.7	9.1	0	6.8	0.3	10.9	1.2	8.3	0	14	0.4	13.1	0.1	7.4	0	9
Bank Swallow	6	0	2.6	0	7	0.1	2.8	0.9	1	0	1.9	0.3	13.4	2.6	18.1	2.8	1.5	3.3
Belted Kingfisher	0.2	1	1	0.6	0.8	1.5	0.7	0.9	0.8	1.8	1.7	1.4	0.8	0.9	0.4	0.9	0.2	0.7
Yellow-headed Blackbird	0.2	0	0.6	0.6	1	4.1	0.2	8.1	0.7	2.3	0.3	0	5.8	0	0.3	0	1	0.3
Blue-gray Gnatcatcher	0	0	0.2	0.5	1	0.6	0.2	1.3	0.5	1.3	0.1	0.7	0.2	1	1.1	0.3	0	0.5
California Gull	1.2	2	3.9	1.4	1.8	0.5	1	2	0.5	0.8	5.6	0.6	0.4	0.1	1.1	1.1	3.5	0.7
Say's Phoebe	0	0	0	0	0.3	0.1	0.3	0.1	0.3	0	0.7	0.3	0.6	0.5	0.1	0.1	0.3	0.2
Warbling Vireo	0	0	0	0	0	0	0	0	0.5	0	0	0.1	0.6	0.4	0	0	0	0.2
American Avocet	0.2	0	0	0	0	0.3	0.2	0	0.3	0	0	0	0	0	4.7	0	0.8	11.7
American Crow	0	0	0	0.3	0	0.1	0	0	0.2	1	0.3	1.4	0	3.1	0.1	0.6	0.3	0.5
Ash-throated Flycatcher	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Black-headed Grosbeak	0.4	0	0.1	0	0.3	0	0.3	0	0.2	0	0.4	0	0.8	0	0.7	0	1.3	0
Broad-tailed Hummingbird	0.2	0	0.2	0	0	0.1	0	0.9	0.2	0	0	0	0	0	0.3	0	0	0

BIG BEND

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	2013		2014		2015		2016		2017		2018		2019		2020		2021	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Northern Flicker	0	8	0.1	4	0	5.9	0.2	6.4	0.2	7	0.4	5.7	0.2	4.5	0.1	4.6	0.7	7
Olive-sided Flycatcher	0	0	0	0	0.3	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Western Meadowlark	0	0	1.4	0	1.5	0.1	1.8	0	0.2	0	0.3	0	0.8	0	0	0.1	0	0.2
Spotted Sandpiper	0	0	0.4	0.1	0	0.4	0.8	0.4	0.2	0.3	0.4	0.1	0.6	0.4	1.1	0.3	0.8	0.8
White-crowned Sparrow	0	3	0	12.3	0	16.9	0	14.4	0.2	11.3	0.3	9.7	0.2	19.4	0.4	23.6	1.7	25.3
Yellow Warbler	0	0	0.1	0.1	0.8	0.5	0.2	0.9	0.2	0.3	0.3	0.6	0.2	1.1	0.1	1.3	0.2	3
Lazuli Bunting	0	0	0	0	1.5	0.4	1.3	0.1	0	1.2	0	0.1	0	0.5	0	0.3	0	2
House Sparrow	1	10	1	3.5	2.8	1.9	1	1.6	0	1.3	0.3	0.4	0	3.9	1.4	5.3	1	8.3
Downy Woodpecker	0	0	0.2	0.8	0	0.4	0.5	0	0	0.3	0	0.7	0.4	0.9	0.1	0.6	0.8	0.2
Great Blue Heron	0.8	1	0.3	0.3	0.3	0.9	0.3	1.3	0	1.3	0.1	0.9	0.2	0.8	0.9	0.9	0.7	1.7
White-faced Ibis	0.2	0	25.7	0	3.5	0	0.3	1.4	0	3.3	41.1	1.4	9.2	8.3	14.4	0	31.7	0
Willow Flycatcher	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0
Cooper's Hawk	0	0	0	0.5	0	0.4	0.2	0.3	0	0.3	0	0.9	0	0.3	0	0.8	0	0.3
Tree Swallow	0	0	0.3	0	1	0	0	0	0	0.2	0	2.9	0	0	0.1	0.1	0	0
Common Yellowthroat	0.2	0	0.1	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.2
Forster's Tern	0	0	0.4	0	0.5	0	0	0	0	0	0	0	0.2	0	0.1	0	0	0
MacGillivray's Warbler	0	0	0	0.1	0.5	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0.3
Blue Grosbeak	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0
Brewer's Blackbird	0	0	6.8	10.8	0.3	25.1	0	2.9	0	11	0	2.1	0.6	3.4	0.1	0.8	0.3	1.5
Dark-eyed Junco	0	2	0	2.8	0.3	3.1	0	3	0	8.5	0	2.9	0	4.9	0	4.1	0	0
Great Horned Owl	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Savannah Sparrow	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0.1	0	0	0	0.5
Cedar Waxwing	0	28	0.1	6.5	18.3	3.6	0	2.1	0	3.2	0	0.1	0.2	0.4	0.1	0	0	1.5
Spotted Towhee	0.2	2	0.4	1.5	0	1.9	0	0.6	0	2.5	0	3.1	0	1.8	0	2.5	0	1.8
Violet-green Swallow	0	0	0.3	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	3.3
Ruby-crowned Kinglet	0	0	0.2	0.9	0	1.3	0	1	0	0.8	0.3	0.9	0.4	0.1	0	0.8	0	0.3
Common Raven	0	0	0.1	0.6	0	0.8	0	0.6	0	0.7	0	1	0	0.1	0	0.5	0	0
Orange-crowned Warbler	0	0	0.1	1.3	0	0.5	0	1	0	0.7	0	0.4	0	1.5	0	0.1	0.2	1.2
Swainson's Hawk	0	0	0.1	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.2
Turkey Vulture	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.2
Woodhouse's Scrub-jay	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peregrine Falcon	0.2	0	0	0.1	0	0.1	0	0.1	0	0	0	0.1	0	0	0	0.1	0	0.2
Blue-winged Teal	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lincoln's Sparrow	0	0	0	0.3	0	0.1	0	0.3	0	0.2	0.3	0	0	0.1	0	0.1	0	0
Pine Siskin	0	0	0	0.5	0	0.4	0	0	0	0	0.3	0	0	0.3	0	0	0	0
Western Wood-pewee	0	0	0	0	0	0	0	0	0	0	0.1	0	0.6	0.1	0	0	0	0.2
Wilson's Snipe	0	0	0	0	0	0.1	0	0	0	0.2	0.1	0	0	0	0	0	0	0
Wilson's Warbler	0	0	0	0.1	0	0	0	0	0	0	0.1	0.4	0	0.8	0	0	0	0.2
American Coot	0	16	0	3.8	0	5.3	0	11.7	0	5.7	0	6.4	0	4.3	0	12.8	0.3	7.5
Green-winged Teal	0	3	0	1	0	0.8	0	3.7	0	4.7	0	5.4	0	0.6	0	2.5	0.2	1.7
Evening Grosbeak	0	0	0	15.6	0	28.1	0	0	0	3.3	0	4.4	0	0.1	0.1	3.3	0	0.8
American Pipit	0	0	0	0.3	0	2.4	0	0.4	0	2.3	0	3.1	0	1	0.1	1.3	0	0.5
Ring-billed Gull	0	1	0	0.8	0	3.8	0	0.6	0	1.5	0	0.3	0	2.4	0	0.6	0.2	3.3
Common Goldeneye	0	3	0	0.1	0	1.8	0	1.3	0	1.3	0	1.6	0	3.9	0	3.9	0	2.8

BIG BEND

COMPLETE LIST OF BIRDS DETECTED DURING BREEDING SEASON SURVEYS (BSS) AND NON-BREEDING SEASON SURVEYS (NBS) 2013-2021

Species	Number of Observations (detections/survey)																	
	2013		2014		2015		2016		2017		2018		2019		2020		2021	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Common Merganser	0	0	0	0	0	0	0	5.4	0	1	0	0	0	2.5	0	0	0	0
Gadwall	0	4	0	0.3	0	0.4	0	2.6	0	0.8	0	3.6	0	0.88	0	4.1	0	2.2
Long-billed Curlew	0	0	0	0	0	0	0	0	0	0.7	0	0	0.2	0	0	0	0	0
Marsh Wren	0	0	0	0.1	0	0.6	0	0.1	0	0.7	0	0.3	0	0	0	0.3	0	0.2
Sharp-shinned Hawk	0	1	0	0.3	0	0.1	0	0.1	0	0.5	0	0.1	0	0.6	0	0.1	0.2	0
Chipping Sparrow	0	0	0	0	0	0.8	0	0	0	0.5	0	0.1	0	0	0	0.1	0	0.7
Pied-billed Grebe	0	0	0	0	0	3.1	0	0.4	0	0.3	0	0.6	0	0.3	0	0.3	0	0.5
Ring-necked Duck	0	0	0	0.3	0	0	0	2.6	0	0.2	0	4.3	0	0	0	1.3	0.3	5.5
Bufflehead	0	1	0	0	0	0.5	0	1	0	0.2	0	0	0	0.5	0	0.3	0	1.5
Great Egret	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Northern Harrier	0	0	0	0.3	0	0.6	0	1	0	0.2	0	0	0	0.3	0	0.1	0	0
Prairie Falcon	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0.1	0	0	0	0
Pinyon Jay	0	0	0	0.1	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Brewer's Sparrow	0	0	0	0	0	0	0	0	0	0.2	0	0.3	0	0	0	0	0	0.2
Black-crowned Night Heron	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0.2	0
Bald Eagle	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0.2
Northern Shoveler	0	0	0	0.3	0	0.1	0	4.1	0	0	0	0	0	0	0	0.4	0	0
Northern Pintail	0	0	0	0	0	0	0	1.1	0	0	0	0	0	0	0	0	0	0
Cackling Goose	0	0	0	0	0	0.3	0	0.3	0	0	0	0	0	0.1	0	0	0	0
Wood Duck	0	0	0	0	0	0.1	0	0.3	0	0	0	0	0	0	0	0	0	0
Lesser Scaup	0	1	0	0	0	0	0	0.3	0	0	0	0	0	0.1	0.1	0	0	1.8
Rufous Hummingbird	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0.1	0	0	0.3
Plumbeous Vireo	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Hermit Thrush	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1	0	0.2
Townsend's Warbler	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0
Lark Sparrow	0	0	0	0	0	0.6	0	0.1	0	0	0	0	0	0	0	0	0.2	0.3
Horned Lark	0	0	0	0.4	0	1.1	0	0	0	0	0	0.3	0	0.3	0	0	0	0.2
American Tree Sparrow	0	0	0	0	0	0.9	0	0	0	0	0	0	0	0	0	0	0	0
Canvasback	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.2
Osprey	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0.3
Sandhill Crane	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Hammond's Flycatcher	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Dusky Flycatcher	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Brown Thrasher	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
Merlin	0	0	0	0.3	0	0	0	0	0	0	0	0.1	0	0.1	0	0.3	0	0
Common Grackle	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Creeper	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Virginia's Warbler	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harris' Sparrow	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Herring Gull	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Wigeon	0	0	0	0	0	0	0	0	0	0	0	5.6	0	3.1	0	1.8	0.2	1.5
Great-tailed Grackle	0	0	0	0	0	0	0	0	0	0	0	0.6	0.6	0.1	0	0	0	0
Snowy Egret	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Varied Thrush	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0

BIG BEND

COMPLETE LIST OF BIRDS DETECTED DURING BREEDING SEASON SURVEYS (BSS) AND NON-BREEDING SEASON SURVEYS (NBS) 2013-2021

Species	Number of Observations (detections/survey)																	
	2013		2014		2015		2016		2017		2018		2019		2020		2021	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Vesper Sparrow	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0.2
Common Nighthawk	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0
Coturnix Quail	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0.8
Fox Sparrow	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0	0
Greater Yellowlegs	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.2
Mountain Bluebird	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Lapland Longspur	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Nashville Warbler	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0.2
Cinnamon Teal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	1.5
Eared Grebe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.1	0	0.2
Long-billed Dowitcher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Northern Mockingbird	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
Redhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	0.2	1

PHOTOS FROM THE FIELD



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