



COMMUNITY SCIENCE BIRD MONITORING AT BIG BEND RESTORATION AREA

2020 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 2020 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



BIRD SURVEY METHODS

Breeding season point count surveys



During May – July of 2020, 10 community scientists conducted 7 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, noted the minute during the survey (1-6) when the observation was made, 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 the site in January, February, March, August, September, October, November, and December 2020. 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.



BIRD MONITORING 2020 RESULTS

2020 SURVEY SUMMARY

During 6 breeding season surveys at Big Bend in 2020, we had 2,008 bird observations and detected 60 species. During 8 non-breeding season surveys, we had 7,758 bird observations and detected 77 species. We had a total species list of 92 species at Big Bend in 2020.



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

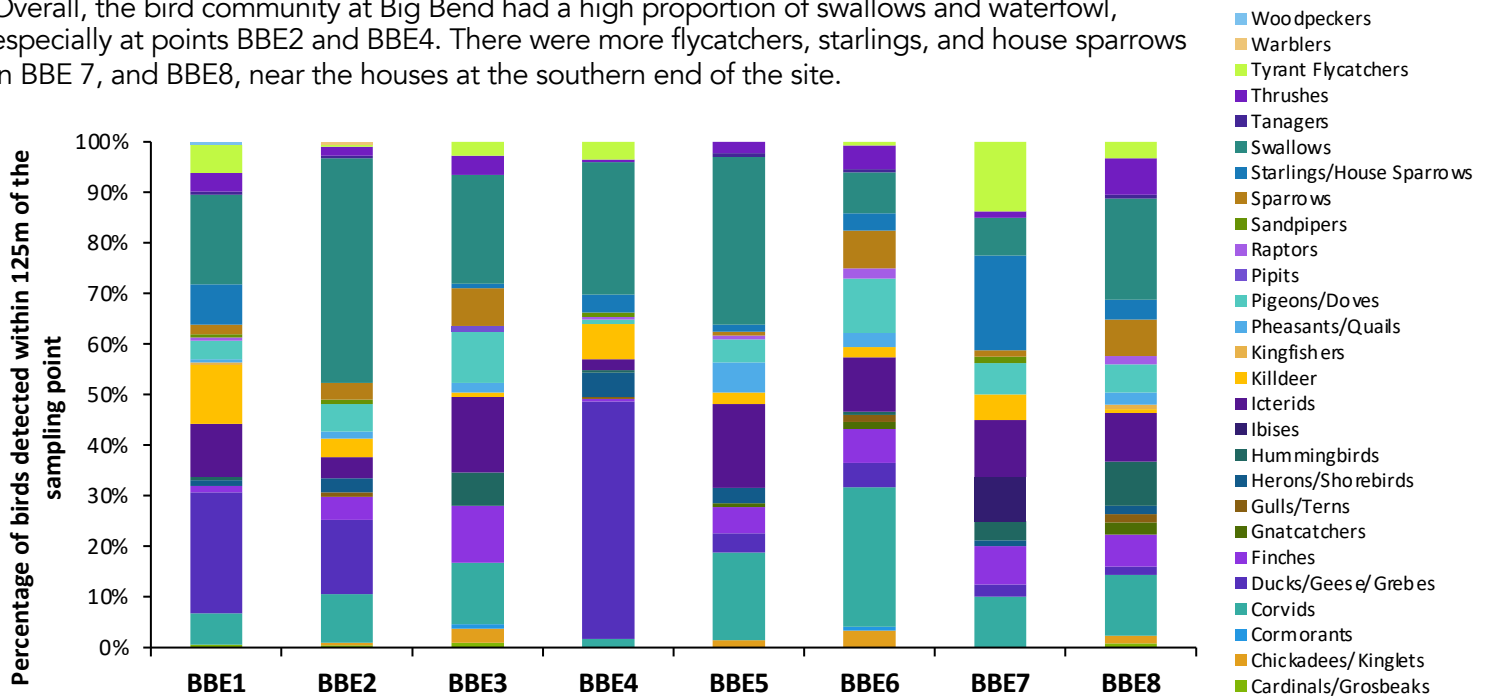
Since we began monitoring in 2013, we've detected 144 total species of birds that use habitat in the Big Bend Restoration Area.

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.

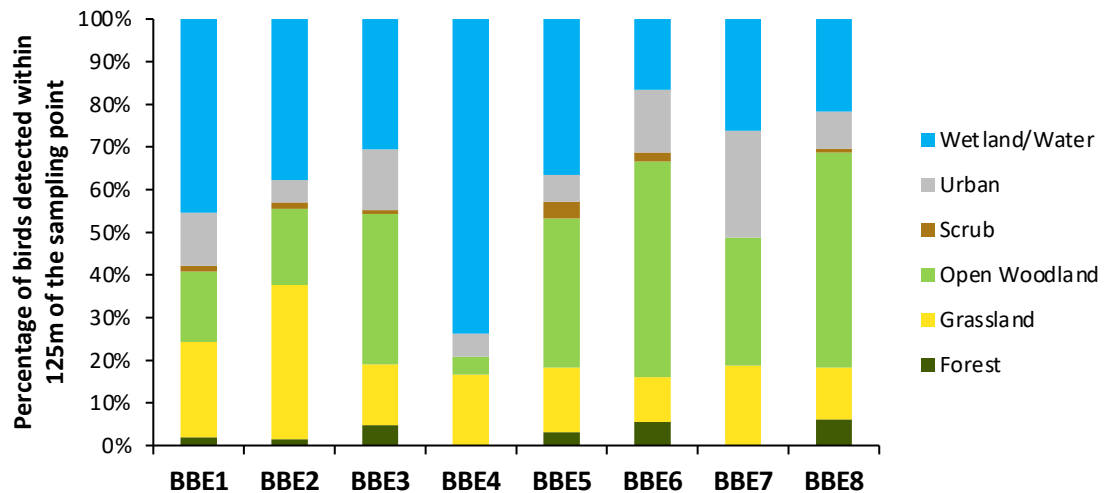
Families

Overall, the bird community at Big Bend had a high proportion of swallows and waterfowl, especially at points BBE2 and BBE4. There were more flycatchers, starlings, and house sparrows in BBE 7, and BBE8, near the houses at the southern end of the site.



Habitat Guilds

The bird community at Big Bend is dominated by wetland/water birds, and birds that rely on open woodland and grassland habitat. An especially high proportion of wetland birds were detected at BBE4, while more grassland birds were detected at BBE2.



BIRD MONITORING 2020 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.

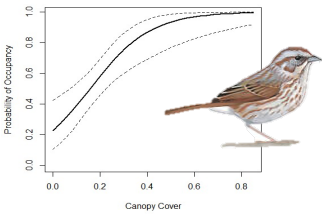
Table 1. Habitat and landscape attributes included in occupancy analysis.

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 (%)

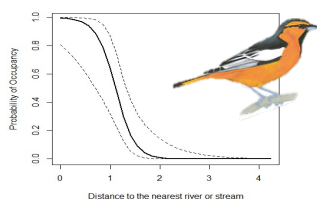
Occupancy Analysis: Species Results

Target Species

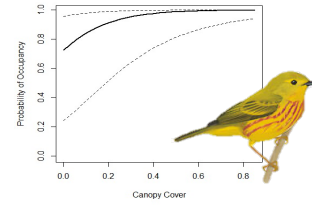
Song Sparrow habitat use increases with increasing **tree canopy cover**



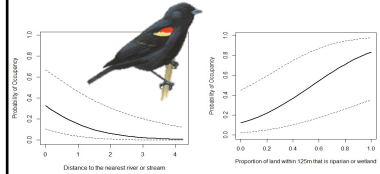
Bullock's Oriole habitat use decreases as you get further from a **river or stream**



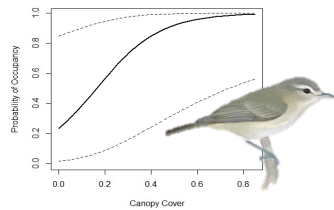
Yellow Warbler habitat use increases with increasing **tree canopy cover**



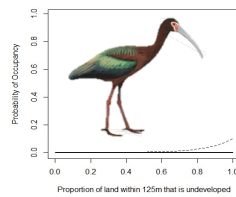
Red-winged Blackbird habitat use decreases with **distance from a river or stream**, and increases with the proportion of **riparian/wetland habitat** within 125m of the point



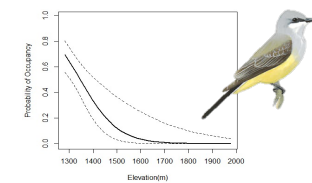
Warbling Vireo habitat use increases with increasing **tree canopy cover**



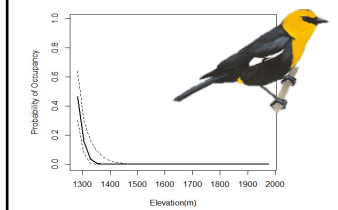
White-faced Ibis habitat use increases with the proportion of **undeveloped habitat** within 125m



Western Kingbird habitat use decreases with **distance from a river or stream**, and decreases with increasing **tree canopy cover**

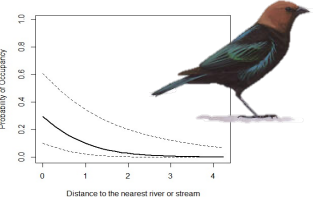


Yellow-headed Blackbird habitat use decreases with increasing **elevation**

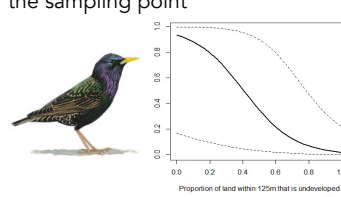


Non-target Species

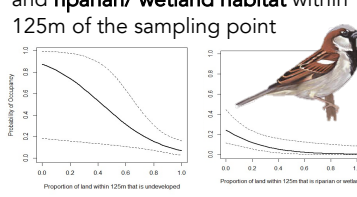
Brown-headed Cowbird habitat use decreases as you get further from a **river or stream**



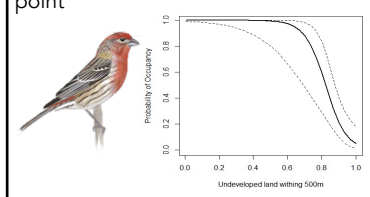
European Starling habitat use decreases with the proportion of **undeveloped habitat** within 125m of the sampling point



House Sparrow habitat use decreases with the proportion of **undeveloped habitat** within 500m and **riparian/wetland habitat** within 125m of the sampling point



House Finch habitat use decreases with the proportion of **undeveloped habitat** within 500m of the sampling point



BIRD MONITORING 2020 RESULTS

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	
	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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
Caspian Tern	0	0	0.8	0	1	0	0.7	0.3	1.3	0	0	0.3	0.4	0	1	0
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
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
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
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
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
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
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
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
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
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
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
Warbling Vireo	0	0	0	0	0	0	0	0	0.5	0	0	0.1	0.6	0.4	0	0
American Avocet	0.2	0	0	0	0	0.3	0.2	0	0.3	0	0	0	0	0	4.7	0
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
Ash-throated Flycatcher	0	0	0	0	0	0	0	0	0.2	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
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

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	
	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
Olive-sided Flycatcher	0	0	0	0	0.3	0	0	0	0.2	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
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
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
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
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
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
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
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
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
Willow Flycatcher	0	0	0	0	0	0	0.3	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
Tree Swallow	0	0	0.3	0	1	0	0	0	0	0.2	0	2.9	0	0	0.1	0.1
Common Yellowthroat	0.2	0	0.1	0	0.5	0	0	0	0	0	0	0	0	0	0	0
Forster's Tern	0	0	0.4	0	0.5	0	0	0	0	0	0	0	0.2	0	0.1	0
MacGillivray's Warbler	0	0	0	0.1	0.5	0.1	0	0.1	0	0	0	0	0	0	0	0
Blue Grosbeak	0	0	0	0	0.3	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
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
Great Horned Owl	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0.1
Savannah Sparrow	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0.1	0	0
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
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
Violet-green Swallow	0	0	0.3	0	0	0.1	0	0	0	0	0	0	0	0	0	0
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
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
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
Swainson's Hawk	0	0	0.1	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0
Turkey Vulture	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Woodhouse's Scrub-jay	0	0	0.1	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
Blue-winged Teal	0.2	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
Pine Siskin	0	0	0	0.5	0	0.4	0	0	0	0	0.3	0	0	0.3	0	0
Western Wood-pewee	0	0	0	0	0	0	0	0	0	0	0.1	0	0.6	0.1	0	0
Wilson's Snipe	0	0	0	0	0	0.1	0	0	0	0.2	0.1	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
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
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
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
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
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
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

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	
	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
Gadwall	0	4	0	0.3	0	0.4	0	2.6	0	0.8	0	3.6	0	0.88	0	4.1
Long-billed Curlew	0	0	0	0	0	0	0	0	0	0.7	0	0	0.2	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
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
Chipping Sparrow	0	0	0	0	0	0.8	0	0	0	0.5	0	0.1	0	0	0	0.1
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
Ring-necked Duck	0	0	0	0.3	0	0	0	2.6	0	0.2	0	4.3	0	0	0	1.3
Bufflehead	0	1	0	0	0	0.5	0	1	0	0.2	0	0	0	0.5	0	0.3
Great Egret	0	0	0	0	0	0	0	0	0	0.2	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
Prairie Falcon	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0.1	0	0
Pinyon Jay	0	0	0	0.1	0	0	0	0	0	0.2	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
Black-crowned Night Heron	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0
Bald Eagle	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0.1
Northern Shoveler	0	0	0	0.3	0	0.1	0	4.1	0	0	0	0	0	0	0	0.4
Northern Pintail	0	0	0	0	0	0	0	1.1	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
Wood Duck	0	0	0	0	0	0.1	0	0.3	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
Rufous Hummingbird	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0.1	0
Plumbeous Vireo	0	0	0	0	0	0	0	0.1	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
Townsend's Warbler	0	0	0	0.1	0	0	0	0.1	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
Horned Lark	0	0	0	0.4	0	1.1	0	0	0	0	0	0.3	0	0.3	0	0
American Tree Sparrow	0	0	0	0	0	0.9	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
Osprey	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0
Sandhill Crane	0	0	0	0	0	0.1	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
Dusky Flycatcher	0	0	0	0	0	0.1	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
Merlin	0	0	0	0.3	0	0	0	0	0	0	0	0.1	0	0.1	0	0.3
Common Grackle	0	0	0	0.3	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
Virginia's Warbler	0	0	0	0.1	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
Herring Gull	0	1	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
Great-tailed Grackle	0	0	0	0	0	0	0	0	0	0	0	0.6	0.6	0.1	0	0
Snowy Egret	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0
Varied Thrush	0	0	0	0	0	0	0	0	0	0	0	0.1	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	
	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
Common Nighthawk	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
Coturnix Quail	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
Fox Sparrow	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0
Greater Yellowlegs	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Mountain Bluebird	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Lapland Longspur	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Nashville Warbler	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0
Cinnamon Teal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0
Eared Grebe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.1
Long-billed Dowitcher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1
Redhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1

Acknowledgements: We'd like to thank the extremely dedicated team of volunteers from Tracy Aviary's Community Science Program who braved early mornings and long hours to collect these data. Thanks also to the Big Bend project partners.

