

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. Since 2013, Tracy Aviary has conducted a community science bird monitoring project in Big Bend Restoration Area. Here, we summarize results from our 2019 field season.

Breeding season point count surveys:

During May – July of 2019, 8 community scientists conducted 5 breeding season point count surveys at Big Bend (Figure 2). Point count surveys were conducted by pairs of community scientists between dawn and 10am. The ‘observer’ identified all birds seen and heard during a 6-minute period, 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 8 non-breeding group surveys conducted at each site in January, February, March, August, September, October, November, and December 2019. 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.

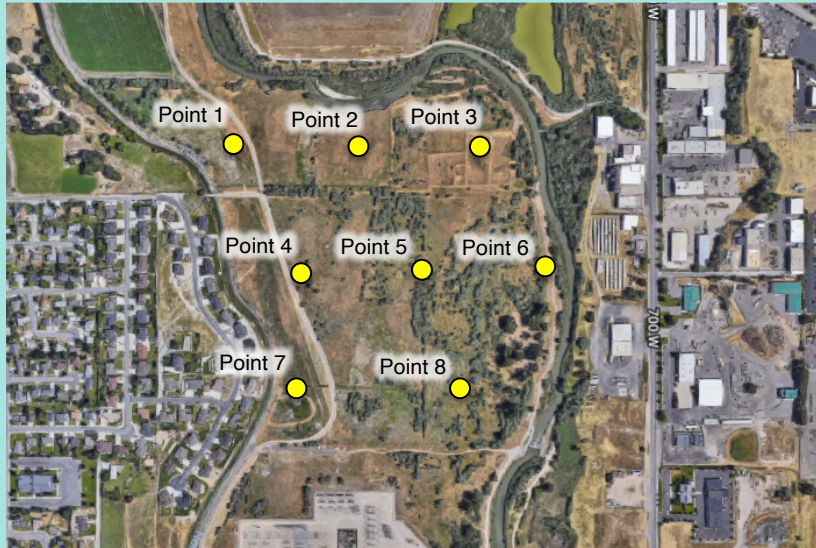


Figure 1. Map of bird sampling points at Big Bend.



Figure 2. Tracy Aviary community scientists conducting breeding season (top) and non-breeding season (bottom) bird surveys.

2019 RESULTS

During 5 breeding season surveys at Big Bend, we had 1,090 bird observations and detected 57 species (Figure 3, 4). During 8 non-breeding season surveys, we had 11,495 bird observations and detected 82 species. 12 species were detected only during the breeding season, and 37 species were detected only in the non-breeding season, for a total list of 94 species at Big Bend in 2019.

We’ve detected a total of 140 bird species at Big Bend between 2013 and 2019 (complete list, pages 5 – 8).

BIG BEND RESTORATION AREA 2019 RESULTS

Bird Detections of Different Families and Habitat Guilds at Big Bend

To determine which birds are using Big Bend, we used point count data to calculate the relative abundance, or total number of observations per survey, of each species. To explore patterns of species occurrence across the landscape, we separated species into family groups and habitat guilds, and noted how many observations of each we had within 125m of each sampling point. Similar to previous years, we had high numbers of swallows at point 2, which is near a Bank Swallow and Northern Rough-winged Swallow colony in the river bank. The points near houses and the power station (1,4,7, and 8) had high proportions of urban-adapted birds, mainly from high numbers of European Starlings.

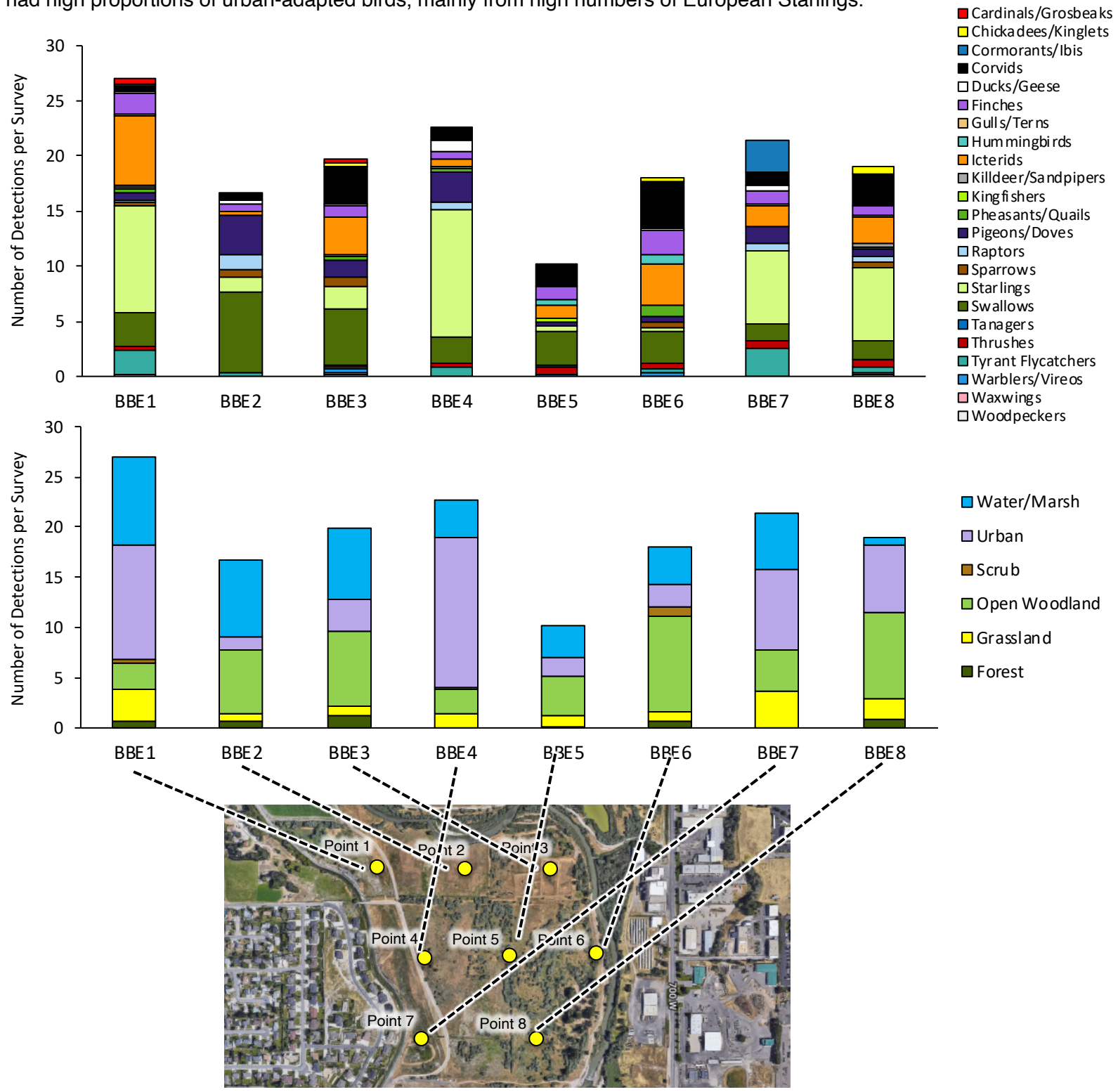


Figure 3. Number of birds from different families (top) and habitat guilds (bottom) detected during 2019 breeding season surveys at Big Bend, and a map of sampling point locations at Big Bend

BIG BEND RESTORATION AREA 2019 RESULTS

Species of Conservation Concern

Since we began monitoring the site, we have documented several bird species of local conservation interest at Big Bend:

Utah Wildlife Action Plan (2015-2025)

Species of Greatest Conservation Need:

- ✓ American White Pelican
- ✓ Bald Eagle
- ✓ Caspian Tern
- ✓ Peregrine Falcon
- ✓ White-faced Ibis

US Fish and Wildlife Service BCR9 Birds of Conservation Concern:

- ✓ Bald Eagle
- ✓ Peregrine Falcon
- ✓ Long-billed Curlew
- ✓ Brewer's Sparrow
- ✓ Willow Flycatcher
- ✓ Pinyon Jay
- ✓ Virginia's Warbler

Utah Partners in Flight Avian Conservation Strategy Species:

- ✓ American Avocet
- ✓ American White Pelican
- ✓ Brewer's Sparrow
- ✓ Broad-tailed Hummingbird
- ✓ Long-billed Curlew
- ✓ Virginia's Warbler

US Fish and Wildlife Service BCR16 Birds of Conservation Concern:

- ✓ Bald Eagle
- ✓ Peregrine Falcon
- ✓ Prairie Falcon
- ✓ Brewer's Sparrow
- ✓ Long-billed Curlew
- ✓ Willow Flycatcher
- ✓ Pinyon Jay

Images from Audubon.org

Comparison to other Jordan River Sites

We compared the bird community at Big Bend with a sample of 6 other sites that we monitor along the Jordan River (Figure 5). These sites contain 32 sampling points located within lowland riparian habitat surrounding the river. We compiled data from 2019 breeding season surveys at all sites between April and July 2019. We classified bird species in three different ways. First we determined whether they were native or non-native to the area. Second, we classified them as urban-adapted or urban-neutral/urban-avoider based on classification developed by Wood et al. (2014). Finally, we classified them according to their association with riparian vegetation; species were classified as riparian-associated when >60% of nests/abundance are in riparian vegetation (Bureau of Land Management 1998, Young et al. 2013). For each survey, we calculated the number of species of each group that were detected within 125m of the sampling point. We used an independent samples t-test to test for significant differences between the proportion of non—native species, urban-adapted species, and riparian-associated species detected in Big Bend and other Jordan River comparison sites.

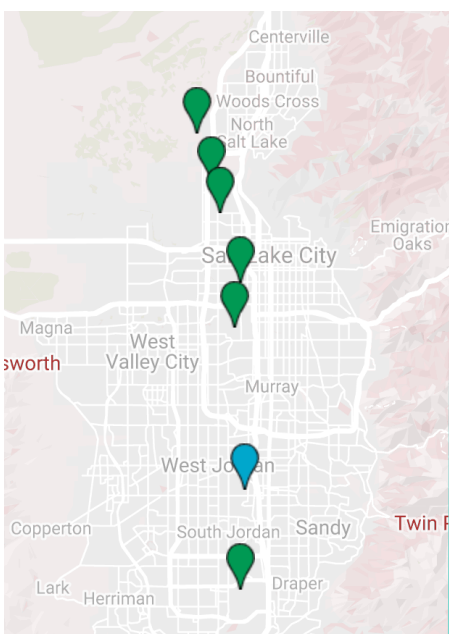


Figure 5. Map of the location of Big Bend (blue) and other study areas used as Jordan River Comparison sites (green).

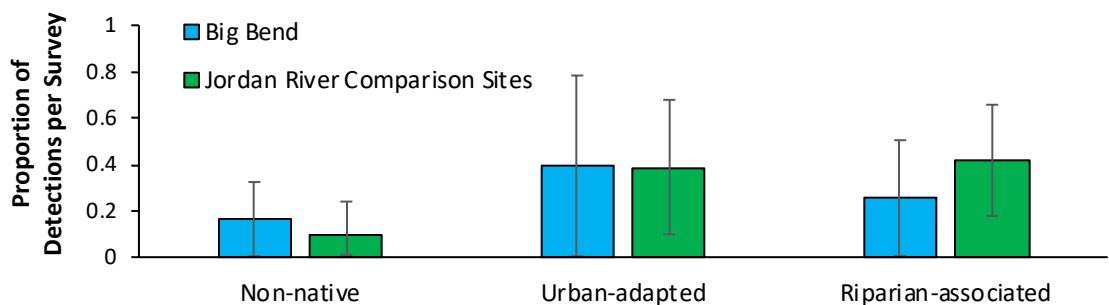


Figure 6. Average proportion and standard deviation of detections of non-native, urban-adapted, and riparian-associated birds at Big Bend (blue) and Jordan River Comparison sites (green).

Big Bend had a slightly higher proportion of detections per survey of non-native species than other Jordan River Comparison sites, and a slightly higher proportion of urban-adapted species. However, these trends were not statistically significant (independent samples t-tests, $p > 0.05$). Big Bend had a significantly smaller proportion of riparian-associated species than comparison sites ($t = -3.64$, $p < 0.005$). After restoration has taken place at Big Bend, we will analyze how the bird community changes from this baseline. If restoration activities effectively enhance the ecological value of the site, over time we would expect to see a shift in the bird community to contain fewer non-native and urban-adapted birds, and more riparian-associated birds.

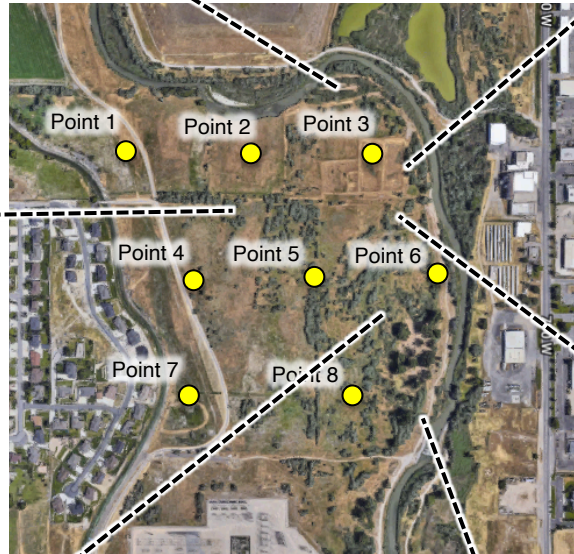
BIG BEND RESTORATION AREA

FUTURE RESTORATION AND MANAGEMENT RECOMMENDATIONS

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.

No tree removal or thinning activities should take place during the breeding and nesting season (April – July).

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.



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.

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.

BIG BEND

COMPLETE LIST OF BIRDS DETECTED DURING BREEDING SEASON SURVEYS (BSS) AND NON-BREEDING SEASON SURVEYS (NBS) 2013-2019

| Species | Number of Observations (detections/survey) | | | | | | | | | | | | | |
|-------------------------------|--|-----|------|-------|------|-------|------|-------|------|------|------|-------|------|-------|
| | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | |
| | 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| Brown-headed Cowbird | 2 | 0 | 1.8 | 0 | 4.8 | 0 | 3.5 | 0 | 2.5 | 0 | 4.4 | 0 | 2.2 | 1.3 |
| Cliff Swallow | 0.4 | 0 | 6.2 | 0 | 0 | 0 | 0.3 | 0 | 2.5 | 0 | 1.1 | 0.1 | 1.4 | 0.1 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| Caspian Tern | 0 | 0 | 0.8 | 0 | 1 | 0 | 0.7 | 0.3 | 1.3 | 0 | 0 | 0.3 | 0.4 | 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 |
| 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 |
| American White Pelican | 1.4 | 0 | 2.6 | 0 | 6 | 0.5 | 1.3 | 0 | 1.2 | 0 | 1.9 | 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 |
| 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 |
| Bank Swallow | 6 | 0 | 2.6 | 0 | 7 | 0.1 | 2.8 | 0.9 | 1 | 0 | 1.9 | 0.3 | 13.4 | 2.6 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| Warbling Vireo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0 | 0 | 0.1 | 0.6 | 0.4 |
| American Avocet | 0.2 | 0 | 0 | 0 | 0 | 0.3 | 0.2 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 |
| American Crow | 0 | 0 | 0 | 0.3 | 0 | 0.1 | 0 | 0 | 0.2 | 1 | 0.3 | 1.4 | 0 | 3.1 |
| Ash-throated Flycatcher | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 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 |
| Broad-tailed Hummingbird | 0.2 | 0 | 0.2 | 0 | 0 | 0.1 | 0 | 0.9 | 0.2 | 0 | 0 | 0 | 0 | 0 |

BIG BEND

COMPLETE LIST OF BIRDS DETECTED DURING BREEDING SEASON SURVEYS (BSS) AND NON-BREEDING SEASON SURVEYS (NBS) 2013-2019

| Species | Number of Observations (detections/survey) | | | | | | | | | | | | | |
|------------------------|--|-----|------|------|------|------|------|------|------|------|------|-----|------|------|
| | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | |
| | 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 |
| Olive-sided Flycatcher | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0.2 | 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 |
| 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 |
| 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 |
| 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 |
| Lazuli Bunting | 0 | 0 | 0 | 0 | 1.5 | 0.4 | 1.3 | 0.1 | 0 | 1.2 | 0 | 0.1 | 0 | 0.5 |
| House Sparrow | 1 | 10 | 1 | 3.5 | 2.8 | 1.9 | 1 | 1.6 | 0 | 1.3 | 0.3 | 0.4 | 0 | 3.9 |
| Downy Woodpecker | 0 | 0 | 0.2 | 0.8 | 0 | 0.4 | 0.5 | 0 | 0 | 0.3 | 0 | 0.7 | 0.4 | 0.9 |
| 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 |
| 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 |
| Willow Flycatcher | 0 | 0 | 0 | 0 | 0 | 0 | 0.3 | 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 |
| Tree Swallow | 0 | 0 | 0.3 | 0 | 1 | 0 | 0 | 0 | 0 | 0.2 | 0 | 2.9 | 0 | 0 |
| Common Yellowthroat | 0.2 | 0 | 0.1 | 0 | 0.5 | 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 |
| MacGillivray's Warbler | 0 | 0 | 0 | 0.1 | 0.5 | 0.1 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Blue Grosbeak | 0 | 0 | 0 | 0 | 0.3 | 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 |
| Dark-eyed Junco | 0 | 2 | 0 | 2.8 | 0.3 | 3.1 | 0 | 3 | 0 | 8.5 | 0 | 2.9 | 0 | 4.9 |
| Great Horned Owl | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Savannah Sparrow | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| 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 |
| Spotted Towhee | 0.2 | 2 | 0.4 | 1.5 | 0 | 1.9 | 0 | 0.6 | 0 | 2.5 | 0 | 3.1 | 0 | 1.8 |
| Violet-green Swallow | 0 | 0 | 0.3 | 0 | 0 | 0.1 | 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 |
| Common Raven | 0 | 0 | 0.1 | 0.6 | 0 | 0.8 | 0 | 0.6 | 0 | 0.7 | 0 | 1 | 0 | 0.1 |
| Orange-crowned Warbler | 0 | 0 | 0.1 | 1.3 | 0 | 0.5 | 0 | 1 | 0 | 0.7 | 0 | 0.4 | 0 | 1.5 |
| Swainson's Hawk | 0 | 0 | 0.1 | 0.1 | 0 | 0.1 | 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 |
| Woodhouse's Scrub-jay | 0 | 0 | 0.1 | 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 |
| Blue-winged Teal | 0.2 | 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 |
| Pine Siskin | 0 | 0 | 0 | 0.5 | 0 | 0.4 | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0.3 |
| Western Wood-pewee | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.6 | 0.1 |
| Wilson's Snipe | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0.2 | 0.1 | 0 | 0 | 0 |
| Wilson's Warbler | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0.4 | 0 | 0.8 |
| American Coot | 0 | 16 | 0 | 3.8 | 0 | 5.3 | 0 | 11.7 | 0 | 5.7 | 0 | 6.4 | 0 | 4.3 |
| Green-winged Teal | 0 | 3 | 0 | 1 | 0 | 0.8 | 0 | 3.7 | 0 | 4.7 | 0 | 5.4 | 0 | 0.6 |
| Evening Grosbeak | 0 | 0 | 0 | 15.6 | 0 | 28.1 | 0 | 0 | 0 | 3.3 | 0 | 4.4 | 0 | 0.1 |
| American Pipit | 0 | 0 | 0 | 0.3 | 0 | 2.4 | 0 | 0.4 | 0 | 2.3 | 0 | 3.1 | 0 | 1 |
| Ring-billed Gull | 0 | 1 | 0 | 0.8 | 0 | 3.8 | 0 | 0.6 | 0 | 1.5 | 0 | 0.3 | 0 | 2.4 |
| Common Goldeneye | 0 | 3 | 0 | 0.1 | 0 | 1.8 | 0 | 1.3 | 0 | 1.3 | 0 | 1.6 | 0 | 3.9 |

BIG BEND

COMPLETE LIST OF BIRDS DETECTED DURING BREEDING SEASON SURVEYS (BSS) AND NON-BREEDING SEASON SURVEYS (NBS) 2013-2019

| Species | Number of Observations (detections/survey) | | | | | | | | | | | | | |
|---------------------------|--|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|------|
| | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | |
| | 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 |
| Gadwall | 0 | 4 | 0 | 0.3 | 0 | 0.4 | 0 | 2.6 | 0 | 0.8 | 0 | 3.6 | 0 | 0.88 |
| Long-billed Curlew | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.7 | 0 | 0 | 0.2 | 0 |
| Marsh Wren | 0 | 0 | 0 | 0.1 | 0 | 0.6 | 0 | 0.1 | 0 | 0.7 | 0 | 0.3 | 0 | 0 |
| Sharp-shinned Hawk | 0 | 1 | 0 | 0.3 | 0 | 0.1 | 0 | 0.1 | 0 | 0.5 | 0 | 0.1 | 0 | 0.6 |
| Chipping Sparrow | 0 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0 | 0.5 | 0 | 0.1 | 0 | 0 |
| Pied-billed Grebe | 0 | 0 | 0 | 0 | 0 | 3.1 | 0 | 0.4 | 0 | 0.3 | 0 | 0.6 | 0 | 0.3 |
| Ring-necked Duck | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 2.6 | 0 | 0.2 | 0 | 4.3 | 0 | 0 |
| Bufflehead | 0 | 1 | 0 | 0 | 0 | 0.5 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 0.5 |
| Great Egret | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 |
| Northern Harrier | 0 | 0 | 0 | 0.3 | 0 | 0.6 | 0 | 1 | 0 | 0.2 | 0 | 0 | 0 | 0.3 |
| Prairie Falcon | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0.1 | 0 | 0.1 |
| Pinyon Jay | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 | 0 | 0 |
| Brewer's Sparrow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0.3 | 0 | 0 |
| Black-crowned Night Heron | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bald Eagle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northern Shoveler | 0 | 0 | 0 | 0.3 | 0 | 0.1 | 0 | 4.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Northern Pintail | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.1 | 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 |
| Wood Duck | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lesser Scaup | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Rufous Hummingbird | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Plumbeous Vireo | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hermit Thrush | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Townsend's Warbler | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lark Sparrow | 0 | 0 | 0 | 0 | 0 | 0.6 | 0 | 0.1 | 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 |
| American Tree Swallow | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Canvasback | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 |
| Sandhill Crane | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 |
| Dusky Flycatcher | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 |
| Merlin | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.1 |
| Common Grackle | 0 | 0 | 0 | 0.3 | 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 |
| Virginia's Warbler | 0 | 0 | 0 | 0.1 | 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 |
| Herring Gull | 0 | 1 | 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 |
| Great-tailed Grackle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 0.6 | 0.1 |
| Snowy Egret | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 |
| Varied Thrush | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 |
| Vesper Sparrow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 |

BIG BEND

COMPLETE LIST OF BIRDS DETECTED DURING BREEDING SEASON SURVEYS (BSS) AND NON-BREEDING SEASON SURVEYS (NBS) 2013-2019

| Species | Number of Observations (detections/survey) | | | | | | | | | | | | | |
|-----------------------|--|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|
| | 2013 | | 2014 | | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | |
| | BSS | NBS | BSS | NBS | BSS | NBS | BSS | NBS | BSS | NBS | BSS | NBS | BSS | NBS |
| Hermit Thrush | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Townsend's Warbler | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lark Sparrow | 0 | 0 | 0 | 0 | 0 | 0.6 | 0 | 0.1 | 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 |
| American Tree Swallow | 0 | 0 | 0 | 0 | 0 | 0.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Canvasback | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 |
| Sandhill Crane | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 |
| Dusky Flycatcher | 0 | 0 | 0 | 0 | 0 | 0.1 | 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 |
| Merlin | 0 | 0 | 0 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0.1 |
| Common Grackle | 0 | 0 | 0 | 0.3 | 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 |
| Virginia's Warbler | 0 | 0 | 0 | 0.1 | 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 |
| Herring Gull | 0 | 1 | 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 |
| Great-tailed Grackle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.6 | 0.6 | 0.1 |
| Snowy Egret | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 |
| Varied Thrush | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 |
| Vesper Sparrow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 | 0 | 0 |
| Common Nighthawk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| Coturnix Quail | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| Fox Sparrow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 |
| Greater Yellowlegs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Mountain Bluebird | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Lapland Longspur | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |
| Nashville Warbler | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.1 |

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