

Community Science Bird Monitoring at MILL CREEK CONFLUENCE

2022 Project Report



PROJECT OVERVIEW

The Mill Creek Confluence is an 8-acre property in South Salt Lake, UT, located where Mill Creek flows into the Jordan River. In partnership with the Jordan River Commission, South Salt Lake, and Salt Lake County, Seven Canyons Trust is conducting ongoing restoration work at the site. In the spring of 2017, Tracy Aviary began a community science bird monitoring study at the Mill Creek Confluence to investigate the bird community of the site. Here, we summarize results from our 2022 bird monitoring field season.

STUDY SITES

We generated 5 sampling points across Mill Creek Confluence 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.

Bird Monitoring Sites



BIRD SURVEY METHODS



Breeding Season Point Count Surveys

During April – July of 2022, 7 community scientists and Tracy Aviary staff conducted 5 breeding season point count surveys at the Mill Creek Confluence. 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, February, March, August, September, October, November, and December 2022. 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.

2022 BIRD MONITORING RESULTS

5 Breeding Season Surveys

- 982 bird observations
- 51 species

8 Non-breeding Surveys

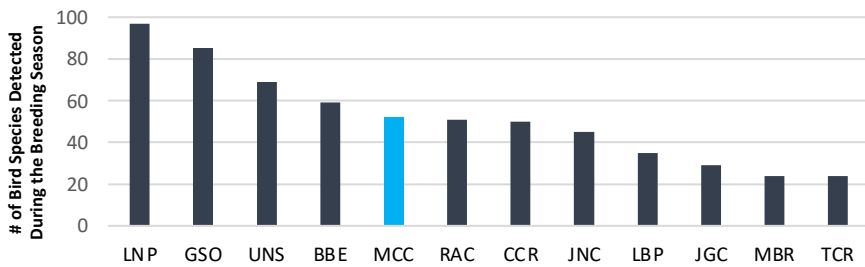
- 3,178 bird observations
- 64 species

80 total bird species were detected at Mill Creek Confluence in 2022

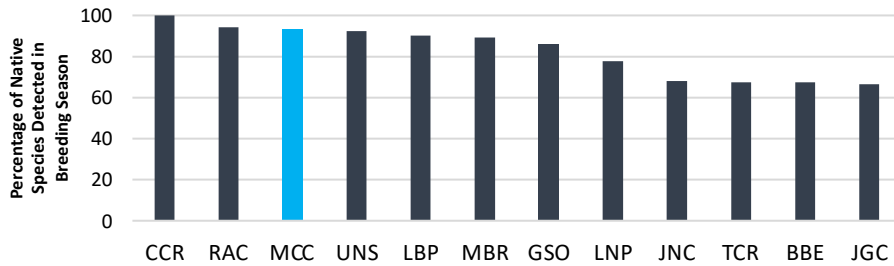
Comparison to Other Sites Along the Jordan River

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

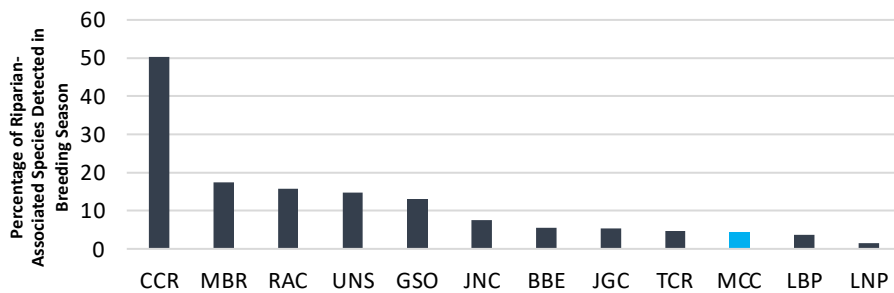
Species Richness



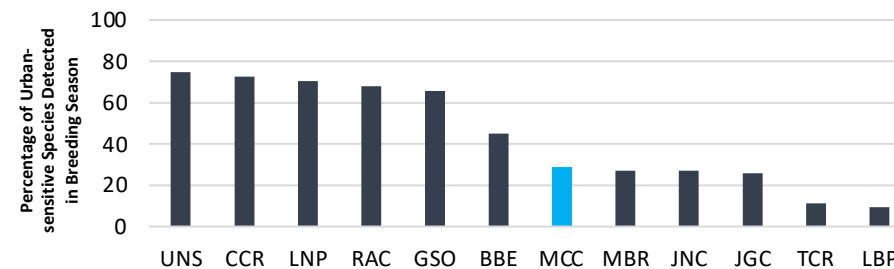
Native Bird Species



Riparian-associated Bird Species



Urban-sensitive Bird Species

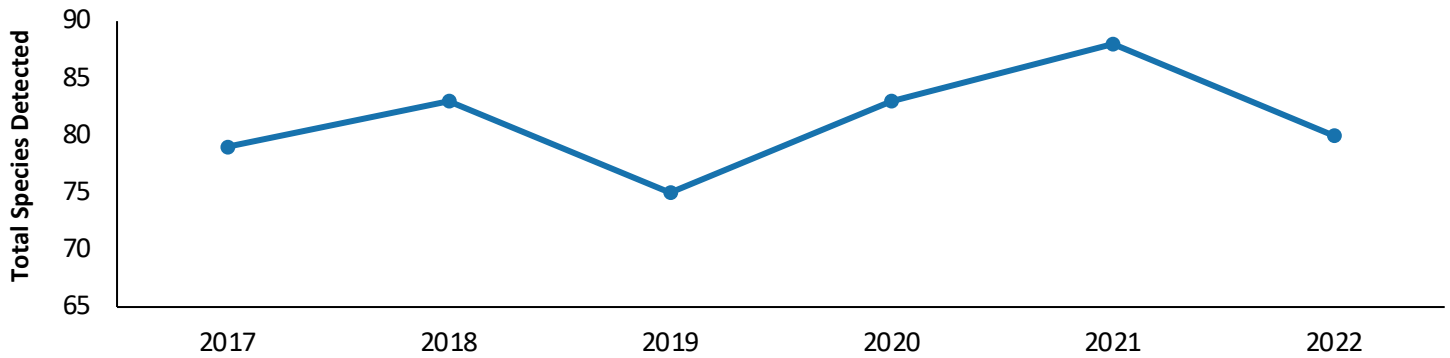


2022 BIRD MONITORING RESULTS

Trends Over Time

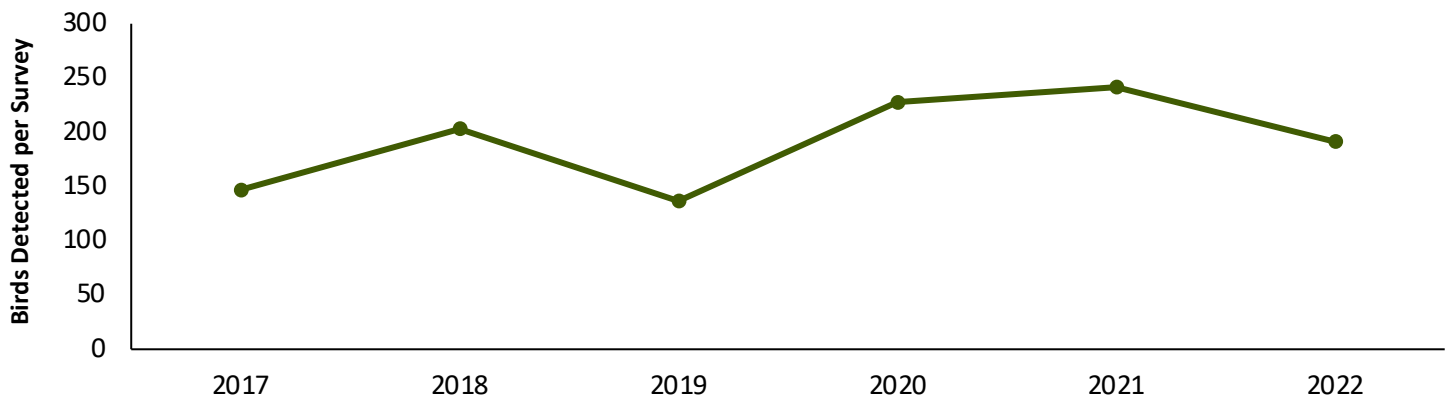
We measured trends in bird habitat use at the site over our bird monitoring period by examining changes in breeding season and non-breeding season species richness (number of bird species detected), and breeding season relative abundance (detections per survey) for several species of interest.

Species Richness

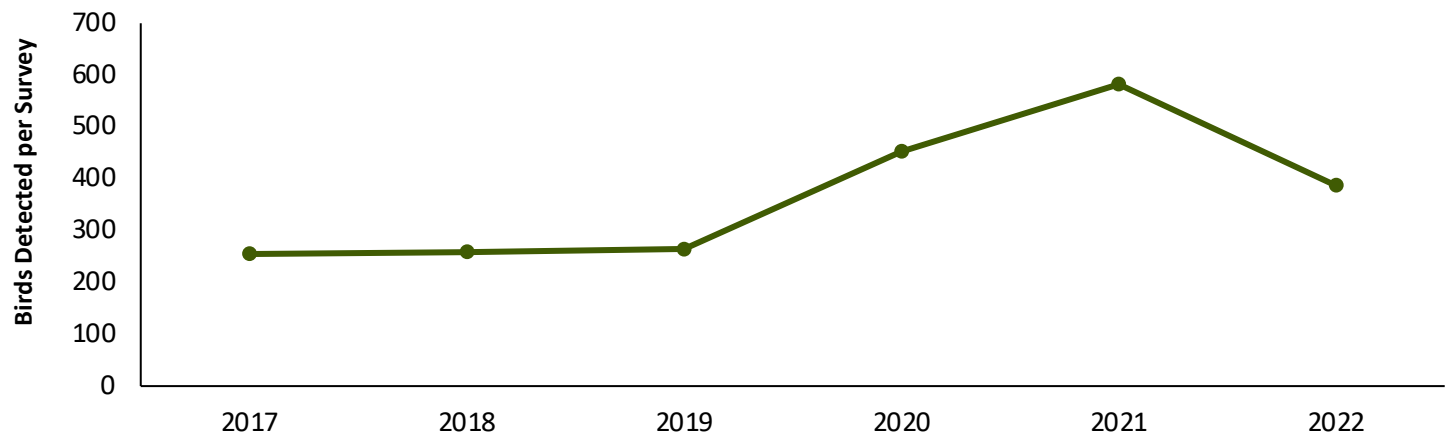


Relative Abundance

Breeding Season (April – July)



Non-breeding Season (August – March)



2022 BIRD MONITORING RESULTS

Bird Habitat Use Patterns Throughout the Jordan River

We use breeding season data to help understand 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 multi-season occupancy modeling analysis using bird survey data from 2013-2022 identified the most important factors influencing habitat use by three target riparian-associated and three urban-associated species across our bird monitoring sites. Our analysis examined which habitat attributes (Table 1) influenced the probability that these species would use an area within our sampling sites, or locally colonize or go extinct from an area.

Occupancy Analysis: Species Results

Canopy Cover was found to be an important factor for habitat use by Song Sparrows. They were more likely to occupy and less likely to go locally extinct from areas with higher canopy cover. Bullock's Orioles were more likely to occupy areas with more herbaceous vegetation, and were more likely to locally colonize areas with greater shrub cover. **These results highlight the importance of maintaining and enhancing vertical structure, including canopy trees, shrubs, and herbaceous plants on the ground.**

Distance to River was found to be an important factor for habitat use by all of the target species examined. All species had decreased habitat use as distance from river increased, and Yellow Warblers were also less likely to locally colonize areas further from the river. **This finding highlights the importance of enhancing habitat directly surrounding the river.**

Urban-associated species such as House Finches and House Sparrows were less likely to use habitat with a greater **Buffer Distance** to the developed area, and House Sparrows were more likely to go locally extinct from areas further from development. This finding highlights the importance of providing a large area of protected space that can buffer sites from development, and decrease use by non-target urban-adapted species.

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

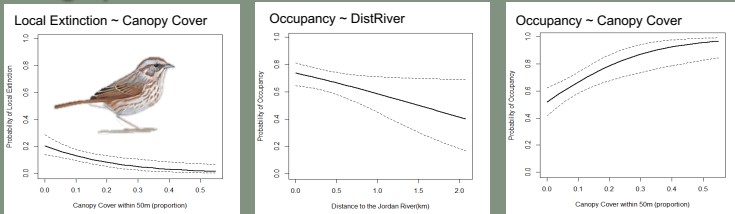
Variable	Measurement (unit)
Canopy Cover	Tree canopy cover within 50m (%)
Canopy Lost*	Decrease in canopy cover from first to last year of monitoring
Shrub Cover	Shrub cover within 50m (%)
Shrub Lost*	Decrease in shrub cover from first to last year of monitoring
Herb Cover	Herbaceous cover within 50m (%)
Water Cover	Cover of water within 50m (%)
Native Canopy	Cover of native canopy trees within 50m
DistRiver	Distance to the river or stream (km)
Riparian125	Riparian or wetland habitat within 125m (%)
Buffer	Buffer distance to nearest developed area (km)

*Variable only included as covariate for local extinction or colonization parameters

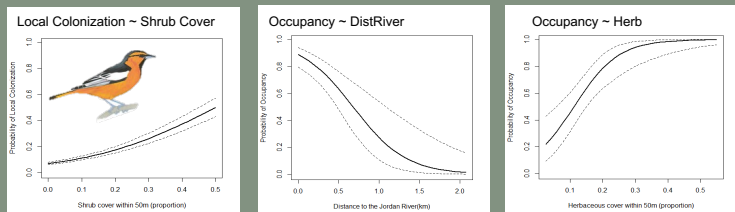
Riparian-Associated Birds

Habitat Relationship Graphs

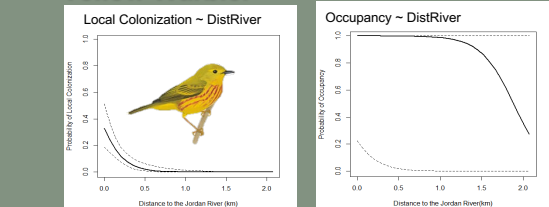
Song Sparrow



Bullock's Oriole



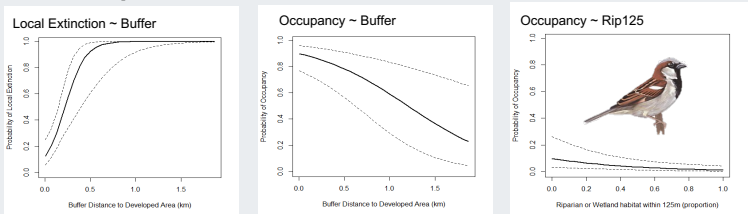
Yellow Warbler



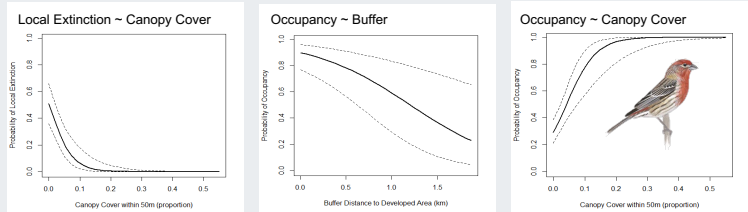
Urban-Associated Birds

Habitat Relationship Graphs

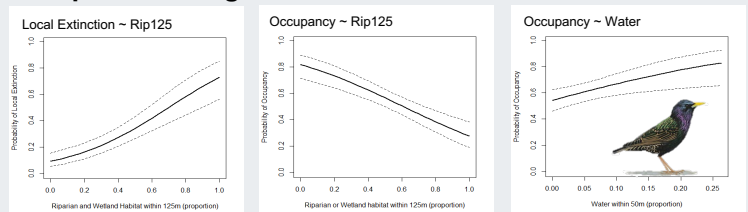
House Sparrow



House Finch



European Starling



RECOMMENDATIONS TO ENHANCE AND PRESERVE BIRD HABITAT

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.

Avoid spraying and mowing. of the northern levee section, especially during the nesting season (April – July); several shorebird species were observed nesting in this area.

Promote vertical structure and canopy cover throughout the site by protecting existing trees/shrubs and/or replacing trees that are removed. This will enhance habitat for riparian-associated birds such as warblers, flycatchers, and orioles.

Keep dogs on leash and discourage use of site by cats. These domestic animals can cause direct mortalities or disturbance to birds.

Maintain standing dead trees to provide habitat for cavity-nesting species. Avoid complete removal if possible; cutting them to a height of 10ft can mitigate safety concerns while still providing cavities.

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.

Improve water quality in the river to support healthy aquatic invertebrate communities.

Add and enhance wetland and ephemeral water elements. Ephemeral water components and additional wetland vegetation will create high quality habitat for species such as Red-winged and Yellow-headed Blackbirds, Virginia Rails and Sora, Marsh Wrens, and Common Yellowthroats.



BIRD MONITORING AT MILL CREEK CONFLUENCE

Complete List of Birds Detected during Breeding Season (BSS) and Non-breeding Season (NBS) Surveys

Species	Number of Observations (detections/survey)											
	2017		2018		2019		2020		2021		2022	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
American Avocet	2	0.8	3.43	0.6	0.4	1	2	0.43	1.78	0	0	0
American Coot	0.5	20.6	1.86	17.2	1.4	20.25	1.83	21.29	0.56	30	1.6	20.75
American Crow	0	1.6	0	1	0	0.13	0	0.29	0	2.63	0	0.63
American Goldfinch	0.25	0.8	0.29	1.4	0	1.63	0.17	1.14	0.22	9	0.4	1.5
American Kestrel	0.25	0.6	0.14	1	0.2	0.63	0	2.29	0.78	2.13	1.2	2
American Pipit	0	3.2	0	1.2	0	1.75	0	0.57	0	1.63	0	0.63
American Robin	3.25	8.8	3.14	3.2	6.6	7.13	5.17	5.29	3.33	8.13	4.4	5.38
American White Pelican	0.25	0	0.86	0	0.4	0.25	1.67	0	0.33	0	0.2	0
American Wigeon	0	0.2	0	0.8	0	0.5	0	1.14	0	1.75	0	1.38
Bald Eagle	0	0	0	0.4	0	0	0	0	0	0	0	0
Barrow's Goldeneye	0	0	0	0	0	0	0	0	0	0	0	1.63
Bank Swallow	0.25	0.2	18.43	0.2	37	0.13	21	0.29	6	0	3.4	0
Barn Swallow	1.75	4.8	3.86	4.2	1.2	2	2.33	6.43	3.11	1.5	2.2	0
Belted Kingfisher	1	2	0.71	1.4	1.4	0.25	0.83	1	1.44	1	0.6	0.88
Black-billed Magpie	6.5	3.8	6.29	3.8	4.8	2.13	4	3	1.67	3.25	2.6	2.88
Black-capped Chickadee	0.25	0.6	0.29	1.2	0	0.25	0.33	0.86	0.11	0.88	0.8	0.63
Black-chinned Hummingbird	0.25	1	0.14	2.2	0.4	0.25	0.17	0.71	0.22	0.38	0.4	0.75
Black-crowned Night Heron	1.5	0	0.43	0.2	0	0.38	0.5	0.43	0	0.38	0.8	0
Black-headed Grosbeak	0	0	0.43	0	0	0	0.67	0	0.44	0	0	0
Black-necked Stilt	0	0.2	0	0	0	0	0	0	0.11	0	0	0
Blue-gray Gnatcatcher	0	0.4	0	0.2	0	0	0	0.43	0	0.13	0	0.13
Brewer's Blackbird	0.75	0.2	2	25.4	0.8	9.38	2.17	4	0.44	10.25	0	8
Brewer's Sparrow	0	0	0	0.2	0	0	0	0.71	0.67	0.25	0	0
Broad-tailed Hummingbird	0	0	0	0	0	0.13	0	0	0	0	0	0
Brown-headed Cowbird	1	0	1.43	0	2	0	1.83	0.14	1.67	0	2.4	0
Bufflehead	0	1.4	0	1.6	0	1.13	0	1.14	0	1	0.4	2.13
Bullock's Oriole	1.25	0	3	0	3	0	2.33	0.14	3.33	0	1.8	0
Cackling Goose	0	0	0	0	0	0	0	0.14	0	0.25	0	0
California Gull	1.75	10.4	3.43	7	3.6	14.5	2.5	27.14	2.56	17.38	1	3.38
California Quail	0.5	0	0.14	0.4	0.8	0.13	0	0	0.11	0	0.2	0
Canada Goose	58.5	33.8	65.71	48.2	12	42.88	89.17	80.29	92.56	74.88	82.2	83.88
Canvasback	0	0	0	0	0.4	0	0	0	0	0	0	0
Caspian Tern	0	0	0	0	0.6	0	0	0	0.33	0	0.2	0
Cedar Waxwing	0	0.6	0	0.2	0	0	0.17	0.29	0	1	0.2	0.25
Chipping Sparrow	0	0.2	0	0	0	0.13	0	0.57	0	0	0.2	0
Cinnamon Teal	0	0	0.29	0.6	0	1.25	2.83	0.71	1	1.25	0	0.75
Cliff Swallow	7	0	2.28	0	0.6	0	0.83	0	2.44	0	1.2	0
Common Goldeneye	0	5.8	0	1.8	0	6.88	0	5	0	6.63	0	6.38
Common Raven	0.25	0	0	0	0	0	0	0.14	0	0.13	0	0.13
Common Yellowthroat	0.5	0	0.43	0	0	0	0.67	0	0.11	0	0.8	0
Cooper's Hawk	0	0	0	0.2	0	0	0	0	0.11	0.13	0	0
Cordilleran Flycatcher	0	0.2	0	0	0	0	0	0	0	0	0	0
Dark-eyed Junco	0	1.2	0	0	0	0.38	0	2.29	0	0.88	0.2	1
Double-crested Cormorant	0	0.2	0.86	0.8	0.8	0.25	1	0.57	0.56	1.13	0.8	0

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Downy Woodpecker	0.5	0.8	0	0	0	0.25	0.33	0.29	0.11	0.13	0.2	0.13
Eared Grebe	0	0	0.29	0	0	0	0	0	0	0	0	0
Eurasian Collared-dove	2	3.2	2	3.2	1.4	2.88	2.5	6.57	3.33	6.25	2.6	7.25
European Starling	3	27.2	13.71	31.4	4.4	44.88	16	9.86	7.44	104.13	7	10.88
Evening Grosbeak	0	0.2	0	0	0	0	0	0	0	0.25	0	0
Forster's Tern	0	0	0.14	0	0.2	0	0	0	0	0	0.2	0
Franklin's Gull	1.25	0	1.71	0	0.8	0	0.17	0.14	3.33	0	0.8	0
Gadwall	0	15.8	0.57	9.6	0.2	17.25	0	22.14	0	21	3.4	26.13
Golden Eagle	0	0	0	0.2	0	0	0	0	0	0	0	0
Great Blue Heron	0	0.2	0.14	0.2	0.2	0	0	0	0	0.75	0	0.25
Great Egret	0	0	0	0	0.2	0	0	0	0	0	0	0
Great-tailed Grackle	0.25	0	0.29	0	0.2	0	0.33	0	0.22	0.5	0	0.13
Green-winged Teal	0	2.8	0.14	2.4	0	4.88	0	5.14	0	7.75	0	9.38
Harris's Sparrow	0	0	0	0	0	0	0	0	0	0	0	0.13
Hermit Thrush	0	0.4	0	0	0	0	0.17	0	0	0	0	0
Hooded Merganser	0	0	0	0	0	0	0	0	0	0.13	0	0
Horned Lark	0	0	0	0.2	0	0	0	0	0	0	0	0
House Finch	4.75	3.6	5.29	2.2	4.6	3.5	3	3.86	4.89	5	3	5.38
House Sparrow	1.75	4	1	3.6	1.4	1.63	1.17	2	0.89	7.13	2	2.5
House Wren	0	0	0	0	0	0	0	0.14	0	0	0	0
Killdeer	2.25	3.2	5	7.6	2.8	3.5	3.33	2	2.67	0.75	2.8	0.88
Lark Sparrow	0	0.2	0	0	0.2	0	0	0.14	0	0	0	0
Lazuli Bunting	0	0.2	0.14	0.2	0	0	0.17	0.29	0	0	0	0.13
Lesser Black-backed Gull	0	0	0	0	0	0	0	0.14	0	0.13	0	0
Lesser Goldfinch	0	1	0	0.6	0.4	0.63	0	0.29	0.33	3.38	0.4	0.63
Lesser Scaup	0	0.6	0	0.4	0	0.25	0	0	0	0.75	0	1.25
Loggerhead Shrike	0	0	0	0	0	0	0	0	0	0.13	0	0
MacGillivray's Warbler	0	0	0	0	0	0	0.17	0	0	0.13	0.2	0.13
Mallard	3	50.2	14.28	36.6	6.8	16.76	18.67	57	20.67	94.13	15.6	76.25
Marsh Wren	0	0.4	0	0.2	0	0	0	0.14	0	0	0	0.25
Mourning Dove	4.25	7	4.43	4	2.2	5.5	6	6.86	5.11	10.5	9.6	9
N. Rough-winged Swallow	7.5	0	14.57	0.6	8	0	0	0	0	0	15	0
Nashville Warbler	0	0	0	0.2	0	0.13	0	0.14	0	0	0	0
Northern Flicker	0.5	0.8	0.14	1.4	0	0.88	0.33	1	0.11	1.25	0	2.13
Northern Harrier	0	0	0	0	0	0	0	0	0	0.13	0	0.25
Northern Pintail	0	1.4	0	0.6	0	0.63	0	1	0	1.25	0	1.25
Northern Rough-winged Swallow	0	0	0	0	0	0	10.67	0.29	12.33	0	0	0.13
Northern Shoveler	0	7.2	0	1.8	0	16.88	0	52.86	0	27	0.2	25.88
Orange-crowned Warbler	0	0.2	0	0.4	0	0	0	0.29	0	0.25	0	0.5
Osprey	0	0.2	0	0	0	0	0	0	0	0	0	0
Peregrine Falcon	0.25	0	0	0	0	0	0	0	0	0	0	0
Pied-billed Grebe	0	0.8	0	0.8	0.2	0.13	0	0.29	0	0.63	0	0.5
Pine Siskin	0	0	0	0	0	0	0	0.14	0	0.13	0	0
Red-tailed Hawk	0	0	0.14	0.8	0	0.63	0	0.71	0	0.88	0.2	0.13

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	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Red-winged Blackbird	9.75	3	7.71	7	9.4	9.13	9.67	65.57	10	66.63	8.4	17.38
Redhead	0	0	0	0	0	0	0	0	0	0.38	0	0
Ring-billed Gull	0	7	0	1	0	5.25	0	12.14	0	7.63	0.6	7.5
Ring-necked Duck	0	0	0	0	0	0.13	0	0	0	0	0	1.63
Ring-necked Pheasant	0	0	1	0.2	0.2	0	0.17	0	0	0.13	0	0
Rock Pigeon	0.5	1.6	0.57	4.6	4.2	4.75	0	18	10.44	18.25	1.2	20.88
Ruby-crowned Kinglet	0	0.6	0	0	0.4	0.38	0	0.57	0	0.63	0	0.5
Ruddy Duck	0	0	0	0	0	0	0	0	0	0	0	0.13
Sage Thrasher	0	0	0.14	0	0	0	0	0	0	0	0	0
Sharp-shinned Hawk	0	0.4	0	0.2	0	0	0	0	0	0	0	0.25
Short-billed Gull	0	0	0	0	0	0	0	0.29	0	0	0	0
Snowy Egret	0	0	0.14	0	0	0	0	0	1	0	0	0
Solitary Sandpiper	0	0	0	0.2	0	0.13	0	0	0.11	0	0	0
Song Sparrow	1.75	1.6	2.43	2.8	2.6	1.63	2.33	3	5.33	4.13	4	3.25
Sora	0	0	0.29	0	0	0	0	0	0	0	0	0
Spotted Sandpiper	0.75	0.4	0.29	0.4	1	0.13	0.5	0	1.33	0.13	0.4	0.25
Spotted Towhee	0	0.2	0	0.2	0	0.75	0	0.57	0	0.25	0	1.13
Swainson's Hawk	0	0.2	0	0	0	0	0	0	0	0	0	0
Swamp Sparrow	0	0.2	0	0	0	0	0	0	0	0	0	0
Tree Swallow	0	0	0	0	0	0	0.33	0	0	0	0.2	0
Trumpeter/Tundra Swan	0	0	0	0	0	0.25	0	0	0	0	0	0
Turkey Vulture	0	0	0	0	0	0.13	0	0	0	0	0	0
Vesper Sparrow	0	0	0	0	0	0	0	0	0	0.13	0.2	0.13
Violet-green Swallow	0	0	0	0	0	0	0	0	0.11	0	0	0
Western Kingbird	0.75	0.4	3	0.2	2.2	0	4.67	0.14	3.44	0	2	0.5
Western Meadowlark	0	0	0	0.4	0.4	0	0	0	0	0.25	0	0
Western Tanager	0.5	0	0.29	0	0	0	0.67	0	0	0	0	0
White-crowned Sparrow	0	3.2	0.14	4.4	0	2.63	0.17	7.14	0.56	6.38	0.4	4.25
White-faced Ibis	7.5	0	0.29	0	0	0	0	0	20	3.5	0	0
White-throated Sparrow	0	0	0	0.2	0	0	0	0	0	0	0	0
Wilson's Snipe	0	0	0	0	0	0	0	0.14	0	0.13	0	0
Wilson's Warbler	0	0.4	0	0	0	0	0	0.14	0	0	0	0.13
Yellow Warbler	0.75	0.4	0.86	0.8	0.8	0.25	0.17	1.14	0.56	0.13	0.6	0.63
Yellow-breasted Chat	0	0	0	0	0	0	0.17	0	0	0	0	0
Yellow-headed Blackbird	3.75	0	2.14	0	2.6	0.25	1.5	0	0.56	0	0	0
Yellow-rumped Warbler	0	0	0	0.6	0.2	1.75	0	1.14	0.67	1.13	0	2.25
Red-winged Blackbird	9.75	3	7.71	7	9.4	9.13	9.67	65.57	10	66.63	8.4	17.38

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