

Community Science Bird Monitoring at LIBERTY PARK

2022 Project Report



PROJECT OVERVIEW

Liberty Park is an 80 acre urban park in downtown Salt Lake City, UT. The park has a variety of recreation amenities and natural features, including a jogging path, pond with several islands, and 8-acre Tracy Aviary. As a large green space with multiple habitat types located within a highly urbanized matrix, Liberty Park is used by a variety of bird species throughout the year. Since 2013, Tracy Aviary has conducted a community science bird monitoring project in Liberty Park. Here, we summarize results from our 2022 field season.

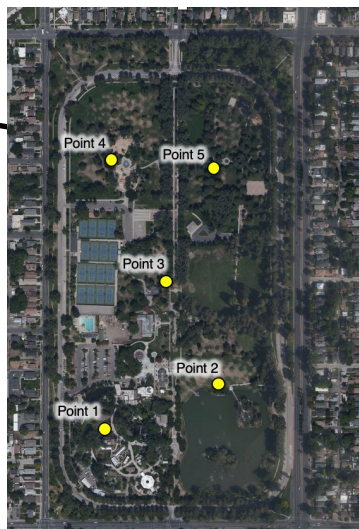
STUDY SITES

We generated 5 sampling points across Liberty Park 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



Liberty Park Sampling Points



BIRD SURVEY METHODS



Breeding Season Point Count Surveys

During May – June of 2022, 7 community scientists and Tracy Aviary staff conducted 4 breeding season point count surveys at Big Liberty Park. 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.



Owl Playback Surveys

During February, May, and June, when owls are most likely to be vocalizing, groups of volunteers led by a trained aviary staff person walked the site in the evening listening for owls, stopping periodically to play owl calls and listen for responses.

2022 BIRD MONITORING RESULTS

4 Breeding Season Surveys

- 463 bird observations
- 35 species

8 Non-breeding Surveys

- 2,591 bird observations
- 48 species

4 Owl Surveys

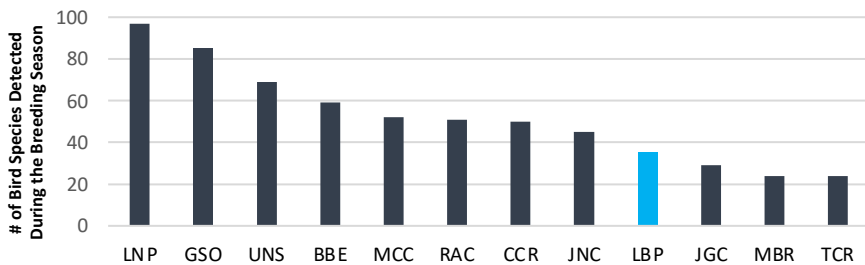
- 5 owl detections
- 1 species

56 total bird species were detected at Liberty Park in 2022

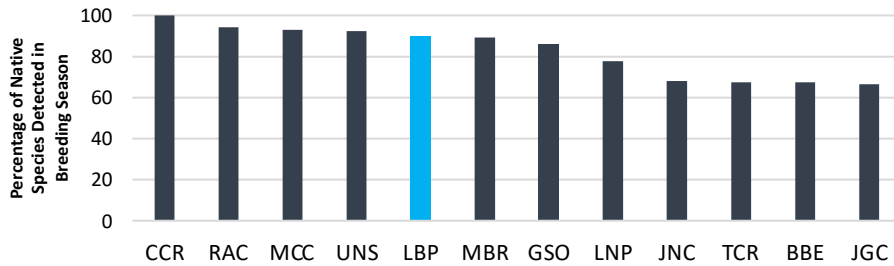
Comparison to Other Sites Along the Jordan River

We can measure the health of an urban riparian site such as Liberty Park 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 Liberty Park (light blue) to other monitoring sites (dark blue), we found high breeding season species richness, average native and urban-sensitive bird species.

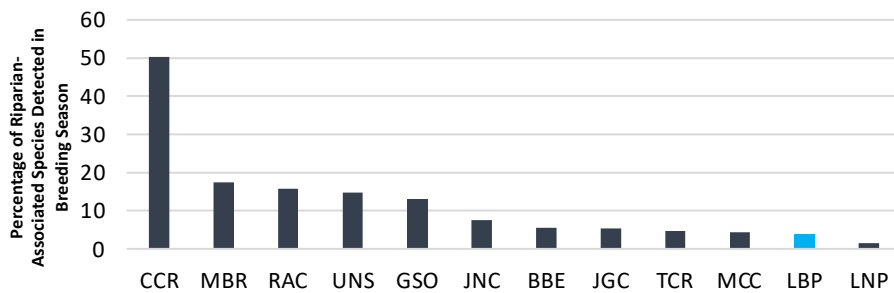
Species Richness



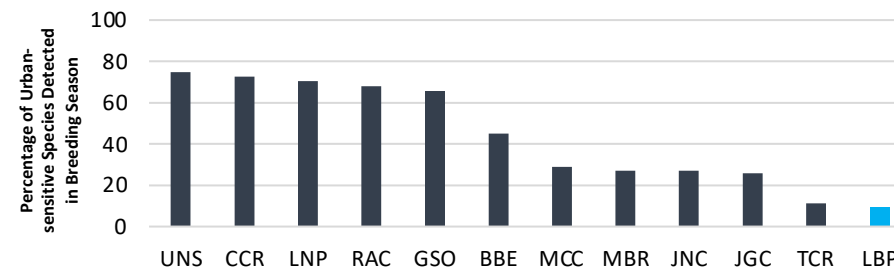
Native Bird Species



Riparian-associated Bird Species



Urban-sensitive Bird Species

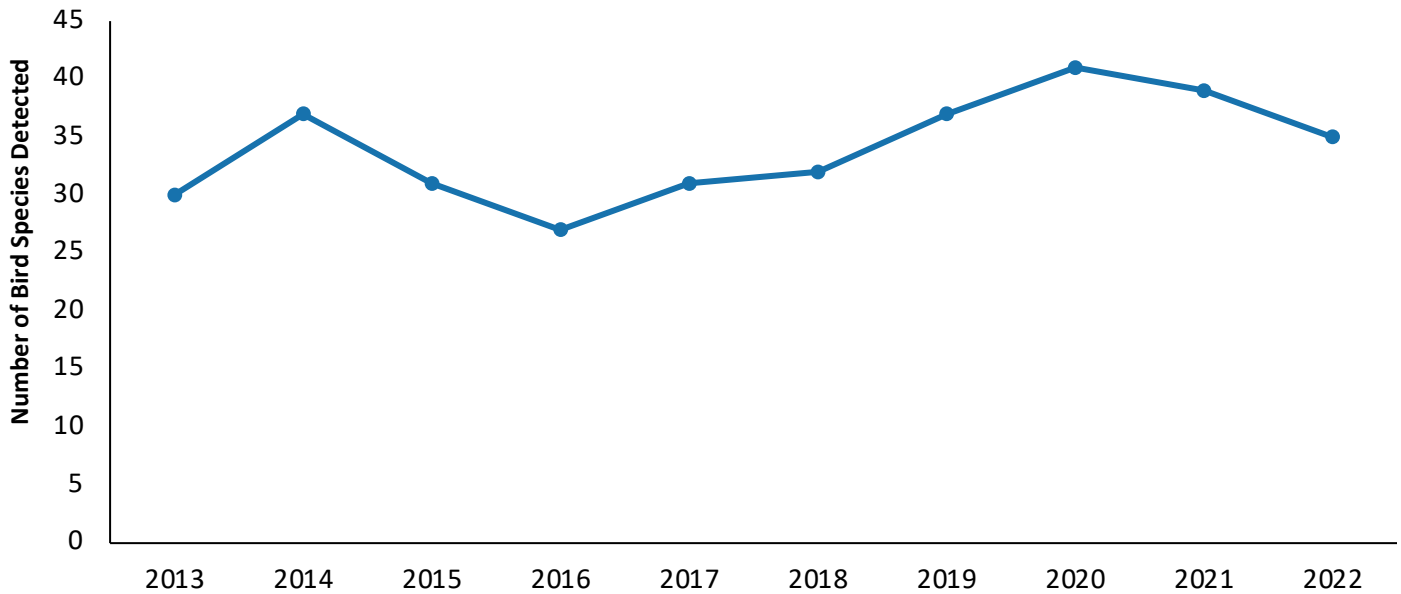


2022 BIRD MONITORING RESULTS

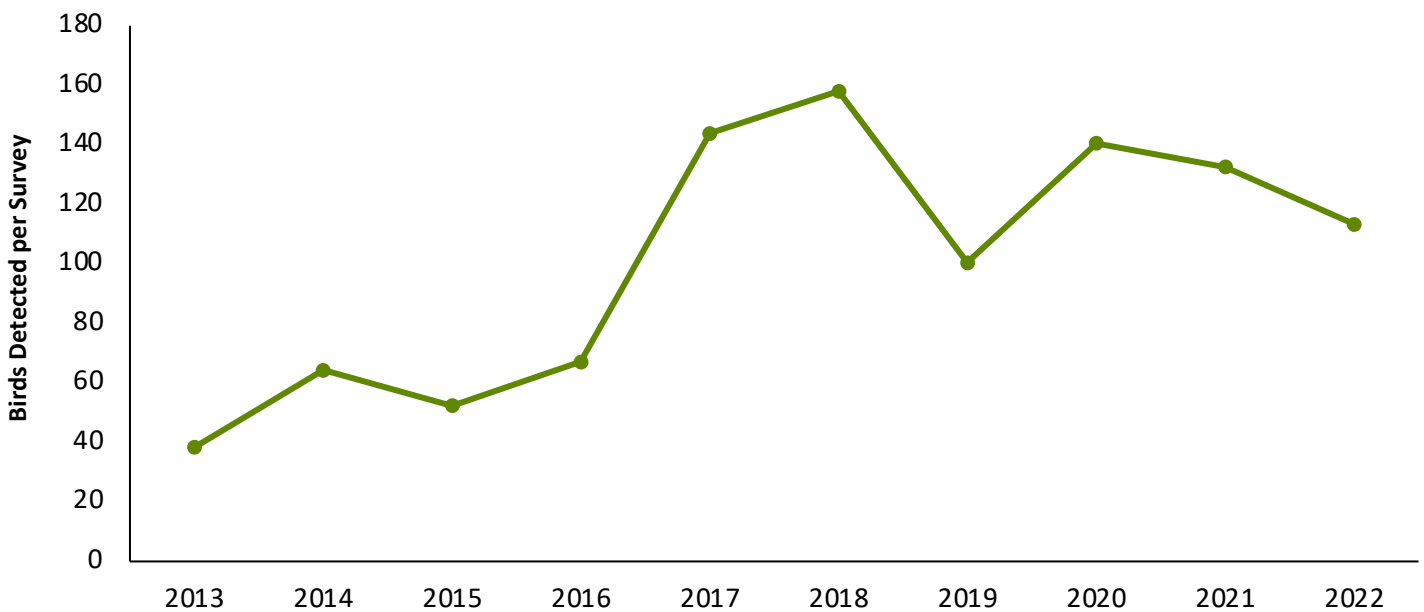
Trends Over Time

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

Breeding Season (April – July) Species Richness



Breeding Season (April – July) Relative Abundance



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.

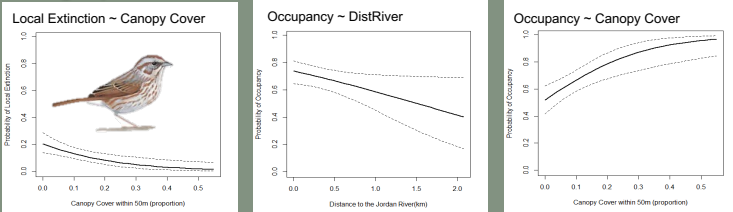
Variable	Measurement (unit)
Canopy Cover	Tree canopy cover within 50m (%)
Canopy Lost*	Decrease in canopy cover from first to last year of monitoring
Shrub Cover	Shrub cover within 50m (%)
Shrub Lost*	Decrease in shrub cover from first to last year of monitoring
Herb Cover	Herbaceous cover within 50m (%)
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

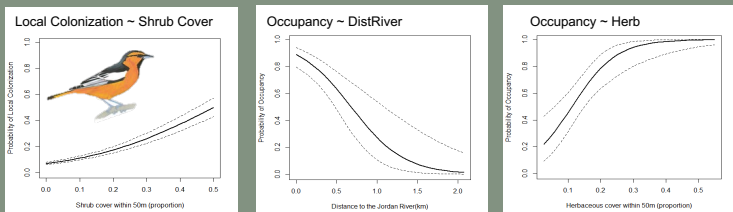
Riparian-Associated Birds

Habitat Relationship Graphs

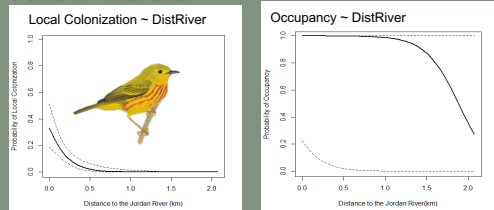
Song Sparrow



Bullock's Oriole



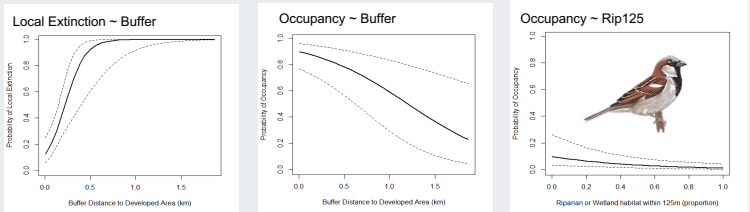
Yellow Warbler



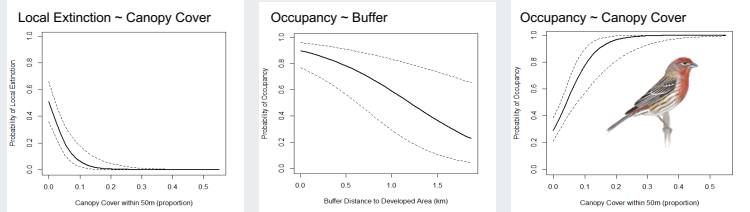
Urban-Associated Birds

Habitat Relationship Graphs

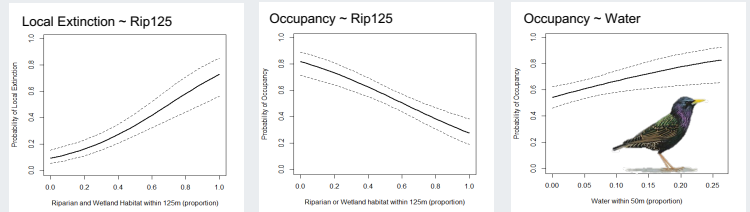
House Sparrow



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 available in Liberty Park.

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 buntings.

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.

Maintain a diverse community of plants that can provide cover, nesting habitat, and food resources such as insects and fruit.

BIRD MONITORING AT LIBERTY PARK

Complete List of Birds Detected during Breeding Season (BSS) Surveys

Species	Number of Detections per Survey each Year									
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
American Coot	0	0.13	0	0	0	0	0.5	0	0	0
American Crow	0.17	1.88	1.67	0.75	0	0.33	0.5	0.25	0	0
American Goldfinch	0.83	1	0.33	0.5	0.4	0	0.33	0	0.33	1
American Robin	1	2.5	1.33	2.25	0.8	3	1.67	1.75	2.11	3.75
American White Pelican	0.17	0	0	0	0	0	0.17	2.25	0.33	0.75
Bank Swallow	0	0	0	0	1	0	0	0	0	0
Barn Swallow	3.83	3.38	2.33	3.75	8.2	16.5	5.17	9.75	7.56	3.5
Black-billed Magpie	0	0.13	0	0	0	0	0.17	0	0.11	0
Black-capped Chickadee	2.67	4.13	2.33	6	3	3.5	6.33	6.25	3.56	5
Black-chinned Hummingbird	0	0	0.67	0	0	0.33	0.67	1.25	1.22	0.75
Black-crowned Night Heron	0	0	0	0	0	0.17	0	0	0.67	0
Brown-headed Cowbird	0.17	0	0	0	0	0	0.17	0	0.11	0
Black-headed Grosbeak	0	0.38	0.33	0	0.2	0	0.17	0.25	0	0
Brewer's Blackbird	0.83	1.13	1.67	1.5	3.6	3.33	1	0.25	0	0
Broad-tailed Hummingbird	0	0.38	0	0	0	0	0	0	0	0
Bullock's Oriole	0	0.13	0	0	0	0	0	0.75	0	0.25
California Gull	1.83	2.5	1.33	1.5	2	1.33	0.5	0.5	8.44	0.75
Canada Goose	0	2	1.67	2.75	50.2	32.83	24.33	30.25	36.11	35.75
California Quail	0.5	0.25	1	0.75	1	0.33	0	3.5	0.56	0
Cedar Waxwing	0.83	0.88	0	0	0.4	7.33	0	0.5	0	0.25
Cliff Swallow	0.17	0	0	0	0	0	0	0.25	0.11	0
Cooper's Hawk	1.67	0.13	0.33	0	0.8	0	0.33	0.75	0.22	0.75
Common Goldeneye	0	0	0	0	0	0	0	0	0	0.5
Common Merganser	0	0	0	0	0.4	0	0	0	0	0
Common Nighthawk	0.17	0	1.33	0	0	0	0	0	0	0
Common Raven	0	0	0	0	0	0	0	0	0.11	0
Double-crested Cormorant	0.17	1.13	1.33	0.5	0	0.17	2	0.75	0.89	1
Domestic Duck sp.	0	0	0	0	0	0	0	1.75	0	0
Downy Woodpecker	0.17	0	0.33	0.75	0.4	0.5	0.17	0.75	0.33	0.75
Eurasian Collared-dove	0.83	2.25	1.67	4	3	3.5	1.5	2.75	0.78	0.75
European Starling	6.33	13.38	10.67	17.5	33	17.83	6.67	9.75	7.33	4
Evening Grosbeak	0	0	0	0	0	0	0	1.75	0	0
Great Blue Heron	0	0.13	0	0.25	0.2	0.17	0	0	0	0
Great Horned Owl	0	0	0	0	0	0	0.17	0	0.33	0
House Finch	3.33	4	4.33	3	2.4	6.17	3.33	3.25	5.33	2.75
Hooded Merganser	0	0	0	0	0.2	0	0	0	0	0.25
House Sparrow	1.33	3.63	1	2.5	4	3.33	2.67	5.75	3.44	1.75
Killdeer	0.17	0.5	0.33	0.75	0.4	0.33	0.5	0	0	0

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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lazuli Bunting	0	0	0	0	0	0	0	0.25	0	0.25
Lesser Goldfinch	0.17	0.75	1.67	1.75	1.8	1.33	0.67	3.25	1.67	1.5
Mallard	5.5	8	7	8.75	19.6	46	28.67	33.5	36	34.5
Mourning Dove	0.5	1	0.67	0.5	0.6	2.33	1.5	1.5	0.33	0.75
Northern Flicker	0.33	1.38	1.67	0.25	0	0.17	0.33	0.5	0.44	0
Northern Rough-winged Swallow	0.17	0.13	0	0	0.2	0.17	0	0	0	0
Osprey	0	0	0	0	0	0.17	0	0	0	0
Pine Siskin	0.33	1.25	0.33	0	0	0	0	0.5	0.22	0.75
Ring-billed Gull	0	0.38	0	0	0	0	0	0.5	0.67	0.5
Red-breasted Nuthatch	0	0	0	0.25	0	0	0	0	0	0
Ruby-crowned Kinglet	0	0	1	1	0.2	0	1.67	0.5	0	0
Rock Pigeon	0	0.13	0	0.25	0	0	0.67	8.25	6.44	4.75
Red-winged Blackbird	0	0	0	0	0	0	0	0	1.22	0.5
Say's Phoebe	0	0	0	0	0.6	0	0	0	0	0
Solitary Sandpiper	0	0	0	0	0	0	0	0	0	0.25
Song Sparrow	0	0	0	1.75	1.4	1.83	3.33	1.5	0.67	2.5
Spotted Sandpiper	0.83	1.38	0.67	0.75	1	1.5	1.17	1.5	1.22	0.25
Tree Swallow	0	0	0	0	0	0	0	0	0.11	0
Violet-green Swallow	1	0.63	0	0	0	0.17	0.17	0.25	0	0.25
Turkey Vulture	0	0	0	0	0	0	0	0	0	0.25
Warbling Vireo	0	0.13	0.33	0	0	0.17	0.17	0.5	0	0
Western Kingbird	0	0	0.33	0	0	0	0.5	0	0	0
Western Screech-owl	0	0	0	0	0	0	0	1	1.67	0
Western Tanager	0	0.13	0.67	0	0.8	1	0	0.25	0.11	0.25
Western Wood-pewee	0	0	0	0	0	0	0.33	0.25	0.11	0
Wilson's Warbler	0	0	0	0	0	0	0	0.25	0	0
Woodhouse's Scrub-jay	0	0	0	0	0	0	0	0	0.11	0
Yellow Warbler	2.33	2.88	2	2.75	2	2	2	1.25	1.44	1.25
Yellow-rumped Warbler	0	0.13	0	0	0	0.17	0.17	0	0.11	0.5

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 Liberty Park project partners.

