Community Science Bird Monitoring at
THREE CREEKS CONFLUENCE
2022 Project Report

TRACY AVIARY Conservation

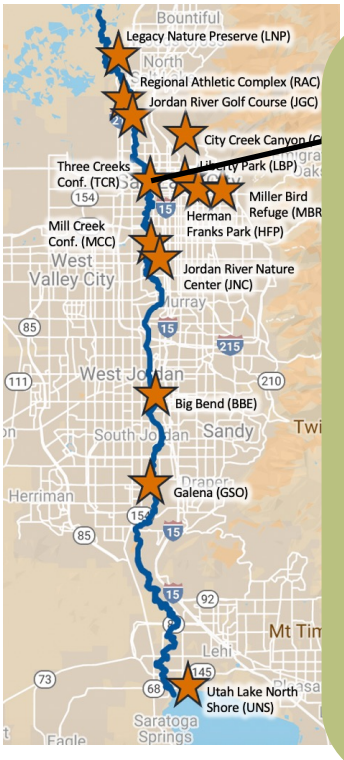
PROJECT OVERVIEW

Red Butte, Emigration, and Parley's Creeks flow underground through Salt Lake City before entering the Jordan River at the Three Creeks Confluence. In 2020, Seven Canyons Trust led a major daylighting and restoration effort at the site; 200 feet of water was daylighted, and recreational and ecological amenities were added to the surrounding riparian areas. In 2017, Tracy Aviary began a community science study at the Three Creeks Confluence to monitor the bird community before and after restoration. We collected three years of pre-restoration data during 2017, 2018, and 2019, and are currently in our second year of post-restoration data collection. Here, we summarize results from our 2022 bird monitoring field season.

STUDY SITES

We generated two sampling points across the Three Creeks Confluence 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.

Bird Monitoring Sites



Three Creeks Confluence

Pre-restoration

Post-restoration

BIRD SURVEY METHODS

Breeding Season Point Count Surveys

During April – July of 2022, 6 community scientists and Tracy Aviary staff conducted 5 breeding season point count surveys at the Three Creeks 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 the site in January, February, March, August, September, 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
- 206 bird observations
- 24 species

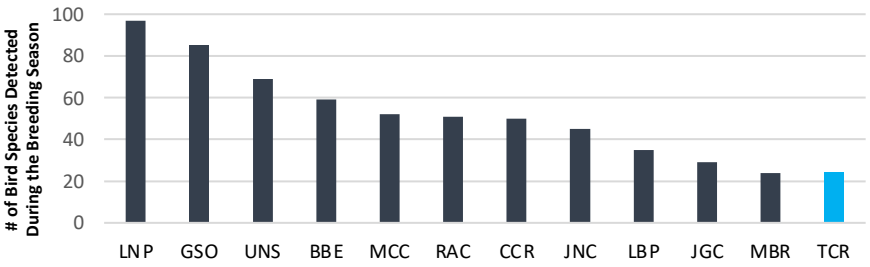
7 Non-breeding Surveys
- 414 bird observations
- 26 species

35 total bird species were detected at Three Creeks Confluence in 2022

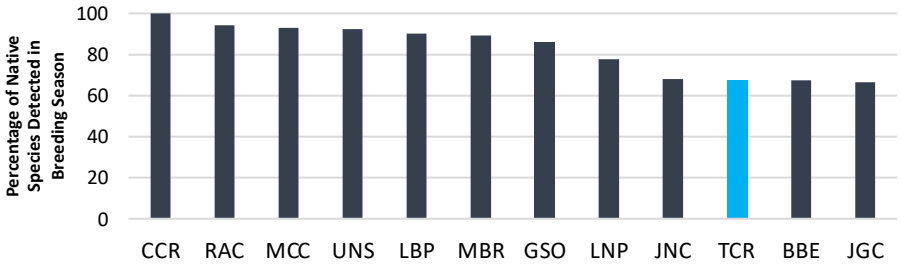
Comparison to Other Sites Along the Jordan River

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

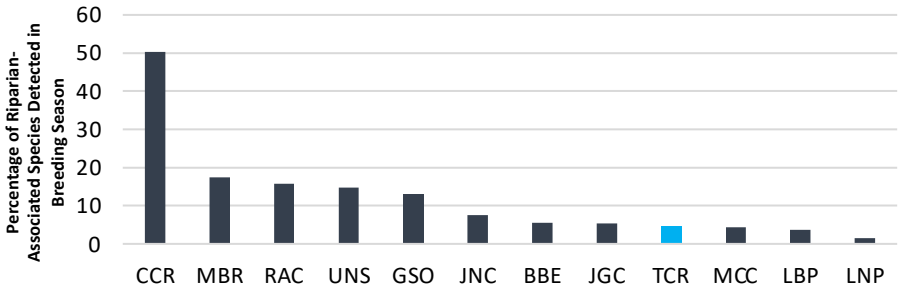
Species Richness



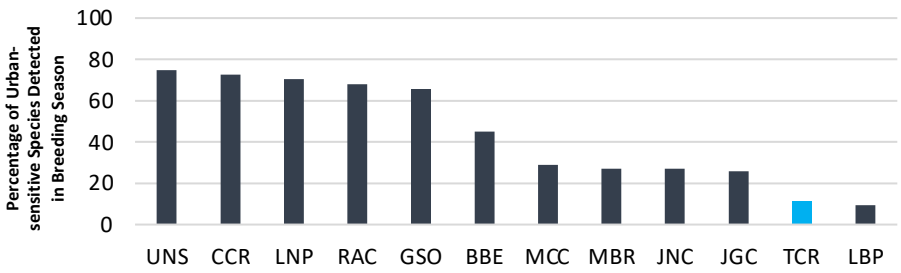
Native Bird Species



Riparian-associated Bird Species



Urban-sensitive Bird Species



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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 all of our Jordan River 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.

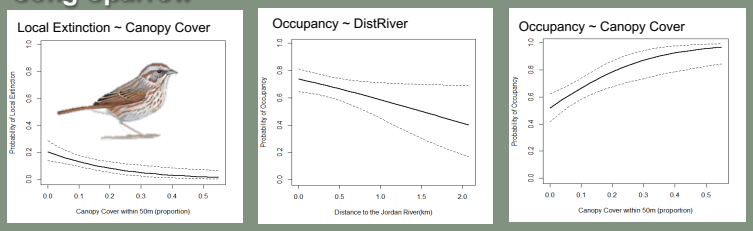
Variable	Measurement (unit)
Canopy Cover	Tree canopy cover within 50m (%)
Canopy Lost*	Decrease in canopy cover from first to last year of monitoring
Shrub Cover	Shrub cover within 50m (%)
Shrub Lost*	Decrease in shrub cover from first to last year of monitoring
Herb Cover	Herbaceous cover within 50m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

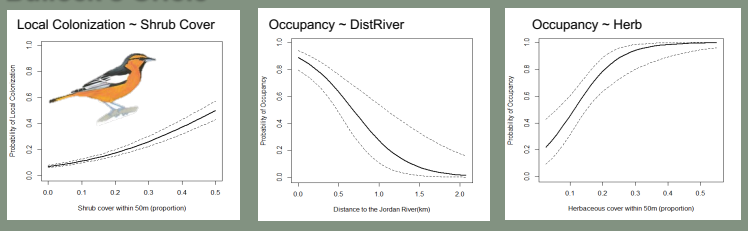
Riparian-Associated Birds

Habitat Relationship Graphs

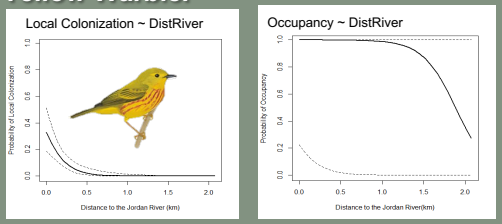
Song Sparrow



Bullock's Oriole



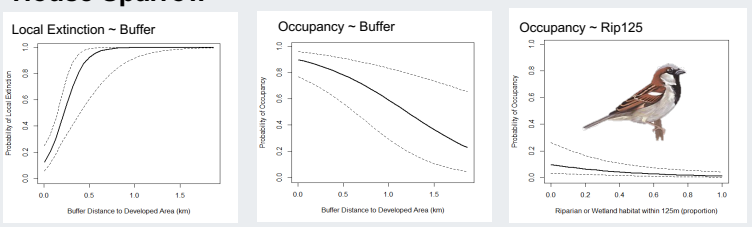
Yellow Warbler



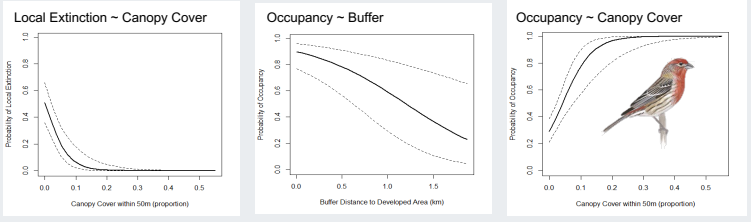
Urban-Associated Birds

Habitat Relationship Graphs

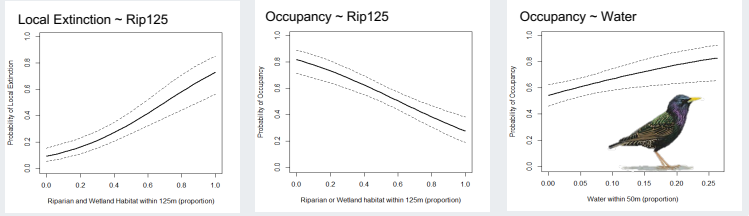
House Sparrow



House Finch



European Starling



Bird images from Audubon.org

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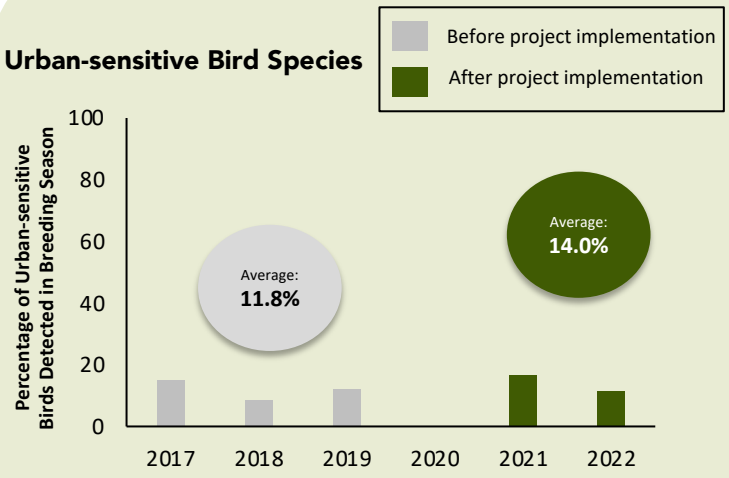
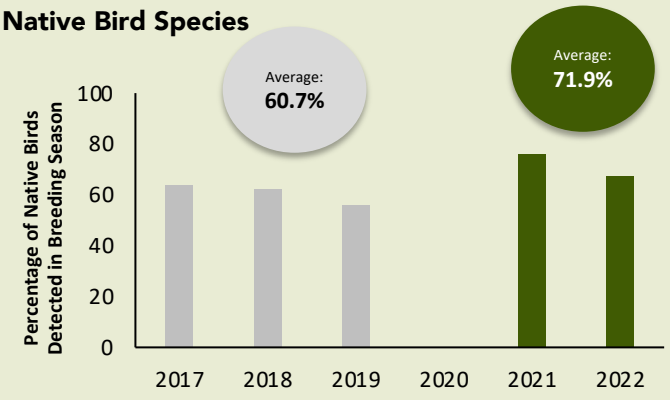
2022 BIRD MONITORING RESULTS

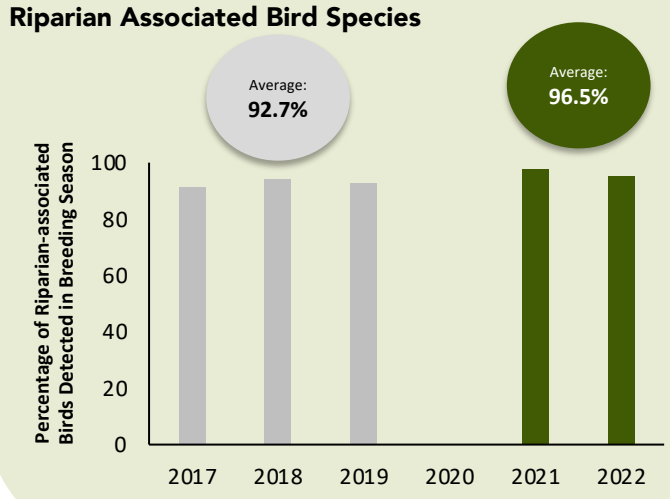
Comparison of Birds Pre- and Post-Restoration

We compared the bird community at Three Creeks Confluence before and after the daylighting and restoration project was implemented by examining changes in species richness, relative abundance (detections per survey), and three community health metrics: percentage of riparian-associated, native, and urban-sensitive bird species detected during breeding season surveys. Many restoration projects experience a decrease in bird habitat use immediately after implementation due to disturbance at the site, and take several years to build back to a healthier bird community. In the two years immediately after project implementation, we documented slightly higher average detections of urban-sensitive, native, and riparian-associated birds. We also documented slightly higher average species richness and relative abundance in the breeding and non-breeding season.

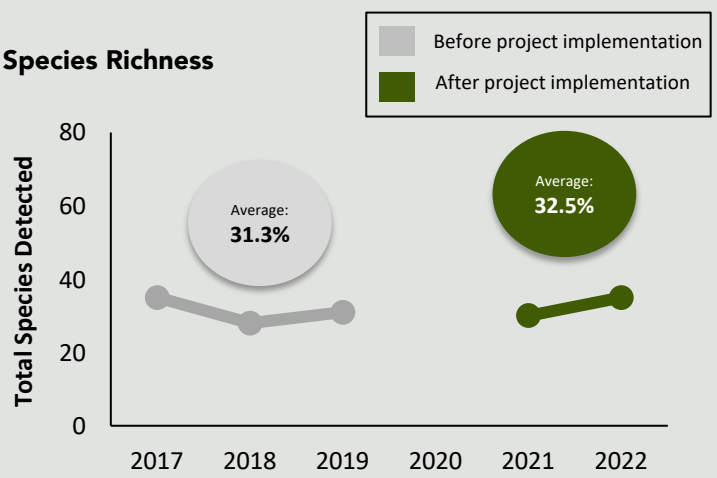
Community Composition

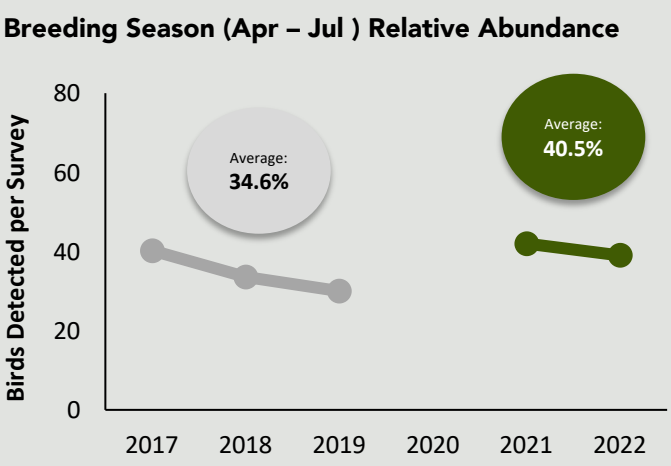


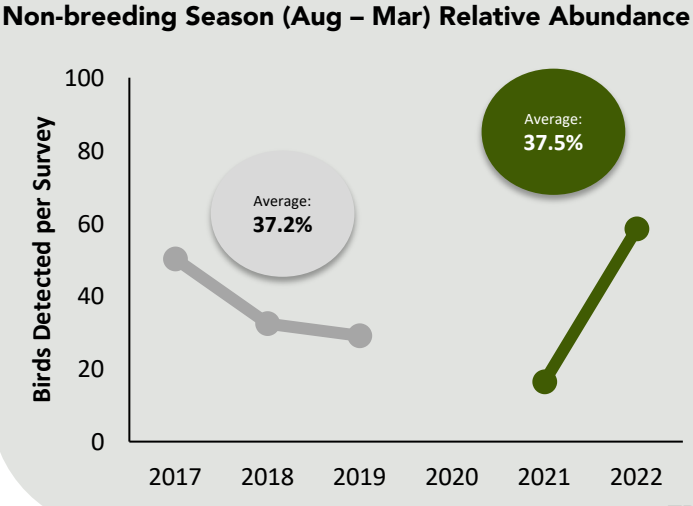




Number of Species and Birds







BIRD MONITORING AT THREE CREEKS 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		2021		2022	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
American Coot	1.5	0	0	0	0	0	0	0	0	0
American Crow	0.5	7	0.43	0	0	1	0	0.33	1	24.43
American Goldfinch	0.25	0	0.29	0.2	0	0	0	0.17	0.8	0
American Kestrel	0.25	0.2	0	0	0	0.17	0	0	0	0
American Pipit	0	0	0	0	0	0.17	0	0	0	0
American Robin	2.25	1	2.86	1.6	2.8	4.2	1	0.33	3.2	1.86
Barn Swallow	1.25	0	2.14	0	1.2	0	4	0	2.4	0.29
Belted Kingfisher	0	0.6	0.43	0.4	0	0	1	0.33	0.8	0.57
Black-capped Chickadee	0.75	0.4	0.43	0.2	1.8	0.5	1	0.33	0	0
Black-chinned Hummingbird	0	0.2	0	0	0.2	0.33	1	0	0	0.14
Brown-headed Cowbird	0	0	0	0	0.4	0	1	0	0	0
Black-headed Grosbeak	0	0	0	0	0	0	1	0	0.2	0
Bullock's Oriole	0.25	0	0.14	0	0	0	0	0	0.4	0
California Gull	0	0.4	0	0.2	0	0.17	0	0.33	0.4	0.14
California Quail	0.25	0	0	0	0	0	0	0	0	0
Canada Goose	0	0	0.14	0	0.8	0	0	0.33	4	0.29
Cedar Waxwing	0	0	0	0	0	0	0	0	0	2.14
Chipping Sparrow	0	0	0	0	0.2	0	0	0	0	0
Common Goldeneye	0	0.2	0	0	0	1	0	0.67	0	1.14
Cooper's Hawk	0	0	0	0	0	0.17	0	0.17	0	0
Dark-eyed Junco	0	3.2	0	0.4	0	1	0	0.17	0	0.29
Double-crested Cormorant	0	0	0.14	0	0.4	0	0	0	0.8	0
Downy Woodpecker	0.5	0.2	0.14	0.2	0.4	0	1	0	0	0.29
Eurasian Collared-Dove	0.5	1.2	1	0.6	0.6	1.33	0	0.83	1.6	1.43
European Starling	9.5	18.6	6.86	20	9.4	12.7	1	4.17	3.8	12.29
Evening Grosbeak	0	1	0	0	0	0.16	0	0	0	0
Gadwall	0	0	0	0	0	0.33	0	0	0	0.14
Hooded Merganser	0	0	0	0.4	0	0	0	0.33	0	1.29
House Finch	3.75	4	3.29	2.2	1	1	1	1.83	0.8	1.71
House Sparrow	3.75	7.6	4.86	2.2	3.2	3.33	7	2	6.4	3.14

BIRD MONITORING AT THREE CREEKS 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		2021		2022	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Lazuli Bunting	0	0.2	0	0	0.2	0	0	0	0	0
Lesser Goldfinch	2.5	1.2	2	0.4	2.6	0	0	1.17	1.6	1
Mallard	7.75	1.2	5.29	2.2	2.2	0.67	16	1.67	6.8	3.71
Mourning Dove	0.25	0.2	0.57	0.2	0	0	0	0.17	0.6	0.29
Northern Flicker	0	0.4	0.43	0.2	0	0.33	0	0.34	0.4	0.43
Northern Rough-winged Swallow	0.25	0	0	0	0	0	0	0	0	0
Orange-crowned Warbler	0	0	0.14	0	0	0	0	0	0	0.29
Pied-billed Grebe	0	0	0	0.6	0	0	0	0	0	0
Pine Siskin	0	0.2	0	0	0	0	0	0	0	0
Red-winged Blackbird	0.25	0	0	0	0	0	2	0	0.2	0
Ring-billed Gull	0	0	0	0	0	0.17	0	0.17	0	0.14
Ring-necked Duck	0	0	0	0	0	0	0	0	0	0.71
Rock Pigeon	0.5	0	0	0	0	0.17	2	0.33	0.8	0
Ruby-crowned Kinglet	0	0.2	0	0	0	0	0	0	0	0
Sharp-shinned Hawk	0.25	0	0	0	0	0	0	0.17	0	0.14
Spotted Sandpiper	0	0	0.14	0	0	0	0	0	0	0
Spotted Towhee	0	0.2	0	0	0	0	0	0	0	0
Steller's Jay	0	0.2	0	0	0	0	0	0	0	0
Warbling Vireo	0	0	0.14	0	1	0	0	0	0.6	0
Western Kingbird	0	0	0	0	0	0	2	0	0	0
Western Tanager	0	0.2	0.14	0	0.6	0	0	0	0.2	0
White-throated Sparrow	0	0	0	0	0	0	0	0.17	0	0
Yellow Warbler	3.25	0.2	1.57	0	1	0.17	0	0	0.6	0
Yellow-rumped Warbler	0	0	0	0.2	0	0	0	0	0.6	0.14

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 Three Creeks Confluence project partners, Seven Canyons Trust and Salt Lake City.*

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