

PRE-RESTORATION BIRD SURVEYS AT JORDAN RIVER THREE CREEKS CONFLUENCE

2017 Project Report
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Cooper Farr
Conservation Science Program
Tracy Aviary
589 East 1300 South
Salt Lake City, UT, 84105

EXECUTIVE SUMMARY

The Seven Canyons Trust, in partnership with Salt Lake City and the Jordan River Commission, is restoring Three Creeks Confluence beginning in winter of 2018. They will daylight 200 feet of confluence water, and add recreational and ecological amenities to the surrounding riparian area. One of the goals of the Three Creeks Confluence project is to enhance the ecological value of the site. In spring 2017, Tracy Aviary began a citizen science bird monitoring study at the Three Creeks Confluence to analyze the bird community of the site before and after it is restored. In this initial project report, we present pre-restoration data from the first five months of the project. Data collecting during the pre-restoration phase will answer the following research questions:

- 1) What birds are using the Three Creeks Confluence area prior to daylighting and restoration?
- 2) How does the pre-restoration community of breeding season birds at Three Creeks Confluence compare with other places along the Jordan River? Specifically,
 - a) Is there a difference in the proportion of non-native species in the bird community of Three Creeks Confluence and other areas of the Jordan River?
 - b) Is there a difference in the proportion of urban-adapted species in the bird community of Three Creeks Confluence and other areas of the Jordan River?
 - c) Is there a difference in the proportion of riparian-associated species in the bird community of Three Creeks Confluence and other areas of the Jordan River?

From May 18 to July 5, 2017, a team of five citizen science participants had 168 bird observations and detected 22 species during the four breeding bird surveys. During two non-breeding surveys in August and September, we had 69 bird observations and detected 15 species. Five of these species were not detected during the breeding season, resulting in a total species list of 27 species for May through September 2017. Three Creeks Confluence had a significantly higher proportion of detections per survey of non-native ($t=4.66$, $p<0.0001$) and urban-adapted species ($t=4.23$, $p<0.001$) than other Jordan River sampling points.

We conclude the report with recommendations to enhance the ecological value of the Three Creeks Confluence and promote a healthy bird community.

ACKNOWLEDGEMENTS

We'd like to thank the extremely dedicated team of volunteers from Tracy Aviary's Citizen Science Program who braved the early mornings and long hours to collect this data. Thanks also to our project partners: the Seven Canyons Trust, the Jordan River Commission, and Salt Lake City Parks and Public Lands.

INTRODUCTION

Red Butte, Emigration, and Parley's Creeks flow underground through Salt Lake City before entering the Jordan River at the Three Creeks Confluence. The confluence is paved over and bounded by vacant lots, and the creeks enter the river via two concrete pipes. The Seven Canyons Trust, in partnership with Salt Lake City and the Jordan River Commission, is restoring Three Creeks Confluence beginning in winter of 2018. They will daylight 200 feet of confluence water, and add recreational and ecological amenities to the surrounding riparian area.

One of the goals of the Three Creeks Confluence project is to enhance the ecological value of the site. Although the health and ecological function of the area is heavily impacted by diverse human uses and historic disturbances, the Three Creeks Confluence has important potential as wildlife habitat. The Jordan River and its tributaries provide lowland riparian habitat, one of the most important habitat types for birds in Utah (Gardner et al. 1999). Riparian areas are used by 75% of Utah's bird species, and can have up to fourteen times the density of birds in upland habitat (Howe 1992, Knopf et al. 1998).

Because they are mobile, sensitive to changing conditions in their environment, and easy to detect and identify, birds are excellent indicators of ecosystem health (Blair 1999). Assessing the community of birds using habitat at the Three Creeks Confluence before and after daylighting and restoration activities will inform how well this project achieves its goal of enhancing the site's ecological value. In spring 2017, Tracy Aviary began a citizen science bird monitoring study at the Three Creeks Confluence to analyze the bird community of the site before and after it is restored.

In this initial project report, we present pre-restoration data from the first five months of the project. Data collecting during the pre-restoration phase will answer the following research questions:

- 3) What birds are using the Three Creeks Confluence area prior to daylighting and restoration?
- 4) How does the pre-restoration community of breeding season birds at the Three Creeks Confluence compare with other places along the Jordan River? Specifically,
 - a) Is there a difference in the proportion of non-native species in the bird community of Three Creeks Confluence and other areas of the Jordan River?
 - b) Is there a difference in the proportion of urban-adapted species in the bird community of Three Creeks Confluence and other areas of the Jordan River?
 - c) Is there a difference in the proportion of riparian-associated species in the bird community of Three Creeks Confluence and other areas of the Jordan River?

METHODS

Study Design

We conducted breeding and non-breeding bird surveys at two sampling points in the Three Creeks Confluence during May through September of 2017. We used a systematic random sampling frame to generate two sampling points within the site area (Figure 1), separating each point by a distance of at least 50m.

Citizen Scientist Participation and Training

We recruited a total of five participants and one Tracy Aviary staff member to complete breeding bird surveys at the Three Creeks Confluence.

Participants were trained as part of Tracy Aviary's Citizen Science Program, which is made up of 32 participants that conducted breeding bird surveys in 12 project locations throughout Salt Lake County. Training for the Citizen Science Program began in late February and continued through the survey season. We provided 6 indoor trainings (2-3 hours), 35 field trainings (2-5 hours), and we required citizen scientists to attend at least one indoor training and 4-6 field trainings. Before citizen scientists conducted surveys, they were required to pass two tests: a bird identification by sound test, where they had to identify the calls and songs of 30 of the most common birds, and a field survey test, where they had to successfully complete a series of mock breeding bird surveys.

Bird Survey Methods

Using the IMBCR point-transect protocol developed by the Bird Conservancy of the Rockies (Hanni et al. 2015), we conducted 4 breeding bird surveys at the Three Creeks Confluence during the 2017 breeding season between May 18th and July 5th. Pairs of citizen scientists conducted unlimited radius point count surveys at sampling point locations between sunrise and approximately 10am. The 'observer' of the team identified all birds seen and heard at the point during a six minute point count, and noted the exact distance using a laser rangefinder, direction, detection type (visual, singing, calling, other), and any other information they could determine about the bird (age, sex, etc.). The 'recorder' of the team 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, cloud cover, ambient noise levels, and presence of water/snow.

During August and September, we conducted two non-breeding surveys to better understand the birds that use this area year-round. Although we only report results from the first two non-breeding surveys, we will continue these surveys each month throughout the non-breeding

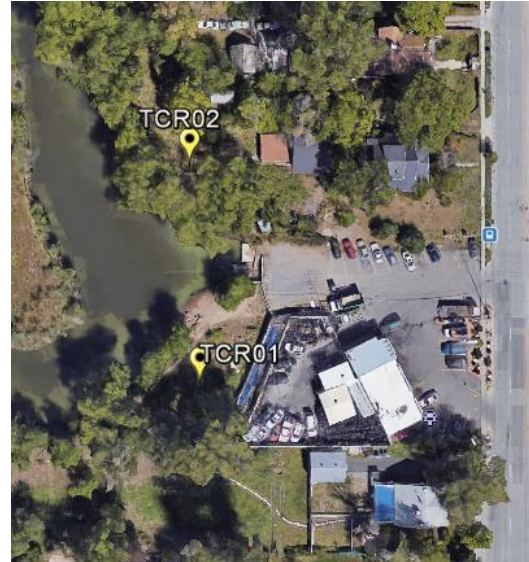


Figure 1. Map of bird survey point locations at Three Creeks Confluence.

season. During the non-breeding surveys, at least one trained Tracy Aviary staff person (henceforth: the 'survey leader') led groups of participants on a walk through the sampling area, and noted any birds seen and heard during that time. Participants helped to detect and identify birds, but the survey leader made the final decision for identification of the bird species and the number of individuals present. The survey leader also noted weather variables, the total amount of time, and the total distance traveled during the survey.

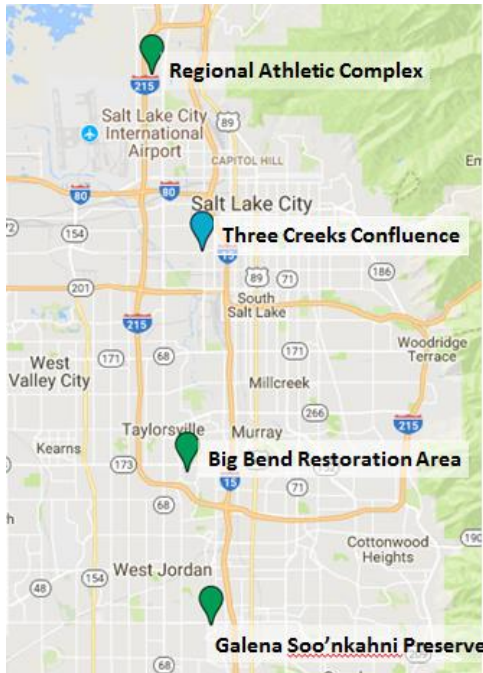


Figure 2. Map of the locations of Three Creeks Confluence (blue) and study areas used as Jordan River Comparison sites (green).

Data Analysis

To determine which birds are using the Three Creeks Confluence area prior to daylighting and restoration, we used point count data to calculate species richness and the relative abundance, or total number of observations/survey, for each species. We noted whether birds occupied the area during the breeding season, non-breeding season, or throughout the year, and compiled a total species list for the site.

We then compared the pre-restoration community of breeding season birds at the Three Creeks Confluence with a sample of other sites along the Jordan River. We selected three other study areas along the Jordan River where Tracy Aviary's citizen science team conducts yearly breeding bird surveys: the Nature Preserve Area

of the Regional Athletic Complex, Big Bend Restoration Area, and Galena Soo'nkahni Preserve (Figure 2). These study areas contain 24 sampling points located within lowland riparian habitat surrounding the river. We compiled data from three breeding bird surveys at each

of these sampling points within the same period that we conducted breeding bird surveys at Three Creeks Confluence (between May 18th and July 5th 2017).

We classified each 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 in the area (within 125m).

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 the Three Creeks Confluence and other Jordan River sampling points.

RESULTS

Pre-restoration Bird Community at Three Creeks Confluence

From May 18 to July 5, 2017, we had 168 bird observations and detected 22 species (Table 1) during the four breeding bird surveys. During two non-breeding surveys in August and September, we had 69 bird observations and detected 15 species. Five of these species were not detected during the breeding season, resulting in a total species list of 27 species for May through September 2017.

Table 1: Complete list of species and the number of observations per survey for each species during breeding season and non-breeding season

Species	Number of Observations (detections/survey)		Native Status	Classification	
	Breeding Season	Non-breeding Season		Urban Status	Riparian Status
European Starling	9.5	15	Non-native	Adapted	Non-associated
Mallard	7.75	2.5	Native	Neutral/Avoider	Non-associated
House Sparrow	3.75	6.5	Non-native	Adapted	Non-associated
House Finch	3.75	1	Native	Adapted	Non-associated
Yellow Warbler	3.25	0.5	Native	Neutral/Avoider	Associated
Lesser Goldfinch	2.5	2	Native	Adapted	Associated
American Robin	2.25	0	Native	Adapted	Non-associated
American Coot	1.5	0	Native	Neutral/Avoider	Non-associated
Barn Swallow	1.25	0	Native	Adapted	Non-associated
Black-capped Chickadee	0.75	0	Native	Adapted	Associated
American Crow	0.5	0	Native	Adapted	Non-associated
Downy Woodpecker	0.5	0.5	Native	Neutral/Avoider	Non-associated
Eurasian Collared-Dove	0.5	2.5	Non-native	Adapted	Non-associated
Rock Pigeon	0.5	0	Non-native	Adapted	Non-associated
American Goldfinch	0.25	0	Native	Adapted	Associated
American Kestrel	0.25	0.5	Native	Neutral/Avoider	Non-associated
Bullock's Oriole	0.25	0	Native	Neutral/Avoider	Associated
California Quail	0.25	0	Native	Neutral/Avoider	Non-associated
Mourning Dove	0.25	0.5	Native	Adapted	Non-associated
Northern Rough-winged Swallow	0.25	0	Native	Adapted	Non-associated
Red-winged Blackbird	0.25	0	Native	Neutral/Avoider	Non-associated
Sharp-shinned Hawk	0.25	0	Native	Neutral/Avoider	Non-associated
Belted Kingfisher	0	1	Native	Neutral/Avoider	Associated
Black-chinned Hummingbird	0	0.5	Native	Neutral/Avoider	Non-associated
Lazuli Bunting	0	0.5	Native	Neutral/Avoider	Non-associated
Northern Flicker	0	0.5	Native	Neutral/Avoider	Non-associated
Western Tanager	0	0.5	Native	Neutral/Avoider	Non-associated

Three Creeks Confluence Bird Community in Comparison to other Jordan River Sites

Three Creeks Confluence had a significantly higher proportion of detections per survey of non-native ($t=4.66$, $p<0.0001$) and urban-adapted species ($t=4.23$, $p<0.001$) than other Jordan River sampling points (Figure 3). On average, there was a smaller proportion of riparian-associated species detected at Three Creeks Confluence survey (mean=0.187, standard deviation=0.038) than other Jordan River Sampling points (mean=0.254, standard deviation=0.019). However, this trend was not statistically significant.

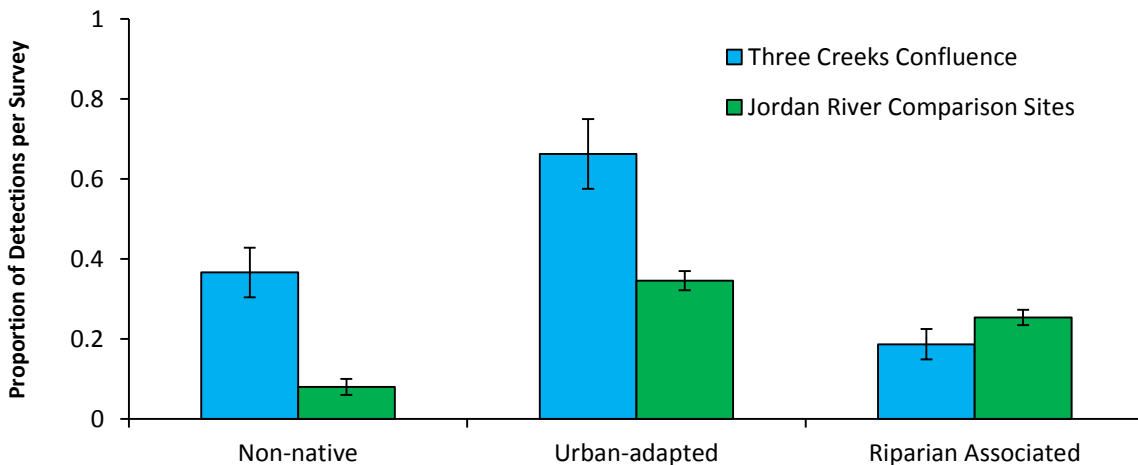


Figure 3. Proportion of detections of non-native, urban-adapted, and riparian-associated birds at Three Creeks Confluence (blue) and comparison sites along the Jordan River (green).

DISCUSSION

By establishing an initial understanding of the bird community and ecological health of Three Creeks Confluence, we create a baseline for the area. Given that the Three Creeks Confluence site is primarily disturbed lots and impervious surface, and is situated within a matrix of developed land, it is unsurprising that the bird community is dominated by non-native and urban-adapted species. After daylighting and restoration has taken place, we will analyze how the community changes from this baseline. If the daylighting and restoration activities effectively enhance the ecological value of the site, 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.

Even in its highly modified and degraded state, the Three Creeks Confluence provides habitat for 27 bird species. Included in this species list were neotropical migrants such as the Western Tanager, Lazuli Bunting, and Black-chinned Hummingbird that were likely using the area as stopover habitat during their migration to Mexico and Central America (Parrish et al. 2007). We

also detected several year-round residents that are often associated with riparian areas, including the Belted Kingfisher and Black-capped Chickadee (Bureau of Land Management 1998). An American Kestrel was observed using the area; this species has experienced significant declines since the 1980's, and it is important to conserve habitats where they are found (Smallwood et al. 2009).

To enhance the ecological value of the Three Creeks Confluence and promote a healthy bird community, we suggest the following:

1. Promote vertical structure and canopy cover throughout the site. Protect the existing trees and shrubs and/or replace trees that are removed. 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. No tree removal or thinning activities should take place during the breeding and nesting season (April – July).
2. 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. Site goals also include community access and transportation infrastructure, so landscape features other than natural vegetation will occur throughout the site. Therefore, native vegetative cover should be prioritized in 1) areas near the water to enhance riparian habitat, and 2) on the edge of the site to buffer sound and light pollution from the surrounding areas.
3. 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 cavity habitat.
4. If lights are to be installed in the area, they should be shielded and pointed downward to decrease light pollution.

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