# CITIZEN SCIENCE BIRD MONITORING AT PARLEY'S HISTORIC NATURE PARK

2015 - 2017 Project Report

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## EXECUTIVE SUMMARY

Parley's Historic Nature Park is an 88-acre park at the mouth of Parley's Canyon. In 2015, Tracy Aviary began a citizen science bird monitoring study to better understand the community of birds that occupies habitat within Parley's Historic Nature Park. This project was designed to gather baseline information to help understand current habitat conditions in the park. As a citizen science project, our study was also created to engage neighbors and community members, and to inspire care for the park and the habitat it provides.

In this project report, we present results from three years of baseline data collection. We collected this information with the goal of answering the following research questions:

1) What bird species occur in Parley's Historic Nature Park (PHP)?
    a. Which species are most common and widespread?
    b. Does PHP provide habitat for any species of conservation concern?
2) How do patterns of bird occurrence differ across PHP?
    a. Which areas or habitats are especially important for the bird community at PHP?

From 2015 to 2017, a team of 13 citizen science participants and 3 Tracy Aviary staff had 893 bird observations and detected 44 species during the twelve breeding bird surveys (Table 1). During the non-breeding season from 2015-2017, we had 3271 bird observations and detected 73 species (Table 2). 34 of these species were detected exclusively during the non-breeding season, resulting in a total species list of 78 species at Parley's Historic Nature Park. We identified common, widespread, and species of concern at PHP, and compared community composition between sampling points. We conclude the report with recommendations to enhance the ecological value of the park 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 partner, Salt Lake City Parks and Public Lands.

## INTRODUCTION


**Figure 1.** Map of use areas, management areas, and trails in Parley's Historic Nature Park.

Parley's Historic Nature Park is an 88-acre park at the mouth of Parley's Canyon (Figure 1). It includes 13 acres dedicated to off-leash dog use, 1 acre for BMX use, 6 acres of Natural Area, 39 acres of Protection area, and 28 acres of Restoration and Buffer Area (Parley's Historic Nature Park Comprehensive Use and Management Plan 2010). Approximately 0.8 miles of Parley's Creek runs through the center of the park, providing important riparian habitat for local bird species. The park encompasses a steep gully, and contains woodland, wetland, and scrub oak-grassland habitats in addition to its riparian core. With important natural resources and heavy recreational use, it is important to understand the current ecological conditions of Parley's Historic Nature Park.

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). In 2015, Tracy Aviary began a citizen science bird monitoring study to better understand the community of birds that occupies habitat within Parley's Historic Nature Park. This project was designed to gather baseline information to help understand current habitat conditions in the park. As a citizen science project, our study was also created to engage neighbors and community members, and to inspire care for the park and the habitat it provides.

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## METHODS

### *Study Design*

We conducted breeding and non-breeding bird surveys at six sampling points in Parley's Historic Nature Park (PHP) during 2015-2017. We used a systematic random sampling frame to generate six sampling points within the site area (Figure 1), separating each point by a distance of at least 250m.


**Figure 2.** Map of bird survey point locations at Parley's Historic Nature Park.

### *Citizen Scientist Participation and Training*

We recruited a total of 13 citizen science participants and 3 Tracy Aviary staff members to complete breeding season surveys at PHP. Breeding season survey participants were trained as part of Tracy Aviary's Citizen Science Program, which is made up of 30-40 participants per year that conduct breeding bird surveys in 12 project locations throughout Salt Lake County. Training for the Citizen Science Program began in late February each year 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 PHP during the 2015 breeding season (May 23$^{rd}$ - July 13$^{th}$), 4 breeding bird surveys during 2016 (May 24$^{th}$ –June 25$^{th}$), and 4 breeding bird surveys during 2017 (May 26$^{th}$ –July 3$^{rd}$). 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 – April each year, we conducted monthly non-breeding surveys to better understand the birds that use this area year-round. Non-breeding surveys were open to Tracy Aviary's Citizen Science Program and all interested members of the public. During the non-breeding surveys, at least one trained Tracy Aviary staff person or citizen scientist (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.

### *Data Analysis*

We compiled lists of all species observed during breeding season surveys and all species observed during the non-breeding season. We used point count data to calculate species richness and the relative abundance, or total number of observations/survey, for each species, and noted whether birds occupied the area during the breeding season, non-breeding season, or throughout the year. We identified the most common species as those with the highest number of detections per survey. We identified the most widespread species as those detected at all six sampling points across PHP. To investigate whether PHP provides habitat for species of conservation concern in the state, we compared our list of species documented at PHP with two conservation priority lists and plans: Utah Partners in Flight Avian Conservation Strategy and the Utah Wildlife Action Plan 2015-2025 (Parrish et al. 2002, Utah Wildlife Action Plan Joint Team 2015).

We investigated patterns of bird occurrence at PHP by comparing the community composition at different sampling points across the site. 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). We calculated the proportion of observations of species in each group that were detected within 125m of each sampling point. We then compared the group proportions between sampling points to determine which sampling points had the highest proportion of native, the lowest proportion of urban-adapted, and the highest proportion of riparian-associated species.

## RESULTS

### *Bird Community at Parley's Historic Nature Park*

During the breeding season from 2015 to 2017, we had 893 bird observations and detected 44 species during the twelve breeding bird surveys (Table 1). During the non-breeding season from 2015-2017, we had 3,271 bird observations and detected 73 species (Table 2). 34 of these

species were detected exclusively during the non-breeding season, resulting in a total species list of 78 species at Parley's Historic Nature Park.

**Table 1:** Complete list of species and the number of observations per survey for each species during breeding season surveys in 2015-2017.

| **Species** | **Number of Observations (detections/survey)** | | |
|---|---|---|---|
| | **2015** | **2016** | **2017** |
| American Robin | 7.75 | 8.75 | 7.5 |
| Yellow Warbler | 5.75 | 7.25 | 6 |
| Spotted Towhee | 5.5 | 5.75 | 4.25 |
| Black-headed Grosbeak | 5.25 | 6.75 | 3.75 |
| Black-capped Chickadee | 4.75 | 2.25 | 4 |
| Song Sparrow | 4.75 | 5.25 | 3.75 |
| Mourning Dove | 3.25 | 2.25 | 1.5 |
| Blue-gray Gnatcatcher | 2.75 | 2.25 | 3 |
| House Finch | 2.5 | 2.75 | 3 |
| Lazuli Bunting | 2.5 | 4.5 | 6.75 |
| Warbling Vireo | 2.5 | 4.75 | 2.5 |
| Lesser Goldfinch | 2.25 | 3.5 | 2 |
| American Goldfinch | 1.5 | 1.5 | 3.25 |
| Black-billed Magpie | 1.25 | 1 | 0.5 |
| House Sparrow | 1.25 | 1 | 1.75 |
| Woodhouse's Scrub-jay | 1.25 | 1.5 | 0.75 |
| Broad-tailed Hummingbird | 1 | 0 | 0.5 |
| California Quail | 1 | 0.5 | 1 |
| European Starling | 1 | 2.25 | 1 |
| Northern Flicker | 1 | 2 | 1 |
| Rock Pigeon | 1 | 2 | 4.5 |
| Black-chinned Hummingbird | 0.75 | 2.25 | 0 |
| California Gull | 0.75 | 0 | 0 |
| Cedar Waxwing | 0.75 | 0.25 | 0.75 |
| Western Tanager | 0.75 | 0.75 | 0 |
| Cooper's Hawk | 0.5 | 0.25 | 0 |
| Barn Swallow | 0.25 | 0.25 | 0.25 |
| Brown-headed Cowbird | 0.25 | 1 | 0 |
| Cordilleran Flycatcher | 0.25 | 0 | 0 |
| Eurasian Collared-dove | 0.25 | 0.25 | 0.25 |
| Mallard | 0.25 | 0.75 | 0 |
| Red-tailed Hawk | 0.25 | 0 | 0 |
| Western Kingbird | 0.25 | 0.5 | 0.75 |
| Yellow-breasted Chat | 0 | 1.5 | 0 |
| American Kestrel | 0 | 1.25 | 0 |
| Downy Woodpecker | 0 | 0.75 | 0.5 |
| Canada Goose | 0 | 0.25 | 0 |
| Chipping Sparrow | 0 | 0.25 | 0.5 |
| MacGillivray's Warbler | 0 | 0.25 | 0 |
| Plumbeous Vireo | 0 | 0.25 | 0.5 |
| American Coot | 0 | 0 | 0.5 |
| Common Raven | 0 | 0 | 0.25 |
| Northern Rough-winged Swallow | 0 | 0 | 0.25 |
| Sharp-shinned Hawk | 0 | 0 | 0.25 |

**Table 2:** Complete list of species and the number of observations per survey for each species during non-breeding season surveys in 2015-2017. *indicates a species that was detected exclusively during the non-breeding season.

| Species | Number of Observations (detections/survey) | | |
|---|---|---|---|
| | 2015 | 2016 | 2017 |
| House Finch | 25.33 | 20.13 | 19.63 |
| European Starling | 17.5 | 4.5 | 9.75 |
| Rock Pigeon | 14.33 | 11.88 | 23.13 |
| Black-capped Chickadee | 12.33 | 9.75 | 10.25 |
| Dark-eyed Junco* | 9.83 | 8.88 | 9.88 |
| American Robin | 7.5 | 7.63 | 7.38 |
| House Sparrow | 6.5 | 3 | 2.13 |
| Lesser Goldfinch | 6 | 10 | 13.88 |
| Song Sparrow | 5.67 | 5.75 | 11 |
| Woodhouse's Scrub-Jay | 5 | 4.38 | 7 |
| Northern Flicker | 4 | 2.63 | 2.88 |
| California Quail | 3.83 | 4.13 | 0.13 |
| Black-billed Magpie | 3.83 | 3.75 | 1.38 |
| Spotted Towhee | 3.67 | 2.63 | 4.5 |
| Mourning Dove | 3.17 | 7.13 | 3.75 |
| Pine Siskin* | 2.67 | 0 | 0.5 |
| American Goldfinch | 2.5 | 2.5 | 7.38 |
| Ruby-crowned Kinglet* | 1.67 | 1.25 | 1.25 |
| Cedar Waxwing | 1.5 | 8.13 | 1.5 |
| Downy Woodpecker | 1.33 | 1 | 2 |
| Brown Creeper* | 1.33 | 0.25 | 0.13 |
| Mallard | 1.17 | 0.38 | 1.5 |
| Red-tailed Hawk | 0.83 | 0.25 | 0.63 |
| Blue-gray Gnatcatcher | 0.83 | 0.63 | 1.5 |
| Canada Goose | 0.67 | 0 | 1.88 |
| Eurasian Collared-Dove | 0.67 | 2.25 | 1 |
| American Kestrel | 0.67 | 1.25 | 0.88 |
| Yellow-rumped Warbler* | 0.67 | 0.75 | 0.13 |
| Western Tanager | 0.67 | 0.5 | 0.38 |
| Lazuli Bunting | 0.67 | 0.88 | 1.5 |
| Black-chinned Hummingbird | 0.5 | 0.25 | 1.25 |
| Dusky Flycatcher* | 0.5 | 0 | 0 |
| White-crowned Sparrow* | 0.33 | 0.5 | 0.5 |
| Evening Grosbeak* | 0.33 | 0 | 0 |
| Golden Eagle* | 0.17 | 0 | 0 |
| Cooper's Hawk | 0.17 | 0.5 | 1.13 |
| Bald Eagle* | 0.17 | 0 | 0 |
| Common Poorwill* | 0.17 | 0 | 0 |
| Cassin's Vireo* | 0.17 | 0.13 | 0 |
| Common Raven | 0.17 | 0.25 | 0.25 |
| Barn Swallow | 0.17 | 0.25 | 0.38 |
| Mountain Chickadee* | 0.17 | 0 | 0 |
| American Dipper* | 0.17 | 0 | 0 |
| Townsend's Solitaire* | 0.17 | 0 | 0 |
| Wilson's Warbler* | 0.17 | 0.13 | 0 |
| Hermit Thrush* | 0 | 0.88 | 0.13 |
| Yellow Warbler | 0 | 0.75 | 1.13 |

| | | | |
|---|---|---|---|
| Black-headed Grosbeak | 0 | 0.75 | 0.25 |
| Warbling Vireo | 0 | 0.38 | 0 |
| California Gull | 0 | 0.25 | 0 |
| Rufous Hummingbird* | 0 | 0.25 | 0.13 |
| Gray Catbird* | 0 | 0.25 | 0.25 |
| Bullock's Oriole* | 0 | 0.25 | 0 |
| Common Goldeneye* | 0 | 0.13 | 0 |
| Turkey Vulture* | 0 | 0.13 | 0 |
| Ring-billed Gull* | 0 | 0.13 | 0 |
| Broad-tailed Hummingbird | 0 | 0.13 | 0 |
| Calliope Hummingbird* | 0 | 0.13 | 0 |
| Red-naped Sapsucker* | 0 | 0.13 | 0 |
| Plumbeous Vireo | 0 | 0.13 | 0.5 |
| House Wren* | 0 | 0.13 | 0 |
| Chipping Sparrow | 0 | 0.13 | 0 |
| Steller's Jay* | 0 | 2.38 | 0 |
| American Crow* | 0 | 0 | 0.38 |
| Belted Kingfisher* | 0 | 0 | 0.25 |
| Golden-crowned Kinglet* | 0 | 0 | 0.25 |
| Sharp-shinned Hawk | 0 | 0 | 0.13 |
| Peregrine Falcon* | 0 | 0 | 0.13 |
| Cordilleran Flycatcher | 0 | 0 | 0.13 |
| Red-breasted Nuthatch* | 0 | 0 | 0.13 |
| Nashville Warbler* | 0 | 0 | 0.13 |
| MacGillivray's Warbler | 0 | 0 | 0.13 |
| Black-throated Gray Warbler* | 0 | 0 | 0.13 |

### *Common and Widespread Species at Parley's Historic Nature Park*

**Figure 3.** Most common species detected at PHP during 2015-2017 breeding seasons. Top row: American Robin, Yellow Warbler, Black-capped Chickadee, Song Sparrow. Bottom row: Spotted Towhee, Black-headed Grosbeak, Lazuli Bunting, Rock Pigeon. Photos from allaboutbirds.org.

American Robins were the most common species that we detected during breeding season surveys in all years (Table 1, Figure 3). Yellow Warblers, and Spotted Towhees were also included in the top five most common species for all years, but their relative abundance varied between years. Other species detected with high relative abundances include Black-headed Grosbeaks (included in top five most common species for 2015 and 2016), Black-capped

Chickadees (top five in 2015), Song Sparrows (top five in 2016), Lazuli Buntings and Rock Pigeons (top five in 2017).

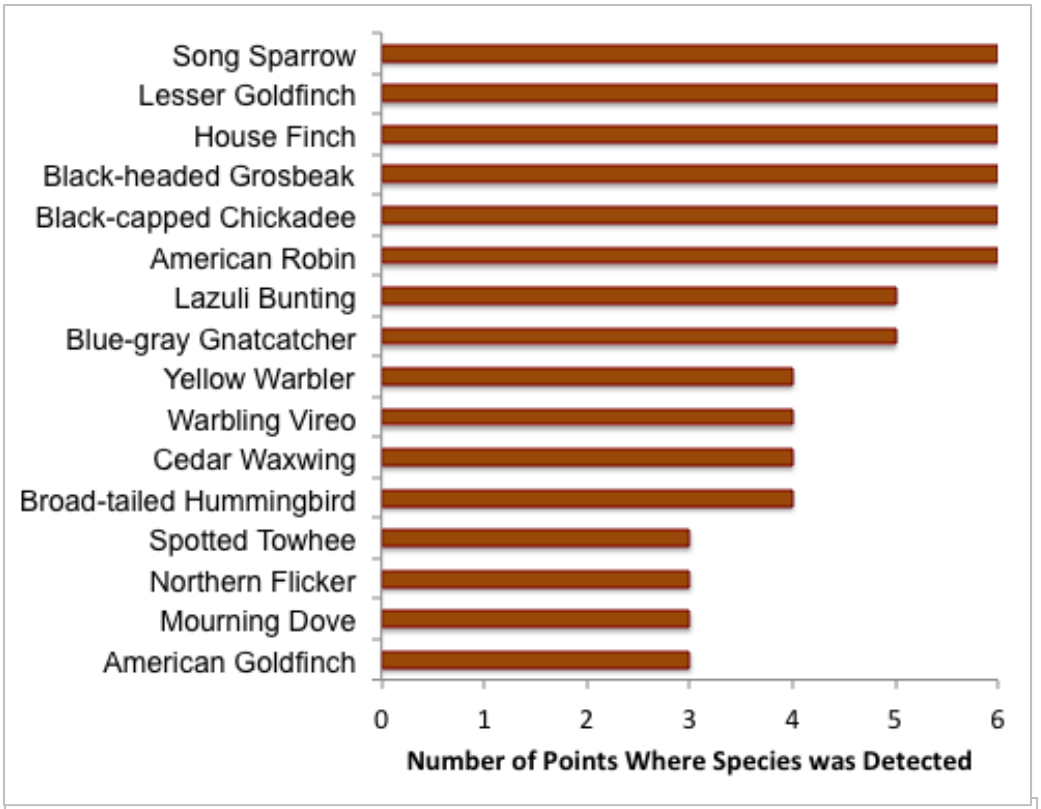


**Figure 4.** Most widespread species detected at PHP during 2015-2017 breeding seasons, and the number of sampling points in which each species was detected.

Six species were widespread across PHP, and were detected at all six sampling points during the 2015-2017 breeding seasons: American Robin, Black-capped Chickadee, Black-headed Grosbeak, House Finch, Lesser Goldfinch, and Song Sparrow (Figure 4).

### *Species of Conservation Concern at Parley's Historic Nature Park*

We detected five birds that are designated as species of conservation importance in the state of Utah. Two species are considered priorities in the Utah Partners in Flight Avian Conservation Strategy: the Broad-tailed Hummingbird, and Black-throated Gray Warbler (Parrish et al. 2002). We detected three species listed as Species of Greatest Conservation Need in the Utah Wildlife Action Plan 2015-2025: Bald Eagle, Golden Eagle, and Peregrine Falcon (Utah Wildlife Action Plan Joint Team 2015).

***Patterns of Bird Occurrence throughout Parley's Historic Nature Park***

Species richness at points during the breeding season ranged from 19 species at point number 2 to 27 species at point number 3. Point number 2 and 3 had the healthiest bird communities; 100% of birds detected during breeding season surveys were native, fewer than 36% of detections were urban-adapted species, and more than 58% were riparian-associated species (Figure 5). Point number 1 had the most altered bird community: 25% of the birds detected during the breeding season were non-native, more than 68% of birds were urban-adapted species, and fewer than 20% of species were riparian-associated (Figure 5).

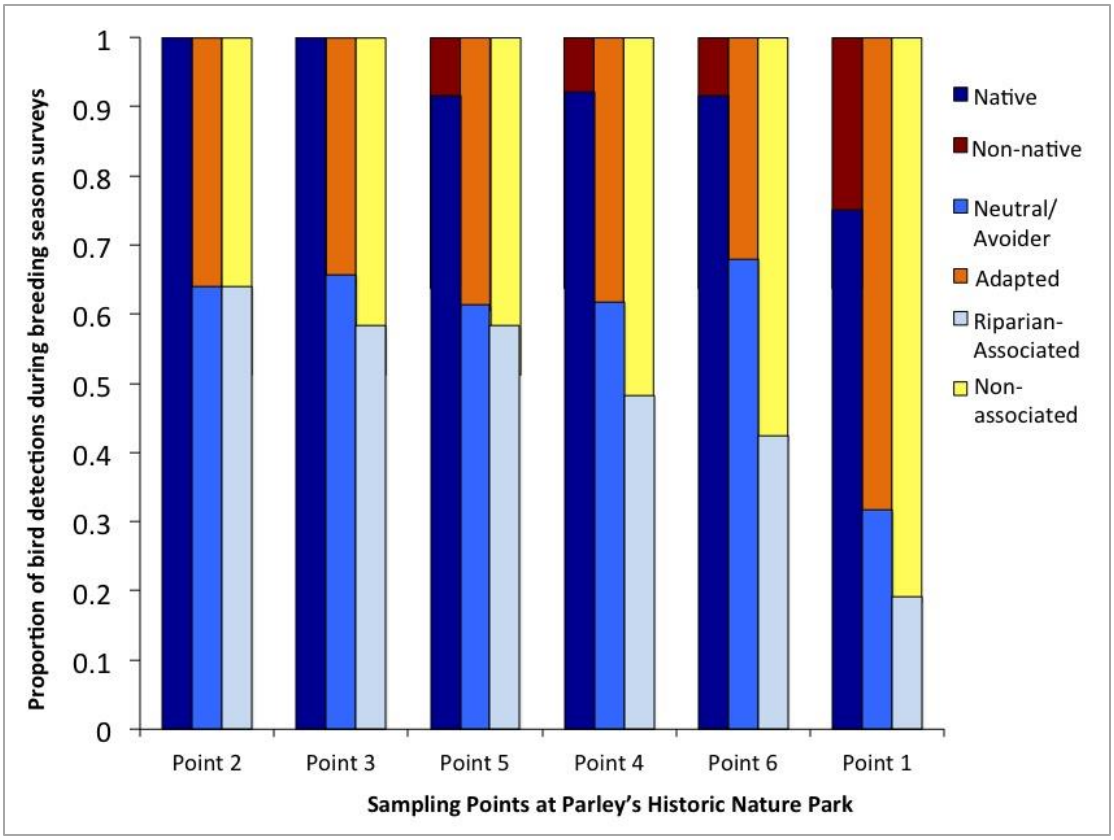


**Figure 5.** Proportion of birds detected at each sampling point in Parley's Historic Nature Park during breeding season surveys that were classified as native or non-native, urban-neutral/urban avoider or urban-adapted, and riparian-associated or riparian non-associated.

**DISCUSSION**

Although Parley's Historic Nature Park is an urban park that sees heavy recreational use, it provides important riparian habitat for a large number of bird species. The species richness of the area is comparable, and even higher, than yearly counts of species in other riparian areas in Northern Utah. For example, in a study by Parrish et al. (2007) of Utah's riparian birds surveyed

during May to August in 1992-2005, the sites near Ogden, Provo, Logan, and Salt Lake City had an average of 29 to 56 species detected per year. We detected 44 species during 2015-2017 breeding seasons.

Species that we identified as common (high relative abundance) and widespread (detected at a majority of sampling points across the site) demonstrate the importance of the riparian vegetation as well as the upland scrub oak habitat at the site. Yellow Warblers, Black-headed Grosbeaks, and Song Sparrows are all strongly associated with riparian habitat, while Lazuli Buntings and Spotted Towhees are associated with scrub oak habitat. Unsurprisingly for a park adjacent to a residential area, the urban-adapted American Robin, Black-capped Chickadee, Lesser Goldfinch, and Rock Pigeon were also found to be common and/or widespread.

We found some interesting variation in patterns of bird occurrence across the site. Points 2 and 3 had the least altered bird community; fewer than 36% of detections were urban-adapted species, and more than 58% were riparian-associated species. These points were both located in the riparian "restoration and buffer area," but varied in recreational access; point 2 allowed access by off-leash dogs, while point 3 was closed to off-leash access (Figure 1, Figure 2). It is unsurprising that point 1 had the most altered bird community; this point is closest to the neighborhood, streets, and parking lot. Located at the entrance point for the off-leash area, point 1 also sees near-constant foot traffic during busy times. Overall, we did not observe large differences in bird occurrence throughout the site. This is likely because the site is relatively small, and encompasses a small number of habitat types across the area.

Parley's Historic Nature Park provides important habitat to many birds, including riparian-associated species and species of conservation concern. To enhance the ecological value of Parley's Historic Nature Park 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. 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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