# Avian Point Count Survey

# Salt River Ecosystem Restoration Project

## Phase 1 – Year 3

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**INTRODUCTION**

The Salt River Ecosystem Restoration Project is a large restoration effort that is rehabilitating seven miles of aggraded river channel and converting 330 acres of agricultural land back into a tidal marsh. The project is being constructed in multiple phases. In 2013, the "Phase 1 – Riverside Ranch" of the project excavated 2.5 miles of river channel and restored 330 acres of a tidal marsh. Prior to this specific restoration phase, avian point count surveys were performed to determine species composition in and around the project area. Under project permit requirements, an avian point count survey is to be performed the third year after completion of the Phase 1 – Riverside Ranch portion of the project. This Year 3 avian point count survey is the first to document species presence, avian richness, and relative abundance in the restored restoration area. These results will be compared to pre-project baseline conditions that were documented in 2011.

All surveys were performed by Sean E. McAllister & Associates.

**SURVEY AREA**

Seven monitoring sites (five survey sites and two reference sites) have been established prior to restoration efforts. Before construction, the survey area primarily consisted of riparian and agricultural fields. After construction, the two reference sites' habitats have remained static and are primarily located with riparian and grazed pasture. While the five survey sites' habitats shifted from riparian and agricultural fields to tidal marsh or riparian associated with a significantly larger and tidally influenced river channel (Table 1).

Table 1: Description of Phase 1 – Riverside Ranch Avian Point Count Monitoring Sites

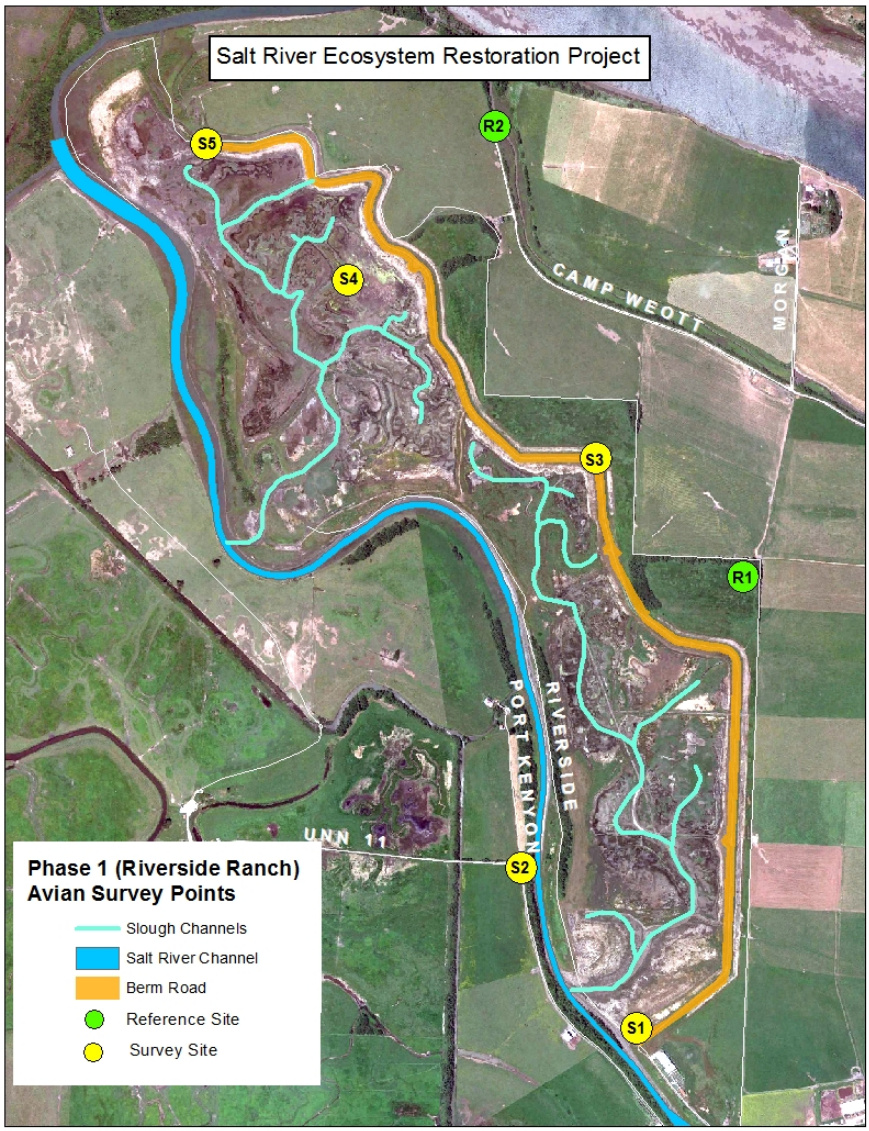
| Monitoring Site | Pre-Project Habitat Type | Post Project Habitat Type (Year 3) |
|---|---|---|
| S1 – Survey Site 1 | Riparian | Riparian, Tidal Marsh, Tidally Influenced River Channel, and Pasture |
| S2 – Survey Site 2 | Riparian | Riparian, Tidally influence River Channel, and Grazed Pasture |
| S3 – Survey Site 3 | Agricultural Field | Tidal Marsh and Pasture |
| S4 – Survey Site 4 | Agricultural Field | Tidal Marsh |
| S5 – Survey Site 5 | Levee (Upland) | Tidal Marsh and Grazed Pasture |
| R1 – Reference Site 1 | Riparian (Freshwater wetland) | Riparian (Freshwater wetland) |
| R2 – Reference Site 2 | Riparian (Tidal Marsh) | Riparian (Tidal Marsh) |

**METHODS**

Census monitoring using point count methods followed a site-specific protocol developed in consultation with California Department of Fish & Wildlife and project biologists, which was modified from the protocol established by Ralph et al. (1993). For example, breeding bird surveys were conducted for 15 minutes, verses the traditional 3 minute point count, at each survey point within 4 hours of sunrise to capture the peak period of bird activity. Surveys were not conducted during rain or strong winds or after 10:30 am.

Point count surveys were conducted at five survey sites on Phase 1 - Riverside Ranch and at two reference site locations in the vicinity of the project area to control for inter-annual variability in species abundance (Figure 1).

**Figure 1. Survey Site Location Map**




## YEAR 3 (2016) AVIAN SURVEY RESULTS

In Year 3, monitoring was performed on June 27th and July 23rd of 2016. A combined total of 832 individual bird detections were made over the two surveys dates (a total of 14 avian point counts) and were represented by at least 52 different species. Five species, American Goldfinch (*Spinus tristis*), Song Sparrow (*Melospiza melodia*), Barn Swallow (*Hirundo rustica*), Brown Headed Cowbird (*Molothrus ater*), and the Eurasian Collard Dove (*Streptopelia decaocto*) were detected at all points during at least one of the two survey days. The most prevalent species overall was the Song Sparrow, detected during all 14 point counts. The most abundant species

was the European Starling (*Sturnus vulgaris*), with 259 combined detections, followed by Song Sparrow (69) and Barn Swallow (68). Eleven species were represented by single birds detected only once (Table 1).

Of the 52 species detected, four (4) are listed as *Species of Special Concern* (SSC) by the California Department of Fish and Wildlife or as *Threatened* (T) or *Endangered* (E) under the California Endangered Species Act. These species are underscored in Table 1, below. Three (3) of the species detected, denoted below with an asterisk (*), were only observed while flying over the project area and were not associating with the surveyed habitats. Other flyover birds were actively foraging (e.g., swallows) or hunting (raptors) while in flight over the project area.

**Table 1: All Species Detected with Relative Abundance (total count) for Year 3 (2016) – Phase 1 (Riverside Ranch).** Table continues on next page.

| Common Name | Species Name | Relative Abundance |
|---|---|---|
| American Goldfinch | *Carduelis tristis* | 47 |
| American Robin | *Turdus migratorius* | 23 |
| Anna's Hummingbird | *Calypte anna* | 1 |
| Bald Eagle | *Haliaeetus leucocephalus* | 1 |
| Barn Swallow | *Hirundo rustica* | 68 |
| Black Phoebe | *Sayornis nigricans* | 8 |
| Black-bellied Plover | *Pluvialis squatarola* | 3 |
| Black-capped Chickadee | *Poecile atricapillus* | 8 |
| Black-crowned Night-Heron | *Nycticorax nycticorax* | 2 |
| Black-headed Grosbeak | *Pheucticus melanocephalus* | 3 |
| Brewer's Blackbird | *Euphagus cyanocephalus* | 24 |
| Brown-headed Cowbird | *Molothrus ater* | 29 |
| Bryant's Savannah Sparrow | *Passerculus sandwichensis alaudinus* | 16 |
| Bullock's Oriole | *Icterus bullockii* | 2 |
| Canada Goose* | *Branta canadensis* | 1 |
| Caspian Tern* | *Hydroprogne caspia* | 4 |
| Chestnut-backed Chickadee | *Poecile rufescens* | 1 |
| Cliff Swallow | *Petrochelidon pyrrhonota* | 15 |
| Common Raven | *Corvus corax* | 13 |
| Common Yellowthroat | *Geothlypis trichas* | 2 |
| Double-crested Cormorant* | *Phalacrocorax auritus* | 2 |
| Downy Woodpecker | *Picoides pubescens* | 2 |
| Eurasian Collared-Dove | *Streptopelia decaocto* | 15 |

| Common Name | Species Name | Relative Abundance |
|---|---|---|
| European Starling | *Sturnus vulgaris* | 259 |
| Great Blue Heron | *Ardea herodias* | 1 |
| Great Egret | *Ardea alba* | 6 |
| Greater Yellowlegs | *Tringa melanoleuca* | 10 |
| House Finch | *Carpodacus mexicanus* | 1 |
| Least Sandpiper | *Calidris minutilla* | 4 |
| Lesser Goldfinch | *Carduelis psaltria* | 2 |
| Marsh Wren | *Cistothorus palustris* | 19 |
| Mourning Dove | *Zenaida macroura* | 13 |
| Northern Flicker | *Colaptes auratus* | 2 |
| Northern Harrier | *Circus cyaneus* | 2 |
| Orange-crowned Warbler | *Vermivora celata* | 5 |
| Pacific Wren | *Troglodytes pacificus* | 2 |
| Pacific-slope Flycatcher | *Empidonax difficilis* | 2 |
| Purple Martin | *Progne subis* | 2 |
| Semipalmated Plover | *Charadrius semipalmatus* | 1 |
| Shorebird Sp. | *Calidris sp.* | 14 |
| Song Sparrow | *Melospiza melodia* | 69 |
| Swainson's Thrush | *Catharus ustulatus* | 19 |
| Swallow Sp. | Hirundidae (gen, sp) | 30 |
| Tree Swallow | *Tachycineta bicolor* | 23 |
| Turkey Vulture | *Cathartes aura* | 15 |
| Unidentified Hummingbird | *Trochilidae (gen, sp)* | 1 |
| Unidentified Selasphorus Hummingbird | *Selaphorus (sp)* | 1 |
| Violet-green Swallow | *Tachycineta thalassina* | 7 |
| Western Gull | *Larus occidentalis* | 3 |
| White-crowned Sparrow | *Zonotrichia leucophrys* | 15 |
| White-tailed Kite | *Elanus leucurus* | 2 |
| Wilson's Warbler | *Wilsonia pusilla* | 3 |
| Wrentit | *Chamaea fasciata* | 7 |
| Yellow Warbler | *Setophaga petechia* | 1 |
| Yellow-breasted Chat | *Icteria virens* | 1 |
| | **TOTAL** | **832** |

Fourteen point count surveys performed across seven monitoring sites in June and July of 2016 showed that species richness averaged 15.5 species per survey date across all seven sites (range 9 to 21). Species richness averaged 15.75 per survey date across the two reference sites. Survey sites averaged 15.4 species across the five survey sites (Figure 4). A further breakdown of average species richness per survey point is shown in Figure 2.

From the 14 point count surveys, relative abundance averaged 59.4 birds per site across all seven monitoring sites. Reference sites averaged lower at 41.3 birds per site and survey sites averaged slightly higher at 66.7 birds per site (Figure 4). A further breakdown of average relative abundance per site for each monitoring date is shown in Figure 3. More birds were detected across all sites in July (576) than in June (256).

Tables 2 through 8 details species and number of birds detected at each monitoring site. Survey sites S4 and S5 show greater shorebird and aquatic species such as Black Bellied Plover (*Pluvialis squatarola)*, Caspian Turn (*Hydroprogne caspia)*, Great Egret (*Ardea alba)*, and Double Breasted Cormorant (*Phalacrocorax auritus)*.

**Figure 2. Average Species Richness at All Sites for Year 3 (2016) – Phase 1 (Riverside Ranch)**

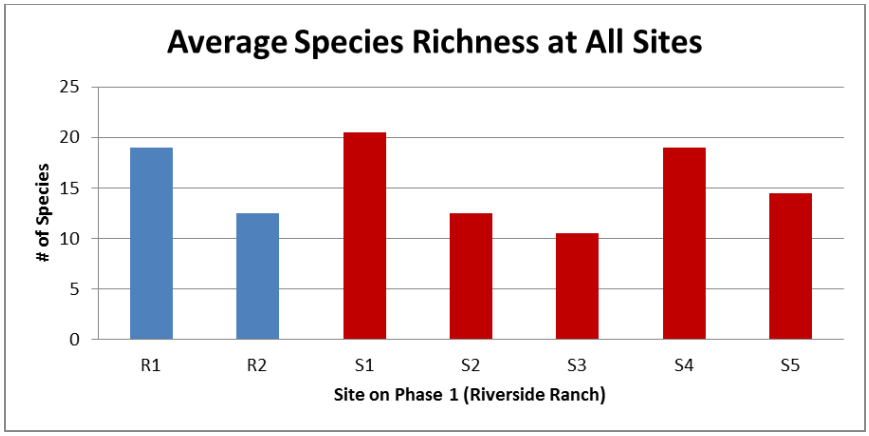


**Figure 3. Average Relative Abundance at All Sites for Year 3 (2016) – Phase 1 (Riverside Ranch)**

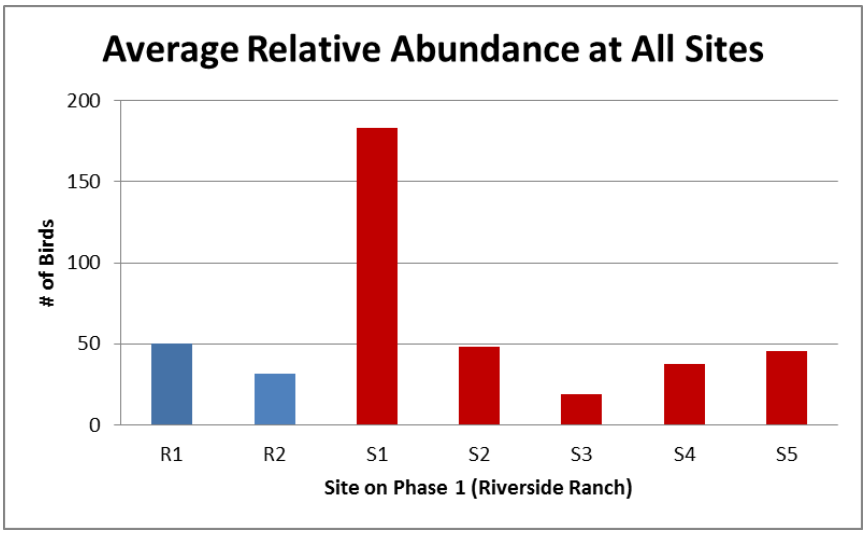



**Figure 4. Comparing Average Abundance and Average Number of Species Between Reference and Survey Sites for Year 3 – Phase 1 (Riverside Ranch)**

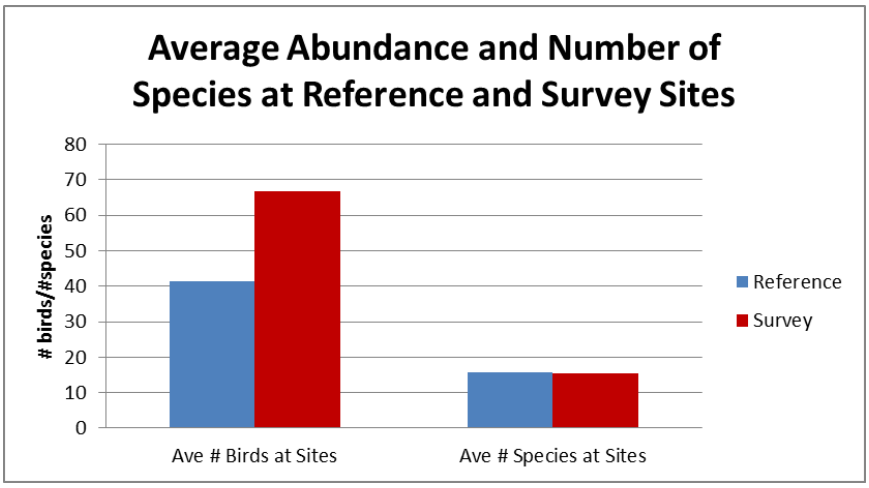


**Table 2: Survey Site 1 Species and Individual Point Count Data for Year 3 (2016) - Phase 1 (Riverside Ranch)**

| S1 | Species - Common Name | June | July | Total | < 50m | >50m | Fly over |
|---|---|---|---|---|---|---|---|
| 1 | American Goldfinch | 1 | 1 | **2** | 2 | 0 | 0 |
| 2 | American Robin | 2 | 1 | **3** | 0 | 3 | 0 |
| 3 | Anna's Hummingbird | 1 | 0 | **1** | 0 | 0 | 1 |
| 4 | Barn Swallow | 3 | 3 | **6** | 0 | 0 | 6 |
| 5 | Black Phoebe | 2 | 1 | **3** | 3 | 0 | 0 |
| 6 | Black-capped Chickadee | 3 | 0 | **3** | 3 | 0 | 0 |
| 7 | Black-headed Grosbeak | 1 | 0 | **1** | 0 | 1 | 0 |
| 8 | Brewer's Blackbird | 6 | 0 | **6** | 0 | 0 | 6 |
| 9 | Brown-headed Cowbird | 7 | 0 | **7** | 0 | 2 | 5 |
| 10 | Canada Goose | 0 | 1 | **1** | 0 | 1 | 0 |
| 11 | Common Raven | 2 | 1 | **3** | 0 | 3 | 0 |
| 12 | Common Yellowthroat | 0 | 1 | **1** | 1 | 0 | 0 |
| 13 | Downy Woodpecker | 1 | 0 | **1** | 0 | 1 | 0 |
| 14 | Eurasian Collared-Dove | 2 | 3 | **5** | 2 | 3 | 0 |
| 15 | European Starling | 2 | 250 | **252** | 0 | 252 | 0 |
| 16 | Greater Yellowlegs | 0 | 7 | **7** | 6 | 1 | 0 |
| 17 | Lesser Goldfinch | 0 | 2 | **2** | 0 | 2 | 0 |
| 18 | Mourning Dove | 3 | 3 | **6** | 2 | 1 | 3 |
| 19 | Pacific-slope Flycatcher | 0 | 2 | **2** | 1 | 1 | 0 |
| 20 | Savannah Sparrow | 1 | 0 | **1** | 0 | 1 | 0 |
| 21 | Song Sparrow | 5 | 2 | **7** | 4 | 3 | 0 |
| 22 | Swainson's Thrush | 3 | 2 | **5** | 2 | 3 | 0 |
| 23 | Swallow Sp. | 0 | 30 | **30** | 0 | 30 | 0 |
| 24 | Tree Swallow | 1 | 2 | **3** | 0 | 0 | 3 |
| 25 | Turkey Vulture | 1 | 1 | **2** | 0 | 0 | 2 |
| 26 | White-crowned Sparrow | 0 | 2 | **2** | 0 | 2 | 0 |
| 27 | Wrentit | 2 | 2 | **4** | 4 | 0 | 0 |
| | | | | | | | |
| | **TOTALS** | **49** | **317** | **368** | **30** | **312** | **26** |

**Table 3: Survey Site 2 Species and Individual Point Count Data for Year 3 (2016) - Phase 1 (Riverside Ranch)**

| S2 | Species - Common Name | June | July | Total | < 50m | >50m | Fly over |
|---|---|---|---|---|---|---|---|
| 1 | American Goldfinch | 2 | 3 | **5** | 2 | 0 | 3 |
| 2 | American Robin | 6 | 2 | **8** | 4 | 4 | 0 |
| 3 | Barn Swallow | 0 | 23 | **23** | 0 | 15 | 8 |
| 4 | Brewer's Blackbird | 7 | 5 | **12** | 2 | 6 | 4 |
| 5 | Brown-headed Cowbird | 5 | 0 | **5** | 4 | 1 | 0 |
| 6 | Chestnut-backed Chickadee | 0 | 1 | **1** | 0 | 1 | 0 |
| 7 | Cliff Swallow | 2 | 0 | **2** | 0 | 1 | 1 |
| 8 | Eurasian Collared-Dove | 2 | 0 | **2** | 0 | 2 | 0 |
| 9 | European Starling | 3 | 0 | **3** | 0 | 1 | 2 |
| 10 | Greater Yellowlegs | 1 | 1 | **2** | 0 | 2 | 0 |
| 11 | Mourning Dove | 0 | 2 | **2** | 1 | 0 | 1 |
| 12 | Song Sparrow | 5 | 3 | **8** | 5 | 3 | 0 |
| 13 | Swainson's Thrush | 2 | 1 | **3** | 1 | 2 | 0 |
| 14 | Turkey Vulture | 0 | 7 | **7** | 0 | 6 | 1 |
| 15 | Unidentified Hummingbird | 1 | 0 | **1** | 0 | 0 | 1 |
| 16 | Violet-green Swallow | 0 | 7 | **7** | 0 | 6 | 1 |
| 17 | White-crowned Sparrow | 3 | 0 | **3** | 3 | 0 | 0 |
| 18 | Wrentit | 2 | 0 | **2** | 0 | 2 | 0 |
| 19 | Yellow-breasted Chat | 1 | 0 | **1** | 0 | 1 | 0 |
| | | | | | | | |
| | **TOTALS** | **42** | **55** | **97** | **22** | **53** | **22** |

**Table 4: Survey Site 3 Species and Individual Point Count Data for Year 3 (2016) - Phase 1 (Riverside Ranch)**

| S3 | Species - Common Name | June | July | Total | < 50m | >50m | Fly over |
|---|---|---|---|---|---|---|---|
| 1 | American Goldfinch | 2 | 0 | **2** | 1 | 1 | 0 |
| 2 | Barn Swallow | 2 | 3 | **5** | 0 | 0 | 5 |
| 3 | Black Phoebe | 0 | 2 | **2** | 2 | 0 | 0 |
| 4 | Brewer's Blackbird | 2 | 0 | **2** | 0 | 1 | 1 |
| 5 | Brown-headed Cowbird | 1 | 2 | **3** | 0 | 3 | 0 |
| 6 | Common Raven | 1 | 0 | **1** | 0 | 1 | 0 |
| 7 | Eurasian Collared-Dove | 1 | 1 | **2** | 0 | 2 | 0 |
| 8 | Greater Yellowlegs | 1 | 0 | **1** | 0 | 1 | 0 |
| 9 | Northern Flicker | 1 | 0 | **1** | 0 | 1 | 0 |
| 10 | Savannah Sparrow | 3 | 1 | **4** | 3 | 1 | 0 |
| 11 | Song Sparrow | 5 | 3 | **8** | 6 | 2 | 0 |
| 12 | Swainson's Thrush | 3 | 2 | **5** | 0 | 5 | 0 |
| 13 | White-crowned Sparrow | 1 | 1 | **2** | 1 | 1 | 0 |
| | | | | | | | |
| | **TOTALS** | **23** | **15** | **38** | **13** | **19** | **6** |

**Table 5: Survey Site 4 Species and Individual Point Count Data for Year 3 (2016) - Phase 1 (Riverside Ranch)**

| S4 | Species - Common Name | June | July | Total | < 50m | >50m | Fly over |
|---|---|---|---|---|---|---|---|
| 1 | American Goldfinch | 2 | 3 | **5** | 1 | 0 | 4 |
| 2 | American Robin | 1 | 1 | **2** | 0 | 2 | 0 |
| 3 | Bald Eagle | 1 | 0 | **1** | 0 | 1 | 0 |
| 4 | Barn Swallow | 1 | 2 | **3** | 0 | 0 | 3 |
| 5 | Black-bellied Plover | 0 | 1 | **1** | 0 | 1 | 0 |
| 6 | Black-capped Chickadee | 2 | 0 | **2** | 0 | 2 | 0 |
| 7 | Brewer's Blackbird | 3 | 0 | **3** | 0 | 3 | 0 |
| 8 | Brown-headed Cowbird | 1 | 0 | **1** | 0 | 0 | 1 |
| 9 | Bullock's Oriole | 2 | 0 | **2** | 0 | 2 | 0 |
| 10 | Caspian Tern | 0 | 1 | **1** | 0 | 1 | 0 |
| 11 | Cliff Swallow | 3 | 0 | **3** | 0 | 0 | 3 |
| 12 | Common Raven | 2 | 0 | **2** | 0 | 2 | 0 |
| 13 | Eurasian Collared-Dove | 0 | 0 | **0** | 0 | 0 | 0 |
| 14 | Great Egret | 0 | 1 | **1** | 0 | 1 | 0 |
| 15 | House Finch | 1 | 0 | **1** | 0 | 0 | 1 |
| 16 | Least Sandpiper | 0 | 4 | **4** | 0 | 4 | 0 |
| 17 | Marsh Wren | 1 | 2 | **3** | 1 | 2 | 0 |
| 18 | Mourning Dove | 1 | 0 | **1** | 0 | 0 | 1 |
| 19 | Orange-crowned Warbler | 1 | 0 | **1** | 0 | 1 | 0 |
| 20 | Savannah Sparrow | 2 | 2 | **4** | 3 | 1 | 0 |
| 21 | Semi-palmated Plover | 0 | 1 | **1** | 0 | 1 | 0 |
| 22 | Shorebird Sp. | 14 | 0 | **14** | 0 | 14 | 0 |
| 23 | Song Sparrow | 4 | 7 | **11** | 5 | 6 | 0 |
| 24 | Swainson's Thrush | 1 | 1 | **2** | 0 | 2 | 0 |
| 25 | Turkey Vulture | 0 | 2 | **2** | 0 | 0 | 2 |
| 26 | Western Gull | 1 | 1 | **2** | 0 | 1 | 1 |
| 27 | White-crowned Sparrow | 0 | 1 | **1** | 0 | 1 | 0 |
| 28 | Wrentit | 0 | 1 | **1** | 0 | 1 | 0 |
| | | | | | | | |
| | **TOTALS** | **44** | **31** | **75** | **10** | **49** | **16** |

**Table 6: Survey Site 5 Species and Individual Point Count Data for Year 3 (2016) - Phase 1 (Riverside Ranch)**

| S5 | Species - Common Name | June | July | Total | < 50m | >50m | Fly over |
|---|---|---|---|---|---|---|---|
| 1 | American Goldfinch | 2 | 14 | **16** | 12 | 0 | 4 |
| 2 | American Robin | 1 | 7 | **8** | 7 | 1 | 0 |
| 3 | Barn Swallow | 0 | 5 | **5** | 0 | 0 | 5 |
| 4 | Black-bellied Plover | 0 | 2 | **2** | 0 | 2 | 0 |
| 5 | Black-crowned Night-Heron | 0 | 2 | **2** | 0 | 2 | 0 |
| 6 | Brown-headed Cowbird | 0 | 8 | **8** | 0 | 2 | 6 |
| 7 | Common Raven | 1 | 1 | **2** | 0 | 2 | 0 |
| 8 | Double-crested Cormorant | 2 | 0 | **2** | 0 | 0 | 2 |
| 9 | Eurasian Collared-Dove | 1 | 1 | **2** | 0 | 2 | 0 |
| 10 | Great Blue Heron | 1 | 0 | **1** | 0 | 1 | 0 |
| 11 | Great Egret | 1 | 3 | **4** | 0 | 2 | 2 |
| 12 | Marsh Wren | 3 | 6 | **9** | 7 | 2 | 0 |
| 13 | Mourning Dove | 1 | 0 | **1** | 0 | 0 | 1 |
| 14 | Northern Flicker | 0 | 1 | **1** | 0 | 1 | 0 |
| 15 | Northern Harrier | 0 | 2 | **2** | 1 | 1 | 0 |
| 16 | Savannah Sparrow | 2 | 2 | **4** | 4 | 0 | 0 |
| 17 | Song Sparrow | 7 | 6 | **13** | 7 | 6 | 0 |
| 18 | Swainson's Thrush | 2 | 0 | **2** | 1 | 1 | 0 |
| 19 | Tree Swallow | 5 | 0 | **5** | 4 | 0 | 1 |
| 20 | Turkey Vulture | 1 | 0 | **1** | 0 | 0 | 1 |
| 21 | Western Gull | 0 | 1 | **1** | 0 | 0 | 1 |
| | | | | | | | |
| | **TOTALS** | **30** | **61** | **91** | **43** | **25** | **23** |

**Table 7: Reference Site 1 Species and Individual Point Count Data for Year 3 (2016) - Phase 1 (Riverside Ranch)**

| R1 | Species - Common Name | June | July | Total | < 50m | >50m | Fly over |
|---|---|---|---|---|---|---|---|
| 1 | American Goldfinch | 3 | 2 | **5** | 3 | 0 | 2 |
| 2 | American Robin | 0 | 2 | **2** | 2 | 0 | 0 |
| 3 | Barn Swallow | 1 | 13 | **14** | 0 | 0 | 14 |
| 4 | Black Phoebe | 2 | 1 | **3** | 3 | 0 | 0 |
| 5 | Black-capped Chickadee | 0 | 3 | **3** | 3 | 0 | 0 |
| 6 | Black-headed Grosbeak | 1 | 0 | **1** | 0 | 1 | 0 |
| 7 | Brown-headed Cowbird | 2 | 2 | **4** | 4 | 0 | 0 |
| 8 | Cliff Swallow | 8 | 2 | **10** | 0 | 0 | 10 |
| 9 | Common Raven | 2 | 1 | **3** | 1 | 2 | 0 |
| 10 | Common Yellowthroat | 0 | 1 | **1** | 0 | 1 | 0 |
| 11 | Downy Woodpecker | 0 | 1 | **1** | 1 | 0 | 0 |
| 12 | Eurasian Collared-Dove | 1 | 1 | **2** | 1 | 1 | 0 |
| 13 | Marsh Wren | 0 | 3 | **3** | 3 | 0 | 0 |
| 14 | Mourning Dove | 1 | 2 | **1** | 0 | 0 | 1 |
| 15 | Orange-crowned Warbler | 1 | 0 | **3** | 3 | 0 | 0 |
| 16 | Purple Martin | 2 | 0 | **2** | 0 | 0 | 2 |
| 17 | Savannah Sparrow | 0 | 1 | **1** | 1 | 0 | 0 |
| 18 | Song Sparrow | 8 | 6 | **14** | 9 | 5 | 0 |
| 19 | Swainson's Thrush | 2 | 0 | **2** | 1 | 1 | 0 |
| 20 | Tree Swallow | 1 | 14 | **15** | 0 | 0 | 15 |
| 21 | Turkey Vulture | 1 | 0 | **1** | 0 | 0 | 1 |
| 22 | Unidentified Selasphorus Hummingbird | 0 | 1 | **1** | 1 | 0 | 0 |
| 23 | White-crowned Sparrow | 2 | 1 | **3** | 3 | 0 | 0 |
| 24 | White-tailed Kite | 0 | 2 | **2** | 0 | 0 | 2 |
| 25 | Wilson's Warbler | 1 | 2 | **3** | 3 | 0 | 0 |
| 26 | Yellow Warbler | 1 | 0 | **1** | 1 | 0 | 0 |
| | | | | | | | |
| | **TOTALS** | **40** | **61** | **101** | **43** | **11** | **47** |

**Table 8: Reference Site 1 Species and Individual Point Count Data for Year 3 (2016) - Phase 1 (Riverside Ranch)**

| R2 | Species - Common Name | June | July | Total | < 50m | >50m | Fly over |
|---|---|---|---|---|---|---|---|
| 1 | American Goldfinch | 2 | 10 | **12** | 4 | 2 | 6 |
| 2 | Barn Swallow | 2 | 10 | **12** | | | 12 |
| 3 | Black-headed Grosbeak | 1 | | **1** | | 1 | |
| 4 | Brewer's Blackbird | 1 | | **1** | | | 1 |
| 5 | Brown-headed Cowbird | 1 | | **1** | | | 1 |
| 6 | Caspian Tern | | 3 | **3** | | 3 | |
| 7 | Common Raven | 2 | | **2** | | 2 | |
| 8 | Eurasian Collared-Dove | 1 | 1 | **2** | | 2 | |
| 9 | European Starling | 2 | 2 | **4** | 2 | 2 | |
| 10 | Great Egret | | 1 | **1** | | | 1 |
| 11 | Marsh Wren | 4 | | **4** | 2 | 2 | |
| 12 | Mourning Dove | 2 | | **2** | 2 | | |
| 13 | Orange-crowned Warbler | 1 | | **1** | | 1 | |
| 14 | Pacific Wren | | 2 | **2** | 2 | | |
| 15 | Savannah Sparrow | 2 | | **2** | 2 | | |
| 16 | Song Sparrow | 4 | 4 | **8** | 4 | 4 | |
| 17 | Turkey Vulture | 1 | 1 | **2** | | | 2 |
| 18 | White-crowned Sparrow | 2 | 2 | **4** | 4 | | |
| | | | | | | | |
| | **TOTALS** | **28** | **36** | **64** | **22** | **19** | **23** |

**COMPARISON OF PRE-PROJECT (2011) AND POST PROJECT (2016) RESULTS**

In 2016, avian point counts were performed at the same survey and reference sites as in 2011. Avian biologist, Sean McAllister, performed the avian point count surveys in both 2011 and 2016. The 2011 survey was completed two years prior to construction of Phase 1 - Riverside Ranch of the Salt River Ecosystem Restoration Project (S. Kline et al 2011). The purpose of the pre-project surveys is to track richness and relative abundance from baseline (pre-project) conditions through post project conditions. The following narrative compares 2011 (pre-construction) and 2016 (Year 3) results.

Total species richness for 2011 was 38 while 2016 was 52. The most abundant species in 2011 were the Song Sparrow (58), American Goldfinch (43), and Barn Swallow (*Hirundo rustica)* (36). In 2016 the most abundant species were the European Starling (259), Song Sparrow (69), and Barn Swallow (68).

Comparing June observations by pre-construction (2011) and post construction (2016) survey years, in June of 2011, 30 different species were detected which was comprised of 195 birds. June of 2016 had 36 species and 256 birds. June 2011 most abundant species were the American Goldfinch, Song Sparrow and Marsh Wren. While in June 2016 Song Sparrows were the most abundant species followed by Brewers Black Bird (*Euphagus cyanocephalus*), American Goldfinch, and Shore bird species. In June 2011, reference site R2 had the highest species richness (14) and abundance (47); S3 had the second highest abundance (35) and species richness (13); S1 had the least species richness (7), though a willow fly catcher, a species listed endangered by California, was detected at this site. June 2016 survey sites S1 and S4 both had the highest species richness (20); S1 had the highest abundance (49) and S4 had the second highest (44); S3 had the lowest species richness (12) and the lowest abundance (23) (Table 9).

Comparing July observations for pre-construction and post construction survey years, 31 avian species were detected and 178 individuals counted in July 2011, while July 2016 had 43 avian species and 576 individuals counted. In July 2011, the most abundant species were Song Sparrow (34), Barn Swallow (23) and American Goldfinch (20). While in July 2016, the most abundant species were European Starlings (*Sturnus vulgaris*) (252), Barn Swallow, and American Goldfinch. The survey site location with the highest species abundance and richness in July 2011 was S4 with 33 individuals of 13 different species; S1 had the lowest abundance (15) and R2 had the least species richness (7). July 2016's S1 site had the highest abundance (317 (252 of which were European Starlings)) and species richness (21); S3 had the least number of species (9) and the lowest number of individuals (15) (Table 9).

**Table 9. Comparison Bird Survey Results between Pre (2011) and Post (2016) Construction Periods by Month**

| Monitoring Site | 2011 Abundance | 2016 Abundance | 2011 Species Richness | 2016 Species Richness |
|---|---|---|---|---|
| **June** | | | | |
| S1 | 14 | 49 | 7 | 20 |
| S2 | 21 | 42 | 12 | 14 |
| S3 | 35 | 23 | 13 | 12 |
| S4 | 24 | 44 | 13 | 20 |
| S5 | 33 | 30 | 12 | 14 |
| R1 | 21 | 40 | 9 | 18 |
| R2 | 47 | 28 | 14 | 15 |
| **TOTAL** | **195** | **256** | **30** | **39** |
| **July** | | | | |
| S1 | 15 | 317 | 8 | 21 |
| S2 | 26 | 55 | 12 | 11 |
| S3 | 23 | 15 | 10 | 9 |
| S4 | 33 | 31 | 13 | 18 |
| S5 | 31 | 61 | 8 | 15 |
| R1 | 31 | 61 | 11 | 20 |
| R2 | 19 | 36 | 7 | 10 |
| **TOTAL** | **178** | **576** | **31** | **43** |

Taking into consideration all monitoring sites, total species richness and abundance significantly increased from 2011 to 2016. Total number of species for both June and July increased 45% from 2011 to 2016. Breaking it down by month, species richness increased 30% in June and 39% in July from 2011 to 2016. Total abundance for both June and July increased 123% from 2011 to 2016. June abundance increased by 31% and July increased by 224%[1] from 2011 to 2016.

Reviewing abundance between 2011 and 2016, total abundance increased by 161% from 2011 to 2016 (62%, not including European Starlings). Abundance in the month of June also saw an increase (48%) in 2016, as well as in July (274% or 77% without European Starlings) (Table 10). Species richness at the survey sites shows an increase from 2011. Avian surveys indicate that species richness increased by 29% in June 2016 as compared to June 2011. July surveys show that species richness increased by 38% in 2016 from 2011 (Table 10).

[1] Abundance in July of 2016 is significantly made up by 252 individuals in a European Starling flock. Removing these individuals still gives July an increase in abundance (83%) from 2011 to 2016.

**Table 10: Comparison of Abundance and Species Richness for 2011 and 2016 and by Survey and Reverence Sites**

| Survey Point | 2011 Abundance | 2016 Abundance | 2011 Species Richness | 2016 Species Richness |
|---|---|---|---|---|
| June | | | | |
| Survey Site | 127 | 188 | 28 | 36 |
| Reference Site | 68 | 68 | 18 | 22 |
| July | | | | |
| Survey Site | 128 | 479 | 26 | 36 |
| Reference Site | 50 | 97 | 14 | 25 |

In 2016, approximately 22 species were detected only at survey sites (i.e. not at the reference sites). Of the 22, 12 species could be considered to be more associated with aquatic or marsh environments, such as Bald Eagle (*Haliaeetus leucocephalus)*, Black-bellied Plover (*Pluvialis squatarola*), Black-crowned Night-Heron (*Nycticorax nycticorax*), Double-crested Cormorant (*Phalacrocorax auritus)*, Greater Yellowlegs (*Tringa melanoleuca*), Least Sandpiper (*Calidris minutilla)*, Semi-palmated Plover (*Charadrius semipalmatus*), etc. Five species, Pacific Wren (*Troglodytes pacificus)*, Purple Martin (*Progne subis)*, White Tailed Kite (*Elanus leucurus)*, Wilson's Warbler (*Wilsonia pusilla)* and Yellow Warbler (*Setophaga petechial)* were only documented at reference sites.

A list of species unique to each survey year is tabulated for survey sites (not reference sites) in Table 11. This table shows a species composition unique to each survey year and associated with the type of habitat existing prior to (riparian and agricultural fields) and after (tidal marsh) restoration efforts.

The number of unique species found in 2016 exceeds the number of species unique to 2011 by 185%. A majority of the unique species to 2011 are not necessarily associated with aquatic or tidal marsh habitat, while half of the species unique to 2016 are associated aquatic or tidal marsh habitat.

**Table 11. Comparing Detected Species Unique to Specific Survey Years at Survey Sites**

| Species Observed Only In Specified Survey Years at Survey Sites | |
|---|---|
| **2011** | **2016** |
| Mallard | Double-crested Cormorant |
| California Quail | Great Blue Heron |
| Osprey | Black-crowned Night-Heron |
| Virginia Rail | Bald Eagle |
| Band-tailed Pigeon | Northern Harrier |
| Willow Flycatcher | Black-bellied Plover |
| American Crow | Semipalmated Plover |
| | Greater Yellowlegs |
| | Western Gull |
| | Caspian Tern |
| | Anna's Hummingbird |
| | Downy Woodpecker |
| | Pacific-slope Flycatcher |
| | Purple Martin |
| | Violet-green Swallow |
| | Pacific Wren |
| | Orange-crowned Warbler |
| | Yellow Warbler |
| | Yellow-breasted Chat |
| | Bullock's Oriole |
| | Lesser Goldfinch |

## CONCLUSION

In 2013, Phase 1 of the Salt River Ecosystem Restoration Project converted over 300 acres of agricultural fields back to tidal marsh and additionally expanded and deepened 2.5 miles of adjacent river channel. Prior to this specific restoration phase, avian point count surveys were performed across seven monitoring sites in and around the project area. Three years after the completion of construction for Phase 1 another avian point count survey was performed. The Year 3 avian point count survey is the first to document species presence, avian richness, and relative abundance in the restored restoration area.

It must be noted that of the seven monitoring sites, S1, S3, S4, and S5 have undergone the most dramatic habitat changes. Prior to construction, these sites were located in grazed pasture with some associated riparian. Tidal marsh habitat is now associated with these sites. S1, S3, and S5 are transition sites, as they sit between agricultural fields and tidal marsh. S4 is completely

located within the tidal marsh. S1 is not only co-located between agricultural fields and tidal marsh, but it is also located next to a significantly larger restored river channel with mature riparian. Survey site S2 remains next to mature riparian and grazed pasture land, however the river channel has also expanded in this area.

Project goals projected that with a more diverse habitat across the project area, abundance and species richness would increase at survey sites (non-reference site) after the project had some time to equilibrate after construction. Figure 4 shows that the average abundance (number of individuals) was larger for survey sites in 2016, while average number of species were the same for survey and reference sites; though species composition varied between survey and reference sites (Tables 2 to 8). Comparing between the survey years, abundance and species richness increased in 2016 for both survey and reference sites (Table 10). This could be caused by a number of variables such as weather effects, previous year's food abundance, or that the Phase 1 – Riverside Ranch portion of the Salt River Ecosystem Restoration Project provided larger beneficial habitat effects beyond the project footprint. Though abundance and species richness values increased for all sites from 2011 to 2016, it is notable to point out that species composition evolved between the two years. Table 11 demonstrates that though the 2011 survey detected some aquatic species at survey sites, the habitat conversion from agricultural land to tidal marsh conditions promoted a significant increase of observed aquatic or tidal marsh associated species.

The results of the 2016 avian point count survey demonstrates that species abundance and richness has predictably responded to the habitat conversion and that the diversity if species in the habitat created by the SRERP beneficially impacted the avian population in the immediate area. Therefore, 2016 results indicate that the project success criteria of showing a trajectory towards, and achieving, increased species richness in Year 5 has been accomplished in Year 3.

**REFERENCES:**

Kline, S.; Mierzwa, K; Svehla, J. 2011. *Avian Protocol and Initial 2011 Survey Report to Support Pre and Post-Construction Monitoring*. Prepared for the Humboldt County Resource conservation District, Eureka, CA.

Ralph, C. J.; Geupel, G. R.; Pyle, P.; Martin, T. E.; DeSante, D. F. 1993. *Handbook of Field Methods for Monitoring Landbirds*. Gen. Tech. Rep. PSW-GTR-144-www. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 41 p.