

# 2023 Breeding Bird and Avifauna Assessment of the Cache Creek Nature Preserve

Submitted to: The Cache Creek Conservancy

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## **Introduction**

The Cache Creek Nature Preserve (hereafter CCNP) is a 130-acre parcel of land situated next to the Cache Creek watershed near the city of Woodland. The preserve was established in 1999 and is managed by the Cache Creek Conservancy (hereafter CCC), which was founded in 1996. Various restoration methods are utilized to manage and recover the CCNP to a more natural state after being heavily mined for aggregate and propagated with invasive non-native plants (such as *Arundo* and *Tamarix*). Once these restoration efforts are performed, monitoring must occur to examine how biodiversity has progressed from the restoration efforts.

One monitoring method that has been conducted since the founding of the CCNP is performing avian point count surveys in the riparian habitats and corridors. This monitoring method is cost-effective, as each field visit may only consume a few hours, allows for the collection of sufficient data in a short period of time, and focuses on one group of organisms for indicating the habitat's health.

Birds are an optimal group of organisms for measuring biodiversity success in riparian habitats due to how frequently migratory birds reside in riparian habitats rather than other dominant habitat types, like woodlands and grasslands (Bryce et al., 2002). Riparian habitats are a unique habitat where aquatic abiotic and biotic features can overlap with terrestrial and sometimes arboreal abiotic and biotic features. Past studies in different regions of the world have shown bird communities to be representative of riparian habitat health (Larsen et al., 2010). There are multiple reasons for this, but the two main reasons (which are applicable to the CCNP) are riparian canopies are ideal for bird roosting and nesting, and a preferable habitat for many insects and other invertebrates that have an aquatic phase in their life stages (Darveau et al., 1995). These invertebrates are key prey items for many insectivorous birds during the breeding season at the CCNP, such as Tree Swallows (Mengelkoch et al., 2004). Overall, riparian habitats benefit bird species with food availability, cover, and breeding habitat.

Before 2022, there were only two avian point count surveys conducted at the CCNP since its establishment in 1999. These two past surveys, taking place in 1999 (Truan, 2002) and 2011 (DiGaudio, 2011), helped set the ground work for establishing a more consistent procedure for point count surveys at the CCNP. A review of the past two studies and their findings can be referenced in last year's report (Boparai, 2022). Starting in 2022, a CCC biologist established annual point count surveys. The study is meant to be replicated every year. The 2023 survey was completed by another CCC biologist from mid to late spring. Over time, consistent monitoring will illuminate how the CCC's restoration efforts are impacting breeding bird populations and avifaunal diversity at the CCNP and the surrounding areas.

## **Methods**

### **A. Field Methods and Data Collecting**

The methods used in the 2023 surveys closely follow those laid out in the 2022 bird surveys. The surveys used were standardized 10-minute variable circular plot point counts. Point count surveys are designed to assess land bird presence/absence, diversity, and abundance (Ralph et al. 1995). GPS coordinates of the eight point count stations can be found in the table below (Table 1). All stations were established at least 200 meters apart from each other to ensure independence of observations between points.

Table 1. Geographic locations of avian point count stations

Station	Latitude	Longitude
1	38.691335	-121.876003
2	38.690730	-121.873480
3	38.690192	-121.870632
4	38.689022	-121.868258
5	38.688737	-121.870510
6	38.688785	-121.872912
7	38.688147	-121.874740
8	38.686733	-121.877083

Point count surveys began at sunrise and were completed within 3 hours of the start time. Each station was approached with caution and silence. Any flushed birds (from approaching the station) were included in the count. Each station was surveyed for 10 minutes, in which abundance and distance from observer were recorded for each species. Each bird detection was classified into a distance bin representing the distance away from the station the bird was first detected; 0-50 meters and greater than 50 meters. Species and the number of individual birds (per species) detected in the 0-50 meters bin were included in the dataset analysis and complete listing of species. Species and individual birds detected in the greater than 50 meters bin were omitted from the dataset analysis, but were added to the complete listing of species detected at the CCNP.

Four point count surveys were performed during the 2023 breeding season on four separate dates: April 17<sup>th</sup>, May 1<sup>st</sup>, May 15<sup>th</sup>, and May 31<sup>st</sup>. To ensure temporal bias would not occur, each date had a different order the stations were surveyed. On April 17<sup>th</sup>, the stations were surveyed in this order: 1, 2, 3, 4, 5, 6, 7, 8. On May 1<sup>st</sup>, the stations were surveyed in this order: 5, 6, 7, 8, 1, 2, 3, 4. On May 15<sup>th</sup>, the stations were surveyed in this order: 4, 3, 2, 1, 8, 7, 6, 5. And on May 31<sup>st</sup>, the stations were surveyed in this order: 8, 7, 6, 5, 4, 3, 2, 1.

Breeding status was another data value recorded for each species. Breeding status involves any field observations of the given species breeding in the CCNP during the 2023 breeding season. Examples of this include parent bird(s) incubating eggs or feeding young, finding a nest of the species with or without presence of the parents, seeing young traveling with their parents outside of the nest setting, witnessing a bird colony building nests (such as Cliff Swallow colonies), and looking at data from other studies and sites of the 2023 breeding season in the lower Cache Creek watershed to verify species breeding outside of visual observation accounts (such as the nest box reports for CCNP and COSP). If species were confirmed breeding in the CCNP during the 2022 breeding season, they were noted as a “yes” for their breeding status. Species that were not confirmed breeding at the CCNP, but were breeding at other locations in the lower Cache Creek watershed and/or in previous breeding seasons at the CCNP, were noted as “no” but had further explanation in parentheses about breeding records elsewhere and/or past breeding seasons.

Lastly, 12 species were noted if observed during point count surveys: Ash-throated Flycatcher, Black-headed Grosbeak, Common Yellowthroat, Nuttall’s Woodpecker, Lazuli Bunting, Least Bell’s Vireo, Song Sparrow, Spotted Towhee, Yellow-breasted Chat, Yellow-billed Cuckoo, Yellow Warbler, and Swainson’s Hawk. According to Central Valley Habitat Exchange (2022), these species are riparian

focal species in the Central Valley and are of conservation concern. These species are ideal indicators of riparian habitat health in the Central Valley, so their presence, abundance, and breeding status are ideal to showcase the habitat quality the CCNP can support.

## **B. Data Analysis**

Data collected from all dates and stations were compiled using Microsoft EXCEL. For each species, an abundance index was calculated by dividing the total number of birds detected (for that species) by the sampling effort (which is four as it was four surveys for each station). This was done for each species at station. Therefore, the total abundance index for each species is a sum of all eight point count stations' abundance indices for each species. As stated in the Field Methods section, all birds detected at all distances were included in the master species list (see table below), but only birds detected within the 50 meter point count stations were included in the data analysis.

Station-specific abundances and species richness were next for calculation. Station-specific abundance was calculated by taking the sum of the total number of individual birds detected from each site across all four sites and dividing that by the sampling effort. Site-specific species richness was calculated by taking the sum of the total number of species detected from each site visit and dividing that by the sampling effort. Four remains the sampling effort for both calculations as that is the number of site visits to each station during the season. With these calculations, it can showcase which station(s) possess higher local avian abundance and species diversity. Sites with higher values in either or both data parameters are “hotspots” while those lower in abundance and species richness could be future targets for additional environmental enhancement.

Lastly, species richness was compared to the three prior studies from 2002, 2011, and 2022 to see long-term trends in avian diversity at CCNP. Two separate bar plots were made. One containing the master species list for each of the three studies, and the other containing only the species detected within the point count stations. This information can show the long-term trend in bird species utilizing CCNP as a potentially valuable location during the breeding season.

## **Results**

Species richness for the 2023 breeding season yielded 72 species across all distances at CCNP (see master species list provided in the following two pages). Within the point count stations, a total of 45 species were detected. The most common species detected were both year-round resident species (e.g. Mourning Doves, California Quail, and California Scrub-Jay) and swallow species that utilize the CCNP during the breeding season (e.g. Tree Swallows and Cliff Swallows). There were also large numbers of some invasive species, such as European Starling. With the exception of a few, most of the species detected were generalists that are found frequently in other parts of Yolo County. 22 species were confirmed breeding at CCNP throughout the 2023 breeding season (Canada Goose, Wood Duck, California Quail, Wild Turkey, Common Gallinule, Pied-billed Grebe, Swainson's Hawk, Red-tailed Hawk, Red-shouldered Hawk, Great Horned Owl, California Scrub-Jay, Common Raven, Loggerhead Shrike, Black Phoebe, Ash-throated Flycatcher, Tree Swallow, Cliff Swallow, American Robin, Western Bluebird, European Starling, Red-winged Blackbird, and Great-tailed Grackle).

Eight of the recorded species are species of significant conservation interest according to the Central Valley Habitat Exchange. These species are bolded in the table below (Swainson's Hawk, Nuttall's Woodpecker, Ash-throated Flycatcher, Common Yellowthroat, Yellow Warbler, Spotted Towhee, Song Sparrow, and Black-headed Grosbeak). These are the same eight species that were noted in 2022.

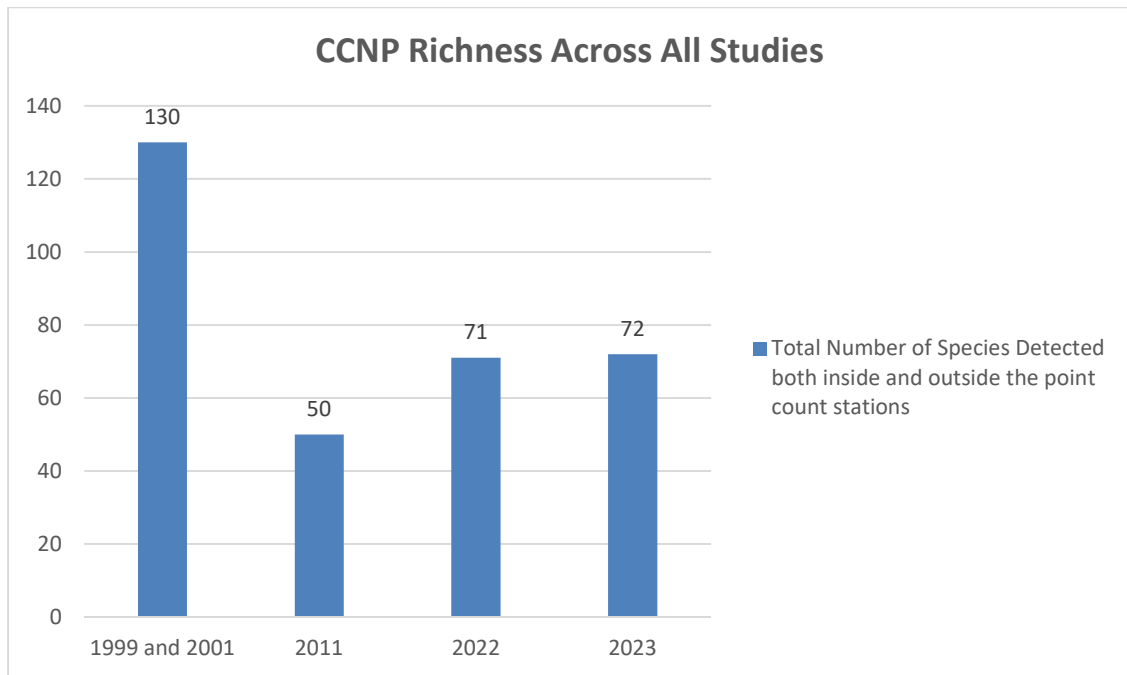
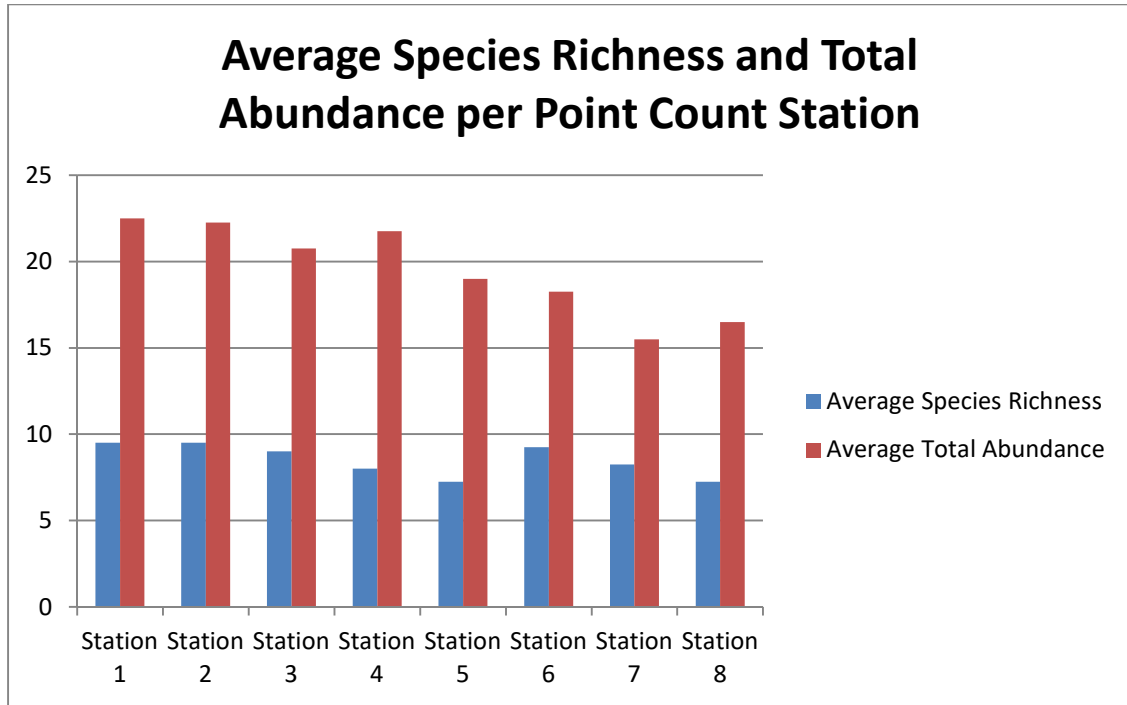
<b>Species from the 2023 Avian Point Counts</b>	<b>2023 Abundance Index</b>	<b>Confirmed Breeding at CCNP in 2023</b>
Canada Goose	-	Yes
Wood Duck	1.5	Yes
Mallard	0.25	No
California Quail	7.5	Yes
Wild Turkey	0.25	Yes
Pied-billed Grebe	-	Yes
Eurasian Collared-Dove	-	No
Mourning Dove	9.75	No
Anna's Hummingbird	1.5	No
Common Gallinule	-	Yes
Killdeer	0.5	No (but were breeding in other parts of the watershed and have bred at CCNP in the past)
Double-crested Cormorant	-	No
Great Blue Heron	-	No
Green Heron	-	No
Great Egret	-	No
Black-crowned Night Heron	-	No
Turkey Vulture	-	No
Red-shouldered Hawk	-	Yes
<b>Swainson's Hawk</b>	0.75	Yes
Red-tailed Hawk	0.25	Yes
Osprey	-	No
Great Horned Owl	-	Yes
Barn Owl	-	No
American Kestrel	-	No
Belted Kingfisher	-	No
<b>Nuttall's Woodpecker</b>	4.5	No (but have bred at CCNP in the past)
Downy Woodpecker	1.5	No
Acorn Woodpecker	-	No
Northern Flicker	2.5	No (but were breeding in other parts of the watershed)
Black Phoebe	1	Yes
<b>Ash-throated Flycatcher</b>	3	Yes
Western Kingbird	0.25	No
Loggerhead Shrike	-	Yes
California Scrub-Jay	10.25	Yes
Common Raven	1	Yes
Northern Mockingbird	0.5	No

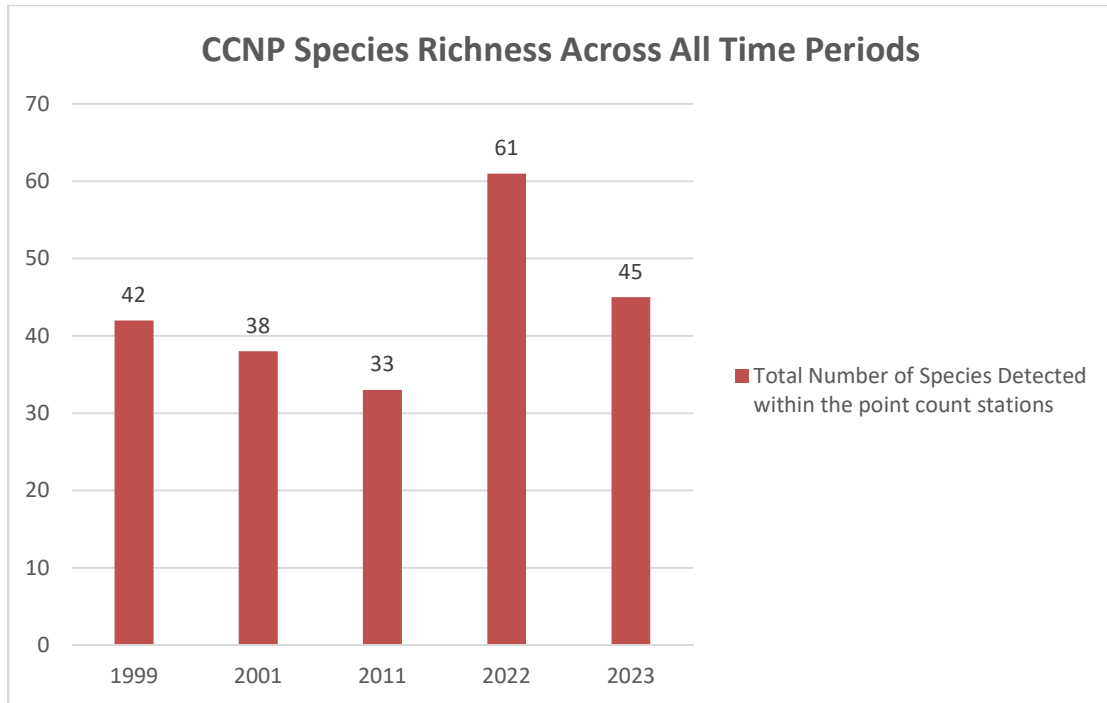
Tree Swallow	16.5	Yes
Cliff Swallow	18	Yes
Barn Swallow	0.25	No (but have bred at CCNP in the past)
Bushtit	3	No (but have bred at CCNP in the past)
White-breasted Nuthatch	-	No
House Wren	5.5	No
Bewick's Wren	4.5	No
Marsh Wren	-	No
Western Bluebird	0.75	Yes
Swainson's Thrush	0.5	No
American Robin	-	Yes
Ruby-crowned Kinglet	0.75	No
California Thrasher	-	No
European Starling	18.75	Yes
Cedar Waxwing	0.25	No
House Finch	5.5	No (but were breeding in other parts of the watershed)
American Goldfinch	0.5	No
Lesser Goldfinch	0.5	No
<b>Common Yellowthroat</b>	0.25	No
<b>Yellow Warbler</b>	0.25	No
Townsend's Warbler	0.25	No
Wilson's Warbler	1	No
Yellow-rumped Warbler	7	No
Orange-crowned Warbler	-	No
<b>Spotted Towhee</b>	0.5	No
California Towhee	3.5	No (but were breeding in other parts of the watershed)
Golden-crowned Sparrow	0.25	No
White-crowned Sparrow	0.75	No
<b>Song Sparrow</b>	2.5	No
Western Tanager	-	No
<b>Black-headed Grosbeak</b>	-	No
Red-winged Blackbird	5.5	Yes
Yellow-headed Blackbird	-	No
Brown-headed Cowbird	12.25	No
Great-tailed Grackle	-	Yes
Bullock's Oriole	1.25	No
<b>72 species total</b>	<b>157.25</b>	<b>22 species</b>

Six species were common at all point count stations in 2023: California Scrub-Jay, California Quail, Tree Swallow, House Wren, Mourning Dove, and Nuttall's Woodpecker.

From the eight point count stations surveyed, the average species richness (number of species detected per point) was 8.5 species. For average total abundance (total number of birds detected per

point), 19.56 birds per point was calculated. All point count stations had a similar range of values for average total abundance (16 to 22 individual birds) and species richness (7 to 9 species).





## Discussion

The overall abundance index for 2023 is 157.25. This is a little lower than in 2022 (179.5). When comparing stations, stations one and two had the highest total abundance and species richness. These stations, being located on the northern border of the wetlands where there is higher nesting activity, are reasonable stations to see an increase in such parameters. Stations seven and eight displayed the lowest total abundance and species richness. These stations are located on the riparian trail adjacent to the Cache Creek where the vegetation is very thick, meaning the best way to detect birds is by auditory detection, and not visual detection. Many riparian birds benefit from thick and diverse understories (Kreitinger & Gardali, 2006), so while these are great conditions for the birds, it makes surveying more difficult. Many of the riparian bird species found around stations seven and eight are more elusive and do not call if they sense danger around them, making them harder to detect. The lower abundance and richness could therefore be a result of more difficult detection.

There were 22 confirmed breeding species in the 2023 nesting season, which is a significant increase from last year (12 species in 2022). 22 breeding bird species is also the largest confirmed number of breeding species in the CCC's records. The increase in observed breeding can be attributed to the plentiful presence of water in the wetlands, which was markedly absent last year. Almost half of the observed breeding species were those that utilize the wetland habitats for nesting or are closely associated to water for insect foraging: Canada Goose, Common Gallinule, Pied-billed Grebe, Wood Duck, Black Phoebe, Red-winged Blackbird, Ash-throated Flycatcher, Tree Swallow, Cliff Swallow, Swainson's Hawk. Additional breeding bird observations were made through the wildlife game camera monitoring program, which allowed staff to record baby chicks of the more skittish birds, like California Quail and Wild Turkey.



Reproductive success is further supported by the 2023 nest box monitoring program (unpublished data). The preliminary data shows that more eggs were laid and more fledglings left the boxes in 2023 for both cavity-nesting songbirds and Wood Ducks at the CCNP. Many nest box birds demonstrate breeding site fidelity, meaning the individual is more likely to return to nest in a site if they have successfully bred in that area in the past (Hepp & Kennamer, 1992).

In early spring of 2022, there was also an Off-Highway Vehicle (OHV) ordinance passed in Yolo County that banned OHV traffic in the lower Cache Creek watershed. Boparai (2022) predicted the reduction of OHV usage in the creek channel would help promote avian breeding in the area, which is supported by the 2023 data. Less noise pollution in the Cache Creek and fewer environmental disturbances overall allows birds to breed more easily (by finding mates, collecting nest materials, foraging in the creek, and nesting in the creek).

While the 2023 study continues to demonstrate improvement in the riparian habitat and associated bird community from a decade ago, this year's study yielded lower avifaunal species richness and abundance compared to the 2022 study. In 2022, the average species richness across all stations ranged from 10 to 15 and the average total abundance was 18 to 25. In 2023, the average species richness across all stations ranged from 7 to 9 and the average total abundance was 16 to 22. These findings are at odds with the increased confirmed breeding species for this year. With more breeding birds, one would expect even greater richness and abundance. There are a few possible explanations for the disparity between last year and this year.

The first potential reasoning for finding lower species richness and total abundance is the greater presence of invasive bird species in 2023. European Starlings had an abundance index twice as large in 2023 compared to 2022 (18.75 in 2023, compared to 9.75 in 2022). European Starlings are known to be aggressive competitors and are often seen usurping the nests of other cavity-nesting birds. Yet, there is mixed evidence to support the idea that the presence of European Starlings significantly negatively impacts native bird populations (Koenig, 2003). Additionally, the native species one would most expect to be disturbed by invasives did not see a significant decrease in their 2023 abundance index. Tree Swallows are obligate secondary cavity nesters that rely on cavities made by other animals or natural tree holes for nesting. European Starlings also like to take advantage of tree cavities, yet Tree Swallow's abundance index increased in 2023, from 10.75 in 2022 to 16.5 in 2023. So it appears that even with the heightened presence of invasive competitors, the Tree Swallows were still abundantly present.

Besides competition for nesting sites, invasive birds can also compete with native birds for habitat and food resources. European Starlings are ecological generalists. They are not specialized in their habitat usage or diets like other birds and therefore are capable of utilizing many diverse resources (this is what makes them so successful in a multitude of environments). If the European Starlings are using a wide array of resources, they could be depleting niche resources that native birds are dependent upon. While these are all possible ways invasive birds could be negatively impacting native birds, the exact causal effects are unknown without further study.

There are a number of other explanations that can be speculated upon. The aforementioned drought from last year may have had residual effects on avian populations this year. In September of 2022, the water in the wetlands began to recede, and by October it was completely dry. According to Bateman (2020), drought can have both direct and indirect effects on wildlife. Direct effects include

dehydration, starvation as a result of food resource shortages, and increase in disease as more birds congregate around the few water sources they can find. Indirect effects are most pronounced in prolonged droughts, as ecosystem function can become compromised. The wetland water loss event occurred after the 2022 point count surveys and after the breeding season, meaning that migratory birds using the CCNP as a breeding site would not have been as heavily impacted. When examining the year-round bird residents of the CCNP, nine species saw lower abundance indices in 2023 compared to 2022: Eurasian Collared-Dove, Anna's Hummingbird, Nuttall's Woodpecker, Black Phoebe, Bushtit, Bewick's Wren, Lesser Goldfinch, California Towhee, Red-winged Blackbird. So while the migratory birds were able to avoid the worst of the drought, the birds that inhabit the CCNP year-long had to cope with the prolonged drought event. This could have led to mortality or dispersal, which could help explain the lower abundance indices of some of the non-migratory birds this year. If droughts continue in the future, it will be interesting to continue to monitor them and their long-term impacts on both migratory and non-migratory birds in the area.

### **Conclusion and Recommendations**

While it is slightly discouraging to find lower avian diversity this year compared to last year, this finding should not overshadow the doubling of observed breeding species at the CCNP. The increase in breeding species is commendable in its own right. It is also important to remember that long-term trends are more informative than short-term ones. Year-to-year variation is expected to some degree. Two years of repeated surveys is not enough to produce reliable data or inferences on long-term trends. From its founding, the CCC has remarkably improved habitat quality through restoration practices in the CCNP and the lower Cache Creek watershed. This year's study still yielded over 70 species and an abundance diversity value of 157.25. With continued monitoring in subsequent breeding seasons, we will be able to better understand how those restoration practices and improvements in habitat quality are impacting wildlife diversity.

## Literature Cited

- Bateman, B. (2023, February 21). *When in drought...* Audubon.  
<https://www.audubon.org/news/when-drought#:~:text=Wetland%20birds%20are%20particularly%20vulnerable,wetlands%20shrink%20and%20dry%20up>.
- Boparai, H. (2022). 2022 Breeding Bird and Avifauna Assessment of the Cache Creek Nature Preserve. *Cache Creek Conservancy*.
- Bryce, S. A., Hughes, R. M., & Kaufmann, P. R. (2002). Development of a Bird Integrity Index: Using Bird Assemblages as Indicators of Riparian Condition. *Environmental Management*, 30(2), 294–310. <https://doi.org/10.1007/s00267-002-2702-y>
- Central Valley Habitat Exchange*. Environmental Defense Fund. (2018, January 23).  
<https://www.edf.org/ecosystems/central-valley-habitat-exchange>
- Darveau, M., Beauchesne, P., Belanger, L., Huot, J., & Larue, P. (1995). Riparian Forest Strips as Habitat for Breeding Birds in Boreal Forest. *The Journal of Wildlife Management*, 59(1), 67. <https://doi.org/10.2307/3809117>
- Digaudio, R. (2011). 2011 Avifauna Assessment of the Cache Creek Nature Preserve, 94B Restoration Site, and the Yolo County Flood Control Mitigation Site. *PRBO Conservation Sciences*.
- Hepp, G. R., & Kennamer, R. A. (1992). Characteristics and Consequences of Nest-Site Fidelity in Wood Ducks. *The Auk*, 109(4), 812–818. <https://doi.org/10.2307/4088155>
- Koenig, W. D. (2003). European starlings and their effect on native cavity-nesting birds. *Conservation Biology*, 17(4), 1134–1140. <https://doi.org/10.1046/j.1523-1739.2003.02262.x>
- Kreitinger, K., & Gardali, T. (2006). Bringing the Birds Back: A Guide to Habitat Enhancement in Riparian and Oak Woodlands for the North bay Region. California Partners in Flight Regional Bird Conservation Plan No. 1, <https://www.prbo.org/calpif>.
- Larsen, S., Sorace, A., & Mancini, L. (2010). Riparian Bird Communities as Indicators of Human Impacts along Mediterranean Streams. *Environmental Management*, 45(2), 261–273. <https://doi.org/10.1007/s00267-009-9419-0>
- Mengelkoch, J. M., Niemi, G. J., & Regal, R. R. (2004). Diet of the Nestling Tree Swallow. *The Condor*, 106(2), 423–429. <https://doi.org/10.1093/condor/106.2.423>
- Ralph, C. J., Sauer, J. R., & Droege, S. (1995). *Monitoring Bird Populations by Point Counts*. <https://doi.org/10.2737/psw-gtr-149>

Truan, M. A. (2022). Cache Creek Nature Preserve Riparian Survey & Monitoring Project, Vegetation and Avifauna, Years 1999 and 2001. *Department of Wildlife, Fish, and Conservation Biology*.