

2023 Wood Duck Nest Box Monitoring Program  
Cache Creek Nature Preserve



Submitted to: Cache Creek Conservancy

Submitted by: Felicia Wang

[wang@cachecreekconservancy.org](mailto:wang@cachecreekconservancy.org)

Cache Creek Conservancy

34199 Co Rd. 20

Woodland, CA 95695

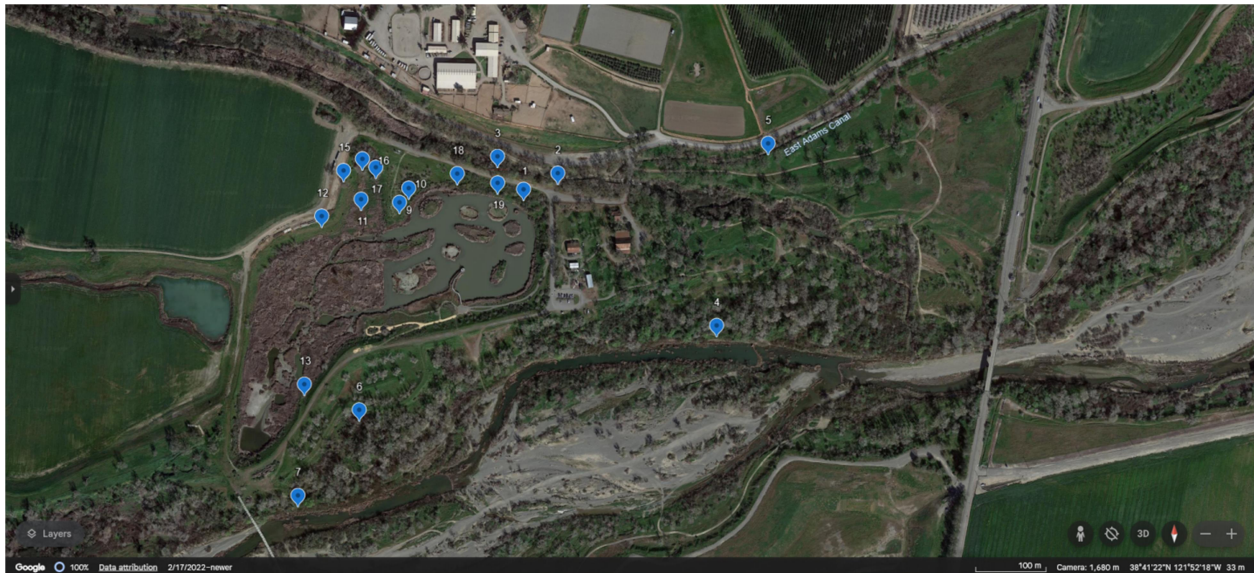
## Introduction

The Cache Creek Conservancy (CCC) has been restoring areas of the lower Cache Creek watershed for more than 25 years. Over time, the CCC has implemented many restoration methods to improve the biodiversity of the watershed. One of these actions includes establishing a bird nest box program. Nest boxes are relatively inexpensive while being an effective form of monitoring breeding bird activity. Nest boxes provide nesting habitat for cavity-nesting birds, which is an especially valuable resource, since the demand for natural cavities can be higher than what is actually available (due to forest loss from human activities, fire, drought, and floods). The utilization of the boxes provides additional information about the birds inhabiting and breeding in the area. Their presence also acts as indicators of a healthy ecosystem, such as water, food resource, and shelter availability.

The CCC manages bird nest boxes at the Cache Creek Nature Preserve (CCNP), Capay Open Space Park (COSP), and Granite-Woodland Reiff (GWR). At the CCNP, there are a total of 17 Wood Duck boxes. They are located along wetland, riparian, and woodland habitats.

The Wood Duck (*Aix sponsa*) is a year-round resident in many parts of California (Cornell University, 2023). They live in wooded areas in close proximity to ponds, lakes, and streams. Unlike most other waterfowl, Wood Ducks nest in tree cavities, from rotted trunks, broken off branches, or old woodpecker holes. They are not capable of making their own cavities. While previously threatened by habitat loss and hunting, the introduction of conservation laws and Wood Duck nest boxes has significantly improved wild Wood Duck populations. They are currently considered a species of low conservation concern. Even so, it is important to continue to preserve their habitat and provide additional nesting cavities for them.

Although the CCNP also hosts several other kinds of bird nest boxes, this report will only cover data that was collected from the Wood Duck nest boxes in 2023. See the 2023 Songbird Nest Box Report for additional nest box data and findings (Wang, 2023).



2023 Wood Duck nest box numbers and locations at the CCNP. Map created in Google Earth.

## Materials and Methods

CCC staff and interns monitored the nest boxes on a weekly basis during the Wood Duck breeding season. Nest box checks began in early March and ended in as late as mid-August, for a total of 24 weeks. A pre-season check was conducted in February to inspect the condition of the nest boxes and make any necessary repairs. Repairs included replacing hinges, cleaning boxes, and refreshing the bedding.

The same procedure was followed for each nest box check. Nest boxes were carefully approached. Before opening, a camera was inserted through the box entrance to obtain a view of any hens or eggs within. If a Wood Duck hen was present inside, the box check would be skipped for the week to prevent stressing the hen. The hen's presence would be recorded and no data would be collected. If no hen was inside, the box check would proceed and data would be collected. Data recorded included: hen's status (present or absent), number of eggs (whole, hatched, and missing or depredated), box status (nest was normal, showed no activity, abandoned, hatched, etc.), number of dead ducklings, presence of feathers, and temperature of eggs (warm or cold). Any other notable observations, such as parasites in the box, were also noted. After collecting data, the eggs would be covered again in downy feathers and wood shavings to keep them warm. The box check was kept to five minutes or shorter in order to reduce disturbance to the nest and any nearby Wood Ducks.

Wood Ducks are a precocial species, meaning their young are born well-developed and are able to feed and move independently almost immediately after hatching. Wood ducklings only remain in the nest box for about 24 hours before they leave with their mother. For this reason, it was rare for observers to see ducklings in the box. In most cases, number of ducklings fledged from the box could only be determined by the number of hatched eggs and if any dead ducklings were left behind.



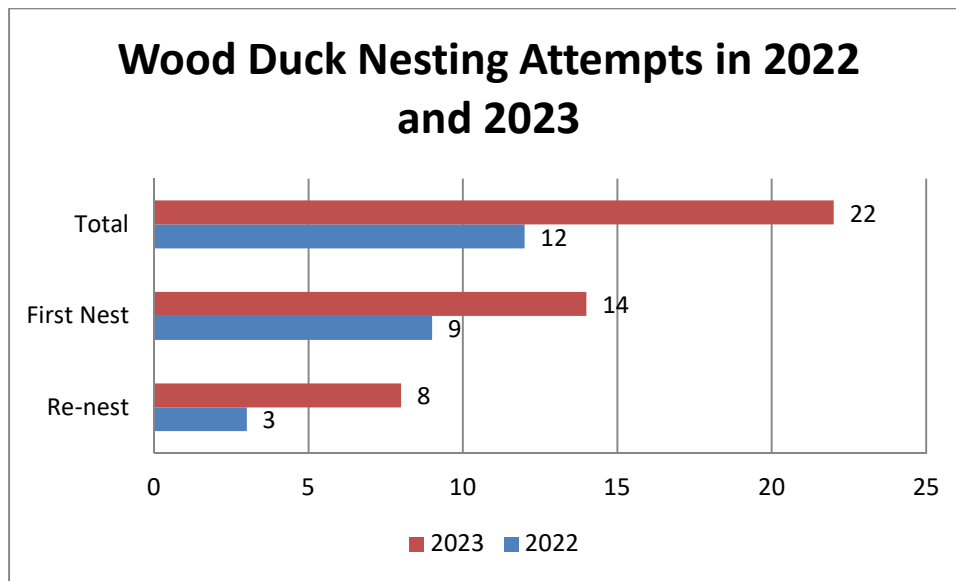
A lucky glance at ducklings inside box 4 on May 1st, 2023.

Any eggs that failed to hatch were removed from the box and left out at the CCNP (away from the box) for scavengers or opportunists to consume. The decision to remove eggs was made either because the rest of the clutch had already hatched (indicated by broken egg shells and absent hen) or because the nest had not been observed with a hen for three consecutive weeks and eggs remained cold for that entire period. Some eggs were opened to observe the development of the embryo. For example, if no development was apparent it could be deduced that no incubation had taken place and nest had likely been abandoned. Dead ducklings were either left out at the CCNP, or brought to the UC Davis Museum of Wildlife and Fish Biology if they were in good condition for research purposes.

Lastly, Wood Ducks are known to re-nest after their first clutch has hatched. When checking a box in the weeks after a known hatching event, new eggs were recorded as a re-nest attempt.

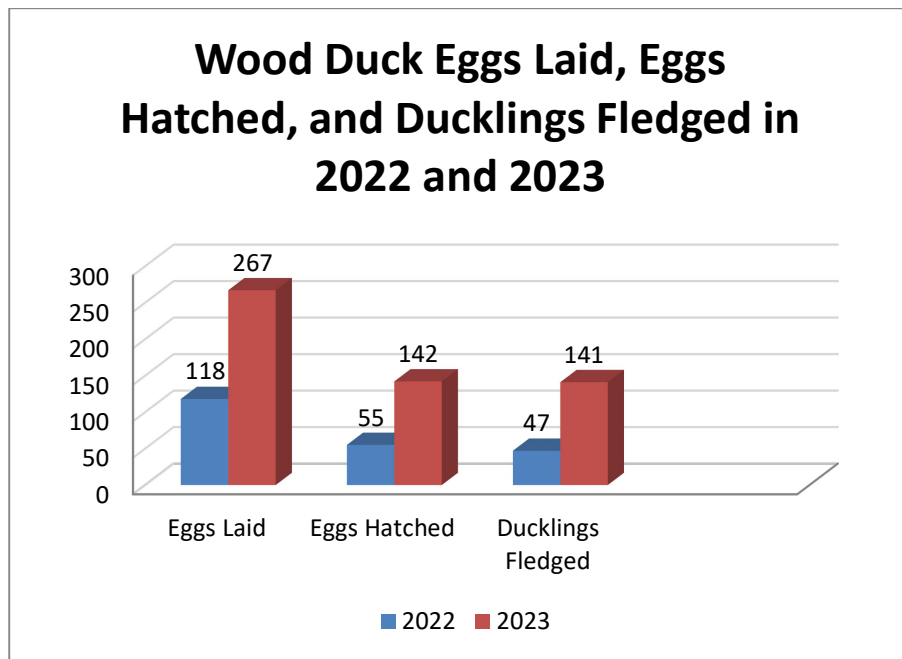
## Results

Out of the 17 Wood Duck nest boxes, 14 had nesting activity (occupancy rate of 82.35%). From those 14 active nest boxes, 8 had re-nest attempts (re-nest rate of 57.14%). There were a total of 22 nesting attempts in the 2023 season, which is almost double the number from last year (12 total). The average clutch size was 12.93 eggs in the first nesting attempt and 10.75 eggs in the re-nest attempt. There was a moderate decline in clutch size from first to second clutch, which is not unusual as clutches laid later in the breeding season have been observed to contain fewer eggs (Cornell University, 2023).



In total, 267 Wood Duck eggs were laid in 2023. From those eggs, 142 hatched and 141 ducklings successfully fledged. This resulted in a hatching success rate of 53.18% and a fledgling success rate of 99.3%. Compared to last year (hatching success rate of 46.61% and fledging success rate of 85.45%), these values are slightly higher but generally similar to 2022. While not included in the final count, there was also a Wood Duck hen found nesting in the Kestrel/Screech Owl nest box overlooking the wetlands. She laid 6 eggs, 5 hatched, and 4 ducklings fledged.

Notably, there has been more than a doubling of nesting productivity in 2023 (see chart below). While this is an encouraging statistic, it is important to differentiate between how many nests are produced versus how many of the nests are incubated. In other words, the number of nests is not relevant so much as the number of nests that are incubated and produce young. Pooling both first nesting and re-nesting attempts, 15 of the 22 nests in 2023 had at least one duckling fledge from the box. The remaining 7 nests had no eggs hatched and were likely abandoned. In 2022, 9 of the 12 boxes had at least one duckling fledge from the box.



## Discussion

The 2023 Wood Duck nest box season was a great success. This year there were also two fewer Wood Duck nest boxes than last year. Nest box occupancy almost doubled. Eggs laid, eggs hatched, and ducklings fledged more than doubled. Whether the increased ducklings produced have also survived in larger numbers is unknown. Regardless, the high output of the boxes is an impressive indication of the suitability of the CCNP's wetland and riparian habitat for Wood Duck breeding.

In the CCC's 2022 Wood Duck Report, Boparai suggested that lower nest box occupancy in 2022 could be attributed to the close spacing of many of the boxes (Boparai, 2022). The northwest portion of the wetlands is occupied by seven Wood Duck nest boxes that are relatively close to one another (60 ft apart at furthest). High density nest areas tend to promote conspecific brood parasitism (CBP). CBP is not uncommon among waterfowl, and is when females will lay their eggs in one or more nests belonging to other females without incubating the eggs. Instead she relies on the resident nester to raise her young. It is thought that if boxes are placed closer together and are visibly exposed, they become more likely to fall to brood parasitism (Semel et al., 1988). The female Wood Ducks at the CCNP may be able to recognize the threat of CBP in the northwest wetlands and thus avoid using the boxes in that area. This would explain the lower occupancy in 2022. Yet, this year, box placement was unaltered and occupancy still increased.

The CCC lacks the tools and resources to determine the degree of brood parasitism at the CCNP. Formerly, clutch size has been used to determine if a nest has been parasitized, but the determination of a “supernormal” clutch size (i.e. size of a clutch in which parasitism can be inferred) has been widely deliberated with no reliable measures determined (Semel & Sherman, 1992). Individual females usually lay 10 to 11 eggs (Cornell University, 2023). There were a few boxes in 2023 that were observed with 18 to 22 eggs, which appears too high for one female to have laid on her own, a potential indicator of CBP. These boxes (3, 4, 9, and 19) are spread throughout the CCNP and none are affiliated with the aforementioned crowded northwest wetlands. In sum, it does not appear that the high density of nest boxes and the threat of CBP was a deterrent for nesting Wood Ducks in 2023. It is also unlikely a leading factor in 2022’s lower WODU egg and fledgling output.

Even if Wood Ducks are unbothered by the concentration of nest boxes in a particular area, this does not mean the boxes need to remain in their same places. A good principle of adaptive nest box management is ensuring the optimal utilization of boxes and the habitat they are placed in. According to Eadie et al. (2022), the single largest predictor for whether a nest box will be used in the future is whether it had been used in the past. All the boxes utilized in 2022 saw nesting activity again in 2023. The three remaining boxes (6, 15, and 16) that were not used in 2022 or 2023 can be candidates for relocation if they continue to see no nesting activity.

An alternative reason for the greater nest box success this year may be due to the higher water levels in both the wetlands and the Cache Creek in spring 2023. Wood Ducks thrive in habitats along streams and other open bodies of water that provide 50-75% vegetative cover (Cornell University, 2023). They forage on mostly aquatic foods consisting of seeds, fruits, and insects, but can also take to dry land to forage if needed. In the spring of 2022, water levels in the wetlands were moderately low due to prolonged drought. This made the wetlands habitable, but not capable of supporting large quantities of nesting Wood Ducks. Similarly, the creek channel was fragmented and only a few pockets of water remained. In spring of 2023, heavy winter rains brought plenty of water into the wetlands. So much so that the observers had to wade through more than a foot of water to reach some of the nest boxes that are normally on dry land. The creek channel remained connected for the duration of the 2023 breeding season. The larger presence of water likely contributed to the high Wood Duck nesting activity in 2023.

Unlike with the songbird nest boxes (Wang, 2023), it does not appear that the Wood Duck nest boxes were impacted by the late summer heat. Wood Duck hatching and fledging rate in the first and second nest attempts were proportional. This is probably because many of the Wood Duck boxes are located in shade. Also, the ducklings do not remain in the box for long before fledging (about 24 hours) so overheating in the boxes is not a large concern.

## **Conclusion and Recommendations**

2023’s Wood Duck nesting productivity is greatly improved from last year. It also demonstrates the potential impact of year-to-year water availability fluctuations on nesting output. It is only with more monitoring that reliable inferences can be made (only two years of consistent nest box data is not enough). Regular nest box checks should continue in the future in order to monitor how variation in habitat conditions affects Wood Duck nesting productivity.

Additionally, it would be beneficial to track if any of the nest boxes remain consistently unused. If there has been more than two years of disuse, it is unlikely that Wood Ducks will find it suitable in the future. These boxes could be relocated to see if they get any interest. Along the creek or in the southwest side of the wetlands may be good alternative locations, as these areas have fewer Wood Duck nest boxes and Wood Ducks have been spotted there.

As a final small note, there were a couple of nest boxes that attracted attention from less desirable visitors. European Starlings are also cavity-nesters and will occasionally try to nest in nest boxes. They are non-native and observers are permitted to remove any nesting attempts. While too large to fit through songbird box entrances, the Wood Duck boxes are easy for them to enter. One box in particular, 5, had a recurring European Starling who would build her nest on top of existing Wood Duck eggs. This battle of observers removing and starlings rebuilding the nest continued for a couple weeks before the starling finally gave up. The starling's presence initially drove the Wood Duck hen away and she abandoned the nest. Luckily, she returned a week after the starling left and successfully raised a new brood of 8 ducklings. If similar situations occur in the future, it is recommended to check those boxes more frequently than once a week (perhaps every three days). Quicker removal of a nonnative nester's materials can lead to quicker dissuasion of the intruder, and potentially avoid Wood Duck nest abandonment.

## Work Cited

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