

Colonial Nesting by Green Herons in Sacramento, California

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The Green Heron (*Butorides virescens*) is common in North America, occurring in most U.S. states and most of Mexico. In the Central Valley, as elsewhere, Green Herons are often observed singly, near or along watercourses including the edges of rivers and lakes and wetlands. They nest in areas that provide secluded nest sites with nearby wetland feeding habitat (Bent 1926, Adams et al. 1985). Their secretive nesting habits, compared to other herons and egrets, has resulted in limited information on nesting ecology.

Green Herons are reported to nest alone, in loose aggregations, or in colonies (Kaiser and Reid 1987, Shuford 1993). When in mixed-species colonies, they tend to nest apart from other species and are outnumbered by the other species (e.g. 12 pairs in a mixed species colony of 804 breeding pairs; Marra and Bull 1986). Most Green Herons are solitary nesters if they can defend a feeding territory, and single-species colonies tend to be small to moderate-sized (e.g., 8, 17, 41 and 70 pairs; Meyerriecks 1960, Meyerriecks 1962).

Green Heron nests are small stick structures, approximately 20 x 30 cm (8 x 12 in), generally unlined but with a well-developed 4.5 cm (2 in) deep cup (Dickerman and T. Gavino. 1969). Nests are usually located above water but may be up to 0.8 km (0.5 mi) from standing water (Kaiser and Reid 1987). In New York, nests were from ground level to 5 m (15 ft) high, most commonly near water, with variable concealment (Meyerriecks 1962).

Little information exists on nesting habits of Green Herons in the Central Valley of California. A review of eBird records for the Central Valley identified only a few other confirmed breeding records (see RESULTS).

On 21 May 2016, Rosa Jimenez (pers. comm.) saw an adult Green Heron fly into one of many planted live oaks along La Riviera Drive, near Howe Avenue in Sacramento and then noted young birds. Because there is little information on nesting populations or rookery sites in the Sacramento region (C. Conard, pers. comm.), I monitored the site over the 2016-2018 nesting seasons. Here, I present information on the population size, nest timing, and nesting success at this colony.

STUDY AREA

The La Riviera colony site is in a highly urbanized area, on La Riviera Drive in Sacramento, Sacramento County, California at 12 m (35 ft) elevation. Howe Avenue, a main arterial road, spans La Riviera Drive just east of the site, with the closest nest approximately 40 m away. The site is located near the American River Parkway, which supports the American River and associated riparian habitat. The nesting colony site consists of a group of interior live oaks (*Quercus wislizeni*) planted between the street sidewalk and the asphalt parking lot of a commercial “strip mall”. More details regarding site conditions are presented in RESULTS.

METHODS

I visited the La Riviera site 36-45 times annually during 19 March to 29 August in the 2016-2018 breeding seasons. I estimated active or fledged nests through direct observation of nestlings, adults feeding young, “branchers” (i.e., dependent young that had left the nest to surrounding branches), fledged (i.e., flying) young, and feces (whitewash).

I recorded nest locations and numbers. Active nests were easily identified by substantial accumulations of whitewash. I recorded numbers of adults, branchers, fledglings, and, in most cases, the number of small nestlings (although these were difficult to count accurately from below nests; Figure 1). Scattered whitewash was used to identify locations of fledged young (Figure 2). I entered data into eBird (<https://ebird.org/hotspot/L4626945>) checklists for all visits and compiled data from these records.



Figure 1. Downy Green Heron (*Butorides virescens*) nestling in a nest.

Photo © Dan Kopp

Observations were sometimes difficult to make because oak canopies were dense, and birds were secretive around their nest. Also, unused nests appeared to be present that were either built during the nesting season and then unused or remaining from previous years. Quantifying the numbers of individual pairs present also was challenging because of difficulty in distinguishing possible late nesting by different pairs from possible second nesting attempts by pairs (i.e., when females begin incubating the next brood while males continue to feed the previous fledged brood; [Davis and Kushlan 1994]). Because of this difficulty, I report only the minimum number of successful nests I recorded each year, which I consider to be reasonably accurate.

I identified distances to various habitats using Google Earth (earth.google.com). I identified nearby known foraging habitat based on my extensive observations conducted within the nearby American River Parkway (unpub. data). I characterized traffic volumes (average daily traffic [ADT]) for La Riviera Drive using Sacramento City Public Works (2018) traffic data as measured on 9 May 2012. Traffic volume on the adjacent southbound section of Howe Ave was taken 13 September 2007.

For context, I summarized Central Valley nesting records from eBird (<http://ebird.org>). eBird did not introduce breeding codes until 2008 and not for the mobile application until 2014. I included all records with breeding codes in the dataset, with the oldest from 1938, a handful from the 1970s to early 2000s, and most from after 2008.

RESULTS

Colony Setting

The rookery consisted of a linear strip of 11 mature interior live oaks spaced over about 100 m (300 ft) (Figure 1). The trees are multi-trunked, as is typical for the species, with an average of 3 trunks per tree (range = 1-5) that average 44 cm (17 in) in diameter [range = 15-76 cm, (6-30 in)]. The individual trees form a dense, interconnected, and continuous canopy except for two trees separated by an entrance to the parking lot. The rookery was about 250 m (750 ft) from the American River, with suitable shallow aquatic foraging habitat in two nearby areas about 600 m (1,800 ft) away.

Average daily traffic on La Riviera Dr. totaled 8,440 vehicles/day. The southbound traffic on Howe Avenue, averaged 33,855 vehicles/day, with rush hour peaks of 2,315 and 2,882 vehicles/hour during the morning and afternoon, respectively. Additional potential sources of disturbances included the active parking lot, frequent foot traffic, and regular barbecue smoke from a nearby business.

Colony Characteristics

Annually during the 2016-2018 nesting season, 12-15 Green Heron nest structures were scattered throughout the canopy, with some within 1 m (3 ft) of each other. No other heron species or colonial nesters were present within the colony. Nests were about 5-7 m (15-20 ft) high. Ground cover below nests consisted of a street (La Riviera Drive) and adjacent sidewalk, a 3.5-m (10-ft) wide landscape strip covered with English ivy (*Hedera helix*), and an asphalt parking lot.

Hérons were observed at the colony from 29 March to 27 August. Nestlings were observed from 30 April to 10 August over the three years and were inferred to be present as early as mid-April based on whitewash and adults perched next to nests. Branchers and fledglings were observed from 5 May to 27 August.



Figure 2. Older juvenile “branching” Green Heron at the La Riviera colony site.

Photo © Chris Conard

I observed at least 5-6 nesting attempts per year (Table 1). The number of individual pairs that occupied the rookery is unknown because some pairs may have nested twice. The number of young per nest varied from three to five. At least three active nests were noted at all times. Reproductive data presented in Table 1 may be underestimated, due to detection and interpretation challenges.

Table 1. Reproductive results at La Riviera Drive Green Heron rookery, 2016-2018.

Reproductive Measure	2016	2017	2018	Average
Minimum number of nesting attempts	6	5	6	5.7
Total number of young fledged	28	18	19	22
Number of young/nesting attempt	4.7	3.6	3.2	3.8

Characterization of Green Heron Colony Sites in eBird

I located 223 eBird breeding code records for Green Herons in California's Central Valley with 78 (35%) of records (mostly mine) from the La Riviera Dr. location. Only six other sites with breeding records were within the Central Valley, at Cosumnes River Preserve, Mather Lake, Gibson Ranch Park, and Camden Park in Sacramento County; Paradise Point Marina in San Joaquin County; and North Davis, Yolo County. All records from sites other than La Riviera Dr. consisted of single pairs.

DISCUSSION

The presence of a Green Heron colony at the highly urbanized La Riviera Drive location, appears unusual but hardly unprecedented for this mostly solitary, secretive species (Dickerman and Gavino T. 1969). Why multiple Green Herons nested together at this site is unknown. It has been suggested that pairs will nest alone if they can defend a feeding territory (Kaiser and Reid 1987). There is no obvious reason why individuals could not have defended territories along the American River. Colonial nesting has been recognized as providing benefits to birds through improved food-finding, by serving as "information centers" from which colony residents can observe and follow successful foragers (Ward and Zahavi 1973), but such a benefit does not appear evident based on the relatively stable and localized foraging conditions at the adjacent American River Parkway. Also, I have not observed group feeding among Green Herons along the river during hundreds of hours of observation (2966 eBird checklists).

The unusual highly developed nature of the nesting colony site raises a question regarding what factors may have caused this Green Heron group to choose this area over the nearby American River Parkway, which appears to support ample nesting habitat nearer to their foraging habitat. The area below the La Riviera rookery site supports a substantial amount of human activity, but nearly all of it is of short duration. Birds may nest near high human disturbance because it may discourage predator activity (Samia et al. 2015). Selection of the rookery site to avoid predation may be supported by the fact that I only twice observed each of two common diurnal raptors,

Swainson's Hawk (*Buteo swainsoni*) and Red-shouldered Hawk (*B. lineatus*) in three years of regular monitoring of the site. Raccoons are common at nearby areas of the American River and are known to prey on heron nestlings (Pratt and Winkler 1985), but perhaps raccoon activity is discouraged at the colony site by vehicle and human activity. The dense nature of the oak canopy in the rookery area also may reduce access to predators or allow movements of young to escape predators.

High levels of recreational use of river channels has been suggested to reduce use and foraging time by Green Herons (Kaiser and Fritzell 1984). Visitors to the adjacent American River Parkway are regularly noisy, but the nearest group use is limited to only one area, the Howe Avenue access 0.4 km away, with most other recreation consisting of low intensity cycling, running, walking, kayaking and paddle-boarding (pers. obs.).

The dense and interconnected branching of oaks at the nesting colony may be another attractant to the site for nesting. I frequently noted the small, uncoordinated nestlings scramble out of their nests and crawl, wings-spread, across the dense network of branches in the understory to be fed by returning adults. I also never observed losses of young due to falls from the rookery site, which regularly occurs at rookeries of other heron species in the region (pers. obs.).

Finally, the site is surrounded by buildings and a line of coast redwoods (*Sequoia sempervirens*) to the northwest that protects the site from winds, which are common in the afternoons (the "Delta breeze") along the American River. These features, as well as the dense canopy of rookery trees may protect the flimsy heron nests (Kaiser and Reid 1987) from wind damage.

In summary, Green Herons may have chosen this site and aggregated there for several reasons, including protection from predators and wind, proximity to foraging areas, and the structure and cover provided by the oaks. Although the difficulty of locating nesting Green Herons limits the number of records, review of the eBird records suggests that the La Rivieria colony site is unusual for its large number of nesting pairs. Birders are encouraged to search further for and document other rookeries in the region, to contribute to our knowledge of the breeding behavior of the species.

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