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Authors: McSweeney, Timothy, and Brooks, Daniel M.

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PREDATION AT AN URBAN FREE-TAILED BAT (*TADARIDA
BRASILIENSIS*) COLONY BY NIGHT HERONS

TIMOTHY MCSWEENEY* AND DANIEL M. BROOKS

Houston Museum of Natural Science, 5555 Hermann Park Drive, Houston, TX 77030-1799

**Correspondent: tim_macswenny@yahoo.com*

ABSTRACT—Harris County, Texas, is home to both species of North American night herons, black-crowned (*Nycticorax nycticorax*) and yellow-crowned (*Nycticorax violacea*). Both species are carnivorous, consuming a wide

variety of vertebrates and invertebrates, although records of either species consuming bats have not been reported. During studies at a local colony of free-tailed bats living under the Waugh Bridge (Houston, Texas), significant feeding behavior observations of both herons were made. Both species were recorded foraging on this urban bat population, utilizing different methods for acquiring the bats as prey. Some of the behaviors are novel as well and are also discussed.

RESUMEN—El condado de Harris, Texas, es el hogar de ambas especies de garzas nocturnas de América del Norte, el martinete común (*Nycticorax nycticorax*) y el martinete coronado (*N. violacea*). Ambas especies son carnívoras y consumen una amplia variedad de vertebrados e invertebrados, aunque no se han reportado registros del consumo de murciélagos por ninguna de las dos. Durante estudios en una colonia local de murciélagos de cola libre que vive bajo el puente de Waugh (Houston, Texas), se realizaron observaciones sobre el comportamiento de alimentación significativa de ambas garzas. Ambas especies se registraron forrajeando en esta población urbana de murciélagos, utilizando diferentes métodos para adquirir los murciélagos como presa. Algunos de los comportamientos también son novedosos y se discuten.

Black-crowned night herons (*Nycticorax nycticorax*) inhabit freshwater habitats from Canada to Tierra del Fuego, Argentina, as well as parts of Africa and Asia (Hancock, 1999). They consume a variety of prey including fish, crustaceans, insects, mollusks, amphibians, reptiles, small birds, and rodents (Hothem et al., 2010). Yellow-crowned night herons (*Nycticorax violacea*) are found in a variety of fresh and saltwater habitats from the eastern United States through the northern coast of South America (Hancock, 1999). Their diet is predominantly made up of a wide variety of crustaceans supplemented with worms, mollusks, and insects (Watts, 2011). Both species often forage in or near water, standing still until prey comes into view, whereupon the heron lunges down and grasps the prey in their bill before swallowing (Kushlan, 1976). Although they feed during crepuscular periods, they may also feed during the day if extra energy is needed (Hothem et al., 2010).

Free-tailed bats are considered to be one of the most common species of bat found in the state of Texas, recorded to live in a majority of the state's counties. Free-tailed bats are insectivores, consuming a variety of beetles and other flying insects. The species is known to live in large colonies, made up of thousands of individuals, primarily in caves but have also been recorded inhabiting manmade structures such as bridges and buildings (Ammerman et al., 2012). The study colony herein was estimated to house a population of about 300,000 bats before Hurricane Harvey in 2017, with current estimates being about 200,000 individuals (Buffalo Bayou Partnership; <https://buffalobayou.org/waugh-bridge-bat-colony-q-and-a/>).

Observations of both species of night herons opportunistically consuming free-tailed bats were made at a local bat colony in Houston (Harris County, Texas). Details of these apparently novel behaviors are described herein.

Buffalo Bayou (85 km) originates in Fort Bend County near the town of Katy, flowing through Houston and Galveston before emptying into the Gulf of Mexico. The Waugh Bridge is the part of Waugh Drive spanning Buffalo Bayou Park, connecting Allen Parkway to Memorial Drive.

The area has been developed into a public park with several foot and vehicle bridges crossing over the bayou.

Waugh Bridge has served as a home for a large colony of ~250,000 Mexican free-tailed bats (*Tadarida brasiliensis*) since about 1993 (Winston et al., 2017). The underside of the bridge is divided into five different sections, with crevices in each section that provide roost refugia for bats during the day prior to evening activity.

Three adult black-crowned night herons were observed on the banks of Buffalo Bayou under the bridge on 7 June 2018 and five adults were observed on 16 June. On 7 June at 2020 h, one individual flew up to the crevices under the bridge and seized a bat from the colony before flying away from the bridge. On 16 June, the herons stood near the water, occasionally drinking from the bayou or flying to the opposite bank. The herons then collectively made seven attempts to seize bats from the crevices between 2012 and 2026 h, with a single individual making three attempts at 2026 h. The herons would circle around on wing before landing on the bank if the hunting attempt failed. Further observations were made on 3 August, where a juvenile black-crowned night heron was seen flying to the walkway at 2008 h and seizing a crawling bat in its mandible, while two other juveniles flew toward the crevices at 2022 and 2023 h (Fig. 1). On 16 August, black-crowned herons were seen flying up to the crevices, pulling bats from the bridge, and flying off with the bat in their beak at 1817 and 1831 h (Fig. 2). At 1927, 1938, 2000, and 2008 h, herons made unsuccessful attempts to seize bats. Bats that were pulled out but not eaten would circle around under the bridge before flying back to the crevice.

On 22 June 2018, three yellow-crowned night herons were observed scavenging six times between 2022 and 2055 h, consuming fallen bats from the ground or water. If on the ground, the heron would seize the live bats with their mandible, walk to the water, and dip the bat into the bayou before swallowing it whole; then the heron would take one drink from the bayou after consumption, presumably to aid the bat moving through the esophagus. The yellow-crowned herons were not observed consuming deceased bats or actively hunting bats from under the



FIG. 1—Black-crowned night heron (*Nycticorax nycticorax*) flying toward a crevice under the Waugh Bridge in Houston, Texas. Photo taken 30 August 2018; courtesy of Sharon Ruhly.

bridge as would black-crowned night herons. However, at 2112 h, a heron flew under the bridge toward one of the support columns and appeared to pursue a bat, but confirmation of prey or heron species was not possible because of low light levels.

Additional visits were made to the bat colony, but herons were either not observed (12 July) or were not hunting bats (30 August). In total, there were six observations of yellow-crowned night herons scavenging bats from below the bridge, and 17 attempts made by black-crowned night herons to seize bats directly from the colony, of which four (23.5%) were successful.

We have reviewed the literature using academic

libraries and Google Scholar, but were unable to find prior documentation of these species of herons feeding upon bats. This was also confirmed with authorities of these two species (B. Watts and R. Hothem, pers. comm.). While black-crowned night herons are known to consume some vertebrate prey, we were unable to find any records of active bat hunting and consumption (Hothem et al., 2010). In contrast, the dietary breadth of yellow-crowned night herons is much narrower, specializing primarily on invertebrate prey (Watts, 2011).

Additionally, the mode of hunting observed herein by the black-crowned night herons is unknown to be documented previously for any Ardeidae. Kushlan



FIG. 2—Black-crowned night heron (*Nycticorax nycticorax*) flying from the Waugh Bridge in Houston, Texas, after seizing a bat. Photo taken 30 August 2018; courtesy of Sharon Ruhly.

(1976) described the “hovering” mode of foraging as “a heron hovering over a single spot and reaches down with its bill to remove prey from the water.” Hovering is described for seven species of North American Ardeidae, including black-crowned night herons but not the yellow-crowned night heron (Kushlan, 1976), similar to the findings herein. In the present study, while some “hovering” may have been involved to glean bats from under the bridge, the behavior we observed involved a heron flying up and reaching up to pluck bats from their concrete crevice refugia rather than looking down over water before seizing prey.

These two species of night herons are often not found in sympatry despite being syntopic with regard to habitat association (Custer and Osborn, 1978). For example, during 7 years of sampling at an urban pond, these two species were only temporally sympatric 3% of the time ($n = 9$), during the same month, and 2% of the time ($n = 5$) during the same sampling session (D.M.B., pers. observ.). Our observations of both species at the same site within a 1-week span suggests that this site is an important, dependable source for foraging by night herons, whether actively hunting or scavenging.

The two species have differing morphological traits that may play a factor in the modes of acquiring bats. Black-crowned night herons have a shorter neck, larger head, and shorter and thicker mandible compared with the yellow-crowned night heron (Sibley, 2014), which may make it easier for them to collect bats directly from the bridge. Further research is needed to determine whether these differences affect night heron hunting methods or if there is some other aspect involved.

Acquiring a novel food source could infer adaptation to a changing environment (Delgado-V. and Brooks, 2003). The two herons may be utilizing a resource that, although uncommon for the species, provides the same nutritional benefits as other prey, especially in an urban environment. These foraging modifications may better permit the

herons to adapt to an ever-changing habitat, especially with continued human population growth and conversion of natural environments to an industrialized ecosystem.

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