

Black Rat *Rattus rattus* predation on an Arabian Collared Kingfisher *Todirhamphus chloris kalbaensis* nest

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Summary: We describe Black Rat activity in a nesting cavity during the period of Arabian Collared Kingfisher chick rearing and perhaps the first record of Black Rat predation of Arabian Collared Kingfisher chicks in Kalba, United Arab Emirates.

The Khor Kalba mangrove system within the Alqurm Wa Lehheffaiiah Protected Area is a Ramsar site known for its considerable biodiversity. Located on the Gulf of Oman coast of the United Arab Emirates (UAE) (25.014 N, 56. 359 E), the habitat is an isolated patch of tidal channels fringed with Grey Mangroves *Avicennia marina*, with a sandy coastline and sabkha plains with surrounding urban development enforcing distinct boundaries. An abundance of marine invertebrates, fish, seabirds and turtles, particularly Green Turtle *Chelonia mydas* have been recorded within the habitat. Khor Kalba is also the only location in the UAE where Sykes's Warbler *Iduna rama* breeds and is also the only known breeding site of the endangered subspecies of Arabian Collared Kingfisher *Todirhamphus chloris kalbaensis* (Plate 1) (Pereira 2013, Symes *et al* 2015).



Plate I: Arabian Collared Kingfisher, *Todirhamphus chloris kalbaensis*, perched on Grey Mangrove *Avicennia marina* in the Alqurm Wa Lehheffaiiah Protected Area. © Mark Williams



Plate 2. Camera trap deployment next to nesting cavity [top left], three eggs discovered inside nest cavity [top right] and adult male kingfisher perched at the cavity entrance captured by both camera traps [bottom].

Regionally, the Collared Kingfisher *Todirhamphus chloris* is considered Endangered under the International Union for the Conservation of Nature due to its declining populations resulting from environmental degradation and loss of essential mangrove trees (Symes *et al* 2015). The Arabian subspecies nests exclusively in natural cavities in the trunks of old Grey Mangrove trees in Khor Kalba. Investigations by Environment and Protected Areas Authority (EPAA) researchers of other mangrove systems in the UAE and nearby mangrove systems in Oman, showed no evidence of Collared Kingfisher nesting (J. Pereira, pers comm, Nov 14, 2017). Considering the scarcity of mature mangrove systems

with cavity-containing trees in the region, the vulnerability of these birds from the localized effects of anthropogenic activities and habitat transformation is of great concern.

Discussions about Collared Kingfisher cavity selection and cavity availability led to the trialling of artificial nest boxes within the mangrove forest. During a camera trap survey of artificial nest boxes in Khor Kalba, Pereira (2013) found signs that multiple invasive species had been active near or inside the nest boxes. Species noted included Common Myna *Acridotheres tristis*, House Crow *Corvus splendens* and most frequently, Black Rat *Rattus rattus*. Later observations have confirmed Collared Kingfishers nesting in these nest boxes. Camera trap surveys of naturally formed mangrove tree cavities have supplemented these findings. Additional intermittent investigations of nesting cavity occupancy recorded nesting debris and activities of invasive species. Here, we document the first confirmed record of Black Rat activity in a nesting cavity during a period of Collared Kingfisher chick rearing.

During a field survey on 16 June 2017, a nest cavity was found with three eggs and was selected for camera trap monitoring (Plate 2). Two camera traps (1 Reconyx Hyperfire and 1 Bushnell Trophy Cam) were deployed to observe the activity of a Collared Kingfisher pair in and around their cavity during the breeding season. The camera traps were left in place until 11 July 2017. On that day, the cavity was visited to service the camera traps and note any developments within the nest cavity. The nest was found to be empty, excavated and abandoned and the cameras were collected to review the captured images. Upon review, it was determined that at least one of the three eggs had hatched (hatchling activity at the cavity mouth was photographed on 6 July and 7 July). This was followed by imagery of a rat entering the cavity on 9 July that was not followed by subsequent hatchling observations (Plate 3). Hatchling disappearance occurring around the time a predator was observed entering the cavity may be the most compelling current evidence of the threat posed to Collared Kingfisher hatchlings by Black Rats. However, in the absence of conclusive evidence, speculation of Collared Kingfisher chick predation or carcass scavenging by rats remains unconfirmed.



Plate 3. Images taken of the cavity by the deployed camera traps: a kingfisher hatchling sitting at the entrance of the cavity on 6 July 2017 [left], a photograph (colors inverted for clarity) of a black rat at the cavity entrance on 11 July 2017 [right].

The intentional or unwitting introduction of invasive species to geographically small habitats is a potentially lethal menace to the persistence of threatened species. Species with distributions that are limited to association with such niche habitats are disproportionately susceptible to the threat of invasive species when compared with wider ranging species (Simberloff 2000, Clavero *et al* 2009). This mimics some of the sensitivities inherent in the insular environment of island biogeography (Bailey *et al* 2010). More than 90% of bird extinctions since 1600 have been of island species, primarily by predation by invasive mammals (Steadman 1995, Wanless *et al* 2007). According to a meta-analysis conducted on seabird–rat interactions, small burrow-nesting seabirds were amongst the most affected by invasive rats. The study also found that, though all species of rats in the study have had negative impacts on the survivability of the seabird populations exposed to them, *R. rattus* was the species with the highest impact on seabird survivability (Jones *et al* 2007).

There are 146 invasive species known to occur in the UAE, of which 5% are mammals (Soorae *et al* 2017). Among the invasive vertebrate species known to occur in Khor Kalba, Common Mynas and Black Rats present the greatest threat to Collared Kingfishers. It is unknown how long breeding Collared Kingfishers and rats have co-occupied the mangroves of Khor Kalba, but given the isolated and geographically restricted breeding locations of the Collared Kingfisher, the implications of Black Rat predation are considered a cause for concern for hatchling survivability.

Archaeological evidence at the location suggests human activity at the site as far back as the fourth millennium BC (Sharjah Archaeology Authority 2016). Black Rat colonization is globally commonly associated with human settlement (Russell & Clout 2004, Banks & Hughes 2012) although it is not known how or when this may have been facilitated at Kalba. It is well documented that invasive rats are one of the main contributors to localized seabird extinction. However, empirical evidence of the Collared Kingfisher population, generated from EPAA's annual census efforts, suggest the Collared Kingfishers are currently persisting with stable breeding-pair numbers despite the many potential threats. This merits further investigation to quantitatively assess the impact that Black Rats have on Collared Kingfisher population dynamics.

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