BREEDING OF BRIDLED TERN *ONYCHOPRION ANAETHETUS* ON A SHIPWRECK IN BAHREGAN BAY, PERSIAN GULF: A CASE REPORT

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Received 30 July 2022, accepted 11 December 2022

ABSTRACT

GHANAATIAN, H., SAFAHIEH, A., KABIRI, K., SAVARI, A., MOHAMADZADEH, M.R. & DARVISHI, K. 2023. Breeding of Bridled Tern *Onychoprion anaethetus* on a shipwreck in Bahregan Bay, Persian Gulf: A case report. *Marine Ornithology* 51: 43–45.

There are several tern species that breed in Iran during summer. Usually they nest on safe and uninhabited islands of the Persian Gulf. Here, we report an unusual occurrence at the *Iran-Reshadat* shipwreck ~10 km from Imam Hassan port in Bahregan Bay, Bushehr Province. At this site, Bridled Terns had laid eggs on the sunken ship upon three deck pillars that reached ~8 m above high water. Despite fishing boats anchoring around the sunken ship and even tying to the pillars, the terns appeared to feel safe and continued to nest at this location.

Key words: Bridled tern, Breeding nest, *Iran-Reshadat*, shipwreck, Bahregan Bay

INTRODUCTION

The Bridled Tern *Onychoprion anaethetus*, in the family Laridae, is a migratory seabird of the tropical and subtropical oceans, usually breeding on offshore islands during summer (Hulsman & Langham 1985). This medium-sized tern is similar to the Sooty Tern *O. fuscatus*, especially the spectacled form of the tropical Pacific (with dark grey upper parts and white under parts). It has a white forehead and eyebrows, and black legs and bill (Hulsman & Langham 1985). It is listed as Least Concern by the International Union for Conservation of Nature (IUCN; BirdLife International 2022).

One subspecies, *O. a. antarcticus*, lives in the Persian Gulf and western Indian Ocean. It has breeding sites on uninhabited islands of the Persian Gulf, such as Dara at Khuzestan Province, Nakhiloo at Bushehr Province, and Shidvar at Hormozgan Province. Nakhiloo Island in the Iranian National Marine Park of Dayyer-Nakhiloo is one of the main breeding sites in the Persian Gulf for tern species, including Lesser Crested Terns *Thalasseus bengalensis*, Greater Crested Terns *T. bergii*, and Sooty and Bridled Terns. Bridled Terns are dispersive and commonly breed under shrubs (Behrouzi-Rad 2014, Tayefeh *et al*. 2017). The incubation period of the Bridled Tern is 28–30 d (Hulsman & Langham 1985).

The *Iran-Reshadat* shipwreck is 166.02 m long and 23.25 m wide, weighing 7190 tons. It sits on its keel at a water depth of 12 m. Geographical position is in the southeastern portion of Bahregan Bay, approximately ~10 km away from the port of Imam Hassan, Bushehr Province, latitude 29°50′31″N and longitude of 50°08′21″E. The *Iran-Reshadat* was a commercial ship that was hit by two AM39 Exocet French missiles from an Iraqi aircraft on 24 August 1983 during Iran-Iraq war (Hooke 1997).

OBSERVATIONS

During marine patrol in Bahregan Bay (Fig. 1), some recreational fishing boats were observed beside the *Iran-Reshadat* on 16 May 2022. The boats were fixed by anchors and ropes were tied to the sunken ship's deck pillars (Fig. 2). The deck pillars of the *Iran-Reshadat* extend ~8 m above sea water at high tides. There is a ladder attached to one of the pillars for climbing (Fig. 2).

Upon climbing one of the pillars, we were surprised to find five Bridled Tern eggs on the pillar head cells. Additional eggs may have been present on other pillars, but we could not climb them. While we were there, one brave tern stayed on their egg, while others hovered above (Fig. 3E).

Fig 1. Map of northwestern Persian Gulf and Bahregan Bay, Bushehr Province, Iran. The *Iran-Reshadat* shipwreck position is indicated (pin).

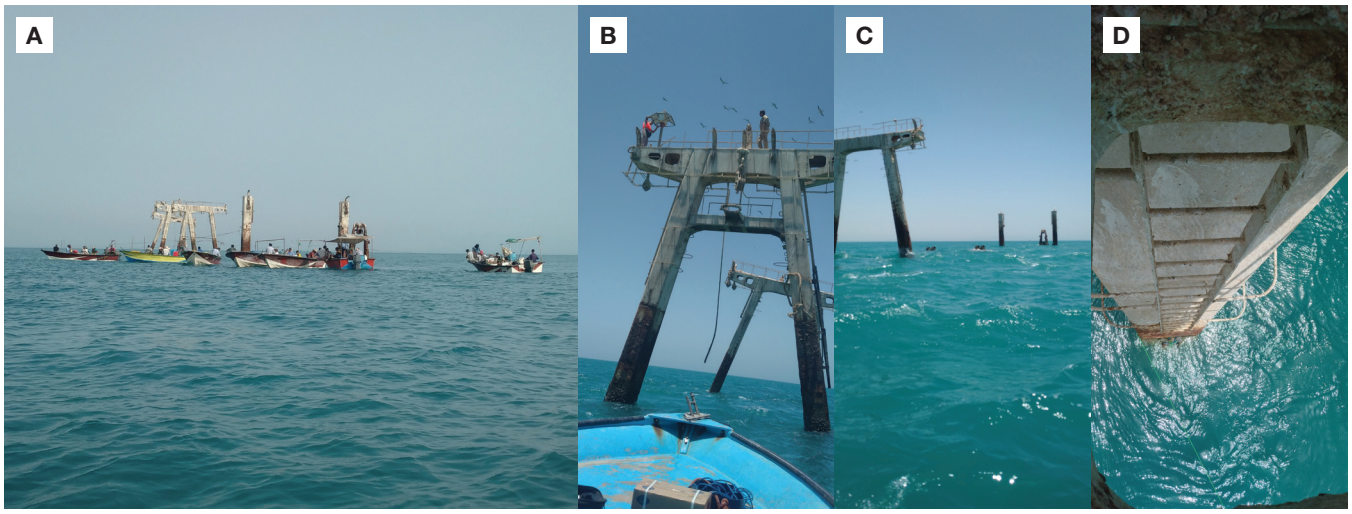

Fig. 2. (A) The *Iran-Reshadat* shipwreck that became artificial reef habitat rich in aquatic species. The picture shows local fishermen fishing around the sunken ship. (B–C) Approximately 8 m of the ship's deck pillars extend out of the sea at high tide. (D) One of the pillars has a ladder for climbing.

In early June (three weeks after our initial observations), the maritime organisation decided to install a solar flashing light to warn other vessels of the wreck during darkness (Fig. 2B). Despite this change, Bridled Terns nesting at the shipwreck did not leave their nests and eggs.

Field observations were carried out at Nakhiloo Island on 25 and 26 June 2022 to assess terns nesting in this natural habitat. It was apparent that Bridled Terns with clutch sizes of one, two, and rarely three eggs make small scrapes under bushes and shrubs (Fig. 4). At Nakhiloo Island, bushes and other vegetation, as well as metallic columns or cells at the *Iran-Reshadat* shipwreck, provide protection from the sun.

DISCUSSION AND CONCLUSIONS

Factors such as temperature, humidity, shape and type of breeding site, nest materials, and food availability have important effects on tern nesting (Behrouzi-Rad 2014, Tayefeh *et al.* 2017). In addition, tern nesting is strongly influenced by social attraction facilitated by the sound of other terns (Lu *et al*. 2020). Thus, a sense of safety is the most important determinant of nesting site choice by terns.

Seabirds commonly exhibit habitat fidelity (McKellar 2007, Beal *et al*. 2021). However, there have been major changes in some natural breeding sites in our study area in the last 30 years. For instance, Booneh (Ghamar) Island (~100 km away from the *Iran-*

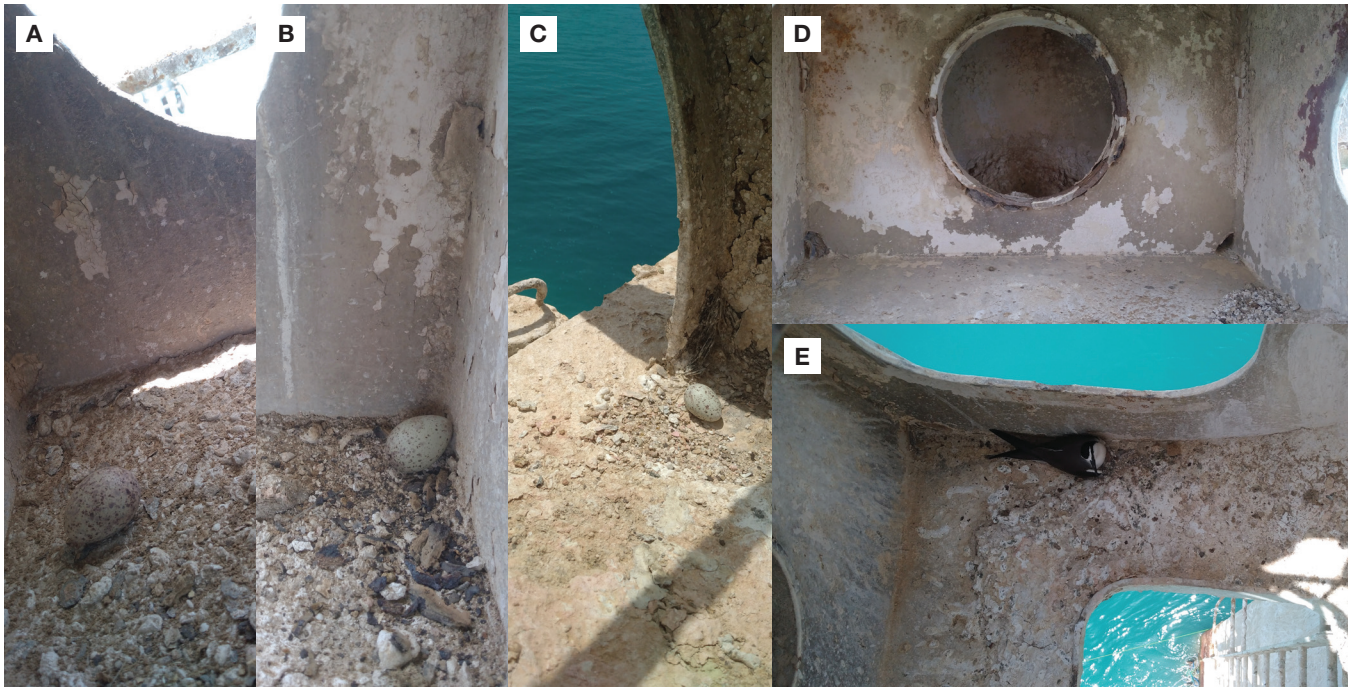

Fig. 3. (A–C) Bridled Terns *Onychoprion anaethetus* laying eggs on pillars of the *Iran-Reshadat* shipwreck. (D) Inner side of *Iran-Reshadat* deck pillar head that provides good habitat for tern breeding. (E) A Bridled Tern incubating its egg on the shipwreck in May 2022.

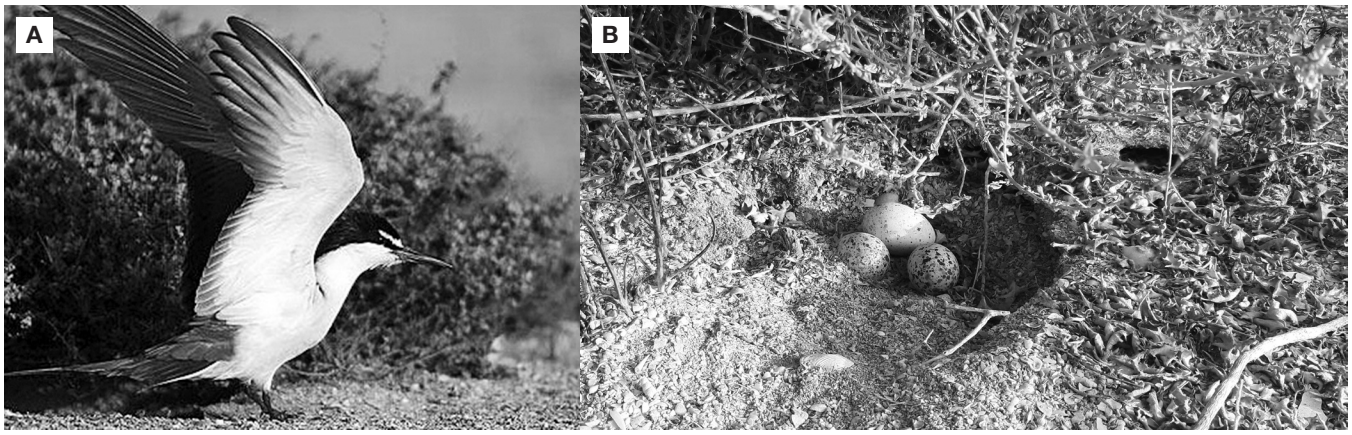

Fig. 4. (A) Shrubbery providing shelter for nesting Bridled Terns *Onychoprion anaethetus* at Nakhiloo Island, Persian Gulf. (B) Clutch sizes of Bridled Terns are one, two, or rarely three eggs.

Reshadat shipwreck) has historically provided good breeding and chick rearing habitat for terns, but it has recently been taken over by the military, creating an inhospitable environment for terns. Ghabre Nakhoda and Dara Islands at Musa multi-branches creek (Khur-e Musa) have also been affected by human activities (Behrouzi-Rad 2014). Terns seeking shelter in nearby areas (such as south of the Arvand River, south Iraq) have not been reported in recent decades (Al-Sheikhli *et al.* 2019). Therefore, Bridled Terns have been forced to colonize elsewhere (Dela Rosa *et al*. 2019). Breeding on shipwrecks may not be the best choice for nesting, but the high abundance of food and good foraging opportunities make shipwrecks an attractive nesting option (Consoli *et al*. 2014). In addition, the height of the pillars and the culture of native fishermen have given the birds confidence that they can reproduce and raise their chicks safely at these unconventional sites.

Some level of guidance is needed to ensure that terns will remain at the shipwreck. For example, rules of access must be established. Solar flashing lights should only be installed with permission from the provincial environment office. These lights should be installed 'appropriately,' and in a season that will exert minimal stress on resident Bridled Terns. Some questions remain about the fate of chicks at the *Iran-Reshadat* site, especially those on pillars without any protective edge (Fig. 3C). Therefore, we recommend that a sufficient budget be considered for monitoring the terns of Bahregan Bay, which could be done by camera. Knowledge gained from this monitoring will allow the development of improved strategies for their protection.

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