

First breeding record of Whiskered Tern *Chlidonias hybrida* from Nalsarovar Bird Sanctuary, Gujarat

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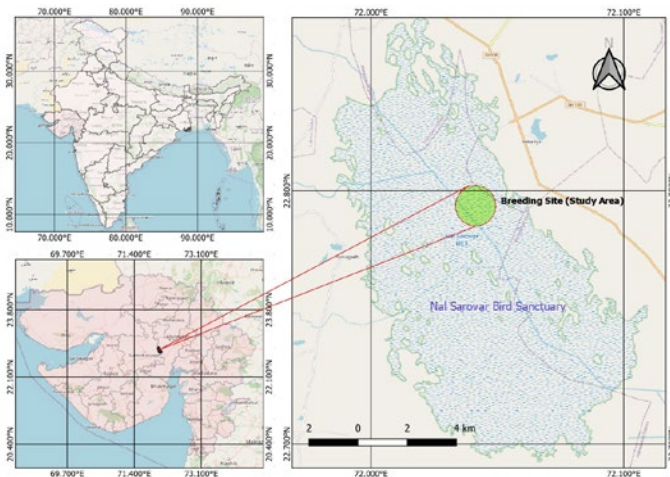
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ABSTRACT

The breeding of the Whiskered Tern (*Chlidonias hybrida*) was noted for the first time in Gujarat at Nalsarovar Bird Sanctuary. The breeding biology of the species, along with interspecies and intraspecies behaviour, was studied at Nalsarovar Bird Sanctuary between June – September 2021. Colonial nesting was noted and breeding was successful.



Map 1

INTRODUCTION

The Nalsarovar Bird Sanctuary, a 120.82 sq. km natural shallow lake situated between Ahmedabad and Sanand Districts of Gujarat, was designated as a Ramsar Site (Number 2078) in September 2012. The varying water levels and vegetation support eight different habitat types (RIS 2012). It is the largest wetland in the Thar Desert Biogeographic Province and the largest in the 4-B Gujarat-Rajputana Biotic Province (Rodgers & Panwar 1988). The salinity and spread of the lake varies, depending on the rainfall pattern and quantum. Some of the IUCN red-listed birds of sanctuary include the critically endangered White-rumped Vulture (*Gyps bengalensis*), and Social Lapwing (*Vanellus gregarious*), as well as the endangered Saker Falcon (*Falco cherrug*), Egyptian Vulture (*Neophron percnopterus*), and the Steppe Eagle (*Aquila nipalensis*).

Terns belong to the *Laridae* family (Sterninae subfamily) of birds which includes terns and noddies. In India, 20 species of

terns have been reported (Praveen *et al.* 2021). The Gujarat checklist (Ganpule 2020) reports 16 species of terns and 2 species of noddies, of which five species of terns are resident: Caspian Tern (*Hydroprogne caspia*), River Tern (*Sterna aurantia*), Little Tern (*Sternula albifrons*), Saunders's Tern (*Sternula saundersi*), and Black-bellied Tern (*Sterna acuticauda*), while the remaining species are either winter migrant or vagrant. The genus *Chlidonias* includes four species, of which three are listed in the Gujarat checklist, including Black Tern (*Chlidonias niger*), White-winged Tern (*Chlidonias leucopterus*), and Whiskered Tern (*Chlidonias hybrida*), while the Black-fronted Tern (*Chlidonias albostratus*), is extralimital. The terns in the genus *Chlidonias* are also referred to as 'marsh terns', as these species are mostly seen around marshes and freshwater bodies.

The Whiskered Tern is a widely distributed and a common winter migrant in Gujarat (Ganpule 2016). Three subspecies of Whiskered Terns are recognized: *C. h. hybrida*, *C. h. delalandii*, and *C. h. javanicus* (Gochfeld *et al.* 2020). Nominate *hybrida* occurs regionally. The Whiskered tern is found in a wide variety of habitats, including inland wetlands, marine intertidal, artificial/aquatic, and marine habitats (del Hoyo *et al.* 1996).

Rasmussen & Anderton (2012) gave the Whiskered Tern as a winter visitor and passage migrant in many parts of the Indian Subcontinent. Ali & Ripley (1981) reported breeding of this species in the Indian Subcontinent in North Cachar in Assam, Kashmir, Delhi, Uttar Pradesh, Bihar, and Bangladesh. Grimmett *et al.* (2011) stated that it is widely distributed in the Indian Subcontinent during the winters. Though the Whiskered Tern is given as a winter migrant to Gujarat, birds in full breeding plumage are regularly photographed here in the state. The 'eBird' status for this species' sightings is year round, with the least frequency for the June-July months and the highest frequency of sightings during the month of September. Recently, breeding has been reported from Morigaon, Kamrul, and Sivasagar districts of Assam (Ranade 2021) and from Kashmir and it is known to breed erratically in N India

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(Grimmett *et al.* 2011). According to the IUCN red list of threatened species (BirdLife International 2022), the species is placed under the 'Least Concern' category. This tern has a wide geographic distribution, including parts of Asia, Africa, Europe, Australia, and a few isolated records are known from the American Continent (del Hoyo *et al.* 2014). The Whiskered Tern is the largest of the marsh terns, with sexes alike (the male has a heavier bill), and it has a short, slightly forked tail which when spread appears square-cut (Higgins & Davis 1997).

On receiving information that Whiskered Terns were seen nesting in Nalsarovar Bird Sanctuary and since no nesting record existed for Gujarat, due permission from the state forest department was obtained to thoroughly study their breeding biology (Map 1). With the help of two volunteers and forest staff (including a boatman), frequent visits and systematic studies were conducted to collect breeding data of Whiskered Tern. A three-month study, i.e., from June–August, was conducted with direct field observations along with camera trap study. We present here the details of the breeding biology of the Whiskered Tern in the Nalsarovar Bird Sanctuary.

METHODOLOGY

Camera Trap study

A camera trap study was conducted to observe nesting behavior, and to get details of incubation, feeding, the behavior of young and predation of chicks (if any). A single infrared waterproof trail camera without flash (no glow) was used for the study. Battery and memory card replacements were done every third day. The first camera installation was done on 27 June 2021, at around 09:30 hrs.



Photo: Anuj D. Raina

The camera was set in duo mode: time-lapse photography and video mode, with a sensor interval of 15 seconds and 15 minutes respectively. Keeping in consideration the disturbance

to the nesting birds and possible negative impact on nesting, only the two outermost nests were considered for camera study purposes. Two bamboo poles were used for camera installation: one fixed vertically as a support for another pole. The vertical pole was submerged and fixed in the muddy lake basin (Photo 1). The second, or the angled pole, was knotted with the vertical pole and fixed with the trap camera. The camera angle of view was framed to capture the nest, hence eliminating the chance of haphazard sensor click for any movement around the camera.

Field visits

Direct visits to the nesting site were made by all the authors at different times and stages. Visits were made using forest department boats, with each boat having a capacity of 3–4 people. The forest department staff made daily routine visits to the nesting site from June to August. The morning hours were fixed for routine visits to observe nesting behaviour and any signs of anthropogenic disturbance. Binoculars and spotting scopes were used for observing behaviour, while DSLR camera (with telephoto lens) was used to record important behaviour by the pairs. A note of all routine observations was maintained by the forest staff.

On information regarding the nesting attempt by the White-winged Tern, the forest department visited the site on 9 June 2021 and was able to locate a large nesting colony of Whiskered Terns along with one pair of White-winged Terns. A total of 109 nests were reported during the whole study conducted between June and September 2021. The first systematic team survey was conducted on 10 June 2021, during the morning hours. All the visits to the nesting site for observations were made during the morning hours between 07:00 hrs to 12:00 hrs. As the sanctuary was closed for tourism during June – September 2021, the chances of any anthropogenic pressure were low.

OBSERVATIONS

Nesting site and nest building

The breeding site had prevalent vegetation to support a floating nest and prevent it being swamped away by strong winds and water currents. The nest observed was a heap of vegetation and grass (mostly aquatic vegetation) fixed and placed over floating or emergent vegetation in shallow water with average depth of about 1.5 m. The nesting area was well covered with macrophytic vegetation, including emergent, submerged, and floating vegetation. Nesting was equally distributed in both open wetlands with submerged vegetation as well as in dense and emergent vegetation (or inside

hydrophytic vegetation) with colonies placed in both. The macrophyte species recorded for nest building include *Hydrilla verticillata*, *Najas graminea*, *Phragmites karka*, *Typha angustata* and *Vallisneria spiralis*. The majority of nest building was done using *Typha angustata*, which is called "Bakhedo" by the locals. The topmost branches of *Hydrilla verticillata* were used as a base for nest building. *Typha angustata* and *Phragmites karka* are generally used as cattle feed by the local community at Nalsarovar. The leftover/dried stems/leaves from these aforementioned species were later used by the Whiskered Tern for nest building (Photo 2). Artificial substrates used for nest building include polystyrene (used by local fishermen as a fishing net float).



asynchronous hatching. In one case, a parent was seen intentionally damaging the egg (laid five days ago) in a nest with two hatchlings present. Two eggs were also seen floating near the nesting site. Some of the nests were observed to be fixed with fishing nets as support. On June 15, 16, and 17, the forest department staff fixed 18 nests with bamboo sticks as support to prevent them from being washed away by wind and water. Between 11 August and 2 September, no visit was made for study purposes at the nest site. Surprisingly, the first nest located on 10 June was also the last nest on 2 September to be used by a breeding pair and had three chicks. Each time eggs were laid in old nests, a new set of vegetation was used and the nest renovated. Many of the nests were used thrice for nesting by the Whiskered Terns. It is not known if the same pair had a second or third brood or if different pairs used the earlier made nests.



Nesting

The clutch size here was between one and three (Photo 3). The egg laying was not done on alternate days. The incubation period ranged between 20 and 25 days, followed by

A Table giving details of observations made over the nesting period is given below. A total of 109 nests were observed in the area, with most pairs successful in fledging young. A new nest was last observed on 2nd August.

Date	Total Nests	Observation(s)
27-June-21	45	One chick in one nest
28-June-21	48	Three new nests seen observed
3-July-21	48	5 nests with chicks
5-July-21	49	9 nests with chicks, one new nest observed
6-July-21	50	18 nests with chicks, one new nest observed
7-July-21	58	All the eggs laid on 15, 16 and 17 June were hatched with 100% success rate i.e. chicks were present in all nests. A total 40 nests with chicks. 8 new nests observed
14-July-21	63	Breeding completed in 48 nests with chicks fledging. 5 new nests observed
25-July-21	79	Nests with eggs laid on 15 June had all successfully fledged. 16 new nests observed
27-July-21	101	22 new nests observed. These nests were protected and restricted for visit by the forest department
1-August-21	108	7 new nests with eggs
2-August-21	109	One new nest. Last nest observed for the season with three chicks present.

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Interspecies competition

Other nesting bird species in the area included the Pheasant-tailed Jacana (*Hydrophasianus chirurgus*) and the Purple Heron (*Ardea purpurea*). Successful nesting of Purple Heron was observed in May-end, while the Pheasant-tailed Jacana nesting was observed during July near the shore of Nalsarovar. The most common species located around the vegetation was the Yellow Bittern (*Ixobrychus sinensis*). A flock of Common Coots (*Fulica atra*) was always observed in the vicinity of the nesting area but was kept away from the breeding / nesting site by the terns. Some of the birds attacked/chased off by the Whiskered Terns include: Red-necked Falcon (*Falco chicquera*), Oriental Honey Buzzard (*Pernis ptilorhynchus*), Heuglin's Gull (*Larus fuscus heuglini*), Little Grebe (*Tachybaptus ruficollis*), Common Coot, Purple Heron, Indian Pond Heron (*Ardeola grayii*), Cattle Egret (*Bubulcus ibis*), Great Egret (*Ardea alba*), Yellow Bittern, Cinnamon Bittern (*Ixobrychus cinnamomeus*), Indian Cormorant (*Phalacrocorax fuscicollis*), and Indian Jungle Crow (*Corvus culminatus*). Once, a Great Cormorant (*Phalacrocorax carbo*) was spotted near a Whiskered Tern nest but was not chased or attacked by it; just alarm calls were uttered.

Activity/behaviour of adults

The nest site was well monitored by all individuals of the Whiskered Tern and the terns were vigilant for any threat. The adults were seen flying over the younger chicks as they left the nest and started swimming. Any perceived threat of an intruder was collectively chased off from the nesting vicinity. The parent's behavior was observed to be more aggressive once the eggs were laid. The colony would chase any intruder, swoop down and sometimes attack it with their bills, accompanied by harsh, loud screams or shrieks. The alarm calls, a *kiriri* would invite other individuals to take part in chasing off the potential intruder or predator.

The process of nest repair and reinforcement was a continual activity, and regular nesting material, including aquatic vegetation, was brought for repairing the nest. The colony was highly active during the morning hours. During the afternoon hours, when the temperature soared, the parents were observed seated in the nest. More intraspecific competition was noted rather than interspecific competition, which in this case is attributed to demand for shared resources like food, space, and nesting material. The rate of intraspecific aggression increased once eggs hatched, as most of the hatching occurred at almost the same time. Kleptoparasitism was seen amongst different parents in the colony. In one instance, a Whiskered Tern was seen picking up an egg from the nest and dipping it five feet away. Whiskered Tern copulation was last seen at the

end of July. Chicks were not only fed by their parents, but by other members of the colony as well. For feeding chicks, parents preyed on invertebrates such as odonates and water striders as well as vertebrates such as fish (Photo 4). And most of the feeding and protection was done under the dense vegetation of the wetland.



Photo: Anuj D. Raina

Activity of chicks

The young displayed semi-nidifugous behavior, i.e., when between 3–8 days old, chicks were seen seeking refuge during any presumed threat and returning back afterwards. In many instances, chicks were seen lying flat on floating vegetation, camouflaging themselves with the vegetation (Photo 5). After the situation became normal and safe, the chicks would return to their nest, assisted by their parents with calls. Whenever chicks ventured out of the nest, a flock of terns was seen flying over them with loud calls. During the venture, if chicks tried to reach another nearby nest, the parents of that nest were seen attacking the chicks, i.e., the behaviour of terns towards other chicks was seen as aggressive in some cases. By the last week of July, a total of three fledglings were seen flying. In one case, two juveniles were seen flying 100 meters away. The duo was making short alternate flights accompanied by three adult terns flying around them. A brief description of the young is as follows: blackish head and neck, buff-brown crown, black and brown chequered pattern on mantle, pale grey wings, fleshy legs and off-white underparts (Photo 6). The chicks had buff-brown down with black marks on head and mantle and white down on underparts.

Nesting attempt by White-winged Tern

Nest building by a White-winged Tern pair was observed on 9 June 2021, near the Whiskered Tern nesting site (Photo 7). The White-winged Tern appeared diminutive when seen next to the Whiskered Tern. The White-winged Tern can be distinguished from the Whiskered Tern in non-breeding plumage by its smaller bill, smaller size, and black round ear

patch that extends below the eyes (similar to 'head-phones'). The tail of the White-winged Tern is square-shaped, while the Whiskered Tern has a slight tail-fork.



Photo: Anuj D. Raina



Photo: Anuj D. Raina



Photo: Anuj D. Raina

Generally, the feeding flight of the White-winged Tern was flutterier, more buoyant and graceful than that of the

Whiskered Tern, and the dips into the water were made at a lower level and in a more regular pattern across the surface of the lake. The nest building of the White-winged Tern continued for a few days but was later abandoned. During the process of nest building, the White-winged Terns were continuously attacked and chased by the Whiskered Terns. The nest of the White-winged Tern looked very similar to that of a Whiskered Tern, i.e., the same nest substrate with a floating nest on macrophyte vegetation and a floating piece of polystyrene. The nesting was not successful (eggs were not laid and the nest was eventually abandoned).

Camera trap study

During the approach for the camera trap installation, the incubating parents left the nest. After the pole and camera were installed, 8–10 terns circled the pole inquisitively. After the first installation, the parents started incubating the nest eight minutes after the team left the spot. The total video length captured for the study is 106.32 minutes (1.77 hours).

The place of the first installation of the camera had two nests. Around the two nests, one egg was seen floating; the first nest had three eggs, whereas the second adjacent nest had a chick on the edge of the nest. Both parents displayed active participation during the brooding phase. A Whiskered Tern was observed incubating the egg after laying the first egg in the nest. During the incubation phase, one parent was continuously present. The incubating parent was seldom seen fixing/repairing the nest while incubating. The 'free' parent would sleep normally at night with its beak tucked in its back, inside its wings, while the incubating parent would sleep with its wings wide open, covering the eggs. The non-incubating partner would continuously shift positions in the nest. In one of the nests where one hatchling with eggs was present, the non-incubating parent was seen bringing food and feeding the hatchling. The chick would constantly move out after a certain time from under the parent while the parent would drag the chick back under its wings. Repairing and reinforcing the nest was a continuous task. In all the videos captured, once all the eggs hatched, only one parent was seen protecting the nest with the chicks. This was presumed to be the male as the male is known to mainly provide for the chicks.

DISCUSSION

All reported breeding sites of Whiskered Terns were of almost similar habitat type to the habitat seen at Nalsarovar. The nesting behaviour, including floating nest type, nest design, nest size, incubation period, hatching and chick's behaviour was found to be similar when compared with other studies on

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the breeding biology of this species (Ali & Ripley 1981, Fazili 2014, Gochfeld *et al.* 2020, Ranade 2021).

Rainfall is a major factor influencing the water level of the lake, and the growth of vegetation. Because of seasonal fluctuations in water levels, habitats are transformed from one type to another within the same year (Vankar *et al.* 2018). Nalsarovar offers suitable habitat required for colonial species to build aquatic nests, which includes availability of nesting material, safety, food, and the surrounding environment. The aquatic nest construction of the Whiskered Tern has to be stable enough to prevent it from getting swamped and withstand water level changes. The nests at Nalsarovar needed human intervention in some cases but were largely stable and suitable for nesting since breeding was successful in a vast majority of the nests.

Whiskered Terns are generally colonial nesting birds and monogamous in nature; they have monomorphic plumage but have dimorphism in size between the sexes (Gochfeld & Burger 1996). Male Whiskered Terns are larger than females, especially so in head and bill measurements and body mass (Ledwoń 2011). Female Whiskered Terns have been observed abandoning males and offspring. The males, which are larger in size, can provide the chicks with more nutritious food. Hence, females contribute less than males in feeding the chicks (Ledwoń & Neubauer 2017). But here in Nalsarovar, we were unable to sex the pairs; we could not verify whether the male or female were involved in which duties and did not record any bird deserting the nest. In our studies, all nests observed had clutch size between one and three. The semi-nidifugous behavior among chicks was very prominent and after a few days, most of the chicks escaped towards vegetation for shelter and safety. From the camera trap video studies, we could see that during the incubation stage, parents devote almost equal time brooding the eggs, which continues till all the eggs hatch in an asynchronous manner. Once all the eggs are hatched, only a single parent's effort is seen for protection during night hours, which could be the female.

Whiskered Tern nesting is affected by food conditions and prey diversity (Paillisson *et al.* 2007). The Sternidae are mostly colonial nesting and semi-altricial. Conspecific nest parasitism, commonly seen in colonial species, has been recorded in the Whiskered Tern (Paillisson *et al.* 2008). But we could not find any cases of conspecific nest parasitism in this study. Many of the winter visiting species of terns have been seen in sanctuary in breeding plumages but have not been reported breeding. Regular monitoring in different seasons can help in knowing the true status of their breeding, if any, and further emphasize

the importance of Nalsarovar as a wetland and the need for its conservation. It should be noted that Whiskered Terns have been recorded nesting in Nalsarovar again in June 2022.

The observation of attempted nesting by the White-winged Tern is interesting. The White-winged Tern breeds in Europe, east to Siberia and Mongolia to SE Russia and adjacent NE China; it has not been recorded to breed in India. Though the nesting was not successful, this is the first observation of attempted nesting by the White-winged Tern in India. This area should be regularly monitored to check whether nesting is attempted again by this species.

CONCLUSION

Gujarat houses a wide variety of wetland types and the chances of tern species nesting (which have not been reported earlier) are high. The Nalsarovar Bird Sanctuary is well managed by the forest department for the removal of waste (like plastic), vegetation control, controlled fishing, and through regular patrolling. Although the sanctuary remains closed for tourism during the monsoon months, i.e., from June to October, the lake was closed for almost a year under Covid norms by the Government of Gujarat. Due to this, there was very less disturbance for the nesting Whiskered Terns in 2021.

In addition to the sanctuary closure during the monsoon season, the lake was restricted for tourism for almost the entire year due to COVID regulations implemented by the Gujarat Government. Although the forest department conducts regular winter monitoring programs to assess the species diversity and count at Nalsarovar, consecutive seasonal studies are required to monitor all nesting species, and their population counts. Anthropogenic pressure has led to changes in nesting patterns, ecological damage, and has brought many species under threat. The data from studies at Nalsarovar can aid in research, disaster management, decision-making, and conservation programs.

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Sighting of Yellow-browed Warbler *Phylloscopus inornatus* at Girnar

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I visited Narayan Dharo, Bhavnath area, near Junagadh, on 13 December 2021 at around 15:00 hrs. It is a good place of birding in the winter season and I visit this area regularly. On that day, I saw many flycatchers like Asian Brown Flycatcher (*Muscicapa dauurica*), Brown-breasted Flycatcher (*M. muttui*) and Taiga Flycatcher (*Ficedula albicilla*). I also saw many warblers like Western-crowned Warbler (*Phylloscopus occipitalis*), Greenish Warbler (*P. nitidus*) and Hume's Leaf Warbler (*P. humei*). I saw one bird, similar to a Hume's Leaf Warbler, but with two prominent wing bars, pale legs, pale orangish bill base and having white-edged tertials. The plumage was brighter greenish, with some yellow in supercilium, and the median covert wing bar was well defined.

I thought that this was different from a Hume's Leaf Warbler. So, I sent the photographs to Prasad Ganpule, and he



Photo: Gaurang Bagda

confirmed that it was a Yellow-browed Warbler (*Phylloscopus inornatus*) based on the strong face pattern, greenish