

# Suspected decline in the breeding population of Sooty Falcons *Falco concolor* on the islands of northern Oman

MICHAEL J McGRADY, TAIMUR AL SAID & HAMOOD AL NERI

**Summary:** A survey of breeding Sooty Falcons on the Daymaniyat and Fahal Islands was conducted in September 2023. A total of 20 active nests was located, nine on the Daymaniyat Islands, and 11 on Fahal. We estimated that a decline of 39–55 % may have occurred since a longer and more detailed study during 2007–2014 on the Daymaniyats, and a decline of 15–19% may have occurred on Fahal. Overall, a decline of 27–33% is suspected. The median number of nestlings was 3 (range 2–4); the mean was  $3.0 \pm 0.47$  ( $n = 9$ ). These estimates should be treated with caution due to constraints on the survey and the resultant small sample sizes, but they suggest a declining status of Sooty Falcons, emphasize the need for up-to-date information on Sooty Falcons on the breeding grounds (and across the annual range) and will contribute to the Action Plan that is being developed. In Oman it is important to resume annual survey and monitoring of Sooty Falcons so as to make use of the good baseline data from the 2007–2014 study.

## INTRODUCTION

Sooty Falcon *Falco concolor* is a medium-sized migratory falcon that breeds in the Middle East and northern Africa. Almost the entire population winters on Madagascar, mostly in the west and southwest of the island. Sooty Falcon shares an unusual ecology with Eleonora's Falcon *Falco eleonorae*. Both species start to breed in high (boreal) summer, and thereby avail themselves in autumn of a flush of potential prey in the form of migrating small birds, which are the main source of food for the falcons and their broods of young. While small birds are the mainstay of the diet during nesting, at other times of the year insects are important, particularly during migration and in winter (Gallo-Orsi 2014, BirdLife International 2023).

Currently Sooty Falcon is classified as globally Vulnerable, and its population is considered to be declining across its range (BirdLife International 2023, though see Riad *et al* 2021). However, the history of population estimates and establishing the conservation status of this falcon has been characterised by inappropriate assumptions and extrapolations perpetuated over time (Kavanaugh & King 2008) meaning that the Vulnerable classification may rest on unsure foundations. Further undercutting confidence in the assessment of the Sooty Falcon's conservation status is the fact that data from recent comprehensive surveys and multi-year monitoring are generally lacking. The surveying and monitoring that has occurred in recent years has been constrained (*eg* Goren *et al* 2023), incompletely described (Riad *et al* 2021) or the results have not been made public (*eg* the giga-developments in the Saudi Arabian Red Sea). The lack of accurate, current information on the status of national populations exacerbates the difficulty in determining the conservation status, the rate of population change and any geographic variation in that change. It also undermines effective conservation. As a result of the apparently poor conservation status of Sooty Falcon, a Convention on Migratory Species (CMS)-sponsored species action plan was drafted (Gallo-Orsi *et al* 2014). That draft was not finalized, but a renewed effort to draft and finalize an action plan was taken up in 2022, and is underway.

During 2007–2014 the Office for Conservation of the Environment (OCE) in Oman conducted research, surveys and monitoring of Sooty Falcons on the islands of northern Oman, including the Daymaniyat Islands and Fahal Island. That work resulted in a number of peer-reviewed publications (McGrady *et al* 2016, 2017, 2019, 2020, Al Jahdhami *et al* 2021), which examined a variety of topics including occupancy and productivity, the effects of disturbance, survival, dispersal and migration. Since 2014 no work has been

done on Sooty Falcons in Oman, and with every passing year the publications from the 2007–14 work become increasingly out of date. At the same time, little information on Sooty Falcons from other parts of their range has been made public.

Against the backdrop of presumed global declines in breeding populations of Sooty Falcon, the past work in Oman provides the best baseline against which apparent population change might be measured.

We collected information on the occurrence and productivity of Sooty Falcons on islands in the Daymaniyat archipelago and Fahal Island in 2023. The main aim was to collect as much information as possible on the islands and compare the results to what was found during the earlier study period. It is important to note that what we report are the results of a survey conducted during a single breeding season that was logistically constrained, and that any conclusions drawn from our results should be treated with caution. More definitive conclusions should only be drawn after more complete, multi-year surveys are conducted. Because of time constraints we knew from the outset that the results from this short study would not be conclusive, but that they might point to whether the breeding population had declined since 2007–2014.

## STUDY AREA AND METHODS

The Daymaniyat archipelago comprises nine islands, which for ease of reference we label D1 – D9, with D1 being the eastern-most island (Figure 1). The islands are composed of raised ancient coral and sandy beaches located about 16 km offshore from Seeb, Oman. The Daymaniyats are designated as a national nature reserve, and landing on the islands is prohibited for much of the year due to nesting birds and turtles. Fahal is a steep-sided island comprised of ancient coral cliffs and scree (Plate 1) located about 4 km off the coast from Muscat, Oman (Figure 1). It is about 37 km east of the eastern-most Daymaniyat Island (D1). Fahal is uninhabited and landing is difficult; police permission is needed. See McGrady *et al* (2016, 2017) for a more complete description of the islands.

We visited islands in the Daymaniyat archipelago and Fahal Island during 8–14 September 2023 to survey for breeding Sooty Falcons. In so far as was practical we



**Figure 1.** The study area, the islands of northern Oman. The Daymaniyat Islands Nature Reserve comprises nine islands, labelled by us as D1 (furthest east) to D9 (furthest west).



**Plate 1.** Fahal Island as viewed from the south. The island is characterized by large cliffs, and unstable scree. Many areas where falcons nest or could nest are inaccessible. © M McGrady



**Plate 2.** Adult Sooty Falcon attending its nest, Daymaniyat Islands, Oman. © M McGrady

followed the methods used by McGrady *et al* (2017) during 2007–2014. We searched likely nesting habitat (cliffs and rocky outcrops) for nesting Sooty Falcons. We had some knowledge of past nesting from the earlier study period, which aided the search. Adult defensive behaviour and other signs (eg prey remains) enabled us to locate nests (Plate 2). Some nests were accessible to us and we visited those, and record their location (GPS) and contents (chicks).

We searched on foot all islands to which we could gain access. Rough seas meant we could not land on some of the Daymaniyat Islands, and the large, unstable, steep cliffs of some Daymaniyat Islands and Fahal islands meant some surveying was done from a boat. Boat-based surveys were done by sailing near the inaccessible parts of the island at a slow speed and visually searching for pairs of adult falcons. The locations (latitude, longitude) of nests or possible nests (based on

adult falcon behaviours) that we could not access were estimated by plotting them on maps. Heat was also a constraint on the field work, so we avoided working during the middle of the day.

## RESULTS

A total of 20 active nests was located, nine on the Daymaniyat Islands, and 11 on Fahal. A further pair on D4 appeared to be holding a territory, but did not have an active nest at the time of our survey. Although not quantified, we frequently found locust (Orthoptera) remains at the falcon nests we visited. Other remains were of Hoopoe *Upupa epops*, Green Bee-eater *Merops orientalis*, European Nightjar *Caprimulgus europaeus*, swift *Apus sp.* and Bridled Tern *Onychoprion anaethetus*. Other prey remains were found, but not identified. The mean number of chicks per active nest was  $3.0 \pm 0.58$  for the Daymaniyats,  $3.0 \pm 0.0$  for Fahal, and  $3.0 \pm 0.47$  overall (Plate 3).



**Plate 3.** Sooty Falcon nestlings, Daymaniyat Islands, Oman.  
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### Daymaniyat Islands

We surveyed all the Daymaniyat islands during 8–11 September 2023 (Table 1). We were unable to land on island D2 because of rough seas. D2 is small and it is unlikely that we missed any pairs occupying the island. D8 is smaller than D2, and was surveyed from a boat. In total we found 10 occupied territories on four islands. We were able to visit six nests, and record the number of nestlings. The median number of nestlings per active nest was 3 (18 nestlings in six nests, 2–4 nestlings per nest).

**Table 1.** Numbers of apparently occupied Sooty Falcon territories on the Daymaniya (D1 to D9) and Fahal during 2007–2014 (from McGrady *et al* 2017) and the number of apparent occupied nesting sites in 2023. Also shown are data from 1978 from Walter (1979).

Year	Fahal	D1	D2	D3	D4	D5	D6	D7	D8	D9	Total Daymaniya	Grand Total
1978	47										44	91
2007	14	0	2	3	5	4	1	4	0	10	29	43
2008	17	0	1	3	4	4	1	3	0	11	27	44
2009	11	0	0	1	3	4	0	2	0	7	17	28
2010	17	0	1	1	1	4	1	0	0	8	16	33
2011	11	0	0	1	1	4	1	1	0	6	14	25
2012	13	0	0	1	1	1	1	0	0	9	13	26
2013	13	0	1	1	1	4	1	2	0	7	17	30
2014	10	0	1	1	1	2	0	1	0	6	12	22
Median (2007–14)	13	0	1	1	1	4	1	1.5	0	7.5	16.5	29
Max (2007–14)	17	0	2	3	5	4	1	4	0	11	29	44
Min (2007–14)	10	0	0	1	1	1	0	0	0	6	12	22
2023	11	0	0	0	1	2	0	1	0	6	10	21

**Table 2.** Percent change between 2007–2014 (McGrady *et al* 2017) and 2023 in apparent numbers of occupied Sooty Falcon territories on islands in north Oman.

	Fahal	Daymaniya	Overall
Median	-15	-39	-27
Max	-36	-65	-52
Min	10	-17	-4



## Fahal Island

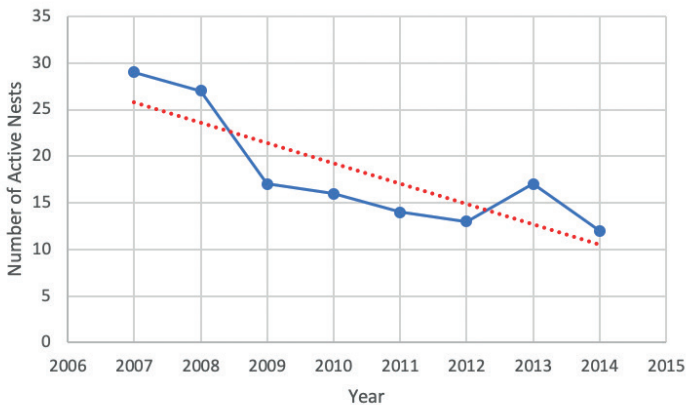
We surveyed Fahal Island on 13 September (Tables 1 & 2). We found a total of four nests with nestlings; we were able to access three nests (Table 1). All nests we visited had three nestlings. Based on falcon behaviour we also identified seven inaccessible areas where nesting was possible or probable. We were unable to search the island thoroughly due to time constraints. We observed up to 12 adult birds flying around the island at one time, suggesting a minimum of six pairs. Based on our experience from the 2007–2014 field work (*ie* a better understanding of detection rates of pairs occupying inaccessible and difficult-to-observe nesting locations), we estimate there could be 18–30 pairs on Fahal, but our confidence in that estimate is low.

Table 2 compares the apparent occupancy of nesting areas on an island-by-island basis in 2023 with measures of occupancy during 2007–2014. Overall, there has been an apparent decline on all islands that had at least one nest during 2007–2014. The possible decline in the Daymaniyat Islands is 39–55%. Because the survey on Fahal was incomplete, and many areas are very hard to survey, we are not confident that the apparent decline of 15–19% there is accurate. However, we subjectively believe that a decline of unclear magnitude has occurred on Fahal since the earlier study. Overall, there seems to have been a decline of 27–33% in Sooty Falcon breeding on the islands of northern Oman.

## DISCUSSION

We found evidence of an apparent decline in the number of Sooty Falcon breeding pairs on the islands of north Oman. Overall, a decline of 27–33% is suspected relative to data from 2007–2014. If real, the suspected declines would be a continuation of the declining trend observed during the 2007–14 study (Figure 2). Comparing with the values in Walter (1979, 44 pairs) a decline of 59% since 1978 is suggested on the Daymaniyat Islands. Using Walter’s estimate for Fahal (47 pairs) as a comparison is less valid because of the need to estimate occupancy of so many nests (both during 1978 and 2023) from a distance. Nevertheless, those values suggest a decline since 1978 in the order of 62%.

Overall, the production of nestlings per active nest in 2023 ( $3.0 \pm 0.47$ ) appeared to be higher than during 2007–2014 ( $2.11 \pm 0.07$ ), and higher than in 1978 ( $2.61 \pm 0.64$ , Walter 1979), although the 2023 sample was small. However, in 2023 locust prey remains were found at many nests. During 2007–2014 the presence of large numbers of locust prey remains



**Figure 2.** Number of active Sooty Falcon nests on the Daymaniyat Islands and trendline during 2007–2014 (McGrady *et al* 2017).

coincided with the most productive year of that study (McGrady *et al* 2017).

Fieldwork in 2023 differed significantly from that in 2007–2014, and this may have affected our findings. Less time was spent surveying the islands in 2023, and the timing of the 2023 survey was different. This meant that it is possible that we missed sites that had been occupied early in the season but

were later abandoned, and that some areas were not exhaustively searched. On Fahal, in particular, our survey was incomplete, and many areas were difficult to survey. Also, because the 2023 results are from a single year only, they do not account for annual variation. Nevertheless, in 2023 fewer nesting pairs of falcons were recorded on every Daymaniyat Island that had nesting Sooty Falcons during 2007–2014.

Despite these caveats, we report this information now in the hope it will be useful in the preparation of the Action Plan that is being developed by CMS, which will provide a useful roadmap for conservation action across the species' range. The Action Plan will certainly point to the lack of data on Sooty Falcons globally, and the undermining effect that has on mounting effective conservation efforts.

Sooty Falcon survey, monitoring and research in Oman were halted in 2014. The results of the 2007–2014 study provide high quality baseline information that can be used to understand population changes. It would be beneficial to restart the Sooty Falcon work, and work to incorporate reserve rangers and EA biologists in a sustainable annual effort.

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Michael J McGrady, International Avian Research, Am Rosenhügel 59, 3500 Krems, Austria. [mike\]McGrady@aol.com](mailto:mike]McGrady@aol.com)

Taimur Al Said & Hamood Al Neri, Environment Authority, PO Box 323, Muscat, PC 100, Sultanate of Oman. [t.alsaid@ea.gov.om](mailto:t.alsaid@ea.gov.om), [hamood.alneeri@ea.gov.om](mailto:hamood.alneeri@ea.gov.om)