

Observations on breeding of Red-necked Falcon near Surendranagar

Gulamahmad Vora: Laxmipara, Surendranagar 363001. gavora71@gmail.com

Faruk Chauhan: Laxmipara, St No 1, Dudhrej Road, Surendranagar 363001. fdchauhan@gmail.com

Yogendra Shah: 'Anand', Jintan Road, Surendranagar 363001. ymshah55@gmail.com

Vishal Thoria: 5 Arun Society, Daalmill Road, Surendranagar 363001. vishal_thoria@hotmail.com

Shivbhadrasinh Jadeja: Snehal Park, Opp. T.B. Hospital, Dudhrej Road, Surendranagar 363001. shivjadeja@gmail.com



Nirav Bhatt

Introduction

The Red-necked Falcon (*Falco chicquera chicquera*) is a widespread resident in the Indian Subcontinent and is widely distributed in Gujarat (Naoroji 2006). It is seen in arid and semi-desert areas, but it is uncommon throughout the state. It is seen in the *vidis* and open habitats with trees in the farmlands of Saurashtra. It is an uncommonly seen species and very little is known about its breeding biology in India. Naoroji (2011) carried out a detailed study on the breeding of this species in Saurashtra, Gujarat. Two nests were studied by him near Jasdan; one nest having one nestling and the other nest with three nestlings. The first nest had a 2-3 day old nestling when observations began, while the other nest had three almost fledged young. Hence, the study on these two nests was carried out after the eggs had hatched, and no data regarding copulation or incubation period is given.

A few details regarding the breeding of Red-necked Falcon in India have been given by Dharmakumarsinhji (1955), Dharap (1974), Ali & Ripley (1978), Gole (1980), Subramanya (1982, 1985) and Ingallahlikar (1988). These studies describe nesting sites, hunting behaviour and feeding habits of this species. But the incubation period of this species is not known (Naoroji 2006). Details regarding copulation and prey are also scanty.

Here, we describe the breeding biology of the Red-necked Falcon – from mating to fledging of chicks, with an emphasis on the prey taken during this period. A brief observation on the mating of the same pair was reported by Shah (2005) earlier. We describe prey taken during breeding, the incubation period and the behaviour of the pair, during this study.

Study Area

The nest of the Red-necked Falcon was located at Nayka Dam (22° 40' N 71° 28' E), near Surendranagar, Gujarat. The nesting was on a White Fig (*Ficus virens*) tree located adjacent to the state highway. The surrounding area had a few more *Ficus virens*, *Salvadora persica*, *Prosopis cineraria*, *Eucalyptus* sp. trees, along with agricultural fields, mainly growing cotton. The nearest water body was Nayka Dam, located approximately 500 mts from the nest site. The approximate annual rainfall of the area is about 500 mm.

Methods

The Red-necked Falcon pair was first seen mating on 14 January 2004 and from then on, daily observations were taken from around 07:00 hrs till 19:15 hrs. Observations were made with binoculars (10x50) and the behaviour recorded with the help of a digital camera. The pair was observed from mating till the fledging of their chicks, and the total period of observation was 83 days, for a total of around 990 hrs of observations. The prey was identified visually, with the help of binoculars, and if the prey species was not identifiable, attempts were made to identify the genus. Egg measurements were taken with the help of a Vernier Calipers. To avoid disturbing the adult falcons, this was done when both the birds had left the nest and was completed as quickly as possible. The eggs were weighed with a weighing scale.

Observations and Results

Copulation

Copulation was first observed on 14 January 2004, and then on a daily basis till 27 January 2004. Mating ceased once incubation started on 28 January 2004, but was observed once on 6 February 2004. The average daily frequency of mating was 5.4, with a maximum of n=8 copulations per day observed twice. During this period, the male delivered a variety of prey to the female, which consisted of mostly birds. Copulation was recorded for a total of 81 occasions, out of which 67 preceded with a prey delivery by the male. A total of 78 (birds n=70,

Red-necked Falcon...

mammals n=6, and reptiles n=2) prey deliveries were recorded during the 14 days when mating was observed.

Egg Laying and Incubation period

The egg laying date was 28 January 2004. This was ascertained by us by visual observation of the nest. The clutch size recorded was four and the details of the eggs are given in Table 1.

Table 1: Egg dimensions and weight

Egg No.	Length (in mm)	Width (in mm)	Weight (in gms)
1	43.5	33.0	23
2	46.6	32.8	24
3	45.2	32.8	24
4	44.1	32.9	24

The average egg size noted here was 44.85 x 32.87 mm. Incubation commenced from 28 January 2004 and was noted till 29 February 2004 (n=33 days), but since the exact date of hatching was hard to ascertain, the incubation period is likely to be 32 to 34 days. The male did all the hunting and providing for the female during incubation. The female was not observed hunting at all during this period. During the incubation period, the male used to observe the nest but did not incubate during the entire period of the study. A total of 151 (birds n=136, mammals n=11, and reptiles n=4) prey deliveries were recorded during the 33 day period.



Prey (lark) delivered to female

Hatching dates and fledging period

The exact date of hatching could not be ascertained. But very young chicks were observed being fed by the female early on 2 March 2004. Thus, the hatching date was 1 March 2004 or 2 March 2004. The brood size at hatching was four. The chicks were fed by the female whenever the male brought prey, but the male rarely used to feed the chicks. During the early nestling stage, hunting and providing for both the female and the chicks was done solely by the male. The female was observed hunting for the first time on 11 March 2004. After

this date, the female used to hunt alone in the nearby areas from the nest site and only occasionally joined the male in hunting.

The fledging period was 36 days (1 March 2004 to 5 April 2004) and all the four chicks fledged successfully. The last observations on the fledged juveniles were made on 5 April; they had moved out of the nest and were seen flying short distances along with the adults. A total of 311 (birds n=285, mammals n=18, and reptiles n=8) prey deliveries were recorded during the nestling period.

A summary of the prey taken during the mating, incubation and fledging period is given in Table 2.

Table 2: Total and percentage of prey species recorded in the diet of the Red-necked Falcon during copulation, incubation and nestling periods

No.	Prey species	Copulation		Incubation		Nestling	
		No	% of total diet	No	% of total diet	No	% of total diet
1	Bee-eater sp. (<i>Merops</i> sp.)	3	3.84	6	3.97	20	6.43
2	Bulbul sp. (<i>Pycnonotus</i> sp.)	0	0	3	1.99	6	1.93
3	Chat sp.	6	7.69	1	0.66	7	2.25
4	House Sparrow	6	7.69	7	4.63	20	6.43
5	Lark sp.	23	29.48	48	31.78	89	28.62
6	Munia sp.	4	5.12	2	1.32	3	0.96
7	Pipit sp. (<i>Anthus</i> sp.)	1	1.28	0	0	0	0
8	Red-collared Dove	2	2.56	5	3.31	17	5.47
9	Indian Robin	15	19.23	9	5.96	26	8.36
10	Rosy Starling	1	1.28	6	3.97	18	5.78
11	Swallow sp.	1	1.28	0	0	0	0
12	Unidentified birds	0	0	46	30.46	79	25.38
13	Warbler sp.	6	7.69	0	0	0	0
14	Wader sp.	2	2.56	3	1.99	0	0
15	Bat sp.	2	2.56	0	0	0	0
16	Mouse sp.	4	5.12	11	7.28	18	5.78
17	Lizards	2	2.56	4	2.65	8	2.57
	Total	78		151		311	

Mating

The prey recorded was mainly Larks, House Sparrow (*P. domesticus*), Pipits, Red-collared Dove (*S. tranquebarica*), Rosy Starling (*P. roseus*), Warblers, Swallows, small Waders, Bee-eaters, Indian Robin (*S. fulicatus*), Bulbuls, Munias and unidentified birds. The mammals recorded were Bat (the species could not be identified) and Mice (*Mus* sp.). Reptiles were taken only twice during this period and were Lizards (*Calotes* sp.)

Incubation

The prey was similar to what was recorded during the mating period and mainly consisted of birds, with Larks being the main prey item. Reptiles (Lizards) and mammals (Mice) were also taken.



Nirav Bhatt

Female feeding small chicks



Nirav Bhatt

Three grown-up chicks in the nest

Nestling

The prey was regularly delivered to the female and it was observed that the prey was similar, with Larks being the main prey.

Discussion

The Red-necked Falcon prefers open habitats, interspersed with trees, cultivation and villages. The habitat here was similar; agricultural area interspersed with trees. The incubation and fledgling period, prey taken during breeding, the composition of prey and preferences and the behaviour of the pair are aspects of breeding which were not known and are reported here.

Dharmakumarsinhji (1955) and Ali & Ripley (1978) mention the nesting season extending from December to March, which is similar to what was observed in our study. Naoroji (2006)



Nirav Bhatt

Prey delivery (silverbill)

mentions the season extending from December to June; Naoroji (2011) recorded a pair nesting in April, with one nest in early nestling and the other having almost fledged young. This gives an indication that the season can be extended and may be variable. A larger sample size of nesting pairs from different parts of India is needed to understand the nesting season of this species. And if the season is extended, what could be the factors influencing certain pairs to nest early and some to nest late? This is an interesting question that needs a thorough study.

From copulation to the early nestling period, the female was not recorded hunting even once. The female started hunting only after the chicks were 10-12 days old, which is slightly earlier compared to 18 days observed by Foysal (2015). Naoroji (2006) also mentions that the female exclusively broods and feeds the chicks, leaving the nest only to snatch prey from the male. This was as observed in our study as well, with the female confined to the nest during the early nestling stage. Possibly, the need for brooding and the fact that the caloric need of the brood is not as high for the female to be hard-pressed to hunt in this period. Does the female go hunting when the chicks no longer need extended brooding or does the female's hunting coincide with the increase in prey demand from the chicks or both? These are another set of questions that will need more data for any reasonable answers. Another interesting aspect to note is that, in addition to the early nestling stage, the female did not participate with the male in hunting during copulation and incubation periods. This is quite an extended period for the small tiercel to go hunting alone, considering that the pair, for most part of the year, hunts in unison.

Naoroji (2006) mentions that the incubation period for the Red-necked Falcon in India is not clearly known. Foysal (2015) records the incubation period as a minimum of four weeks, but the nest was discovered when the female was already incubating and as a result a correct assessment cannot be

Red-necked Falcon....

made. The incubation period of around 33 days observed in this study is similar to the incubation period recorded for the African subspecies *Falco chicquera ruficollis* (32-35 days) (Naorji 2006). Our estimated incubation period of 32-34 days is similar to the African subspecies, but a bigger sample size from different regions of India is needed to get a better indication. Also, the average egg size noted here is larger than the average of 42.4 x 31.1 mm given in Ali & Ripley (1978).

The fledging period of 36 days recorded in this study correlates with Foyzal (2015), who recorded 37 days and also with the African subspecies (34-40 days). But, Naorji (2011) recorded 45 days in Jasdan, which seems quite extended; he mentions drought like conditions at the time of his study and could this have contributed to the extended fledging period? This could be an odd record and it is likely that the fledging period is around 36 days. The breeding attempt in this study was successful and the adults were able to fledge all the four chicks that hatched. Could this be an uncommon occurrence? Nothing is known about the factors that influence the breeding success of Red-necked Falcon in India; a list of variables that are likely to influence breeding success need to be gathered from a larger sample size and only long term monitoring of the nesting pairs will allow us to make conclusions on aspects such as clutch size, brood size at hatching, brood size at fledging, breeding success and fledging period.

The prey species recorded in this study were mainly birds, and the choice of bird prey was diverse. The frequency of prey deliveries and the total number of prey brought to the nest increased during the nestling period, which clearly shows the increased demand for food due to the chicks. It would be interesting to compare nests with fewer chicks to see if and how the amount of prey and the frequency of prey deliveries vary. In the study done by Naorji (2011), average prey deliveries per day was 4-5 during the nestling period, while here, the average was 8.6 during the same period. Lark species constituted the highest percentage of all the species recorded consistently throughout the nesting season, followed by unidentified birds. Since hunting during most of the breeding season was carried out by the smaller tiercel, the prey sizes delivered is most likely a reflection of this. It is possible that Larks constituted the highest percentage of the prey due to the habitat in which this pair was nesting, with Larks being abundant in the hunting area. It is interesting to note that reptiles and mammals constituted only a small percentage of the diet. Naorji (2011), records exclusively birds at two nest sites in Saurashtra, with only one instance of a mammal (unknown Bat species) brought to one of the nest sites. In comparison, Foyzal (2015), in Bangladesh, records both birds

and Bats of *Pipistrellus* species; the diversity of prey recorded here was higher, with Lizards and Mice also making up a small part of the diet during the breeding season. It seems that the diet of this species is quite diverse, with both mammals and reptiles also featuring in its diet. However, it seems that it is more partial to birds. The choice of prey might vary with habitat and the high diversity of prey featured may be a reflection of a diverse habitat. As with other aspects of the breeding biology, prey preferences and prey availability on the breeding success of the Red-necked falcon needs a thorough study from different regions of India.

The Red-necked Falcon is listed as 'Near Threatened' (BirdLife International 2014) and the African sub-species *Falco chicquera ruficollis* is treated as a separate species (Kemp *et al.* 2016). In Gujarat, this falcon is becoming increasing uncommon; its crepuscular nature makes it a very challenging species to study. A bigger sample size of nest sites should be located from different regions of India and only long-term monitoring of nest sites will help better understand the different aspects of its breeding biology (nest site preferences, nesting season, incubation period, breeding success and its prey preferences). A comparative analysis of data from nesting pairs from different habitats and regions will help better understand its needs and also the threats to this little studied species in India.

The Red-necked Falcon has declined due to habitat degradation and rapid urbanization. The trees on which this pair nested for 3 consecutive years were cut down for road widening. Since then, the pair was seen very rarely in the area. Finding an appropriate nest could also be a problem for these birds because of availability of very few areas similar to the study area. Strong measures should be taken to avoid cutting of trees during road widening. It is important to note that this nest and the nests studied earlier in Saurashtra did not fall in protected areas and were located either near villages or in agricultural areas. Although the exact causes of the decline are not known, but besides habitat destruction, widespread use of pesticides could also be a factor, but this is not proven. The Red-necked Falcon is not persecuted, but it is now very sparsely distributed and requires immediate attention. A first step towards its conservation is to obtain its population estimate in Gujarat. In the short term, nesting sites should be identified and protected. For the long term conservation of this species, suitable habitat should be identified and protected, with an emphasis on educating farmers/locals and involving them in the protection of these birds. Land management and effects of changes in land use (conversion from agricultural to urban) should be studied and the long term impact of this change on the species should be

monitored. Awareness campaigns should also be conducted, to effectively highlight the decline of this species in India.

Acknowledgements

We would like to thank Dr. Pranay Rao for reviewing and giving detailed inputs on the draft manuscript. We thank Prasad Ganpule & Nirav Bhatt for their help in finalizing the manuscript.

References

Ali, S. & Ripley, S. D. 1978. *Handbook of the birds of India & Pakistan*, Vol 1. Second edition. Oxford University Press, Delhi.

BirdLife International. 2014. *Falco chicquera*. The IUCN Red List of Threatened Species 2014 [Accessed on 3 November 2016].

Dharap, R. N. 1974. Red-headed Merlin nesting in densely populated area. *Newsletter for Birdwatchers* 17(10): 11–12

Dharmakumarsinhji, K. S. 1955. *Birds of Saurashtra*. Saurashtra: Published by the Author.

Foysal, M. 2015. Observations of Red-headed Falcon (*Falco chicquera*) (Aves: Falconiformes: Falconidae) nest at Keraniganj, Dhaka, Bangladesh, with a focus on post-fledging behaviour. *Journal of Threatened Taxa* 7 (5): 7138–7145

Gole, P. 1980. A March bird count in Poona. *J. Bom. Nat. Hist. Soc.* 77: 49– 55

Ingallahlikar, S. 1988. Birds of prey around Pune. *J. Ecol. Soc.* 1: 59–65

Kemp, A. C., Kirwan, G. M. & Marks, J. S. 2016. Red-headed Falcon (*Falco chicquera*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.). *Handbook of the Birds of the World Alive*. Lynx Edicions, Barcelona. [retrieved on 3 November 2016].

Naoroji, R. 2006. *Birds of Prey of the Indian Subcontinent*. Om Books International. Delhi.

Naoroji, R. 2011. Breeding of the Red-headed Falcon (*Falco chicquera*) in Saurashtra, Gujarat, India. *Forktail* 27: 1-6

Shah, Y. 2005. Matting (Sic) of Red-headed Falcon (*Falco chicquera*). *Flamingo* 2 (3&4): 10

Subramanya, S. 1982. Nesting of Red-headed Merlin (*Falco chicquera*) in Bangalore, Karnataka. *J. Bom. Nat. Hist. Soc.* 79: 412

Subramanya, S. 1985. Hunting and feeding habits of the Red-headed Merlin (*Falco chicquera*). *Newsletter for Birdwatchers* 25 (1&2): 4-8 □



Nirav Bhatt

Fresh juvenile with kill (Lesser Agama)