

Notes on a breeding pair of
Black-shouldered Kite *Elanus caeruleus*
in Ahmedabad District, Gujarat



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Abstract

The Black-shouldered Kite *Elanus caeruleus* is a medium-sized long-winged raptor belonging to Family Accipitridae. It is found in different habitats in India and the same as in Gujarat, from forests, grasslands, and arid scrublands to agricultural fields. In this note, we present detailed observations on a breeding pair of black-shouldered kites located in an agricultural field in Aniyari village, Sanand Tehsil, Ahmedabad District, Gujarat. The nest was built on a *Prosopis cineraria* tree with eight types of nesting materials, the three weeks incubation periods, 100% hatching success, and six weeks of growth and plumages of hatchling, feeding behaviors, and associated bird fauna were studied. A total of 207 feeding flights were recorded in six weeks, with 4.92 feeding flights/day. The prey delivered by the adults to the chicks consisted of vertebrates belonging to three classes (93.23 % mammals, 4.83% reptiles, and 1.93% birds). Both parents took part in the nesting building, incubation, and rearing of the neonates.

Key Words

Accipitridae, Black-shouldered Kite, Breeding, Diets, Growth, Neonates, Raptor.

Introduction

The black-shouldered kite *Elanus caeruleus* (now BSK) is a medium-sized, long-winged raptor with a short tail belonging to the Family: Accipitridae. This kite is widely distributed across the Afrotropical and Indo-Malayan regions, with marginal occurrence in the Western Palearctic and northern Australasia (Lawicki & Perlman, 2017). In recent decades, BSK has experienced a range extension in Europe and the Middle East (See Appendix 1: Lawicki & Perlman 2017: 11-12). In some newly colonized areas, the breeding population is multiplying, increasing vagrancy in adjoining countries (Balbontin et al. 2008). This species is a resident of India and Sri Lanka and has been sighted in the small atoll islands of Lakshadweep off the southwestern coast of India (Ali & Ripley 1987).

Information available in the literature on the breeding biology of this species, especially in the context of the Indian population is limited and anecdotal (Pittie 2023). The information on the breeding data (breeding season, nesting and diet) of this species is available in a few publications (Dharmakumarsinhji 1955; Ali & Ripley 1983; Naoroji 2006; Grimmett et al. 2011; Yasmin & Aju 2021; Bhatia 2021). The species does not exhibit a high degree of Reversed Sexual Dimorphism (RSD) like other highly predatory raptor species; the male is slightly smaller in size than the female (Bhatia 2021). The black-shouldered kite is commonly distributed in Gujarat and occurs in grasslands, arid scrublands, and agricultural fields (Ganpule et al. 2023). This species is globally categorized as 'Least Concern' under the IUCN Red List criteria (BirdLife International 2019). This species is listed under the 'Schedule I' category under the Indian Wildlife Protection Act 1972 (Amendment 2022).

Here, we present new and detailed observations based on the monitoring of a breeding pair of BSK with the aid of 'Stealth Cam Digital,' supplemented by photographs through direct observation.

Study Area

The study area is located near Aniyari village, Sanand Tehsil, Ahmedabad District, Gujarat, and is close to the Nalsarovar Wildlife Sanctuary. The entire area is an agricultural field with scattered human habitation. The nest site is surrounded by paddy fields and scrub lands with a few tall *Prosopis cineraria* trees, '*Capparis decidua*, and Neem trees *Azadirachta indica* within a five km radius.

Methodology

We studied an active nest and a successful breeding attempt by pair of BSKs for a total of ten weeks between 10th October 2022 - 18th December 2022. These were visually monitored from sunrise to sunset using binoculars (Nikon 10*50 Aculon A211 & Hawke Nature-Trek 12*50) and documented with the help of digital cameras, a point-and-shoot 360 (Nikon P900), and DSLR

(Canon 7D and Nikon D850). Also, we evaluated behaviours of parental care and consumption of prey/food by identifying the number and variety of prey brought to the nest by the breeding pair of BSK.

Automatic cameras

The nest monitoring was carried out using a motion-sensor/time-lapse camera (three minutes long) using 'Stealth Cam SKU: STC-DS4KU' for ten weeks. On 12th October 2022 (after four eggs were noted in the nest), we fixed 'Stealth Cam,' an auto camera to continue monitoring the nest. The intention of using telephoto cameras for direct observation during the breeding, especially during the hatching phase, was to reduce the possibility of any disturbance to the parent birds. The cameras were mounted on a nearby branch about two meters above the nest level, ensuring the breeding pair was never disturbed. The camera's field of vision was adjusted to capture any activity around the nest without causing hurdles or visual obstruction. We also confirmed the safety of the nest, took all measures to minimize the disturbance to birds, and followed

the stipulated guidelines for research on nesting birds (Barve et al. 2020).

All photographs recorded on camera were carefully scrutinized to identify the prey brought to the nest by the parents. The prey species were identified with the help of published literature; for rodents (Wilson & Reeder 2005; Menon 2014), birds (Girmmitt et al. 1998), and reptiles (Daniel 2002) and in addition, also, we examined a few pellets (collected below to the nesting tree). Additionally, we recorded observations of behaviours of the parent and the chick in real time in the context of other relevant information. Based on the image/footage records from the stealth cam and direct observation, we compiled detailed observations on the behaviour and the stages of growth of the chicks. During the study, we avoided further invasive methods to record other details viz. egg and hatchling measurements. We listed other forms of life around the life, along with BSK nest monitoring, including birds, reptiles, and mammals, from the surrounding vertebrates' fauna.

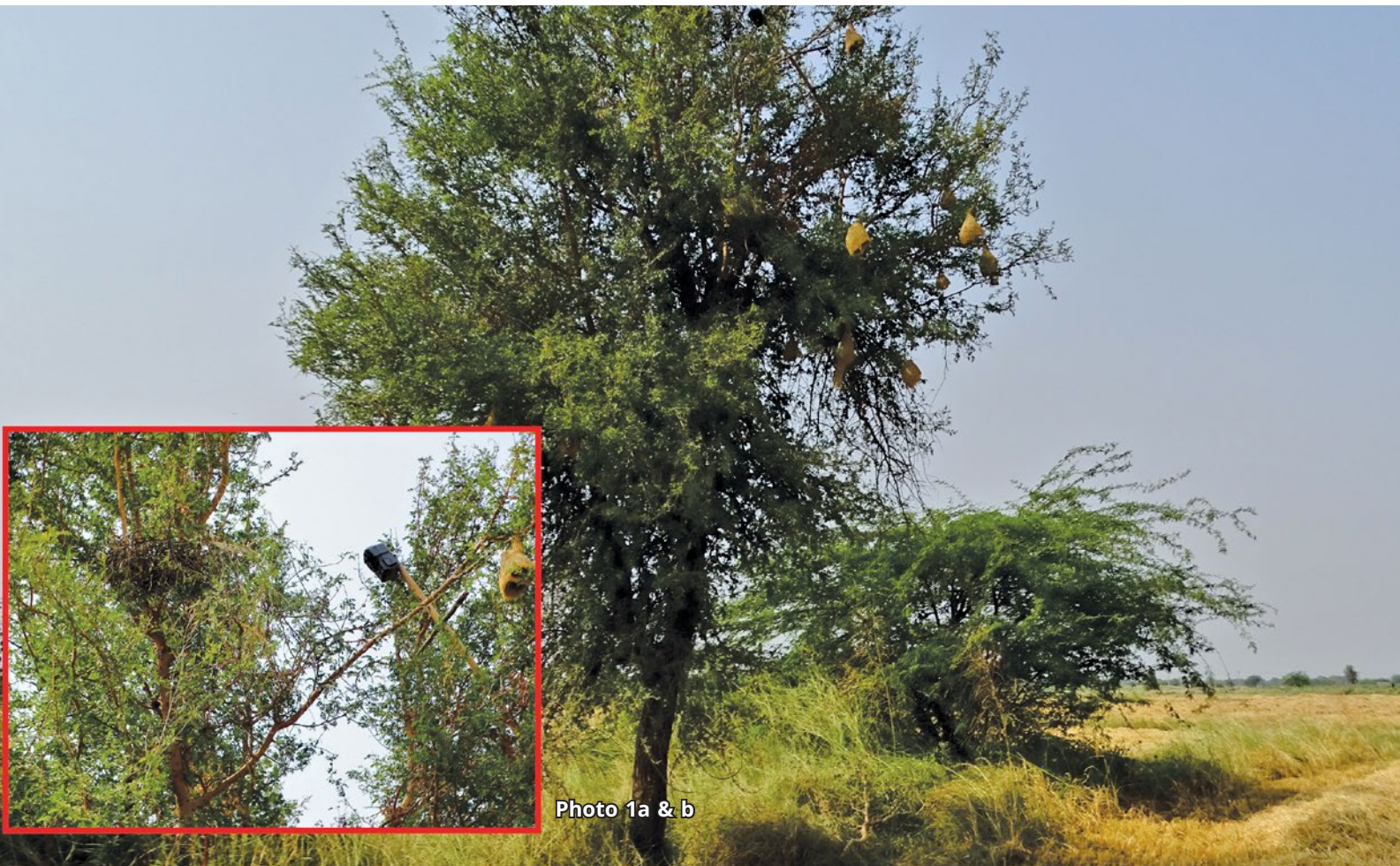


Photo 1a & b

Observations and Results

Nest and Nest Site:

The nest was located on an 8.5 m high *Prosopis cineraria* tree (Photo 1a & b) surrounded by agricultural fields. The nest was placed 6.5 m above ground level on the upper canopy on a fork 20 cm in circumference. It was exposed by one side and shaded with branches on the other. The nest was bowl-shaped, size 38 x 32, with a depression of 6.5 cm. The nesting material comprised eight types of nesting materials (feathers, sticks, plant roots), with the inner lining made of fine grasses (Table 1).

Eggs and Incubation:

The clutch size was four and the eggs were light-marbled brown in colour, oval-shaped and approximately the size of pigeon eggs. Both adults shared the incubation duties and the eggs were left unattended only during the change of duty between the adults. The change of duty usually preceded a parent bird landing on an upper branch and making a screaming call; as soon as it receives a call from another parent, the seated parent who left the nest from incubation. Such observation was noted, especially during the changing of duty for incubation. On a few occasions, we observed one of the adult birds bringing a half-eaten rodent to the nest (Photo 2) and offering it to its mate that was incubating. The adults continued to bring nesting materials and repaired the nest throughout the incubation period. During the entire incubation period, an adult parent bird that wasn't incubating always roosted on the uppermost tree branch of the nest tree.



Photo 2



Photo 3

Hatching successes and early stages of the chicks

All four eggs hatched successfully. Two freshly hatched chicks were observed on 1st November 2022, morning (between 08:45 to 09:20 h.). The third (Photo 3) and fourth chicks hatched on 2nd November 2022. All hatchlings were covered in pink coloured down, active and healthy. The present incubation period was recorded over three weeks/22 days. The incubation period was calculated from the first notice of the nest on 10th October 2022 to the date hatchlings emerged from eggs.

Table 1 - Nesting materials used by Black-Shouldered Kite *Elanus caeruleus*

No.	Types of nesting materials	No.	Types of nesting materials
1	Straws and Bark pieces of <i>Prosopis cineraria</i>	5	Grass blades (Unidentified)
2	Sticks of <i>Vachellia nilotica</i>	6	Roots of plants (Unidentified)
3	Twigs of <i>Azadirachta indica</i>	7	Hair (Unidentified)
4	Leaves & Roots of Paddy <i>Oryza sativa</i>	8	Bird Feathers (Unidentified)

Table 2: Weekly growth and plumages description of Black-shouldered Kite chicks

Date to Date	Age	Growth and Plumage	Body Colors	Behaviours
2nd Nov. 2022	1st Day old (Photo 5a)	Completely pink in colour	Light greyish eyes, beak, and light yellowish feet with black claws	Hardly raised their heads
1-7 Nov. 2022	1st Week old (Photo 5b)	Body was covered with down	Egg-tooth till appears on the upper beak	Raising the heads and begging for food
8-14 Nov. 2022	2nd Week Old (Photo 5c)	Numbers of pin feathers developing on the wings, nape, back and tail	Pink Greyish colour on wings due to feathers buds. Egg-tooth goes from the upper beak	While begging for food, the neck now strong and able to pick morsels of meat from the parent's beak
15-21 Nov. 2022	3rd Week Old (Photo 5d)	Body colour black with brown specks		Low-pitched screams. Chicks capable of holding and tearing food. Also, stealing food from other chicks. Also capable of standing and sitting on the tarsi. Showing aggression in response to intruders
22-28 Nov. 2022	4th Week Old (Photo 6a)	Numbers of black-brown feathers on the wings, back, and head. Size half of the adults	Beak black colour with yellow cere	All chicks were alert and responded to intruders. Wing and foot stretching behaviours were observed in chicks. Jumping and hopping behaviours began
29-5 Dec. 2022	5th Week Old (Photo 6b)	Chick has grown sizably, almost 80-90 % of the adults	Body colour grey-black with cream markings. Beak in jet black and feet yellow with dark black claws	Chicks playing, exercising and started independently tearing prey brought by the adults
6-12 Dec. 2022	6th Week Old (Photo 6c)	Body part is covered with feathers. It has grown almost 90-95 % in size in comparison to the parents		Chicks now capable of swallowing and tearing prey entirely. Chicks at branching stage
13-19 Dec. 2022	7th Week old	Body colour is much like an adult, except for back feathers colour and eye, and beak		Chicks left the nest and leave the nesting tree during the day time





Unfortunately, a chick died on 25th November and the cause was unknown (Photo 4), and hatchling successes were 75% noted. During the incubation period, one of the adult roosted on the nest tree, always while the other was brooding. By 17th November (end of the third week) both the adults roosted on top of the nest tree leaving the chicks alone in the nest.

Growth and Plumages:

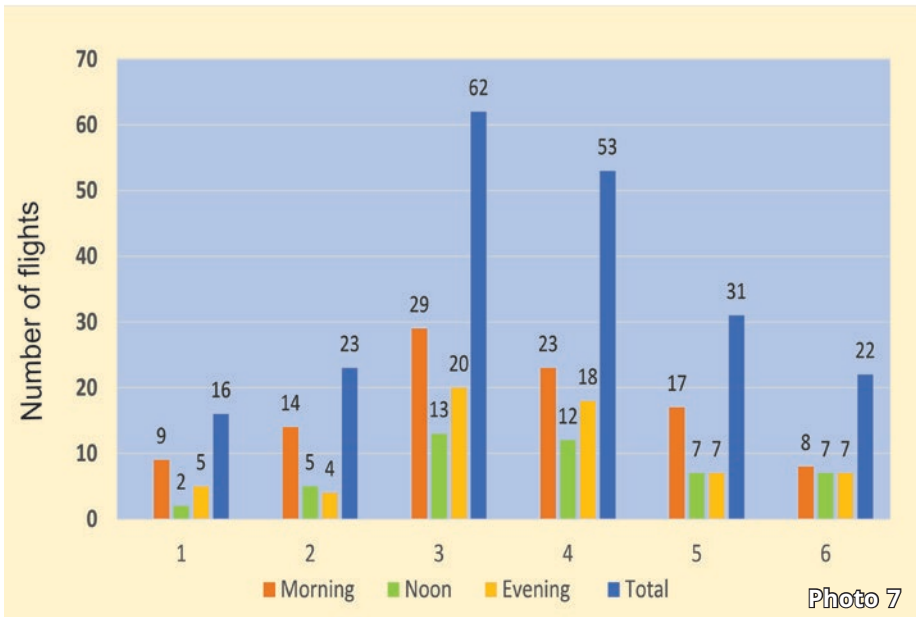
The changes in plumage colour and growth of the neonates right from the day of hatching to the sixth week, were noted. The weekly growth of the chicks and description of plumages are given in Table 2 (Photo 5 & 6). By the end of the seventh week, the chicks had fully fledged and were similar in size to an adult. They differed from the adults in plumage markings, colour of the beak, feet, and eyes. Also, fledglings fly well and leave the nest for forage foods independently.

Feeding Frequency:

Both adults took 207 prey deliveries for feeding to neonates, in six weeks, with 4.92 deliveries/day (Photo 7). Both the adults took part in feeding the chicks. Morning prey deliveries were between 06:36 to 09:45 hrs., and the last deliveries were recorded between 1748 to 1822 hrs. Prey delivery frequency was highest in the mornings (48.30%) compared to the evenings (29.46%) hours.

Diet:

A total of seventeen prey species belonging to vertebrate classes (mammals, avians, and reptiles) were delivered to the chicks (Table 3). The prey species were identified to the species level: two insectivores, ten rodents, one bird, and three lizards. 77 prey deliveries were unidentified, including rodents (Photo 8), birds (Photo 9), and a few reptiles (Photo 10). Prey species were identified based on images from cameras and also an examination of pellets (n=67). On a few



occasions, the rodents brought by the parents were half-eaten and we also observed on a few occasions the adults bringing partially alive prey. Both parents regurgitated pellets under trees within a radius of 1000 m of the nesting tree, usually used as perching posts before landing at or after leaving the nest.

Feeding Behaviours:

Both adults participated equally in feeding the chicks which involved tearing the prey into tiny morsels that were manageable for the chicks to swallow. Both adults also equally shared other parental nest-related activities viz. nest cleaning, like removing pellets and prey remains from the nest. It was challenging to differentiate the sexes of the adults, but often both birds were at the nest together or soon after one another, enabling us to tell apart the sexes based on their sizes. Whenever the adults brought larger prey (rodents/big shrews), a considerable amount of time was spent tearing it up. While the adults brought food alternatively, sometimes they both came simultaneously. In such cases, one adult feeds the chicks and the other perched on a nearby tree or on the nesting tree’s top branch and called.



Bird diversity in the nesting area:

During the study period 45 bird species belonging to 32 families (Table 4), including three species of nocturnal birds were recorded. A total of seven species of diurnal raptors (Falconidae: n=1 and Accipitridae: n=6) were recorded within a radius of one km from the

Table 3: List of prey species brought to the nest by Black-Shouldered Kite *Elanus caeruleus*

Class	No.	Order / Family / Common & Scientific Species Name		Total (%)
Mammals		Mammals – Insectivores		
		Family: Soricidae	10	04.83
	1	Asian House Musk Shrew <i>Suncus murinus</i>	4	
	2	Pygmy Shrew <i>Suncus etruscus</i>	6	
		Mammals - Rodent		
		Family Muridae	183	88.40
	3	Desert Jird or Gerbill <i>Meriones hurrianae</i>	4	
	4	Indian Gerbil <i>Tatera indica</i>	48	
	5	Pygmy Gerbil <i>Gerbillus nanus</i>	14	
	6	Indian Hairy Footed Gerbil <i>Gerbillus gleadowi</i>	2	
	7	Co. House Rat <i>Rattus rattus</i>	17	
	8	Norway Rat <i>Rattus norvegicus</i>	5	
	9	Little Indian Field mouse <i>Mus booduga</i>	19	
	10	House mouse <i>Mus musculus</i>	3	
11	Unidentified Rodent	71		
Avian		Bird - Quail	4	01.93
		Family: Turniciadae		
	12	Barred Buttonquail <i>Turnix suscitator</i>	2	
	13	Unidentified Bird	2	
Reptiles		Reptiles Lizards / Squamata	10	04.83
		Family: Agamidae		
	14	Indian Garden Lizard <i>Calotes cf versicolor</i>	2	
		Family: Mabuyidae		
	15	Co. keeled Skink <i>Eutropis carinata</i>	2	
	16	Grass Skink <i>Eutropis macularia</i>	2	
	17	Unidentified Lizard	4	
		Grant Total	207	

nest tree. The twelve species belonging to eleven bird families visited the nest tree for perching, foraging, and some unknown reasons (see: Table 4). Three species (Indian Silverbills *Euodice malabarica*, Black Drongo *Dicrurus macrocercus*, and Shikra *Accipiter badius*) had direct interactions with the breeding pair of BSKs. The first one was stealing the nesting materials from the nest (Photo 11), and the latter two species were noted as food competitors of the breeding pair.

Discussion

The breeding season of the BSK seems to be quite variable from, September to November (Dharmakumarsinhji 1955), Grimmett et al. (2011) mentioned breeding round the year, and Naoroji (2006) notes that the species' breeding season is very flexible, usually May and October, but varies from area to area. Food availability is probably one of the factors (Ramli & Fauzi 2018), and this could also be a reason for double-brooding reported in the species (Ferrero et al 2003; Ferguson-Lees &

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Christie 2005). While in this study, the nesting period was between October and December, the variation in the breeding season reported by other authors needs a more thorough investigation with data spread across its range in India.

This species selects the nesting site and nesting-tree to depend again on the safety and availability of prey (Ramli & Fauzi 2018). The nesting site observed in this study was located in an agriculture field, and the nest was built on a moderately tall 8.5 meters *Prosopis cineraria* tree. Dharmakumarsinhji (1955) notes that the species prefers open country and solitary thorny tree species are selected. In our study, the selection of nesting trees is quite similar to those described



by Faanes & Howard (1987) in their study of habitat suitability index models of BSKs. However, BSKs selected different tree species for nesting, including native trees same as ornamental trees (Dharmakumarsinhji 1955; Ławicki & Perlman 2017; Ramli & Fauzi 2018; Yasmin & Aju 2021).

Black-shouldered Kite nests are bowl-shaped and made up of sticks and twigs, and are lined with grasses, straws, or mammal fur (Anderson & Batchelder 1990). The size of the nest is also variable; in Washington, USA, BSK's nest size was 50 cm in diameter and 12 cm in depth (Anderson & Batchelder 1990). In Peninsular Malaysia, the nest dimension was 30 cm across and 20 cm across deep (Renganathan 1984). In this study, a nest was observed of 38 (wide) x 32 (height) and 6.5 cm in depth. Both parents continued to repair the nest throughout the breeding season. This could possibly be due to the strong winds in the area and also because the nest material was constantly being stolen by Indian Silverbills *Euodice malabarica*.

The clutch size of this kite is also variable, ranging from 2 to 4 eggs and sometimes three eggs (Vosogi et al. 2012), but also rarely even a clutch of seven eggs have been recorded in a nest in Portugal (Collar 1978). The clutch size recorded in this study was four eggs. Such variation in clutch size in birds is dependent on the age and health status of the female (Tapia & Zuberogoitia 2018).

Mendelsohn (1984) recorded BSK, the breeding success when the food supply was abundant. Erichen et al. (1996), recorded most nests-site in corridors of natural vegetation that comprise agricultural and human settlement areas. In the present study, we record similar nesting sites in support of earlier observations of Mendelsohn (1984) and Erichen et al. (1996).

In this study, we recorded 17 prey species being brought to the nest by the adults. A major portion of their diet consisted of rodents (88.40%) and reptiles (4.83%) and birds (1.93%) formed a very minor part of their diet. Diet studies in Fars



Photo 11



a



b

Photo 12

Province study in Iran (Vosoghi et al. 2012) have also shown rodents as a significant portion (84%) of the prey, with two species of rodents (House Mouse *Mus masculus* and Steppe Field Mouse *Apodemus cf witherbyi*) forming the majority of the rodent prey. Ferguson-Lees & Christie (2001) state that the BSK is a habitual predator of rats and small reptiles, and the present study corroborated similar observations. It would be interesting to see how variable their diets are across their range in India and if the diet variation has any impact

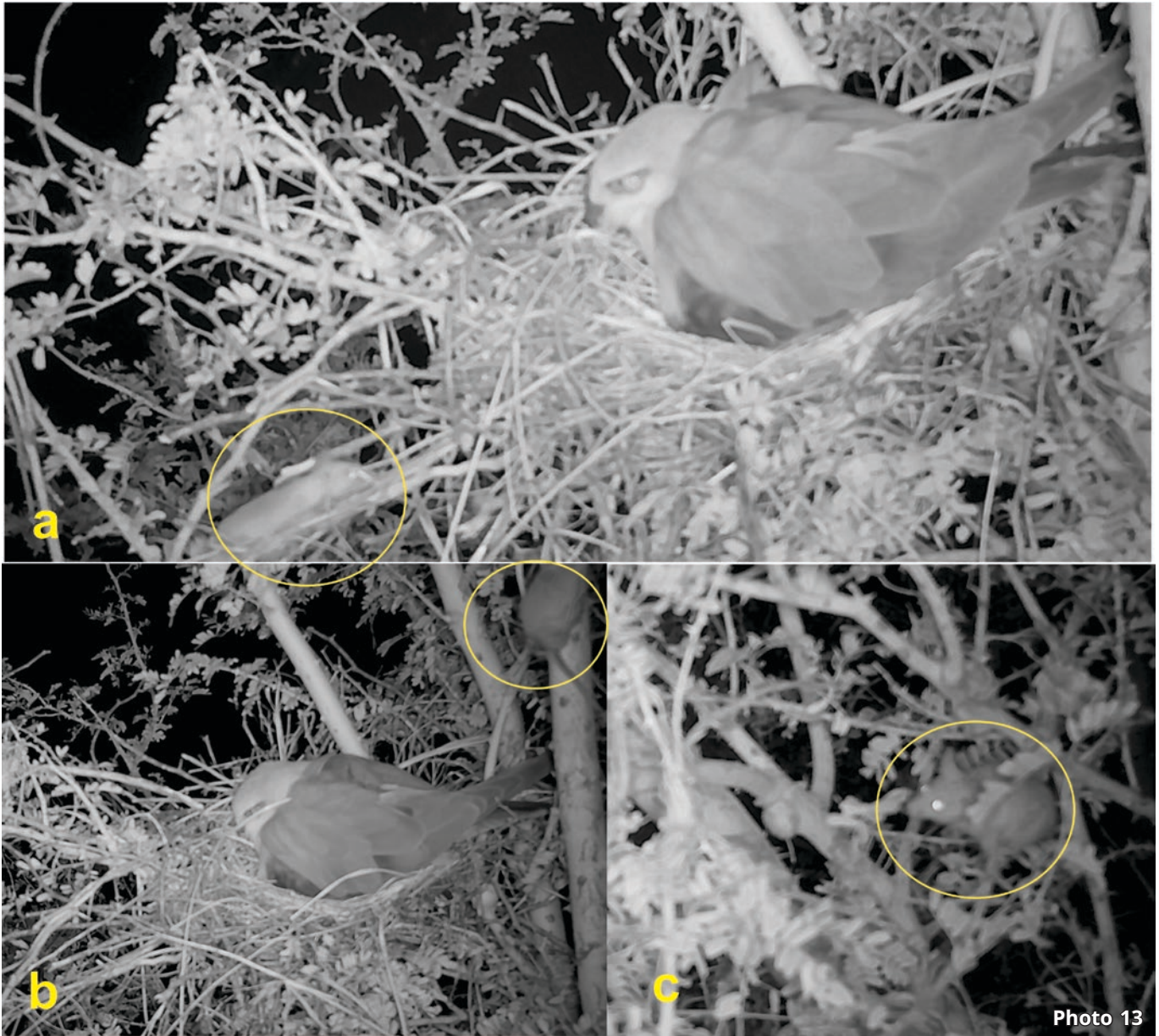
on the breeding success of this species. The various types of diets are due to the probabilities of availability of prey in the surroundings of the agricultural fields.

Peak foraging and feeding activities recorded during the study were in the morning (48.30%) and evening times (29.46%), and the activity in the noon periods was at 22.22%. This gives an indication that BSKs are predominantly crepuscular and their foraging activity coincides with activities of their primary prey species - rodents (Yasmin & Aju 2021).

Our observations on the plumages and growth of the chicks are more comparable to the hatchling growth study of nearer co-genera member *Elanus axillaris* (Debsus et al. 2006). At the end of six weeks, chicks took short-distance flights and left the nest. The juveniles were observed for two weeks after leaving the nest and during this time they were completely dependent on the adults for food. Further post-fledging observations could not be made during this study.

Both parents equally took part in incubation, brooding, hunting and prey deliveries, feeding, guarding, and also keeping the nest tidy. Both adults aggressively attacked intruders and defended the nest from potential predators such as a Shikra (Photo 12). The female was observed uttering threat calls while in the nest in response to Indian Silverbills coming to the nest to steal nesting material during the incubation period. It was also observed that the female bird during incubation at night was not bothered by nocturnal ants. On a few occasions, these ants were moving on all over the incubating female, it seemed unperturbed. These numbers of ants were attracted might be due to the smells of pallets.

A total of 12 species of birds were observed directly interacting with the nest tree and nest, either for perching or foraging. These included Indian Silverbills, Black Drongo (*Dicrurus macrocercus*), and Shikra (*Accipiter badius*). We also observed a



rodent (Muridae) visiting the nest at night (Photo 13); twice during the incubation (on 24th and 29th October), and once during the hatchlings stage (22nd November). However, the reason for these visits is unclear, rodents are recorded predators of eggs and hatchlings of birds (Smith et al. 2016; Barve et al. 2020).

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Table 4: The list of bird species recorded within one kilometer of the study area

(Species marked as * are Nest Tree Visitor and species marked as ** are ones that directly Interacted with the breeding pair of Black Should Kites).

No	Common Name of Birds (Species Name)
	Family: Turnicidae
1	Barred Buttonquail (<i>Turnix suscitator</i>)
	Family: Phasianidae
2	Grey Francolin (<i>Ortygornis pondicerianus</i>)
3	Indian Peafowl (<i>Pavo cristatus</i>)
	Family: Anatidae
4	Bar-headed Goose (<i>Anser indicus</i>)
5	Greylag Goose (<i>Anser anser</i>)
	Family: Threskiornithiae
6	Indian Red-napped Ibis (<i>Pseudibis papillosa</i>)
	Family: Ardeidae
7	Cattle Egret (<i>Bubulcus ibis</i>)
	Family: Falconidae
8	Common Kestrel (<i>Falco tinnunculus</i>)
	Family: Accipitridae
9	Black Kite (<i>Milvus migrans</i>)
10	Short-toed Snake Eagle (<i>Circaetus gallicus</i>)
11	Western Marsh Harrier (<i>Circus aeruginosus</i>)
12	Shikra (<i>Accipiter badius</i>)**
13	Eurasian Sparrowhawk (<i>Accipiter nisus</i>)
14	Indian Spotted Eagle (<i>Clanga hastata</i>)
	Family: Gruidae
15	Common Crane (<i>Grus grus</i>)
	Family: Charadriidae
16	Red-wattled Lapwing (<i>Vanellus indicus</i>)
	Family: Columbidae
17	Eurasian Collared-Dove (<i>Streptopelia decaocto</i>)*
	Family: Tytonidae
18	Barn Owl (<i>Tyto alba</i>)
	Family: Strigidae
19	Spotted Owlet (<i>Athena brama</i>)
	Family: Caprimulgidae
20	Indian Nightjar (<i>Caprimulgus asiaticus</i>)
	Family: Coraciidae
21	Indian Roller (<i>Coracias benghalensis</i>)*
22	European Roller (<i>Coracias garrulus</i>)

	Family: Upupidae
23	Common Hoopoe (<i>Upupa epops</i>)
	Family: Alcedinidae
24	White-throated Kingfisher (<i>Halcyon smyrnensis</i>)
	Family: Meropidae
25	Asian Green Bee-eater (<i>Merops orientalis</i>)
	Family: Laniidae
26	Bay-backed Shrike (<i>Lanius vittatus</i>)
	Family: Dicruridae
27	Black Drongo (<i>Dicrurus macrocercus</i>)**
	Family: Corvidae
28	House Crow (<i>Corvus splendens</i>)
	Family: Pycnonotidae
29	White-eared Bulbul (<i>Pycnonotus leucotis</i>)*
	Family: Cisticolidae
30	Plain Prinia (<i>Prinia inornata</i>)
31	Zitting Cisticola (<i>Cisticola juncidis</i>)
	Family: Acrocephalidae
32	Booted Warbler (<i>Iduna caligata</i>)
	Family: Phylloscopidae
33	Common Chiffchaff (<i>Phylloscopus collybita</i>)
	Family: Sturnidae
34	Rosy Starling (<i>Pastor roseus</i>)
	Family: Muscicapidae
35	Siberian Stonechat (<i>Saxicola maurus</i>)*
	Family: Nectariniidae
36	Purple Sunbird (<i>Cinnyris asiaticus</i>)*
	Family: Passeridae
37	House Sparrow (<i>Passer domesticus</i>)*
38	Yellow-throated Sparrow (<i>Gymnoris xanthocollis</i>)*
	Family: Poloceidae
39	Baya Weaver (<i>Ploceus philippinus</i>)*
	Family: Estrildidae
40	Indian Silverbil (<i>Euodice malabarica</i>)**
41	Red Avadavat (<i>Amandava amandava</i>)
	Family: Motacillidae
42	Paddyfield Pipit (<i>Anthus rufulus</i>)
43	Tree Pipit (<i>Anthus trivialis</i>)
	Family: Emberizidae
44	Black-headed bunting (<i>Emberiza melanocephala</i>)*
45	Red-headed bunting (<i>Emberiza bruniceps</i>)*

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