

Status survey of Lesser Florican *Sypheotides indicus* for developing a conservation plan for Shokaliya landscape, Ajmer, Rajasthan



BNHS - Lesser Florican project

Final Report
June 2020



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Status survey of Lesser Florican *Sypheotides indicus* for developing a conservation plan for Shokaliya landscape, Ajmer, Rajasthan

Final report

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Bombay Natural History Society

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ABBREVIATIONS

BNHS – Bombay Natural History Society; CWLW – Chief Wildlife Warden; CF – Conservator of Forests; CCF – Chief Conservator of Forests; DyCF – Deputy Conservator of Forests; DEAC – District-level Expert Appraisal Committee; DEIAA – District-level Environment Impact Assessment Authority; LFCCA – Lesser Florican Community Conserved Area; LFCR – Lesser Florican Conservation Reserve SEIAA – State-level Expert Appraisal Committee; TCF – The Corbett Foundation; WII – Wildlife Institute of India; *Syphoetides indicus* and *Syphoetides indica* are used as the scientific names of the Lesser Florican

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TITLE OF THE PROJECT

Status survey of Lesser Florican *Sypheotides indicus* for developing a conservation plan for Shokaliya landscape, Ajmer, Rajasthan

SUMMARY

A detailed study was conducted from January 2019 to June 2020 to understand the landscape. The data from the published literature, especially from the research project reports, was compiled and arranged chronologically. Birds were observed intensively in and around the known florican areas at Shokaliya landscape. To avoid duplicate count, established territories of males were mapped. Total 3762 sq. km was covered extensively and 1727 sq. km intensively. LF was sighted at 26 sites (73 locations) across 26,621 ha (266.21 sq. km). Around 500 m radius of LF each location (29 sq. km covering 24 sites) was studied thoroughly; 34 unique males and 9 females were sighted. Total 172.62 hours of observations were carried out at LF location sites; 9 sites were visited once, 14 sites twice and three sites thrice. A total of 6 individual surveyors conducted the surveys.

The distribution of LF depends on the rainfall pattern; the bird species visits the study area in peak monsoon, which is a short window period of three months from July to September, and because of this many local people are not aware of their presence. Males have strong site fidelity and they visit same breeding sites every breeding season. Females are very elusive and not detected easily. Besides, during our surveys the species was found in low numbers, distributed patchily across the huge landscape. Given the extent of the area, all displaying males too may not have been detected. Floricans were mainly seen in the croplands as majority of the common grazing lands or pasture lands are now full of *Prosopis juliflora*, unsuitable for the species. Areas with traditional crops like Jowar, Moong and Urad growing up to a height of 50–100 cm were seen preferred by the birds. Disturbance due to mechanical operations while farming, widespread use of chemical fertilizers/pesticides, overgrazing in *kankads* (common grazing lands) were observed as major threats to the breeding birds.

Our observations have shown that the Lesser Florican shows strong site fidelity; it moves a lot in grasslands and croplands before settling down in its breeding site; once settled, it starts developing breeding plumage; it establishes its territory and displays lek system. The frequency of a male's jump becomes doubled in the presence of a female and mating lasts for about half an hour. Initially, the florican prefers jowar crop fields and is seen tolerating the presence of farmers up to 50 metres. We have heard the display sounds of a florican late into the night. The use of heavy machines and music system on tractors seem to be affecting it. Uncontrolled tourism, increase in free ranging dogs, land use changes, chemical spray, unavailability of grasslands were found some of the important threats to be addressed immediately.

Except for a few reserve forests, there are no Protected Areas in the Shokaliya landscape for the conservation of floricans. BNHS suggested a landscape where Lesser Florican Community Conserved Areas (LFCCAs) or Lesser Florican Conservation Reserves (LFCRs) could be developed. Therefore, based on breeding bird sighting

locations, using Google Earth imagery and field surveys, we tried to identify potential areas that could be managed as LFCCAs or LFCRs under a long-term strategy. Similarly, data about reserve forests, potential florican habitats and mining operations in the adjoining sites were collected for mapping the areas that can be considered as LFCCAs or LFCRs. For the identification of additional sites, data from satellite transmitter study conducted by WII in the year 2013 was used.

A sensitization programme to enable a discussion on the conservation of Lesser Florican called *Kisan Chaupal* (phrase in Hindi meaning 'a meeting of farmers') was organized jointly by the Forest Department, State Biodiversity Board of Rajasthan and BNHS on February 19, 2020. Villagers including the sarpanch, farmers, common residents (men and women), school children and staff of the forest department attended the event. Preparation of this programme started in January 2020 with a series of awareness and nature education activities held in the schools of Shokaliya.

During the 1990s, there were around 55 Great Indian Bustard (GIB) reported in this landscape, which reduced to 4 birds in 2016 and, unfortunately, no confirmed sightings thereafter. It is hoped that the LF will not go the way of the GIB and, in that respect, efforts are on for its conservation through traditional farming practices, with the help of the concerned agencies.

BACKGROUND OF THE PROJECT

On the suggestion of the Office of the Additional Principal Chief Conservator of Forests (APCCF) and the Chief Wildlife Warden (CWLW), Rajasthan; the Office of the Deputy Conservator of Forest (DyCF), Ajmer approached the Bombay Natural History Society (BNHS) to conduct a survey of the Lesser Florican in the Shokaliya area with focus on conservation. As suggested by the Chief Wildlife Warden, Rajasthan, we submitted a project proposal to his office on 4 May 2017.

In reply, we received a sanctioned letter from the office of the Chief Wildlife Warden, number F4(T)/vividh/CWLW/2017-18/3989, dated 25 July 2017.

Subsequently joint pan-India surveys were conducted in collaboration with WII, TCF and State Forest Departments during July–August 2017 (Dutta et al 2018). Initial status and distribution data of the florican was assessed through the joint surveys conducted in collaboration with WII, TCF, local NGOs, volunteers, and the State Forest Department during the breeding season of LF (July–August 2017 as well as 2018). The region where the species was recorded earlier was initially monitored by vehicle occupancy followed by foot transect. During two consecutive breeding seasons, 2017 and 2018, around 30–40 males (direct sightings) were observed in area of Ajmer and its surroundings. Therefore, considering the 1:1 male female ratio of this bird and accounting for the individuals that may have been missed during the survey, there may be around 100–125 Lesser Floricans in the Shokaliya area and its adjoining regions (Dutta et al 2018).

The bird species was found across five states: Rajasthan, Madhya Pradesh, Gujarat, Maharashtra and Andhra Pradesh. Velavadar Blackbuck National Park, Bhavnagar district, Gujarat and Shokaliya landscape of Rajasthan (Nasirabad, Bhinai, Tantoti, Kekri, Sarwar tehsils in Ajmer district; Malpura tehsil of Tonk district; Gulabpura and Shahpura tehsils of Bhilwara district) emerged as the strongholds of the species with more than 80% of the global population (Dutta et al 2018). Since Velavadar Blackbuck National Park is a Protected Area, there are comparatively less threats to the species than in Shokaliya landscape, where it survives in human-dominated landscape. This project was initiated to develop a micro-level planning for the conservation of Lesser Florican and its habitats that are under immense pressure from mining and intensive agricultural activities.

An inception report along with a brief report on the distribution of Lesser Florican, based on breeding bird survey 2017, was submitted to the Rajasthan Government in November 2017. Because of financial constraints, the BNHS team could not carry on further work in the field; the first instalment of grants came through in October 2018. With the arrival of funds, BNHS restarted full-fledged work on the project from January 2019.

OBJECTIVES

1. To study the status and distribution of Lesser Florican in Shokaliya area
2. To map the distribution areas, preferred habitats, potential habitats
3. To map their distribution in the ongoing and proposed mining areas
4. To study the present and future threats to Lesser Florican population
5. To prepare a conservation plan for ensuring a healthy Lesser Florican population
6. To assess the importance of the area in sustaining the Lesser Florican population

LESSER FLORICAN – CONSERVATION PRIORITY SPECIES

The smallest of the Indian bustards protected under Schedule 1 of the Wildlife (Protection) Act, 1972, Lesser Florican is an endangered species according to IUCN Red List 2011. It is included as one of the priority species for recovery by the Ministry of Environment, Forest and Climate Change (MoEF&CC) in 2009, under the scheme of Integrated Development of Wildlife Habitats. The guidelines for Species Recovery Plan (SRP) were prepared for three resident bustard species namely Great Indian Bustard, Lesser Florican and Bengal Florican, after consulting the concerned experts from institutions like BNHS, WII, and WWF-India (Dutta et al. 2013). India has two dedicated Lesser Florican sanctuaries, both in Madhya Pradesh; they were established following a visit by the renowned ornithologist Dr Sálim Ali to this region in 1983. The two sanctuaries are Sailana Wildlife Sanctuary in Ratlam district (12.96 sq. km, where its Shikarwadi compartment or block comprises 354 ha and Amba component, 1000 ha) and Sardarpur Wildlife Sanctuary in Dhar district (348 sq. km area with 628 ha of grassland; a new plot of 50 ha of grassland has been developed in Panpura).

TAXONOMY, MORPHOLOGY, ECOLOGY, BEHAVIOUR

Taxonomically, Lesser Florican comes under the order Gruiformes, family Otididae, genus *Sypheotides* and species *indicus*. *Sypheotides indica* was designated by Collar and Andrew (1988). Locally known as *Kharmor* in Gujarat and *Khar titar* by Bhils in eastern Rajasthan. The sizes of the male and female are 46 and 52 cm respectively. Breeding male is black and white in colour, with dusky yellow-coloured legs, a horn-like brown-coloured upper mandible and a yellow coloured lower mandible. Females are sandy coloured. While performing its display, the male folds its legs and shoots vertically upwards attaining a height of about 2 to 3 metres, with wings partly open, and flutters rapidly, producing a croak-like sound. (Lad 2016) mentioned "it has been observed that the sound produced by the displaying male was not emitted by the voice box but comes from bits of sounds produced by the rotation of the primary feathers around the carpal joint during the wing beat". The characteristic vertical jump by the males makes them conspicuous during the breeding season.

The male jumps to a height of 2 to 3 metres at a selected place, going on to make as many as 600 jumps in a day, and the sound can be heard up to a distance of 300 to 400 metres (Lad 2016). The display is to repel the rivals and serves to attract the females too. The display spots are easily identifiable from the male's excreta scattered in the grassy patches rendered bare by the male's repeated trampling. Lesser Florican has a tendency to hide by lying low in grasses, and flies away if a threat is nearby; the bird produces a short whistle when flushed. Its flight is characterized by the rhythmic strokes of the broad wings, outstretched neck and feet tucked under the body.



Image 1 Detection of the Female Lesser Florican is difficult unless it is flushed © Surendra Chauhan



Image 2 Left: Displaying male Lesser Florican; Right: Evasive Lesser Florican female concealed in its habitat © Surendra Chauhan

The Lesser Florican feeds in open grass patches at dawn and the dusk, and retires into the thick bushes as the temperature rises (Sankaran 1991). During the non-breeding season, they prefer lightly wooded areas, grazed lands and scrubland that are dominated by bushes like *Zizyphus*. The Lesser Florican is an omnivore and its diet vary from locusts, caterpillars, flying ants, worms, lizards, frogs to herbs, berries and plant shoots, all of which find mention in literature (Haribal *et al.* 1986). Typical foraging behaviour is to walk for 5 to 10 metres, and pause to look out for threats, before darting forward to snap up its prey (Haribal *et al.* 1986). It feasts on caterpillars on *Butea* bushes (Haribal *et al.* 1986) and according to Sankaran (1991); orthopteran insects like grasshoppers, locusts and crickets play a crucial role in meeting the food needs of the female and the young ones. During the breeding season in the monsoon, the male was also seen in waterlogged areas. Significant behavioural studies have been conducted on the Lesser Florican by Sankaran and Rahmani (1986).

The Lesser Florican is found in dry grasslands and scrub lands, but also occasionally in cotton and millet crop fields of cotton and millet (Sankaran 2000). The grasslands of NW India are dominated by *Sehima nervosum* and *Chrysopogon fulvus*. The bird prefers dry ungrazed plains with 0.5–1-metre-tall grass (Magrath *et al.* 1985); it is reported to confine mainly to *beeds*, which are essentially unused private lands or common grazing pastures or grasslands (Sankaran and Rahmani 1986). In areas where grasslands or *beeds* were overgrazed, it was observed that the birds found the habitat unsuitable and moved into irrigated croplands (Sankaran 1997).



Image 3 Series of images have been merged into one frame to show the typical display of the male Lesser Florican involving a vertical jump of 2–3 metres © Hari Somshukar

MOVEMENT, TERRITORIES AND MIGRATION

The breeding season starts at the onset of the southwest monsoon, with the males attaining the breeding plumage in the months of June and July (Sankaran and Rahmani 1986). They prefer elevated patches on the ground or small ridges to perform their display (Sankaran 1991, 93, 94); establishing territory mainly depends upon the height of the grass.

According to Magrath *et al.* (1985) and Sankaran (1994), the bird follows a lek mating system in which no pair bonds are formed. Lesser Florican is not a sociable species; the male and female do maintain a separate territory. It is not as shy of humans as the Bengal Florican is. Males set up territories in one- to two-hectare area, and the territorial boundaries are set up at a distance of 200 to 500 metres distance (Sankaran 1994, 1995). Males display from a particular spot within the territory (Sankaran and Rahmani 1986). At one given time, 3-5 territories were observed within an area of one sq. km (Sankaran 1994). Females nest outside the territorial range of the male.

The bird is an irregular local migrant, behaving nomadic during the SW monsoon. It remains confined to the plains and open areas (Hume and Marshall 1879). Post-breeding period, most of the birds from Rajasthan, Gujarat and Madhya Pradesh migrate to peninsular India (Dharmakumarsinhji 1950). Earlier, the major breeding grounds were in eastern Haryana, Nasik and Kathiawar peninsula (Goriup and Karpowicz 1985), but these grounds have shifted to southern Rajasthan, western Madhya Pradesh and southern and eastern Gujarat (Sankaran 1991, 94).

Its movements in non-breeding period have been poorly reported, with uncertain migration towards the Terai region, West Bengal and Odisha. According to Dharmakumarsinhji (1950), the breeding Florican in Saurashtra and Kutch arrives from peninsular India. He also noted that the Florican arrives on the east coast of Saurashtra from the direction of Gujarat and Bombay by crossing the Gulf of Cambay.

Satellite tracking of two male Lesser Floricans in 2014 by WII revealed that males could shift their territories within an area (Mohan *et al.* 2016). It was earlier believed that Lesser Floricans are long distance migrants and their foraging grounds might be in the Western Ghats and Gangetic Plains (Sankaran 2000). However, a tagged Florican migrated just 94 km south of its breeding ground, demonstrating small distance migration and returning to their birthplace during the next breeding (Mohan *et al.* 2016). Both breeding and non-breeding habitats of the Lesser Florican are semi-arid grasslands that are under immense human-induced pressure.

POPULATION STATUS

In the 1980s and early 1990s, extensive surveys were conducted by the BNHS and later by SACON (Sankaran 1991, 1994, 1996, 2000, Sankaran *et al.* 1992). Its estimated population density was 2187 males in 1982, which declined by 60 percent to about 836 males in 1989, 1103 in 1994 which went up to 1765 (32% increase) in 1999. While estimating the population, Sankaran (1991, 2000) considered the proportion of the grasslands and breeding ranges to calculate the population density of displaying males. In August 2010, a survey was conducted in areas where previously surveys were conducted by Sankaran (2000), and a sharp decline of almost 65% of the population was seen in the areas of Rajasthan, Gujarat and MP, (Bharadwaj *et al.* 2011). During recent surveys conducted jointly by BNHS, WII, TCF and state governments, the global population estimation has been given 300 to 600 males (Dutta *et al.* 2018).

DISTRIBUTION OF LESSER FLORICAN IN INDIA

PAST DISTRIBUTION

The Lesser Florican is endemic to the Indian subcontinent. As indicated earlier, it was once widespread and common, but now breeds in a few areas in Gujarat, south-east Rajasthan, north-west Maharashtra and western Madhya Pradesh. There is some dispersal to southeast India in the non-breeding season. It was once abundant in Terai region of Nepal but now is seen in the area quite rarely. It has also been sighted in Pakistan and is a vagrant in Bangladesh. These population fluctuations are directly correlated with rainfall patterns and breeding season. They indicate that it is susceptible to extinction in the event of severe, prolonged drought.

PRESENT DISTRIBUTION

Currently, Lesser Florican breeding range is restricted to Gujarat, southeast Rajasthan, northwest Maharashtra, Kurnool district of Andhra Pradesh and western Madhya Pradesh (Dutta *et al.* 2018).

1. Rajasthan: a) Shokaliya Florican landscape, Ajmer, Rajasthan; b) Adjoining areas of districts Bhilwara, Tonk, Jalore, Pratapgarh
2. Gujarat: a) Velavadar Blackbuck Sanctuary and adjoining areas of Bhavnagar; b) few sites in Surendranagar, Amreli, Rajkot, Junagarh of Gujarat
3. Madhya Pradesh: a) Sailana WLS, Ratlam; b) Sardarpur WLS, Dhar; c) Petlawad, Jhabua; d) Jiran, Neemuch
4. Andhra Pradesh: Rollapadu WLS
5. Maharashtra: a) Akola and b) Washim districts
6. Karnataka: Bidar

HABITAT STATUS

The Lesser Florican occurs in dry grasslands with scattered bushes, scrub, and to a lesser extent in tall crops of millet and cotton. Sufficient grass cover is particularly important during the breeding season. Large trees with big canopy are not desirable in the florican habitat (Magrath *et al.* 1985). The Lesser Florican forage, rest, display and breed in plains and undulating grasslands (Magrath *et al.* 1985; Sankaran and Manakadan 1990). It does not inhabit hills, wetlands, marshy lands, dense forests, extreme deserts and barren lands. It is regularly found in agricultural fields where crops of millet, cotton and some cereals are cultivated (Sankaran 1991). Its presence has also been marked in grassland habitats within forest plantations.



Image 4 A Lesser Florican in its typical habitat in the study area © Ashley Chiu

STUDY AREA

INTENSIVE STUDY AREA – AJMER

The district of Ajmer is located between 25°38' and 26°58' latitude and 73°54' and 75°22' longitude. The district is surrounded by Nagaur in the north, Jaipur and Tonk towards east, Pali in the west and Bhilwara and Rajsamand in the south. There are nine tehsils in Ajmer: Ajmer, Kishangarh, Beawar, Sarwar, Nasirabad, Kekri, Bhinai, Masuda and Peesangan. The average rainfall in the district is around 430 mm. The climate is semi-arid; from April to June, the district faces hot dry summers, with a mean temperature every day of max. 39.4 °C and min. 26.9 °C (Hydrogeological Atlas of Rajasthan Ajmer District, 2013).

The prominent geographical feature is the Aravalli hill range that runs through the district. It forms one of the great water divides of India; so, rivers and streams west of Aravalli drain into the Arabian Sea while those east of it pour their waters into the Bay of Bengal. The rain that drops in the southern part of the district drains into Chambal. The rivers are severe in nature and flash floods are common in the monsoon; the Khari and Dai rivers pour their water into the Banas River.

Tehsils Nasirabad, Arai, Bhinai, Tantoti, Sarwar, Kekri are included under the study area. Sarwar, Nasirabad, Kekri and Bhinai tehsils lie in the south and southeastern parts of the district. The two rivers constituting the drainage system of these tehsils are Dai and Khari. Being a semi-arid region, the landscape is mainly dominated by xerophytes; some of the grasses found in this area include *Cenchrus ciliaris*, *Sehima nervosum*, *Dichanthium annulatum*, *Chloris brabata*, *Dichanthium foveolatus* while *Senegalia catechu* (Khair), *Acacia nilotica* (desi Babul) and *Anogeissus pendula* (Dhok) are some of the common tree species. Types of soil found in the district are Sandy Soil, Mountainous Soil, Red Yellow Soil and Black Soil. Black Soil is exclusively found in Sarwar tehsil and some parts of Kekri tehsil.

EXTENSIVE STUDY AREA: AJMER SURROUNDINGS

Shahpura: The Shahpura tehsil in Bhilwara district falls under the Banas River Basin drainage; it is around 1313 sq. km. Shahpura tehsil is largely made up of phyllite and schist. Annual mean rainfall is 630 mm; summers are hot and dry, whereas winters are cold. The tehsil mainly has plains with a few scattered hillocks.

Gulabpura: It is an industrial and educational hub. Located near the Rojari River, it comes under the Banas River Basin drainage; rivers Khari and Rojari drain the tehsil. The region was once a home to a considerable population of the Great Indian Bustard.

Malpura: Situated in the north western part of Tonk district, Malpura is the largest tehsil of the in terms of area. Its climate is largely sub-humid; average rainfall is around 500 mm. The tehsil lies in the Banas River Basin drainage, and it is mostly plain with relief features. Situated 4 to 5 km from the town of Malpura is the Central Sheep and

Wool Research Institute (CSWRI), the largest of its kind in India. CSWRI focuses on improving the native breeds of livestock in the country, especially the sheep.

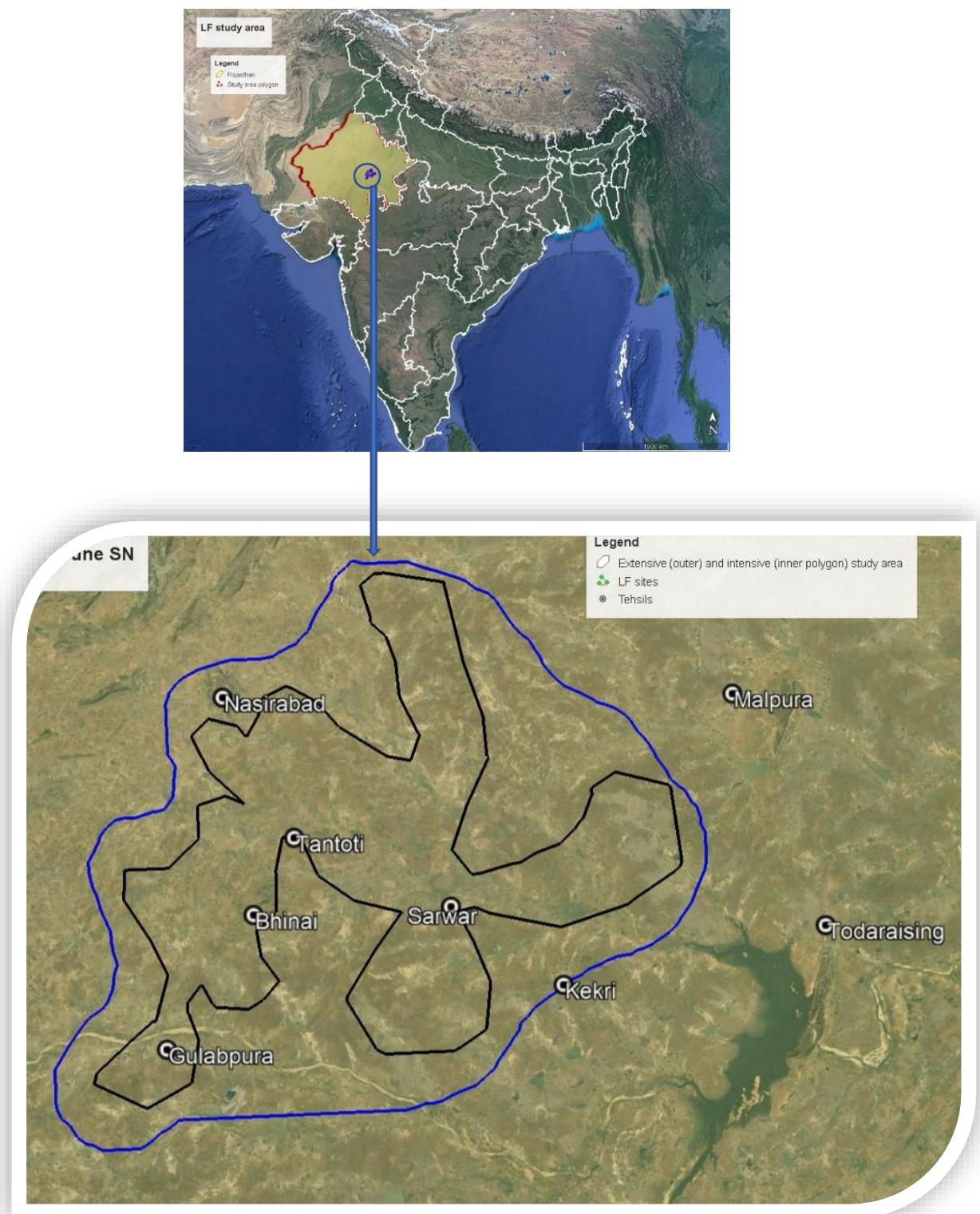


Figure 1 Map showing extensive (outer large polygon 3762 sq. km) and intensive (inner small polygon 1727 sq. km) study areas (Map prepared using outer boundaries of LF sites and drawing polygons in Google Earth by Sujit Narwade)

METHODS

BIRD AND HABITAT SURVEY

The distribution of LF depends on the rainfall pattern; females are very elusive and not detected easily and, since the bird is found in low numbers across a huge landscape, all displaying males too may not get detected. Birds visit the study area in the peak monsoon season, which is a short window period of three months from July to September. To overcome this problem, a large-scale survey based on displaying males was carried out simultaneously by multiple observers.

A detailed study was conducted to understand the landscape from January 2019 to March 2020. Total 3762 sq. km (Apart from Gulabpura of Ajmer district, Shahpura, Gulabpura tehsils of Bhilwara district and Malpura tehsil of Tonk district) was covered extensively and 1727 sq. km Nasirabad, Bhinai, Sarwar, Tantoti and Kekri tehsils of Ajmer district) intensively.

Considering the fact that the LF survives in pockets of human-dominated landscape, data on the bird species was first collated from the published literature, especially research project reports, and arranged chronologically. The status and distribution data of LF was compiled with the help of local NGOs and volunteers, and through personal communication with the staff of the Forest Department, Government of Rajasthan. The region where the species was recorded earlier was initially monitored by vehicle to gain information about its occupancy. The areas where the birds were detected were covered on foot. Since the bird was found in low density and patchily distributed, complete count method was used for population monitoring (Bibby *et al.* 2000) and GPS locations were collected for mapping and distribution studies. Birds in and around the known florican areas at Shokaliya landscape were observed intensively. To avoid duplicate count, established territories of males were mapped (Sankaran 1994). Data was compiled about current land use and overlaid on the proposed/upcoming mining locations using data compiled from Ajmer Forest Division.

SOCIO-ECONOMIC SURVEYS

Secondary data was collected from government records and published reports. Key Informant Surveys (Marshall 1996) were used for more qualitative and effective data collection. As a result of their personal skills or position within a society, key informants were identified (Burgess 1982), who provided more information and a deeper insight into what is going on around them.



Image 5 Most of the youth migrate to cities in search of work, leaving responsibility of cattle grazing on women and girls ©
Chandraprakash Prajapat

DATA COLLECTION TO UNDERSTAND THE CHANGING LAND USE

A strategy needs to be devised and implemented to deal with mining activity and to protect the floricans and their habitats in Shokaliya florican landscape. During the survey, mining activities were seen all over the landscape for major minerals such as feldspar, quartz and mica stone, as well as minor minerals such as marble and masonry stone. The florican habitat was observed to be degraded and fragmented because of a number of abandoned, non-functional and operational mines in Shokaliya area. Some of the areas are intensively mined.

Secondary data about the existing and upcoming mines in the florican areas was used for mapping. Location data of the mines encountered during the surveys were compiled. Data of the proposed mines were received through the Office of the Deputy Conservator of Forests (DyCF), Ajmer and from the reports of District-Level Environment Impact Assessment Authority (DEIAA) and District-Level Expert Appraisal Committee (DEAC). For further details of the mines and their locations in florican landscape, please see annexure III. Map layers of mine locations and current florican distribution sites were overlapped for comparison.

MAPPING OF THE LF SITES FOR IDENTIFICATION OF PROPOSED LFCCAS OR LFCR

Except for a few reserve forests, there are no protected areas in the Shokaliya landscape for the conservation of floricans. Therefore, using Google Earth imagery, we tried to identify potential areas that could be managed as Lesser Florican Community Conserved Areas (LFCCAs) or Lesser Florican Conservation Reserve (LFCR) under a long-term strategy. Similarly, data about reserve forests, potential florican habitats and mining operations in the adjoining sites was collected for mapping the areas that can be considered as LFCCAs or LFCRs.

FARMLAND SURVEYS TO UNDERSTAND CROPPING PATTERN

In the study area, the land is measured in bigha, size of which varies place to place; therefore, our report uses measurement units which are commonly referred to by the local people.

1. One bigha = 1,618.7 sq. m (17,424 sq. ft) = 20 Biswa
2. One Hectare = 10,000 sq. m = 6.17 bigha



Image 6 Respondent survey in progress to understand the socio-ecological dimensions © Vikram Hinonia



Image 7 Time-to-time field visits helped to capture the various stages of the crops © Chandraprakash Prajapat



Image 8 Information was collated from experienced ground staff of the Forest Department.
Mr Abdul Gani (top) and Mr Rajendra Singh (bottom) in conversation with BNHS Scientist Sujit Narwade © Neelkanth Bora



Image 9 It was difficult to move in crop fields before the harvest the crop was dense and tall © Sujit Narwade

GENERAL BIRD SURVEY

Four open areas mainly comprising grasslands, traditional crop fields and four wetlands (figure 2) were visited bimonthly to get an idea about other birds seen in the study area; a list of these birds are provided as an annexure IX. Near about thirty minutes were spent observing the birds at each site totaling $8 \times 30 \times 6 = 1440$ minutes or 24 hours by two observers. Additional inputs were taken from Shri Rajendra Singh, Forester, Shokaliya who is one of the finest birdwatchers and knows the area very well.

MOSAICS OF OPEN GRASSLAND AND CROP FIELDS

1. Shokaliya-Sanod-Kesarpura: 13.8 sq. km of common grazing land covered with more than 60% of invasive exotic trees *Prosopis juliflora*. One of the strongholds of Lesser Florican where more than 7–8 males recorded each season.
2. Madhopura-Bhagwantpura: Common grazing land of 6.25 sq. km with mainly kair and native plants surrounded by traditional crop fields. Around 5–6 males recorded each season in this area.
3. Bhatiyani-Kumhariya: Grazing land of 7.49 sq. km area with mainly traditional crops interspersed with sparse grasslands. 5–6 males of Lesser Florican regularly reported from this area.
4. Kalyanipura-Kitap: Area of 6.39 sq. km sandwiched between villages on boundary of Tantoti and Bhinai tehsils, south to Shokaliya where cropping is mainly done manually and Lesser Florican can be seen here till October.

WETLANDS

1. Bamniya Balaji temple lake – One of the scared places where birds and other aquatic fauna get protection due to religious belief of saving the life by local

people. In monsoon water level and catchment area become vast as one cannot observe the things beyond 500 meters.

2. Ramsar wetland – Wetland visited frequently and catchment area spread across more than 600 Ha depending on amount of rainfall.
3. Madhopura wetland – Small seasonal wetland which remain dry during summer and overflooded to village settlements in monsoon.
4. Sarana wetland – Seasonal wetland where people do farming in catchment areas after water resides post monsoon.



Image 10 View of a seasonal wetland in the study area © Sujit Narwade



Image 11 Grassland or grazing land, the typical habitat of the Lesser Florican © Sujit Narwade

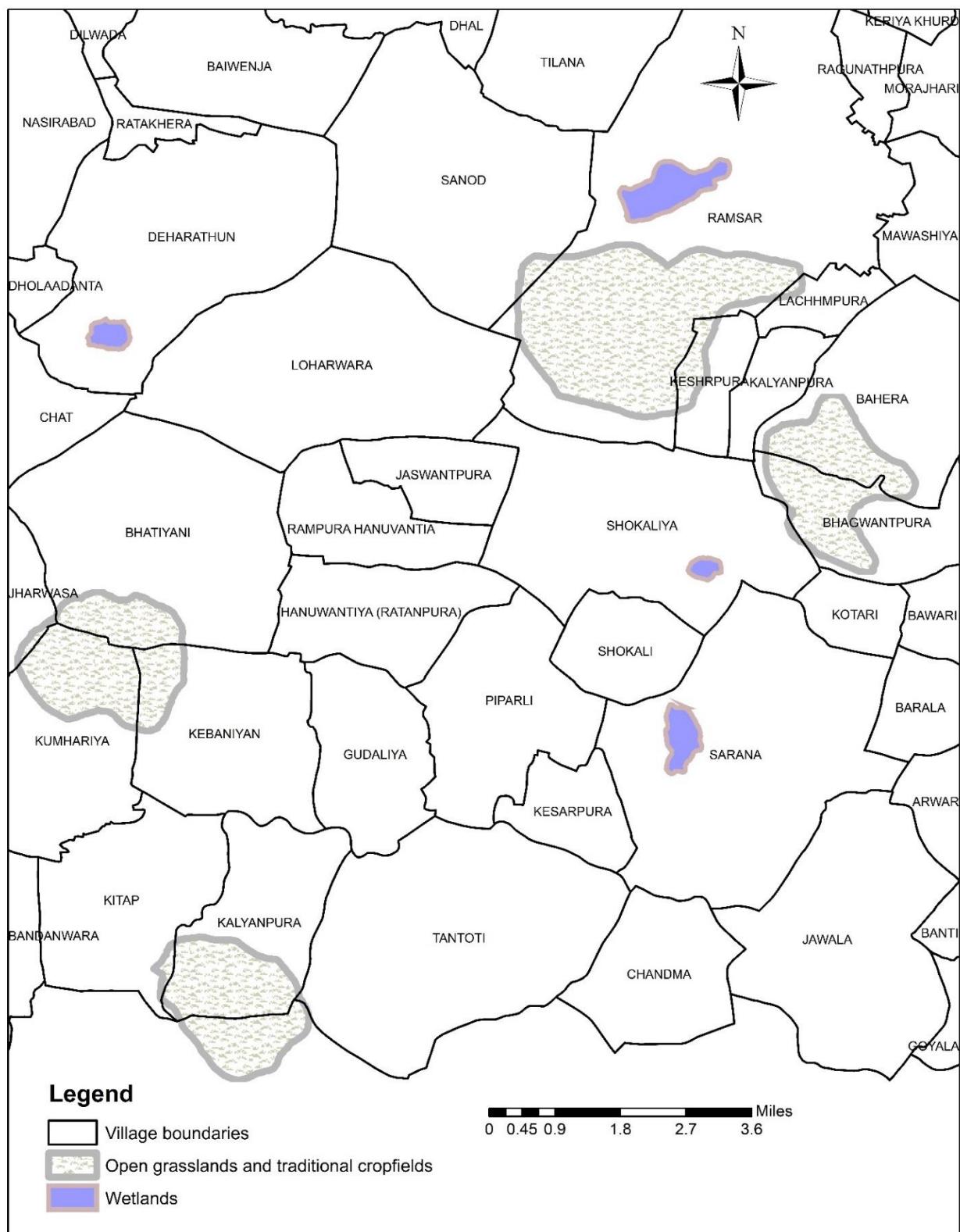


Figure 2 Bird survey sites (Map prepared using village shape files and area polygons saved by BNHS team on field during surveys and generated through ArcMap 10.6.1 software by Sujit Narwade

RESULTS

SURVEY RESULTS

A detailed study was conducted to understand the landscape from January to June 2019. Total 3762 sq. km (Apart from Gulabpura of Ajmer district, Shahpura tehsils of Bhilwara district and Malpura tehsil of Tonk district) was covered extensively and 1727 sq. km Nasirabad, Bhinai, Sarwar, Tantoti and Kekri tehsils of Ajmer district) intensively. LF was sighted at 26 sites (73 locations) across 26,621 ha (266.21 sq. km). Around 500 m radius of each LF location was studied thoroughly. Total 172.62 hours of observations were carried out at LF sites; 7 sites were visited once, 14 twice and three sites thrice. Total 6 individuals conducted the surveys.

Lesser Florican displaying males were sighted at 73 locations, which were clubbed into 26 sites; 34 unique males and 9 females were sighted. Site-wise maps, including the adjoining potential areas, have been prepared to enable further conservation action (see annexure IV for further details). Total area of 26,621 ha (266.21 sq. km). has been marked for Lesser Florican conservation and management work (see figure 6 and table 1 for more details). There is a need for further studies at the landscape level to understand their breeding ecology and their movement during non-breeding seasons. The male florican prefers a grass/crop with height up to 30 to 40 centimetres. The male was observed displaying at a distance of 150 to 200 metres from threats of any kind.

Some of the other key observations are mentioned below:

1. Most often, displaying (jumping) males can be detected in the morning and evening hours during the monsoon; efforts are needed to locate the females.
2. Most of the Lesser Floricans observed during the survey were seen in the croplands or marginal areas of the common grazing lands.
3. The Lesser Floricans seem to prefer fields with traditional crops like Moong, Til and Maize (at an early stage).
4. Small population of LF is distributed in patches across Shokaliya landscape.
5. During secondary data collection and interaction with the locals regarding the Lesser Florican, it was observed that the locals are mostly unaware about the presence of this bird.
6. Many functional/non-functional mines were seen in Shokaliya and the adjoining regions during this survey.
7. Intensive farming and widespread use of pesticides were also observed in some areas.

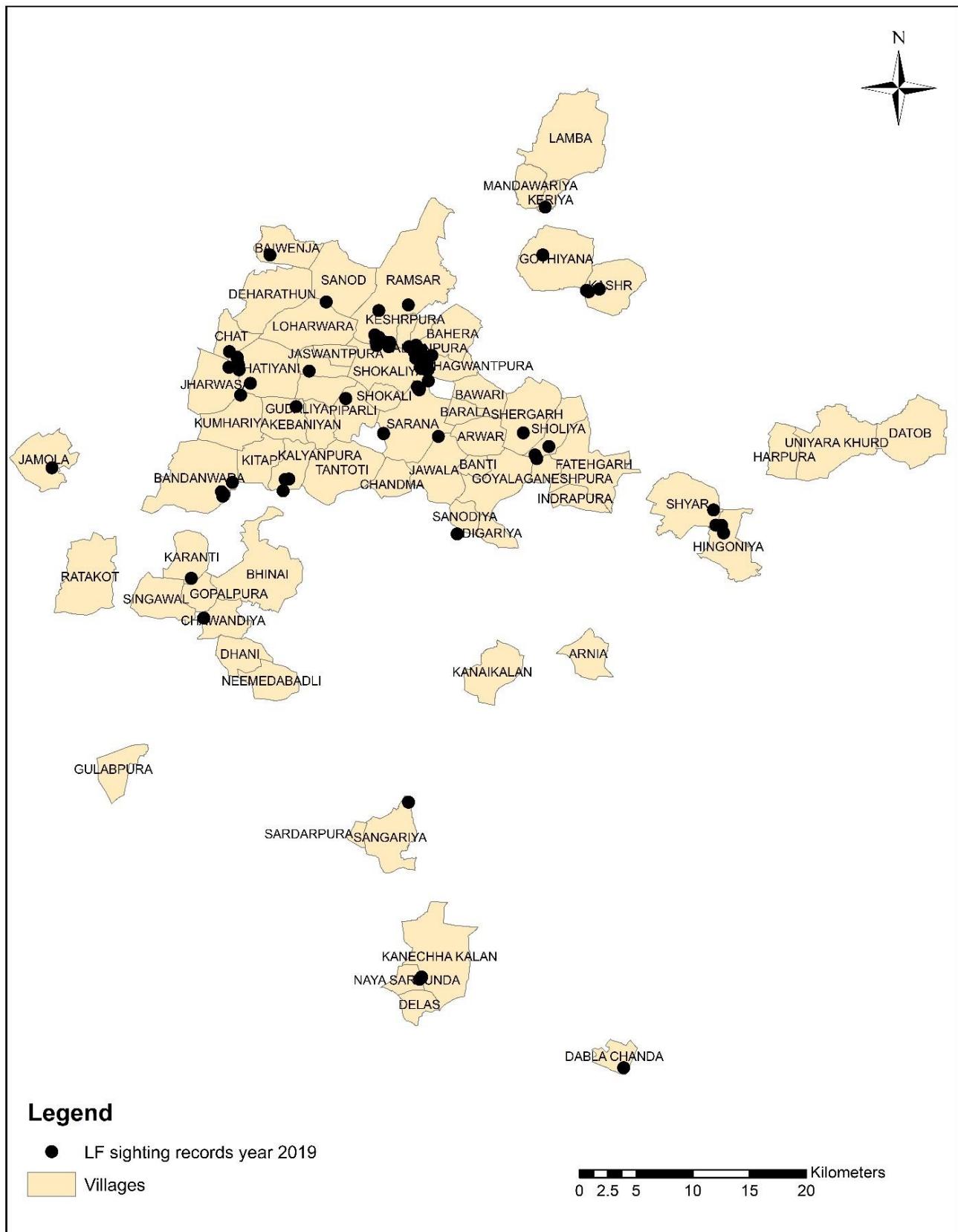


Figure 3 Lesser Florican sightings in 2019 by BNHS (Map prepared using village shape files and point locations saved by survey team on field and generated through ArcMap 10.6.1 software by Sujit Narwade)

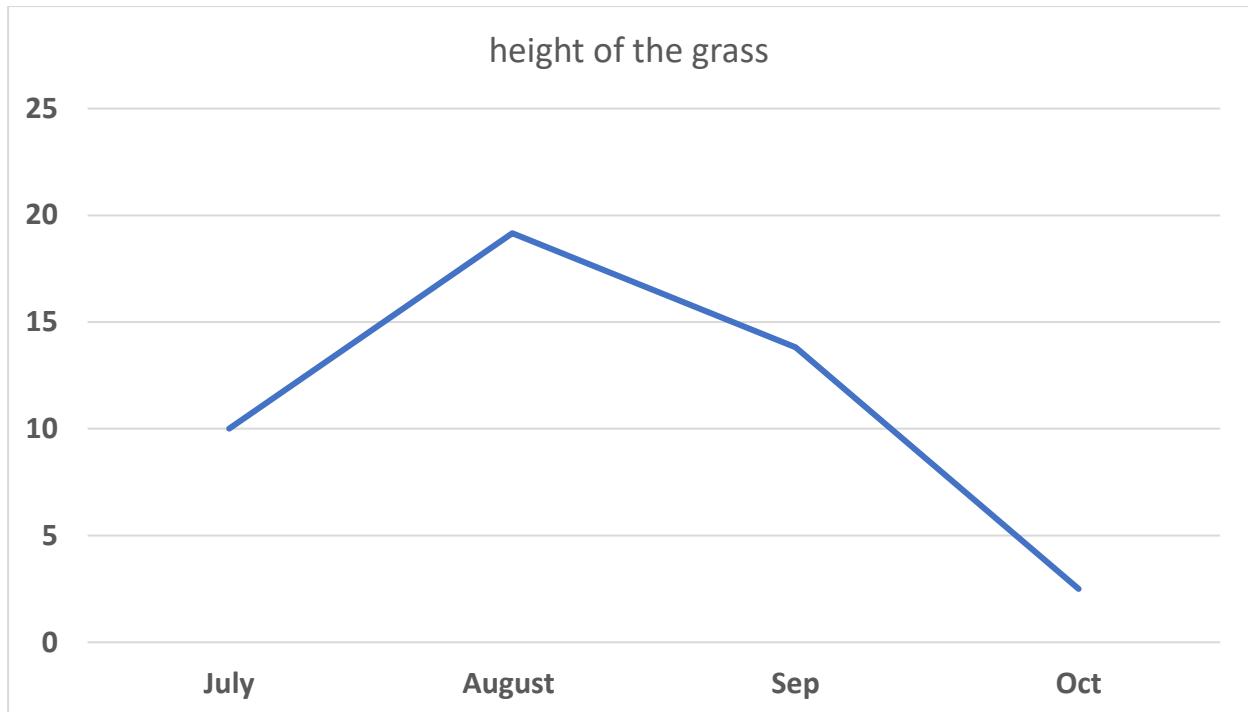


Figure 4 Overall grass height in grazing lands of the study area © BNHS Lesser Florican project



Image 12 Because of limited availability of grazing lands, there is huge pressure on existing grassland, resulting in the grass not being allowed to grow beyond a few centimetres. © Chandraprakash Prajapat

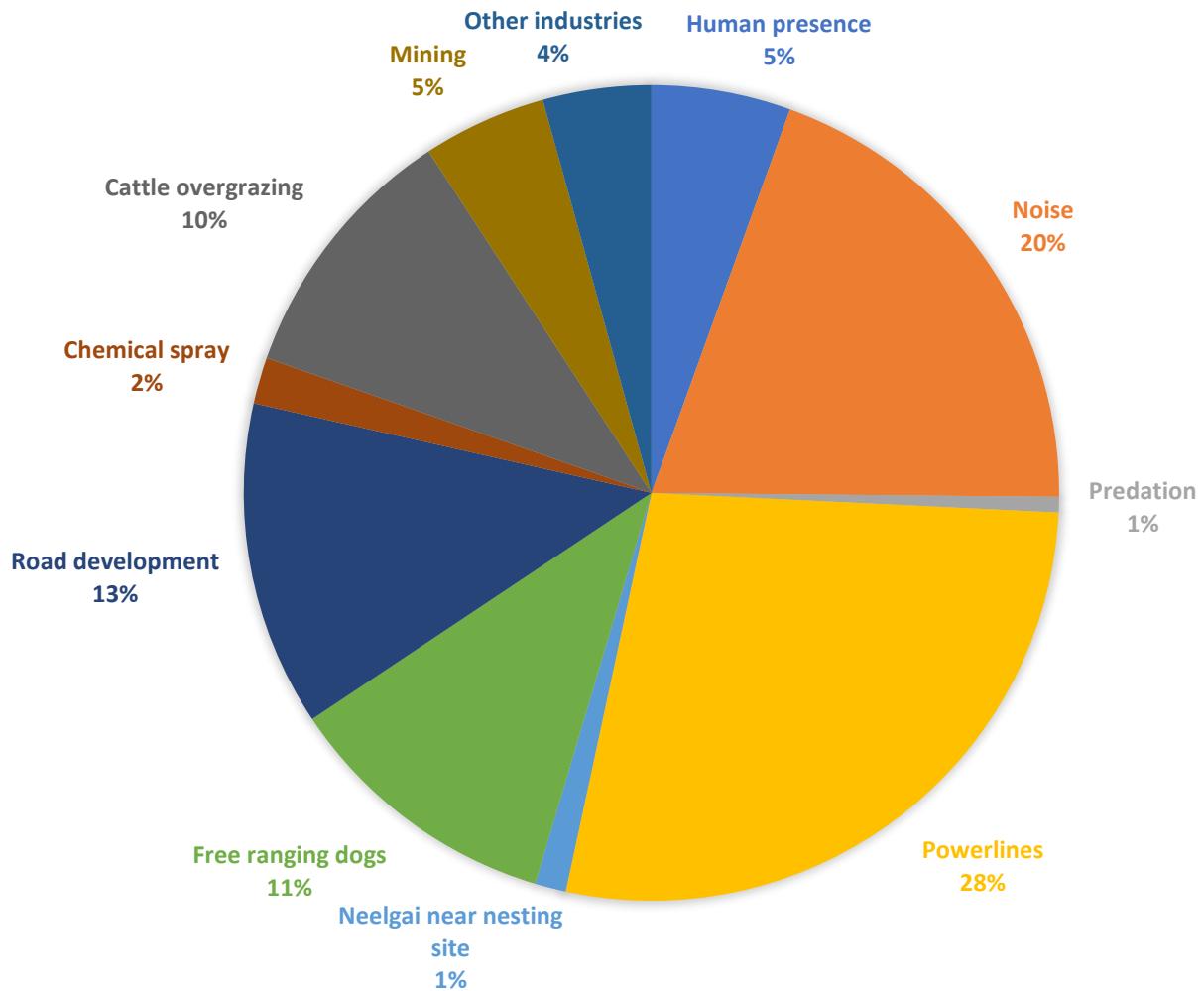


Figure 5 Threats to Lesser Florican observed during the survey period © BNHS Lesser Florican project
(Note – A new threat has been emerged with noise of loud music played on tractors is leading to disruption in wing sound produced by male florican during display)

Table 1 Lesser Florican area that should be spared from any land use changes

S. N.	Name of site	LF area in (in Ha)	LF sites	AO - PA (in Ha)	S. N.	Name of site	LF area in (in Ha)	LF sites	AO - PA (in Ha)
1.	Bhandanwara	1542	10	785.50 756.5	14.	Keriya	167	01	78.55 88.45
2.	Bhatiyani-Rampura	781	04	314.2 466.8	15.	Lamba Khurd	682	02	157.1 524.9
3.	Chaat- Raslpura	1,312	01	785.5 526.5	16.	Motipura	296	02	157.1 138.9
4.	Gopalpura - Lamba	1,401	04	314.2 1086.8	17.	Ratakot-Sawaipura	1,392	01	78.55 1313.45
5.	Gowalia-Gopalpura	2,264	11	864 1400	18.	Sanod	965	01	78.55 886.45
6.	Goyala-Kheeriya-Shergarh-Sholiya	3423	06	471.3 2951.7	19.	Sanodia-Jotayan	933	03	235.5 697.4
7.	Gulabpura	2567	02	157.1 2409.9	20.	Sarana	580	02	157.1 422.9
8.	Hingoniya-Piproli	1613	03	235.5 1377.4	21.	Sedariya, Kitap	407	02	157.1 249.9
9.	Jhanbarkiya	1,040	01	78.55 961.45	22.	Shokaliya, Kesarpura, Madhopura, Ramsar	1,705	06	471.3 1233.7
10.	Kanai Kalan	203	01	78.55 124.45	23.	Sokali-Peeproli	207	02	157.1 49.9
11.	Kanai Khurd	755	02	157.1 597.9	24.	Tantoti, Dhantol, Kalyanipura	1431	3	234 1196.1
12.	Kasheer	283	02	157.1 125.9	25.	Sangria, Dhanop	186	1	78.55 107.45
13.	Kebaniya-Kumhariya	672	01	78.55 593.45	26.	Dabla Chand	318	1	78.55 239.45
Total Lesser Florican area (occupied and potential) - 26,621 ha									
Total LF locations - 73									

Assumptions

1. Rough estimation based on breeding bird surveys conducted 2019: 500 m radius area occupied as territory by the displaying male
2. Area of circle = πr^2
3. $\pi r^2: 3.142 \times 500 \times 500 = 7,85,500 \text{ sq. m or } 78.55 \text{ ha}$
4. AO: Area occupied by Lesser Florican based on breeding bird surveys conducted in 2019
5. PA: Potential area identified based on available field surveys and current land use

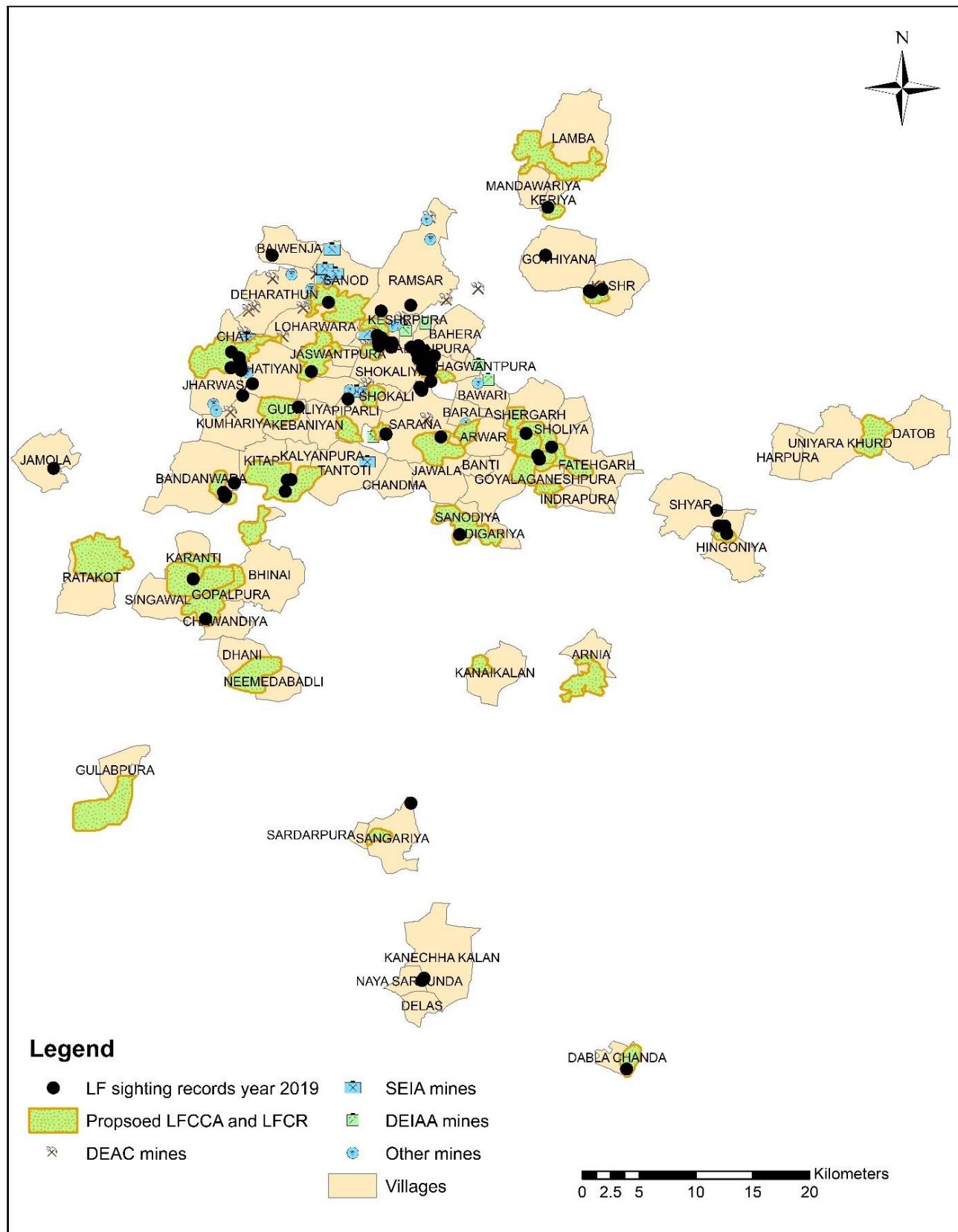


Figure 6 Lesser Florican sightings during 2019 by BNHS and proposed LFCCAs or LFCRs, mining areas (Map prepared using village shape files and area polygons saved by survey team on field and generated through ArcMap 10.6.1 software by Sujit Narwade)

NATURAL HISTORY OBSERVATIONS (CHRONOLOGICAL)

1. **Male breeding plumage** – on 03/07/19, a florican male was sighted near Bhuri Nadi area of Shokaliya with partially developed breeding plumage.
2. **Foraging** – After arrival florican males were seen foraging on winged termites emerged out of mounds because of first few rain showers, locusts, spiders, beetles, bugs, grasshoppers, moong crop pod borers, moths and grass shoots, etc.
3. **Establishment of territory** – On 09/07/19, even after searching for two days, the bird seen on July 3 was not observed as it could not establish its territory then. At the beginning of the breeding season males do not have a well-defined territory, they keep on moving in the Jowar fields and display at various sites and once the breeding season sets in, they acquire well-defined territories with particular display sites.
4. **Sightings nearby** – On 16/07/19 another male florican was sighted near Kesarpura village.
5. **Use of grassland and croplands before settling** – On 19/07/19 a male LF was sighted in Kalyanpura-Bhagwantpura kankad (grazing land), rarely displaying but continuously foraging as it walked for a kilometre and more before disappearing beyond the bunds.
6. **Display after establishing territory** – On 23/07/19 a male LF was seen at one place, displaying cautiously, getting disturbed if approached by anything within a vicinity of less than 150 metres. Display seen throughout the day up to 8:40 PM in the evening and in midnight during moonlight.
7. **Site fidelity** – male floricans were seen on same site during three consecutive years 2017, 2018, 2019 near Syar-Hingonia villages.
8. **Mating** – on 27 July, a male was displaying when a female approached it. Suddenly the male's jumps doubled than usual. The female landed near male and both were seen twining their necks and rubbing them together; they copulated more than two times in half an hour.
9. **Disturbance due to human activities** - On 01/08/19, a male LF was seen in a farmland. It was disturbed for an entire day as the farmer was carrying out weeding operation. But it resumed its display as soon as the farm labours moved out.
10. **Lek behavior** – On 02/08/19 at Madhopura kankad, 3 males and two females were observed close to each other; later, one pair moved to Bajra crop and mating lasted for 15 minutes.
11. **Observations at previous known sites** – On 03/08/19 surveys were conducted in Keriya and Morajhadi villages where birds had been recorded in 2017, but none were to be seen that year. Area was waterlogged and had become a temporary small waterbody.
12. **Guidance from experienced forest officers** – On 04/08/19- the CWLW, Rajasthan visited the area along with CCF, Jodhpur and DFO (Ajmer); two male LF were recorded at 12.30 pm during their visit. CWLW told the team to plan awareness sessions on organic farming and habitat restoration of the area.
13. **Uncontrolled tourism** – On 05/08/19, given that it was a Sunday, three to four vehicles were seen searching for floricans, and photographers approaching

them very close for good photographs. Tourists were warned by the BNHS team not to disturb the birds and the incidence was also informed to the forester of the area.

14. **Exploring other areas** – During 8 and 9 August 2019, the BNHS team visited Cheeta Kheda (Neemuch) and Sailana (Ratlam) in Madhya Pradesh State to understand the status of birds and their habitat in the given regions. Shri Ajay Yadav, CCF, Ujjain also arranged a training programme for conducting lesser florican surveys systematically.
15. **Visits by experienced wildlifer** – On 10 and 11 August 2019, Dr. G.S. Bharadwaj, PCCF, Jaipur and Dr. Praveen Mathur, HoD, Environment Department, MDSU visited the site.
16. **Response by the birds to pesticide spray**- Two males regularly observed in the previous years in Madhopura farmlands during the initial weeks of August were not seen during 2019 survey (conducted from August 7 to 17), most probably owing to pesticide spray. Following heavy rains soon after, the chemical spray was washed out, and the males were once again seen foraging and displaying on the site.
17. **Bird detectability issue** – After second week of August (15/08/19), the height of the crop (primarily Moong) reached 50 to 60 centimetres, and flowering and fruiting started, leading to low detectability of the birds except during display. The females are more often seen at the onset of the season and become inconspicuous when they begin the egg laying process.
18. **Injuries to birds** – On 17/08/19 a young female florican was rescued by a staff of the forest department at Dhanop, Shahpura, Bhilwada district. The bird was kept in a nursery and brought to Ajmer veterinary hospital for further treatment but could not survive because of shoulder injury. The BNHS team visited the site from where bird was rescued and saw a couple more LF. Florican sites were mapped for further monitoring.
19. **Inaccessibility to the areas** – After heavy rains, most of the internal roads were waterlogged. For example, on 18/08/19, display sound of the 2 males could be heard by the team at Bhatiyani but due to inaccessibility, the team could not reach the area.
20. **Infrequent displays and less detectability** – From 19 to 23 August 2019, the survey team observed two male floricans at Madhopura farmlands for the entire evening, not displaying, which meant that most of the females were nesting.
21. **Meeting with experienced scientists** – On 28/08/19 the team met Dr. Asad Rahmani, one of the renowned bustard conservationists who suggested to monitor the areas where he saw birds in 1990 and try to understand why birds have left those areas.
22. **Crop harvesting** – After 11/09/19, huge harvesters were seen in the farmland; Moong crop that had reached 2 to 3 centimetres was cut down, leaving behind nothing. A couple of Indian peafowl nests were seen damaged due to harvesting by machines. Only Jowar *Sorghum sp.*, Til or Sesame *Sesamum indicum* and Bajra or Pearl Millet *Pennisetum glaucum* crops were left. Post harvesting, cattle were allowed to graze in the leftover crop straw.

23. **Ex-situ conservation work planned by Rajasthan Government** – From September 10 to 15, a team from the Forest Department of Jaipur and Wildlife Institute of India (WII) launched a search operation to collect Lesser Florican eggs for ex-situ conservation programme. Despite using the drone, it was difficult to spot females in tall crops; also, they were late in starting the operation.
24. **Chicks of other birds** – Following the egg search operation conducted by the Forest Department, many farmers started reporting chicks and even captured a couple of chicks of Indian Peafowl thinking that the female had abandoned them.
25. **Grass height in grazing land** – Due to scarcity of fodder and limited grazing lands, the height of the grass never went up more than 15–20 cm in kankads (grasslands)
26. **Late breeding season** – On 27/09/19 while cutting pearl millet at Madhopura 3 females or non-breeding males were seen flushed. On October 4, a bird was seen for the last time at Sarana.



Image 13 One young female florican was rescued near Sangria of Shahpura tehsil on 16 August 2019 with wing injury but could not survive. This may be because of collision with power lines© Neelkanth Bora

NEED FOR LFCCA OR LFCR TO DEAL WITH THE ISSUE OF LAND USE CHANGES, ESPECIALLY MINING

Since Lesser Florican is known to follow rainfall and shifts its territories locally, BNHS recommends developing Lesser Florican Community Conserved Areas (LFCCAs) or Lesser Florican Conservation Reserves (LFCRs) instead of Sanctuaries in the study area. All government land such as revenue, forest, common grazing land or pastures (kankad) should be spared from land use changes in the future. More precise maps for the proposed LFCCAs or LFCRs will be available only after regular consultation and meetings with the local people, the Forest Department and regular surveys that can affirm the presence of the bird.

ADDITIONAL SITES SUGGESTED FOR LFCCA BASED ON SATELLITE TRANSMITTER STUDY CONDUCTED BY WII

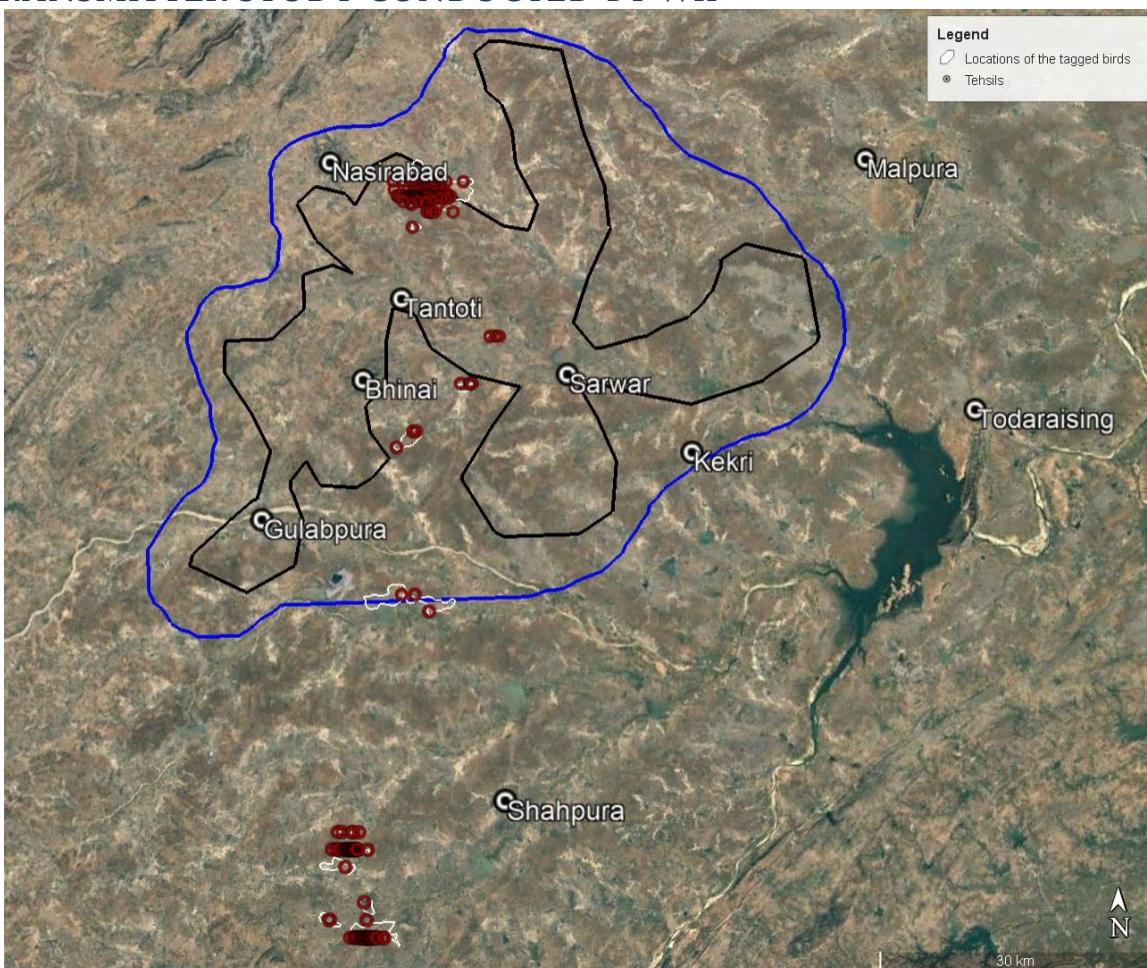


Figure 7 Additional sites to be managed for the conservation of Lesser Florican based on satellite transmitter study carried out by WII [Map prepared using locations provided by WII (Mohan et al. 2016) and generated through Google Earth by Sujit Narwade]

Note - Satellite tracking of two male Lesser Floricans in 2014 by WII revealed that males could shift their territories within an area. As per Mohan et al. (2016), "it was earlier believed that Lesser Floricans are long-distance migrants and their foraging grounds might be in the Western Ghats and Gangetic Plains (Sankaran 2000). However, a tagged Florican migrated just 94 km south of its breeding ground, demonstrating small-distance migration and natal philopatry during the next breeding. Both breeding and non-breeding habitats of the Lesser Florican are semi-arid grasslands that are under immense human-induced pressure".

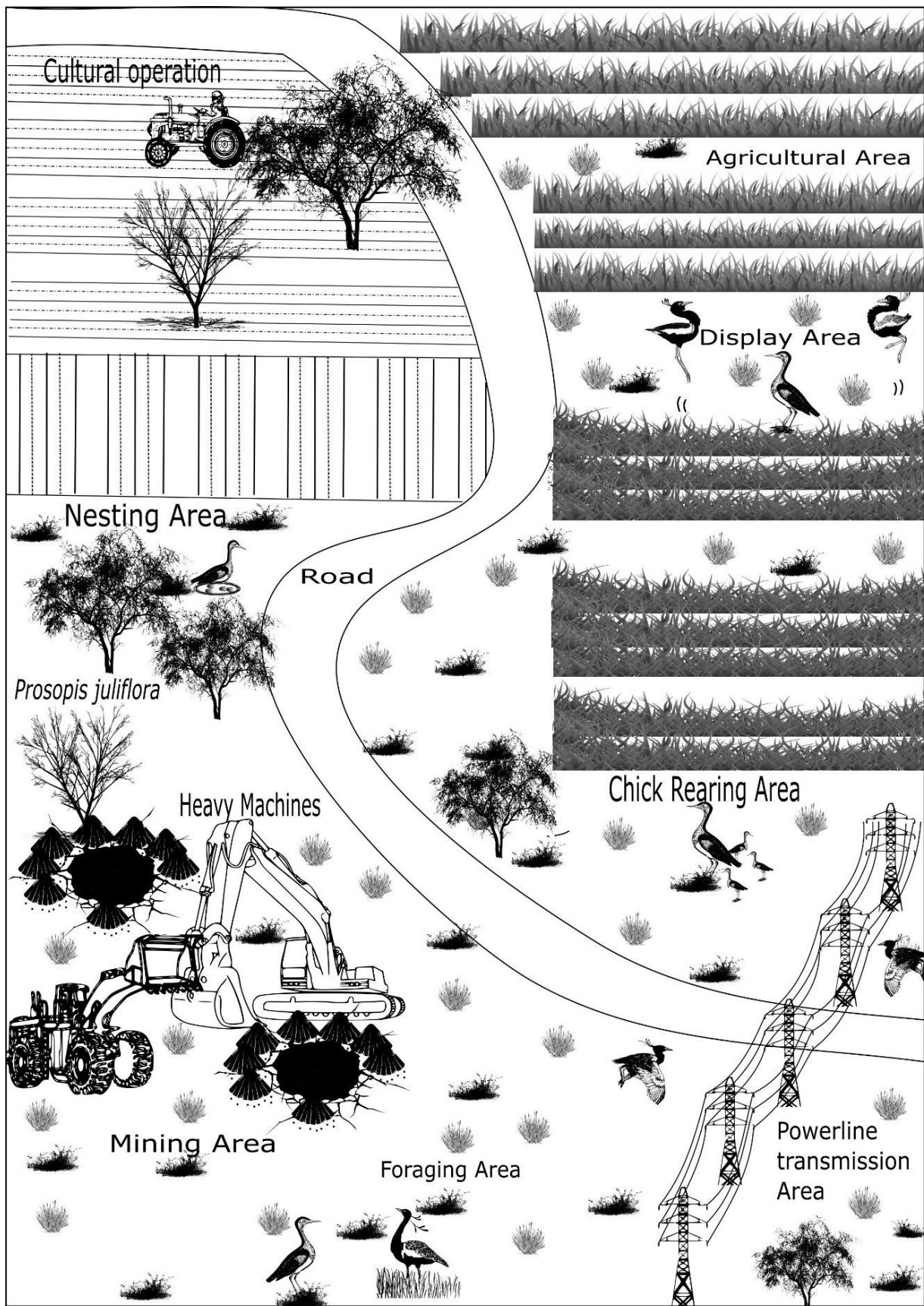


Figure 8 Habitat requirements for Lesser Florican and the threats they face (Sketch by Pratik Pansare)

CHALLENGES TO SAVE LESSER FLORICAN BREEDING IN AGRO-PASTORAL LANDSCAPE



Image 14 Lesser Florican nest (left: distant view, middle: zoomed in view of the nesting female, right: eggs that get exposed in the croplands during the harvesting season and face the risk of being destroyed by human activities © Chandraprakash Prajapat



Image 15 Heavy machines like harvesters can cut the crop from ground level within a few hours © Sujit Narwade



Image 16 Nests, eggs and chicks are prone to get damaged during harvesting using heavy machines © Chandraprakash Prajapat



Image 17 Continuous use of machines is a major disturbance to the breeding birds © Chandraprakash Prajapat

UNDERSTANDING CROPPING PATTERN

Annually, two crops are cultivated in the study area, one in the monsoon, which is known as kharif and the other, in winter, known as rabbi (names of the crops provided in table 2 and 5). In the first week of July, farmers start preparing for the kharif season. In summer, the farmlands are ploughed by the farmers to maintain the temperature and moisture of the soil. The pests and their eggs, which can cause harm to the crop, are mechanically removed by the help of ploughing machines so that it does not cause any harm to the kharif crop.

Because of extreme weather conditions like heavy rainfall, the crops may be damaged and produce low yield. If a farmer invests less, then too the production can go down. The use of fertilizers and the type of land – whether irrigated or non-irrigated – play a crucial role in productivity. If the rainfall is irregular, then the process may get delayed by 10 to 15 days.

KHARIF CROPS (GENERALLY SOWN IN THE FIRST WEEK OF JULY).

PULSES (MOONG, CHAWLA, URAD)

It takes around 7 days to germinate, and 10 to 15 days to attain a height of 10 to 15 cm. In 15 to 25 days, it attains a height of 30 to 45 cm; the flowering stage is around 35 to 40 days, the growth of pods starts in 40 to 50 days. The crop is ready to be harvested in 60 to 70 days, when its height is 60 to 75 cm. It was found that the Lesser Floricans prefer a vegetation height of 25 to 100 cm and traditional crops like Moong and Urad. In other crop fields like Jowar and Maize, the birds were seen when the height of the crop was less than 100 cm and pests like borers could be easily found.

Table 2 Common Kharif crops in the study area

Sr. No.	Local name	Common Name	Scientific Name	Contribution of crop in %
1.	Jowar	Jowar	<i>Sorghum sp.</i>	30
2.	Urad	Black Gram	<i>Vigna mungo</i>	20
3.	Moong	Green Gram	<i>Vigna radiata</i>	20
4.	Makka	Maize	<i>Zea mays</i>	10
5.	Til	Sesame	<i>Sesamum indicum</i>	5
6.	Bajra	Pearl Millet	<i>Pennisetum glaucum</i>	5
7.	Guar	Cluster Bean	<i>Cyamopsis tetragonoloba</i>	10
8.	Mungfali	Groundnut/Peanut	<i>Arachis hypogaea</i>	
9.	Others	(Chilly, Cotton)	-	

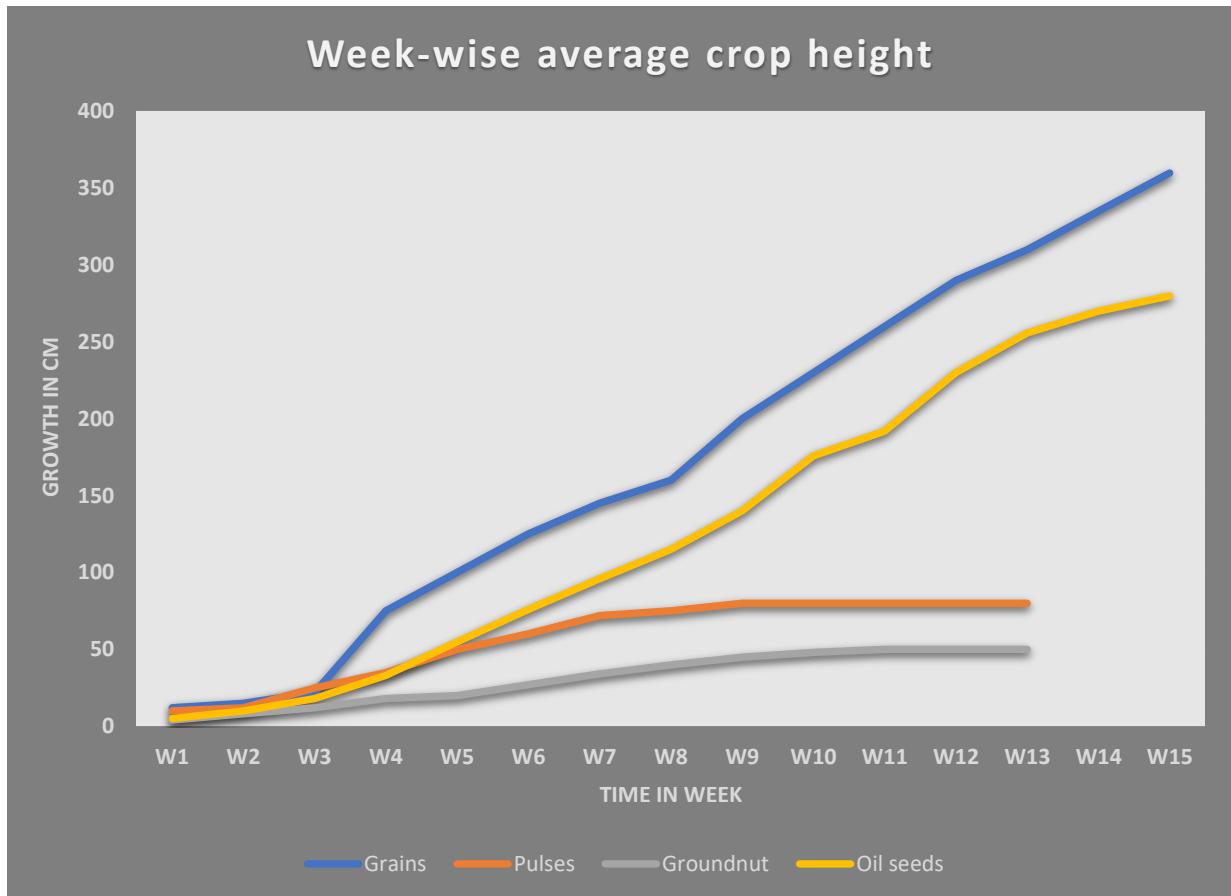


Figure 9 Graph showing the growth of traditional crops (crops less than 100 cm height are mostly preferred by Lesser Floricans) © BNHS Lesser Florican project

Other crops grown in small areas

Kulath and Chawla

These are a couple of other types of pulses cultivated as kharif crop in smaller areas (area of 1 to $\frac{1}{2}$ Biswa) by less than 10% of the farmers. The maximum height of these crops is 30 cm, which is ideal for the Lesser Florican.

Grains (Jowar, Millet, Maize)

The grain is sown for the dual purpose of food as well as fodder; it takes 3 to 3.5 months to get harvested. It attains a height of 150 to 250 cm and sometimes goes up to 300 cm. The duration required for the production of a particular crop:

1. Bajra (Millet) – 70 to 75 days
2. Makka (Maize) – 75 to 80
3. Jowar (Sorghum) – Different types of Jowar are being cultivated by the farmers in accordance with their priority for food as well as fodder. It has been further classified into following:
 - a. Shankar Jowar – 70 to 80 days
 - b. Desi Jowar – 70 to 75 days
 - c. Hadauti Jowar – around 120 days
 - d. Gujrati Jowar – 60 to 65 days



Image 18 Floricans have been seen in areas where traditional crops are still cultivated © Sujit Narwade



Image 19 Lesser Florican in early stage of developing breeding plumage © Chandraprakash Prajapat

MAJOR RABBI CROPS

In study area, usually rabbi crop is harvested in March and April.

1. Chana (Chickpea): It takes around 5 months for this crop to mature and be ready for harvest. It grows up to a height of 30 cm; if well irrigated, it may attain a height of 40 to 45 cm. The height is quite proportional to the grain size the plant attains. This crop is mainly harvested manually and therefore, the Lesser Floricans are seen in these fields until the breeding season.
2. Spices cultivated by the farmers in rabbi season:
 - a. Jeera (Cumin) – 30 to 40 cm
 - b. Dhania (Coriander) – 30 to 70 cm
 - c. Ajwain – 30 to 40 cm
 - d. Methi (Fenugreek) – 30 to 100 cm

INVESTMENT VS PRODUCTION

FOR JOWAR

Overall net expenditure is Rs 4000 per bigha and average production is 3 quintals. Current market price of Jowar is Rs 2000/quintal and Rs 6,000/- per bigha (6.25 bigha= 1 ha). Additionally, Jowar gives fodder (*kadabi*), which can be used for one's cattle or sold at a cost of Rs 10,000/-for one and half tractor trolley yield per bigha.

FOR PULSES

Net expenditure is Rs 3900 per bigha and average production is 2 quintals. Current market price of Moong and Urad is Rs. 5000/quintal and Rs. 10,000/- per bigha (6.25 bigha= 1 Ha).

Table 3 Production cost and market value of grains (mainly jowar)

Sr. No.	Requirement	Activity	Cost per bigha (in INR)
1.	Prior to rainy season	Ploughing 1 st time	200
2.	Levelling	Ploughing 2 nd time	200
3.	Seeds	2 ½ to 3 kg	500
4.	Sowing	Machine charges	200
5.	Fertilizer	D.A.P. 500	250
6.	Weed growth control	Herbicide spray	150
7.	Weeding	Mechanical weed cutting	150
8.	Insect control	Pesticide	300
9.	Harvesting labour charges	Manual cutting	1200
10.	Thresher	threshes grains	500
11.	Grading and transport	Sorting regarding quality	100
12.	Baggage, loading, unloading		150

Table 4 Production cost and market value of pulses

Sr. No.	Requirement	Activity	Cost per bigha (in INR)
1.	Prior to rainy season	Ploughing 1 st time	200
2.	Levelling	Ploughing 2 nd time	200
3.	Commencement of rain	Ploughing 3 rd time	200
4.	Seeds	2 ½ to 3 kg	300
5.	Sowing	Machine charges	200
6.	Fertilizer	D.A.P. 500	250
7.	Weed growth control	Herbicide spray	150
8.	Weeding	Mechanical weed cutting	150
9.	Insect control first dose	Pesticide	300
10.	Insect control second dose	Pesticide	200
11.	Harvesting labor charges	Manual cutting	1000
12.	Thresher	threshes grains	500
13.	Grading	Sorting regarding quality	100
14.	Baggage	-	50
15.	Loading and unloading bags	-	100



Image 20 Sole dependence on rainfed crops, huge investment and uncertainty about crop production are the challenges faced by the farmers in the study area © Sujit Narwade

Table 5 Rabi crops (The season starts in the month of October, post breeding of LF)

Sr. No.	Local name	Common Name	Scientific Name
	Grains		
1.	Gehu	Wheat	<i>Triticum aestivum</i>
2.	Chana	Bengal Gram or Chick Pea	<i>Cicer arietinum</i>
3.	Jau	Barley	<i>Hordeum vulgare</i>
4.	Chari Jowar	Jowar as fodder	<i>Sorghum sp.</i>
	Spices		
5.	Jeera	Cumin	<i>Cuminum cyminum</i>
6.	Sarson	Mustard	<i>Brassica nigra</i>
7.	Tarameera	Arugula, Rocket	<i>Eruca sativa</i>
8.	Dhania	Coriander	<i>Coriandrum sativum</i>
9.	Ajwain	Ajowan or carom	<i>Trachyspermum ammi</i>
10.	Methi	Fenugreek	<i>Trigonella foenum-graecum</i>
11.	Isabgol	Ispaghula or psyllium	<i>Plantago sp.</i>
	Vegetables		
12.	Tamatar	Tomato	<i>Lycopersicon esculentum</i>
13.	Karela	Bitter Gourd	<i>Momordica charantia</i>
14.	Lauki or aaldi	Bottle Gourd	<i>Lagenaria siceraria</i>
15.	Taurai	Sponge Gourd	<i>Luffa aegyptiaca</i>
16.	Baingan	Birnjal	<i>Solanum melongena</i>
17.	Ful Gobi	Cauliflower	<i>Brassica oleracea var botrytis</i>
18.	Patta Gobi	Cabbage	<i>Brassica oleracea var capitata</i>
19.	Kheera	Cucumber	<i>Cucumis sativus</i>
	Fodder		
20.	Rajka	Alfalfa	<i>Medicago sativa</i>
21.	Methi	Fenugreek	<i>Trigonella foenum-graecum</i>
22.	Jawar	Jowar	<i>Sorghun sp.</i>

USE OF CHEMICALS

HERBICIDES

15 % of the weeds are removed physically by cultivators while 85% percent are removed by the use of herbicide. Main content of herbicide is Imazethaprys, which is an aromatic carboxylic acid.

PESTICIDES

Insecticides are used after 15 to 20 days of sowing of crops. Pesticides used by the cultivators are:

1. Triazofos: it is a nematicide, insecticide
2. Monocrotophos: it is an organophosphate insecticide
3. Rogor (Dimethoate): it is an acaricide
4. IRMA: - Emamectin Benzoate
5. SAAF: Carbendazim m12% + Mancozeb 63% WP
6. Macarena: Organic component 22%w/w, Mineral comp. 15%w/w, Inert Ingredient/Aqua 63% w/w
7. Based on biotechnology

FERTILIZERS (D.A.P. AND UREA)

1. For pulses (**Moong, Urad**)

D.A.P: 5 to 10 Kg per bigha is added before sowing the seeds. Urea is rarely used in pulses but in the case of heavy rainfall, about 20% of the farmers use it in their farms; 5 to 7 Kg of urea is used for 1 bigha.

2. For Fodder Crop (**Jowar, Bajra, Makka**)

D.A.P: 5 to 7 kg per bigha of fertilizer is added in the soil before sowing. 20% of the farmers do not add fertilizers as they use crop as fodder for their cattle; 4 to 5 kg of urea is used per bigha.



Image 21 Majority of the people from Shokaliya area were found using chemicals rampantly © Sujit Narwade



Image 22 Excessive use of pesticide leads to the destruction of useful insects © Sujit Narwade



Image 23 Use of chemicals such as combination of pesticides, fungicides, herbicides, and weedicide could have cumulative impact, which needs to be studied © Sujit Narwade

August 2019

ISSUE OF CHEMICAL SPRAY

In first two weeks of August, the florican was not seen because of chemical spray at its displaying sites; it reappeared when the chemical spray got washed out after the heavy rain.



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						Pesticide spray
1	2	3	4	5	6	7
8	9	10	11	12	13	14
		Heavy rains				
15	16	17	18	19	20	21
22	23	24	25	26	27	28
				Herbicide spray		

Calendar showing how the presence (Green) or absence (Red) of the florican was influenced by the presence of chemical spray on the farmlands at Madhopura site in August 2019 © BNHS Lesser Florican project



Image 24 Because of land use changes, Lesser Floricans are losing their prime breeding habitats © Sujit Narwade



Image 25 Displaying males were seen tolerating the presence of farmers © Sujit Narwade



Image 26 Lesser Florican seen crossing a road to move from one field to another © Sujit Narwade



Image 27 Territorial males seen chasing each other to assert dominance over the territory © Surendra Chauhan



Image 28 Locust attack is difficult to control with chemicals © Chandraprakash Prajapat



Image 29 Locusts were seen attacking almost everything green leading to crops loss © Chandraprakash Prajapat

THREATS AND CONSERVATION ISSUES

Lesser Florican is an Endangered bird facing population decline because of loss of habitat and various threats such as:

1. Poaching, trapping and egg collection.
2. Lack of understanding of population size and breeding as well as non-breeding distribution.
3. Lack of awareness among local communities.
4. Habitat loss and degradation owing to conversion to agriculture and overgrazing
5. Disturbance from unethical photography; many people are found engaged in unethical photography in their race to get the best shot.
6. Disturbance to breeding because of overgrazing and subsequent grassland degradation.
7. Widespread use of pesticides, affecting the food chain of the Florican.
8. Increasing number of new renewable energy power projects such as wind and solar planned on dry arid areas used by the GIB and Lesser Florican.
9. Network of heavy electric line for power transmission, which has led to the loss of habitat as well as death of birds due to electrocution.
10. Land use changes owing to an increase in agriculture, change in crop pattern, the encroachment of grasslands, inappropriate grassland management and rapid development have led to the loss of florican habitat.
11. Trampling of florican eggs because of overgrazing.
12. Mining, especially opencast mining, is one of the main causes for the loss of habitat of this species.
13. Grasslands most often do not enjoy protected status like forests and are usually considered as wasteland. They are targeted for all sorts of development including all types of afforestation – as compensation sites for areas lost or submerged because of a development project, for the improvement of forest cover and for the development of fuel wood or medicinal plant plots. This not only occupies the grassland space, but also fragments the grassland landscape and forms as a visual disturbance for the bustards including Lesser Florican, besides leading to the loss of prime habitats that are very crucial for breeding.
14. Climate change (a prime manifestation being irregular rainfall) is an indirect threat. Being a monsoon breeder, the Lesser Florican changes its breeding grounds depending upon the monsoon conditions, which makes its conservation difficult. The fluctuations in climate and irregular rainfall in many parts of its distribution range have led to its disappearance or irregular presence in the normally frequented areas.
15. Presently, research on the Lesser Florican ecology, behaviour and its habitat needs are very limited and requires to be scaled up.



Image 30 All kind of wildlife like mammals, reptiles, and birds in the region regularly fall prey to poachers © Chandraprakash Prajapat



Image 31 On one occasion, with the help of Florican friends, the BNHS team was able to nab the poachers and release some of the captured wildlife © Chandraprakash Prajapat



Image 32 A forester inspects a trapped animal. The poachers were handed over to forester for further action © Chandraprakash Prajapat



Image 33 Left: A trapped Monitor Lizard is set free. Right: A trap seized from a poacher © Chandraprakash Prajapat



Image 34 Trained dogs are being used for poaching in the study area © Chandraprakash Prajapat



Image 35 Local people were made aware of Wildlife (Protection) Act, 1972 © Chandraprakash Prajapat



Image 36 Many times people get confused with florican chick and chicks of other ground nesting birds. A Peafowl chick seen here (with hind claw) resemble with florican chick but presence of hind claw clearly distinguishes it from a florican chick (without hindclaw) © Harish Sahu



Image 37 Yellow-wattled Lapwing with juvenile in the study area © Chandraprakash Prajapat



Image 38 Study area is also the breeding ground of Indian Courser (chick seen here) © Dharam Veer Singh Jodha



Image 39 Eurasian Thicknee or Stone curlew showing a threat display to save its chick from a Monitor Lizard © Chandraprakash Prajapat

DISCUSSION

DETAILED PROJECT PLANNING (DPR) PROPOSED FOR THE FLORICAN CONSERVATION BY AJMER DIVISION

This is an initiative taken by the office of DyCF, Ajmer towards the conservation of Lesser Florican in Ajmer area. The Ajmer Forest Division has developed a DPR and needs attention towards the following points:

1. DPR is for 893 ha of reserve forest spread across three villages named Arwad, Goyala and Kheeriya. Except this 893-ha area, no reserve forest land is available on the plains in Ajmer division (mainly hills and slopes are reserved).
2. The suggestion to construct a stone masonry wall along with barbed wires and chain-linked fencing may be an ideal requirement for wildlife conservation but this will create future complications with the local community regarding grazing cattle and availability of fodder.
3. On priority, BNHS recommends taking an initiative to check the land use of sites where the Lesser Florican is distributed, which includes across 26,621 ha (266.21 sq. km - please see table 1) including some part from Bhilwara district.
4. In DPR budget, amount has been kept for fencing of 893 ha, which could be considered for revision, with more emphasis on aspects like habitat restoration (removing *Prosopis juliflora* and planting grass seeds), awareness, and incentives to farmers for sustainable agriculture practices as a long-term conservation initiative
5. Lesser Florican will not be able to survive without the support of local people. More importantly, birds visit Ajmer because of the self-management of grazing land by local communities and traditional crops preferred by farmers, which needs to be supported by the government agencies.

The BNHS project team will come up with more precise data and information by the end of the ongoing project. Meanwhile, a map of Lesser Florican distribution sites (based on surveys conducted in 2017-18) overlaid on the adjoining potential areas (community grazing lands and some farmlands) is shown in the figure 6, which can be considered as **florican landscape of Ajmer division**.

NEED FOR AN INNOVATIVE AND PARTICIPATORY APPROACH FOR CONSERVATION OF LESSER FLORICAN

The management of the Florican Community Conserved Areas (FCCAs) needs an innovative and participatory approach. Some recommendations:

1. All florican distribution sites other than the Protected Areas can be developed as Florican Community Conservation Areas (FCCAs) or *florican community reserves*.
2. Special criteria should be adopted for FCCAs.
3. Ownership of the land should remain with the people, except areas under the control of the forest department.
4. Breeding sites of floricans should be given full protection.
5. Restrictions on habitat alteration, mining, industrialization, establishment of non-renewable energy projects and installation of power lines.
6. Owing to negligence and mismanagement, almost all grasslands under reserve forests and sanctuaries in India have become unsuitable habitats for the floricans. To control the growth of invasive plant species, habitat restoration work should be carried out on government-owned land.
7. To avoid overgrazing, some of the plots can be managed by rotational grazing.
8. If nesting is observed on a chunk of land of a local farmer, he/she should be subsidised for the same.

Sustainable/ traditional agricultural practices should be promoted in the florican sites

Since the majority of the Lesser Floricans are found breeding in crop fields, there is a need to promote florican-friendly agricultural practices. Florican recovery programme should include a component of sustainable agricultural scheme. Farmers who adopt florican-friendly agricultural practices should be given training and certificate from the concerned agencies for availing better market price for their crop yield.

To reduce chemical load in farmlands, the use of bio-fertilizers and bio-pesticides should be promoted and incentivized.

Type of machines used also play a significant role in the breeding success of the ground-nesting florican. Heavy mechanical tools are being used to cover larger areas in a shorter span. Giant tools such as threshers were brought on rent by the farmers from Punjab and Haryana states to harvest the crops, leading to more disturbance to the nesting females and nests (see annexure II with sketches of manual and mechanical tools). In areas where the female floricans rest, the use of traditional manual farming tools could be encouraged under agri-environmental schemes such as special incentives for leaving the nesting areas on the farm untouched or ensuring minimum disturbance to the birds during their breeding season.

KISAN CHAUPAL - SENSITIZATION PROGRAMME CUM FEEDBACK WORKSHOP

The LF population is declining rapidly and Ajmer is one of the major strongholds. From 1980 to 1990, the Shokaliya area was also home to the Critically Endangered Great Indian Bustard, but it is now locally extinct from Ajmer area. Farmers can play vital role in the conservation of bird species like Lesser Florican, which mainly breeds in the agriculture fields. During the breeding period, it must be ensured that there is less disturbance to the display and nesting sites. Sensitizing the local people in this regard is crucial. Hence, a sensitization programme to enable a discussion on the conservation of Lesser Florican called *Kisan Chaupal* (phrase in Hindi meaning ‘a meeting of farmers’) was organized jointly by the Forest Department, State Biodiversity Board of Rajasthan and BNHS on February 19, 2020. Villagers including the Sarpanch, farmers, common residents (men and women), school children and staff of the forest department attended the event.

Preparation of this programme started in January 2020 with a series of awareness and nature education activities held in the schools of Shokaliya. The focus was to create awareness about nature in general and LF conservation in particular through fun-filled activities. Folk songs, dance and street plays on Lesser Florican or *Kharmor* were planned and designed. The best teams were given an opportunity to perform during the final event. Under nature education programme, various competitions like quiz were organized and winners were felicitated during the final event.

As per the feedback received from the audience, the most entertaining and effective nature conservation activity was a street play or *Nukkad natak* (in Hindi). Based on the sessions by the BNHS team on the ecology of the Lesser Florican and its conservation issues, the students of Gyandata Public school of Shokaliya put up a play filled with characters like farmers, Lesser Florican, police officers and forest officials. The play drew focus to the Lesser Florican as the mascot of Ajmer, messenger of rain, enemy of harmful insects and the sign of healthy crop. It showed that farmers can play an important role in saving the species by adopting traditional farming practices and informing the forest department about poachers.

Representatives of Krishi Vigyan Kendra (KVK) Ajmer emphasized on the use of bio-pesticides and simple organic farming tools. They also demonstrated how extensive use of chemical fertilizers like DAP (Di-ammonium phosphate) is harmful to the soil and how farmers can produce bio fertilizers in their farms.

A couple of villagers who had made special efforts towards florican conservation were felicitated as ‘Kharmor mitra’ or florican friends.

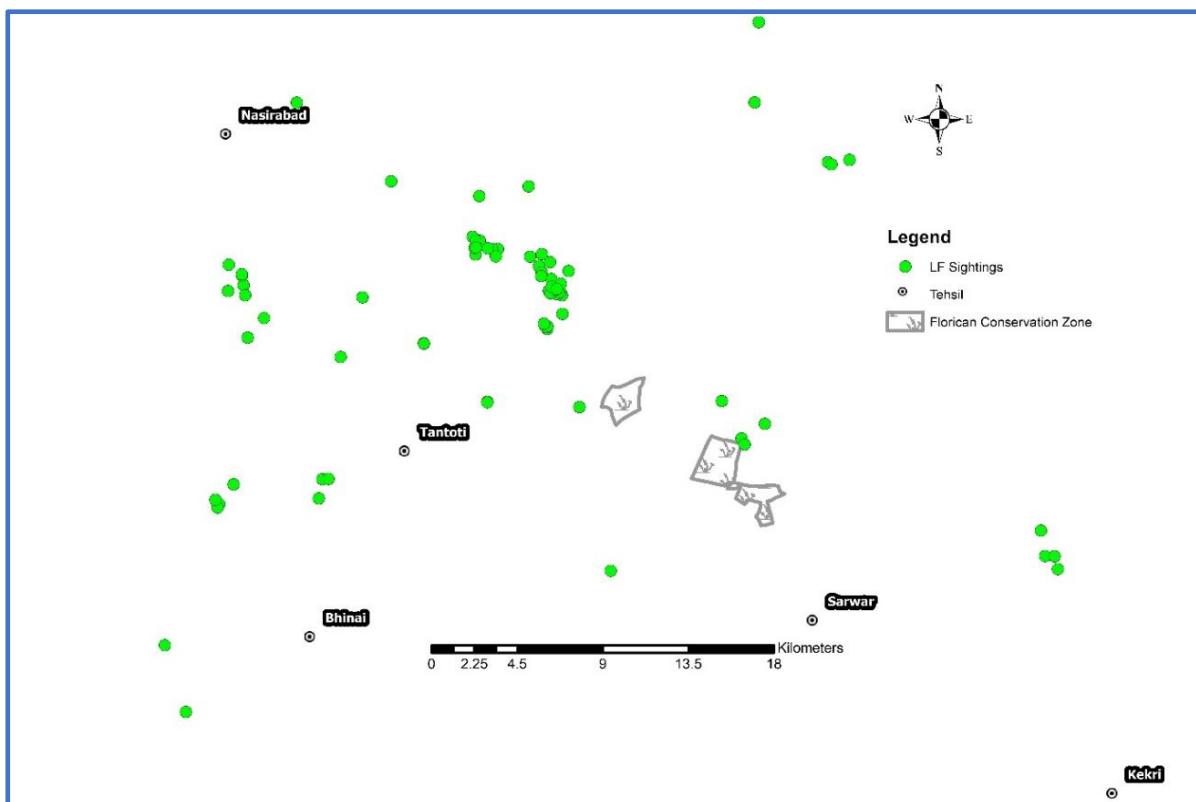


Figure 10 An area of 893 ha of reserve forest near at Arwad, Goyala and Kheeriya has been proposed to be restored as a habitat for Lesser Florican by Ajmer Forest Division, and the green circles are the locations where LF males were sighted (Map prepared using village shape files and area polygons of Reserved Forest shared by Ajmer Division and generated through ArcMap 10.6.1 software by Sujit Narwade



Image 40 Due to overprotection, area proposed as Florican Conservation Zone at Arwad is now full of *Prosopis juliflora*, which is so dense that sunlight does not reach the ground; it needs to be restored as grassland that is suitable for the Lesser Florican © Sujit Narwade



Image 41 Few portions of the proposed Florican Conservation Zone are already fenced by stone wall as well as Trench Cum Mound (TCM) to stop cattle movement © Sujit Narwade



Image 42 Comparatively, the areas near Goyala and Kheeriya have less dense *P. juliflora* © Sujit Narwade



Image 43 Traditionally, the locals manage common grazing lands by removing *Prosopis juliflora* and retaining native plants
© Sujit Narwade



Image 44 Nilgai raid crops at night and take refuge in grasslands/common grazing land during day time © Chandraprakash Prajapat

ANNEXURE I) SUMMARY OF HISTORICALLY CONDUCTED STATUS SURVEYS OF LF IN RAJASTHAN (1982 TO 2011)

SN	District	Range	Taluka/ Village	Place	1982	1984	1986	1989	1994	1999	2010	2011
1.	Tonk	Malpura		Kurar							2	0
2.	Tonk	Malpura		Lamba							2	1
3.	Tonk	Malpura		Sindoliya biri							0	0
4.	Tonk		Malpura	Dinghara and Rampura area	N.V.	N.V.	0	N.V.	N.V.	2		
5.	Ajmer		Shokaliya Kekri, Bagera Basu, Tora		N.V.	2	0	N.V.	N.V.	4		
6.	Ajmer		Gagwana		N.V.	N.V.	N.V.	N.V.	N.V.	N.V.		
7.	Ajmer	Sarwar		Gothiana							0	0
8.	Ajmer	Nasirabad		Block 1							3	18
9.	Ajmer	Nasirabad		Block 2							0	40
10.	Ajmer	Nasirabad		Block 3							0	11
11.	Bhilwara	Gulabpura		Hudla- Badla bir							0	0
12.	Bhilwara		Shahpura	Shivpura Village area		N.V.	2					
13.	Bhilwara		Sangamer	Kalsanse		7	0					
14.	Bhilwara		Sangamer	Kalsanse		0	N.V.					
15.	Bhilwara	Shahpura		Shopura							2	2
16.	Bhilwara	Shahpura		Mewada							1	0
17.	Bhilwara	Shahpura		Baldarkha							0	0
18.	Bhilwara	Shahpura		Khamor bir							1	0
19.	Bhilwara	Shahpura		Mataji ka Khera							1	0
20.	Bhilwara	Shahpura		Bari dand							0	4
21.	Bhilwara	Shahpura		Latiya khera							0	1
22.	Chittaurgadh	Pratapghad		Basad	N.V.	N.V.	N.V.	N.V.	0	0		
23.	Chittaurgadh	Pratapghad		Bajrangadh	N.V.	N.V.	N.V.	N.V.	8	8		
24.	Chittaurgadh	Pratapghad		Kariawath	N.V.	N.V.	N.V.	N.V.	N.V.	11		
25.	Chittaurgadh	Pratapghad		Sidpura	N.V.	N.V.	N.V.	N.V.	N.V.	7		
26.	Chittaurgadh	Pratapghad		Mohwdi kheda	N.V.	N.V.	N.V.	N.V.	N.V.	2		

SN	District	Range	Taluka/ Village	Place	1982	1984	1986	1989	1994	1999	2010	2011
27.	Pratapgarh	Devgarh		Kariabad							0	0
28.	Pratapgarh	Pratapgarh		Malwala ka mal							1	2
29.	Pratapgarh	Pratapgarh		Navlakha bir							2	0
30.	Pali		Omkali	Croplands		N.V.	N.V.					

Abbreviations N.V.: Area not visited,

Source: Surveys in year 1982 – Yahya 1990; in year 1984, 1986, 1989 – Sankaran (1991); 1994 – Sankaran (1994); 1999- Sankaran (2000).



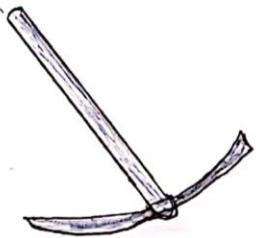
Image 45 In Shokaliya area, Lesser Florican survives in traditional crop fields such as Moong and Urad © Sujit Narwade

ANNEXURE II) FARMING TOOLS COMMONLY USED IN THE STUDY AREA

MANUAL TOOLS

छाथ से योग्यता उपकरण निम्न सूची के हैं →

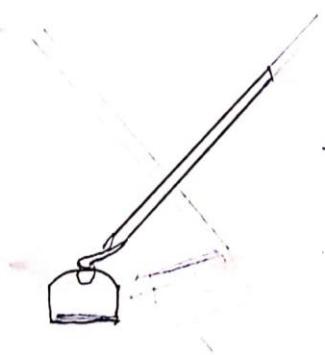
① गोती →



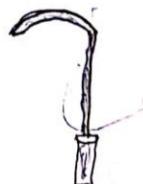
② जली ↓



3. फावड़ा



4. दातली



5. कुदाली
(कस्सी)



Figure 11 Sketches of Tools used for Manual Cropping – 1) Pick Axe; 2) Rake; 3) Hand Weeder; 4) Hand Sicle; 5) Mattock © Chandraprakash Prajapat (tool names are likely to change regionally)

MECHANICAL

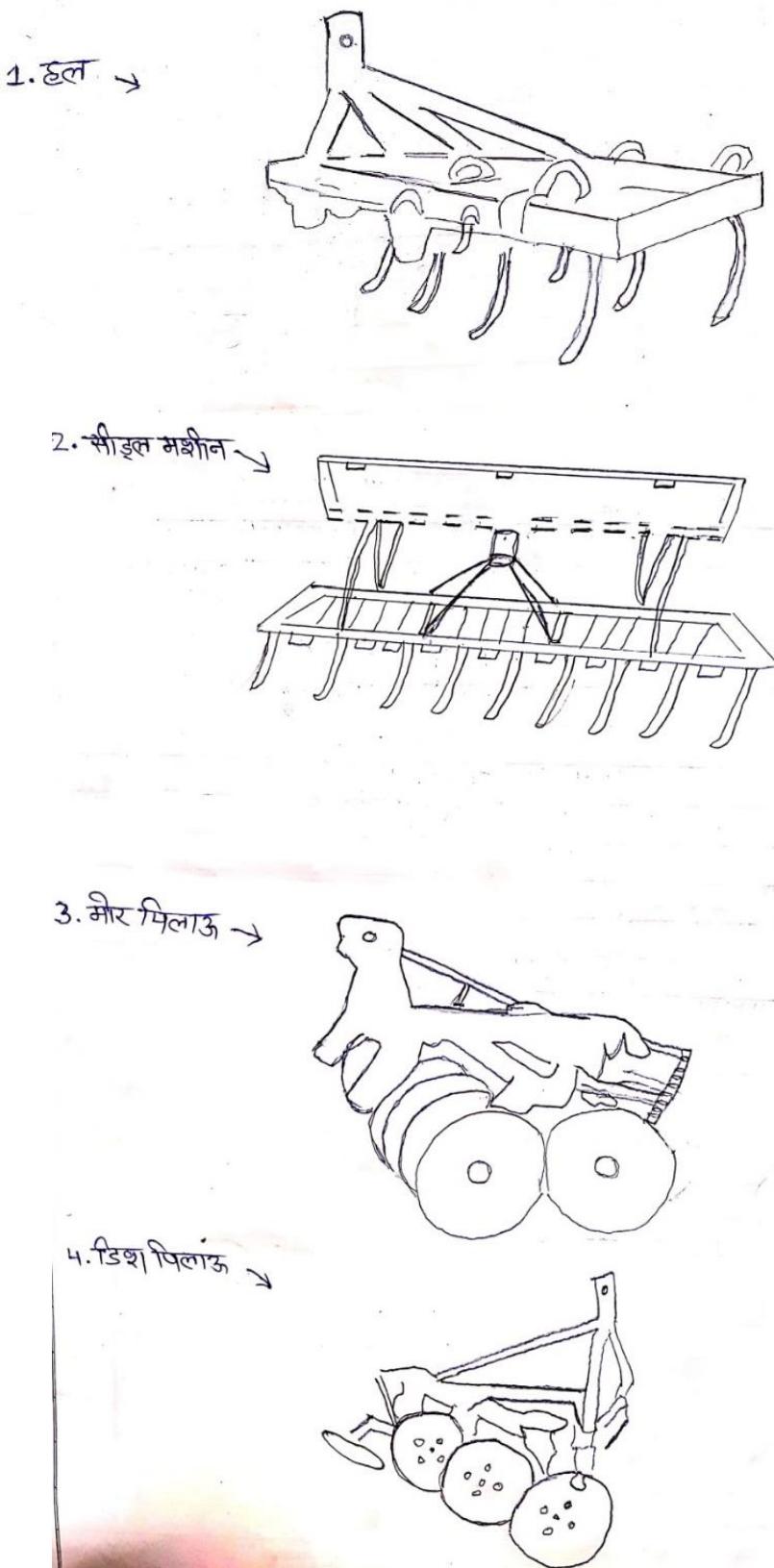
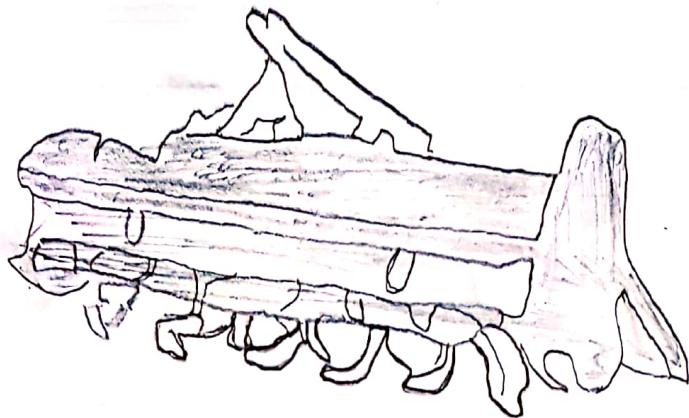


Figure 12 Sketches of Tools used for Manual Cropping – 1) Plougher; 2) Seeder; 3) Cultivator; 4) Disc Plougher © Chandraprakash Prajapati (tool names are likely to change regionally)

५. रोटेवेटर →



६. दवा स्प्रे मशीन →



७. ट्रिलर →

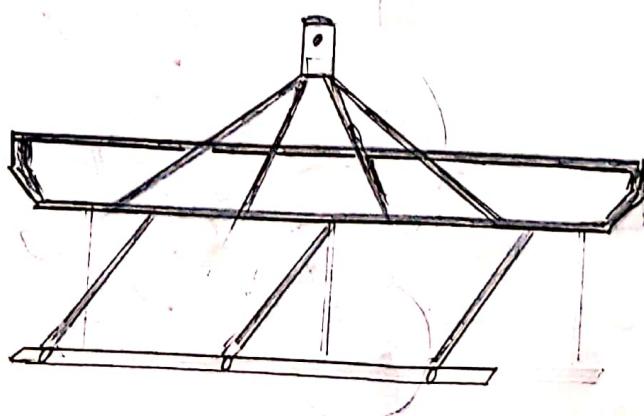
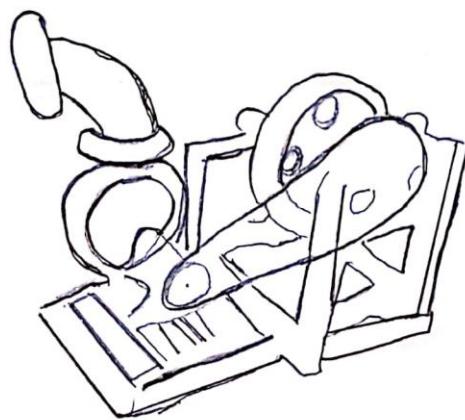


Figure 13 Sketches of Tools used for Manual Cropping – 5) Rotavator; 6) Chemical Spray Machine; 7) Triller © Chandraprakash Prajapat (tool names are likely to change regionally)

८. पानी लेकने का पम्प



९. रिपर
ज्वार काटने
का मशीन

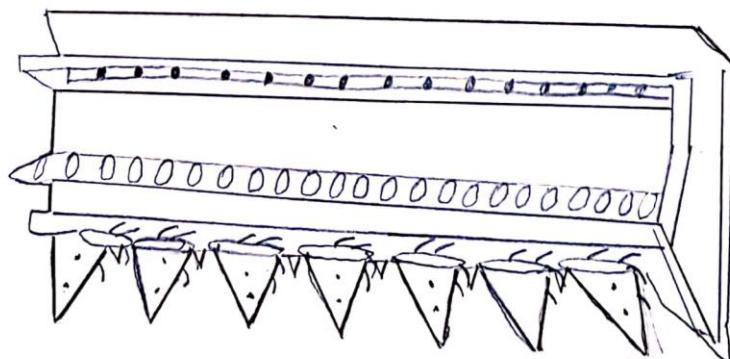


Figure 14 Sketches of Tools used for Manual Cropping - 8 Water Pump 9 Jawar Reaper © Chandraprakash Prajapat (tool names are likely to change regionally)



Image 46 Instead of heavy machines, traditional manual harvesting is extremely helpful for the successful breeding of Lesser Floricans in cropland areas © Chandraprakash Prajapat

ANNEXURE III) LIST OF EXISTING AND PROPOSED MINES IN THE STUDY AREA

DEAC DEIAA mines					
Sr. No.	Mine Lease No.	Village	Tehsil	Latitude	Longitude
1	6 99	Shokaliya	Sarwar	26°14'42"	74°50'20"
2	24 09	Derathu	Nasirabad	26°17'15"	74°46'00"
3	9 92	Bhudwasa	Nasirabad	26°10'55"	74°44'00"
4	10 09	Rambadi	Nasirabad	26°20'10"	74°53'28"
5	41 06	Chat	Nasirabad	26°14'40"	74°44'40"
6	25 95	Loharwada	Nasirabad	26°14'31"	74°46'30"
7	211 05	Ramsar	Nasirabad	26°14'10"	74°50'55"
8	48 05	Ramsar	Nasirabad	26°14'1"	74°50'35"
9	1 96	Ramsar	Nasirabad	26°14'3"	74°50'30"
10	41 09	Loharwada	Nasirabad	26°15'52"	74°47'27"
11	88 09	Sanod	Nasirabad	26°17'30"	74°48'04"
12	22 96 R	Shokaliya	Sarwar	26°12'15"	74°50'32"
13	86 11	Bhatiyani	Nasirabad	26°13'35"	74°44'40"
14	73 01	Sarana	Sarvar	26°16'15"	74°54'15"
15	139 08	Ramsar	Nasirabad	26°15'23"	74°52'10"
16	109 11	Mavasiya	Nasirabad	26°16'47"	74°55'45"
17	9 99	Derathu	Nasirabad	26°15'55"	74°45'8"
18	156 07	Ramsar	Nasirabad	26°18'40"	74°52'20"
19	9 01	Sarana	Sarwar	26°10'35"	74°53'20"
SEIAA mine list					
20	3 05	Sarana	Sarwar	26°8'30"	74°50'30"
21	24 99	Piproli	Sarwar	26°11'50"	74°50'00"
22	445 05	Sanod	Nasirabad	26°17'8"	74°48'27"
23	6 92	Sanod	Nasirabad	26°18'35"	74°48'50"
24	184 07	Chat	Nasirabad	26°14'20"	74°44'50"
25	5 96	Sanod	Nasirabad	26°17'40"	74°48'30"
26	1 96	Ramsar	Nasirabad	26°14'35"	74°50'30"
27	47 2000	Sanod	Nasirabad	26°17'27"	74°49'00"
28	352 08	Rampura	Nasirabad	26°13'45"	74°47'45"
29	347 08	Rampura	Nasirabad	26°13'45"	74°47'45"
DEIAA mines					
Sr. No.	Mine Lease No.	Village	Tehsil	Latitude	Longitude
30	75 02	Bhagwantpura	Sarwar	26°13'7"	74°55'47"

31	48 07	Bavdi	Sarwar	26°12'25"	74°56'15"
32	321 04	Kesarpura	Sarwar	26°9'42"	74°50'46"
33	549 05	Kesarpura	Sarwar	26°9'50"	74°51'4"
34	443 05	Lakshmipura	Nasirabad	26°15'05"	74°53'15"
35	85 11	Kesarpura	Nasirabad	26°14'45"	74°52'20"
Other mines					
36	31 97	Bavdi	Sarwar	26°12'15"	74°55'45"
37	16 93	Piproli	Sarwar	26°11'50"	74°50'20"
38	44 2000	Arwad	Sarwar	26°10'20"	74°55'10"
39	4 04	Kebaniya	Sarwar	26°11'00"	74°45'56"
40	316 05	Sanod	Nasirabad	26°16'42"	74°47'50"
41	2 91	Loharwada	Nasirabad	26°16'15"	74°47'50"
42	539 05	Ramsar	Nasirabad	26°15'00"	74°51'52"
43	52 08	Ramsar	Nasirabad	26°14'57"	74°51'42"
44	23 03	Bhatiyani	Nasirabad	26°12'45"	74°44'50"
45	245 06	Hanuliya	Nasirabad	26°11'55"	74°49'40"
46	309 08	Ramsar	Nasirabad	26°19'5"	74°53'30"
47	468 05	Derathu	Nasirabad	26°17'25"	74°46'55"
48	348 05	Rampura	Nasirabad	26°13'45"	74°47'45"
49	515 05	Bhudasa	Nasirabad	26°11'15"	74°43'12"
50	379 05	Bhudasa	Nasirabad	26°10'55"	74°43'20"
51	11 09	Rambadi	Nasirabad	26°20'00"	74°53'20"



Image 47 Opencast mining leads to the destruction and depletion of suitable florican habitat © Sujit Narwade



Image 48 Because of mining, the entire Shokaliya florican landscape has been degraded and fragmented © Sujit Narwade



Image 49 On the occasion of Word Environment Day, 5 June 2019, an information display board on the Lesser Florican was erected at Madhopura village, Tantoti tehsil © Sahdev Kumhar



Image 50 Office of DyCF put in special efforts to sensitize people about Lesser Florican conservation with the help of the election commission and office of the district collector © Sujit Narwade



Image 51 A brilliant idea by Ajmer DyCF, wherein a Lesser Florican urges people to cast their vote without fail © Sujit Narwade



Image 52 Ajmer Forest Division declared Lesser Florican as a mascot of Ajmer district, and the election commission adopted this mascot to create voter awareness © Sujit Narwade

ANNEXURE IV) SITE-WISE MAPS OF LESSER FLORICAN DISTRIBUTION AREAS

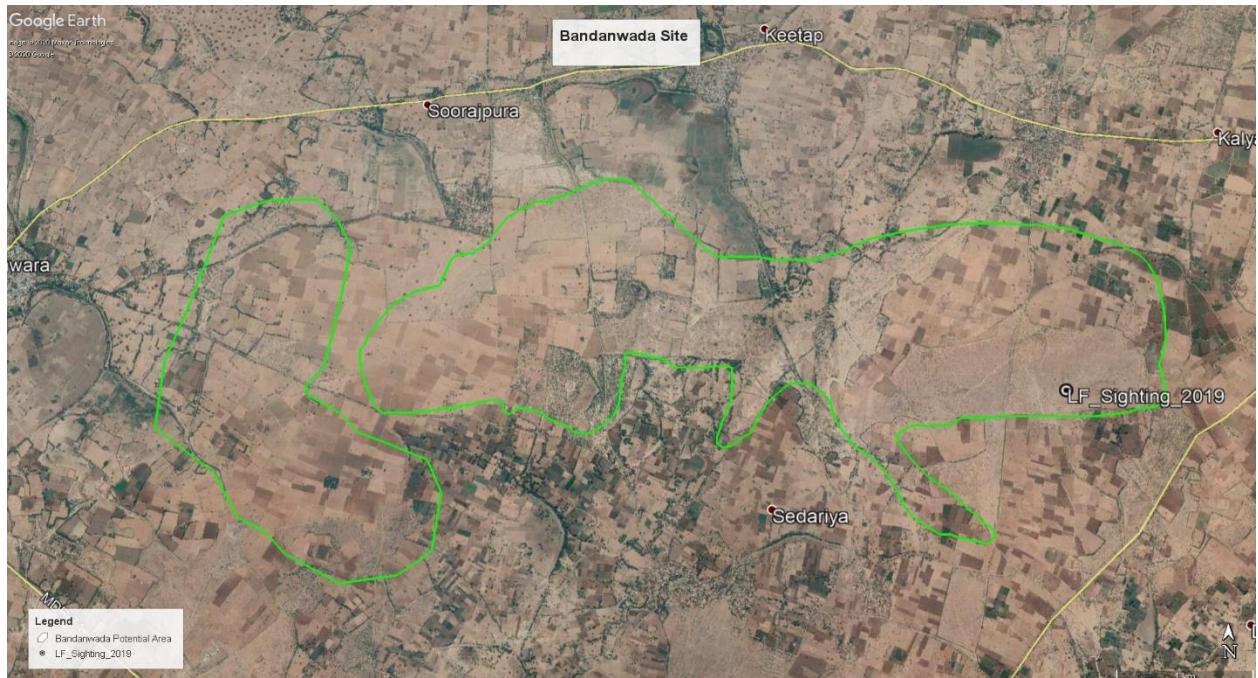


Figure 15 In 1542 ha, male Lesser Florican was sighted at Bandanwada area; Kankad is a potential area to be managed as florican site near Sedariya and Soorajpura (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

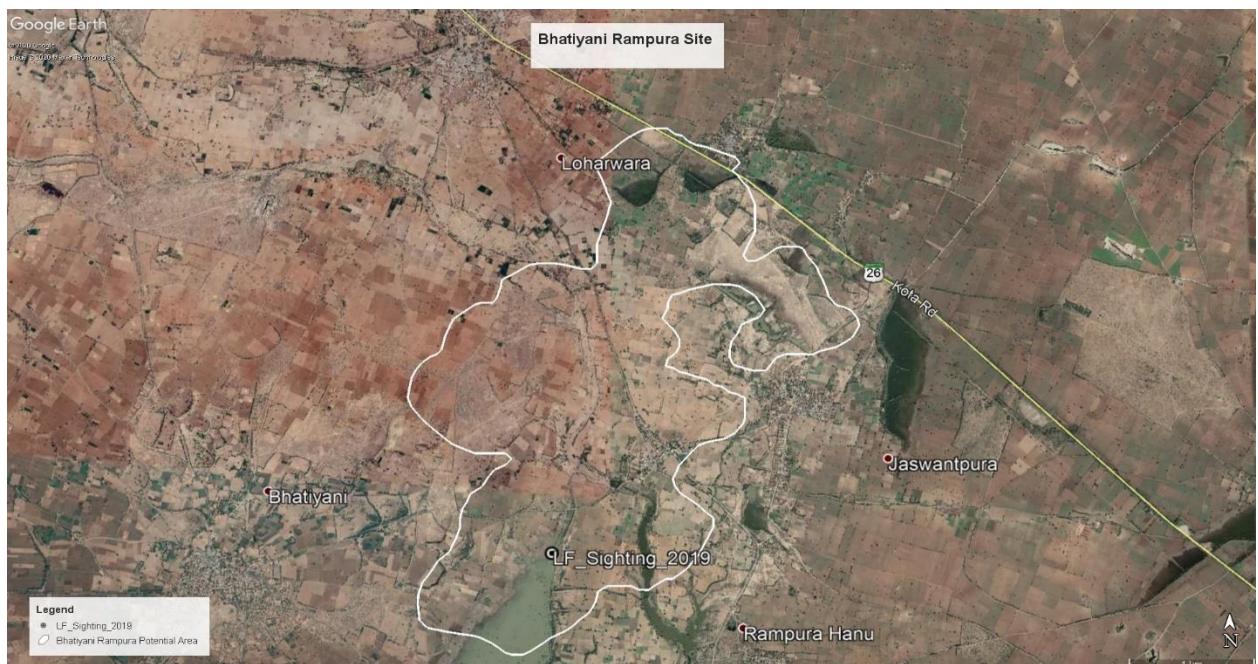


Figure 16 Bhatiyani Rampura: 781 ha.; male Lesser Florican was sighted at 3 adjoining sites – Hanuvantiya, Loharwara, Jaswantpura (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

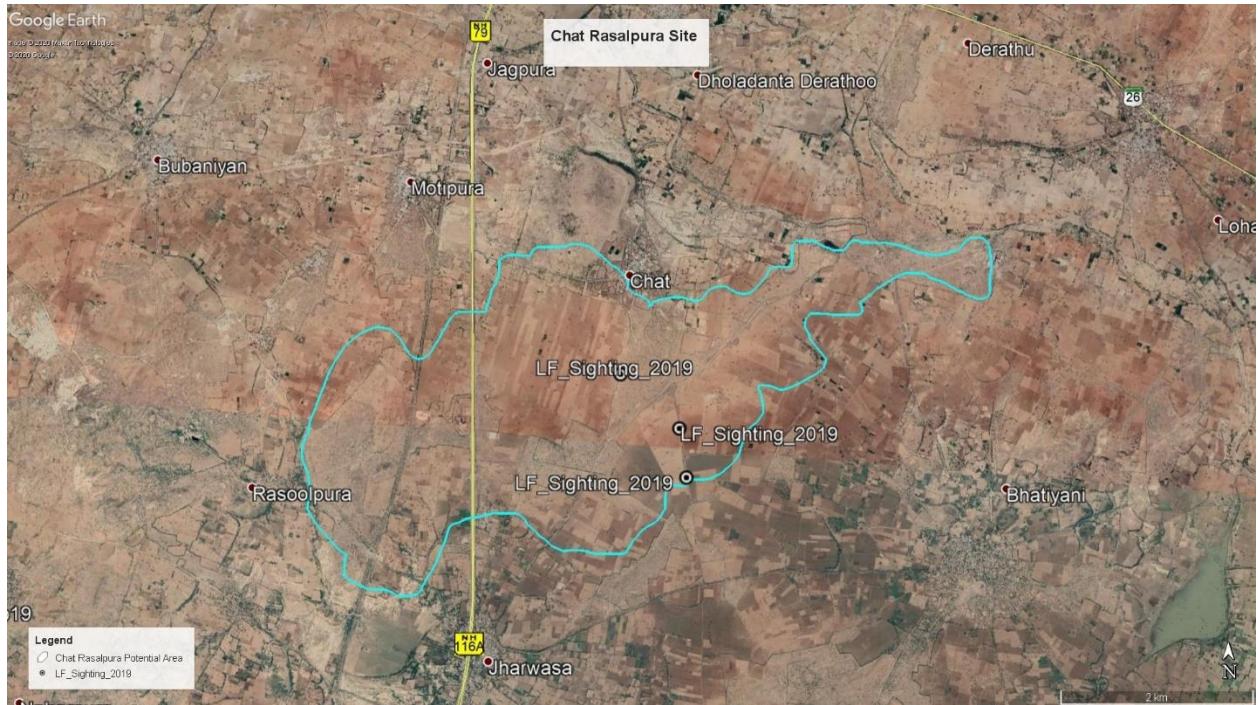


Figure 17 Chat-Rasalpura; 1312 ha; male Lesser Florican sighted at one site (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 18 Gopalpura Lamba: 1401 ha; male Lesser Florican sighted in 2017-2018 (adjoining villages – Mandawariya, Chota Lamba) (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

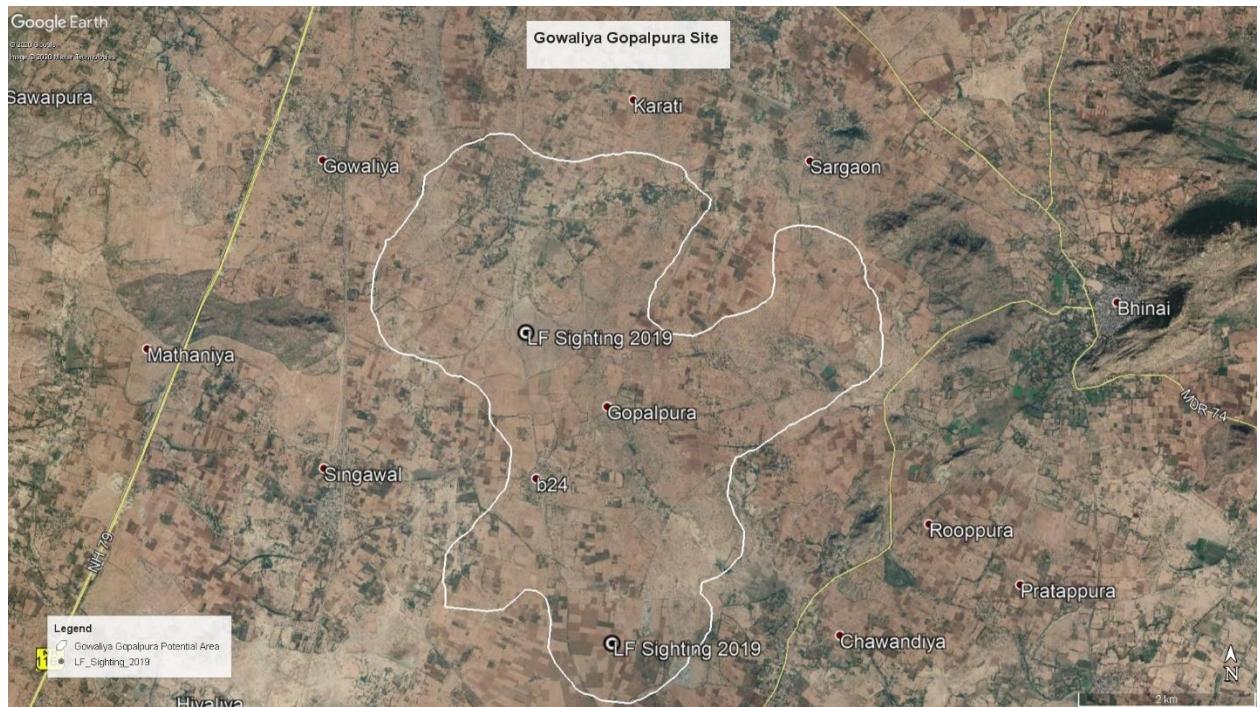


Figure 19 Gowaliya-Gopalpura: 2057 ha; male Lesser Florican sighted on 2 locations (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

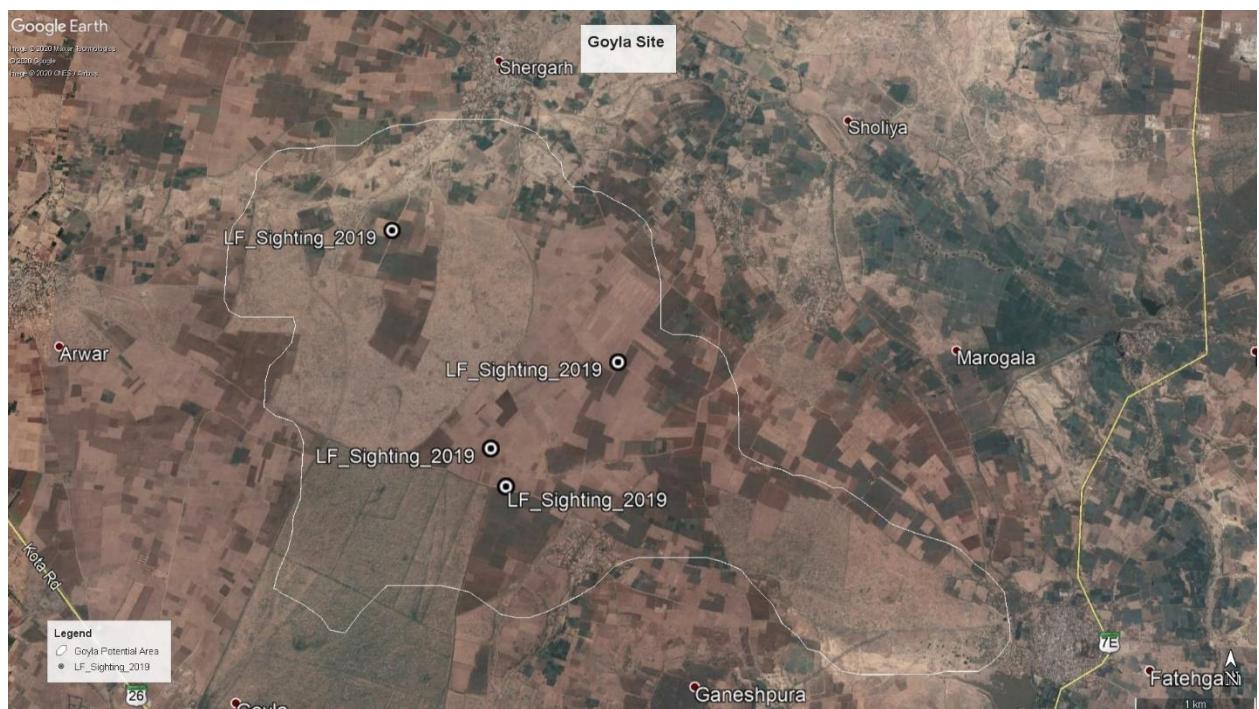


Figure 20 Goyala-Kheeriya: 3423 ha; male Lesser Florican sighted at 6 sites. Part of this has been proposed as florican conservation reserve (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 21 Gulabpura: 2567 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 22 Hingoniya Piproli: 1613 ha; male Lesser Florican sighted at 3 sites (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

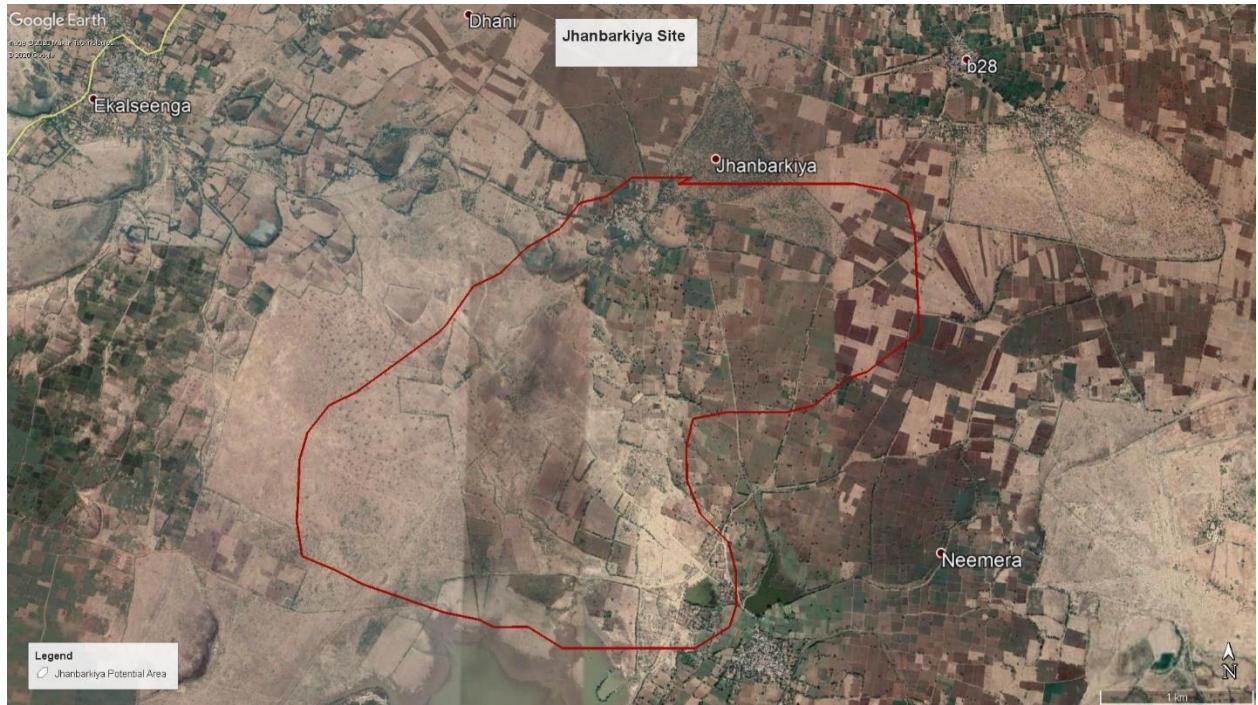


Figure 23 Jhanbarkiya: 1040 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

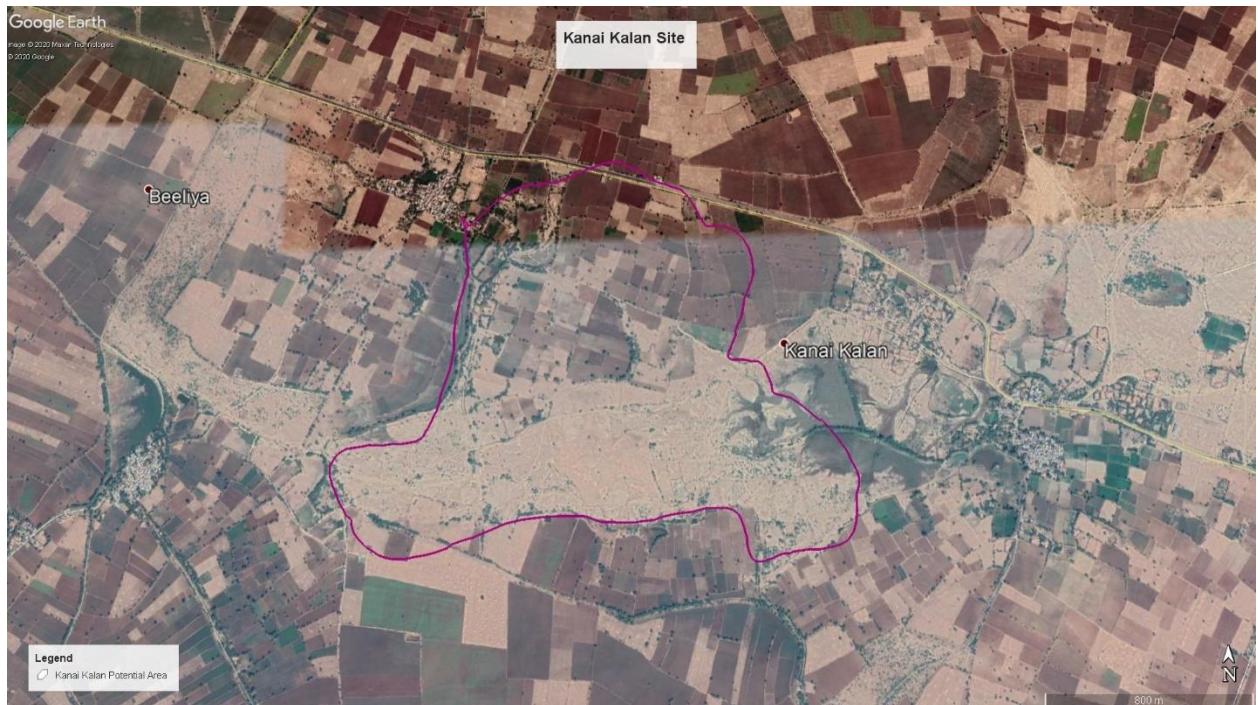


Figure 24 Kanai Kalan: 203 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

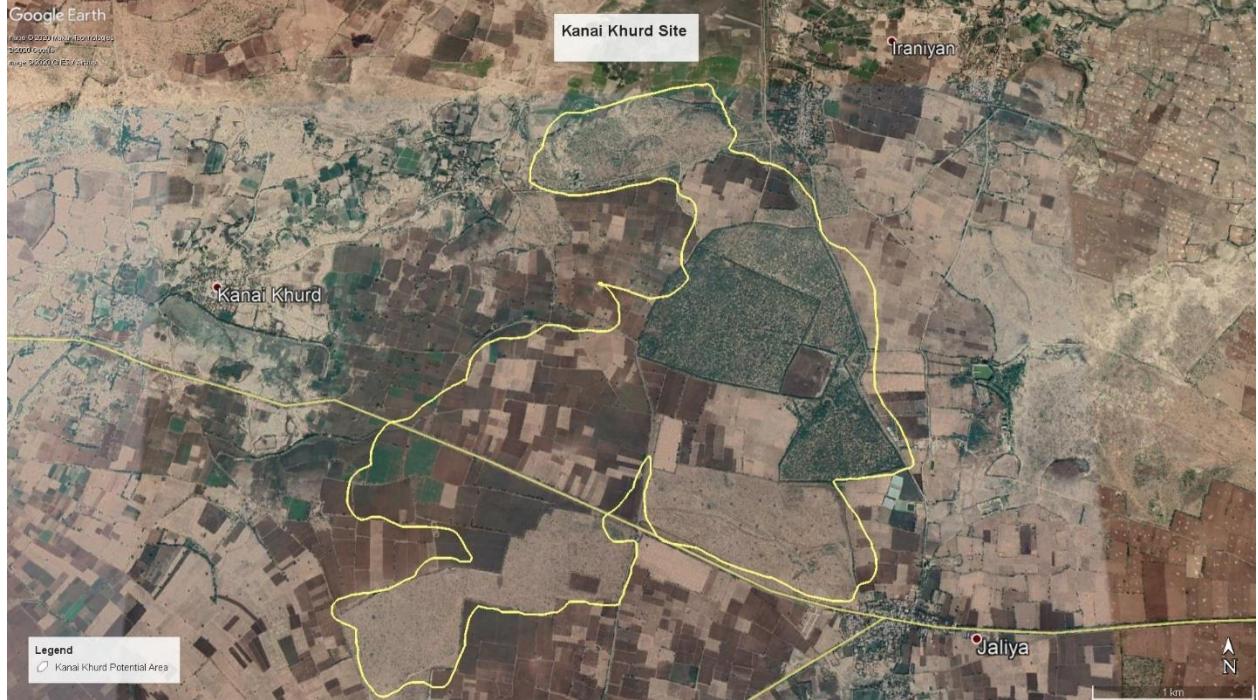


Figure 25 Kanai Khurd: 755 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

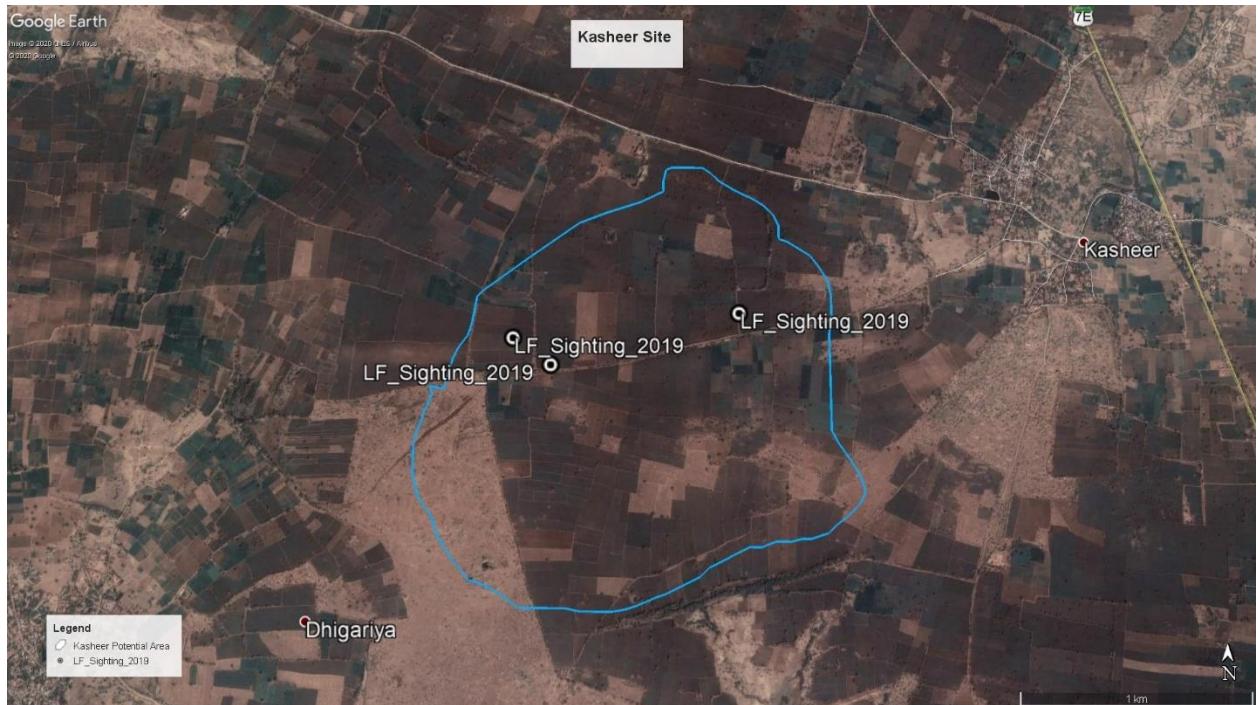


Figure 26 Kasheer: 283 ha; male Lesser Florican sighted at 2 sites (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 27 Kebaniya Kumhariya: 672 ha; male Lesser Florican sighted at 1 site (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

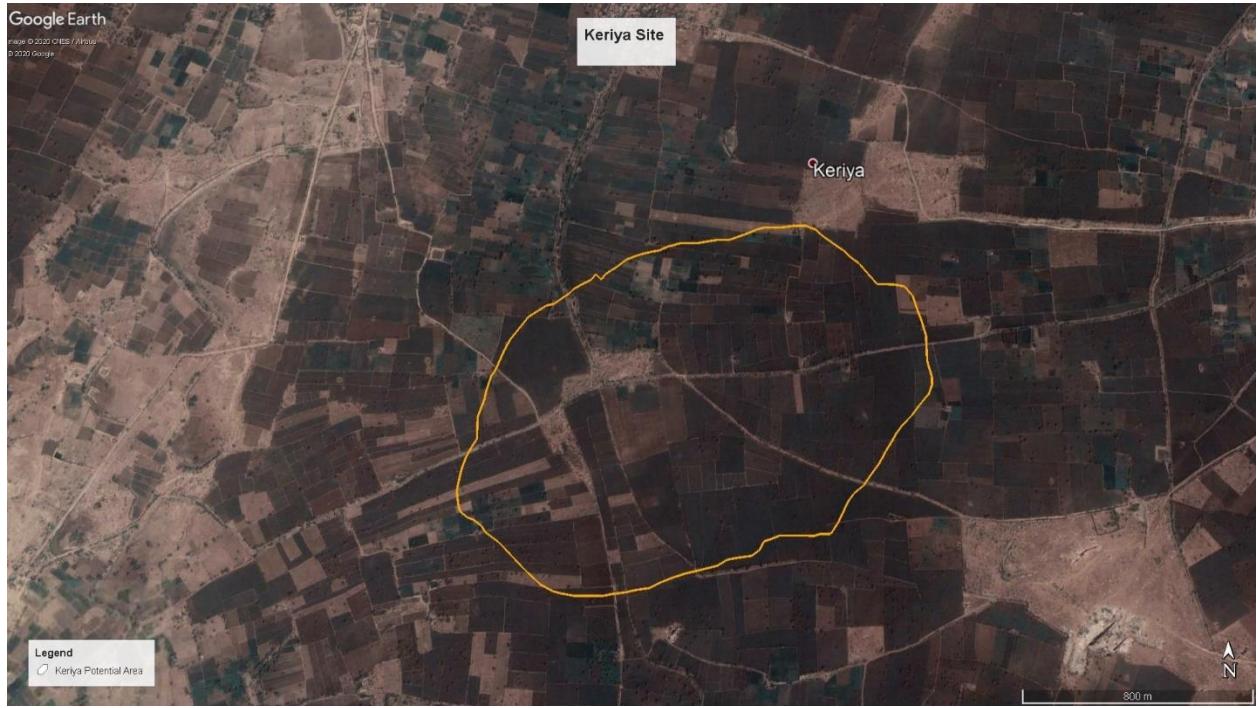


Figure 28 Keriya: 167 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 29 Lamba Khurd: 682 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 30 Motipura: 296 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

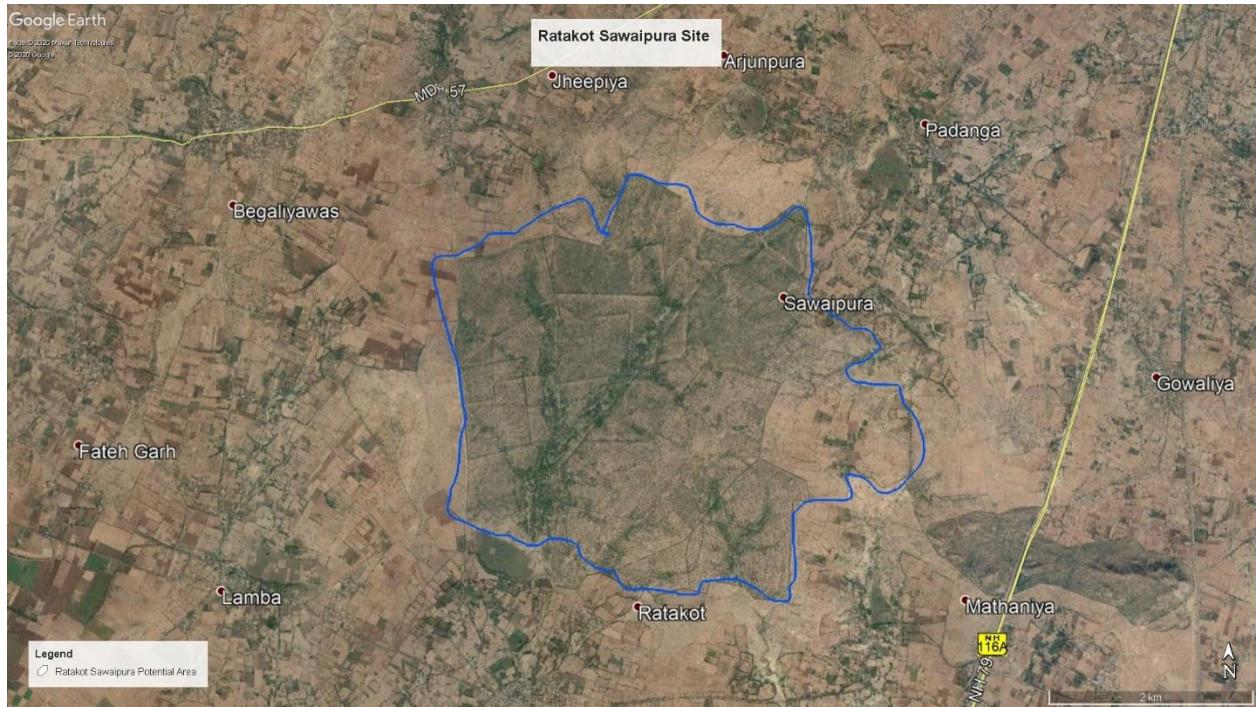


Figure 31 Ratakot Sawaipura: 1392 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

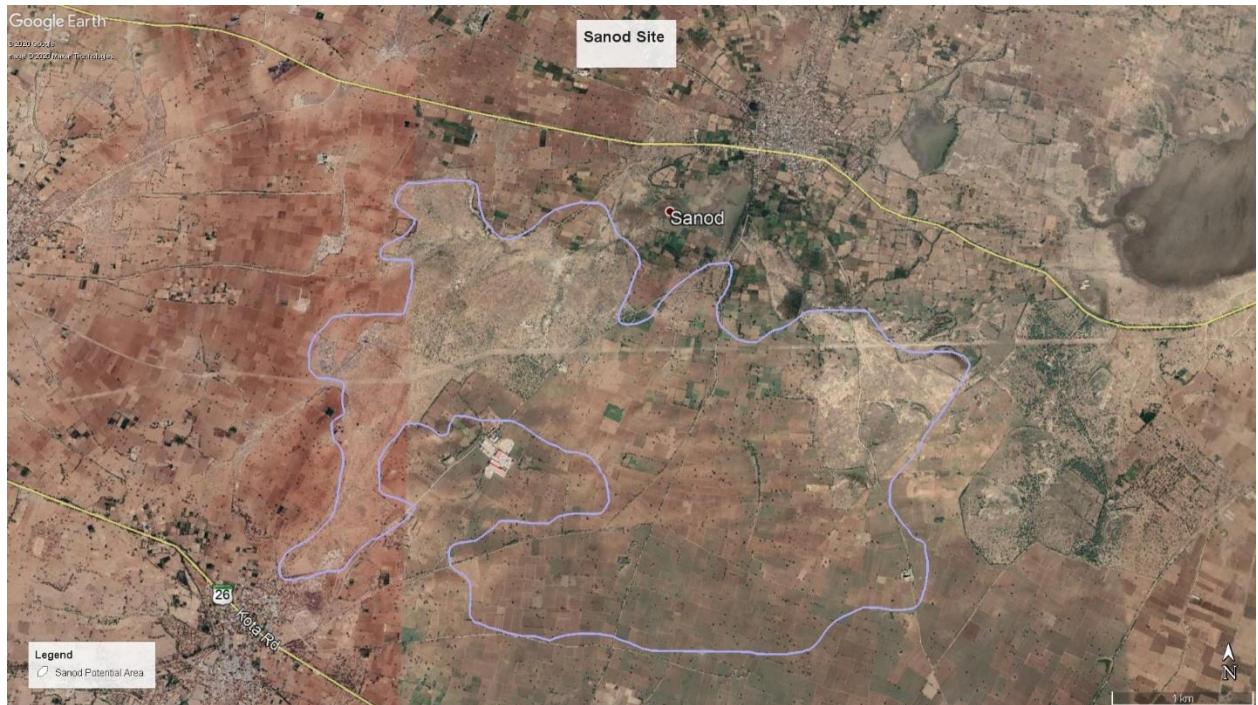


Figure 32 Sanod: 965 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 33 Sanodiya: 933 ha; male Lesser Florican sighted in 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 34 Sarana: 550 ha; male Lesser Florican sighted at 2 sites (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 35 Sedariya: 407 ha; male Lesser Florican sighted in year 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

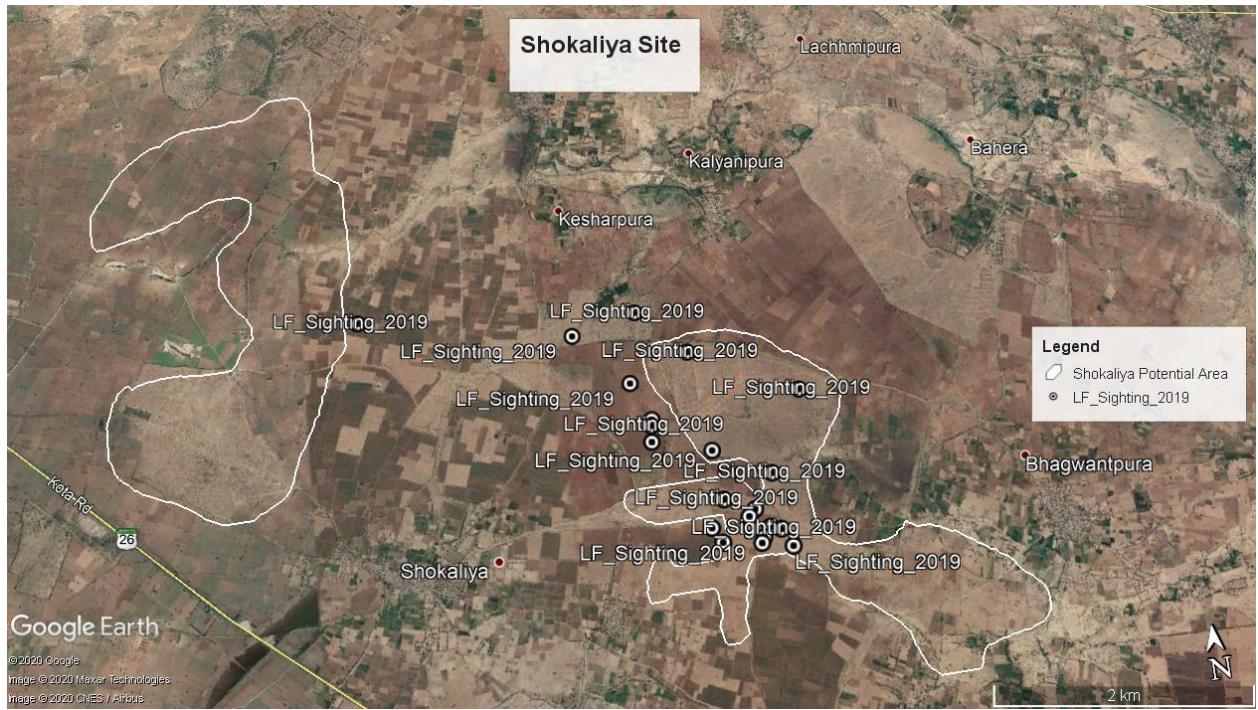


Figure 36 Shokaliya: 1705 ha; male Lesser Florican sighted at 3 sites (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 37 Sokli Piproli: 207 ha; male Lesser Florican sighted in year 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 38 Dhantol, Kalyanipura, & Tantoti: 1431 ha; male Lesser Florican sighted at 2 sites (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

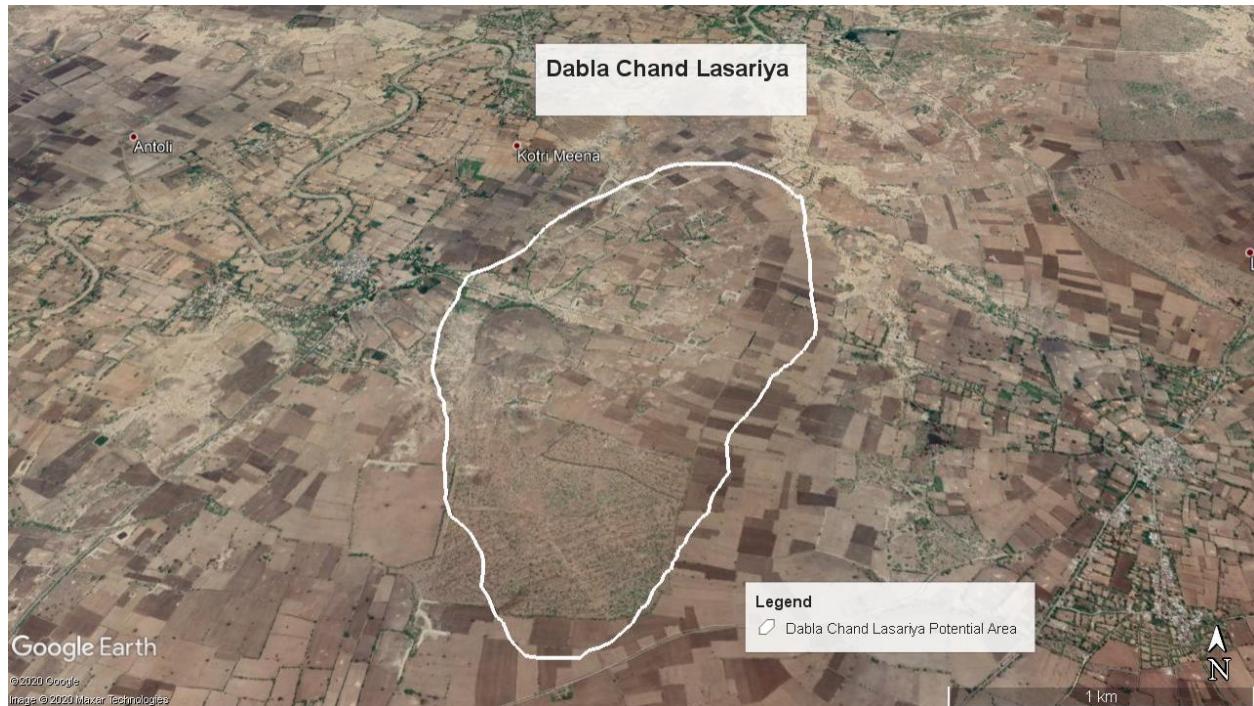


Figure 39 Dabla Chand Lasariya site: 318 ha; male Lesser Florican sighted in year 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)



Figure 39 Sangriya Dhanop site: 186 ha; male Lesser Florican sighted in year 2017-2018 (Map prepared using LF sighting locations and polygons of potential areas drawn in Google Earth by Pratik Pansare)

ANNEXURE V) FEW GRASSES/SHRUBS OF STUDY AREA

ANNEXURE V-A) GRASSES (FAMILY POACEAE)

1. *Cenchrus ciliaris* Linn. African foxtail

Local Name: Anjan, Dhaman

This is a tufted, perennial grass with a height of 0.30-1.2 m. The blade of the leaf is linear, the inflorescence is dense and cylindrical, the seed remains viable for 2 to 3 years. It prefers arid and semi-arid climatic regions of the country. The grass is preferred by all classes of livestock because of its contents of very suitable ratios of calcium and phosphorus. It is mostly used as fodder for stall feeding as it provides very good hay and maintains the nutritive value even on ripening (Trivedi 2002).

2. *Cenchrus setigerus* Vahl. Bird wood grass

Local Name: Dhaman

It is a perennial grass with bulbous base leading to form clumps; it attains height of 0.2 to 9 meters. The leaf blade is 2 to 20 cm long and 1.8 to 6.9 mm wide, the inflorescence is compact; it has spike 2 to 20cm long and 0.4 to 1.0 cm wide. It occurs naturally in the Indian subcontinent, especially in regions of Sindh, Punjab, Rajasthan and Gujarat. It prefers arid to semi-arid conditions. It grows well in sandy loam soils. It is a highly palatable grass for the cattle and is used as hay.

3. *Cynodon dactylon* n (L.) Pers Doob/Bermuda, Lawn

Local Name – Dhobdi

It is a profusely branched leafy species, perennial in nature. Stolon when cut is capable of germinating into a plant by themselves; leaves are short and soft spikes are arranged on the tip of erected peduncles. It grows in varying altitudes from sea level to an elevation of 2000 m and is the most nutritive of all the grasses. This grass is exclusively used for checking soil erosion (Trivedi 2002).

4. *Dichanthium annulatum* (Forsk) Stapf – Marvel grass, Apang

Local Name – Jargaa

It is a tufted, erected fine stemmed perineal grass that attains a height of 1.2 m. The columns are purplish; or blue in colour with distinct ring of white hair at each node; leaves are bluish-green. It grows in a wide range of soil from medium black to red alluvial. It can tolerate fair amount of drought as well as salinity, but does not prefer acidic soil. It is used for grazing and soil conservation (Trivedi 2002).

5. *Heteropogon contortus*- Spear grass

Local Name – Lampa

Densely tufted, perennial and highly palatable grass, it grows to a height of 1 m; it is leafy at the base; leaves are firm and linear growing up to 60 cm long, especially on poor and rocky soils. The grass is very good fodder but due to the presence of sharp awns or spears at maturity, it is grazed accordingly. It can be cut at pre-flowering stage to be used as hay. This is also used for soil conservation programme and light burning of the grass beneficial to the species (Trivedi 2002).

6. *Sehima nervosum* Sain Grass/ Rat's tail grass

It is a perennial grass, forming tufts with numerous tillers and attaining a height of 1 meter and above in height; pale yellow and bright on ripening. Commonly found in red gravelly to medium sandy loamy soils, this grass is also seen in rocky crevices of undulating topography and hill slopes. It is a forage grass and may be utilized as cattle fodder (Trivedi 2002).

ANNEXURE V-B) SHRUBS

1. *Echinops echinatus* Camel's Thistle

Local Name – Oont Katela, Brahmadandi

A xerophytic herbaceous plant of 1 m in height, it is widely distributed in the arid regions of India. Usually present on and along roadsides, grasslands, and open forest areas. Flowerheads occur in solitary white spherical balls (globose), 3-5 cm across, clustered at the ends of branches, and flowering occurs between December and January. The people of southern Rajasthan are known to use the root part of the plant; they make a paste and smear it on the soles and palms to treat heatstroke (Maurya *et al.* 2015).

2. *Hygrophila auriculata* Kokilaksha/Gokulakanta

Local Name – Neeli Kanteli

It is distributed in tropical and subtropical regions in India; 40-100 cm tall with unbranched, sub-quadrangular stems with numerous fasciculate, swollen node. Leaves sub-sessile, lanceolate, acute, hairy; flowers in axillary clusters of eight at each node in 4 pairs. The leaf, root and seed of this plant are traditionally used for the treatment of inflammation, jaundice, hepatic obstruction, urinary infection, oedema, gout, diabetes, bacterial infection etc. (Chopra *et al.* 1986, Nadkarni 1978).

3 *Solanum xanthocarpum* Yellow-fruit nightshade

Local Name – Kateli/Purple flower

A prickly herb, it is an important plant species in Ayurveda medicine. Very commonly found throughout Indian plains. Root paste is utilized by the Mukundra tribal of Rajasthan for the treatment of hernia (Paul and Dutta 2011).

4 *Argemone mexicana*- Prickly poppy

Local Name – Kantala, Satya nashi

This plant is commonly used as a medicinal preparation. It grows to a height of 0.3 to 1.2 m. Leaves are exstipulate, sessile, alternate, deeply lobed, caudate with unicostate reticulate venation with thorny margins. Fruit is thorny porcidal capsule having blackish brown seeds (Kushtwar and Tripathy 2017). Flowers are large, complete, hypogynous, pedicillate, actinomorphic, hermaphrodite and ebracteate (Charles and Rao 2012). Its latex is used to treat rheumatism and syphilis, while the powder of the seeds is used to treat asthma, headache and stomach complaints (Godara *et al.* 2015).

5 *Leptadenia pyrotechnica* Khimp

Local Name- Kheep or Khip

It is leafless, erect and evergreen shrub (Qureshi *et al.* 2012), which has multipurpose uses (Sadeq *et al.* 2014). It also grows in northern dry sandy soil and in western India (Burkhill 1985). It is a perennial plant, ascendingly growing, profusely branched shrub that is 0.5 to 3 metres in height; the stem is glabrous, green to pale yellow in colour and has watery fluid/sap. It is leafless or contains deciduous small leaves, which usually fall in the early stage of development. Its seeds are hairy in the form of tufts. Its roots are good soil binders that fixes the sand dunes due to elongated and extensive root system (Qureshi *et al.* 2012). The plant sap is rubbed on the skin to treat smallpox and dermatitis (Ram 2016).

6 *Calotropis gigantea* Aak/Giant Milk Weeds or Swallow

Local Name – Aakda

A tall shrub reaching 2.4-3 m height; bark yellowish white, furrowed; branches stout, terete, with fine appressed cottony pubescence. Leaves are sessile, elliptic-oblong or obovate-oblong, acute, thick, glaucous-green (Verma and Rajbala 2018). It is drought resistant, salt tolerant to a relatively high degree, spread throughout the country and prefers sandy soils (Gupta *et al.* 2012). Seed dispersal is through animals and wind; it quickly becomes established as a weed along degraded roadsides, lagoon edges and in overgrazed native pastures. *Calotropis gigantea* has economic and medicinal importance; it is used to treat cough and skin diseases (Meena 2015).

7 *Commelina diffusa* Dayflowers

Local Name – Bokna

It a perennial, monocotyledonous weed which spreads diffusely, creeping along the ground, branching heavily and rooting at the nodes, obtaining stem lengths up to 1 m. *Commelina diffusa* shows vegetative reproduction and cut stems root readily in moist ground. This weed prefers moist, fertile soil (e.g., gardens, cultivated fields), throughout the year, but especially in the rainy season (Marco and Forzza 2017).

8 *Tridax procumbens* Coat buttons/Tridax daisy

Local Name- Ghamra

It is a species of flowering plant in the daisy family. A small perennial herb having short, hairy blade-like leaves, it is known as a weed and pest plant. Corolla is yellow in colour (Kale *et al.* 2014). It is a common weed growing in open places, coarse textured soils of tropical regions, sunny dry localities, fields, waste areas, meadows and dunes. It is a semi prostate, annual, creeper herb. Stem ascends up to 30-50 cm height, remains branched, sparsely hairy, rooting at nodes. Flowers are tubular, yellow with hair, inflorescence capitulum. Its leaf extracts are known to treat diarrhea, dysentery, infectious skin diseases; and cosidred antiseptic, insecticidal and ant parasitic properties (Meena 2015).



Figure 38 Left - *Echinops echinatus* © Sujit Narwade



Right - Prickly poppy© Sujit Narwade



Image 53 Left - Coat button flower *Tirdex procumbance* © SN



Right - Flowers of *Calotropis gigantea* © Sujit Narwade

ANNEXURE VI) COMMON PLANTS OF THE STUDY AREA

1. *Vachellia nilotica or Acacia nilotica, Gum Arabic tree* Local Name –Desi Babool
 It is a nitrogen-fixing, leguminous, moderate sized, evergreen tree with slender, terete, pubescent branches when young; grey or brown leaves, 2 pinnate, 5-10 cm long, short trunk, bark fissured, and having round spreading crown with feathery foliage, found in the drier parts of India (Verma 2016). May to October flowering and from December to April fruiting occurs (Sharma 2016). Leaves, pods are used as fodder mainly for goats and sheep.

2. *Prosopis juliflora*, Local name - Vilayati babul

An invasive evergreen tree, native to South America, Central America and the Caribbean (Tewari et al 2013). It was introduced to India in 1857 from Mexico (Gupta & Balara 1972). A xerophytic evergreen tree, it thrives on all soil types under variable climatic conditions (Anonymous 1969). The tree is typical of those growing in arid and semi-arid region (Sawal 2004). It has taken over almost all the grasslands of the study area leading to shrinking of the florican habitat. Traditionally, locals in Ajmer were found removing *P. juliflora* from Panchayat lands or grazing lands, mainly for firewood and making charcoal. However, it is also true that the tree has enjoyed overprotection, and has become thick forests in reserve forest areas. It serves as good fuel wood and fencing material in the rural areas.

3. *Capparis decidua*, Local Name - Kair

Kair is one of the important native shrubs of hot arid ecosystem with the ability to survive in various unattended and unprotected habitats (Singh et al. 2005). A bushy shrub in dense tufts, 4-5 m high, or occasionally a small tree with many green vine-like apparently leafless branches, hanging in bundles. Leaves are very minute (2 mm long), with a very short life span on young shoots, so that the plant looks leafless most of the time. Flowers pink, red-veined, in small groups along the leafless shoots, in the axils of the spines. Fruit small many-seeded ovoid or sub-globulous, slightly mucronate pink berry of the size and shape of a cherry, becoming blackish when dry (Orwa et al. 2009). Mainly used in making vegetable curry, pickle, in landscape gardening, or for afforestation purposes. It controls soil erosion and acts as a drought-resistant plant.

4. *Balanites aegyptiaca* - Hingota, Local Name - Hingoni

It is known as 'Desert date' in English, one of the most common but neglected wild plant species of the dry land areas (Gupta et al. 2017). It is a slow growing, small, not very spreading, multi-branched, evergreen, spiny and medium-sized tree reaching up to 10 m tall (Orwa et al. 2009). The fresh and dried leaves, fruit and sprouts are all eaten by livestock; the wood is pale yellow or yellowish-brown. The bark is used to deworm cattle in Rajasthan. A greenish-yellow to orange-red resin is produced from the stems (Orwa et al. 2009).

5. *Vachellia leucophloea* or *Acacia leucophloea* – Ronjh, Local Name - Khejda
A large thorny tree, trunk stout, dividing into several large diameter branches, flowers conspicuous, light-yellow to cream in colour, pods yellow, green or brown in colour. Flowers are borne in abundance during the rainy season. Flowering occurs during July-November in India. Pods ripen from April-June. It is a component of dry forests, savannas, bush woodlands, and desert ecosystems from the sea level to elevations of 800 m (Orwa *et al.* 2009).

6. *Prosopis cineraria* Jammi, Shami, Local Name - Khejri

It is a small, moderate-sized evergreen thorny tree, with slender branches armed with conical thorns and with light bluish-green foliage. It is known as Kalpavriksha of Rajasthan because of its multipurpose uses – fodder, timber, fuelwood and as a vegetable; besides, it is worshipped by a large number of people of various communities (Arif *et al.* 2017). It is the only leguminous tree which grows well against all the climatic odds of the desert and supplies green fodder even during the driest period of May-June when other fodders become scarce, leafless and dormant (Arif *et al.* 2017).

7. *Azadirachta indica* Neem, Local Name -Neemdo

One of the most versatile plants that has gained worldwide importance due to medicinal and insecticide properties (Adithya *et al.* 2017). Juvenile leaves are eaten directly in the month of March, which are effective for blood purification. The leaves are boiled in water and used for bathing to cure skin diseases; the bark is boiled in water and this water is used for bathing to cure prickly heat. The residue that is left after extracting oil from the seeds is used as an organic manure and to improve the fertility of the soil. It is also believed that this residue is a good nitrogen fertilizer and inhibits soil pests like nematodes, fungi and insecticides.

8. *Ziziphus nummularia* Ber, Chinese apple, Indian plum, Local Name –Bor

It is a tropical fruiting tree species and is called the king of arid zone fruits (Meena *et al.* 2014). The leaves and twigs of most species can be used as nutritious fodder for livestock. The fruit is eaten raw, pickled or used in beverages. It is known as one of the most favorite fruit of GIB (Rahmani 1989).

8. *Anogeissus pendula* Dhokada (Kardhai), Local Name – Dhoke

Slow growing, small to medium sized deciduous tree (Menna *et al.* 2018). It forms the dry tropical forest and dry mixed deciduous forests of Rajasthan (Champion and Seth 1968) and is seen planted in large numbers on hill slopes in Ajmer.



Image 54 *Acacia nilotica* tree © Vikram Hinonia



Image 55 *Prosopis juliflora* © Vikram Hinonia



Image 56 *Capparis decidua* © Vikram Hinonia



Image 57 *Balanites aegyptiaca* © Vikram Hinonia



Image 58 *Prosopis cineraria*© Vikram Hinonia



Image 59 *Ziziphus mauritiana* © Vikram Hinonia

ANNEXURE VII) WORKSHOPS/MEETINGS/EVENTS



Image 60 Mr Arindam Tomar, CWLW, Rajasthan (first one from left) visited Shokaliya and guided the BNHS team regarding garnering community support © Sahdev Kumhar



Image 61 Dignitaries at the farmers' meet. From left to right - Mrs. Sudeep Kaur Sharma, DyCF, Ajmer; Mr. Arijeet Banerjee, PCCF, Forest Protection, Mrs. Shruti Sharma, PCCF (Tendu Patta), Mr. R.K. Jain, CCF, Ajmer; Mr. C.K. Meena, CF, Ajmer, Dr. Sujit Narwade, BNHS and Mr. Shakti Pratap Singh, a local leader © Ajmer Forest Division



Image 62 Students sing a welcome song dedicated to the Lesser Florican © Ajmer Forest Division



Image 63 Students of a Shokaliya school perform a folk dance on Lesser Florican © Ajmer Forest Division



Image 64 Students of a Shokaliya school perform a folk dance on Lesser Florican © Ajmer Forest Division



Image 65 Locals perform a special dance with Lesser Florican as the focus © Ajmer Forest Division



Image 66 A street play or Nukkad Natak on Lesser Florican conversation in progress. The play was a great hit among the audience © Ajmer Forest Division



Image 67 A villager sifts through the Hindi booklet on Lesser Florican and its conservation © Ajmer Forest Division



Image 68 Visitors at the Farmers' Meet. More than 400 villagers from Lesser Florican distribution sites



Image 69 Group photo of staff of Forest Department and BNHS © Ajmer Forest Division © Ajmer Forest Division



Image 70 Mr. Nathulal Kumhar, a farmer from village Madhopura and a strong supporter of florican conservation work, being felicitated during the event © Ajmer Forest Division



Image 71 Survey participants during a sensitization cum training workshop © Parul Sen at Ajmer



Image 72 A media report on a workshop on forest protection and joint forest management action where Lesser Florican issue was highlighted



Image 73 Staff of Ajmer Forest Division being sensitized about Lesser Florican conservation © Divakar Yadav



Image 74 An awareness programme in progress at Ramsar. BNHS project staff utilized opportunities like *balsabhas* organized by schools © Neelkanth Bora



Image 75 An orientation programme about the Lesser Florican survey conducted prior to the field work in year 2017 © Divakar Yadav



Image 76 Project staff during the inauguration of the Lesser Florican statue, declared as a mascot by the election commission based on Ajmer Forest Division initiative © BNHS photo archive



Image 77 BNHS staff received help and support from Shri Shatrujit Singh ji (seen in the middle), an eminent birdwatcher and resident of Shahpura



Image 78 Clay sculptures of male and female Lesser Floricans and their eggs by Nathulal Kumhar, a resident of Madhopura village © Chandraprakash Prajapat



Image 79 Participants at a bird fair organized by Ajmer Forest Division in February 2020 © Chandraprakash Prajapat



Image 80 School children at a birdwatching session during the bird fair organized by Ajmer Forest Division © Chandraprakash Prajapat



Image 81 A talk on florican delivered by the BNHS team at a local school during the initial phase of the project © Chandraprakash Prajapat



Image 82 Students attend a quiz session on Lesser Florican © Chandraprakash Prajapat



Image 83 Winners of the quiz competition were felicitated in the school © Chandraprakash Prajapat



Image 84 Dr Sujit Narwade of BNHS assisting the students with the street play on Lesser Florican © Chandraprakash Prajapat

ANNEXURE VIII) ABOUT PROJECT TEAM

1. **Sujit Narwade, PhD, Project Scientist, BNHS:** Sujit has a bachelor's degree from Solapur, Maharashtra. His PhD was on the "Birds of Deccan Plateau, Maharashtra, with special reference to conservation of Great Indian Bustard", awarded by the University of Mumbai through BNHS (October 2017). He has been working with BNHS since 2004 on several projects such as GIB (Maharashtra; 2011-17; Rajasthan since year 2018), Lesser Florican (MP, Maharashtra 2016-2018; and Rajasthan - since year 2018) and Bengal Florican (UP; 2016-17) in various capacities. He has the experience of working with funding agencies like Forest Department, BirdLife International as well as PSUs like National Thermal Power Corporation (NTPC) and City and Industrial Development Corporation (CIDCO-Government of Maharashtra undertaking). He has served as the In-charge of Environmental Information System (ENVIS) Centre on Avian Ecology (funded by MoEF&CC; 2008-2011).
2. **Dr Neelkanth Bora, Programme officer, BNHS:** Neelkanth is a dentist, registered under the Rajasthan State Dental Council. He did his BDS from Rajasthan University of Health Sciences. He has a keen interest in environment and is involved in birdwatching activities undertaken by Youth Aranya, Jodhpur. He has attended the Leadership in Biodiversity Course held by BNHS in 2018-19. He participated in the Lesser Florican survey conducted by BNHS in July-September 2019.
3. **Pratik Pansare, Project Fellow, BNHS:** He is an entomologist and has previously worked in All-India Coordinated Tiger monitoring Project of WII.

4. Chandra Prakash Prajapati, Field Assistant, BNHS: Chandra Prakash is a resident of a local village Madhopura, in Shokaliya Gram Panchayat. He is the son of Nathulal Kumhar, one of the progressive farmers from Shokaliya. He is an enthusiastic bird watcher and has been observing the Lesser Florican, including nests in his farmland, since the last many years.
5. Vikram Kumar Hinonia: Vikram is pursuing his MSc in wildlife sciences from the University of Kota. He is in his final year and has participated in various surveys like Lesser Florican Survey conducted by WII. He did his under graduation in forestry from the Agriculture University Kota.



Image 85 Project team from right to left Dr Sujit Narwade, Chandraprakash Prajapati, Vikram Hinonia, Dr Neelkanth Bora © BNHS photo archive

ANNEXURE IX) LIST OF BIRDS SEEN IN STUDY AREA

Nomenclature followed by BirdLife International (<http://datazone.birdlife.org/home>) and Hindi names (http://www.bnhsenvis.nic.in/Database/VernacularNames_832.aspx)

Abbreviations provided at the bottom of this annexure IX.

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
1.	Alpine Swift	<i>Tachymarptis melba</i>	बड़ी अदाबिल	OGA	W	BK
2.	Ashy Prinia	<i>Prinia socialis</i>	सिलेटी दुमफुदकी	OGA	All	All over
3.	Ashy-crowned Sparrow-Lark	<i>Eremopterix griseus</i>	स्लोटिसिर दवकचिरी	OGA	All	All over
4.	Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	झक्की	PL	W	All over
5.	Asian Desert Warbler	<i>Sylvia nana</i>	मरू फुदकी	OGA	W	All over
6.	Asian Green Bee-eater	<i>Merops orientalis</i>	हरा पतरंग	OGA	W	All over
7.	Asian Openbill	<i>Anastomus oscitans</i>	घोगिल	W	All	BB (herony)
8.	Asian Palm-swift	<i>Cypsiurus balasiensis</i>	ताड़ी अदाबिल	OGA	All	All over
9.	Asian Pied Starling	<i>Gracupica contra</i>	अबलक मैना	OGA	All	All over
10.	Asian Woollyneck	<i>Ciconia episcopus</i>	हाजी लगलग	W	W	All wetlands
11.	Bank Myna	<i>Acridotheres ginginianus</i>	गंगा मैना	OGA	All	All over
12.	Bar-headed Goose	<i>Anser indicus</i>	सरपट्टी सवन	W	W	BB
13.	Barn Swallow	<i>Hirundo rustica</i>	लिशरा अबाबील	OGA	W	All over
14.	Barred Buttonquail	<i>Turnix suscitator</i>	धारिया गुल्लू	OGA	M	All over
15.	Baya Weaver	<i>Ploceus philippinus</i>	सामान्य बया	OGA	All	All over
16.	Bay-backed Shrike	<i>Lanius vittatus</i>	मटिया लहटोरा	OGA	All	all over
17.	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	वाक बगला	W	All	BB (herony)
18.	Black Drongo	<i>Dicrurus macrocercus</i>	सामान्य भुजंगा	OGA	All	all over
19.	Black Kite	<i>Milvus migrans</i>	सामान्य चील	OGA	All	all over
20.	Black Stork	<i>Ciconia nigra</i>		W	W	RW
21.	Black-tailed Godwit	<i>Limosa limosa</i>	बड़ागुदेरा	W	W	All wetlands
22.	Black-winged Stilt	<i>Himantopus himantopus</i>	गजपांव	W	All	All wetlands
23.	Black-headed Bunting	<i>Emberiza melanocephala</i>	कलसिर चिरटा	OGA	W	SSK, Bhatiyani
24.	Black-headed Gull	<i>Chroicocephalus ridibundus</i>	कालशीर्ष धोमरा	W	W	BB
25.	Black-headed Ibis	<i>Threskiornis melanocephalus</i>	सफेद बुज्जा	W	All	BB
26.	Black-rumped Flameback	<i>Dinopium benghalense</i>	कालपुठ अंगारा कठफौड़िया	PL	W	BK
27.	Black-winged Kite	<i>Elanus caeruleus</i>	कपासी चील	OGA	All	all over
28.	Blue-cheeked Bee-eater	<i>Merops persicus</i>	निलगाल पतरंग	OGA	W	BK
29.	Blue-tailed Bee-eater	<i>Merops philippinus</i>	निलदुमा पतरंग	OGA	W	BK
30.	Bluethroat	<i>Luscinia svecica</i>	नीलकण्ठी लूसीनिया	OGA	W	All over

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
31.	Blyth's Reed-warbler	<i>Acrocephalus dumetorum</i>	पोदेनरकुल फुदकी	OGA	W	All over
32.	Bonelli's Eagle	<i>Aquila fasciata</i>	मोरंगी बाज	OGA	All	SSK
33.	Booted Eagle	<i>Hieraetus pennatus</i>	गिलहरी मारबाज	OGA		SSK
34.	Booted Warbler	<i>Iduna caligata</i>	बड़पाव फुदकी	OGA	W	All over
35.	Brahminy Kite	<i>Haliastur indus</i>	ब्राह्मणी चील	W	W	RW
36.	Brahminy Starling	<i>Sturnia pagodarum</i>	पुहैया मैना	OGA	All	All over
37.	Brown Crake	<i>Zapornia akool</i>	भूरी क्रेक-	W	M	SP
38.	Brown-headed Barbet	<i>Psilopogon zeylanicus</i>	बड़ा बसन्या	PL	W	BK
39.	Brown-headed Gull	<i>Larus brunnicephalus</i>	सामान्य धोमरा	W	W	BB, RW
40.	Caspian Gull	<i>Larus cachinnans</i>	कैस्पियन धोमरा	W	W	BB
41.	Cattle Egret	<i>Bubulcus ibis</i>	गाय बगला	W, A	All	BB (herony)
42.	Chestnut-bellied Sandgrouse	<i>Pterocles exustus</i>	कुहारमट तीतर	OGA	All	All grazing lands
43.	Clamorous Reed-warbler	<i>Acrocephalus stentoreus</i>	बड़ीनरकुल फुदकी	OGA	W	All over
44.	Common Babbler	<i>Argya caudata</i>	डुमरी गोगाई चरखी	OGA	All	All over
45.	Common Barn-owl	<i>Tyto alba</i>	करेल उल्लू	H	All	All over
46.	Common Buttonquail	<i>Turnix sylvaticus</i>	छोटा गुल्लू	OGA	M	All over
47.	Common Coot	<i>Fulica atra</i>	टिकडी	W	W	All wetlands
48.	Common Crane	<i>Grus grus</i>	क्रौंच		W	BB, RW
49.	Common Cuckoo	<i>Cuculus canorus</i>	कूपूकुहुक	OGA	M	BK
50.	Common Greenshank	<i>Tringa nebularia</i>	बड़ाटिमटि माचौबाह	W	W	BB
51.	Common Gull-billed Tern	<i>Gelochelidon nilotica</i>	गलचंचु कुकरी	W	W	RW
52.	Common Hawk-cuckoo	<i>Hierococcyx varius</i>	सामान्य पपीहा	OGA	M	BK
53.	Common Hoopoe	<i>Upupa epops</i>	हुदहुद	OGA	W	MA
54.	Common Iora	<i>Aegithina tiphia</i>	सामान्य शोबिंगी	OGA	All	All over
55.	Common Kestrel	<i>Falco tinnunculus</i>	करोन्तिया		W	Kalyanipura
56.	Common Kingfisher	<i>Alcedo atthis</i>	छोटा किलकिला	OG/W	All	BB
57.	Common Moorhen	<i>Gallinula chloropus</i>	सामान्य जलमुर्गी	W	All	BB
58.	Common Myna	<i>Acridotheres tristis</i>	देशी मैना	OGA	All	All over
59.	Common Pochard	<i>Aythya ferina</i>	छोटी लालसीर बतख	W	W	BB
60.	Common Redshank	<i>Tringa totanus</i>	छोटासुर माचौबाह	W	W	All wetlands
61.	Common Ringed Plover	<i>Charadrius hiaticula</i>	छल्लेदार बाटन	W	All	All wetlands
62.	Common Sandpiper	<i>Actitis hypoleucus</i>	सामान्य चौबाह	W	All	All wetlands
63.	Common Shelduck	<i>Tadorna tadorna</i>	शाह चकवा	W	W	BB
64.	Common Snipe	<i>Gallinago gallinago</i>	सामान्य चहा	W	W	BB
65.	Common Stonechat	<i>Saxicola torquatus</i>	सामान्य भटपीद्वा	OGA	W	All over
66.	Common Tailorbird	<i>Orthotomus sutorius</i>	सामान्य दरजिन	OGA	All	All over

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
67.	Common Teal	<i>Anas crecca</i>	छोटी मुर्गावी	W	W	BB
68.	Common Tern	<i>Sterna hirundo</i>	सामान्य कुकरी	W	W	BB, SP
69.	Coppersmith Barbet	<i>Psilopogon haemacephalus</i>	ठठेरा बसन्या	PL	W	BK
70.	Cotton Pygmy-goose	<i>Nettapus coromandelianus</i>	गिर्फ्फा बतख	W	W	BB
71.	Crested Bunting	<i>Emberiza lathami</i>	चोटीपत्थर चिरटा	OGA	W	SSK, Bhatiyani
72.	Crested Lark	<i>Galerida cristata</i>	चोटीदार चंडूल भरत	OGA	M	All over
73.	Dalmatian Pelican	<i>Pelecanus crispus</i>	डालमेशियन हवासिल	W	W	All wetlands
74.	Demoiselle Crane	<i>Anthropoides virgo</i>	कुरजा	WA	W	BB, RW
75.	Desert Wheatear	<i>Oenanthe deserti</i>	रेतील भूपीद्वा	OGA	W	All over
76.	Dusky Crag Martin	<i>Ptyonoprogne concolor</i>	घुमिलशैल अबाबील	OGA	W	SSK, Bhatiyani
77.	Eastern Orphean Warbler	<i>Sylvia crassirostris</i>	सलेटी पिढ़ी	OGA	W	All over
78.	Egyptian Vulture	<i>Neophron percnopterus</i>	सफेद गिर्द	OGA	W	makhopura garbage dump
79.	Eurasian Buzzard	<i>Buteo buteo</i>	सामान्य चूहामार	OGA	W	SSK
80.	Eurasian Collared-dove	<i>Streptopelia decaocto</i>	पवर फाखता	OGA	All	All over
81.	Eurasian Eagle-owl	<i>Bubo bubo</i>	सामान्य उल्लू	Wells	All	BK
82.	Eurasian Sparrowhawk	<i>Accipiter nisus</i>	बाशा	OGA	All	All over
83.	Eurasian Spoonbill	<i>Platalea leucorodia</i>	चमचा	W	All	BB
84.	Eurasian Thick-knee	<i>Burhinus oedicnemus</i>	युरेशियाई कर्वनि	W	All	BB
85.	European Roller	<i>Coracias garrulus</i>	बिलायती नीलकंठ	OGA	W	BK
86.	Garganey	<i>Spatula querquedula</i>	चेता बतख	W	W	BB
87.	Glossy Ibis	<i>Plegadis falcinellus</i>	कौआरी बुज्जा	W	W	All wetlands
88.	Gray-headed Canary-flycatcher	<i>Culicicapa ceylonensis</i>	राखोड़ी पिलो माखीमर	W	All over	
89.	Graylag Goose	<i>Anser anser</i>	सिलेटी सवन	W	W	BB
90.	Great Cormorant	<i>Phalacrocorax carbo</i>	बड़ा पनकौआ	W	All	BB (heronry)
91.	Great Tit	<i>Parus major</i>	सिलेट रामगंगरा	PL	All	All over
92.	Great White Egret	<i>Ardea alba</i>	मलंग बगला	W	All	All wetlands
93.	Great White Pelican	<i>Pelecanus onocrotalus</i>	सफेद हवासिल	W	W	All wetlands
94.	Greater Coucal	<i>Centropus sinensis</i>	बड़ा महोक	OGA	All	All over
95.	Greater Flamingo	<i>Phoenicopterus roseus</i>	राज हंसावर	W	W	BB
96.	Greater Painted-snipe	<i>Rostratula benghalensis</i>	राज चहा	W	All	All wetlands
97.	Greater Short-toed Lark	<i>Calandrella brachydactyla</i>	बाधेरी का पुल्क	OGA	W	All over
98.	Green Sandpiper	<i>Tringa ochropus</i>	हरा चौबाह	W	W	BB
99.	Grey-breasted Prinia	<i>Prinia hodgsonii</i>	सिलेटीछाती	OGA	All	All over

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
100.	Grey Francolin	<i>Francolinus pondicerianus</i>	सफेद तीतर	OGA	All	All over
101.	Grey Heron	<i>Ardea cinerea</i>	सिलेटी अंजन	W	All	BB (herony)
102.	Grey Wagtail	<i>Motacilla cinerea</i>	स्लेटी खंजन	OGAW	W	All over
103.	Grey-bellied Cuckoo	<i>Cacomantis passerinus</i>	सुरमई कुहक	OGA	M	BK
104.	Grey-necked Bunting	<i>Emberiza buchanani</i>	सिलेटीगर्दन चिरटा	OGA	W	SSK, Bhatiyani
105.	House Bunting	<i>Emberiza sahari</i>	मरू चिरटा	OGA	W	SSK, Bhatiyani
106.	House Crow	<i>Corvus splendens</i>	घरेलु कौआ	OGA	All	all over
107.	House Sparrow	<i>Passer domesticus</i>	घरेलु गौरेया	OGA	All	All over
108.	House Swift	<i>Apus nipalensis</i>	घरेलु अदाबिल बतासी	OGA/H	All	All over
109.	Great Grey Shrike	<i>Lanius excubitor</i>	सिलेटील हटोरा	OGA	All	all over
110.	Indian Bushlark	<i>Mirafra erythroptera</i>	भारतीय झाड़भरत	OGA	All	All over
111.	Indian Cormorant	<i>Phalacrocorax fuscicollis</i>	देशी पनकौआ	W	All	BB (herony)
112.	Indian Courser	<i>Cursorius coromandelicus</i>	सामान्य नुकरी	OGA	All	BK, KK
113.	Indian Cuckoo	<i>Cuculus micropterus</i>	काफल पक्का	OGA	M	MA
114.	Indian Golden Oriole	<i>Oriolus kundoo</i>	स्वर्ण पिलक	OGA	M	all over
115.	Indian Grey Hornbill	<i>Ocyceros birostris</i>	सिलेटी धनेश	PL	All	BK
116.	Indian Nightjar	<i>Caprimulgus asiaticus</i>	सामान्य छपका	OGA	M	BK
117.	Indian Paradise-flycatcher	<i>Terpsiphone paradisi</i>	शाह बुलबुल (rufous morph) सुलतान बुलबुल (white morph)		All	BK, SSK
118.	Indian Peafowl	<i>Pavo cristatus</i>	मोर	OGA	All	All over
119.	Indian Pond-heron	<i>Ardeola grayii</i>	अंधा बगला	W	All	BB (herony)
120.	Indian Robin	<i>Saxicoloides fulicatus</i>	कलचुरी	OGA	All	All over
121.	Indian Roller	<i>Coracias benghalensis</i>	देशी नीलकंठ	OGA	W	MA
122.	Indian Silverbill	<i>Euodice malabarica</i>	सादा मुनिया	OGA	All	All over
123.	Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	गुगरल बतख	W	All	BB
124.	Yellow Tit	<i>Machlolophus holsti</i>	पीला रामगंगरा	OGA		Bhatiyani
125.	Intermediate Egret	<i>Ardea intermedia</i>	पतंगखा बगला	W	All	All wetlands
126.	Isabelline Shrike	<i>Lanius isabellinus</i>	बादामी लहटोरा	OGA	W	all over
127.	Isabelline Wheatear	<i>Oenanthe isabellina</i>	बादामी भूपीद्वा	OGA	W	All over
128.	Jacobin Cuckoo	<i>Clamator jacobinus</i>	अबलक चातक	OGA	M	BK
129.	Jungle Babbler	<i>Turdoides striata</i>	जंगली गोगाई चरखी	OGA	All	All over
130.	Jungle Bush-quail	<i>Perdicula asiatica</i>	जंगली लवा	OGA	All	All over
131.	Kentish Plover	<i>Charadrius alexandrinus</i>	कॉलरवाला बाटन	W	W	RW
132.	African Comb Duck	<i>Sarkidiornis melanotos</i>	Nakata	W	W	BB

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
133.	Laggar Falcon	<i>Falco jugger</i>	कोही		All	Kalyanipura
134.	Large Grey Babbler	<i>Argya malcolmi</i>	बड़ी गोगाई चरखी	OGA	All	All over
135.	Large-billed Crow	<i>Corvus macrorhynchos</i>	लम्बी चौंच कौआ	OGA	All	all over
136.	Laughing Dove	<i>Spilopelia senegalensis</i>	टुटरु	OGA	All	All over
137.	Lesser Flamingo	<i>Phoeniconaias minor</i>	छोटा हंसावर	W	W	RW
138.	Lesser Florican	<i>Sypheotides indicus</i>	खड़मोर	OGA	M	All over (details in the report)
139.	Lesser Sandplover	<i>Charadrius mongolus</i>	छोटा बाटन	W	W	BB
140.	Lesser Whitethroat	<i>Sylvia curruca</i>	चिया	OGA	W	All over
141.	Little Cormorant	<i>Microcarbo niger</i>	छोटा पनकौआ	W	All	BB (herony)
142.	Little Egret	<i>Egretta garzetta</i>	कारचिया बगला	W	All	All wetlands
143.	Little Grebe	<i>Tachybaptus ruficollis</i>	छोटा डुबुड़ी	W	All	All wetlands
144.	Little Pratincole	<i>Glareola lactea</i>	छोटी धोबेचा	W	All	BB
145.	Little Stint	<i>Calidris minuta</i>	छोटा पनलवा	W	W	All wetlands
146.	Little Tern	<i>Sternula albifrons</i>	छोटी कुकरी	W	W	BB, SP
147.	Long-billed Pipit	<i>Anthus similis</i>	शेल चरचरी	OGA	W	All over
148.	Long-legged Buzzard	<i>Buteo rufinus</i>	लमटंगा चूहामार	OGA	W	SSK
149.	Long-tailed Shrike	<i>Lanius schach</i>	लम्बीपूछ लहटोरा	OGA	All	all over
150.	Mallard	<i>Anas platyrhynchos</i>	निलसर बतख	W	W	BB
151.	Marsh Sandpiper	<i>Tringa stagnatilis</i>	छोटाटिमटि माचौबाह	W	W	BB
152.	Montagu's Harrier	<i>Circus pygargus</i>	मोन्टांगु गिरगिटमार	OGA	W	All over
153.	Mottled Wood-owl	<i>Strix ocellata</i>	धब्बेदार उल्लू	OGA	M	BK
154.	Northern Pintail	<i>Anas acuta</i>	सीखपर बतख	W	W	BB
155.	Northern Shoveler	<i>Spatula clypeata</i>	तिदरी बतख	W	W	BB
156.	Oriental Darter	<i>Anhinga melanogaster</i>	बानवै	W	All	BB
157.	Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	शाहू तेला	OGA	W	Bhatiyani
158.	Paddyfield Pipit	<i>Anthus rufulus</i>	खेत चरचरी	OGA	All	All over
159.	Painted Francolin	<i>Francolinus pictus</i>	चिचित तीतर	OGA	M	All over
160.	Painted Stork	<i>Mycteria leucocephala</i>	जांघिल ढोक	W	All	BB (herony)
161.	Pallas's Gull	<i>Larus ichthyaetus</i>	बड़ा धोमरा	W	W	BB
162.	Pallid Harrier	<i>Circus macrourus</i>	उजला गिरगिटमार पलई	OGA	W	All over
163.	Peregrine Falcon	<i>Falco peregrinus</i>	शाहीन कोही		W	Kalyanipura
164.	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	पिहो	W	All	SP
165.	Pied Avocet	<i>Recurvirostra avosetta</i>	कास्य चहा	W	W	BB
166.	Pied Bushchat	<i>Saxicola caprata</i>	अबलक झाड़ीपीद्वा	OGA	All	All over
167.	Pied Kingfisher	<i>Ceryle rudis</i>	कोरिल्ला किलकिला	OG/W	All	BB

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
168.	Asian Plain Martin	<i>Riparia chinensis</i>	सामान्यअबाबील	OGA	W	SSK, Bhatiyani
169.	Plain Prinia	<i>Prinia inornata</i>	सादादुम फुदकी	OGA	All	All over
170.	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>	टुईया तोता	OGA	All	All over
171.	Purple Heron	<i>Ardea purpurea</i>	नरी अंजन	W	W	All wetlands
172.	Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	बड़ापंचरंगी शक्करखोरा	OGA	All	All over
173.	Purple Sunbird	<i>Cinnyris asiaticus</i>	बैंगनी शक्करखोरा	OGA	All	All over
174.	Purple Swamphen	<i>Porphyrio porphyrio</i>	क्रेकजमुनी जलमुर्गी	W	All	BB
175.	Rain Quail	<i>Coturnix coromandelica</i>	वर्षा बटेर	OGA	M	All over
176.	Red Avadavat	<i>Amandava amandava</i>	लाल मुनिया	OGA	All	All over
177.	Red-Crested Pochard	<i>Netta rufina</i>	लालसीर बतख	W	W	BB
178.	Red Turtle-dove	<i>Streptopelia tranquebarica</i>	इटकोहरी फाखता	OGA	M	All over
179.	Red-breasted Flycatcher	<i>Ficedula parva</i>	सिफिया मछरिया	OGA	W	All over
180.	Red-headed Bunting	<i>Emberiza bruniceps</i>	लालमुखी कलसिर चिरटा	OGA	W	SSK, Bhatiyani
181.	Red-headed Falcon	<i>Falco chicquera</i>	लालसर तुरुमति	OGA	M	Kalyanipura
182.	Red-naped Ibis	<i>Pseudibis papillosa</i>	कला बुज्जा	W	All	All over
183.	Red-rumped Swallow	<i>Cecropis daurica</i>	लालपुट्टी अबाबील	OGA	All	All over
184.	Red-vented Bulbul	<i>Pycnonotus cafer</i>	गुलदुम बुलबुल	OGA	All	All over
185.	Red-wattled Lapwing	<i>Vanellus indicus</i>	शरारी टिटहरी	OGAW	All	all over
186.	River Tern	<i>Sterna aurantia</i>	जल कुकरी	W	All	BB
187.	Rock Bush-quail	<i>Perdicula argoondah</i>	पत्थर लवा	OGA	All	All over
188.	Rock Dove	<i>Columba livia</i>	सामान्य कबूतर	HA	All	All over
189.	Rose-ringed Parakeet	<i>Psittacula krameri</i>	सामान्य तोता	OGA	All	All over
190.	Rosy Starling	<i>Pastor roseus</i>	गुलाबी मैना	OGA	W	All over
191.	Ruddy Shelduck	<i>Tadorna ferruginea</i>	सुखवि	W	W	BB
192.	Ruddy-breasted Crake	<i>Zapornia fusca</i>	कथईसीना	W	W	BB
193.	Ruff	<i>Calidris pugnax</i>	रफ रीव	W	W	BB
194.	Rufous-fronted Prinia	<i>Prinia buchanani</i>	जंगलीभाल दुमफुदकी	OGA	M	All over
195.	Rufous Treepie	<i>Dendrocitta vagabunda</i>	लाल तरूणिक	PL	All	all over
196.	Rufous-tailed Lark	<i>Ammomanes phoenicura</i>	लालपूछ भरत	OGA	All	All over
197.	Savanna Nightjar	<i>Caprimulgus affinis</i>	सवाना छपका	OGA	M	BK
198.	Scaly-breasted Munia	<i>Lonchura punctulata</i>	चिति मिनुया	OGA	All	All over
199.	Shikra	<i>Accipiter badius</i>	शिकरा	OGA	All	All over
200.	Short-eared Owl	<i>Asio flammeus</i>	छुटकन्ना उल्लू	OGA	W	BK
201.	Short-toed Snake-eagle	<i>Circaetus gallicus</i>	सापमार	OGA	All	all over

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
202.	Sirkeer Malkoha	<i>Taccocua leschenaultii</i>	लालमुखी मालकोहा	PL	W	BK
203.	Small Minivet	<i>Pericrocotus cinnamomeus</i>	छोटा राजालाल	OGA	All	SSK, Bhatiyani
204.	Spotted Owlet	<i>Athene brama</i>	सामान्य खुसट	OGA	All	All over
205.	Spotted Redshank	<i>Tringa erythropus</i>	बड़ासुर माचौबाह	W	W	BB
206.	Steppe Eagle	<i>Aquila nipalensis</i>	रगड़ उकाब	OGA	W	SSK
207.	Lesser Yellownape	<i>Picus chlorolophus</i>	कोडियाला कठफोड़िया	PL	W	BK
208.	Streak-throated Swallow	<i>Petrochelidon fluvicola</i>	नहर अबाबील	OGA	All	All over
209.	Tawny Eagle	<i>Aquila rapax</i>	चोटा जुमिज उकाब	OGA	W	SSK
210.	Tawny Pipit	<i>Anthus campestris</i>	भूरिया चरचरी	OGA	W	All over
211.	Tawny-bellied Babbler	<i>Dumetia hyperythra</i>		PL	All	All over
212.	Thick-billed Flowerpecker	<i>Dicaeum agile</i>	फूल चुक्की	PL	All	All over
213.	Tickell's Blue-flycatcher	<i>Cyornis tickelliae</i>	अधरंगा	PL	W	All over
214.	Tree Pipit	<i>Anthus trivialis</i>	मुसरीचि	PL	W	All over
215.	Tricoloured Munia	<i>Lonchura malacca</i>	तेलिया मुनिया	OGA	M	All over
216.	Variable Wheatear	<i>Oenanthe picata</i>	बहुरूपी भूपीद्वा	OGA	W	All over
217.	Western Koel	<i>Eudynamys scolopaceus</i>	कोयल	OGA	All	All over
218.	Western Marsh-harrier	<i>Circus aeruginosus</i>	दलदली पतई	OGA	W	BB, RW
219.	Western Reef-egret	<i>Egretta gularis</i>	काला बगला	W	W	All wetlands
220.	Western Yellow Wagtail	<i>Motacilla flava</i>	पिला खंजन	OGAW	W	All over
221.	Whiskered Tern	<i>Chlidonias hybrida</i>	मुच्छल कुकरी	W	W	All wetlands
222.	White-bellied Minivet	<i>Pericrocotus erythropygius</i>	सफेदगर्दन राजालाल	PL	W	SSK, Bhatiyani
223.	White-eyed Buzzard	<i>Butastur teesa</i>	टीसा	OGA	All	Bhatiyani
224.	White Stork	<i>Ciconia ciconia</i>	उजला लगलग	W	W	RW
225.	White Wagtail	<i>Motacilla alba</i>	सफेद खंजन	OGAW	All	All over
226.	White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	सफेद छाती किलकिला	OGA/ W	All	All over
227.	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	सफेदछाती जलमुर्गी	W	All	BB, SP
228.	White-browed Fantail	<i>Rhipidura aureola</i>	सफेद नचनी	OGA	All	all over
229.	White-eared Bulbul	<i>Pycnonotus leucotis</i>	सफेदगाल बुलबुल	OGA	W	All over
230.	White-naped Tit	<i>Machlolophus nuchalis</i>	कलपीठ रामगंगरा	PL	All	Bhatiyani
231.	Wire-tailed Swallow	<i>Hirundo smithii</i>	तरडम अबाबील	OGA	W	All over
232.	Wood Sandpiper	<i>Tringa glareola</i>	भूरा चौबाह	W	W	BB, SP
233.	Yellow-crowned Woodpecker	<i>Leiopicus mahrattensis</i>	पिलताज कठफोड़िया	PL	All	BK
234.	Yellow-eyed Babbler	<i>Chrysomma sinense</i>	सोनाचश्म चरखी	OGA	All	All over

Sr. No.	Species common name	Scientific name	Hindi name	Habitat	Season	Site
235.	Yellow-footed Green-pigeon	<i>Treron phoenicopterus</i>	सामान्य हरियल	PL	W	All over
236.	Yellow-legged Buttonquail	<i>Turnix tanki</i>	पीतपैर गुल्लू	OGA	M	All over
237.	Chestnut-shouldered Petronia	<i>Gymnoris xanthocollis</i>	जंगली चिड़िया	PL	All	All over
238.	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i>	जर्द टिटहरी	OGA	All	BG
239.	Zitting Cisticola	<i>Cisticola juncidis</i>	जिटजिट फुदकी	OGA	All	All over

Abbreviations

Habitat: O - Open; G - Grassland; A - Agriculture; W-Wetland; PL - Plantation

Season: W-Winter; M-Monsoon; S-Summer

Site: BK - Bhatiyani-Kumhariya; MA - Madhopura Agriculture; RW - Ramsar Wetland; SP - Sarana Pond; BG - Bhagwantpura Grassland; SSK - Shokliya, Sanod, Kesarpura;
KK - Kalyanipura, Kitap



Image 86 Chick of a Chestnut-shouldered Petronia seen in study area © Ashley Chiu



Image 87 Rain Quail male (in breeding plumage) taking soil bath © Dharam Veer Singh Jodha



Image 88 Breeding Colony of Painted Stork at Bamniya Balaji Wetland © Sujit Narwade

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