Bulletin of Pure and Applied Sciences
Vol.40A (Zoology), No.2,
July-December 2021: P.285-290

Print version ISSN 0970 0765
Online version ISSN 2320 3188
DOI: 10.5958/2320-3188.2021.00033.4

Content Available online at: https://www.bpasjournals.com/zoology

Original Research Article

Exploring the Population Status of Galliformes in Mandi District, Himachal Pradesh, India

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Article Info:
Received on 20.08.2021
Accepted on 10.11.2021
Published on 15.12.2021

ABSTRACT:
The present study was conducted to determine the population and habitat preferences of Red jungle fowl, Peafowl and Black francolins through calling count method. The study area was divided into five sites/ localities. The call count of Gallus gallus was maximal in Bandal chowk, Janitridhar has an outside population of Francolinus francolinus and Pavo cristatus was maximal in Sakrain dhar. The studied region included a varied flora, with 14 plant species and 9 shrub species. These phasianidae species decline in the area due to overhunting, habitat loss and degradation. The present study results are helpful for a conservation strategy for these birds' species. This study also gives baseline data on the population of these three common phasianidae birds, which could serve as a basis for future habitat level studies.

Keywords: *Birds, Call count, Phasianidae, Population, Threats*

How to cite this article: Thakur, K., Sharma, S., Kumar, R., Thakur, M.L. (2021). Exploring the Population Status of Galliformes in Mandi District, Himachal Pradesh, India. *Bulletin of Pure and Applied Sciences-Zoology*, 40A (2), 285-290.

INTRODUCTION

Birds are one of the major biotic components of natural ecosystems. Birds can live in different habitat conditions and have been blessed with plumage cover and flying ability. The world's bird population is estimated to be about 10,000 species (Singh, 2015). The avifaunal diversity of India explicates 1332 species covered in 26 orders (Praveen et al., 2020). Birds are well regarded as excellent bio-indicators of ecosystem quality and environmental health (Harisha & Hosetti, 2018).Remarkably, Galliformes are important markers of environmental quality, and determining their status is crucial for management. The Galliformes order comprises around 290 species of birds, which are now divided into 5 families that are Phasianidae, Odontophoridae, Numididae, Cracidae and Megapodiidae (Crespo et al., 2018). The phasianidae family includes some of the world's most stunning and prominent birds i.e. partridges, francolins, quails, and pheasants. There are 45 species of Galliformes in India, 7 of which are indigenous to the country. The Himalayan region has the largest diversity of Galliformes (n = 34), with 29 species having restricted ranges within the Himalayas (Bagaria et al., 2021). Population of

various galliformes species declined due to overhunting, depletion of natural habitat, deforestation, encroachment of their habitat area, climate change, recreation and commerce (Eliza & Sarma, 2016; Thapa et al., 2020; Tian et al., 2018). Dharampur Tehsil, the district's primary business hub, lies 22 kilometers west of the district headquarters in Mandi, Himachal Pradesh. Dharampur contains the Shivalik hills of the Himalaya. In the lower Himalayan area, research on the Galliformes is relatively restricted, and its condition in this region is mostly unknown. There has been no previous report of the population of phasianidae birds in Dharampur area. The objective of present study is to study the population status, distribution, threats and habitat utilization of three phasianidae birds in Dharampur area.

MATERIALS AND METHODS

Study design

Dharampur situated at 31°71´ North Latitude and 76°73´ East Longitude, and an altitude of 642.82 m in the lower Himalayan region of Mandi district of Himachal Pradesh. Dharampur lies in Humid-subtropical zone of Shivalik Himalaya in Himachal Pradesh. The area was drained by river Beas and also by some perennial hill streams like sheer khud and shone khud. Aside from that, the valley was dotted with a host of small seasonal streams. Furthermore, the study region wascharacterized by abundant vegetation in and around farm fields and human settlements.

The area was stratified based on vegetation, altitude and habitat type (given in Table 1). The entire study area was divided into five sites. The habitat type was primarily mixed. Vegetation was dominated by plant species like *Grewia optiva, Dalbergia sissoo, Acacia catechu, Morus alba* plants and several kinds of shrubs like *Lantana* sp*., Rubus* sp*., Murraya koenigii* etc. Grassland and coniferous forest of Pinus (*Pinus roxburghii)* were also present in patches. Due care was exercised to include representative vegetative types of Dharampur. Each location was searched along road routes. Following studies, sites were monitored throughout the investigation (Table 1).

The surveys were designed to cover a considerably large area in a short period of time. The study sites were Bandal chowk which is near to Tihra, has thick vegetation of Tree and Shrubs along with grassland, Sakrain dhar which is near Jalpamata temple (Mahri) had diverse tree species, Janitri dhar which had a forest of *Quercus leucotrichophora* and *Pinus roxburghii* located at top of 1783 m altitude. Janitri dhar was devoid of human disturbance and also last boundary of Dharampur area, Kandapattan which was drained by the Beas River, located at 643 m altitude and Sajaopiplu which had also thick vegetation of Tree and Shrubs. During the observations, no birds were captured or injured.

Sampling strategies

Phasianidae birds were observed with the aid of 10 × 42 Nikon field binoculars and GPS were used for reading elevation, latitude and longitude. The observation was made better by keeping track of the birds' peak activity hours. Since most birds' peak activity lasts for 1 to 2 hours after sunrise or before sunset. Remarkably, monitoring was performed early in the morning. The calling site count method is a reliable and less expensive technique for estimating the population of phasianidae. The call count method was used to record the presence of Galliformes in these five locations(Kumar et al., 2020). Three call count stations were surveyed at each site. Call count stations were selected and GPS readings of elevation, latitude and longitude were taken for each location. Prior to dawn, observers were stationed at each call count site to record Galliformes calls. Directions of the calls were detected by using a compass. In all the directions of observation, some differences were made to avoid double counting. Identification of calling species and their numbers were recorded. Vegetation of the sites was also recorded. The density of flora was measured by the Quadrate method (10 × 10 m). Plants and shrubs species were recorded.

RESULTS

The three species are extensively dispersed over the Indian subcontinent, occupying a range of habitats. *Gallus gallus* are resident of Himalayas, northeast and eastern India, found at mainly foothills and plain level (Palei et al., 2016). *Francolinus francolinus* is found up to 2150 metres in the Himalayas, where it lives in a variety of subtropical and temperate habitats (Kumar et al., 2020). *Pavo cristatus* are found almost throughout India, up to 2800 m in Himalaya(Thapa et al., 2020).The conservation status of these three species isLeast concern (LC). The population trend is decreasing in *Gallus gallus* whereas; it remains stable in *Francolinus francolinus*, and *Pavo cristatus*. *Pavo cristatus,* is India's national bird and listed in Schedule-I of the Indian Wildlife Protection Act, 1972.

During the study extending over six months (July to December 2016), call count of *Gallus gallus, Francolinus francolinus*, and *Pavo cristatus* were observed in Mandi.In our observation, Total call count of *Gallus gallus* at five sites was 17 (Table 2). Sajaopiplu and Bandal chowk had the maximum number of calling count i.e. 5 calling count (Fig.1). The minimum number of call counts was 2 at Janitri Dhar and Kandapattan. The density of flora in Bandal chowk and Sajaopiplu is shrubby i.e. this type of habitat is suitable for the *Gallus gallus* (Table 3).The present study revealed that the total call count of *Francolinus francolinus* was at peak in Janitri Dhar and marginal in Sajaopiplu (Fig.1).There were 4 calls in Janitri Dhar and only 1 in Sajaopiplu. The altitude of Janitri Dhar was 1783 m (Table 1), highest altitude in five locations which implies that calling count of *Francolinus francolinus* was maximal in higher altitudes. Analyses of data revealed that the *Pavo cristatus* had maximum calling count in Sakrain Dhar i.e. 4 calling count and minimum in Sajaopiplu i.e. 1 calling count (Fig. 1). It was seen that Sajaopiplu had less population of *Francolinus francolinus* and *Pavo cristatus.* The flora of Sakrain Dhar had maximum numbers of trees species i.e. *Pavo cristatus* loves the habitat which had maximum numbers of trees (Table 3).

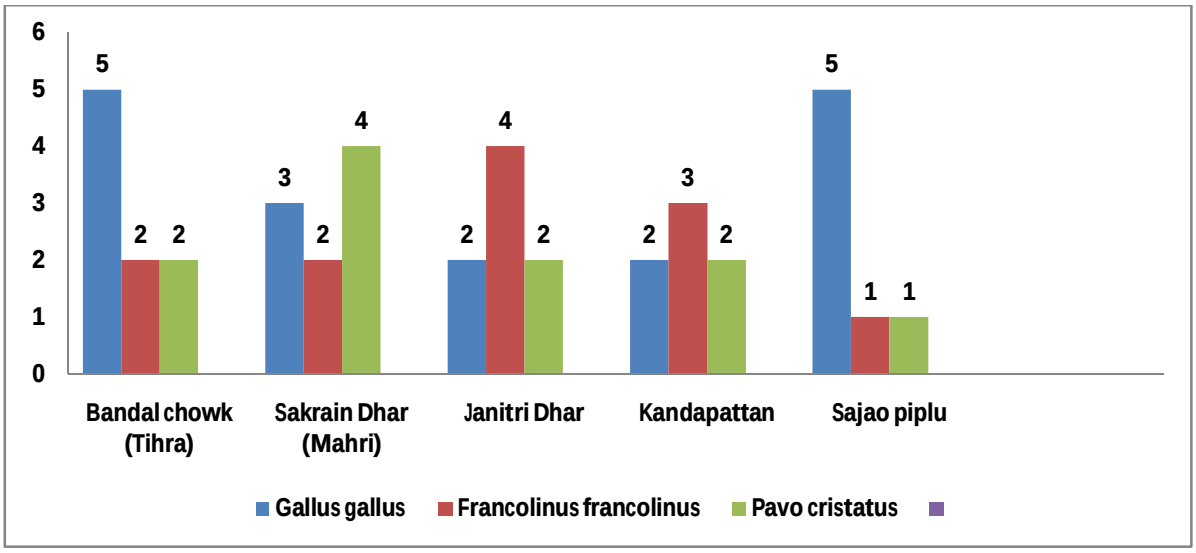

Figure 1: Call count of *Gallus gallus, Francolinus francolinus* and *Pavo cristatus* at different locations

Table 1: Studies sites with respective altitude and latitude in the Dharampur area

Location of site	Latitude		Altitude	Habitat type
	East	North		
Bandal chowk	76.67574°	31.75296°	1051 m.	Mixed
Sakrain Dhar	76.70607°	31.82310°	1109 m.	Mixed
Janitri Dhar	76.81551°	31.78009°	1783 m.	Mixed
Kandapattan	76.77114°	31.31769°	643 m.	Mixed
Sajaopiplu	76.73238°	31.76706°	877 m.	Mixed

Table 2: Call count of *Gallus gallus*, *Francolinus francolinus* and *Pavo cristatus* at different localities

Location (call count)	*Gallus gallus*	*Francolinus francolinus*	*Pavo cristatus*
Bandal chowk (Tihra)	5	2	2
Sakrain Dhar (Mahri)	3	2	4
JanitriDhar	2	4	2
Kandapattan	2	3	2
Sajaopiplu	5	1	1
Total	17	12	11

Table 3: Density of flora at different locations

Location	Tree		Shrubs	
	Name of species	No.	Name of species	No.
Bandal Chowk	*Dendrocalamus strictus*	7	*Aspargus* sp.	1
	Grewia optiva	4	*Murraya koenigii*	1
	Morus alba	1	*Adhatoda vasica*	1
			Rubus sp.	1
Sakrain Dhar	*Toona ciliata*	2	*Zizipus* sp.	1
	Dalbergia sissoo	3	*Murraya koenigii*	1
	Bombax ceiba	1	*Jatropa* sp.	12
	Musa sp.	5		
	Grewia optiva	1		
	Ficus auriculta	1		
	Mangifera indica	1		
Janitri dhar	*Cedrus deodara*	2	*Rubus* sp.	1
	Quercus leucotrichophora	2	*Berberis* sp.	2
	Grewia optiva	1		
	Pinus roxburghii	2		
Kandapattan	*Dalbergia sissoo*	4	*Lantana* sp.	6
	Acacia catechu	2	*Rubus* sp.	4
Sajaopiplu	*Pyrus pashia*	2	*Murraya koenigii*	3
	Dalbergia sissoo	2	*Colebrookea* sp.	2
	Grewia optiva	1	*Rubus* sp.	2
	Morus alba	4		

There was diverse flora in the study area including 14 plants species including *Dendrocalamus strictus, Grewia optiva, Morus alba, Toona ciliata, Dalbergia sissoo, Cedrusdeodara* etc. and 9 species of shrubs that were *Murraya koenigii, Adhatoda vasica, Zizypus* sp., *Rubus* sp., *Berberis* sp., *Lantana* sp., *Colebrookea* sp. etc. (Table 3). There were enormous number of species of shrubs and call count of *Gallus gallus* was maximal in Bandal chowk. *Murraya koenigii* was present in three study sites. *Jatropa* sp. was only seen in Sakrain Dhar. Tree species were abundant in Sakrain Dhar and maximum call count of *Pavo*

cristatus was heard. *Grewia optiva* was present in most of the locations which were dominated by plants species in all the localities.

Habitat loss poses the greatest threat to species. The phasianidae birds were threatened by habitat destruction, poaching, egg collection, wild meat and predation. Leopards, mangooses, jungle cats, dogs, yellow- throated martens, various hawks and eagles, great horned owls, lizards and snakes are potential predators of these birds. Some people use bleaching powder in tablet form along with feeding grain so that after eating poisonous tablet, these birds die. Some people use homemade traps to capture these birds for wild meat. The Indian peafowl (*Pavo cristatus*) was under threat from various quarters including the demand for feathers.

DISCUSSION

Results part revealed that the Sajaopiplu and Bandal chowk has maximum number of call count of *Gallus gallus* i.e. 5 calling count followed by Sakrain Dhar, whereas minimum call count was at Janitri Dhar and Kandapattan. It was found that in Sajaopiplu and Bandal chowk, shruby vegetation is more common in mixed habitat type. Shrubs vegetation is more suitable for red jungle fowl. Similar results were found by Subhani(2010) in Deva Vatala national Park, POK and they found *Lantana camara* and *Zizyphus mauritiana* to be ecological indicator for red jungle fowl(Subhani et al., 2010) but at our study site, *Aspargus* sp., *Murraya koenigii, Adhatoda vasica, Rubus* sp. and *Colebrookea* sp. were present.

The results of the present study revealed that the call count of *Francolinus francolinus* was maximal in Janitri dhar and area containing *Cedrus deodara, Quercus leucotrichophora, Grewia optiva, Rubus* sp. and *Berberis* sp. in mixed habitat. Janitri Dhar has an altitude of 1783 m, maximum in all the sites. The present study also revealed the presence of *Rubus* sp. The black francolin has been known to live in scrub environments. According to Kukreti (2017), the black francolin is a bird of disturbed environments found near human settlements and agricultural areas (Kukreti, 2017) but in our study the population of *Francolinus francolinus* was minimal near human settlements area and higher in area which was devoid of human disturbance (Janitri dhar). Thisarea showed the presence of *Pinus roxburghii, Cedrus deodara, Quercus leucotrichophora* and *Berberis* sp. etc. similar flora identified by Kumar et al. (2020) in Himalayan region near *Francolinus francolinus* habiat (Kumar et al., 2020)

In the present study, the call counts of the peafowl were 4 in Sakrain Dhar which is maximal in all the localities. The present study revealed the presence of *Toona ciliate, Dalbergia sissoo, Bombax ceiba, Musa* sp., *Grewia optiva, Ficus auriculata, Mangifera indica, Zizipus* sp., *Murraya koenigii*, and *Jatropa* sp. Sakrain dhar has a wider range of vegetation and also higher number of peafowl observations than other sites. Ranjith and Jose (2016) also find more peafowl number with increased diversity of vegetation in Palakkad district, Kerala, India (Ranjith & B Jose, 2016). Kumar and Balasubramanian (2011) also noticed undamaged seeds of *Ziziphus oenoplia* in peafowl droppings (Rajeshkumar & Balasubramanian, 2011) similar to our result. Overall, Indian Peafowl feeds primarily on grass seeds, tender leaves and shoots of herbaceous plants, numerous flowers, and *Ziziphus* sp., fruits in their natural habitat. The present study revealed that in the Sakrain dhar there were maximum number of trees, the human interference was very low and the availability of natural water source so these were the reasons for the maximum number of call counts.

To manage and conserve wildlife populations, it is necessary to research abundance and density estimations of species. To acquire valuable insights into the status of a certain species, data on its distribution, habitat occupancy, population estimates, and potential threats are required (Kumar et al., 2020). The Galliformes have received little attention in the scientific community, and their status in the Shivalik Himalayan region is mostly unclear. There has never been a record of these phasianidae birds in Mandi. Consequently, this research provides baseline data on the population of some common galliformes in Dharampur area of Mandi (H.P).The current inquiry is an effort that might serve as a benchmark for future habitat level research.

Acknowledgements

Kushal Thakur acknowledges Chairperson of Biosciences Department, Himachal Pradesh University for providing facilities to carry out the work. Author also acknowledges Rajnikant Thakur, who helps during fieldwork. "This research did not receive any specific funding".

Conflicts of Interest

The authors confirm that there is no Conflict of Interest.

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