

# Density and Relative Abundance of Grey Peacock-Pheasant (*Polyplectron bicalcaratum*, Linnaeus, 1758) in Montane Broadleaved Evergreen Forest of Mizoram, North East India

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## Abstract

Grey Peacock Pheasant (*Polyplectron bicalcaratum*) is identified as ecological indicator of forest ecosystem in tropical rain forest. Study on density and abundance was carried out by line transect method in Lengteng wildlife sanctuary, Mizoram, northeast India for 27 months. Transects are walked four times a month in early morning hours. In 108 transect sampling, 134 individuals were recorded with the encounter rate  $0.51 \pm 0.06/\text{km}$  and density of  $0.14/\text{km}^2$ . The altitudinal distribution range is 1621m – 1783m above sea level, within this range they confined foraging in an area of about  $5 \text{ km}^2$ . Largest group observed was comprised of 5 members and the average group size was 0.23 individuals. Male – female sex ratio was 1.89. The low population density of grey peacock pheasant in the present study may be attributed to the skulking behaviour of the bird and the steep terrain with thick undergrowth. The results and its possible reasons are discussed in detail.

**Key Words:** Grey Peacock-Pheasant, Lengteng wildlife sanctuary, Density, Encounter rate, Line transect, Mizoram

## 1. Introduction

Grey Peacock-Pheasants, *P. bicalcaratum* is one of the most charismatic members of the order Galliformes, sub-family Phasianinae of the family Phasianidae. This group of birds commonly referred as game birds are characterized by strong sexual dimorphism with the males being highly ornate with bright colours and adornments such as wattles and long tails and usually larger than females.

*P. bicalcaratum* is represented by four subspecies, viz. *P. bicalcaratum bakeri* (Lowe, 1925) - Bhutan Grey Pheasant, more widely known as Himalayan Grey Peacock-Pheasant. It is the palest and greyest form. *P. bicalcaratum bailyi* (Rothschild, 1906) commonly known as Hainan Grey Peacock-Pheasant. It is a dark grey coloured form with white markings. *P. bicalcaratum bicalcaratum* (Linnaeus, 1758) known as Burmese Grey Peacock-Pheasant, a dark brown and buff coloured specimen. *P. bicalcaratum ghigii* (Delacour and Jabouille, 1924) which is commonly called Ghigi's Grey Peacock-Pheasant; browner than *P. b. bicalcaratum* with buff coloured surrounds on the tail ocelli (Srivastav and Nigam, 2010).

*P. bicalcaratum* is the most versatile of all peacock pheasants occurring in mainland of south-east Asia. In India the species has been recorded in the central and eastern Himalayas (Ramesh et al. 1999). In eastern Himalaya its distribution is recorded from Sikkim through Arunachal Pradesh and other north-eastern states (Srivastav and Nigam, 2010). Distribution of national studbook of Grey Peacock Pheasant restricted to northern Mizoram only, but Sailo et al. (2013) showed that the species is fairly common in all districts of Mizoram. Compare to its sister pheasants- Kalij Pheasant and Red Jungle fowl, it is less common and confined to thick evergreen forest only.

Literature on the population status of *P. bicalcaratum* is scanty in Indian subcontinent and at global level as well. . The available literatures indicate diversity and distribution of pheasants and/or galliformes; some are merely site specific survey only. Ramesh et al. (1999) studied ecology and conservation status of the Pheasants of Great Himalayan national Park, Western Himalaya, and from northeast India. Selvan et al. (2013) worked on abundance, habitat use and activity patterns of three sympatric pheasants in an Eastern Himalayan Lowland tropical Forest of Arunachal Pradesh, India. Sathyakumar et al. (2010) works on galliformes of Khangchendzonga Biosphere Reserve, Sikkim; Dohling and Sathyakumar (2011) on relative abundance of Galliformes in Meghalaya; Choudhury (2001) on some bird records from Nagaland.

Mizoram is biodiversity rich region being a part of Indo-Myanmar Hotspot, and very little is studied are available on the Galliformes. Choudhury (2005, 2006, 2009), Ghose (1999, 2000), Ghose and Thanga (1998), Ghose *et al.*(2003), Sailo et al. (2013) and Lalthanzara et al. (2011a,b, 2014) have reported their studies on surveys and site specific distribution of different galliformes in Mizoram. No study on density and abundance of *P. bicalcaratum* in

Mizoram is reported, thus there is a paucity of information on this aspect of *P. bicalcaratum* in Mizoram. Conroy and Noon (1996) reported that density and abundance of a species is essential to monitor the population of the species which is essential for conservation of species and management of habitat. *P. bicalcaratum* is placed under Schedule I and is accorded highest protection in the Indian Wildlife Protection Act (1972). Therefore, the present study is taken up to generate basic information on density and relative abundance of the *P. bicalcaratum* of Mizoram. This data will help to design and develop conservation strategies for the species.

## 2. Materials and Methods

### 2.1. Study site

The study site Lengteng Wildlife Sanctuary (LWS) which covers an area of 60km<sup>2</sup>, is located at 23°50'31.99"N and 93°12'35.39"E in state of Mizoram, close to international border shared with Myanmar (Figure 1). Its proximity to Chin hills of Myanmar is one of its significance as the study site is in Indo-Myanmar biodiversity hotspot. The forests comprise of tropical evergreen and sub-tropical broad-leaved types which is still fairly undisturbed. The elevation ranges from 400 to 2141m.

The potential habitat of *P. bicalcaratum* was identified by preliminary field survey using existing test path or footpath to determine the presence/absence and distribution of the species within the survey areas. The foraging area for intensive study is identified in the core area of the LWS at northern periphery (23°52'05.17''N 93°15'54.87''E and 23°51'10.95''N 93°15'34.38''E)(Figure 1) of about 5km<sup>2</sup>. The landscape comprises of small steep hills with deep gorges and small streams, thick undergrowth of climbers, bamboo and shrubs. All these lead to very poor visibility even during the day and also the area cannot be easily access due to steepness of the slope. The temperature in the habitat ranges from 6.4°C-22.3°C. Rainfall is experienced from the month of April and continues till October with an average annual rainfall being 2500mm. The altitude of the intensive study area falls between 1500m-1890m above mean sea level.

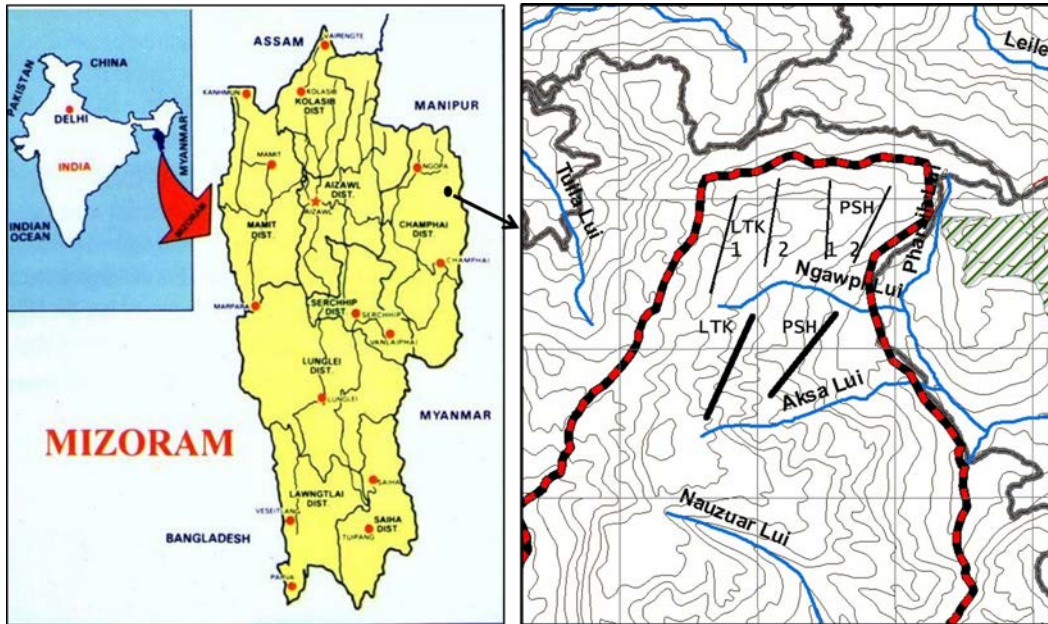


Fig. 1: Map showing study site and transects

## 2.2. Methods

Line transects method (Burnham et al. 1980) was employed to monitor the density and relative abundance of the *P. bicalcaratum*. After identifying the probable habitat of the bird, 6 (six) line transects were laid as convenience. Later, four transects were abandoned due to very poor encounter rate, and two line transects finally identifies for further study. The two transects were named as Lengteng Kawng (LTK) and Pharsih Hnar (PSH) with a length of 2.37km and 2.72km respectively. Each transect was walked four times a month in the morning hours (0430 - 0800 am) for 27 months i.e. January 2013- March, 2015. The number, sex and age of birds encountered, call or alarm detected and the distance of detection are recorded. Environmental variables like rainfall, temperature, wind velocity, relative humidity, cloud cover, slope, litter cover and other necessary information are properly recorded.

## 2.3. Calculation

Relative abundance of *P. bicalcaratum* was calculated using encounter rate (E.R) i.e. number of birds seen/Km walk or number of calling station/sampling plot (Rodgers, 1991), i.e.  $ER = n/L$ , whereas  $n$  = number of sightings or birds detected and  $L$  = distance involved. The density was estimated following the formula (Rodgers, 1991)  $Density = n/2l \times r$ , where ' $n$ ' = number of individuals, ' $l$ ' = total distance walked, ' $r$ ' = sighting distance.

## 3. Result and Discussion

The total length of two line transect covered during the course of study was 260.70km. Both transects were sampled for 108 times, 134 individuals were encountered during 84 encounters during transect sampling. Encounter rate was about 1.6 individuals per sampling for 84 times or 1.21 individual per sampling. The sampling success rate is about 76.3%. The largest group encountered in a single occasion is 5 individuals in the month of November 2013 at an elevation of 1691m. Single bird is detected most often. The average sighting distance being 16.19m, close encounter could not done because of poor visibility at ground level, steep slippery terrain and thick leaf litter that caused soundless sampling almost impossible.

The lowest and highest point at which *P. bicalcaratum* detected was 1621m and 1783m respectively. Birdlife International (2015) also reported the presence of *P. bicalcaratum* up to elevation of 1800m. But Sathyakumar and Kaul (2007) reported that the bird inhabit an elevation of less than 1200m in India and Shillai et al. (1995) had reported the distribution range of this species limited to 500m-1100m altitude in Gaoligongshan region of Yunnan, China. Although the present survey area has a wide range of elevation but they were not detected in the lower ranges. The distribution of *P. bicalcaratum* seems to be influenced by the type of vegetation than the altitude however upper and lower limit of elevation decides the spatial niche. While Srivastav and Nigam (2010) are of the opinion that the upper limit of *P. bicalcaratum* distribution range is debateable.

The relative abundance estimated from encounter rate (E.R) of *P. bicalcaratum* is found to be  $0.51 \pm 0.06/\text{km}$ . The E.R of Kalij pheasant (*Lophura leucomelanos*) in the PSH transect of an adjacent area is  $0.33 \pm 0.04/\text{km}$ . During the course of study, no habitat overlapping between *L. leucomelanos* and *P. bicalcaratum* in the two transects was observed. Meanwhile 40.8% habitat overlapping was observed between the two species by Selvan et al. (2013). This may be due to an additional sampling tool employed by them. They employed 40 camera traps in addition to line transect sampling, that enhances frequency of detection.

The density of *P. bicalcaratum* inside LWS is estimated to  $0.14/\text{km}^2$ . This is very low as compare to  $4.2/\text{km}^2$  in Pakke Tiger reserve (Selvan et al. 2013) in India and  $3.75/\text{km}^2$  in Hainan Island, China (Yu-Ren 1998). Again this may be attributed to the uses of 40 camera traps in addition to transect sampling as well as uses of more number of transect. This leads to higher density record. The present investigation site is not suitable for laying many

transects, out of the six transect laid in the beginning, and four were abandoned due to poor result. This poor data may be again due to its steepness, thick ground leaf litter and poor visibility, that causes difficulty in soundless transect sampling. The study area is compounded by steep slope, thick undergrowth of bamboo species, woody shrubs and climbers. Selvan et al. (2013) reported a very low *P. bicalcaratum* transects sighting as the bird was too shy to be detected, they detected mostly be their calls. The case is similar with the present study. Dohling and Sathyakumar (2011) also recorded *P. bicalcaratum* only once based on vocalization in their studies on Galliformes of Nongkhylllem Wildlife Sanctuary (NWS).

Sex ratio, calculated by male-female ratio from direct sightings in transects, opportunistic sighting and vocal call gives 1.89. This result is contrasting to previous reports by Selvan et al. (2013), and Javed and Rahmani (2000) findings who reported higher female than male. This may be attributed to that we records more vocal call than direct sightings, considering all call by individual male.

#### **4. Conclusion**

The relative abundance and density of *P. bicalcaratum* is low in comparison to other studies. It may be attributed to poor ground conditions and of the good forest type in the habitat area of wild animals. Therefore, it is suggested to take immediate conservation measures for the survival of this important ecological indicator species. The possible reasons for low density have to be worked out whether it is due to anthropogenic activities, habitat degradation, predator, food or other environmental factors. Elaborate studies on biological and ecological aspects with additional tools like camera trap are required for better results, comparable with international studies conducted at other places.

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