

Research Note

**Aggregation of Red Jungle Fowl *Gallus gallus* on a road in Alaungdaw
Kathapa National Park, Myanmar.**

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Abstract The size and composition of flocks of Red Jungle Fowl *Gallus gallus* were recorded during spontaneous observations on a road in Alaungdaw Kathapa National Park, Myanmar in the middle of the dry season in 2007. The flocks observed on the 1,600m section of the road consisted of four mixed sex groups, two female only groups, and five solitary males. The average flock size was 2.2 birds if solitary males were included. The overall sex ratio was 1:1.2 which showed no bias from evenness. The population density in the road side secondary forest was tentatively estimated to be 0.8 birds/ha, making it one of the highest densities reported so far.

Key words: red jungle fowl, flock size, flock composition, population density, road census, Myanmar

INTRODUCTION

The Red Jungle Fowl *Gallus gallus*, the ancestor of the domestic chicken, is distributed widely in South and Southeast Asia (Johnsgard 1999). In these areas, the jungle fowl prefers to live in secondary growth or edge habitats to heavily forested habitats (Collias and Collias 1996, Johnsgard 1999, Kalsi 1992, Robson 2002). Both males and females of this species are philopatric, and in general, they form a flock composed of one dominant rooster, accompanied by several subordinate roosters and hens, forming a polygynous mating system (Collias and Collias 1996, Johnsgard 1999).

There have been many studies of the phylogeny of this species based on genetics (e.g., Akishinomiya et al. 1996, Moiseyeva et al. 2003), and social behavior such as mate selection in enclosures (e.g., Zuk and Johnsen 1998, Johnsen et al. 2001). However, only a few ecological studies have been conducted in the wild, i.e., Collias and Saichuae (1967) in Thailand and India, Kalsi (1992) in India, and Hayashi et al. (1983) in Indonesia. The secretive be-

havior of this species (Johnsgard 1999) hinders direct observation of wild populations and has prevented the progress of ecological studies.

We observed many jungle fowls along a road as we passed through Alaungdaw Kathapa National Park (NP) in Myanmar, and recorded the sex-age composition of their flocks. Although this report is based on brief, incidental observations, this is the first description of aggregation of the jungle fowl in Myanmar, and it provides rare, useful material contributing to the discussion on the social structure and population density of this species.

RESEARCH SITE

The research site was along a 1,600m section of a 5m wide unpaved road that runs through an uninhabited area inside but near the park boundary of Alaungdaw Kathapa NP in the southern part of Sagaing Division, Myanmar (94°37' 4.3" E, 22°29' 49.7" N), ranging from 250m to 370m in altitude (Fig. 1). There were no obstacles to view on the road itself, but soil mounds and scrub prevented good



Figure 1. Locations of Alaungdaw Kathapa NP, Monywa, Yangon, and major river systems.

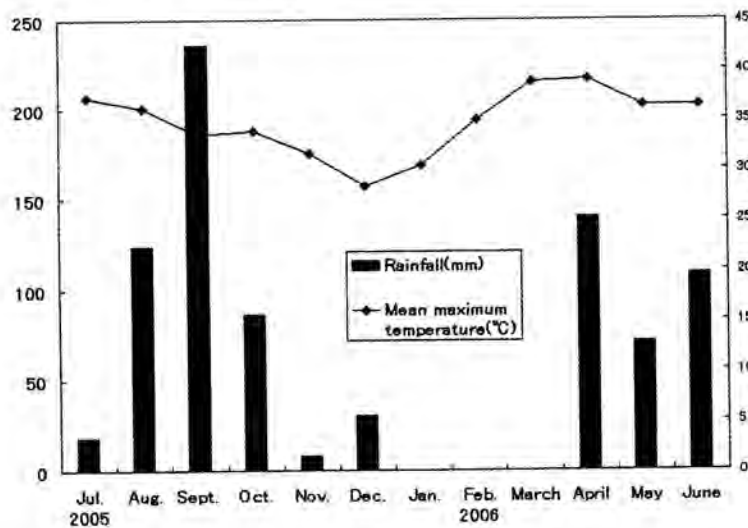


Figure 2. Monthly rainfall and the monthly mean maximum temperature in Monywa from July 2005 to June 2006 (Department of meteorology and hydrology). Meteorological data for Monywa, 80km from Alaungdaw Kathapa NP, were used because no data from Alaungdaw Kathapa NP are available.

views along the roadside. The vegetation along the road consisted of secondary, mixed deciduous forest approximately 10-15m in height, with bamboos.

Alaungdaw Kathapa NP occupies 1,605km² in an

area lying between the Chindwin River floodplain and the Myittha River valley in Sagaing Division. The altitude ranges from 30m to 1,048m above sea level. The climate of the area is subtropical mon-

soon, and the mean annual rainfall was 1,507mm (Lynam 2003). May to October is the rainy season and November to March is the dry season in this area (Fig. 2).

The national park has a rich fauna, including several natural predators of the jungle fowl, such as wild cats, civets, wild dogs *Cuon alpinis*, and various birds of prey. Although the national park is surrounded by farm land and human settlements, the national park itself is well forested although with some disturbance resulting from the logging of teak trees *Tectona grandis* before 1989, when the park was established (United Nations Development Program and Food and Agricultural Organization of the United Nations 1983). Poaching, extraction of non-timber forest products and livestock grazing threatens the wildlife in this national park (Lynam 2003).

METHODS

This research was conducted in the middle of the dry season, on 20 January 2007. The weather was very clear on the day of observation. The sunset was at 18:00, and it became completely dark at 18:20.

We watched for jungle fowl on the road in the direction in which we were traveling at a maximum speed of 20kmph. The birds were seen within 50-100m of the vehicle, and occasionally, could be approached down to 5m. Some birds may have run off the road before we noticed their presence. The two observers in the front of the vehicle watched for birds and identified their sex and age-class, while the person in the back seat recorded their observations and occasionally helped with identification. The distances between observations were measured using the odometer of the vehicle.

Jungle fowl sexual dimorphism, both in body size and color, is remarkable (Robson 2002), and we were able to easily distinguish roosters from hens. In addition, we distinguished two types of roosters: 'big roosters' those with large crowns and bodies and 'small roosters' those with smaller crowns and bodies.

RESULTS and DISCUSSION

We observed a total of 24 jungle fowls at 11 sites (Table 1) as we drove 1,600m between 17:15 and 18:00. Juveniles were not observed. Nine big roost-

Table 1. The results of a road census of the Red Jungle Fowl in Alaungdaw Kathapa National Park, Myanmar.

| Time | Distance from the start (m) | 'Big rooster' | 'Small rooster' | Hen |
|-------|-----------------------------|---------------|-----------------|-----|
| 17:15 | 0 | 0 | 1 | 3 |
| | | 1 | 0 | 3 |
| | | 1 | 0 | 0 |
| | | 1 | 0 | 0 |
| | | 0 | 0 | 3 |
| 17:31 | | 1 | 0 | 0 |
| | | 0 | 0 | 1 |
| | | 1 | 0 | 0 |
| 17:48 | | 2 | 1 | 2 |
| 17:49 | 1,200 | 1 | 0 | 0 |
| 17:57 | 1,400 | 1 | 0 | 1 |
| 18:00 | 1,600 | 0 | 0 | 0 |
| Total | | 9 | 2 | 13 |

ers, two small roosters and 13 hens were observed, giving a sex ratio of 1:1.2 which showed no bias from evenness (Fisher's exact test, $p > 0.05$). The flocks consisted of four mixed sex groups, five solitary males (45% of all cases), and two female groups. The average flock size was 2.2 birds (S.D. = 1.5 birds) if solitary males were included.

Collias and Collias (1967) observed Red Jungle Fowl in secondary forest in the Siwalik Hills of northwestern India during the dry season just before the monsoon, from April to June. They reported that this period was the mating season. The average size of their flocks was 2.0 birds, and the overall sex ratio was 102:90, also showing no bias from evenness (Fisher's exact test, $p > 0.05$). They found 10 solitary female or female groups, 35 solitary males (38% of the cases), 9 male groups, and 38 mixed sex groups. They supposed that the presence of many solitary males resulted from high mate competition among males in the mating season. Collias and Saichuae (1967) reported observing 33 Red Jungle Fowl flocks in Kanchanaburi, west-central Thailand in March, about one month prior to the main nesting season there. The average size of their flocks, including solitaires, was 2.0 birds, and the flocks consisted of 12 solitary males (58% of the cases), three all male groups, nine all female groups, and nine mixed sex groups. The overall sex ratio was 29:36, which also showed no bias from evenness (Fisher's exact test, $p > 0.05$).

The average size of jungle fowl flocks is clearly about two birds, with many solitary males observed in all studies so far. The flock size may change according to the reproductive state of the birds. Collias and Collias (1967) observed that there were fewer polygynous groups early in the mating season, whereas later there were cases of males in company with single females after some had gone off to incubate their eggs. As we had no data on reproduction of the Red Jungle Fowl in Myanmar, discussion of the significance of the flock size observed in our study must wait for the results of long-term field studies.

The diameters of the daily home ranges of two

flocks of Red Jungle Fowl in the Siwalik Hills were 137m and 91m, and the average distance between sites where different roosters gave their territorial calls during the mating season was 91m (Collias and Collias 1967). In Java, Indonesia, a wild hen tracked by radio telemetry moved about 90m in a straight line during 10 hours in August although the reproductive state of the observed bird was not known (Hayashi et al. 1983). If, based on these observations, we assume that the diameter of the daily home range of the jungle fowl is about 100m, and that the 24 birds observed during this study gathered from an area 200m in width (100m on each side of the road) and 1,600m in length (the length of the road observed), the minimum population density of this area amounts to 0.8 birds/ha. Collias et al. (1966), based on two years observation of an unconfined population in San Diego Zoo, reported that Red Jungle Fowl are relatively sedentary, with limited home ranges. However, the home range size of the wild Red Jungle Fowl may change in response to seasonal variation in food availability and reproductive state. Any such changes in the home range size would affect population density. Furthermore, we did not know from where the birds observed on the road actually came. Thus, it should be noted that our population density estimate is tentative and requires further field observations to confirm it.

Estimates of the population density of the Red Jungle Fowl vary widely from region to region: 0.25 (Bump and Bohl 1961) to 1.0 birds/ha (Collias and Collias 1967) in the Siwalik Hills, India, and 0.011-0.016 birds/ha in Yunnan, China (Li 1996). Collias and Collias (1967) supposed that the high population density in the Siwalik Hills resulted from the abundance of termites, as a food resource, and from the dense undergrowth providing shelter from predators. The population density estimated tentatively during the present study site was as high as in the Siwalik Hills. A long term study of the social structure and population density in relation to food abundance and vegetation cover at the site is necessary to elucidate the significance of this population density.

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