

**BIOLOGICAL CHARACTERISTICS AND BREEDING BEHAVIOURS OF GREEN PEAFOWL (*PAVO MUTICUS* (Linnaeus)) IN HUAI KHA KHAENG WILDLIFE SANCTUARY**

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**บทคัดย่อ**

จากการศึกษาลักษณะทางชีววิทยาและพฤติกรรมการสืบพันธุ์ ของนกยูงไทย ในเขตรักษาพันธุ์สัตว์ป่า ห้วยขาแข้ง จังหวัดอุทัยธานี และจังหวัดตาก ระหว่างเดือนตุลาคม พ.ศ. ๒๕๒๕ ถึงเดือนตุลาคม ๒๕๓๐ โดยการเดินสำรวจ ศึกษาพฤติกรรมจากห่างคัสต์ และใช้วิทยุติดตามสัตว์ ปรากฏว่านกยูงที่พบในเขตรักษาพันธุ์ ป่าแห่งนี้เป็นนกยูงไทยชนิดย่อยอินโดจีน ปกติจะอาศัยอยู่ในป่าผสมผลัดใบ ป่าเต็งรัง ป่าไผ่ ป่าดงดิบกลุ่มเล็กๆ ริมลำห้วย บริเวณโป่งและริมหนองน้ำในป่า ในฤดูผสมพันธุ์ มักพบนกยูงอาศัยอยู่ตามแนวลำห้วยสายใหญ่ๆ ที่มีเนินกรวดกลางน้ำ และหาดทรายริมฝั่ง ขนาดของดินที่อยู่อาศัยในฤดูผสมพันธุ์ มีขนาด ๑๔๘ เฮกแตร์

นกยูงออกหากินในเวลาประมาณ ๐๗.๐๐ น. หลบเข้าพำนักในทึ่มในเวลาประมาณ ๑๐.๐๐-๑๐.๓๐ น. และออกหากินอีกครั้งในเวลาประมาณ ๑๖.๓๐ น. นกยูงกินพืชอย่างน้อย ๖๖ ชนิด รวมทั้งแมลงและสัตว์มีกระดูกสันหลังขนาดเล็ก และกลับเข้านอนนอนในเวลาประมาณ ๑๘.๐๐-๑๘.๓๐ น. บนต้นไม้ที่สูงริมห้วย

การจับคู่ผสมพันธุ์ ของนกยูงไทยเป็นแบบโพลีแกมมัส ฤดูผสมพันธุ์ เริ่มจากเดือนพฤศจิกายนถึงเดือน มีนาคม นกยูงเพศเมียวางไข่บนพื้นดินในป่าใกล้ลำห้วย จำนวนไข่ต่อรังมีจำนวน ๒-๕ ฟอง และฟักออกเป็นตัว ภายใน ๒๖-๒๗ วัน โครงสร้างของประชากรของเพศตัวเต็มวัย : เพศเมียตัวเต็มวัย : ลูกนกที่ยังไม่โตเต็มวัย ในฤดูผสมพันธุ์ มีโครงสร้างเฉลี่ย ๑.๐๐ : ๓.๘๔ : ๐.๖๗

นกยูงไทยมีความสัมพันธ์ กับสัตว์ป่าชนิดอื่นที่อาศัยอยู่บริเวณเดียวกันเป็น ๒ รูปแบบใหญ่ๆ คือ แบบช่วยเหลือซึ่งกันและกัน และแบบเหยือกกับผู้ล่า

**ABSTRACT**

The study on the biological characteristics and breeding behaviours of green peafowl (*Pavo muticus* (Linnaeus)), which was carried out in Huai Kha Khaeng Wildlife Sanctuary, Changwat Uthai Thani and Changwat Tak, from October 1986 to October 1987, revealed that the green peafowl of this sanctuary is the Indo-Chinese green peafowl. This bird is commonly found in the mixed deciduous forest, dry dipterocarp forest, secondary forest, small patches of dry evergreen forest, salt licks and ponds in the forests. During the breeding season, this bird population usually comes to aggregate along the main streams which have sand bars and point bars. Its home range size in breeding season was 148 hectares.

Green peafowl is a diurnal bird, roosting in trees but feeding on the ground. It begins to forage at 07.00 a.m., rests in sheltered area at about 10.00-10.30 a.m. and forages again at 04.30 p.m. It feeds on at least 66 species of plants. Besides that it feeds on insects and small vertebrates. Generally, the roosting times range from 06.00-07.30 p.m. in groves of tall trees near the riversides.

The mating type of the green peafowl is polygamous and had a breeding season which lasts from November to March. The peahen nests on the ground in the forest or in high grass patches along the riversides. Clutch size ranges from 2-5 eggs with an incubation period of 26-27 days. The average population structure of adult male: adult female: immature bird in the breeding season was 1.00: 3.84: 0.67

The green peafowl has many types of relationships with other wildlife in the same habitats, but 2 main types are commonly recognized, symbiosis and predation.

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## INTRODUCTION

Humans and birds have been closely related for a long time. Pictures of birds were found on the walls of caves in Southern Spain. They were drawn by stone age man about 25,000 years ago (Wallace, 1955). Birds are useful natural resources. They benefit humans in many ways, such as meat-cropping, economic returns, environmental controllers, advances in biological and medical knowledge and recreation (Dasman, 1964). The peafowl, especially the green peafowl (*Pavo muticus* (Linnaeus)) is a big bird that has beautiful feathers. Many people have been emphasised that it is the most beautiful and most handsome pheasant in the world (Delacour, 1977; Norapuk, 1986).

In the past, green peafowl were commonly found in forests near main rivers or riversides of Thailand but recently the bird population has decreased and they are disappeared from many areas due to habitat destruction and hunting. Therefore, the green peafowl is noted as a vulnerable species (IUCN, 1979) but Bain and Humphrey (1982)

reported that this species is only a threatened species. Green peafowl has been declared as a type one protected species of Thailand (Wildlife Conservation Division, 1987). It means that naturally this bird is not used as food or game hunting. If no suitable solution and management the green peafowl in its natural habitat may disappear from the forests of Thailand in a near future. Thus the result of this research is expected to be useful to encourage personels and/or authorities concerned to make conservation, management and utilization programmes of this bird in the country successful.

### Objectives

1. To study home range terri-tory of the green peafowl in Huai Kha Khaeng Wildlife Sanctuary by observa-tion and radio tracking methods.
2. To investigate the status and habitat preference of the green peafowl in Huai Kha Khaeng Wildlife Sanctuary.
3. To study the distribution of the green peafowl in Huai Kha Khaeng Wildlife Sanctuary.
4. To study general and breed-

ing behaviours during the breeding season.

5. To study the population structure of the green peafowl in the breeding season.

6. To study the relationships

between the green peafowl and other wildlife.

7. To propose a suitable management plan for green peafowl conservation in Huai Kha Khaeng Wildlife Sanctuary.

### MATERIALS AND METHODS

#### Materials

1. Binoculars
2. Hand compass
3. Diameter tape
4. Camera and other protographic equipments
5. Blinds
6. Snares
7. Haga hypsometer
8. Radio tracking and equipments
9. Equipment for recording data
10. Dot grid
11. Maps of the Military Map Department (scale 1:50,000) and the Huai Kha Khaeng Wildlife Sanctuary map (scale 1:250,000)

#### Methods

1. Explored the area expected to be the green peafowl's habitat and

distribution, especially the area in which the peafowl has always been found, such as Pong Nai Sor, Khao Ban Dai, Huai Ai Yoh Junction, etc.

2. Consulted with official personels and other people who work in Huai Kha Khaeng Wildlife Sanctuary about the distribution and nesting of the green peafowl and reviewed from past research papers in this area.

3. Made 8 blinds for observing peafowl, 5 blinds at Khao Ban Dai, 1 at Pong Noi, 1 at Pong Nai Sor and 1 at Huai U Yee Junction in order to study their number age range, and behaviours such as food and food habit, territorial defence by the male, courtship display, care of young, habitat and climatic conditions, and the relationships between the green peafowl and other wildlife.

4. Captured peafowls by using 95 snares set along the riversides where the peafowl usually walks along in Khao Ban Dai and Huai Ai Yoh Junction according to the method used by Ponsena (1987).

5. Glued radio transmitter to the upper tail of the green peafowl by tying it on 2-3 feathers and glueing it on with permanent glue and tying the whip antenna along the feathers to the end of feathers.

6. Located checking stations and made the temporary paths to join the checking stations.

7. Drew a map of checking stations and checking areas

8. Tracked peafowl by radio receiver according to the method used by Brander and Cochran, 1969 ; Mac-

donald and Amlaner, 1980 and Tsuji *et al.*, 1987 with some modifications.

9. Drew maps of habitat area used by the trapped peafowl.

10. Searched for the roosting trees and made profile diagrams of the roosting stands.

11. Collected plant specimens in which the green peafowl forage on in various areas. The dry preservation were identified at the Royal Forest Department Herbarium and at the Herbarium of Botanical Section, Agriculture Department in Bangkok.

The botanical name is referenced from Smitinand (1980) while the zoological name is referenced from Lekagul and McNeely (1977) and Wildash (1968).

## RESULTS AND DISCUSSION

The green peafowl are found in habiting in 8 protected areas of Thailand, and Huai Kha Khaeng Wildlife Sanctuary has the largest population of this bird. The green peafowl of this sanctuary is the Indo-chinese green peafowl (*Pavo muticus imperator* Delacour).

Both sexes have almost the same brilliant green plumage, but the female is slightly less bright than the male. The female's legs, crest and spurs are shorter than of the male. During the mating period the male has train but it does not appear in female.

This bird is commonly found in the deciduous forests and riversides along Huai Kha Khaeng from Huai Krading junction down to Huai Pong Khi Thong and in Huai Ai Yoh from Huai Ai Yoh junction running upstream to Khlong Kho and a small area in Huai Mae Di watershed extending from Huai Mae Di junction up along the stream less than 2 km. The result is similar to the report of Rojanadilog *et al.* (1985), excepted for the Huai Song Thang area.

In 1983, at least 200 peafowls were estimated by Round (1983) for all distribution range in Huai Kha Khaeng Wildlife Sanctuary. Presently, the population has been considerably increased because of the good area protection and the abundance of suitable food especially bamboo grains. The estimated present population of the green peafowl in the whole sanctuary area is around 300-400 birds.

The bird's habitats composed of mixed deciduous forest, dry dipterocarp forest, secondary forest, small patches of dry evergreen forest, salt licks, sand

bars, point bars and ponds in the forests. All of these habitats have been free from human disturbance since the establishment of the sanctuary. The population concentration are high along the riversides during the dry period and dispersing in to the higher elevation during the wet season.

Three peafowls, 2 males and 1 female were caught for study by radio tracking method. The first male and the female were died by shock while we were attaching the radio transmitter. Therefore, only 1 male had been successfully attached the radio transmitter for checking its home range and daily activities. The results shown that the activity area per day was 68.28 hectares (ha) with a home range size in breeding season of 148.00 ha. The size of habitat utilization was varied month by month; 98.00 ha with 69.00 ha/day in January, 81.00 ha with 52.25 ha/day in February and 139.00 ha with 86.70 ha/day in March. The results from radio locating show that the bird was 47.34% of the times at the riverside, 40.77% of the times in

the mixed deciduous forest and 12.79% of the times in the dry dipterocarp forest.

Green peafowl is a diurnal bird in which it starts its daily activities at about 07.00 a.m. and return to the roosting site by 06.00-06.30 p.m. Dense fog usually delay the starting feeding time of the bird. It moves into dense shade about 10.00-10.30 a.m. and forages again in the afternoon at 04.30 p.m. Green peafowl feed on at least 66 species of plants of various parts, insects, reptiles, amphibia and fish. Vegetation is the main natural diet of the green peafowl. Bomboo grains are the favorite food of this bird.

The bird prefers to comfort its body by means of preening, sun bathing, dust bathing and rain bathing. These behaviours are usually alternated with others activities throughout the day. Green peafowl prefer to roost in the forest at a distance not more than 300 m. from the riverside in its territory or home range. The roosting tree grove is usually taller and larger than nearby forest stands. Generally, the roosting

tree is more than 20 m. tall with a sparsely cover of leaves in the dry period. Females commonly roost together on the same tree or the same group of trees while the male always roosts alone. The birds usually roost on the same group of roosting trees every night if there are no disturbances.

The green peafowl had loud resonant calls. The territorial declaring calls usually occur at 06.00-09.00 a.m. and 05.30-07.30 p.m. Vocal characteristics of male and female voices are very similar as well as among age groups of the same sex. The vocalization can be distinguished into 5 types depending on the purpose of uttering the call such as alarming, warning, gathering, mating and territorial calls. These vocal characteristics and vocalization are quite different from the reports of Rattana-wiboole (1986) and Maneekorn (1985). The differences may be caused by the vocal characteristics identification and personal variations of the observer.

This bird is a polygamous breeding type in which 1 male can mate with many females. The breeding season lasts

from November to March. In early stages of the breeding season, the adult males will separate himself to occupy point bars, sand bars and nearby forests to declare his mating territory while female flock roams through more than one male territory. The male will intimidate her by threatening, calling and approaching display. The females flock size ranges from 2 to 19 members but the common members are 3-5 birds. As the flock roams into the male territory, a female in heat will move close to the male and then they will mate. After mating the female separates herself to find nesting site. The peahen nests on the ground in the deciduous forests and high grasses patches along the riversides. The clutch size ranges from 2-5 eggs with an incubation period of 26-27 days. After the young come out from the eggs, then the mother take them out from the nest to forage in the undergrowth of forests and at the riversides. The chicks live with their mother for one year or more until the next breeding season. The average population structure of adult male : adult

female : immature bird in the breeding season at Khao Ban Dai region was 1.00 : 2.82 : 1.47 and at other areas of the sanctuary was 1.00 : 4.47 : 0.22.

The green peafowl has many types of relationship with other wildlife in the same habitats but two main types, symbiosis and predation were commonly found during this period of study. The most symbiotic way is predator warning. The common symbiosis relationship with animal species are Red jungle fowl (*Gallus gallus* (Linnaeus)); Greater coucal (*Centropus sinensis* (stephens)); Black drongo (*Dicrurus macrocercus* Vieillot); Greater racket-tailed drongo (*D. paradisens* (Linnacus)); Phayre's langur (*Presbytis phayrei* Blyth) and Common barking deer (*Muntiacus muntjak* (Zimmermann)), etc. The green peafowl is a predator of many small amphibia, reptiles, fish and insects but it is a prey of many carnivorous species in the area such as Masked palm civet (*Paguma larvata* (Hamilton-Smith)); Common water monitor (*Varanus salvator* (La-

urenti) ); Yellow tree monitor (*V. bengalensis* (Gray)); Leopard (*Panthera pardus* Linnaeus) and Crested serpent eagle (*Spilornis cheela* (Latham) ).

### CONCLUSIONS

In Thailand the green peafowl is found inhabit in 8 protected areas but Huai Kha Khaeng Wildlife Sanctuary has the largest population (300-400 birds). The green peafowl of this sanctuary is the Indo-Chinese green peafowl. Both the male and female have almost the same brilliant green plumage, but the female's colour is slightly less bright than the male's. Only the male has a train during the breeding season.

This bird is commonly found in the mixed deciduous forest, dry dipterocarp forest, secondary forest, small patches of dry evergreen forest, salt licks and ponds in the forests. During the breeding period, this bird population usually comes to aggregate along the main staeams which have sand bars and point bars. Its home range size in breeding season was 148 hectares.

Green peafowl is a diurnal bird, roosting in trees but feeding on the

ground. It begins to forage at 07.00 a.m., rests in sheltered area at about 10.00-10.30 a.m. and forages again at 04.30 p.m. It feeds on at least 66 species of plants, some insects, small reptiles, amphibia and fish. Bamboo grains are its favourite food. Preening, sun bathing, dust bathing and rain bathing are the common comfort behaviours which can be seen throughout the day. Generally, the roosting times range from 06.00-06.30 p.m. in groves of tall trees near the riversides. The bird frequently calls at 06.00-09.00 a.m. and 05.30-07.30 p.m. Vocal characteristics of the male and female are very similar but they have various kinds of calls for various situation.

The mating type of the green peafowl is polygamous and has a breeding season which lasts from November to March. During this period, the adult male will move to the point bars along

the main streams to establish its mating territory and try to defend the area from other males. It calls and displays to induce females to enter into his territory. Mating usually occurs in the morning and late afternoon. After mating, the female will separate herself from her flock to construct her nest. The peahen nests on the ground in the forest or in high grass patches along the riversides. Clutch size ranges from 2-5 eggs with an incubation period of 26-27 days.

The average population structure of adult male : adult female : immature bird in the breeding season at Khao Ban Dai region was 1.00 : 2.82 : 1.47

and at other areas of the sanctuary was 1.00 : 4.47 : 0.22.

The green peafowl has many types of relationships with other wildlife in the same habitats, but 2 main types are commonly recognized, symbiosis and predation. The most common symbiotic way was predator warning. The animals which the peafowl most commonly had a symbiotic relationship with were Red jungle fowl, Greater coucal, Black dongo and Common barking deer, etc. The green peafowl is a predator of many small vertebrates and insects but it is a prey of many carnivorous species such as Masked palm civet, Common water monitor, Leopard and Crested serpent eagle, etc.

### RECOMMENDATION

1. Further study should be carried out with a large sample size of transmitted birds over a period of 12 months. In addition, snares and workmen should be increased in numbers.

2. Glueing radio transmitter to the bird should not over 15 minutes or a tranquillizer should be administered

to the trapped peafowl in order to prevent shock and death.

3. More than 2 radio receivers should be used to check the movement of the radio transmitted to get a more accurate results.

4. Tape recorders should be used to record the calling sounds of the bird

on a sonogram.

5. Diet composition should be studied from dropping analysis, stomach analysis, and testing the diet composition of those peafowls in captivity.

6. People should be instructed not to disturb the peafowls in the study area, especially in the mating territory.

7. There should be increased protection in the sanctuary from hunters and poachers.

8. The peafowl population should be increased by propagating in large and wild captivity and then releasing them back into the forest areas which was a peafowl distribution range before.

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