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Characteristics of Bird Community by Types of Habitat in Deogyusan National Park

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Abstract: This study was to analyse on the bird communities of Deogyusan National Park conducted from July 2008 to June 2009, and from April to July, 2010. During the research period, a total of 2,689 individuals were observed, specifically, 12 orders, 34 families and 96 species. The most dominant species was *Passer montanus* (404 individuals, 15.02%), followed by *Paradoxornis webbianus* (156 individuals, 5.80%), *Emberiza elegans (*153 individuals, 5.69%), *Corvus frugilegus* (145 individuals, 5.39%), *Hypsipetes amaurotis* (110 individuals, 4.09%), *Streptopelia orientalis* (106 individuals, 3.94%), *Aegithalos caudatus* (97 individuals, 3.61%), *Cettia diphone* (94 individuals, 3.50%), and *Turdus pallidus* (89 individuals, 3.31%). The largest number of species were observed in May and June, breeding season, and in winter the number was low. The largest number of individuals were also observed in May and June, and the number was also low in fall and early spring. Species diversity was the highest in Baekryunsa area, forest area. Species richness was the highest in Seolcheon area, lowland snow area. Both species diversity and species richness were the lowest in Hyangjeokbong area, mountain ridge. The coefficient of similarity of research areas shows that species composition is dependent on environment. Areas were groups into Hyangjeokbong area (highland ridge), Baekryunsa area and Anseong area (slope and valley), and lowland area and Seolcheon area (farmland and stream).

Keywords: Dominant species, habitat, Species diversity, Species richness, Coefficient of similarity

Introduction

The Korean National Park, as one of the most representative ecological, natural and cultural sites of Korea, includes native plants of the Korean peninsula, the ecological significance of which cannot be emphasized more (Kim, 1993). However, the effective land use and the increase of visitors to the Korean National Park led to the expansion of road construction which on the other hand resulted in the ecological fragmentation and damage of natural habitat (Kim, 1993). While the analysis of 15 national parks revealed that the Jirisan, Seolaksan, Sokrisan, Hanrasan, Deogyusan, Odaesan and the Sobaeksan National Parks are the most valuable ecological sites to be preserved, while at the same time these areas are suffering the high level of disruption caused by visitors (Kim and Nam, 1996).

The Deogyusan National Park (established in February 1, 1975) is located in the central region of the Sobaek Mountains and is an inland mountain area surrounded by Gayasan (Mt.) to the east, Naejangsan (Mt.) to the west, Jirisan (Mt.) to the south and Gyeryongsan (Mt.) and Sokrisan (Mt.) to the north. Its most prominent peak is the Hywangjeokbong (1,614 m), followed by Seolcheonbong (1,510 m), Dumunsan (1,051 m), Jeoksangsan (1,029 m) and Geochilbong (1,177 m) and Jungbong (1,593 m), Muryongsan (1,492 m) and NamDeogyusan (1,507 m) to the south. The park stretches over 231.650 km^2 of surface area and includes 4 districts, including Jeonrabukdo and Gyeongsangnamdo (Korea National Parks Authority, 2004).

Studies on the avifauna of the Deogyusan National Park included a study by Lee *et al.* (1994), which reported 34 species of 16 families and 5 orders in its fall and summer study and a study by Lee (2003), which reported 69 species. Furthermore, such studies were conducted through natural resource study of the Deogyusan National Park (Korea National Parks Authority, 2004) and resource monitoring (Korea National Parks Authority, 2008), the studies were generally limited mostly to specific seasons, showing lack of a comprehensive study on thee avifauna of the region with regards to individual seasons and habitat types.

Therefore, this study was conducted in order to compare and analyze the avifauna of the Deogyusan National Park in relation to the months and area in order to provide information for effective protective measurement and systematic management of the Deogyusan National Park as an avian habitat.

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Table 1. Conditions of survey areas

Areas	Distance (km)	Altitude (m)	District
A	5	>1,300	ridge
B	10.2	600~1,500	east slope and valley
C	4.5	600~1,300	west slope and valley
D	18.6	<600	roadway, village, farmland, stream, reservoir
E	26.8	<600	roadway, village, farmland, stream, reservoir

A: Hyangjeokbong, B: Baekryunsa, C: Anseong, D: Lowland, E: Seolcheon

Materials and Methods

Study area

The Deogyusan National Park stretches over 2 provinces and 4 districts of Yeongnam and Honam region and was designated as a national park (surface area 231.650 km^2) in 1975. A 30 year census, taken between 1971 and 2000, showed annual average temperature of 10.4ºC, with the average temperature of 23.1ºC in July and August and –1.2 ºC in February. Annual average precipitation is 1,422.1 mm, with 57% of the total occurring during the summer and 8% during the winter. The Warmth Index (WL) is 85.7ºC/month and the Coldness Index (CL) is –20.7ºC/month (Korea National Parks Authority, 2004; Kim, 2010).

The Hyangjeokbong peak includes colonies of the *Taxus cuspidata* and the *Abies koreana*, and the ridge area includes colonies of the *Rhododendron schlippenbachii-Hemerocallis fulva*. The ridge area of Hyangjeokbong location 1,500 m above sea level includes the *Quercus mongolica* colony as the subtrees, with such colonies found in the tree layer of slopes or valley areas. Colonies of the *Q. variabilis* and the *Q. serrata*, along with *Pinus densifloa* colonies primarily in southern slopes and ridge area of the below half, were found in the area between 700 m and 1,000 m above sea level. The valley area included primarily colonies of the *Fraxinus mandshurica*, while the Chilyeon valley included colonies of the *Carpinus laxiflora* and the *Q. serrata* (Korea National Parks Authority, 2004; 2008; Kim, 2010).

In order to assess the avifauna of the Deogyusan National Park, the area was divided into 5 study sites: high-altitude ridge area of the Hyangjeokbong area (A: Seolcheonbong- Hyangjeokbong -Jungbong-Baekambong-Dongyeopryeong), the east slopes valley area of the Baekryunsa area (B: Jungbong-Osujagul-Baekryunsa-Gucheondong Visitors Center), western slopes and valley area of the Anseong area (C: Dongyeopryeong-Anseong Visitors Center), town, road, agricultural area, river streams and reservoir area of the low elevation area (D: Gucheondong and Anseong area under 600 m above sea level), town, road, agricultural area, river streams and reservoir area under 600 m above sea level of the Seolcheon area (E: Gucheondong-Rajaetongmun-Mupung-Eunsanri). The study was conducted over 12 sessions between July of 2008 and June of 2009 and over 4 sessions between April of 2010 and July of 2010, at a total of 16 sessions, on the avian colonies inhabiting the Deogyusan National Park area (Table 1, Fig. 1).

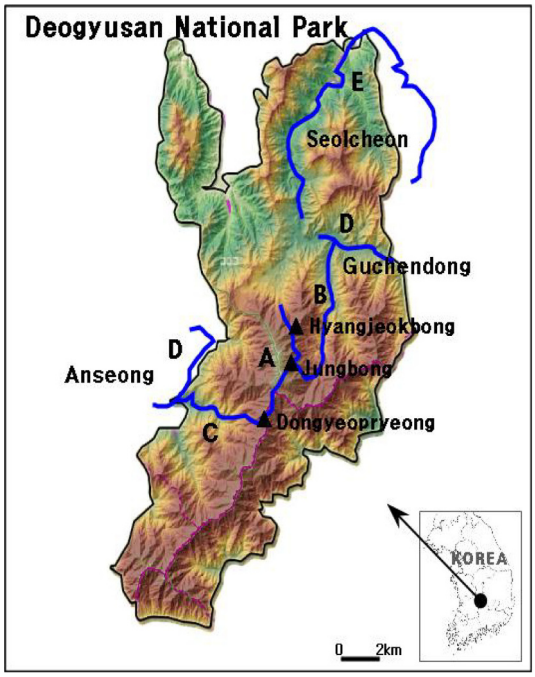

Fig. 1. Map showing the survey areas in Deokyusan National Park (survey route; —). A: Hyangjeokbong, B: Baekryunsa, C: Anseong, D: Lowland, E: Seolcheon

Study methods

The study was conducted using the line transect census method (Bibby *et al*. 1992) while moving along the hiking trail and roads of the Deogyusan National Park to examine bird community. Birds were observed using a binocular (Nikon 10×50), the naked eye or via bird cries in order to record bird species and individuals, and a GPS (Gamin 60CS) was used to record sites of observation. Observation data was organized by area using volume 25 (Ecosystem of birds) of the Illustrated Encyclopedia of Fauna & Flora of Korea (Won, 1981) and *A Field Guide to the Birds of Korea* (Lee *et al*., 2000).

Equations used for the analysis of the avian colonies are as follows.

Relative species density (*RD*) by Brower *et al*., (1990)