

Breeding Biology of Scaly-Bellied Woodpecker, *Picus squamatus*, in Margalla Hills National Park, Pakistan

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Abstract.- The study was designed to investigate the breeding biology of scaly-bellied woodpecker (*Picus squamatus*) in Margalla Hills National Park (MHNP), Pakistan. Ten active nests were located on tree trunks and out of these five successful nests were made at 1-3 meters, 2 at 5.1-7 meters, 1 at 9.1-11 and two were made at 13.1-15 meter height. Scaly-bellied woodpecker nests were built on chir pine *Pinus roxburghii* 13 (46%) and paper mulberry *Broussonetia papyrifera* 15 (54%) in MHNP. The clutch size was 4-6 and incubation period 16-17 days. Fifty three eggs were laid in the active nests, 42 (79.25%) hatched, 7 (13.21%) eggs were infertile and 4 (7.54%) eggs were destroyed. Out of 42 nestlings, 36 (85.71%) fledged and remaining 6 (14.29%) were lost. No predation was recorded in the present study. The body weight of nestlings up to five days was recorded as 10, 16, 22, 30 and 36 g on the 1-5th day of hatching. This is the first ever report on the breeding biology of scaly-bellied woodpecker population present in Margalla Hills National Park, Pakistan.

Keywords: Nesting, woodpecker, cavity-nesting.

INTRODUCTION

Woodpeckers (family Picidae) are characterized in having stiffened tail feathers and a powerful bill, specialized to feed on insects. Woodpeckers are susceptible to habitat changes and act as general indicators of forest biodiversity and specific indicators of forest bird species (Mikusinski *et al.*, 2001) and also serve as bio-control for insects (Pechacek, 2006). Moreover, by providing the cavities for secondary cavity nesters, the woodpeckers may interact with many species and play their role as a key-stone species (Smith, 2006). The fragmented habitats have adverse effects on breeding capacity of many woodpecker species (Virkkala *et al.*, 2006). It is believed that woodpeckers as an insect eater; have important role in bio control and ultimately in restoration processes of natural habitat. The resources used by woodpeckers can be analyzed in terms of food, dead wood, tree species and habitat patches. The wise use of restoration ecology in rehabilitating the woodpeckers in their natural habitat is a necessary tool, because many of the woodpeckers are

considered as charismatic species and several of them are red-listed (Virkkala, 2006; Mikusinski, 2006).

Scaly-bellied woodpecker is distributed in Afghanistan, India, Nepal, Pakistan and Turkmenistan. In Pakistan, it is found in Chitral, Gilgit through Kashmir, Baltistan and Punjab salt range, Nathia Galli, Margalla Hills National Park, Pakistan (Roberts, 1991). The global status of scaly-bellied woodpecker is least concern (IUCN, 2012). The natural habitat of scaly-bellied woodpecker are boreal forests, temperate forests, and subtropical or tropical moist lowland forests and utilizes a wide range of altitudes from 1500–3300 m (Ali and Reply, 1983; Mikusinski, 2006).

Margalla Hills National Park (MANP) is a part of lesser Himalayas located north of Islamabad, Pakistan and covers an area of 17,386 hectares. MHNP has many valleys and Tilla Charouni with 1604 m is its highest point. The area is rich in biodiversity and almost 391 bird species are reported to be present; many of them are regular breeders in MHNP. The woodpecker species found in MHNP are scaly-bellied woodpecker (*Picus squamatus*), lesser golden-backed woodpecker (*Dinopium benghalense*; Linnaeus); Sind pied woodpecker (*Dendrocopos assimilis*), Himalayan woodpecker (*Dendrocopos himalayensis*), Rufous-

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bellied pied woodpecker (*Dendrocopos hyperythrus hyperythrus*), yellow fronted woodpecker (*Melanerpes flavifrons*), brown-fronted woodpecker (*Leiopicus auriceps*), fulvous-breasted woodpecker (*Dendrocopos macei*) and grey-capped pygmy woodpecker (*Dendrocopos canicapillus*). Among these species, some are resident and some are migrant (Mikko, 2001). A small resident population of scaly-bellied woodpecker is known to exist in MHNP, Pakistan (Roberts, 1991). No information is available in published literature regarding the breeding biology of the scaly-bellied woodpecker population present in the region. Therefore, the present study was designed with the objective of investigating the breeding biology of scaly-bellied woodpecker in MHNP, Pakistan.

MATERIALS AND METHODS

Study area

MHNP, (33° 43' N and 72° 55'E), is located in northern Pakistan <http://en.wikipedia.org/wiki/Pakistan> at the foothills of the Himalayas <http://en.wikipedia.org/wiki/Himalayas>. The MHNP is spread over an area of 17,386 ha with elevation 456–1580 m above mean sea level (amsl). It was established in 1980 with the aim to protect biodiversity, culture, heritage and landscape. The overall vegetation of this national park is divided into two slopes; The southern slope is short stuttered, comprising of deciduous and evergreen trees with diverse shrub growth while the northern slope consist of pines and groves of oak. The park has a rugged topography of steep slopes and gullies, with predominance of limestone rocks. Deforestation and grazing have caused soil erosion, leaving shallow residual soil or parent rocks (Shinwari *et al.*, 2001). Average temperature ranges between 16.9 and 40.1°C during summer and 3.1 to 24.7°C during winter. The major part of the precipitation (annual average 120 cm) is received during July – August, and the snowfall is occasional (Masud, 1977). A total of 608 plant species have been recorded from the park, including *Acacia modesta*, *Bauhinia variegata*, *Cassia fistula*, *Bombax ceiba* (trees), *Dodonaea viscosa*, *Woodfordia fruticosa*, *Justicia adhatoda* and *Zizyphus mauritiana* (shrubs). These provide major

forest cover. Some 30 species of mammals, including rhesus monkey (*Macaca mulatta*), jackal (*Canis aureus*), wild boar (*Sus scrofa*), grey goral (*Naemorhedus goral*), common leopard (*Panthera pardus*) and barking deer (*Muntiacus muntjac*); 250 species of birds, 17 species of reptiles, six (6) species of amphibians and 27 species of fish have been reported from the park area (Anjum *et al.*, 1984; Rafique *et al.*, 2005; Hameed *et al.*, 2009).

Field data collection

Data were collected from August 2009 to July 2010. Preliminary field surveys were conducted to mark the nests of scaly-bellied woodpecker. Both male and female excavate many nests before the start of breeding season and only few are occupied by them (Personal observation). The breeding season of scaly-bellied woodpecker starts from late April and ends in early June. Field observations were taken from early morning till late evening. The observations were aided by the use of binoculars (20×50mm). The numbers of tree cavities (occupied or unoccupied) were noted before the breeding season and the number of active nests that were occupied by the woodpeckers were also confirmed subsequently. The nest parameters (the entrance diameter, height from the ground and depth of the nest cavity and material found inside the nest), nest location characteristics (tree species on which cavities were found, cavity status (occupied or unoccupied) and position of nest from the ground, breeding success (clutch size, incubation period, nestling and fledging success) and losses (nest, eggs and nestlings) were recorded. The time and time span of the breeding season, egg laying, incubation period and numbers of hatchlings were also recorded.

Statistical analysis

The data on the breeding biology of scaly-bellied woodpecker are presented in percentages and the data based upon the dimension of nest and eggs are presented in mean and standards deviations.

RESULTS AND DISCUSSION

Twenty eight tree cavities were located before the breeding season. Active tree cavities were

monitored during the breeding season in the study area. Ten cavities were successfully occupied by scaly-bellied woodpecker.

Nest cavity location and substrate

The data on cavity site, height and vegetation type for nest building on the nesting success of scaly-bellied woodpecker in MHNP are given in Table I. Scaly-bellied woodpecker preferred to excavate nest holes on the tree trunk compared to forks. The findings of the present study are in partial confirmation of the results of study conducted on red-cockaded woodpecker; *Leuconotopicus borealis*, that the nest holes are placed on the tree trunks and not on other parts of the tree (Ligon, 1970; Johnsgard, 2009).

Table I.- Nesting success of scaly-bellied woodpecker in Margalla Hills National Park, Pakistan (n=28).

Particulars	Total nests	Successful nests	Failed nests
	No. (%)	No. (%)	No. (%)
Position of nest			
Tree Trunk	26 (92.86)	10 (100)	16 (88.89)
Fork	2 (7.14)	0 (0)	2 (11.11)
Total	28 (100)	10 (100)	18 (100)
Height from ground (m)			
1-3	6 (21.43)	5 (50)	1 (5.55)
3.1-5	3 (10.71)	0 (0)	3 (16.67)
5.1-7	4 (14.29)	2 (20)	2 (11.11)
7.1-9	2 (7.14)	0 (0)	2 (11.11)
9.1-11	5 (17.86)	1 (10)	4 (22.22)
11.1-13	3 (10.71)	0 (0)	3 (16.67)
13.1-15	5 (17.86)	2 (20)	3 (16.67)
Total	28 (100)	10 (100)	18 (100)
Vegetation type			
<i>Broussonetia papyrifera</i>	15 (53.57)	4 (40)	11 (61.11)
<i>Pinus roxburghii</i>	13 (46.43)	6 (60)	8 (38.89)
Total	28 (100)	10 (100)	19 (100)

Nest characteristics

The dimensions of the nest cavities of scaly-bellied woodpecker in MHNP are given in Table II. The mean height of the nest cavity hole from ground level was 6.08 m (1.2–14.6 m), mean cavity depth was 32.97 cm (25.4–38.1 cm) and mean entrance diameter was about 5.95 cm (5.08–6.5 cm). The

findings of present study are somewhat similar with the data reported on nest site characteristics of red-bellied woodpecker (*Melanerpes carolinus*) that was reported 5.08 cm in entrance diameter, 22.86 cm in depth and at the height of 12.2 m from ground (Stockard, 1904). However, the nest entrance diameter of the nest in black woodpecker (*Dryocopus martius*) was reported 9.2 cm in width. It is pertinent to mention that wood chips and dust were seen scattered inside the cavity that might be used to protect the eggs from being damaged and also to prevent the heat losses during incubation.

Table II.- Dimensions of nests of scaly-bellied woodpecker in Margalla Hills National Park, Pakistan (n = 28).

Dimensions (cm)	Mean± SD	Range
Entrance diameter	5.94±0.55	5.08 – 6.5
Cavity depth	32.97±4.85	25.4 – 38.1
Height from ground (m)	6.08±4.59	1.2 – 14.6

Clutch size, incubation period, hatching and fledgling success

The data on clutch size, incubation period, hatching and fledgling success of scaly-bellied woodpecker in MHNP is given in Table III. The eggs found in the nests of scaly-bellied woodpecker were oval in shape and white in color. The clutch size ranged between 4 to 6, with 90% of the nests having 5-6 eggs, while only 10% had 4 eggs. It has been observed that scaly-bellied woodpecker has clutch size almost similar to other members of the family Picidae e.g. in great spotted woodpecker (*Dendrocopos major*), with clutch size four to six (Mazgajski, 1998), three to six in hairy woodpecker (*Leuconotopicus villosus*), and two to six in red-bellied woodpecker (Bent, 1939). In present study, egg incubation period in scaly-bellied woodpecker was recorded 16-17 days (Personal Observation) that is similar to the previous observations which is 17 days (Roberts, 1991). The incubation period is similar to other species of woodpeckers; in Sindh pied woodpecker (15-16 days), black-naped green woodpecker (*Picus canus sanguiniceps*) (17 days) and in lesser golden-backed woodpecker (17-19 days) (Roberts, 1991). The incubation period of pileated woodpecker (*Hylatomus pileatus*) and red-

bellied woodpecker was reported 18 and 14 days, respectively (Bendire, 1895; Forbush, 1927; Bent, 1939; Johnsgard, 2009). It was observed that young ones were naked and blind at hatching. Hatching and fledgling success in nests having 5-6 eggs was 90%.

Table III.- Reproductive parameters of scaly-bellied woodpecker in Margalla Hills National Park, Pakistan (n = 28).

Clutch size	No. of active nests (%)	Hatchling success (%)	Failed nests (%)
4	1 (10)	0 (0)	0 (0)
5	5 (50)	5 (50)	5 (50)
6	4 (40)	4 (40)	4 (40)
Total	10 (100)	9 (90)	9 (90)

Table IV.- Dimensions of eggs of scaly-bellied woodpecker in Margalla Hills National Park, Pakistan (n=53).

Particulars	Mean± SD	Range
Length (cm)	3.29±0.12	3.02-3.43
Width (cm)	2.30±0.08	2.15-2.4
Weight (g)	14.5±0.51	14-15

Table V.- The nestling success and causes of eggs and nestling loss in scaly-bellied woodpecker in Margalla Hills National Park – Pakistan (n=28).

Particulars	Number (%)
Egg stage	
Total No. of nestlings	53 (100)
Hatched	42 (79.24)
Infertile	7 (13.21)
Predated	0 (0)
Other losses	4 (7.55)
Nestling stage	
Total No. of nestlings	42 (100)
Fledged	36 (85.71)
Predated	0 (0)
Other Losses	6 (14.29)

Egg dimensions

The mean egg length was 3.29±0.23 cm (3.02–3.43 cm), mean egg width was 2.30±0.1 cm

(2.15–2.4 cm) and mean egg weight was recorded 14.5±0.2 g (14–15 g). Whistler and Late (2007) reported 3.25 cm length and 2.06 cm width. In magellanic woodpecker (*Campephilus magellanicus*) egg length ranges from 3.31-3.49cm and width ranges from 2.29-2.45 cm (Ojeda, 2004). The weight range of the eggs was about 12.25-12.60g.

Egg and nestling loss

During study period in active nests 53 eggs were laid, out of which 42 (79.25%) eggs hatched, 7 (13.21%) eggs were infertile, 4 (7.54 %) were destroyed by wood cutters during the cutting of trees. No sign of predation was observed during the current study in the breeding season of the species. A total of 42 nestlings were produced out of which 36 (85.71 %) fledged, and remaining 6 (14.29 %) were lost.

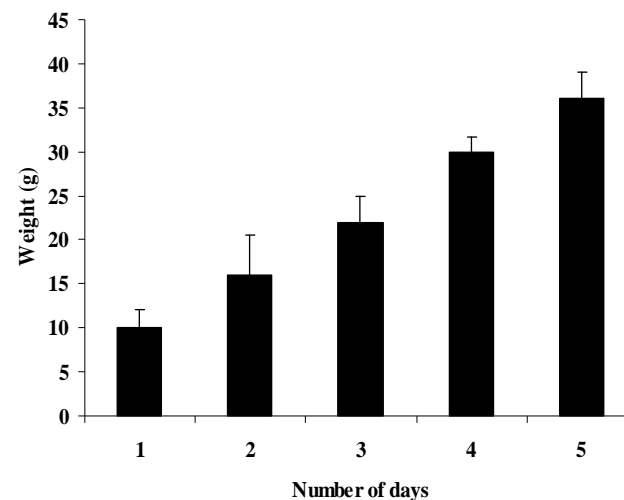


Fig. 1. Body weight of the nestlings of Scaly bellied woodpecker up to five days.

Nestling weight

The mean body weight of nestlings of scaly-bellied woodpecker during the first five days after hatching was 10±2.45, 16±4.5, 22±3.0, 30±1.6 and 36±3.0 g, respectively (Fig. 1). In magellanic woodpecker, nestling weight was recorded as 122.7 and 125.5 g weight at day first and three of hatching, respectively (Ojeda, 2004).

REFERENCES

- ALI, S. AND RIPLEY, S. D., 1983. *Handbook of the birds of India and Pakistan*. Oxford Univer. Press, Delhi, India.
- ANJUM, A., MAQSOOD, A., MUNIR, A. AND GHULAM, A., 1984. *Status of habitat and distribution of wildlife in Islamabad district*. Annual Report, PARC, Islamabad, Pakistan.
- BENDIRE, C.E., 1895. Life histories of North American birds. *Smithson. Inst. U.S. Nat. Mus. Bull.*, **174**: 237-245.
- BENT, A.C., 1939. Life histories of North American woodpeckers: order piciformes. *Smithson. Inst. U.S. Nat. Mus. Bull.*, **174**: 1-15.
- FORBUSH, E.H., 1927. *Birds of Massachusetts and other New England states*. Vol. II. Massachusetts Department of Agriculture, Boston.
- HAMEED, W., ABBAS, F. AND MIAN, A., 2009. Population features of barking deer (*Muntiacus muntje*) in Margalla Hills National Park, Pakistan. *Pakistan J. Zool.*, **41**: 137-142.
- IUCN, 2012. *Red list of threatened species*. Version 2012.1. <www.iucnredlist.org>. Downloaded on **03 June 2015**.
- JOHNSGARD, P.A., 2009. *Birds of great plain: Family Picidae (Woodpeckers)*. University of Nebraska-Lincoln Press.
- LIGON, J.D., 1970. Behavior and breeding biology of red-cockaded woodpecker. *Auk*, **87**: 255-278.
- MASUD, R.M., 1977. *Master plan for Margalla Hills National Park, Islamabad, Pakistan, 1979 to 1984*. National Council for Conservation of Wildlife, Islamabad.
- MAZGAJSKI, T.D., 1998. Nest-site characteristics of great spotted woodpecker *Dendrocopus major* in central Poland. *Polish J. Ecol.*, **46**: 33-41.
- MIKKO, P., 2001. *Birds of Islamabad: status and seasonality*. WWF, Pakistan, pp. 130.
- MIKUSINSKI, G., GROMADZK, M. AND CHYLARECKI, P., 2001. Woodpeckers as indicators of forest bird diversity. *Conserv. Biol.*, **15**: 208-217.
- MIKUSINSKI, G., 2006. Woodpeckers: distribution, conservation and research in a global perspective. *Ann. Zool. Fenn.*, **43**: 86-95.
- OJEDA, V.S., 2004. Breeding biology and social behavior of Magellanic Woodpecker in Argentine Patagonia. *Eur. J. Wildl. Res.*, **50**: 18-24.
- PECHACEK, P., 2006. Breeding performance, natal dispersal and nest site fidelity of three-toed woodpecker in the German Alps. *Ann. Zool. Fenn.*, **43**: 165-176.
- RAFIQUE, M., HASAN, S.A. AND BAIG, K.J., 2005. *Inventory of faunistic diversity in Margalla Hills National Park*. Ist Annual Report (2004-05), Pakistan Museum Natural History, Islamabad.
- ROBERTS, T.J., 1991. *The birds of Pakistan. vol.1*. Oxford University Press, Karachi.
- SHINWARI, I., SHINWARI, M.I. AND KHAN, M.A., 2001. Marketable medicinal plants of Margalla Hills National Park, Islamabad, Pakistan. *Pakistan J. Forest.*, **51**: 63 – 70.
- SMITH, K.W., 2006. The implications of nest site competition from starlings *Sturnus vulgaris* and the effect of spring temperature on the timing and breeding performance of great spotted woodpecker *Dendrocopus major* in southern England. *Ann. Zool. Fenn.*, **43**: 177-185.
- STOCKARD, C.R., 1904. Nesting habits of the woodpeckers and vultures in Mississippi. *Auk*, **21**: 463-471.
- VIRKKALA, R., 2006. Why study the woodpeckers? The significance of woodpeckers in forest ecosystem. *Ann. Zool. Fenn.*, **43**: 82-85.
- WHISTLER, H. AND LATE, F.Z.S., 2007. *Popular handbook of Indian birds*. Indian Imperial Police. 4th ed. Revised and Enlarged by Norman BK. British Museum Natural History London, pp. 264.

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