

The breeding biology of the Black-faced Spoonbill *Platalea minor*

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ABSTRACT. The breeding biology of the Black-faced Spoonbill *Platalea minor* was studied on Dokdo Island (38°45'N, 124°58'E), D.P.R. Korea from late May to early August, 1995. Black-faced Spoonbills' nests were situated 42.4 m up the cliff, and were between 1.2 m and 1.5 m from each other. Of the five nests observed, two were old Spoonbill nests, and two were old Grey Heron *Ardea cinerea* nests while one was a new Spoonbill nest.

The clutch size was three in each case ($N = 5$). Eggs observed were oval, and white with small brown spots. Two pairs had their first clutches of 3 eggs destroyed by Herring Gulls *Larus argentatus*. Both pairs laid second clutches of three eggs within 2 weeks.

The incubation period was 26 days in each of the 5 nests. Incubation duties were shared by males and females, and there were 4.4 ± 1.3 (SD) ($N = 29$) exchanges/day.

The brooding period was 40 days. The main food item of these spoonbills was fish (mainly *Acanthogobbius flavinanus*). The number of feedings/day was 4.1 ± 1.3 ($N = 44$), and decreased in the late nestling period.

Key words: breeding ecology, conservation, *Platalea minor*, Dokdo Island, D.P.R. Korea

INTRODUCTION

The Black-faced Spoonbill *Platalea minor* of East Asia is a rare species (del Hoyo *et al.* 1992), presently known to breed only on the Korean Peninsula and in Northeast China, and winter on the Jiangsu province (China), in Taiwan, Hong Kong, and Kyushu (Japan). The wild population of Black-faced Spoonbills is estimated to be about 600 individuals from observation in wintering sites (Dahmer & Feley unpubl. data; see Appendix 1 of these Proceedings). However, only about 100 Spoonbills are known to breed on the Korean Peninsula (Chong & Pak 1999, these proceedings). There are no records of breeding in Far East Russia (Li *et al.* 1994), and the present status of historic breeding sites in China are unknown (Zhen Zoo Xin 1976, Zhao Zheng Jie 1984, 1985).

The Spoonbills' historic range on the Korean Peninsula included the lower Duman River in north Hamgyong Province, Pyongan Province, Kyonggi Province, Chonra Province, south Gyongsang Province or Cheju Island (Won Hong Gu 1963). The present breeding sites on the Peninsula are shown in Chong & Pak (1999).

A lack of information on the species poses problems for its conservation. Comprehensive research to explain the apparent difference between the known numbers of wintering and breeding individuals has not been possible yet, and the Spoonbill's breeding biology itself has



Fig. 1. Study site, Dokdo Island.

not been known. In this paper we report our observations of 5 nests on Dokdo Island, North Korea (DPRK), from courtship to fledging.

STUDY SITE AND METHODS

Dokdo Island (38°45'N, 124°58'E), is located within the political unit of Kumsong-ri, Onchon County, south Pyongan Prov. and lies west of Kumsong-ri. The circumference is 1.2 km, and its highest elevation is 85 m. A sand beach is revealed at low tides all round the island. The north and east sides are steep cliffs, while the south side is not steeply inclined. Spoonbills nest on the north and west sides.

The flora of Dokdo Island is dominated by *Artemisia selengensis*, *Chenopodium album*, *Pteridium aquilinum*, *Lespedeza cyrtobotrya*, *Pueraria lobata*, *Sambucus coreana*, *Fraxinus rhynchophylla*, *Weigela subsessilis* (Fig. 1).

During the study period, a further 35 species of birds of 22 families were seen on Dokdo Island. The most common species in the cliff area, and those most closely associated with the Spoonbills, were Grey Herons *Ardea cinerea*, Pelagic Cormorants *Phalacrocorax pelagicus* and Herring Gulls *Larus argentatus*.

Five adult pairs, 1 sub-adult and 3 juveniles were present on the island. Observations on one nest were continued for 80 days, from May 25 to August 10, 1995, with the other 4 nests providing incidental information. The observation point was located on a promontory of Dokdo Island overlooking the nesting cliff.



Fig. 2. Courtship behavior of Black-faced Spoonbill.

RESULTS

Copulation

Copulation by Black-faced Spoonbills began with courtship behavior. The male initiated courtship by preening the female's cheek, head and neck. His mate responded by rubbing the male's head and neck (Fig. 2). This continued for 4 to 5 minutes, after which the male raised his head plumage, grasped the female's bill about the mid-point and initiated copulation for 7 to 8 seconds (Fig. 3).

This courtship behavior and copulation continued until the day before the final egg was laid. Extra-pair copulation was not observed.

Nesting

Of the five nests observed, two were old spoonbill nests, two were old Grey Heron nests while one was a new spoonbill nest. The re-used Heron nests were 40 cm and 80 cm in diameter, while the re-used spoonbill nests were 20 cm and 50 cm. Nests were placed 42.4 m high on the cliff, and were between 1.2 m and 1.5 m from each other.

Black-faced Spoonbills were observed to build a new nest by placing 1 or 2 sticks on the substrate before egg laying, and then adding more sticks during incubation. It reached 50 cm at the widest point, and 20 cm at the narrowest. All pairs were observed to supplement their nests during incubation, brooding and fledging. The male brought sticks to the nest, and passed them to the female who placed them in the nest with her bill. The addition of sticks may insure that the chicks do not fall out as the nest deteriorates during the nestling period, and may imprint them with this nesting behavior.

Egg laying and brooding

The spoonbills laid one egg every other day, until the clutch size of three was reached ($N = 5$). Eggs observed were oval, and white with small brown spots. Two pairs had their

Table 1. Date of laying of first egg and number of eggs in each nest.

Nest No.	First nesting		Re-nesting	
	Date of egg laying	Number of eggs	Date of egg laying	Number of eggs
1	29 May	3		
2	23 May*	3	8 Jun	3
3	5 Jun*	2	27 Jun	2
4	8 Jun	3		
5	?		1 Jul**	3

*First eggs, damaged by *Larus argentatus* ; birds began to breed after supplementary egg-laying.

**Date of laying of first egg unknown; this seemed to be supplementary egg-laying.



Fig. 3. Copulation of Black-faced Spoonbills.

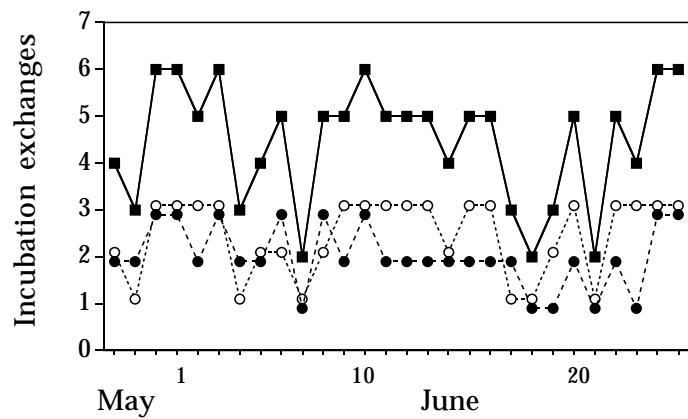


Fig. 4. Fluctuation in numbers of incubation exchanges by Black-faced Spoonbills during incubation period. ●: incubation exchange from male to female, ○: from female to male, ■: total number of exchanges.

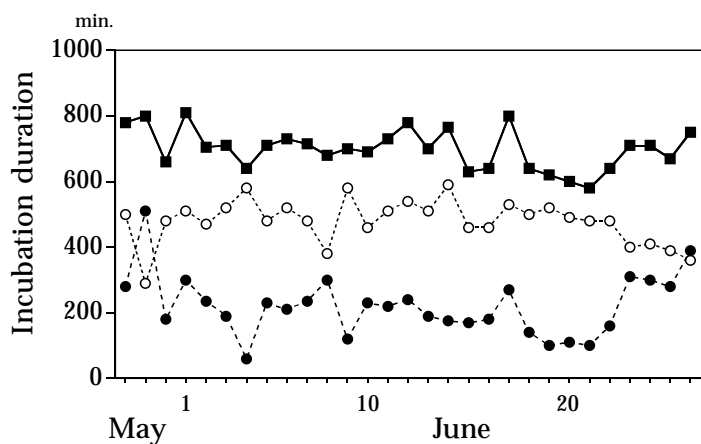


Fig. 5. Fluctuation in duration of incubation of Black-faced Spoonbills during incubation period. ●: female, ○: male, ■: total.

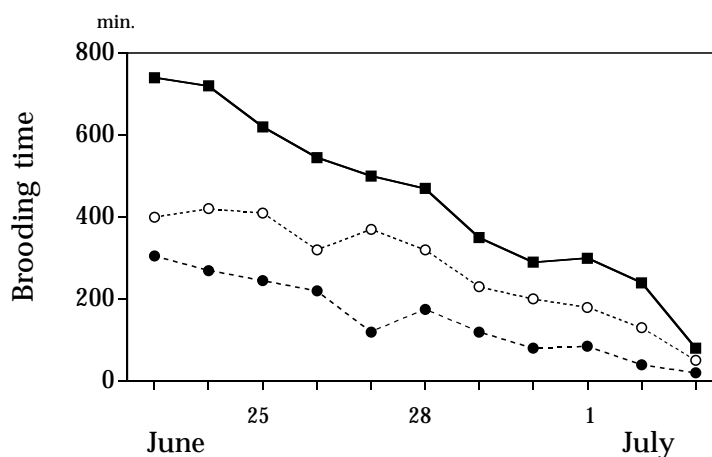


Fig. 6. Fluctuation in brooding time of Black-faced Spoonbills during nestling period. ●: female, ○: male, ■: total.

first clutches of 3 eggs destroyed by *Larus argentatus* on May 23 and June 5. Both pairs laid second clutches of three eggs within 2 weeks (Table 1).

The incubation period was 26 days in each of the 5 nests. Incubation duties were shared by males and females, and 4.4 ± 1.3 (SD) ($N = 29$) exchanges/day were common (Fig. 4). Of 342.6 daylight hours recorded, females incubated 105.6 hours (30.8 %), and males 237.0 hours (69.2 %) (Fig. 5). Night incubation (19:00 H to 07:00) was done solely by the female. They often turned the eggs during incubation exchanges. On the 25th day of incubation, just before hatching, adults placed small twigs in the nest.

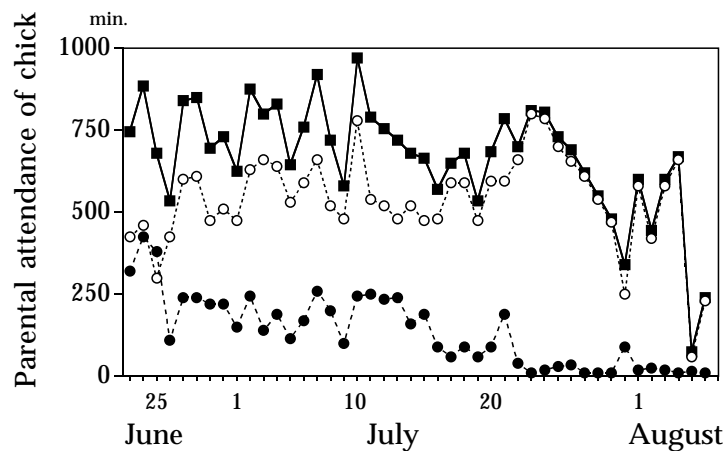


Fig. 7. Time spent attending the chicks by parent Black-faced Spoonbills during the nestling period. ●: female, ○: male, ■: total.

Brooding

The brooding period was 40 days. The adults brood the chicks until 11 days after hatching. The brooding time of the male was 92.3 hours (65.8 %), and of the female was 47.9 hours (34.2 %). Total observation time was 140.2 hours (Fig. 6). Brooding time decreased throughout the nestling period.

During the fledging period, the female attended the chick 104.3 hours (46.4 %), and the male was in attendance 120.6 hours (53.6 %) of the 224.9 total observation hours (Fig. 7).

Main food items of Spoonbill were fish (mainly *Acanthogobbius flavinanus*). The chick was fed 4.1 ± 1.3 times/day ($N = 44$), and number of feedings decreased during late nestling period (Fig. 8).

Day 3 (June 26)

The eyes were opened. Soft pin-feathers were seen in the skin. The bill's tip was sharp.

Day 9 (July 2)

The body was covered with grey pin-feathers. The bill was flesh colored, and the bill's tip rounded. The chick began to walk and give hunger calls of "choruruk."

Day 14 (July 7)

The body was covered with white feathers, and the head plumage covered the ear. The chick competently walked and preened. The lores had become black, the bill had changed into a spoon shape and black spots had appeared on the primaries.

Day 26 (July 19)

The chick's bill was light black in color and half the length of the adult's, while the body size was slightly smaller than the adult. Wings were fully feathered, and the tail 5 cm in length. The legs were black. The chick exercised often, and kept its balance by flapping its wings.

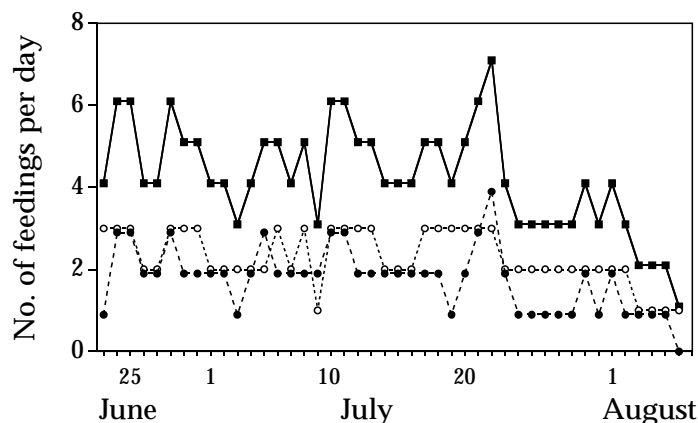


Fig. 8. Fluctuation in numbers of feedings by parent Black-faced Spoonbills during nestling season.
 ●: female, ○: male, ■: total.

Day 30 (July 23)

The adults breeding plumage was disappearing, as plumes were being shed and the yellow breast was becoming lighter.

Day 38 (July 31)

One chick of the primary nest spent a night in a different nest, but did not beg from the adult there and was not fed.

Day 40 (August 2)

The chicks bill had a black spot on the end of the bill, and the bill size was 3/5 that of the adults. The body size was still smaller than the adult. The chick fledged around the 40th day. The adults and the fledged chicks flew together, exercising and feeding.

Breeding Success

The five pairs laid a total of 20 eggs during the season. Six eggs (of two nests) were predated by *Larus argentatus* before brooding. The spoonbills successfully hatched nine (64.3 %) of their 14 brooded eggs. This low hatching success is a result of three eggs from a single nest being destroyed by *Larus argentatus* on the 20th day of incubation (July 7), and a further three eggs of one nest and two eggs of another not hatching. Excluding the predated nests, hatching success was 81.8 %. Six chicks reached fledging, which is 42.8 % of the eggs laid, and 66.6% of chicks hatched. The cause of mortality of three chicks was falling from the nest, which occurred on the 18th, 20th and 26th day after hatching.

CONCLUSION

It is difficult to compare the breeding success of Black-faced Spoonbills on Dokdo Island with that of other breeding sites, because there are few previous reports on the breeding biology of this species. Information on clutch sizes before 1960 gives 4 to 6 eggs as a normal clutch (Won 1963), but all clutches observed on Taegam-do and Sogam-do Islands since

1981 have had no more than three eggs (Pak, unpubl. data).

Larus argentatus was an important natural enemy of the nesting spoonbills. Gulls destroyed eggs of 3 nests during the study period. Two nests were predated early in the breeding cycle, and the adults laid second clutches, but the third nest was predated too late during incubation for re-nesting.

The spoonbills of Dokdo Island feed in the reclaimed land of Kumsong-ri, and the shallow waters nearby. From observations of the chicks being fed at Dokdo, it appears that their main diet is *Acanthogobbius flavinanus*. Other research on stomach contents of some individuals has found 1) 90 % fish, 9% shrimp and 1% crab, 2) 100 % clams, and another 3) contained larvae of *Diptera* and *Lepidoptera* (Insect) (Won 1963). The available prey in the area of Dokdo, and the birds' feeding habits can be studied.

Dokdo Island is an important breeding area for spoonbills, and also for Chinese Egrets *Egretta eulophotes*, 200 pairs of which breed there. Presently the island is designated as a State Natural Monument of the DPRK, and thus we would like to encourage an active management scheme. Possible management programs to improve breeding success would be to move the *Larus argentatus* colony to the island's south side. Research should be designed so that it does not disturb the breeding birds. Conservation of the feeding sites is crucial to the continuing success of the Spoonbill colony, and to the bio-diversity of wetlands on the Korean Peninsula.

On a larger scale, a comprehensive investigation of potential breeding sites on the Korean Peninsula and in Liaoning Province, People's Republic of China, is a high priority. Through research, and by increasing the public's awareness of this species, we can enter a new phase of conservation for this endangered and beautiful bird of the wetlands.

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