Population, status, moult, measurements, and subspecies of Knot *Calidris canutus* wintering in south India

S. Balachandran

Balachandran, S. 1998. Population, status, moult, measurements, and subspecies of Knot *Calidris canutus* wintering in south India. *Wader Study Group Bull.* 86: 44 - 47.

The Knot *Calidris canutus* is a regular winter visitor to India; the same subspecies *rogersi* winters both in India and Australia. Wintering adults arrive with partial primary moult in October and complete moult by January. The weight observed at departure time (March) is much less than that observed in Australia.

Balachandran, S., Bombay Natural History Society, Mumbai-400 023. India. Present address: 11/100, Central Street, Agasteeswaram & P.O., Kanyakumari District. Tamil Nadu. S. India. 629701

INTRODUCTION

The migration and distribution of Knot *Calidris canutus* is better known than that of any other wader species (Piersma & Davidson 1992). However, the information from the Indian wintering grounds is very scanty. This is evident from the status of rare vagrant given by Ali & Ripley (1983) and Cramp & Simmons (1983) to Knot in India. Bird ringing carried out at the Gulf of Mannar between 1985-1988 by the Bombay Natural History Society revealed that this species is a regular winter visitor to the area, usually numbering a few hundred. The species was also seen regularly during the early eighties at Great Vedaranyam Swamp (Point Calimere Wildlife Sanctuary) and ten individuals were ringed between 1980 and 1981. Two individuals were also ringed further north at Pulicat Lake near Madras during 1990 (Mohapatra & Rao 1992). This paper provides information on the population, age structure, moult, measurements and subspecies of Knot wintering along the south Indian coast based on the results of these bird ringing studies.

METHODS

The birds were caught with mesh nets and nooses, the traditional methods used by professional bird trappers of coastal regions. Birds caught were ringed, aged, measured, weighed and examined for moult before release.

Birds were aged as 'adults' and 'first year' based on the characters described in the Prater *et al.* (1977). 'Adult' refers to birds older than first-year and included second-year birds from the first of August onwards. The term 'first year' refers to birds hatched in the same year.

Moult scoring was carried out following Snow (1967). Wing, bill and tarsus were measured to the nearest millimetre, and birds were weighed to the nearest gram.

Monthly bird counts were carried out to determine the seasonal fluctuation in bird numbers. Although a few migrants started arriving in late August, the netting started from September onwards. Hence, each season commenced in September and ended in August. Thus, the 1985-86, 1986-87, 1987-88 seasons are referred to as 'first' 'second and 'third seasons respectively.

STUDY AREA

Two coral islands, Manali and Hare island, a lagoon called Pillaimadam in the Gulf of Mannar near Mandapam and Dhanushkodi lagoon in the Rameswaram island were the major study areas selected (Figure 1).

RESULTS

Seasonal fluctuation

The birds start arriving during the second week of October and the number increases until November after which there is a decline in population in December before again increasing to a maximum in March, prior to their return journey. Although the birds remain throughout the winter, the maximum numbers counted in November and March indicate that a transient population occurs along with wintering individuals, during inward and return migration (Figure 2). The sudden disappearance in certain months in 1985and 1987 is due to increases in the water level in the lagoon. The maximum numbers were seen at the eastern end of the Dhanushkodi lagoon. The annual population was around 250 during all the three years.

Age composition

The percentage of 'first year' birds caught declined from 55% (1985) to 27% in the second year. No 'first year' bird was caught in the third year (1987). The absence of first year birds from 1987/88 catches may perhaps be due to breeding failure during the previous summer (1987).

Moult

Adult Knot start their primary moult elswhere and complete it at the Gulf of Mannar before leaving for the breeding grounds. The earliest caught adult (October 16) had a moult score of 19,

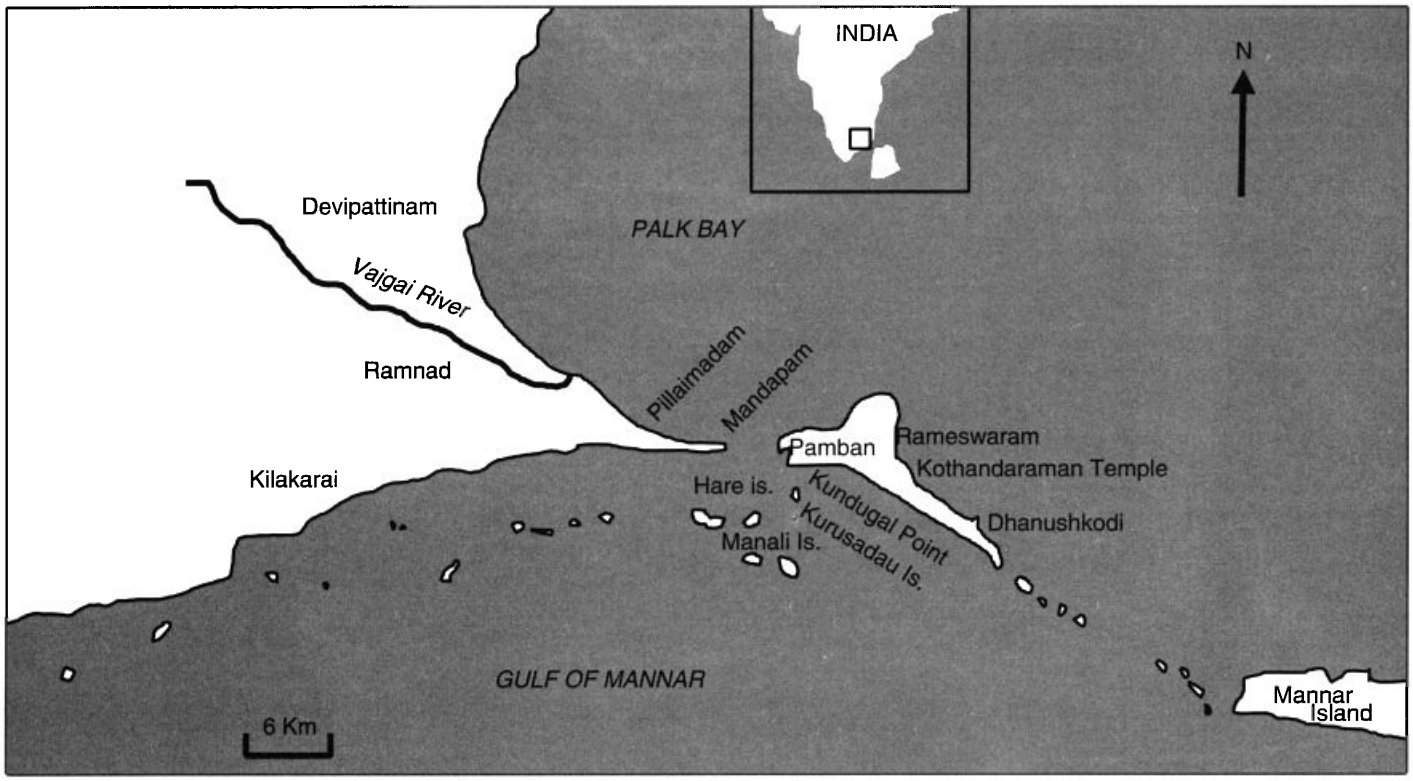

Figure 1. Study sites

(it had renewed the inner three primaries and the fourth was about to be completed). Adults mainly complete their primary moult in December, only a very few extending it until January. This is in contrast to the observation made at the Dutch Wadden Sea by Boere (1976), where they complete their moult during October, with an estimated duration of 90100 days. All the three adults caught in October and November and a few caught in December and early January had growing primaries. All the adults caught from mid December (except one in early January) to March had completed primary moult. The completion period is six weeks later than the wintering Knots of north-west Australia and six weeks earlier than south-east Australian wintering birds. No evidence of suspended moult was detected in the primaries. The differences in timing of primary moult may be due to the differences in arrival time as suggested by Barter (1992). All secondary feathers were renewed when the primary moult was completed.

First-year birds did not start their moult until February and left for their breeding grounds with old moderately worn primaries. However, in Australia Barter *et al.* (1988b) observed that many of the first-year Knots undergo a partial or full primary moult which commences in January. Hence, further confirmation is required as only a small sample of first-year birds was obtained. An adult caught on 17 December was observed in second moult with all fresh completed primaries except the 5th and 6th growing primaries which were about to complete.

Plumage changes

Most adult birds arrived with partial postbreeding plumage during October, and retained it until December. The birds seem to attain their partial prenuptial plumage in February, as almost all the adults caught in March were in partial prenuptial breeding plumage. Some adults attain over 50% of the breeding plumage by March. One first-year bird caught in late March had attained partial breeding plumage.

Site fidelity to wintering sites

Of the 11 birds ringed in the first season, one bird was retrapped in each of the following two seasons. This suggests that site fidelity occurs in Knots. The details of retrapping are given below:

Ring No.	Date of ringing	Place of ringing	Date of recapture	Place of recapture
B45632	4 Feb.1986	Dhanuskodi	28 Mar.1987	Dhanushkodi
B45638	5 Feb.1986	Dhanuskodi	12 Dec.1987	Dhanushkodi

The retrap rate is therefore over 18%.

Biometrics

	Adult				First-year			
	Range	**Mean**	**SD**	**n**	**Range**	**Mean**	**SD**	**n**
Wing	153-175	165.6	4.69	28	151-165	159.6	4.97	9
Bill	30-36	32.9	1.79	30	30-33	32.2	0.92	9
Tarsus	29-34	31.7	1.27	30	29-33	31.7	1.33	9

The measurements varied from those given in Ali & Ripley 1983. Adult measurements are slightly high compared to those of first-year birds as shown below.

Measurement from other sources:
i) Ali & Ripley 1983

Wing	162
Bill	31.5.5
Tarsus	27.5

ii) Barter *et al.* 1988a

Wing		**Bill**		**Age**
Mean	S.D.	Mean	S.D.	
159.2	5.7	32.8	1.8	1
161.1	6.8	32.9	1.7	2
165.4	4.4	33.0	1.7	2+
165.2	4.5	32.8	1.7	3+

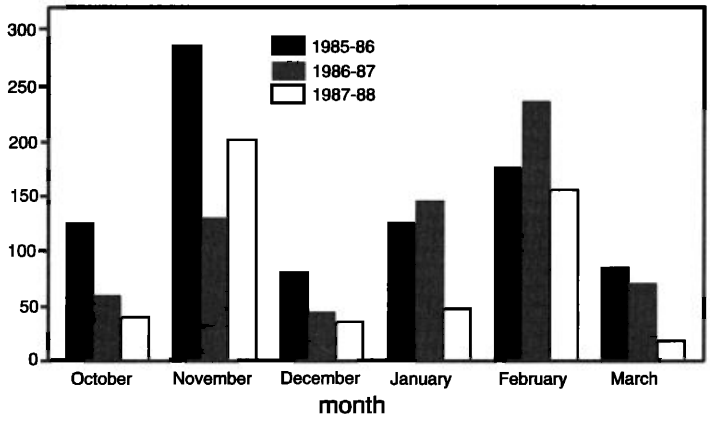

Figure 2. Population fluctuation of Knots.

Subspecies

Among the morphometric charecters described by Hayman *et al.* (1986) for the subspecies *rogersi* (short-billed with medium shade chesnut belly, moderate area of white on rear belly) tallied with the Knots caught at the Gulf of Mannar. In addition, the measurements of wing and bill length agree well with the biometric data for *rogersi* wintering in Australia obtained by Barter *et al.*1988b.

Weight changes

The weight recorded for the wintering Knot at Gulf of Mannar varied between 92 and 138g for the first-year birds, and

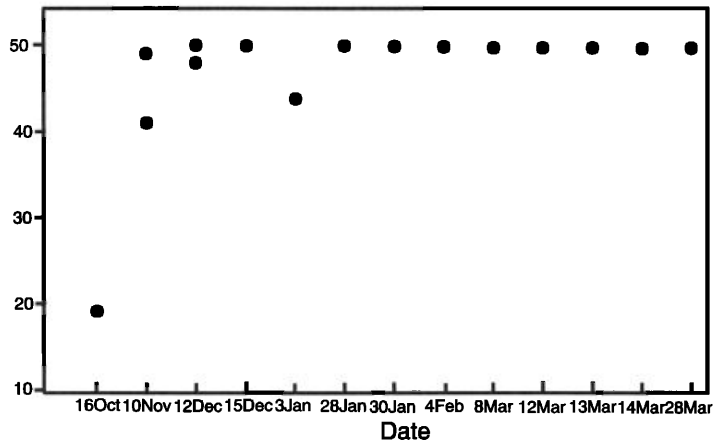

Figure 3. Primary moult score against date.

95-170 g for the adults. Apart from one adult caught during mid March which weighed 170g, all birds weighed less than 140g. As only a few birds were caught during October and November monthly mean weight was not calculated for these periods. However, the monthly mean weight of adults showed a steady increase from December (106g) to March (125g). The monthly mean weight for first year birds varied between 118g (December) and 123g (March). The mean departure weight (March) observed in south India is considerably less than the mean departure weight of 175 g. observed in *rogersi* wintering in north-west Australia by Barter *et al.* (1988a).

DISCUSSION

The status of 'rare vagrant' given in Ali & Ripley (1983) is not correct. The estimated population of 250 at Mandapam and the ringing total of 39 birds at Mandapam and 10 at Point Calimere suggests that Knot is now a regular common winter visitor to the Indian subcontinent. The Knot at the Gulf of Mannar are short-billed, which suggests that the race is *rogersi* (breeding in east Siberia and wintering in Australasia) not the nominate *canutus* as described by Ali & Ripley (1983). The birds caught in breeding plumage had rufous fringes on the mantle and moderate areas of white on the rear belly, which match characteristics described for *rogersi*. The measurements of wing and bill fall within the range of *rogersi* given by Roselaar (1983). The mean wing and bill lengths of adult and first-year birds observed in Australia by Barter *et al.* (1988a) are almost same as those observed in India. This also confirms that the subspecies wintering in India is *rogersi*, as in north-western Australia. These Knot may follow the flyway of the Great Knot *Calidris tenuirostris* which also breeds in eastern Siberia and winters in the Indian subcontinent. Although the birds arrive in the study area rather late, they spend the whole winter there, and are more faithful to their wintering site, which is

evident from the subsequent years' retrap percentage. They complete the latter part of the primary moult at the Gulf of Mannar before leaving for the breeding grounds. Weight at departure is much less (30%) than in Australia, from where they have to travel a greater distance to reach the breeding grounds. This kind of variation in weight has also been observed in other species such as Great Knot (Balachandran 1997) and Broad-billed Sandpiper *Limicola falcinellus* ((Balachandran & Natarajan 1997).

For *rogersi,* Barter (1992) predicted, based on the Summer & Waltner (1979) equation, and assuming an average flight speed of 75 km/h and a fat-free weight of 88 g (average weight at Shanghai, China), that the minimum weights for succeesful non-stop migration (northward) to China are 150g in north-west Australia and 185g in south-east Australia. The birds with an average weight 125g at the Gulf of Mannar are probably not heavy enough to undertake a non-stop migration to Shanghai (China), hence they may stage in wetlands en route to the Chinese coast. The recoveries of south Indian-ringed Curlew Sandpiper *Calidris ferruginea* and Broad-billed Sandpiper at Shanghai as well as in Chilka Lake (further north in India) also support this assumption. Although the Gulf of Mannar is closer than the Australian wintering ground to Shanghai, only birds weighing at least 140g should be able to undertake a non-stop migration from Gulf of Mannar to Shanghai (based on assumption the adopted by Barter 1992).

ACKNOWLEDGEMENTS

This study was carried out as a part of the Bombay Natural History Society's (BNHS) bird migration study supported by U.S. Fish & Wildlife Service under a grant from PL-480 funds No. 14-16-0009-87-02 released through Department of Environment, Wildlife and Forest of India. I gratefully acknowledge the permission given to work in the area by the Tamil Nadu Forest Department and the facilities provided by the regional centre of Central Marine Fisheries Research Institute, Mandapam camp. I wish to express my sincere thanks to Mr.J.C Daniel, the then Director of BNHS for his guidance and for going through this manuscript. I am also grateful to my colleague Mr. Jaya Prakash Menon for his help in making the figures.

REFERENCES

Ali, S. & Ripley, S.D. 1983. *Handbook of the birds of India and Pakistan.* Compact edition, Oxford Univ. Press, New Delhi

Balachandran,S. 1997. Population, status, moult, measurements of Great Knot *Calidris tenuirostris* wintering in south India. *Stilt* 30: 3-6.

Balachandran,S. & Natarajan,V. 1997. Moult, biometrics, age structure and subspecies of Broad-billed Sandpiper *Limicola falcinellus* wintering at Great Vedaranyam Swamp. *Stilt* 31: 23-25.

Barter, M.A., Jessop, A.E. & Minton,C.D.T.1988a. Red Knot *Calidris canutus rogersi)* in Australia. Part 1 : Sub-species confirmation, distribution and migration. *Stilt* 12: 29-32.

Barter, M.A., Jessop, A.E. & Minton,C.D.T.1988b. Red Knot (*Calidris canutus rogersi)* in Australia. Part 2 : Biometrics and moult in Victoria and north-western Australia. *Stilt* 13: 20-27.

Barter, M.A. 1992. Distribution, abundance, migration and moult of the Red Knot *Calidris canutus* rogersi. *Wader Study Group Bull.*64, *Suppl.*:64-70

Boere, G.C. 1976. The significance of the Dutch Waddenzee in the annual life cycle of arctic and subartic and boreal waders. Part 1 : The function as a moulting area. *Ardea* 64:210-291.

Cramp. S. & Simmons, K.E.L. (eds) 1983. *Handbook of Birds of Europe, North Africa and the Middle East: the birds of the western Palaearctic.* Vol. 3. Oxford Univ. Press.

Hayman, P., Marchant. J. & Prater, T. 1986. *Shorebirds: an Identification Guide to the Waders of the World.* Croom Helm, London.

Piersma, T. & Davidson, N.C. 1992. The migrations and annual cycles of five subspecies of Knots in perspective. *Wader Study Group Bull.*64, *Suppl.*:187-197.

Prater, A.J., Marchant, J.H. & Vuorinen, J. 1977. *Identification and ageing of Holarctic waders.* BTO Guide 17, Tring, England.

Rao, P. & Mohapatra, K.K. 1993. Occurrence of the Knot (*Calidris canutus*) from Andhra Pradesh. *J. Bombay nat. Hist. Soc.* 90:509

Roselaar, C.S. 1983. Subspecies recognition in Knot *Calidris canutus* and occurrences of in Western Europe. *Beaufortia* 33 (7): 97-109

Snow, D.W. 1967. *A guide to moult in British birds.* BTO Field Guide No. 11, Tring, U.K.