TIME-BUDGETS OF TRANSIENT GREENSHANKS IN DENMARK

by Arne Kiis

INTRODUCTION

Information about time budgets of waders outside the breeding season is scant. Many authors (e.g. Goss-Custard 1969, Pienkowski 1981) present data about foraging frequencies. However rather few detailed time budgets for summer periods following breeding are available: Puttick (1979) studied the Curlew Sandpiper *Calidris ferruginea*, and Wishar & Sealy (1980) studied the Marbled Godwit *Limosa fedoa*. In this paper I give details of the time budget of adult Greenshanks *Tringa nebularia* at the time of their autumn arrival in Denmark.

STUDY AREA AND METHODS

The study was made at a pond in the Bygholm salt meadow inside the nature reserve Vejlerne (57°04'N, 9° 07'E), Denmark. The pond was about 200 m², depth < 0.2 m, with mud, grass, and gravel bottom. Moller (1980) provides an ecological outline of the reserve.

Observations were made from a dike at a distance of about 50 m with spotting scope. I sampled behavioural states every 10 seconds of a randomly chosen "focal" Greenshank, using Instantaneous Sampling (Altmann 1974). Sampling was started at a pre-determined time, and ended when the bird went out of sight for more than 1 minute or flew away. Notes about defaecations were made between the activity records. The birds were not individually marked, so I do not know how many individuals I sampled. The estimated population, based on plumage and behavioural differences between individuals, was between 10 and 50 birds.

Most observations were made between 28 June - 8 July 1980, but a few supplementary records from 31 July are included (3% of the total). The observations covered the whole day. In the morning and evening, observations were made as early and as late as permitted by the light conditions. This was between 0410 h and 2230 h (with sunrise at about 0440 h and sunset at 2205 h).

Most birds observed could be aged as adults on plumage characteristics, and probably all were adults.

For analysis I divided the day into periods of 2 hours (between (0400 - 2000 h) and 2.5 hours (2000 - 2230 h) and pooled data obtained for each block. The number of data points sampled in each time block is shown in Figure 1.

RESULTS

The Greenshanks at Bygholm spent 68% of the day foraging. Foraging was most frequent before 1000 h and after 2000 h, when the birds were foraging 76% and 80% of the time respectively. Foraging frequency was lowest between 1200 - 1400 h when foraging occupied 52% of the time (Figure 1).

Resting frequency averaged 14% of the day. This comprised roosting for 11% and lying (sitting on their tarsi) for 3%. Resting frequency peaked at 1200 - 1400 h (27%) and lows were recorded before 0600 h (3%) and after 2000 h

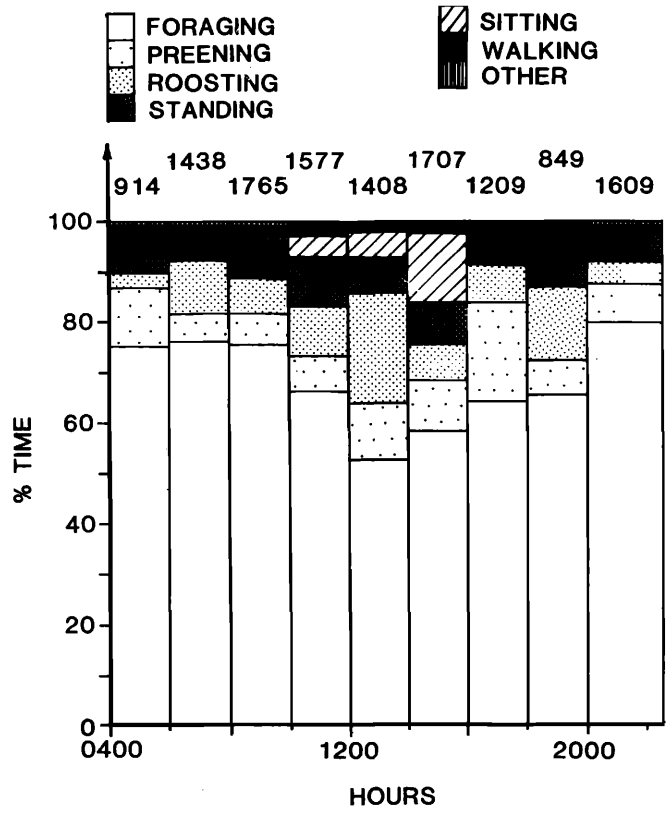

Figure 1. Time budgets of Greenshanks at Bygholm between 28 June - 8 July 1980. Numbers above each time-period give sample sizes.

(5%, Figure 1). The birds rested always on the shore less than 1 m from the water. Birds lying on their tarsi were seen between 0950 - 1540 h in only warm and sunny weather.

Preening occupied overall 8% of the day of the Greenshanks. Before 0600 h and between 1200 - 1400 h they used 12% and 11% of their time respectively, for preening, but merely 5% between 0600 - 0800 (Figure 1). During preening, the birds worked their breast and belly (using the bill) 61% of the time (data from all time blocks pooled, n = 988 datapoints), wings (using the bill) 19%, head (by rubbing it against breast or wing) 5%, back (using the bill) 5%, and scratched (with a leg) 5% of the time. The frequency of scratching rose through the day ($r = 0.75$, $P<0.05$, n = 9 time periods). Scratching was always below the folded wing and with equal frequency to the right and to the left (49% right, n = 79).

The Greenshanks stood still for 8% of the day. This was most frequent between 1800 - 2000 h (12%) and least frequent during early morning (0600 - 0800 h, 6%, Figure 1). Walking occupied 2% of the day. It was most often recorded when the birds were crossing a bank in the pond. Flying was observed for less than 0.6% of the time.

Table 1. Numbers of attacks by, and displacements of, Greenshanks and other bird species at Bygholm. Won and lost columns refer to the outcome for the Greenshank.

	Aggressions		Displacements	
	won	lost	won	lost
Oystercatcher *Haematopus ostralegus*	0	0	0	2
Lapwing *Vanellus vanellus*	0	0	0	1
Curlew *Numenius arquata*	0	0	0	1
Avocet *Recurvirostra avosetta*	0	1	0	1
Wood Sandpiper *Tringa glareola*	7	0	0	0
Redshank *Tringa totanus*	4	0	1	0
Spotted Redshank *Tringa erythropus*	14	0	0	0
Greenshank *Tringa nebularia*	9		–	–
Black-headed Gull *Larus ridibundus*	0	1	0	11
Hooded Crow *Corvus corone*	0	0	0	2

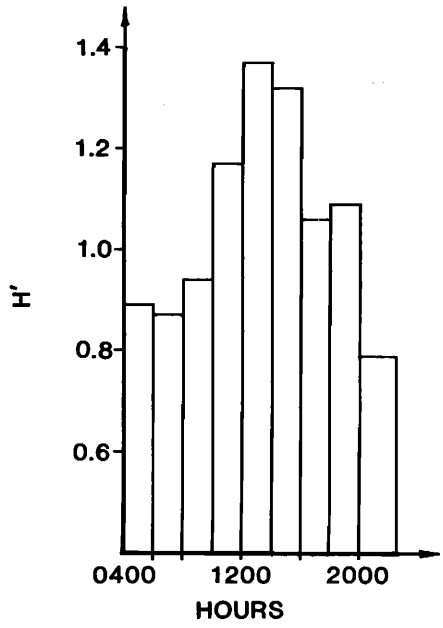

Figure 2. Diversity of the activity of Greenshanks at Bygholm between 28 June – 8 July 1980. $H' = -p_i \ln(p_i)$, where p_i = frequency of the i'th activity.

Aggressive interactions were infrequent, occupying only 0.3% of the day. Frequency of aggression was positively correlated with foraging frequency ($r = 0.70$, $P<0.05$, $n = 9$). This pattern is consistent with the more extensive data on migrant waders in Recher & Recher (1969). Most encounters were between congeners (94%, $n = 36$, see Table 1).

Greenshanks always left the water to defaecate. Similar behaviour has been recorded by Hamilton (1975). The birds defaecated grass and gravel (roughly equally available) with equal frequency (42% vs. 58%, $P>0.2$, $n = 43$). The interval between consecutive defaecations averaged 790 S (S.D. 470, range 300 – 1845, $n = 27$) and was negatively correlated with foraging frequency in the interval ($r = -0.73$, $P<0.001$), i.e. birds defaecated most frequently when foraging intensively. Birds were never seen to cast pellets.

Greenshank activities were most diverse between 1200 – 1400 h and least diverse before 0800 h and after 2000 h, when measured by the Shannon diversity index (Figure 2). There was negative correlation between foraging frequency and activity diversity ($r = -0.87$, $P<0.001$, $n = 9$).

DISCUSSION

The Greenshanks studied at Bygholm had a similar time budget to that of the two other waders studied during summer periods following breeding, Curlew Sandpiper (Puttick 1979) and Marbled Godwit (Wishart & Sealy 1980). However, my observations of Greenshanks lying on their tarsi for 3% of the day, and up to 14% of the time during early afternoon, have no equivalents in the other studies. The frequency of preening (8%) was also low compared to the 17% recorded by Wishart & Sealy (1980) for the Marbled Godwit. The frequency of flight was much lower than that observed by Puttick (1979) in the Curlew Sandpiper. This latter suggests that the birds in Puttick's study area might have been more disturbed (e.g. by tide) than the birds at Bygholm.

In general the Greenshanks arriving at Bygholm in early July seem to have plenty of time to meet their demands, since they spent almost one quarter (22%) of the daylight hours preening and resting.

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Arne Kiis, Mejlgade 39, DK-8000 Aarhus C, Denmark