Opportunistic behaviour as key-determinant in the winter strategy of the Jack Snipe *Lymnocryptes minimus* in southern Scandinavia

Michael Brinch Pedersen

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This is the first documentation of the winter survival strategy of the Jack Snipe, which verifies provisional conclusions from several observations in Northern Europe. Between January and March 1993 one radio-tagged Jack Snipe was observed under different winter conditions in Denmark. Through 52 consecutive days and nights is became evident that the Jack Snipe mainly feeds at nights, and that the wintering resort might be of relatively small size (18 km²), where of only few prime habitats, constituting less than 1% of the observed residence, were actually utilized. Weather dependence in habitat selection and inter-site movements was most significant during nights; the bird responded promptly to frost by mowing up to five km to regain feeding activity in more suitable habitat, leading to a "Survival through habitat shift" hypothesis.

M.B. Pedersen, Bygager 24, DK-7190 Billund, Denmark.

INTRODUCTION

The winter distribution of the Jack Snipe *Lymnocryptes minimus* in Europe is confined to the Britain & Ireland, south-west continental Europe and the Balkans (Cramp & Simmons 1983). Winter occurrence in southern Scandinavia has been regarded as accidental (Cramp & Simmons 1983; Tuck 1972). However, the maximum winter population in Denmark has recently been estimated roughly to be between 10,000-20,000 individuals (Pedersen 1992).

The winter survival strategy including behavioral features *e.g.* dispersion and activity pattern of the Jack Snipe under severe climatic conditions is poorly known (Cramp & Simmons 1983; Tuck 1972; Pedersen 1989), due to methodological constraints of studying this highly crepuscular and unobtrusive species.

To winter in southern Scandinavia, in the Boreonemoral Zone between northern and central Europe, and in an intermediate coastal/continental climate with extreme temperatures, is a major challenge for a wader that mainly preys by probing (Cramp & Simmons 1983) in mud or shallow wetlands easily frozen over. During winter 1992/93 a study was undertaken to highlight behavioural determinants that enable the Jack Snipe to winter in an unstable environment.

METHODS

The study was undertaken on farmland in southwest-Jutland, Denmark (Figure 1), near the town Billund (55° 44'N, 09°01'E). One Jack Snipe was radio-tagged with a movement sensitive transmitter from HOLOHIL (type BD 2G). The transmitter was glue-mounted onto the inner back feathers of the bird (transmitter weight: 1.5 g. ~ 2.1% body weight). In total, 127 successful bearings were taken (Table 1) in a 52 day period between January 29 - March 21 1993; subsequently the transmitter was cut off. Bearings were taken by remote sensing technique at least twice daily (night and day respectively) at distances up to 1,400 m. In the course of the study bearings failed on three nights only, before nocturnal feeding habitats were located.

Habitat selection

Macro-habitat were identified by cross-bearing from points at least 50 m from the bird. Nocturnal feeding habitats in arable land were located by searching for tracks (*i.e.* faeces, bill - and foot prints) the subsequent day. In cases of changes in air temperature under or above the freezing point additional bearings were taken within the same night.

Activity

Active/in-active behavior was measured due to interpretation of movement cues as described by Kenward (1987) within minimum five minutes of tracking per observation. Stable signal strength (no change in pulse power during observation time) indicated roosting/alert behaviour; fluctuating signal strength (change in pulse power during observation time) indicated moving/feeding behaviour.

RESULTS

Macro habitat distribution

Five different sites formed the observed winter residence, consisting of three habitats (Table 1). The distribution between meadow and arable habitats differed significantly between night and day ($Chi^2=78.66$, df=1, $P< 0.001$); the bird never occurred in meadows at nights or on fields during day-time, whereas the stream served as buffer for the other two habitats being the only habitat where the bird occurred both day and night (Table 1).

Table 1. Observations of a radio tagged Jack Snipe in relation to habitat, time and temperature, January-March 1993 (*see Figure 1 for definition of habitat).

	Night		Day		
Site*	≤0°C	>0°C	≤0°C	>0°C	Total
A	28	5	9	2	44
B	0	0	11	23	34
C	0	0	0	20	20
D	0	25	0	0	25
E	0	4	4	4	4
Total	28	34	20	45	127

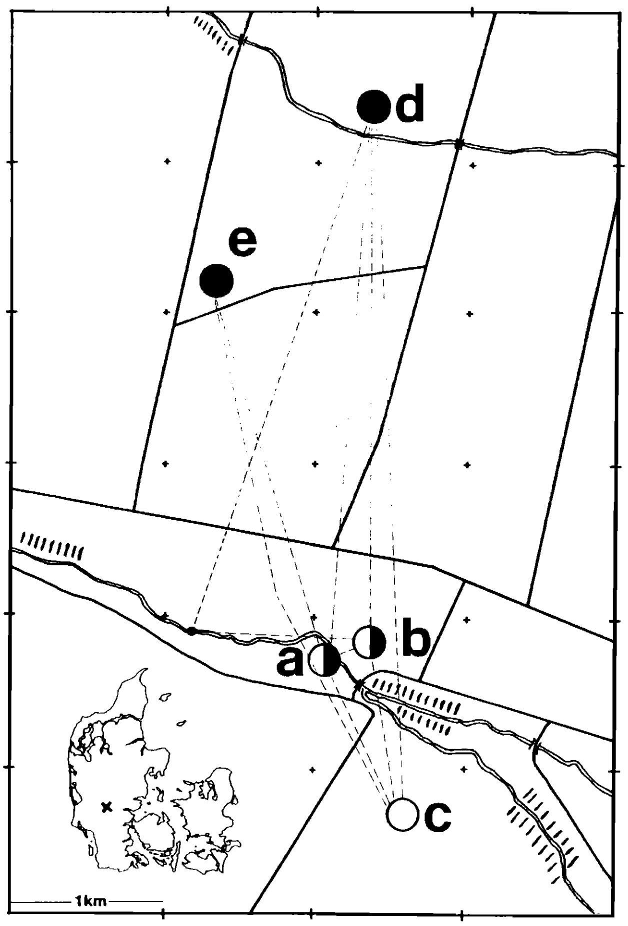

Figure 1. Study area and dispersion pattern (----) of a radio tagged Jack Snipe at days (°) and nights (•), and both days and nights (legends combined) at five different sites (small dot = one spontaneous observation) during January-March 1993: (a) Stream (450 m) with shallow margins, pre-dominated by *Baldingera arundinacea, Juncus effusus* and *Carex rostrata*; (b) Meadow (1.3 ha) with surface springs, predominated by *Eriophorum angustifolium, Sphagnum sp., Juncus effusus, Carex nigra* and *Equisetum palustre*; (c) Meadow (5.6 ha) without springs, pre-dominated by *Deschampsia caespitosa* and *Juncus effusus*; (d) Sporadic flooded stubble fields and winter corn (6.5 ha); (e) Harvested potato field (1.5 ha), sporadic flooded.

Site fidelity: The most persistent return-rate to same the site was 27 nights (Site A and B combined; *cf.* Table 1), 14 days (Site C) and five subsequent nights/days combined (Site A and B combined). Temperature was observed as a proximate factor in limiting the number of days spent at one site and arousing short-term habitat shifts during night-time (n=4; *cf.* Dispersion Pattern). Disturbance was also observed to influence site-fidelity and subsequent postponement of returning to the same site; in the early course of the study the bird was flushed in day-time (n=3) in order to observe flight-ability of the bird. In all cases the bird moved to another roosting site the next day and, other factors being equal, didn't return until at least four days later.

Activity pattern

Diurnal activity: Generally days were spent in-active (n=65), when observed the bird was alert or sleeping; Feeding were recorded in eight cases (12 %), six times during a cold spell (-6 - -1°C; Site A and B) and twice in early spring (3-8°C; Site C). In all cases feeding intensity was rather low (10-15% / 5 min.).

Nocturnal activity: During nights the bird was mobile and foraging in all cases (n=62) irrespective temperature (-7-8 ° C). In all cases feeding frequency was extremely high (100%/5 min.), regardless of time and obviously the bird seemed to forage intensely throughout the whole night.

Dispersion pattern

Spatial dispersion: Though the total extent of the observed winter residence was approximately 18 km², only five sites were directly used (Figure 1) constituting app. 0.15 km² of the total area (< 1%). The whole diurnal/nocturnal home range was 1,000 m/5,250 m respectively. Shortest flight distances between day and night sites were observed during cold spells (< 100 m). Habitat shifts were observed only during night (n=5); if air-temperature dropped below or raised above 0°C the bird reacted promptly by leaving the site first visited and moving app. five km to another habitat, even within few hours after arrival at the first feeding site. Movements from arable land to a stream-side (>°C → ≤°C) and *vice versa* occurred during the same nights. Movements from day site (roosting) to night site (feeding) were significant distant; 28 night flight (55%) with maximum distances between 4,500-5,250 m (one-way) were recorded.

Temporal dispersion: In the course of the study postponement of departure from the roosting site to feeding grounds at sunset was positively correlated with increasing day-length (r=0.993; df.=6, t=20.56, P<0.01; n=8). In general the bird departed 30-40 minutes after sunset; in cloudy evenings departure commenced 10-15 minutes earlier compared to bright evenings, where departure was postponed.

DISCUSSION

In this study habitat shifts in relation to air temperature were significant features of the observed winter behaviour. Habitat shift is a behavioral response to hard weather and prey behavior, enabling enhanced foraging profitability in order to maintain food intake rate since temperature evidently limits accessibility and availability of main prey (Burger & Olla 1984; Jones & Wolff 1981; Smith *et al.* 1992). The dispersion pattern became more or less predictable in course of the study, but the individual probably obtained information on "optimal" utilization of the winter residence under different temperatures and hydrological conditions both before and during the study.

A preliminary study undertaken during the 1980s in parts of the study area during the 1980s (Pedersen 1989; Site A and B in this study) demonstrated that the local occurrence of Jack Snipe was irregular through winter, and more individuals were recorded during cold spells (minimum temp. -19°C). This lead to the assumption of habitat shift to running waters being weather dependent, suggesting stream margins and spring areas to serve as buffers during cold spells. This assumption has now been confirmed. Similar indications of Jack Snipe being resident near running waters during frost periods are known from other parts of northern/central continental Europe (Kliebe 1971; Kroymann 1968; Sack 1961), justifying that the results are applicable to Europe in general. Similar behavioral responses to severe weather have been described in other waders *e.g.* Common Snipe *Gallinago gallinago* (Pedersen 1989; Tuck 1972) and Green Sandpiper *Tringa ochropus* (Smith *et al.* 1992).

This study demonstrates how opportunistic winter behavior enables the Jack Snipe to survive at local scale during cold spells in Europe. This "survival through habitat shift" hypothesis is contrary to assumptions of hard weather movement of Jack Snipe from the continent to the British Isles during midwinter (or correspondingly a "survival through migration" hypothesis) as suggested by Hale (1980). In this study hard weather movements were proved to happen only at local scale. If the observed winter strategy is prevailing for the species, it should be regarded as a proximate factor that enables the existence of a resident winter population of Jack Snipe in southern Scandinavia, including Denmark (Pedersen 1992), Sweden (SOF 1990) and Norway (Haftorn 1971).

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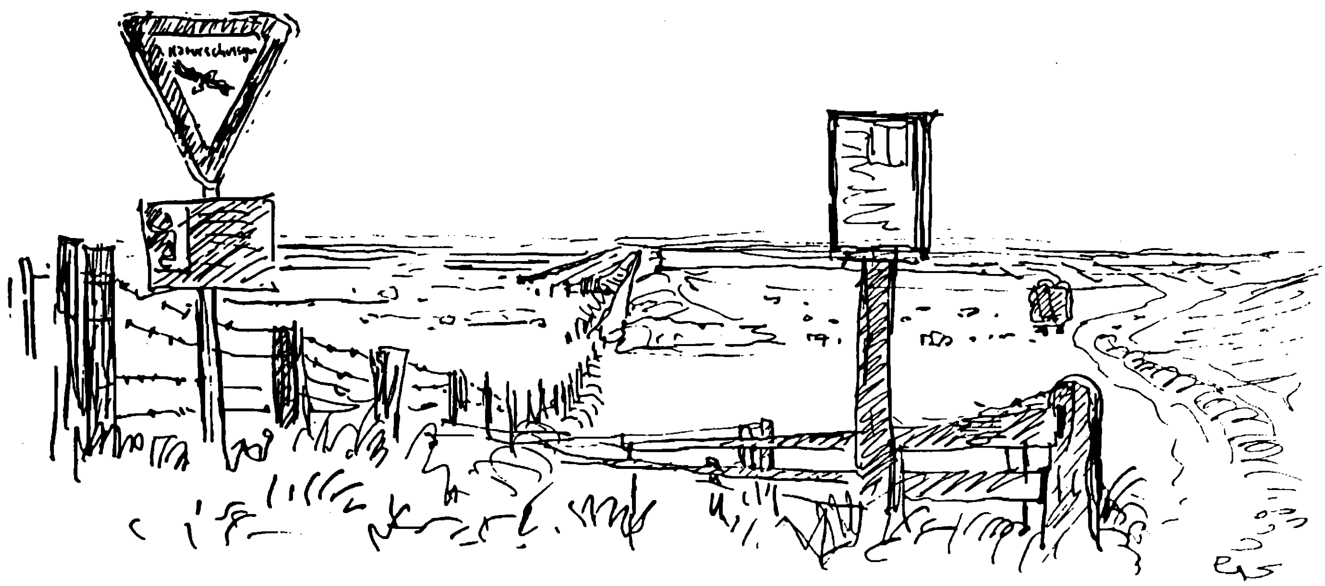

The influence of nest controls, catching and ringing on the breeding success of Baltic Dunlin *Calidris alpina*

Ole Thorup

Thorup, O. 1995. The influence of nest controls, catching and ringing on the breeding success of Baltic Dunlin *Calidris alpina*. *Wader Study Group Bull.* 78: 26-30.

A six year study of the breeding biology of Baltic Dunlin on Tipperne, Denmark indicates that frequent nest controls, catching of adults on nests, and colour-marking of newly hatched chicks have had no influence on the breeding success. A reduction in breeding success was only observed in areas where Common Gulls *Larus canus* searched for food continually. Here nest predation was much higher immediately after catching than in the other periods; the data are limited though, and the difference is not statistically significant. However, it is recommended that precautionary measures should be considered when catching Dunlin and other "timid" waders in similar situations.

Ole Thorup, V. Vedsted Byvej 32, V. Vedsted, DK-6760 Ribe, Denmark.

INTRODUCTION

The influence of disturbance made by scientists undertaking breeding biology studies is often an unrecorded factor that may have adverse effects on breeding success. In general, any impact on breeding success caused by the research might seriously bias the results, making conclusions unclear or even meaningless. Studies that influence the breeding success of threatened or vulnerable species might even contribute to population decreases, and thus cause serious conservation problems.

A study of the breeding biology of the Baltic Dunlin was initiated in 1990 on Tipperne. The study was not designed to highlight human impact. However, data from the first six years of this study allows the estimation of the possible impact of various study methods on the breeding success.

Since the influence of different kinds of research on breeding success is generally little recorded, these results are presented to help minimisation of the impact of scientists on breeding success. A review of recorded effects of investigator disturbance on nesting birds is presented by Götmark (1992). This analysis of 100 breeding biology papers concerning investigator disturbance effects does only include four wader studies, however.

A review of nest desertion in waders following the catching of adults is presented by Kania (1992).

METHODS

Tipperne is a nature reserve in western Jylland, Denmark (55°53' N, 8°14' E), consisting of 650 ha of brackish meadows (see Thorup 1991 for further description). In the study area the meadows are managed with relatively intensive cattle grazing starting fairly late in the breeding cycle of the Dunlin, and regular mowing.

Tipperne holds a breeding population of 125-150 pairs of Baltic Dunlin, locally breeding at densities of 50-80 pairs/km².

Within the area, three intensive study plots were established (64 ha, 40 ha and 55 ha, respectively). Additionally a reference area (50 ha), where no catching at the nest took place, and where nest visits were kept to a minimum (one visit every 6 to 10 days) was established.

Nest controls: A nest control is defined as a visit during which the number of eggs and possible presence of pipping eggs or young was registered. On some visits an egg was water-tested to determine the approximate stage of incubation (see van Paassen *et al.* 1984). At the visit following a catching attempt a nest control usually included a check to determine a possible desertion of the nest. If the incubating bird was not seen leaving the nest it was controlled whether the eggs were warm and thus still incubated.

To determine any possible influence of visiting nests, a comparison was made between the survival of nests frequently visited (nests controlled more than every third day), regularly visited (nests controlled on average between every third and sixth day) and rarely visited (nests checked with on average more than six days intervals). In general neighbouring nests were controlled at the same visits, and the nest control frequency is corresponding to the actual level of disturbance.

Catching adults on the nest

To establish a study population of individually recognisable birds, as many adult birds as possible were caught on the nest and ringed (and measured). A walk-in-trap (see Bub 1974) was used. The trap was placed on the nest, then the ringer left for 25-35 minutes, and in about two out of three attempts the incubating bird was caught at the return (Table 1). An interval of at least 24 hours was chosen between two