Does the wind influence egg fertility? A probable case with Curlew Sandpiper *Calidris ferruginea*

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Thirty percent of Curlew Sandpiper's eggs were found to be unfertilized in one of four years of studies at northern Taimyr, Siberia. The clutches with reduced hatchibility were laid in a period of a few days early in the season when strong winds were blowing. It is thought that copulation was impossible during strong winds.

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INTRODUCTION

Hatching success in birds can be influenced by weather both directly and indirectly, for example through freezing of eggs, snow covering nests and preventing incubation, flooding or washing away of nests *etc.* However, I was unable to find in the literature any cases of wind influencing hatching success by reducing egg fertilization rate. A probable case was recorded once during six years of fieldwork on breeding waders in northern Taimyr, Siberia. The aim of this note is to document the situation recorded and to attract the attention of other observers to the phenomenon.

METHODS

In 1982-84 and 1990-92, the ecology of several wader species was investigated in four areas of north-western and north-central Taimyr, however the main bulk of data dealt with in this paper was obtained in 1983 in the lower Lenivaya River (75°16'N 89°30'E), in 1984 near the Uboinaya River mouth (73°37'N 82°20'E), and in 1990-91 in the Knipovich Bay area (76°05'N 98°32'E). In 1984, attention was paid to the unusually high proportion of Curlew Sandpiper *Calidris ferruginea* eggs which did not hatch (Table 1), and which were probably unfertilized as they did not contain visible embryos when opened.

Unfortunately, 1984 was a season with quite heavy predation on wader eggs by Arctic Foxes *Alopex lagopus* (Tomkovich & Vronsky 1994), and as a result few successful nests of this, the most numerous wader species, were available for analysis. Predation also precluded the collection of sufficient data on other, less numerous, species.

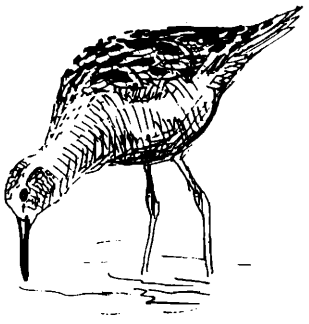

Table 1. Proportion of unhatched eggs in Curlew Sandpiper clutches in different years and sites of the northern Taimyr. * - Nests/eggs survived to hatching

Study area	Lenivaya River	Uboinaya River	Knipovich Bay	Knipovich Bay
Year	1983	1984	1990	1991
No of nests*	5	5	22	9
No of eggs*	17	20	86	35
Unhatched eggs n (%)	0 (0%)	6 (30.0%)	5 (5.8%)	1 (2 9%)

RESULTS

One to three unhatched eggs were found in three of the five Curlew Sandpiper nests being studied which survived It was surprising that the hatching dates of these three clutches were either 9 or 10 July, not scattered through the hatching period, which lasted from 6 to 17 July that year. To check whether reduced hatchibility of clutches was related to hatching date, the brood sizes of Curlew Sandpipers (chicks 1 to 6 days old) when first found for ringing was compared for different periods. Five broods hatched on 9-11 July consisted of 1 to 3 chicks (mean 2.2), while four broods hatched on 13-17 July were of 2 to 4 chicks (mean 3.25). The difference between the medians is large, but not significant. When the data from broods and clutches are combined, however, the difference between the means is larger: 2.1 (n = 8) and 3.5 chicks (n = 6) respectively, and the difference between the medians is significant (Mann-Whitney U-test, U = 6, $P<0.05$). This difference probably reflects the general situation, with a high proportion of unfertilized eggs in clutches hatched on 9-11 July.

The incubation of these clutches must have started on 19-21 June, taking into account the average incubation period of 20.3 days (Tomkovich *et al.* 1994), and egg laying in

these clutches therefore took place between 16 and 21 June.

DISCUSSION

Copulation in pairs of Curlew Sandpiper takes place not later than from the moment the pair settles down in a breeding area or from the day of pair formation on the territory of the already settled male, until the day when that pair's nest contains two eggs (Tomkovich 1988). Early breeders usually arrive already in pairs and start laying eggs within 5-6 days of their arrival (Tomkovich *et al.* 1994). This means that the period between 11 and 19 June 1984 could have been critical for fertilization of eggs in those pairs which had low egg hatchibility that year.

One reason for the low number of Curlew Sandpiper eggs laid between 16 and 21 June 1984 which were fertilized, could be that this period concided with periods of strong winds. On 11-14, 16-17 and 19 June 1984, strong winds were blowing in the study area, and were particularly stormy on 11-12 and on 19 June, making walking difficult for the observer. Later in June that year and in the egg-formation periods of Curlew Sandpipers in the other years of the study, calmer weather with only a few, single days of strong winds prevailed.

This coincidence of low egg hatchability and long periods of strong winds during egg-formation in the local population suggests these phenomena are related. The most probable explanation seems to be that copulation was impossible during strong winds. No alternative explanation was found. Reduced nest attendance due to cold weather might be such another explanation, but the breeding season of 1984 was in general warm with only one half a day snowfall on 12 July, and much better than breeding conditions in more northern area, Knipovich Bay, in 1990-1991, where fertility of eggs was not greatly reduced.

The dependence of egg fertility rate on strong winds during critical periods may at least partly explain the appearance of unfertilized eggs in other avian inhabitants of open landscapes. The suggested effect of wind on hatching success (a 30% reduction in this case) is unexpectedly strong. In addition, this interpretation of the observations does not support van Rhijn's (1985) theory on effective sperm storage in female oviducts of polygynous Calidridine species such as Curlew Sandpiper.

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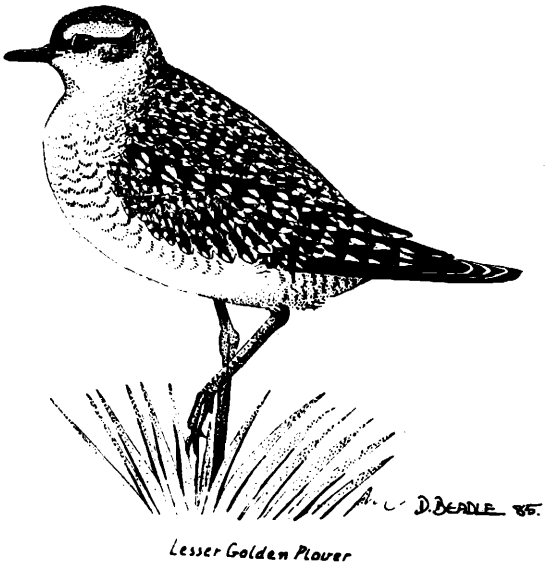

Lesser Golden Plover