Hatching dates for Common Sandpiper *Actitis hypoleucos* chicks - variation with place and time

T.W. Dougall, P.K. Holland & D.W. Yalden

Dougall, T.W., Holland, P.K. & Yalden, D.W. 1995. Hatching dates for Common Sandpiper *Actitis hypoleucos* chicks - variation with place and time. *Wader Study Group Bull.* 76 : 53-55.

Common Sandpiper chicks hatched in 1990-94 between 24 May (year-day 146) and 13 July (year-day 196), but the average hatch-date was variable between years, up to 10 days earlier in 1990 than in 1991. There are indications that on average Common Sandpipers hatch a few days earlier in the Borders, the more northerly site, but this may reflect a change in the age structure of the Peak District population between the 1970s and the 1980s - 1990s, perhaps the indirect consequence of the bad weather of April 1981.

Dougall, T. W., 29 Lauriston Gardens, Edinburgh EH3 9HJ, UK.
Holland, P. K., 2 Rennie Court, Brettargh Drive, Lancaster LA1 5BN, UK.
Yalden, D. W., School of Biological Sciences, University, Manchester M13 9PT, UK.

INTRODUCTION

Common Sandpipers *Actitis hypoleucos* have a short breeding season, like most waders; arriving back from West Africa in late April, most have laid eggs by mid-May, which hatch around mid-June. Chicks fledge by early July, and by mid-July most breeding territories are deserted (Holland *et al.* 1982). The timing of the breeding season seems constant from year to year, but there are few data to quantify this impression. It is difficult to locate an adequate sample of nests in any one year to provide an adequate indication of the timing of the season, let alone do so over several years.

The demonstration by Holland & Yalden (1991) that bill lengths (and masses) of Common Sandpiper chicks are strongly correlated with age offers an indirect approach. Reversing the calculation, given bill length and the date of ringing, the age and therefore the hatch-date of each chick could be estimated. Enough chicks, at a range of ages through the breeding season, can be caught each season to allow comparisons between sites and years.

MATERIALS AND METHODS

Holland & Yalden (1991a) showed that bill length, y (in mm) was related to age, x (in days) as $y = 0.56x + 9.9$; thus age should be related to bill length as $x = (y-9.9)/0.56$ and we have used this formula to produce a standard table of age for each half millimetre length of bill from 10 mm (age 0) to 21 mm (19.8 days, = 20 days).

For the years 1990-1994, we have data for 8-23 broods from the Borders (mostly Leithen Water and Dewar Water, south of Edinburgh, collected by T.W.D.) and for 10-25 broods from the Peak District (mostly the Ladybower Reservoir system, but also from the River Ashop, collected by D.W.Y.). For the Peak District, we have reworked the data for 63 broods used by Holland & Yalden (1991a) in calculating the original regression, and coming from the years 1977-1989 (mostly the 1980s). We also have, for comparison, the known hatch dates for 49 nests reported by Holland *et al.* (1982), coming from various sites in the Peak District in the 1970s.

Ringing activities continue through the breeding season at both sites, and chicks can be at any age from 0 to 19 days old when caught (though young chicks are generally easier to find). Where several chicks of a brood were caught, a single date for hatching was entered. Older chicks sometimes suggested hatching dates two or three days apart, and the mean was used for the latter, the earlier date (*i.e.* the apparent hatch date of the older chick) for the former. One might expect a brood of four young to take 1 - 1½ days to hatch, so causing some inherent variation and, of course, their growth rates may differ a little.

The sample of hatch dates is strongly skewed in all samples, so non-parametric tests (Meddis 1984) have been used to compare the mean hatch dates for each sample (site or year). Hatch-dates are presented as year-days, so that 1 June is year-day 152, or 153 in a leap year.

RESULTS

For the years 1990-1994, we were able to calculate 81 hatch-dates for the Borders and 99 for the Peak District. These ranged from year-day 146 (24 May) to 196 (13 July), but the mean hatching dates for the different years and sites clustered in the period 6-18 June (year-days 159-171). In each year, the mean hatch date in the Borders was earlier than in the Peak District, by 1-5 days, but this difference was not quite statistically significant (Meddis' H = 2.84, p = 0.088, d.f. = 1). However, the difference in hatch-dates between years, allowing for any difference between sites, was highly significant (H =

12.81, p = 0.012, d.f. = 4), and moreover fitted best the hypothesis that 1990 was the earliest year, 1991 was the latest, and the other three years were equal (Z = 3.51, p < 0.001). Hatch-dates were around 10 days earlier in 1990 than in 1991 (Table 1).

Table 1. Hatch-dates calculated for Common Sandpiper chicks in the Peak District and in the Borders, 1990-1994.

PEAK DISTRICT	1990	1991	1992	1993	1994
Mean hatch date	160.5	170.8	168.3	167.0	167.1
S.D.	1.7	2.0	2.2	2.2	2.6
n	10	25	22	25	17
Earliest	152	160	157	150	152
Latest	173	196	195	188	187
BORDERS					
Mean hatch date	159.3	165.3	165.4	163.6	166.3
S.D.	3.4	4.9	2.6	1.8	2.7
n	10	8	18	23	22
Earliest	149	146	150	146	150
Latest	187	192	185	182	195

(Difference between years, Meddis H = 12.8, p = 0.012)
(Difference between places, Meddis H = 2.8, p = 0.088)

Although the difference in hatch-dates between the Borders and Peak District study sites was not quite formally significant, there were distinctly more hatch-dates in May in the Borders, and, conversely, more dates in July in the Peak District; analysed this way, there was a significant difference between the areas (χ^2 = 12.3, p = 0.003) (Table 2).

Table 2. Number of hatch-dates in May, June and July in the two study areas, 1990-94 combined.

	May	June	July	Total
Peak District	5	83	11	99
Borders	18	58	5	81

(χ^2 = 12.35, p = 0.003)

Table 3. Variation in mean hatch-date in the Peak District, comparing pre-1980 data from Holland *et al.* (1982) with 1980-89 data from Holland & Yalden (1991a) and the recent sample from 1990-94.

	pre-1980	1980-1989	1990-1994
Mean	164.7	167.6	167.6
S.D.	1.4	1.1	1.0
n	49	63	99
Earliest	149	152	150
Latest	198	192	196

(Meddis specific test, pre-1980 earlier than others, Z = 1.99, p = 0.046)

Within the Peak District, the average hatch-date for the aggregate 1990-94 sample is identical to that for the 1977-1989 sample of chicks measured by Holland & Yalden (1991), at year-day 167.6 (14-15 June). However, the hatch-dates for the known nests of Robson *et al.* (1982), from the 1970s, averaged three days earlier (Table 3), and this result was statistically significant (Meddis specific test, with no *a priori* expectation of direction of change, Z = 1.985, p = 0.046).

DISCUSSION

Despite the impression of synchrony in breeding season from year to year, our results indicate the variation in average hatch-date between years. We have demonstrated that the growth rates of Common Sandpiper chicks were faster in 1992, a warm, dry June, and slower in 1991 which was cold and sunless (Yalden & Dougall 1994). Hatch dates were clearly similarly affected by different weather conditions, and May was also cool in 1991, while it was warm in 1990.

The indication that the breeding seasons were somewhat earlier in the Borders, 280 km north of the Peak District, was surprising and counter-intuitive. There is no difference in altitude between the study sites (both range 700-1000 ft, 210-300 m), so one would expect the northern site to be later. Such a result could occur if one site (Peak District) were studied more persistently than the other (Borders); however, the discrepancy is particularly the absence of early (May) hatch dates, at the time when surveyors' enthusiasm is greatest.

A clue may be given by the somewhat earlier hatch-dates in the Peak District in the 1970s, which show the same mean hatch-date (year-day 164) as the recent Borders sample. Hatch-dates seem to have slipped back in the Peak District around 1980, but to have been stable since then. This difference might have been caused by the difference in methodology (known hatch dates, versus calculated hatch dates from chicks captured for ringing), but, assuming that it is genuine, the impact of the late April snowstorms of 1981 might be the cause. We have documented the sharp decline that year of our Peak District study population (from 22 pairs in 1980 to 14 pairs in 1981) (Holland & Yalden 1991b), and we suspect that older, well-established and more experienced birds suffered heavier mortality than younger birds, in part because we expect them to return to their territories more promptly at the start of the season (Holland & Yalden 1995). However, the 1981 snowstorm was a local rather than a national phenomenon, and had no effect in the Borders area.

Our results clearly indicate the sensitivity of the timing of the breeding season in Common Sandpipers to the weather, just as the growth rate of the chicks is similarly sensitive. The short breeding season, particularly its curtailment in July, suggests that it is critical for the young to fledge as early as possible, either because the food supply on the breeding grounds declines through July (Yalden 1986) or perhaps because the fledglings have to grow further and accumulate fat for their southerly migration. Presumably the change indicates that laying dates, and therefore the start of incubation, are delayed in

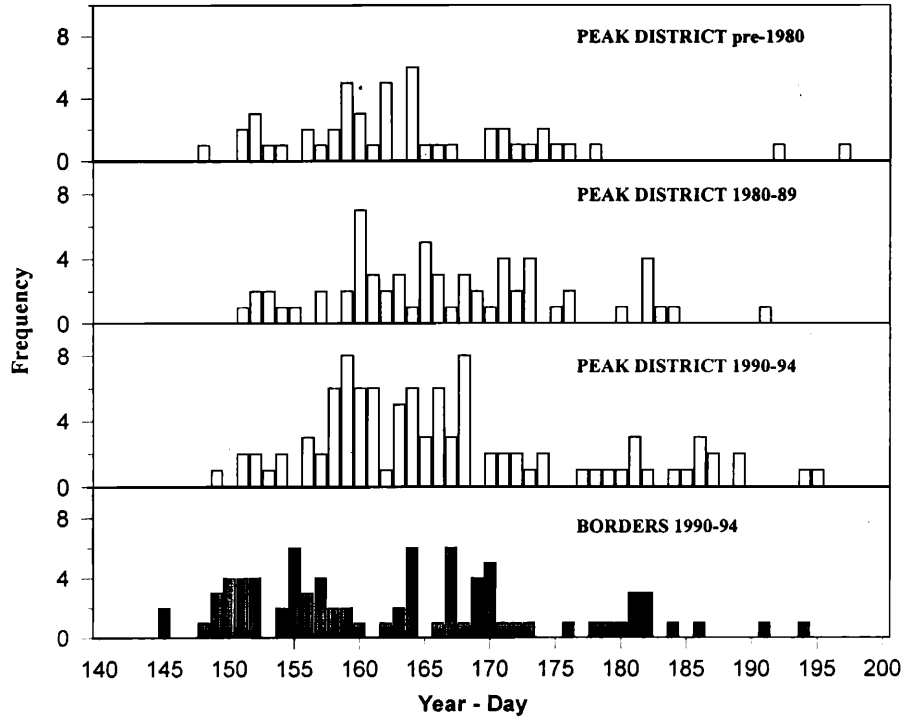

Figure 1. Frequency distribution of hatch-dates for Common Sandpipers *Actitis hypoleucos.* The hatch dates for 49 known nests reported by Holland *et al.* (1982) ("Peak District pre-1980") are compared with dates calculated back from the age of chicks caught for ringing by Holland & Yalden (1991) ("Peak District 1980-89"), caught more recently in the Peak District, and in the Borders. Hatch-dates are given as year-days (152 = 1 June, or 31 May in a leap year).

"later" years, and this must reduce the opportunities for replacement clutches to be laid if the first clutch is lost. The tail of later dates (Figure1), those after year-day 175 (23 June), is presumed to represent these replacement clutches. Presumably the average hatch-date represents some sort of optimum for the species, in which case the apparently later date now (but not formerly) in the Peak District, and the larger tail of July hatch dates in the Peak District than in the Borders, suggest that conditions in the breeding season in the Peak District have changed.

This speculation would be strengthened by information on hatch-dates, growth rates and breeding success of Common Sandpipers elsewhere in their range. Cuthbertson *et al.* (1952), working at Sedbergh, midway between our study sites, reported a mean hatch date for 14 nests of year-day 166, 13 June (range 4-23 June) in the years 1949-51. This is a small sample, but coincides well with the other dates. More evidence on average dates and their variation from year to year would be welcome. The BTO's nest record cards for this species have not been analysed, but may not indicate hatch-date with sufficient accuracy. However, there may be merit in examining this source of data.

ACKNOWLEDGEMENTS

Data from the Borders region were collected by Borders Ringing Group and collated by T.W.D. Recent Peak District data were collected by D.W.Y., pre-1990 data by both D.W.Y. and P.K.H.. We thank the various land owners, particularly Severn-Trent Water Plc, Dalmeny and Raeshaw Estates, for permission to study Common Sandpipers on their land. Dr R.R. Baker ran the statistical tests through his version of Meddis, for which we are very grateful.

REFERENCES

Cuthbertson, E.I., Foggitt, G.T. & Bell, M.A. 1952. A census of Common Sandpipers in the Sedbergh area, 1951. *Brit. Birds* 45: 171-175.

Holland, P.K., Robson, J.E. & Yalden, D.W. 1982. The breeding biology of the Common Sandpiper (*Actitis hypoleucos*) in the Peak District. *Bird Study* 29: 99-110.

Holland, P.K. & Yalden, D.W. 1991a. Growth of Common Sandpiper chicks. *Wader Study Group Bull.* 62: 13-15.

Holland, P.K. & Yalden, D.W. 1991b. Population dynamics of Common Sandpipers (*Actitis hypoleucos*) breeding along an upland river system. *Bird Study* 38: 151-159.

Holland, P.K. & Yalden, D.W. 1995. Who lives and who dies? The impact of severe April weather on breeding Common Sandpipers *Actitis hypoleucos. Ring & Migr.* 16: (in press)

Meddis, R. 1984. *Statistics using ranks: a unified approach.* Blackwell, Oxford.

Yalden, D.W. 1986. Diet, food availability and habitat selection of breeding Common Sandpipers *Actitis hypoleucos. Ibis* 128: 23-36.

Yalden, D.W. & Dougall, T.W. 1994. Habitat, weather and the growth rates of Common Sandpiper *Actitis hypoleucos* chicks. *Wader Study Group Bull.* 73: 33-35.