Growth of Common Sandpiper chicks

P.K. Holland & D.W. Yalden

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Common Sandpipers grow from 8.70 g at hatching to 40.11 g at fledging, at a rate of 1.65 g day^{-1}; their bills lengthen from 9.20 mm to 20.83 mm over the same period, a rate of 0.61 mm day^{-1}. Growth in mass is probably sigmoidal, and bill length is a better criterion for ageing very young and nearly fledged chicks. In the middle range, bill lengths and mass are closely correlated, so allowing the use of relative mass to judge a chick's condition.

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INTRODUCTION

In a previous paper (Holland *et al.* 1982), we suggested that chicks of Common Sandpiper *Actitis hypoleucos* grow from 8 g at hatching to about 40 g at fledging, 19 days later. We have not, however, published any details of growth rates, and are not aware of any other such publications on Common Sandpipers. This paper summarizes the information available to us after 12 seasons of fieldwork.

MATERIAL AND METHOD

Common Sandpiper chicks are difficult to find except as newly hatched young in or near the nest. Once fully mobile they are adept at hiding in such places as burrows and under boulders. When first fledged, however, they are vulnerable to capture in mist nets set across the breeding streams. Thus we have most information for very young and just-fledged chicks. Chicks were weighed (to the nearest 0.1 g when very young, otherwise to 0.5 g) when handled for ringing. Bill-lengths (to the nearest 0.5 mm) also have been measured, with a ruler, in response to the appeal for more information by Rhys Green (1984). Chicks were not weighed if it was wet or windy, nor if it was likely to attract further attention to the nest site.

We have collected information on the following categories and numbers of birds.

(1) 19 pulli taken at the nest on the day of hatching (= day 0).
(2) 59 newly hatched pulli away from the nest, which we know or believe to be 1-2 days old (= day 1.5).
(3) A further 27 chicks have been caught at known-ages between 2 and 21 days old.
(4) Included in these 27 are nine chicks recaptured after known time intervals. Along with a further two recaptures of unknown-age chicks, these give us 11 direct figures for weight increments per day.
(5) In addition to 9 fledglings of known age which are included in (3), we have caught 19 other fledglings that were only just flying. We assume that these were each 19 days old, when measured, for this analysis.

The mean mass and bill lengths were calculated for the samples of "day 0", "day 1.5" and "day 19" chicks (categories (1), (2) and (5)). We then calculated the regression of mass and bill-length against age (in days) for the 27 known-age birds (category (3)), and included the means (only) of birds at "day 0", "day 1.5" and "day 19". We did this to avoid swamping our samples of known-age birds with the very young and just-fledged birds.

RESULTS

Mass

At hatching, Common Sandpiper chicks average 8.7 g. They barely grow in weight initially, being only 8.94 g at 1-2 days old (Table 1). At fledging they average 40.11 g, implying a

Table 1. Measurements of chicks of Common Sandpiper *Actitis hypoleucos*.
Those measured on Day "0" were still in the nest. Day 1-2 chicks had left the nest; they were regarded as 1.5 days old in the analysis. Day "19" chicks are those which were newly fledged, but of uncertain precise age. Known-age chicks which had just fledged were 18-22 days old.

Age	Mass (g)			Bill length (mm)		
	$\bar{x}$	SD	n	$\bar{x}$	SD	n
Day 0	8.70	.10	17	9.20	0.79	10
Day 1-2	8.94	0.84	59	10.21	0.56	29
Day "19"	40.32	2.78	19	21.00	1.04	18
Day 18-22	39.67	2.05	9	20.50	0.89	9

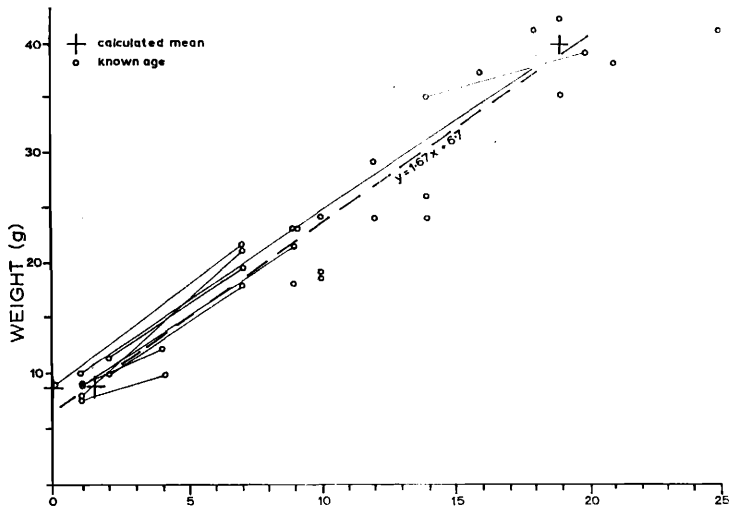

Figure 1. Mass (g) in relation to age (days) for Common Sandpiper chicks of known age. Solid lines connect points for each recaptured individuals. The dashed line is the calculated (reduced major axis) regression line. The calculated means for chicks at hatching, at 1-2 days old, and at fledging are shown as crosses.

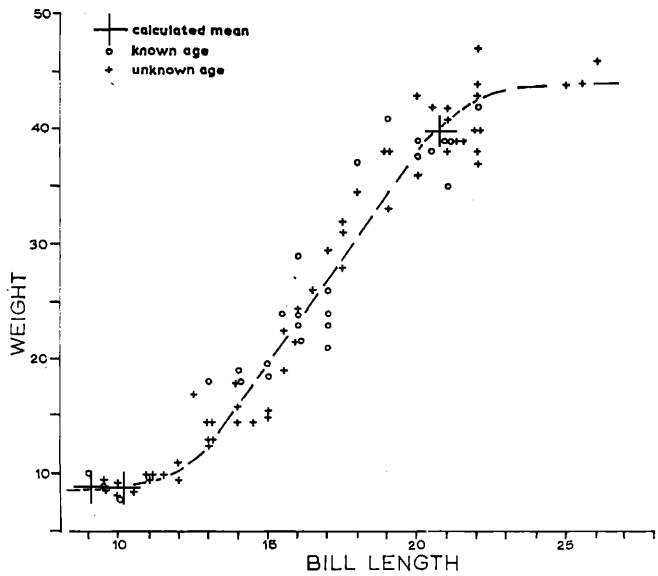

Figure 3. Graph of bill-length (mm) against mass (g), for all measurements of Common Sandpiper chicks, of known and unknown age. Trend line drawn by eye.

growth rate of 1.65 g day^{-1} over 19 days. The calculated regression (reduced major axis) is y = 1.73x + 5.87 (Pearson's r = 0.96, t = 18.6, d.f. = 29, P < 0.001). The direct measurements of weight-gain of individuals ranged from 0.67 to 1.86 g day^{-1} (mean 1.46, S.D. 0.43, n=11). There are indications (Figure 1) that growth rates were slower over the first 3-4 days of life, as might be expected.

Bill length

At hatching the bills of Common Sandpiper chicks average 9.1 mm long, and by 1-2 days old these have increased to 10.2 mm long (Table 1). This increase is highly significant (t = 4.39, p < 0.001). At fledging bill-lengths average 20.83 mm, implying a growth rate of 0.61 mm day^{-1} over 19 days. The calculated regression is y = 0.56x + 9.9 (Pearson's r = 0.91, t = 10.8, d.f. = 23, p < 0.001) (Figure 2). There are insufficient recaptures of individuals to calculate a direct figure of daily growth rate, or to comment on any changes in growth rate with age.

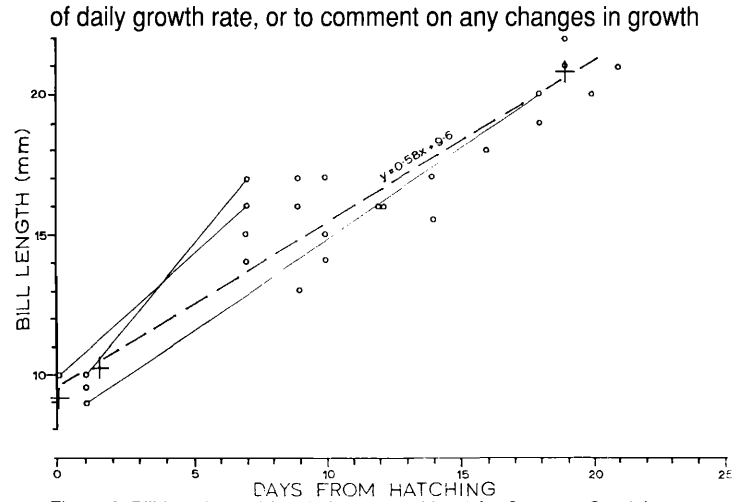

Figure 2. Bill-length (mm) in relation to age (days) for Common Sandpiper chicks of known age. Other details as Figure 1.

Mass in relation to bill length

The possibility that bill-length might provide an estimate of age, independent of mass, is examined in Figure 3, which includes data from additional chicks of unknown age. Figure 3 shows that bill-length increases during the first few days after hatching while body mass does not. Reference to Figure 2 suggests that bills lengthen about 2 mm over 4 days, while body mass barely increases at all. It also appears that, having fledged at around 40 g (Figure 1), their bills continue to grow to adult length ($\bar{x}$ 24.8; Prater *et al,* 1977) but little or no weight is gained for a further 10 days after fledging. At fledging their wings are still very short ($\bar{x}$ 92.9, S.D. 5.17, range 83-100 mm, n=23) compared with those of adults (male $\bar{x}$ 111.5, range 105-117, female x 115.7, range 111-122; Holland *et al.* 1982), and we presume that further growth over the 10 days post-fledging goes into increases in length rather than into mass.

DISCUSSION

Visser & Beintema (1988) suggest that waders vary between slow-growing but energetically conservative species (*e.g.*Lapwing *Vanellus vanellus*) and fast-growing but energetically extravagant species (*e.g.* Black-tailed Godwit *Limosa limosa*). In growing at 1.65 g day^{-1} (3% of adult weight per day) and fledging in 19 days, Common Sandpipers seem to belong in the second group. This is also consistent with field observations that very little brooding is done after the first four days (Yalden 1986).

Green (1984) suggested that bill-length could provide a good estimate of age and that it might also allow the relative condition of a wader chick to be assessed. It certainly appears that bill-length is a better indicator of age over the first 4 days of life than is mass and this is possibly true after fledging as well. Figure 3 indicates that in the middle period of chick growth, when bills measure between 12 mm and 20 mm (equivalent to ages around 4 to 20 days - Figure 2), the bill-length and mass are well correlated and so their relative values should give a useful indication of the chick's condition. Over this range of bill-lengths, the (reduced major axis) regression is $y = 3.88x - 37.98$ (Pearson's $r = 0.97$, $t = 21.9$ $P < 0.001$).

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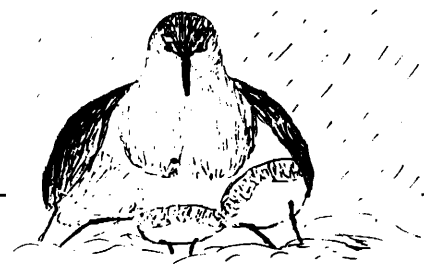

The Northern Dunlin Puzzle

Hans Meltofte

The migratory patterns of different populations of the northern subspecies of the Dunlin *Calidris a. alpina* have been a matter of debate for decades. The picture is still far from clear, but recent results published by Brenning *et al.* (1987, 1989), Gromadzka (1989), Goede *et al.* (1990), and Rosner (1990), have shed significant new light on the problems.

During my current work preparing an overview of wader migration through Denmark I have tried to add these new "bricks" into a common picture of the vast bulk of European Dunlin literature and the data on censuses, migration, phenology and ringing data from Denmark. It is not a very detailed analysis as I am dealing with 36 wader species on a two-year grant. Nevertheless, it is possible from the synthesis to suggest a general pattern of the migration of different populations of northern Dunlins migrating to Europe. I will not present here all the primary data and the evidence. My purpose is to present the model, with the aim of provoking more thoughts and analyses along these lines.

In general there appear to be several trends within the breeding range from Scandinavia to central North Siberia. In birds from further to the east:
1) adults migrate later both in spring and autumn;
2) moult earlier; and
3) the major part of the birds winter more to the south. On the contrary, juveniles from the eastern populations pass through northern Europe earlier and faster than juveniles from the western populations. To what extent the Scandinavian mountain population fits into this pattern is unknown.

Based on available data it is possible to separate at least three sub-populations, each with more or less clearly distinct annual schedules. In several aspects there are considerable overlaps, such as in wintering areas (Greenwood 1984), but nevertheless there appear to be different core wintering areas. Below I use these starting points for the three sub-populations.

1. The majority of Dunlins, *that winter in the British Isles,* migrate to the German and Danish parts of the Wadden Sea and a number of major Danish spring areas during March. Here they stay until mid May, when they leave for the breeding grounds in northern Europe.

Most of the autumn migration of adults is concentrated over southern Scandinavia in July and early August, these birds heading rapidly and directly to the Wadden Sea and the