

One type of habitat common to all these sites, the 'salinas', which play an important role for the wintering wader populations (see Rufino et al. 1984) is, however, presently under strong pressure. Many of the Portuguese complexes of 'salinas' are being turned into fish or shrimp farms or even just left abandoned. Both of these changes are bad for the wader populations as they mean loss of safe roosting places and feeding opportunities at high tide. If this trend is not reversed, considerable numbers of waders will be affected and the January counts are likely to reflect this in future years.

ACKNOWLEDGMENTS

I wish to thank all those who were involved in the wader counts throughout these years. Without them this paper would never had been written.

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WEIGHTS AND DURATION OF STAYS IN RUFFS *PHILOMACHUS PUGNAX* DURING SPRING MIGRATION: SOME DATA FROM ITALY

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INTRODUCTION

The spring migration of large numbers of Ruffs *Philomachus pugnax* is a particular feature of most Italian wetlands.

Some important night-roosts usually form inside protected marshlands and these roosts are often reoccupied in different years. A wide range of the surrounding habitats (e.g. cultivated fields, salt-pastures, and salinas) is usually visited by foraging birds during the day.

The Comacchio wetland system is exploited by Ruffs for particularly long periods. For example the roost at Valle Zavelea (= Fossa di Porto) is visited by birds between at least late February and late April (Baccetti et al. 1985). Here we assess the importance of this site as a refuelling area in the Ruff migration system by investigating the weights of ringed birds on different dates and by observations on the duration of stay of dye-marked birds.

STUDY AREA

The Valle Zavelea roost is located at one side of the lagoon of Comacchio in the Po Delta area of north-west Italy (Figure 1). The site is a small dammed marshland (70 ha), with a mixture of low reedbeds, mudflats covered by glasswort *Salicornia* and with some open water.

The importance of this site for roosting Ruffs was very great some years ago. There were, for example, 10,000 birds in 1983, and up to 2,000 birds in 1985 (Baccetti et al. 1985). Numbers

This paper was presented at the 8th International Feeding Ecology Symposium, Ribe, September 1989.

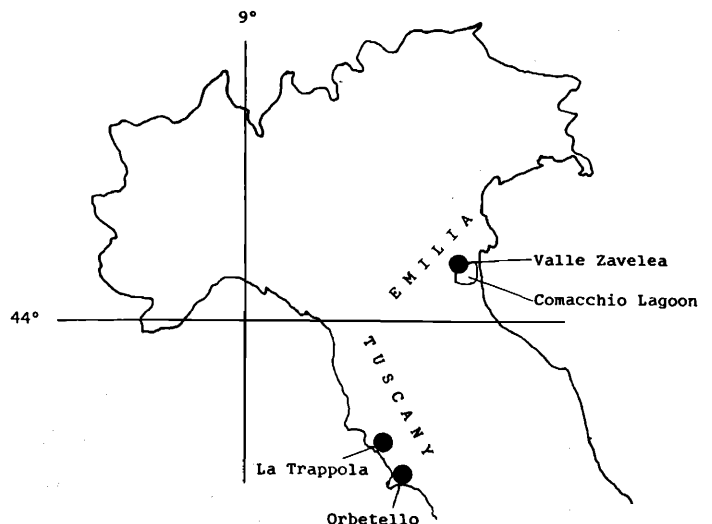


Figure 1. The location of the study areas in Italy.

have, however, been steadily decreasing in recent years due to incorrect habitat management aimed at improving fisheries. The maximum number in 1989 was, for example, only 600 birds). This management which has increased the water level also badly affected our work,



making it necessary for us to stop our ringing efforts in 1989 after only four catches.

Two coastal sites in Tuscany (Orbetello and la Trappola - Figure 1) also were sampled in 1986 and 1987. Fewer birds (less than 1,000) are usually present at these places and the birds are probably present for a shorter time just after arriving from the winter quarters.

METHODS

All the Ruffs were caught at night in a variable number of mist-nets set in the vicinity of the roost. Tape-luring (with continuous calls of the Black-tailed Godwit *Limosa limosa* from one or two loud-speakers positioned just under the nets) determined movements from the roost to the netting-site.

The catching activity was usually between sunset and 0200 hours, with nets being visited every hour. The birds were measured, weighed with Pesola spring balances, and released within one hour, after ringing and dyeing (usually with Rhodamine B). No retraps were made.

Valle Zavelea roost was checked for visual controls of dyed birds in 1988. After we stopped catching these checks were continued twice each week until no marked birds remained. Nearby feeding areas were checked non-systematically for marked birds.

RESULTS

A total of 348 Ruffs were ringed at the roost near Comacchio in 1985, 1988 and 1989. An additional 25 birds were caught in Southern Tuscany in 1986 and 1987.

Field activity was concentrated in March and early April. This period was divided in four 10-days intervals, starting from 2 March. These time intervals were chosen according to Berthold (1973). All the birds were sexed and aged using Prater *et al.* (1977). Four sex/age classes were recognized: M6 adult males, M5 second-year males, F6 adult females, and F5 second-year females. Their patterns of occurrence at the Zavelea roost in the different date periods are shown in Figure 2, with all data combined from 1985, 1988 and 1989. This shows clear evidence of a later passage of females than males, and of young birds compared to adults. This is similar to the pattern described by Harengerd (1982) and also by Forcellini *et al.* (1985) for a stop-over site in northern Italy.

The analysis of morphometric data (lengths of wing, bill, tarsus, head and bill, and toe) found no significant variation (ANOVA)

for birds of the same sex/age class caught in different periods of the same year. Neither were there any differences between the overall average values of different years (Student's t-test).

Weights

The analysis of weights shows a similar pattern to that for the other measurements, with no significant variation for any class in the different periods (ANOVA). Both second-year males (M5) and second-year females (F5) in our sample always had lower mean weights than the respective adult categories: t-tests on pooled data, M5 vs M6 $p = 0.0003$; F5 vs F6 $p = 0.0025$ (see also Table 1).

Coefficients of variation (C.V.) are similar for both sex classes of adult birds (M6 = 10.8, F6 = 10.2). This suggests that each sex class probably comprises an equal proportion of freshly arrived (lean) birds and heavy ones. There was a large enough sample only for adult males (M6) to make a comparison between Valle Zavelea birds and migrants at stop-over sites along the coast of Southern Tuscany (also caught in March). This comparison indicates that male Tuscan Ruffs have significantly lower weights: $n = 17$, mean = $155.5 \pm 13.4g$ (range 137-181g), t-test, $p < 0.0001$. The variance of the weights of these Tuscan Ruffs is less than for M6 birds in Valle Zavelea (F test, $p < 0.05$).

The average weights for males and females at both sites are, however, much lower than those reported from other areas. OAG Munster (1989) report averages during autumn migration of 240g for males and 150g for females. Koopman (1986) found consistently higher masses for both males and females than we found in Italy. This difference was even present for birds moulting in autumn when their weight is usually at its lowest. Weights from Kenya in spring (Pearson 1981) more closely resemble those in Italy.

Dye-marking

Totals of birds dyed at Valle Zavelea were 151 in 1985, 138 in 1988, and 42 in 1989. As well as a few long-distance records (one in The Netherlands, one in Poland, and two in Czechoslovakia), there were 26 sightings at roosts in the Comacchio wetlands in 1988 after ringing activity ceased (Figure 3). The last dyed birds were observed 23 days later than ringing stopped.

The total numbers of sightings on feeding areas situated at various distances from the roost were: 14 in 1985 (9.3% of birds marked), 5 in 1988 (3.8%) and 1 in 1989 (2.3%). Figure 4 shows the distribution of these observations.

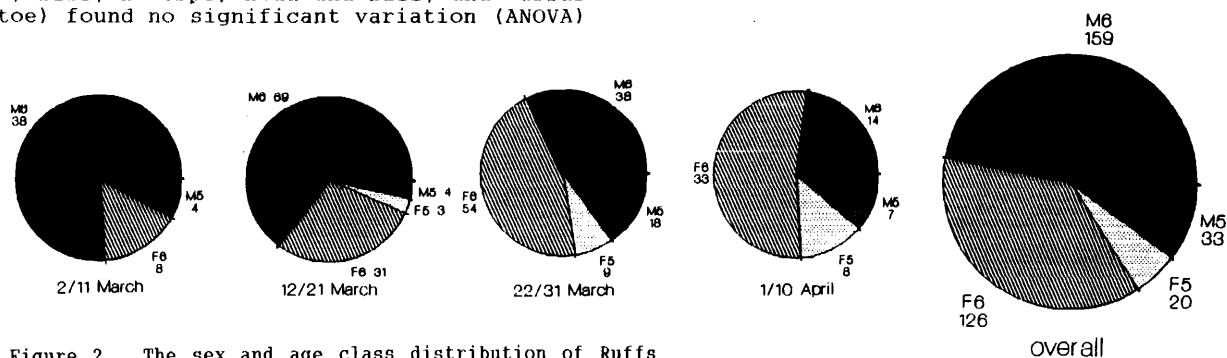


Figure 2. The sex and age class distribution of Ruffs caught at the Valle Zavelea roost in the Comacchio wetland.

Table 1. Weights of Ruffs caught in the Comacchio wetlands.

	2-11 March	12-21 March	22-31 March	1-10 April	Total
Adult males (M6)	179.8±16.5 150-208(38)	181.6±20.2 145-234(69)	181.6±20.3 137-223(38)	181.3±23.2 133-217(14)	181.2±19.5 133-234(159)
Adult females (F6)	104.4±13.0 87-128(8)	106.0±9.8 90-128(31)	105.0±12.5 62-135(54)	101.5±10.7 82-123(33)	104.3±11.5 62-135(126)
2nd-year males (M5)	164.7±13.1 140-182(4)	158.5±27.0 134-190(4)	172.4±15.7 146-207(18)	162.8±23.9 128-186(7)	167.8±19.2 128-207(33)
2nd-year females (F5)		101.7±16.3 84-116(3)	95.6±5.6 88-107(9)	100.1±8.8 86-109(8)	98.3±8.7 84-109(20)

Values are: mean ± standard deviation
range (sample size)

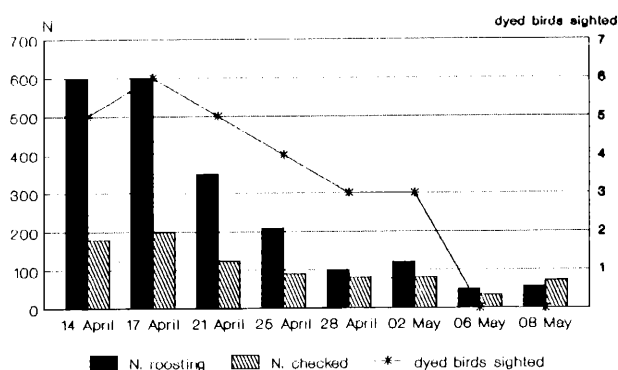


Figure 3. Sightings of dyed birds in 1988 after the catching period ended on 5 April.

The average distance from the ringing site of these sightings was 26.1 km. Areas with most sightings (Iolanda di Savoia and Salina di Cervia) are 28 km and 47 km respectively from the roost.

DISCUSSION

Migrating Ruffs seem to exploit the surroundings of Comacchio lagoon, unlike other Italian areas (e.g. Tuscany), as an important refuelling place after flying the first part of their route to the breeding grounds. This is indicated by features including the long stop-overs of dyed birds and the wide range of body mass values recorded for each sex/age class. Weight was lower and less variable at Tuscan stop-over sites, where the birds probably find poorer for refuelling for onward migration.

The absence of an increasing weight in the population sampled at Valle Zavelea suggests a constant turnover during our study period which was during the peak of the spring migration. Alternatively there could be an earlier start of the Ruff passage that would then have occurred before the period of our ringing activity, with a higher proportion of lean birds present at this time. A stay of 10-20 days could permit adult male Ruffs to increase their body mass by up to 100 g, since the observed range in weights was 133 g to 234 g, at the highest daily rate of gain proposed by Davidson (1984) for other species of waders.

The remarkable dispersion of Ruffs over the feeding area around Comacchio, which covers

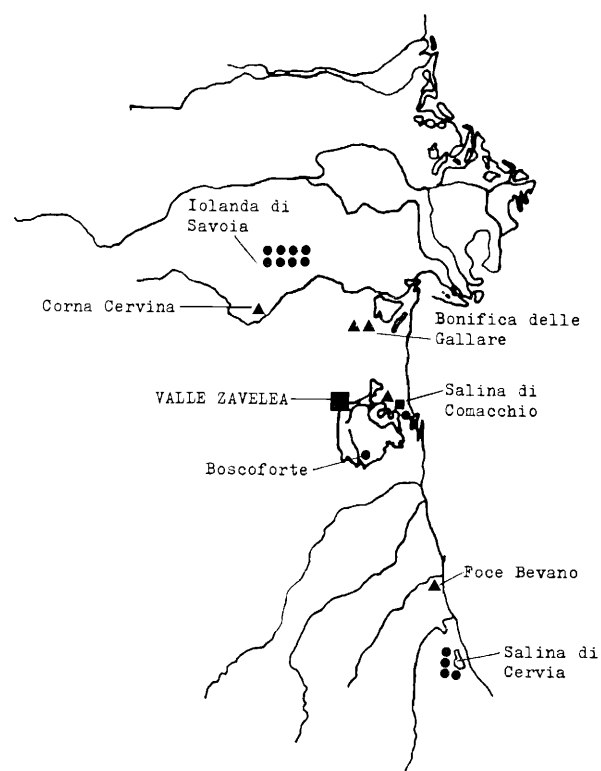


Figure 4. Feeding areas visited by Ruffs caught and dyed at Valle Zavelea.

Each symbol indicates an observation of one bird, in different years: ○ 1985, ● 1988, ▲ 1989.

over 1500 km², provides further evidence of a complex use of land resources. This would be rather unexpected if the birds made only very short stop-overs. Counts made in 1985 over most of the feeding sites of birds presumably coming from Valle Zavelea roost (Baccetti *et al.* 1985) indicate that up to 50.4% of daily totals of birds can use feeding areas located in marshlands and similar habitats (including artificial ponds of sugar factories). 40% occurred in salt-pans and 9.6% in cultivated areas and rice fields. A similar feeding distribution was apparent from sightings of dyed birds, grouped in the same habitat categories (55% marshlands and ponds, 30% salt-pans, 15% cultivated areas).

Such a variety and size of potential feeding places is undoubtedly seldom available in Italy

and may account for the complex ecological strategies used by resting Ruffs. Situations resembling those in Tuscany are probably those more typical of Italy.

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BODY CONDITION OF PURPLE SANDPIPERS *CALDRIS MARITIMA* WINTERING IN NORTH-EAST ENGLAND

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"A little information can go a long way" (Anon)

INTRODUCTION

Most wader species overwintering in Britain and elsewhere in the northern temperate zone store reserves of fat and body protein during winter, usually interpreted as an insurance against food shortage and high energy demands during severe winter weather (e.g. Davidson 1981). Reserves of fat generally rise to a peak in midwinter (December-January) before declining to minimum levels in March. Those birds that migrate north to breed then begin to store pre-migratory reserves of varying amounts. These seasonal variations in body condition are most readily seen as variations in total body mass (e.g. Johnson 1985).

Purple Sandpipers winter further north than any other wader, occurring well north of the Arctic Circle in places such as northern Norway (Summers *et al.* 1990). They are close to the southern limit of their wintering range in Britain (Cramp & Simmons 1983) and are unusual amongst the British wader fauna in having no marked midwinter peak in their total mass although mass does increase before migration in spring (Atkinson *et al.* 1981). The inference of this pattern of mass variation is that Purple Sandpipers carry only small fat reserves during winter. Since there have been no published analyses of the body condition of Purple Sandpipers the size of the nutrient reserves represented by body mass at different times of year remains, however, speculation.

This note reports the body condition of an extremely small sample (four birds) of wintering Purple Sandpipers in Britain. Despite its size the sample provides the interesting information on protein reserves and lean mass in relation to body size, and first

confirmation that the fat loads in winter are indeed small in comparison to those of other wintering waders.

The birds were adults and collected as accidental casualties of catching operations at St. Mary's Island on the Northumberland coast of north-east England on 20 March 1981, a time when fat loads of waders are generally at their smallest. Carcasses were analysed for fat reserves and protein reserves (represented by the size of the pectoral muscles) using standard techniques (Davidson 1981, Piersma *et al.* 1984).

BODY SIZE

The sample consisted of three males and one female. Bill-lengths (Table 1) of the males were between 24 and 26.5 mm, in the range of the 'short-billed' males identified as Norwegian breeding birds by Atkinson *et al.* (1981). The female was very large, and within the range of the 'long-billed' females breeding in Iceland and possibly Greenland or Canada (Nicoll *et al.* 1988).

BODY CONDITION

Total body mass and body condition are summarised in Table 1. The lipid indices of males ranged between 5.3 and 7.7%, with an average 6.7%. The single female had a similar fat load of 6.0%. These fat loads are similar to the late winter fat levels of most other waders wintering in Britain, which average 5-8% fat (Davidson 1981a,b).

The pectoral muscles form a large part of the