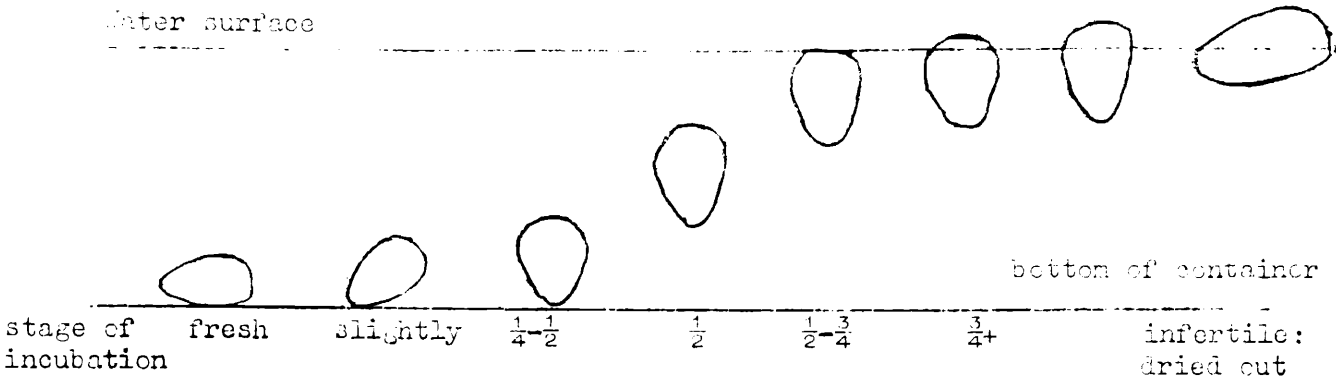
I know that several individuals are considering looking at breeding wader in some detail both in Britain and elsewhere, so I thought it would be a good idea to write a short piece based on the lessons learnt from analysing British and Icelandic breeding data. All ringers can help but please keep disturbance to a minimum.

1) Breeding adults: these are relatively easy to trap on nest by using a fairly large drop or similar trap. Snipe are so tame that often, once the nest is discovered, you can drop a mist net over the sitting bird. Biometrics of known breeding adults (and first years if they can be still aged) is vital to enable biometric analyses of mixed populations to be made.

2) Eggs: obviously the number of eggs in each nest should be recorded. Most lay eggs on approximately every other day, sometimes the gap between eggs may be as long as six days, this means that clutch size must be determined by visits at least 3 days apart - preferably by two visits in one week. The earlier in the laying cycle that the nest is found the better the information. Once there is a full clutch you can still check on the 'age' of the eggs. Newly laid eggs are full of albumen and yolk. They are heavier than water so sink if placed in a small container of water. As incubation proceeds more air is found in the egg and it becomes lighter until it floats on the surface of the water. The diagram below helps to determine the stage of incubation. Weighing the eggs gives similar information.



The hatching date is important to discover and with waders it usually occurs 22-30 days after the clutch is complete. The egg start to be chipped by the pullus inside about 2 days before the pullus emerges - so please record if the eggs (and how many of them) are chipped. Also check to see if any eggs are infertile and are left in the nest - this is needed for hatching success.

Once the pulli emerge they spend a few hours drying out in the nest but after that they start to wander. For the first few days the young can usually be found around the nest but after that the parents may lead them away to a better feeding area. Ringers can gain much information from pulli by applying normal biometric studies.

(a) the weight: wader pulli have a reasonably predictable growth curve so knowing the hatching weight, the fledging weight and time taken from hatching to fledging we can predict to within 2 or 3 days the age of the pull Most of these parameters are 'known' but more information on all of them is needed. So weigh the pulli - the nearest gram or half gram is usually sufficient. Retraps of pulli are very useful to check the rate of growth and pulli ages.

(b) wing, bill. These grow at a more or less constant rate through the fledging period. The latter only need be measured once the primaries have emerged from their sheaths. What we need to know is the difference between the measurements of a newly fledged bird and a fully grown juvenile. All the evidence is that it takes 2-3 weeks after fledging before the bird is fully grown, this is important for biometrical studies of migrating waders.

(c) Brood size. The number of young per brood will give an indication of the success of the successful broods. To find out the number in a brood a few minutes careful watching may be needed (it is easier with Ringed Plover and Oystercatcher than with Dunlin, Redshank or Curlew). Once the number in the brood is known then catch as many of the pulli as possible and weigh them. By comparing the brood size with the weight (i.e. age) of the pulli, you can show the mortality of the chicks.

An example for Ringed Plover in Iceland (1972) was

Weight	Average brood size
under 10 grams	2.84
11-20 grams	2.67
21-30 grams	2.18
31-40 grams	2.14

This indicates that just under a quarter of the pulli, which hatch, die. The fledging success is an important parameter to see how well the species is standing up to environmental factors.

To Summarise Do not just ring and fling pulli

Perhaps in the order of importance

1) after ringing, weigh all pulli, including retraps
2) catch breeding adults and measure
3) observer brood size
4) look of clutches - check state of incubation
   - see if they are chipping
   - see how many clutches fail, how many eggs are lost or are infertile.

We need a blitz on breeding birds to finally tie up many unknowns about migration periods. Also of course the more you ring the betterchance of a recovery.

Record these details on Nest Record Cards - a supply of which can be obtained through the B.T.O. - and please send them back promptly at the end of the season.

YOU MUST NOTE Many species of breeding wader are on the protected list in Britain. Permits must be obtained (from the B.T.O.) before you go for them and, as always, disturbance kept to an absolute minimum.

GENERAL LIST. Little Ringed Plover, Whimbrel, Greenshank, Stone Curlew.

SPECIAL LIST. Kentish Plover, Dotterel, Black-tailed Godwit, Wood Sandpiper, Temminck's Stint, Ruff, Avocet, Black-winged Stilt, Red-necked Phalarope.

Some Results from Ringing Dunlin on the Dee in winter

R.A. Eades

Some results from ringing Dunlin C. alpina on the Dee Estuary during May and the autumn months of July, August and September have been given in previous bulletins, and I should now like to look at the Merseyside Ringing Group's results from Dunlin ringing in the "winter", that is the months October to April inclusive, again during the period from June 1958 to June 1971.

Although the M.R.G. started ringing Dunlin on the Dee in 1958, it was not until 1963 that Dunlin were ringed in the winter time, because previously waders were mainly caught at Shotton Pools and Dunlin did not visit these pools in the October to April period, apart from a few in April. After the decline

of Shotton Pools the M.R.G. started to mist net wading birds on the tidal are of the estuary on the new moon night tides, mainly at two roost sites, The Point of Air, Flintshire, and West Kirby, Cheshire. This led to Dunlin being caught in all periods when present on the Dee, including the winter months.

The first Dunlin to be ringed on the open shore were two "Fully Grown" birds at the Point of Air in October 1963, and a hundred Dunlin were ringed there during that winter season. In 1964 the first catch was made on the ope shore at West Kirby and by 1965 techniques had improved sufficiently to catch over six hundred birds in a season, Table 1 shows the numbers caught each October to April period, and it can be seen that totals were low in 1967/68 and 1968/69, but increased thereafter. The dramatic increase in 1970/71 foll successful cannon-netting visits by the Wash Wader Ringing Group. 680 were at the Point of Air, and the two catches on fields at Thurstaston, with 1261 ringed, were the first to be ringed at that site by the Merseyside Ringing Gr whilst three hundred Dunlin ringed at West Kirby were mist netted in the norm way.

Table 1.

October/April Period	Numbers of Dunlin Ringed	Number with Non-Dee Rings	Percentage with Non-Dee Rings
1963/64	107	3	2.8%
1964/65	155	1	0.6%
1965/66	611	11	1.8%
1966/67	403	6	1.5%
1967/68	133	2	1.5%
1968/69	115	0	zero
1969/70	704	15	2.1%
1970/71	2257	28	1.2%
Total	4485	66	1.4%

These four and a half thousand Dunlin ringed in the winter months over a peri of eight years have yielded sufficient information to draw some tentative conclusions.

THE DEE AS A WINTERING GROUND

The Dee is an important wintering area for Dunlin, and it seems that Dunlin remain allthe winter upon the Dee, and return year after year.

Remaining all "winter"

There are 28 cases of a Dunlin being caught twice during the same October to April period, of which 12 were caught again st the same roosting site, whilst 16 changed roost. It is interesting that the changesin roost in the same season are mostly between a day time roost site and a night time one. Thus birds ringed at night on the shore at West Kirby were caught again in the day time on ploughed fields at Thurstaston, six birds roosted by day on Hilbre Is and West Kirby by night, and a bird cannon-netted at the Point of Air was controlled at Thurstaston. However, only three Dunlin interchanged between night roosts of West Kirby and the Point of Air. (Fields are only used sparodically as roosts, always in the day time.)

Loyalty to the Dee as a wintering ground

There are only two recoveries indicating a shift in wintering ground between the Dee and another estuary. An adult ringed in March 1970 at Carnforth, Morecambe Bay, was controlled at Thurstaston in February 1971 and an adult ringed in December 1965 at West Kirby was controlled in January 1970 at Carn This is despite a large ringing programme on Morecambe Bay, only 60 km north the Dee.

In contrast, 90 Dunlin have been ringed in one winter and controlled dur a subsequent winter, as shown below.

	Same Roost Site	Different Roost Site	Total
One winter later	9	14	23
Two winters later	7	15	22
Three winters later	12	9	21
Four winters later	9	3	12
Five winters later	6	3	9
Six winters later	1	2	3
	44	46	90

It is apparent that the Dunlin is quite a long lived bird, and probably the introduction of longer lasting alloys for wader rings will increase the number of old birds being controlled. Apart from these controls, only eight Dunlin have been found dead locally and reported to the Ringing Office, and none have been reported shot (the Dunlin is, of course, protected by law).

Ratio of Adults to Juveniles

Since 1969 all Dunlin ringed on the Dee have been identified, as either adult or juvenile, whereas previously some birds were not separated; so it is possible to work out a proper ratio of adults to juveniles in recent years.

In the winter of October 1969 to April 1970 there were 655 adults to 49 juveniles, i.e. 13:4 adults to one juvenile. These birds were ringed at night, almost all at West Kirby, often under cold, uncomfortable conditions. It would not be unreasonable to expect some juveniles to be missed, especially when looking for ageing criteria by torchlight.

In the winter 1970/71 there were 1833 adults to 424 juveniles, a ratio of 4:3 adults to one juvenile. This ratio is much higher than that of the previous year and has some interesting aspects. Thus, at West Kirby a series of night catches yielded 235 adults to 52 juveniles, i.e. 4.5 adults to one juvenile and at the Point of Air, a daylight cannon net catch resulted in 618 adults to 69 juveniles, of 8.8 adults to one juvenile. At Thurstaston in January, a cannon net catch on a ploughed field resulted in 154 adults to 72 juveniles or 2.1 adults to one juvenile, and a second catch in February gave 818 adults to 217 juveniles or 3.2 adults to one juvenile. At Shotton Pools there were 8 adults to 14 juveniles or 0.4 to one.

Thus the higher ratio of juveniles in the 1970/71 winter was a feature at all sites, and it was pleasing that night tide samples also had higher ratios. It seems that observer error is not too high at night, and it was also interesting to see that more juveniles were cannon netted on the ploughed field than were cannon netted on the beach. Possibly, juveniles are more likely to roost on a field than adults, or juveniles are not as shy of cannon net as adults. There is no reason to suppose that the distribution of juvenile birds in a roosting flock is random, so cannon net catches probably do not give a really random sample from the Dunlin population.

DUNLIN RINGED AWAY FROM THE DEE AND CAUGHT IN "WINTER"

Amongst the four and a half thousand Dunlin ringed in the "winter" on the Dee a total of 66 were found to have been already ringed away from the Dee. Table 1 shows how many were controlled each season, and the percentage of controls each season. It can be seen that winters with totals below 200 tend to fluctuate much more (from zero to 2.8%) than those winters with larger totals (from 1.2% to 2.1%). This is probably a result of sampling error, suggesting that a winter total of at least four hundred birds is needed to monitor the ratio of birds ringed elsewhere.

Apart from the ups and downs of winters with low totals, the percentage of non-Dee birds has remained fairly steady at about one and a half percent, i.e. for every two hundred Dunlin ringed in the winter, three carry rings from elsewhere. Some Dunlin are controlled many years after ringing, often with rings very worn and corroded (see below).

TIME ELAPSING BETWEEN RINGING AWAY FROM THE DEE AND CONTROL ON THE DEE

Less than 12 calendar months	18
between 1 year and 2 years	10
" 2 years and 3 years	15
" 3 " " 4 "	6
" 4 " " 5 "	6
" 5 " " 6 "	2
" 6 " " 7 "	2
" 7 " " 8 "	4
" 8 " " 9 "	2
" 9 " " 10 "	1
	66

Two Dunlin from Sweden have been controlled twice, one ringed in 1963 was controll in 1968 and 1971, and one ringed in 1965 was controlled in 1966 and 1968. The eldest Dunlin was ringed at Revtangen in September 1957 and controlled in Decembe 1966.

Although the percentage of Dunlin ringed away from the Dee has remained fairl constant over the year, there have been changes in the proportion of Dunlin ringe at various countries. See Table 2.

TABLE 2

PERCENTAGES OF DUNLIN EACH WINTER RINGED AWAY FROM THE DEE

	Revtangen	Sweden	Denmark	Finland	Poland	Germany	Wash
1963/64	0.92%	1.87%	-	-	-	-	-
1964/65	-	0.62%	-	-	-	-	-
1965/66	0.31%	0.49%	0.14%	0.16%	-	0.49%	0.16%
1966/67	0.49%	0.49%	0.25%	-	-	0.25%	-
1967/68	-	2.25%	-	-	-	-	-
1968/69	-	-	-	-	-	-	-
1969/70	0.42%	0.28%	-	-	-	0.28%	1.13%
1970/71	0.17%	0.48%	0.09%	0.13%	0.09%	-	0.13%

The percentage of Swedish ringed birds has remained fairly steady at about half a percent, whilst Revtangen has slowly lost ground from the mid-sixties. T percentage of Dunlin ringed in Germany (including Heligoland) and Denmark has decreased, whilst the first Polish ringed birds were caught in 1971. The percen of Wash ringed birds was low in the early sixties, but extremely high in 1969 a the large catches of 1971 showed a drop. In recent years the Wash Wader Ringing Group have concentrated on other species than Dunlin, so one could expect a fall this percentage.

TABLE 3

DUNLIN CAUGHT IN WINTER ON THE DEE WHICH WERE RINGED ELSEWHERE

Month and Place of Ringing	March	April	July	August	September	October	Total
Revtangen	-	-	-	1	9	2	12
Ottenby	-	-	4	4	2	1	11
Rest of Sweden	-	-	3	8	1	-	12
Denmark	-	-	2	2	-	-	4
Finland	-	-	2	-	2	-	4
Poland	-	-	-	2	-	-	2
Heligoland and Germany	-	1	-	1	5	-	7
Wash	2	-	-	7	3	-	12
Northumberland	-	-	-	-	1	-	1
Morecambe Bay	1	-	-	-	-	-	1
Total	3	1	11	25	23	3	66

The 66 controls give some insight into the migration routes of the Dunlin which winter on the Dee. Autumn migration seems to start in July, with adults ringed in Sweden, Denmark and Finland. August appears to be the peak month for ringing Dee-bound Dunlin in Sweden, with birds ringed throughout that country. Surprisingly, Finland is not represented, but there are birds in Poland and Denmark, and the North Sea is crossed by August with seven birds caught on the Wash, and singles from Heligoland and Revtangen. The first juveniles appear in August, with four juveniles in Sweden and one from Revtangen, but only one of the Wash birds being first year.

In September there is a definite change in emphasis, away from the Baltic to the North Sea, with nine birds from Revtangen, five from Heligoland and West Germany, three from the Wash and one from Northumberland. Possibly, there is one migration route from South Norway to Northeast England and another from the South Baltic to North Germany and thence across to the Wash. Eight of the Revtangen birds were aged as "Fully Grown", but in fact two of these were found to be juvenile birds when controlled by the M.R.G. By October, Scandinavian ringers do not seem to catch many Dunlin, with only one juvenile from Ottenby and two "fully grown" from Revtangen.

The spring migration is not so clear, with only four controls. Two Dunlin ringed together on the Wash in March 1968 have been controlled in the winter and a bird ringed in the German Frisian Islands in April 1965 was controlled in January 1970.

TABLE 4

RECOVERIES OF DUNLIN RINGED ON THE DEE IN WINTER

	January	March	May	July	August	September	Total
Skanor, Sweden	-	-	-	3	1	-	4
Denmark	-	-	-	-	1	-	1
Finland	-	-	-	-	2	-	2
Poland	-	-	-	-	1	-	1
Waddensee	-	1	2	-	-	-	3
North France	-	-	-	1	-	-	1
S.W. France	-	1	-	-	-	-	1
Humber	-	-	-	-	-	1	1
Wash	-	-	-	-	2	-	2
Morecambe	1	-	-	-	-	-	1

There have been 17 recoveries away from the Dee from the Dunlin ringed in the winter months. Autumn recoveries are almost all of birds controlled by other ringers, often at sites mentioned previously. It is worthy of note that there have been no recoveries of winter ringed birds from Ottenby or Revtangen, the two stations which send the most controls to the Dee. This is puzzling, but perhaps the explanation is that these stations catch Dunlin on migration to many wintering grounds, Morecambe Bay, the Wash, France, the Dee etc. with a large turnover of birds, and Dunlin en route to the Dee form a small part of the total. Thus, although many of the Dunlin wintering on the Dee pass through Revtangen and Ottenby, and in passing, about one in a hundred have been ringed there, to the ringer at Revtangen and Ottenby, the birds with Dee rings are so diluted by other birds that they do not catch birds with Dee rings. The bird recovered in North France was shot.

There are few recoveries in spring. A bird ringed at Shotton Pools in April was shot on the Gironde, Southwest France at the end of March the following year. It seems very likely that this bird was not a wintering bird but on passage from further south to breeding grounds in Iceland or Greenland (see previous WSG Bulletin)

It is also noteworthy that there are three spring recoveries of birds found dead in the Dutch/German Waddensee area. Thus one was found dead on Borkum Island on 27th March, another on Scharhon Island on 1st May and another in May on Texel Island. Three deaths in the same area in spring suggest that the migration in spring is more taxing to the birds in some way than the autumn. One bird was