WINTERING WADERS ON BELFAST LOUGH AND THE OUTER ARDS COAST, NORTHERN IRELAND

by L.W. Austin and S.J. Leach

INTRODUCTION

The coastline of north-west Europe, including Britain and Ireland, provides an important refuge for overwintering and passage waders. Since 1969, most estuaries in the UK have been regularly monitored by the British Trust for Ornithology/Royal Society for the Protection of Birds/Nature Conservation Council 'Birds of Estuaries Enquiry (BoEE)'. Unlike other major estuaries in Northern Ireland, the wader populations of Belfast Lough have never been properly assessed due, in part, to security restrictions (Hutchinson 1979, Prater 1981). However, since 1979/80, the Department of the Environment for Northern Ireland has carried out regular counts of Inner Belfast Lough, between Holywood (Irish Grid J390790) and Newtownabbey (Irish Grid J356819) (Figure 1). These have indicated that the lough supports significant populations of Oystercatcher *Haematopus ostralegus* and Redshank *Tringa totanus* (Prater 1981, Weyl in prep.). In 1984/85, the BTO/WSG 'Winter Shorebird Count' censused waders on UK coasts not previously covered by the BoEE. This revealed that the Northern Irish coast, particularly that of Co. Down, held large concentrations of Turnstones *Arenaria interpres* and Ringed Plover *Charadrius hiaticula* (Salmon and Moser 1985).

In view of the general paucity of data on the wader populations of Belfast Lough and the Outer Ards coast, co-ordinated counts of these areas were made throughout the 1985/86 winter. This paper summarises the results of these counts, and gives a preliminary assessment of the importance of the area for overwintering waders.

STUDY AREA

Belfast Lough is a wide sea lough, separating Counties Antrim and Down on the eastern coast of Northern Island. The limits of the lough for this study were taken as Whitehead (Irish Grid J479922) and Orlock Point (Irish Grid J560837) (Figure 1).

Between Whitehead and Carrickfergus, the northern (Co Antrim) shore is steep and rocky and is, to a great extent, industrialised. West of Carrickfergus, the foreshore is less steep, with intertidal mud and rocks. The city of Belfast with its associated docks and industry is at the head of the lough, around the mouth of the River Lagan. Here, the extensive intertidal mudflats and musselbanks are much used by waders, although these areas have been greatly reduced this century by successive and continuing land-claim works. The southern (Co. Down) shore from Holywood eastwards is predominantly a rocky coastline interspersed with sandy bays, the largest being Ballyholme Bay at Bangor (Irish Grid J520823).

The Outer Ards coast is the eastern shore of the Ards peninsula which separates Strangford Lough from the Irish Sea. The area covered in our counts was from Orlock Point to Bar Hall Bay (Irish Grid J616467), at the southern tip of the peninsula (Figure 1). The offshore Copeland Islands were excluded from the study. The coastline is unusually varied, with numerous low headlands, rocky coves and sandy bays. Tidal range in the area is particularly high and this feature, together with the gently sloping shoreline, produces broad and complex intertidal habitats, that are particularly attractive to waders.

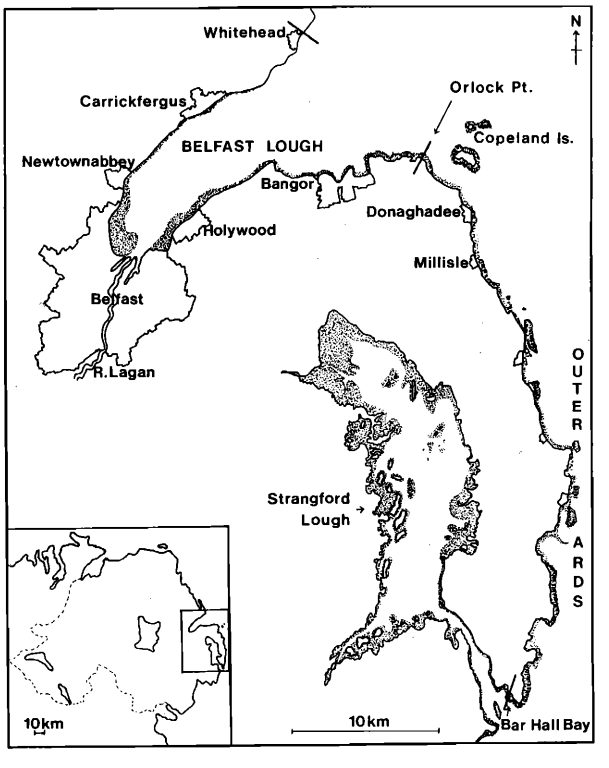

Figure 1. Belfast Lough and the Outer Ards coast, Northern Ireland, showing localities mentioned in the text.

METHODS

On Belfast Lough, counts were carried out each month from September 1985 to April 1986. Monthly counts on the Outer Ards began in December 1985 after casual observations near Donaghadee suggested this area was likely to be of importance for several species of waders.

Counts were timed to coincide with the BoEE dates and whenever possible Belfast Lough and the Outer Ards were counted on consecutive days. Thus, most counts were carried out within 3-4 hours of high water. In January, the Outer Ards count was postponed due to bad weather, and we could make only a low water count. In March, an additional low water count was

Table 1. Counts of waders on Belfast Lough from September 1985 to April 1986. Counts of international importance are double underlined, counts of 'national' importance (Great Britain) are single underlined, and counts of 'national' importance (Ireland) are marked with +; see text for full definitions.

Species	1985					1986			
	16 Sept	14 Oct	15 Nov	13 Dec	14 Jan	10 Feb	5 Mar*	13 Mar	10 Apr
Oystercatcher	4649+	2892+	3308+	3977+	3777+	3450+	3311+	2637+	1809+
Ringed Plover	79	123	340	159	227	154	85	88	32
Golden Plover	-	-	2	47	-	-	2	9	1
Grey Plover	-	-	2	2	2	4	2	1	1
Lapwing	227	602	860	1902	208	42	38	39	84
Knot	160	210	141	1	148	190	70	126	-
Purple Sandpiper	-	-	55	83	59	98	73	61	51
Dunlin	28	27	169	736	746	415	818	691	21
Ruff	2	-	-	1	1	9	2	6	5
Snipe	-	18	6	48	42	1	3	29	46
Bar-tailed Godwit	16	57	36	65	81	50	159	203	-
Black-tailed Godwit	15	5	35	29	21	10	13	20	37
Curlew	757	752	63	67	40	537	724	316	37
Redshank	1802+	1124+	1041+	1160+	859+	851+	924+	1387+	629+
Turnstone	602	745	773	789	865	989	547	1183	516

*Low water counts

Table 2. Counts of Waders on the Outer Ards coast from December 1985 to April 1986. Counts of international importance are double underlined, counts of 'national' importance (Great Britain) are single underlined and counts of 'national' importance (Ireland) are marked with +; see text for full definitions.

Species	1985	1986			
	12 Dec	7 Jan*	12 Feb	12 Mar	11 Apr
Oystercatcher	739	743	845	801	469
Ringed Plover	379+	693	641	253	147
Golden Plover	1091	1200	28	141	165
Grey Plover	15	35	39	35	9
Lapwing	3761	3900	47	111	1
Knot	10	-	-	2	-
Purple Sandpiper	77	52	94	64	60
Dunlin	1342	1548	1753	1419	11
Snipe	40	71	70	67	21
Bar-tailed Godwit	58	86	107	32	22
Curlew	103	134	296	202	92
Redshank	504	387	629	728	675
Turnstone	1903	1050	1808	1949	1992

*Low water count

carried out on Belfast Lough in order to compare counts made at high and low water.

RESULTS AND DISCUSSION

The results of the 1985/86 wader counts on Belfast Lough and the Outer Ards coast are presented in Tables 1 and 2; while Table 3 summarises earlier counts of the inner lough. In all, 25 species of wader have been recorded on Belfast Lough and the Outer Ards during organised counts (Tables 1, 2 and 3) to which the following discussion refers. In addition to waders, Belfast Lough supported important numbers of Great Crested Grebes *Podiceps cristatus* (1985/86 peak: 288 in October), Scaup *Aythya marila* (344, February) and Goldeneye *Bucephala clangula* (458, December).

There have been few attempts to estimate the total size of shorebird populations in either Northern Ireland or the Republic of Ireland, and most species have probably been underestimated (M.E.Moser, pers. comm.). Until up-to-date estimates are available it is not clear how important Belfast Lough and the Outer Ards are in an Irish or British Isles context; in the discussion below we have suggested a population may be of 'national' importance if it exceeds 1% of the Great Britain population or 5% of the most recent Irish estimate for that species.

Systematic list

Oystercatcher. From 1979/80 to 1985/86, Inner Belfast Lough supported a 'nationally' important population of Oystercatchers (Table 3). Although the greatest numbers were recorded on the inner lough, in 1985/86 considerable numbers were found outside this area. For example, a small island near Carrickfergus had

Table 3. Peak counts of waders on Inner Belfast Lough for 1979/80 to 1985/86. Counts of international importance are double underlined, counts of 'national' importance (Great Britain) are single underlined and counts of national importance (Ireland) are marked with +; see text for full definitions.

Species	Year 79/80	80/81	81/82	82/83	83/84	84/85	85/86
Oystercatcher	2040+	5000+	3080+	2168+	4800+	3310+	3610+
Ringed Plover	100	125	162	78	166	128	150
Golden Plover	-	1	-	-	-	1	24
Grey Plover	3	2	1	-	-	-	2
Lapwing	840	1800	1030	64	450	760	1292
Knot	50	160	104	130	62	189	210
Purple Sandpiper	7	4	-	-	-	-	-
Dunlin	1940	2000	1310	1355	812	960	672
Ruff	6	34	20	-	3	8	9
Snipe	2	50	4	-	42	15	41
Bar-tailed Godwit	135	140	153	43	150	168	200
Black-tailed Godwit	-	7	20	18	29	9	35
Curlew	880	1076	984	712	800	700	660
Redshank	1341+	1461+	1900+	980+	1020+	620	1397+
Turnstone	100	126	146	41	292	192	291

Other species recorded: Sanderling (2 records), Little Stint (12), Pectoral Sandpiper (1), Curlew Sandpiper (5), Jack Snipe (3), Whimbrel (10), Spotted Redshank (1), Greenshank (7), Common Sandpiper (12).

Table 4. Comparison of peak 1985/86 results with those from 1984/85 (data from M.E. Moser and R. Weyl, pers. comm.).

	Belfast Lough		Outer Ards Coast	
	1984/85	1985/86	1984/85	1985/86
Oystercatcher	4337	4764	1078	845
Ringed Plover	308	357	571	641
Dunlin	1119	957	1959	1753
Redshank	1102	1975	628	629
Turnstone	658	1143	987	1903

a high tide roost-site of 400-500 birds. However, at low water, large numbers were found feeding on mussel beds on the outer lough and the figures suggest that many birds were 'commuting' from roost-sites on the inner lough to feeding areas on the outer lough.

Variations in the numbers of birds recorded may be due to movement to and from Strangford Lough, or to birds feeding inland.

Ringed Plover. In 1985/86, Ringed Plover populations on Belfast Lough and the Outer Ards were of 'national' and international importance respectively (Tables 1 and 2); and the counts were similar to those obtained in 1984/85 (Table 4). Ringed Plover numbers appear to show a pattern of overwintering similar to that shown by the 7-year means for the inner lough (Figure 2). The clearly defined peak in November is consistent with other estuarine counts of Ringed Plover in Northern Ireland (Prater 1981). Also, a relatively constant proportion (one-third to one-half) of the whole lough population was found on the inner lough. This suggests that the 1984/85 (Winter Shorebird Count/BoEE) and 1985/86 (this study) counts of Ringed Plovers are fairly representative and are a reasonable estimate of the numbers usually occurring on Belfast Lough and the Outer Ards.

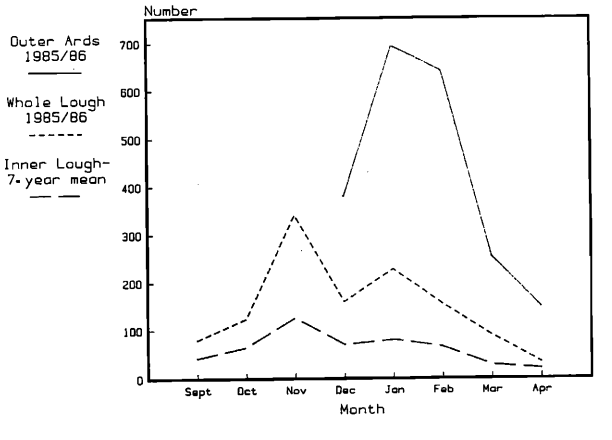

Figure 2. Seasonal fluctuations in the number of Ringed Plovers wintering on Belfast Lough and the Outer Ards: ———— Outer Ards 1985/86; ---------- Whole Lough 1985/86, — — — — Inner Lough, 7-year means.

Golden Plover *Pluvialis apricaria*. Golden Plovers were found in the greatest numbers on the Outer Ards. However, the number recorded varied greatly, probably due to weather dependent movements to and from the coast.

Grey Plover *Pluvialis squatarola*. Grey Plovers were recorded only in small numbers (max. 39 in February), and were found mostly on the Outer Ards coast south of Millisle.

Lapwing *Vanellus vanellus* were recorded throughout the study area in highly variable numbers, probably being affected by weather-dependent movements from inland feeding areas.

Knot *Calidris canutus*. An overwintering flock of about 200 remained in the inner lough throughout most of the study. The few birds recorded on the Outer Ards may have been stragglers from the large flocks on Strangford Lough.

Sanderling *Calidris alba*. A passage migrant, twice recorded on the inner lough.

Little Stint *Calidris minuta*. A passage migrant, usually recorded in the autumn on the inner lough; max. 5 on 18 September 1981. One bird overwintered in 1979/80.

Pectoral Sandpiper *Calidris melanotos*. One record on the inner lough on 16 September 1980.

Curlew Sandpiper *Calidris ferruginea*. A passage migrant, recorded on the inner lough, always in autumn; max. 10 on 16 September 1985.

Purple Sandpiper *Calidris maritima*. Purple Sandpipers were restricted to the rocky shores of the Outer Ards and the Co. Down coast of Belfast Lough. Birds were well dispersed and occurring in small groups (max. flock size 12), usually with Turnstones.

Dunlin *Calidris alpina*. The numbers of Dunlin on Inner Belfast Lough have recently been declining (Figure 3). This is consistent with the national decrease of 22% over 15 years (Moser in prep.) and, at least in the case of Belfast Lough, may be due to land-claim work reducing the area of available mudflats (Weyl in prep.). However, it is interesting to note that, although Dunlin is primarily an estuarine species (Prater 1981, Moser in prep.), our largest numbers were found on the open shores of the Outer Ards, mostly south of Millisle. This is consistent with the findings of the 1984/85 Winter Shorebird Count (Table 4).

Ruff *Philomachus pugnax* were found in small numbers (1985/86 max. 9), always on the inner lough.

Jack Snipe *Lymnocryptes minimus*. Small overwinter populations occur throughout the study area; the numbers recorded vary greatly, however, probably a consequence of the skulking nature of this species.

Snipe *Gallinago gallinago*. Snipe overwinter throughout the study area, possibly occurring in greater numbers during cold weather. Again, the counts varied greatly as birds were rarely seen unless disturbed by the counter.

Bar-tailed Godwit *Limosa lapponica* were found throughout the study area but were recorded in the greatest numbers at and around their inner lough roost-sites.

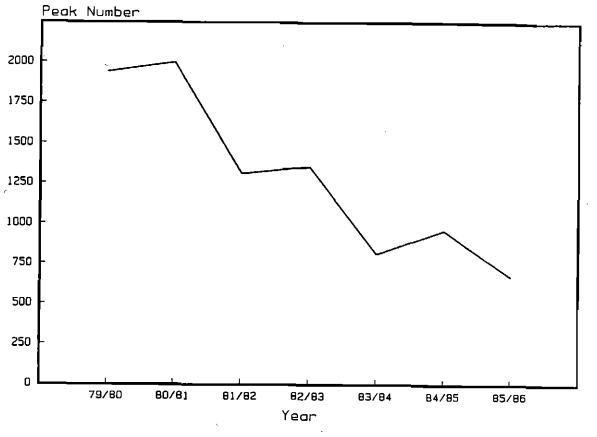

Figure 3. Peak counts of Dunlin on Inner Belfast Lough from 1979/80 to 1985/86.

Black-tailed Godwit *Limosa limosa* were found exclusively on Inner Belfast Lough. The number of birds overwintering, although small, appears to be increasing (Table 3).

Whimbrel *Numenius phaeopus*. A regularly recorded passage migrant; max. 3 on 2 September 1980.

Curlew *Numenius arquata* were recorded throughout the study area, but were found in greatest numbers on the inner lough. The variation in counts may be due to large numbers feeding or roosting inland.

Spotted Redshank *Tringa erythropus*. One record on 19 October 1981.

Redshank. From 1979/80 to 1985/86, Inner Belfast Lough supported a 'nationally' important population of Redshank. In 1985/86, although concentrated on the inner lough, Redshank were also found scattered throughout the whole study area.

Greenshank *Tringa nebularia*. Passage migrant, recorded 7 times on the inner lough.

Common Sandpiper *Actitis hypoleucos*. Passage migrant, max. 4 on 17 July 1981.

Turnstone: In 1985/86, both Belfast Lough and the Outer Ards supported populations of Turnstone likely to be of international importance. Indeed, the number of Turnstone recorded is the most striking feature of these results. Salmon and Moser (1985) noted the presence of previously undiscovered concentrations of Turnstone on the Co. Down coast. This was based on the 1984/85 BTO/WSG Winter Shorebird Count which recorded 658 on Belfast Lough and 987 on the Outer Ards (M.E.Moser, pers. comm.). However, in 1985/86 we recorded even higher midwinter peaks, of 989 and 1903 respectively. It is unlikely that these figures represent a real difference in the numbers present in the two winters but is probably explained by the different counting methods employed. The 1984/85 Winter Shorebird Counts were carried out within 3 1/2 hours of low water whereas our 1985/86 counts were conducted 3-4 hours either side of high water. This explanation is confirmed by our two low water counts which compare closely with the Winter Shorebird Count results: Belfast Lough,

547 compared with 658, and on the Outer Ards, 1050 compared with 987. In 1985/86, our two midwinter counts, made at high water, produced totals of 2692 (December) and 2797 (February) for the whole study area. These results suggest a remarkable constancy in the numbers of Turnstone, both within and between winters, and is consistent with work elsewhere which has found that Turnstones are highly faithful to their wintering sites (Symonds *et al.* 1984, Metcalfe and Furness 1985).

As indicated above, low water counts of Turnstone have probably underestimated numbers by 50-60%. However, it is unclear if this discrepancy would be a general feature of all Turnstone counts or whether it is simply a result of the very variable nature of the habitats on this particular stretch of coastline. The current estimate of the Turnstone population of Northern Ireland is 3140 (M.E.Moser, pers. comm.) although the actual figure could be considerably higher, perhaps in the region of 4000-4500.

Wilson's Phalarope *Phalaropus tricolor*. One record of 3 on 16 September 1980.

CONCLUSION

Belfast Lough and the Outer Ards coast support considerable numbers of overwintering waders with some populations probably of 'national' or international importance. The estuarine areas of Belfast Lough have been counted for 7 years, for the BoEE and are of 'national' importance for Oystercatcher and Redshank (Weyl, in prep.). The Outer Ards and the shores of Outer Belfast Lough are clearly also of importance to waders, particularly Ringed Plover and Turnstone. The Winter Shorebird Count has shown Co. Down to be one of the best counties in the United Kingdom for waders, supporting an average linear density of 118 waders km^{-1} (M.E.Moser, pers. comm.). In both 1984/85 and 1985/86, the Outer Ards supported about 200 waders km^{-1} and must, therefore, rate as one of the best discrete sites for open shore waders in the UK.

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A POTENTIAL BIAS IN LOG-TRANSFORMED ALLOMETRIC EQUATIONS

by A.G. Wood

INTRODUCTION

Many recent studies in avian ecology have used regressions with logarithmic transformations to estimate various biological parameters, particularly metabolic rate (Lasiewski and Dawson 1967, 1969, Zar 1968, Aschoff and Pohl 1970, Kendeigh *et al.* 1977). This paper examines a potential bias resulting from the use of such equations, and presents the appropriate methods for converting estimates from logarithmic equations back to untransformed units.

THE PROBLEM

In the general case, we have two variables X and Y which are related by the allometric equation:

$$Y = kX^b \qquad (1)$$

where k and b are constants. Although the relationship between X and Y is non-linear, the transformed variates logX and logY are connected by the straight line relationship:

$$\log Y = \log k + b.\log X \qquad (2)$$

This equation implies a linear relation between the logarithms of X and Y based on three assumptions:

1. The expected value of Y, for a given X is $E(\log Y) = \log k + b.\log X$
2. The variance V of logY, given logX, is constant.
3. For each value of logX, logY is normally distributed.

The parameters of transformed equation (2) can now be estimated using the biological data and standard least-squares regression techniques.

When a logarithmic transformation is used it is usually necessary to be able to express estimated values of Y in untransformed units. Such a back transformation is not direct, because if the distribution of logY at a given