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The abundance and distribution of wildfowl and waders on the Cleddau (Milford Haven)

by

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ABSTRACT

The report draws on information from the long-term Birds of Estuaries Enquiry monthly counts on the Cleddau, from special studies carried out at key sites during winter 1987/88 and from the available literature in order to provide a comprehensive assessment of the abundance and current wintering distribution of wildfowl and waders throughout the Cleddau estuarine system.

Winter is the time of year when the Cleddau is of major overall importance to intertidal bird populations, although notable passages of some species occur during autumn and, possibly, spring. Only for the already small Knot population, and possibly for Ringed Plover, is there evidence for any sustained decline in wintering populations since the early 1970s. Populations of the remaining species have either remained relatively stable overall, or, in particular for certain wildfowl such as Shelduck, Wigeon and Teal, shown marked increases.

Average peak winter BoEE counts on the Cleddau over the five-year period up to 1988/89 reveal the site to be internationally important by virtue of holding an average of more than 20,000 wintering waterfowl. In addition, two species of wildfowl (Shelduck, Teal) have wintering populations exceeding the relevant species qualifying levels for international importance, and both these and three further waterfowl species (Wigeon, Curlew, Redshank) exceed the relevant qualifying levels for national importance. A further wader species (Whimbrel) has a nationally important passage population.

Based on BoEE data, the winter distributions of all the main waterfowl species among 14 count areas within the Cleddau system are tabulated and mapped. Five count areas stand out among these as being particularly significant in holding average peak winter counts of waterfowl exceedng 10% of that for the Cleddau as a whole. Listed in declining order of importance, these are Pembroke River, Lower Western Cleddau, Carew/Cresswell, Upper Western Cleddau and Angle Bay. Special studies carried out in winter 1987/88 at five key sites within the Cleddau tend, on consideration with other available evidence, to suggest that Western Cleddau/Eastern Cleddau/Landshipping Quay, Carew/Cresswell, Pembroke River and Angle Bay each form recognizably discrete units for conservation purposes, with a low level of bird movement between them relative to that within them.

1. INTRODUCTION

The Cleddau (51-41N, 4-58W), a term taken here to include both Milford Haven and the estuaries of the rivers Cleddau, has a total wintering population of around 20,000 wildfowl and waders, making it of international importance for these species and one of the major estuarine sites for intertidal birds contained wholly within Wales. The wider conservation importance of this estuarine system has been comprehensively summarized by Little & Hiscock (1987), who provide an up-to-date synopsis of the available information both on the subtidal and intertidal habitats present and on their invertebrate and fish communities. In addition to the substantial areas of the Cleddau covered by the Pembrokeshire National Park and/or Sites of Special Scientific Interest, described by Little & Hiscock (1987), protection for birds within the system is further enhanced by the Cleddau Wildfowl Refuge. This was established in 1970 under the Wild Birds (Cleddau Sanctuary) Order and covers the Western Cleddau below Uzmaston, the Eastern Cleddau from above Picton Ferry, and the Daugleddau downstream to a line between Black Tar and Landshipping Quay.

In recent years the Cleddau, in common with other coastal areas in south Wales, has become subject to a diverse array of proposed and potential developments, the implications of which for birds are normally unclear. The present report is therefore aimed at providing a baseline of information regarding the abundance and distribution of the wildfowl and wader populations present, on which more detailed studies commissioned in relation to specific development proposals may be grounded.

2. AIMS

The study had three major aims:

i) To analyse the 1987/88 Birds of Estuaries Enquiry (BoEE) data in conjunction with those from other years to provide an overview of the distribution and seasonal and annual trends in abundance of wildfowl and waders on the Cleddau.

ii) To evaluate patterns of usage of key intertidal areas of the Cleddau by wildfowl and waders during winter 1987/88.

iii) To synthesize the information obtained to provide an assessment of the conservation importance of the Cleddau to wildfowl and waders.

3. STUDY AREA AND METHODS

The estuarine system of the Cleddau comprises the ria of Milford Haven and its upper reaches, the Daugleddau, the bays and creeks along the length of the ria and opening into it, and the estuaries of the rivers Cleddau which merge at the head of the Daugleddau (Little & Hiscock 1987). In the lower parts of this complex system, the muddy or sandy intertidal habitats suitable for most estuarine waterfowl occur largely in the discrete bays and creeks, which are separated by rocky shores, very steep in places, along which few birds occur. By contrast, higher up the system along the tidal reaches of the rivers Cleddau and the upper Daugleddau, habitat attractive to estuarine waterfowl is more continuous.

BoEE counts are usually made on a pre-selected date near the middle of each month, chosen to coincide with spring tides. Full details of general BoEE methodology and the rationale behind it are provided by Prater (1981). Coverage of the main areas for intertidal birds along the Cleddau system during the early years of the BoEE in the first half of the 1970s was both episodic and rarely comprehensive. This is reflected in the monthly summary statistics provided by Prater & Rowe (1978): for the Cleddau, they had to include data collected in 1975/76, a procedure used only for sites for which information from the 1969-75 period was limited. In the late 1970s, coverage declined still further despite a useful short-term survey of birds on the Upper Cleddau (from Cosheston Pill upriver) between October 1977 and March 1978 (Elliott 1978).

BoEE counting on the Cleddau was finally reorganized on a systematic basis in mid 1982. Subsequently, the first of a series of counters' meetings held at roughly annual intervals was organized in March 1984 to review the situation. Arising out of this, in June 1984 the Pembrokeshire Organising Committee for Ornithological Research (POCOR) produced a report which provided a comprehensive synopsis of the actual and intended future scope of BoEE counting on the Cleddau (Rees 1984). This most useful document described the desired scope of BoEE coverage in relation to that then being achieved. The 20 actual or potential count areas given are listed in Table 3.1 and mapped on Figure 3.1. For the purposes of this report, the number of count areas recognized was reduced to 14, outlined in Table 3.1 and mapped on Figure 3.2, for the reasons given below.

The "Upper Western Cleddau" area used here comprises two contiguous areas (a and b on Figure 3.1) of Rees (1984). One of these (a) was not covered at that time, but data from it have subsequently been collected and submitted to the BoEE in a form merged with that of area (b); this joint treatment seems appropriate. Rhoose Ferry - Neyland (i), Milford Docks (p) and Gelliswick (q) are all areas that have not to date been covered by BoEE counts: the first is probably largely unsuitable habitat (Rees 1984), Milford Docks is used only by small numbers of Turnstone (Rees 1984), and Gelliswick Bay is much disturbed and only occasionally used by very few waders (Rees, in litt.). Westfield Pill (j), which formerly held relatively few birds, was eliminated as a count area in 1986 after construction of a marina there had resulted in its lower section becoming unsuitable for birds and its upper reaches becoming non-estuarine (Rees 1986); some Goldeneye nevertheless still use it and it may be reinstated as

Table 3.1 BoEE count areas within the Cleddau listed by Rees (1984) and as treated in this report.

Rees (1984)	This report
a) Haverfordwest-Uzmaston	Treated as single unit called
b) Uzmaston-Fern Hill	Upper Western Cleddau
c) Western Cleddau	Unchanged, but called Lower Western Cleddau
d) Eastern Cleddau	Unchanged
e) Beggar's Reach	Unchanged, but called Daugleddau
f) Llangwm	Unchanged
g) Carew/Cresswell Rivers	Unchanged
h) Cosheston Pill	Unchanged
i) Rhoose Ferry - Neyland	Not considered (never covered)
j) Westfield Pill	Not considered (site since destroyed)
k) Pembroke River	Also incorporates Pwllcrochan (n)
l) Llanstadwell	Unchanged
m) Llanreath/Front St.	Unchanged
n) Pwllcrochan	Merged with Pembroke River (k)
o) Castle Pill	Unchanged
p) Milford Docks	Not considered (never covered)
q) Gelliswick Bay	Not considered (never covered)
r) Sandy Haven Pill	Unchanged
s) Angle Bay	Unchanged
t) Gann Estuary	Unchanged

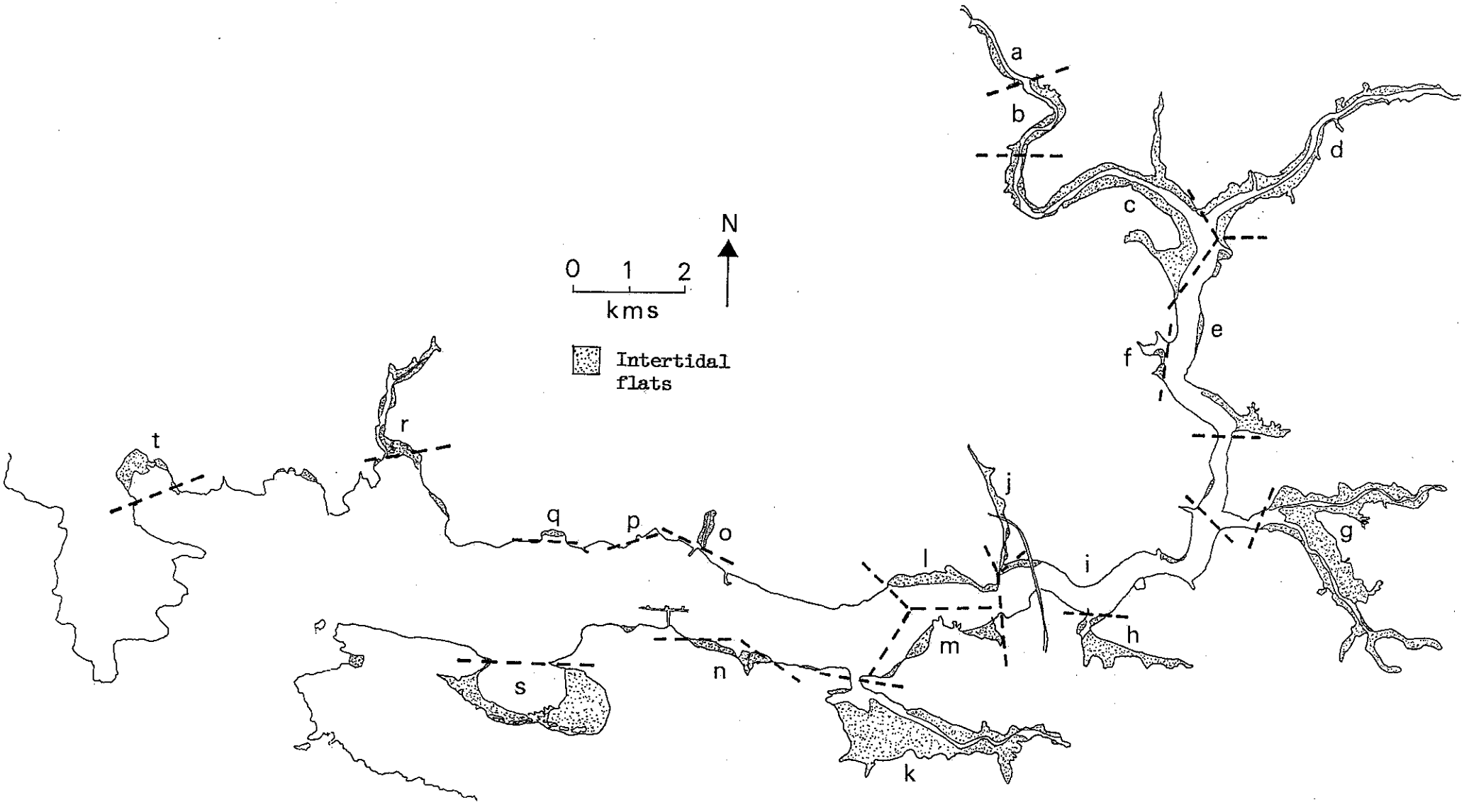

Figure 3.1 The Cleddau estuarine system, showing the count areas listed by Rees (1984). Names of count areas identified by letters are given in Table 3.1.

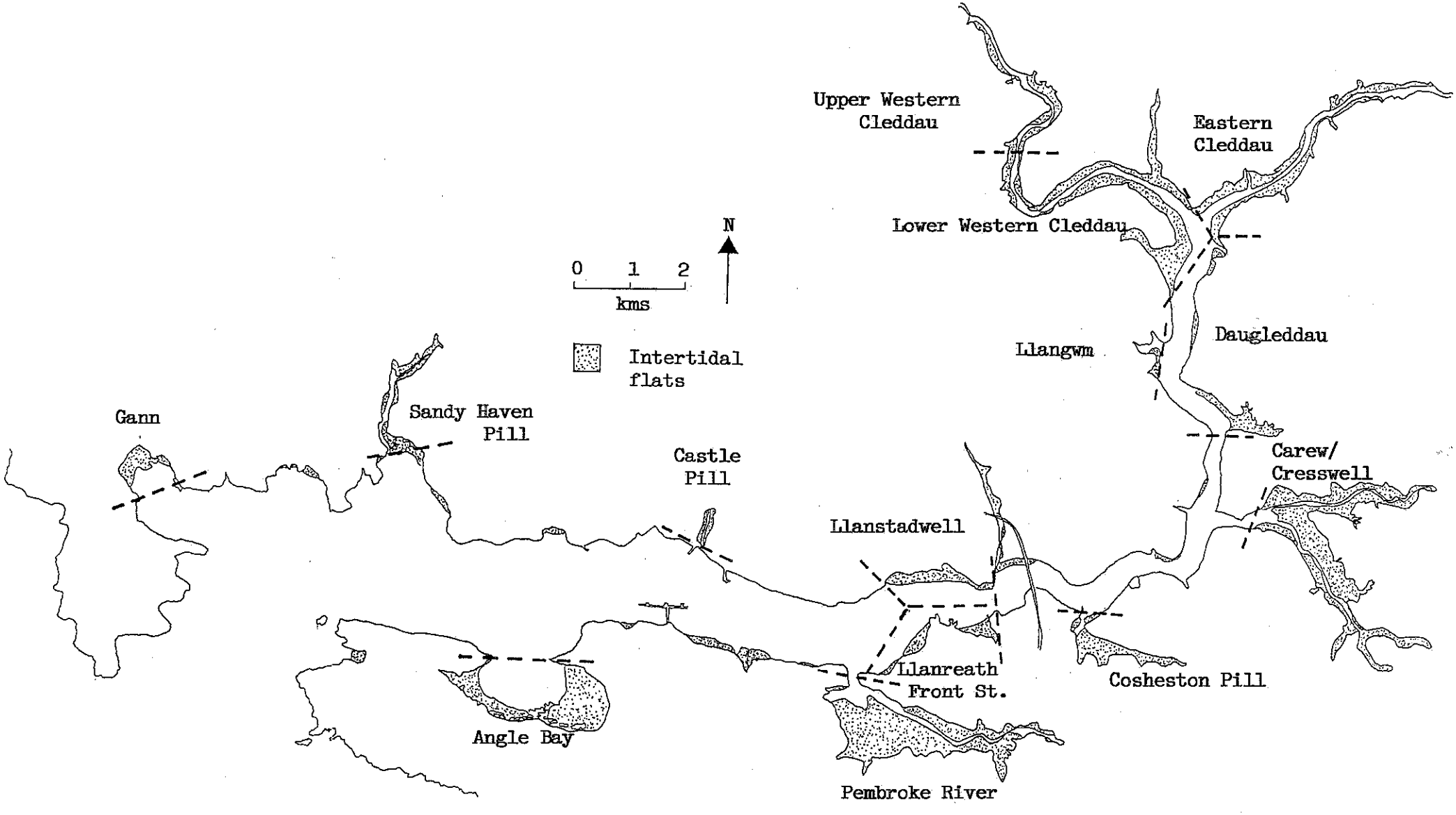

Figure 3.2 The Cleddau estuarine system, showing the count areas adopted in this report.

a count area in the future (Rees, in litt.). Most of the relatively few birds at Pwllcrochan (n) move to the neighbouring major area of Pembroke River (k) at high tide (Rees 1984, 1986); in consequence merged data have been submitted to the BoEE in recent years and treatment of the two areas together seems appropriate.

Unlike all the above, the merging of some data from Milton Pill, a creek at the southern end of the Carew/Cresswell complex (g), with that from the geographically separate Cosheston Pill (h) cannot be viewed as biologically appropriate, but has occurred nevertheless on BoEE returns as a result of the method of count area coverage adopted (Rees 1984, 1985, 1986). Available evidence suggests, however, that it has little influence on the assessment of the relative importance of these two count areas made in this report.

In Chapter 4 of this report (Annual and seasonal trends in numbers), merged data from all 14 count areas since the BoEE reorganization in 1982 have been considered; these data are also compared where appropriate with those available from the early 1970s. Chapter 5 (national and international importance) is similarly based on merged BoEE data for the most recent five years only (1984/85-1988/89). In Chapter 6 (Winter distribution within the Cleddau), the most recent five years of BoEE data for each of the 14 count areas are considered separately, on the basis of which the proportional significance of each count area is assessed. Information analysed in Chapter 7 (Patterns of use of key sites in winter) derives from special studies, separate from the BoEE, carried out in winter 1987/88.

4. ANNUAL AND SEASONAL TRENDS IN NUMBERS

Annual trends are considered for all species of wildfowl and waders having peak wintering populations of 50 or more in any individual year, and seasonal trends for all species having average populations during any month of over 25 individuals. Brief consideration is then given to less common species, and a final section summarizes overall trends in numbers of wildfowl and waders on the Cleddau estuary.

4.1. MUTE SWAN *Cygnus olor*

The highest average monthly count during the mid 1980s has been about three times that recorded in the early 1970s (Table 4.1), but no trend is apparent in peak winter counts over the past seven seasons (Figure 4.1a). Numbers of birds recorded build up over the autumn to reach a peak in mid winter (Figure 4.1b).

4.2. CANADA GOOSE *Branta canadensis*

Data from the past seven seasons suggest a slowly increasing winter population (Figure 4.2a). At least between July and March, there is little seasonal variation in numbers (Figure 4.2b). Most birds tend to occur in a single flock, and the occasional zero counts (*eg* November and December 1987) almost certainly result from this flock feeding in riverside fields just outside the area covered (Elliott 1978, Rees 1984).

4.3. SHELDUCK *Tadorna tadorna*

Numbers recorded on BoEE counts averaged over 300% greater in the mid 1980s relative to the early 1970s (Table 1), but recent data do not show an obvious trend (Figure 4.3a). Numbers present reach a minimum in late summer and autumn, when birds are away at their traditional moulting grounds; thereafter they build up during November and December to a pronounced peak between January and March. Both the onset of the build up and the period of the peak occur a month later than on the Burry Inlet (Prys-Jones *et al*. 1989). A large-scale departure has occurred by April, although small numbers remain to breed along the Cleddau, with counts of up to 80 young in recent years.

4.4. WIGEON *Anas penelope*

The highest average monthly count of Wigeon on the Cleddau increased over 200% between the early 1970s and the mid 1980s (Table 4.1). Data from recent winters show no trend, but reveal an exceptional peak count of nearly 10,000 birds during the bitterly cold weather of January 1987 (Figure 4.4a). A similar influx occurred at the same time on the neighbouring Burry Inlet (Prys-Jones *et al*. 1989), but data from the Cleddau reveal no evidence of another exceptional influx that occured on the Burry Inlet in October 1987. Seasonal change in numbers on the two estuarine systems is very similar, with a build up during the autumn to a mid winter peak followed by a rapid fall off in February and March (Figure 4.4b).

Table 4.1. Comparison of highest average monthly BoEE counts of wildfowl and waders on the Cleddau for the periods 1969/70 - 1975/76 and 1982/83 - 1988/89.

	1969/70-1975/76+	1982/83-1988/89	% change++
Mute Swan	12	37	-
Whooper Swan	1	0	-
White-fronted Goose	5	0	-
Greylag Goose	1	2	-
Canada Goose	?	95	?
Brent Goose	1	2	-
Shelduck	280	1,255	+348%
Wigeon	1,000	3,137	+214%
Gadwall	0	4	
Teal	300	2,275	+658%
Mallard	230	379	+65%
Pintail	11	6	-
Shoveler	20	10	-
Pochard	0	1	-
Tufted Duck	0	2	-
Scaup	0	2	-
Eider	0	1	-
Common Scoter	1	0	-
Goldeneye	11	45	-
Red-breasted Merganser	9	21	-
Oystercatcher	360	427	+19%
Ringed Plover	210	92	-56%
Golden Plover	580	748	+29%
Grey Plover	45	76	+69%
Lapwing	2,200	1,851	-16%
Knot	260	27	-90%
Sanderling	2	2	-
Little Stint	1	1	-
Curlew Sandpiper	1	2	-
Dunlin	3,000	3,474	+16%
Ruff	1	1	-
Jack Snipe	0	3	-
Snipe	40	228	+470%
Black-tailed Godwit	1	2	-
Bar-tailed Godwit	22	55	+150%
Whimbrel	5	40	-
Curlew	870	1,360	+56%
Spotted Redshank	6	10	-
Redshank	820	1,076	+31%
Greenshank	30	42	-
Green Sandpiper	2	2	-
Common Sandpiper	13	26	-
Turnstone	140	136	-3%

NB + From Prater (1981), with additional information from Prater & Rowe (1978).

++ Only calculated for species having populations exceeding 50.

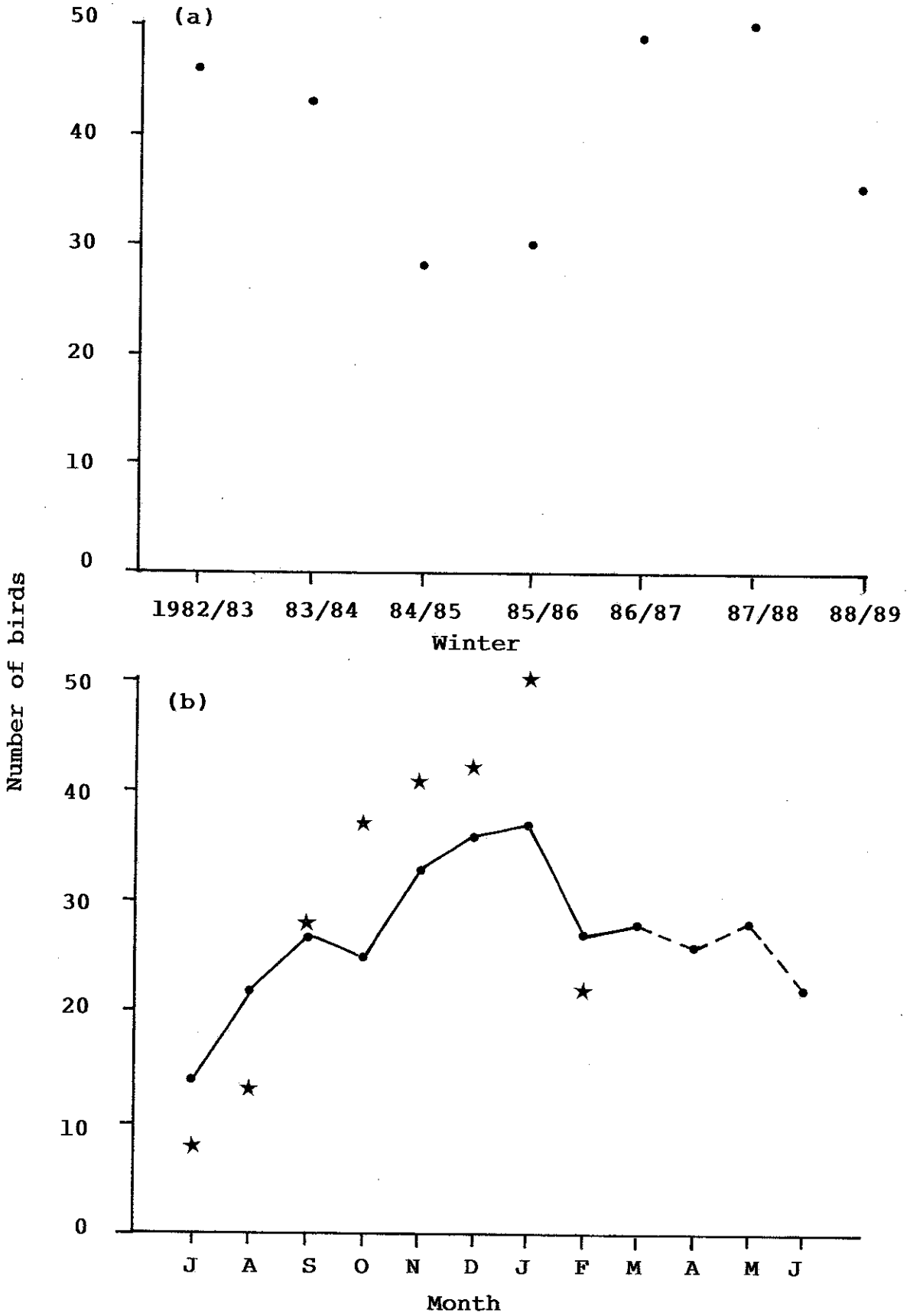

Figure 4.1 Mute Swans on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

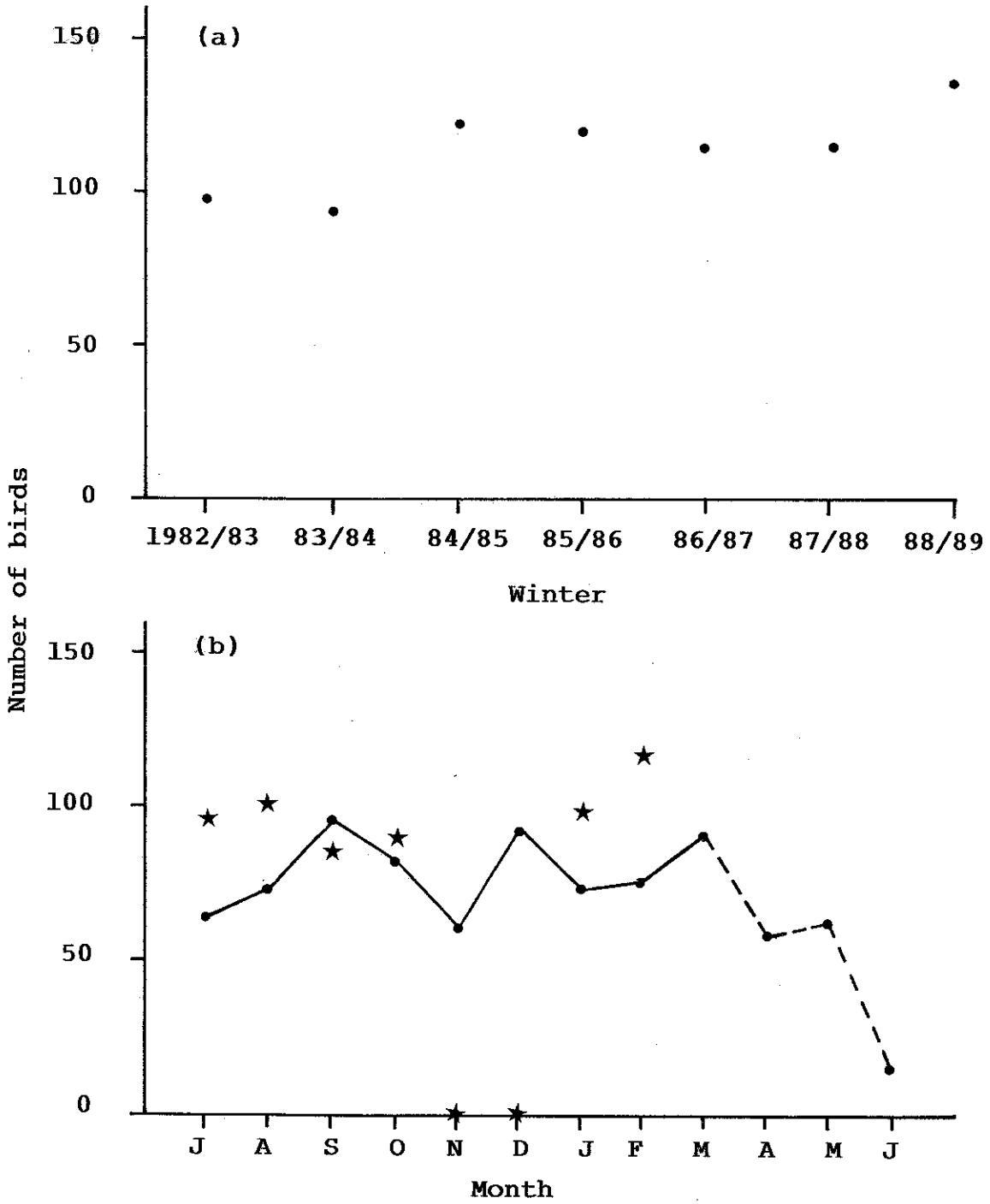

Figure 4.2 Canada Geese on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

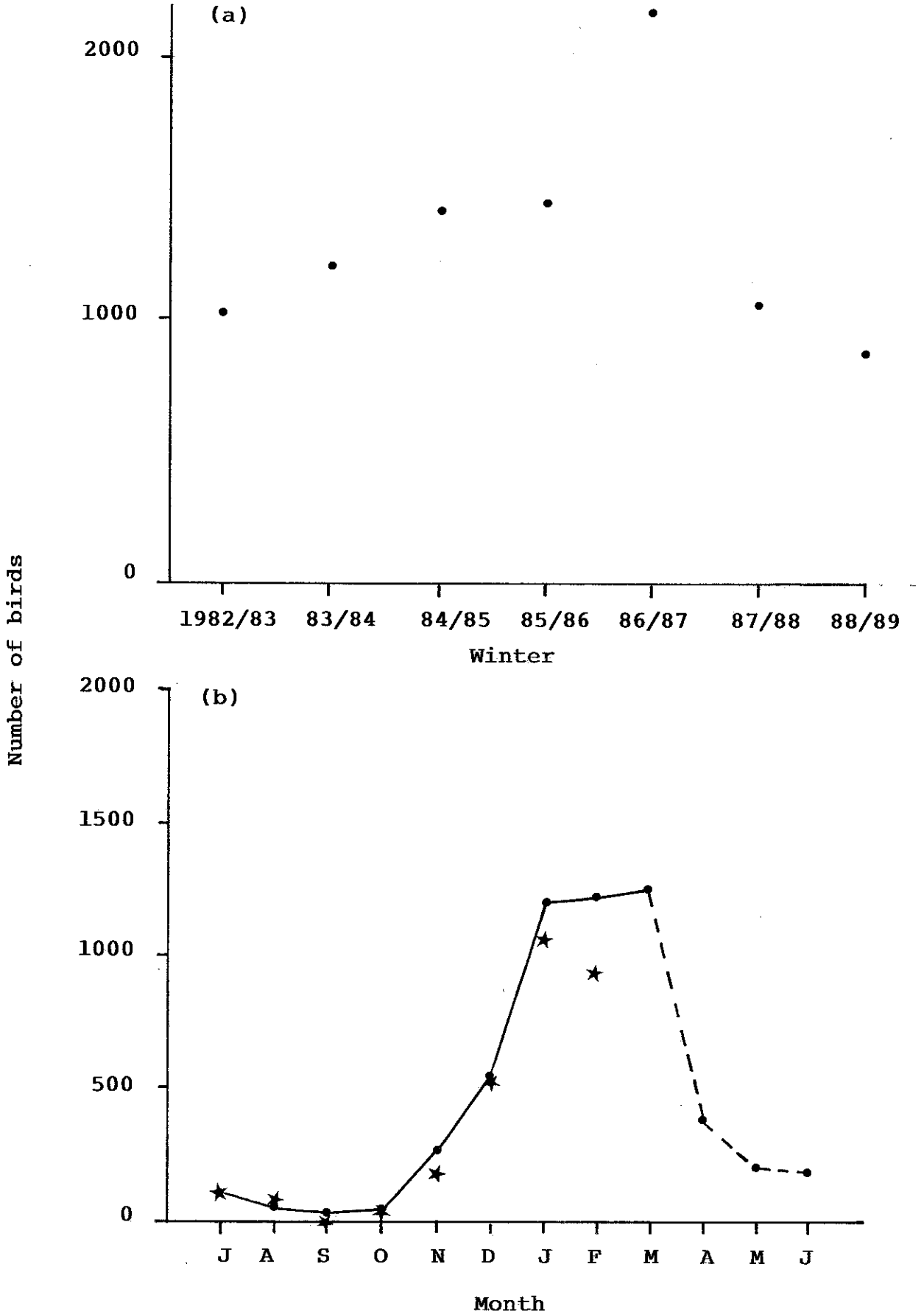

Figure 4.3 Shelduck on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

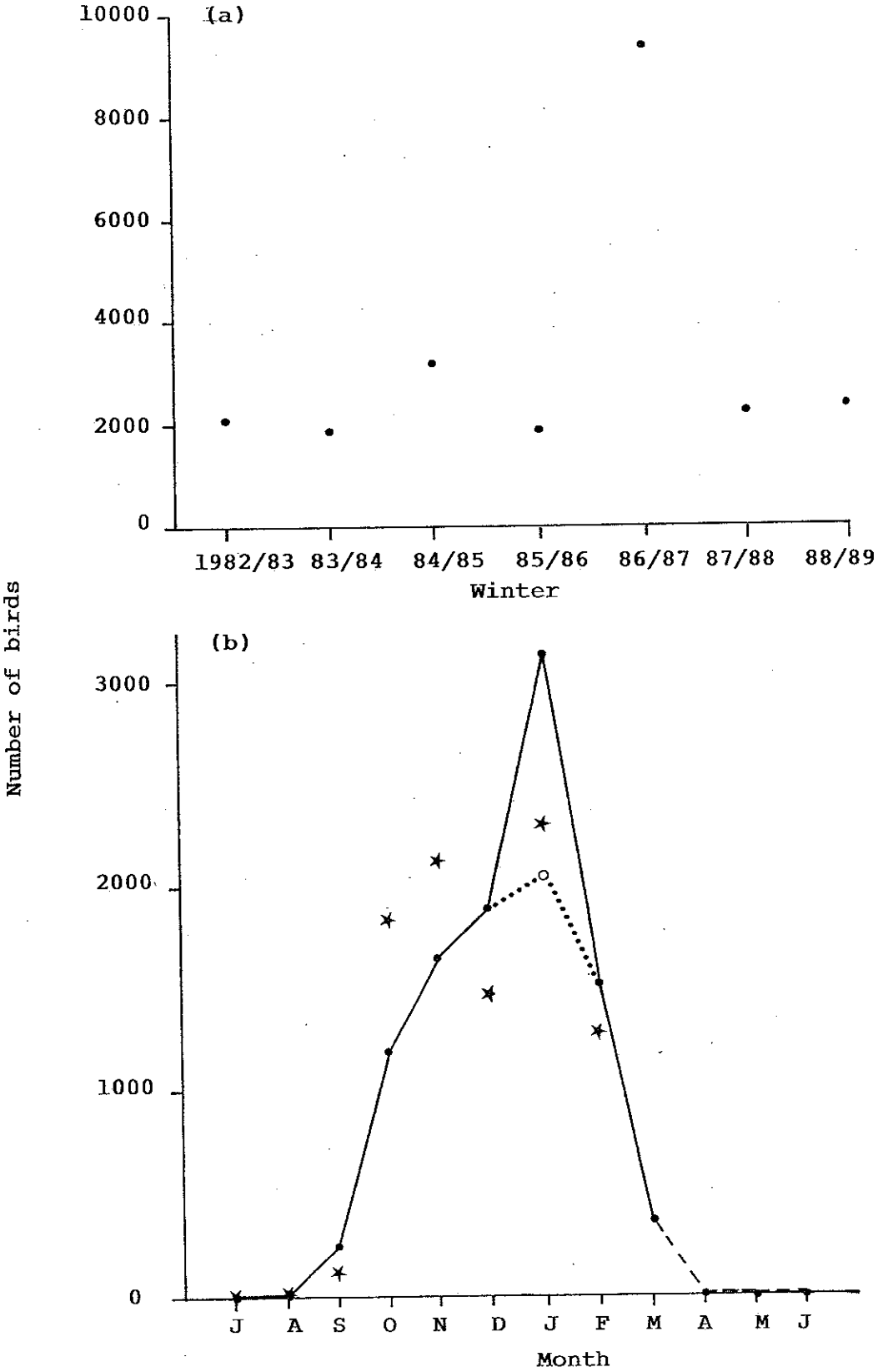

Figure 4.4 Wigeon on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.
Open circle shows January average omitting exceptional 1987 count.

4.5. TEAL Anas crecca

Numbers of Teal recorded on the Cleddau have surged by over 600% since the early 1970s (Table 4.1), an even greater increase than that found on the neighbouring Burry Inlet (Prys-Jones et al.1989). Recent peak winter counts suggest that an increase is still occurring (Figure 4.5a). Numbers of birds present build up rapidly during late autumn and early winter to a mid winter peak, followed by a crash in numbers between February and April (Figure 4.5b).

4.6. MALLARD Anas platyrhynchos

A 65% increase in the highest average monthly count of Mallard on the Cleddau has occurred since the early 1970s (Table 4.1), relatively modest in comparison with that shown by Shelduck, Wigeon and Teal, and recent peak winter counts show no trend (Figure 4.6a). Numbers present increase during autumn to a peak in early winter, followed by a pronounced decline during February and March (Figure 4.6b).

4.7. GOLDENEYE Bucephala clangula

Recorded Goldeneye numbers on the Cleddau have increased substantially since the early 1970s (Table 4.1), but have shown no trend over recent years (Figure 4.7a). The species is almost exclusively a winter visitor, with the largest numbers being present after the turn of the year (Figure 4.7b).

4.8. OYSTERCATCHER Haematopus ostralegus

The highest average monthly count of Oystercatchers on the Cleddau in the mid 1980s was 19% up on that of the early 1970s (Table 4.1), and winter peak counts over recent years reveal a continuing increase in numbers (Figure 4.8a); over the same period a substantial national population increase has occurred (Salmon et al. 1988). Numbers of birds present build up during July and August to reach a peak in September, followed by a slow decline until February and a rapid one thereafter (Figure 4.8b).

4.9. RINGED PLOVER Charadrius hiaticula

The highest average monthly count of Ringed Plovers on the Cleddau has decreased by over 50% since the early 1970s (Table 4.1). Recent peak winter counts reveal no clear trend but considerable variability (Figure 4.9a), which may at least partially be a product of difficultly in censusing this cryptic species reliably (cf. Spearpoint et al. 1988). Numbers increase in early autumn, remain relatively stable through the late autumn and winter, and then decline to low levels in March (Figure 4.9b); the available BOEE data provide no evidence for staging by passage birds such as that found on the Burry Inlet (Prys-Jones et al. 1989).

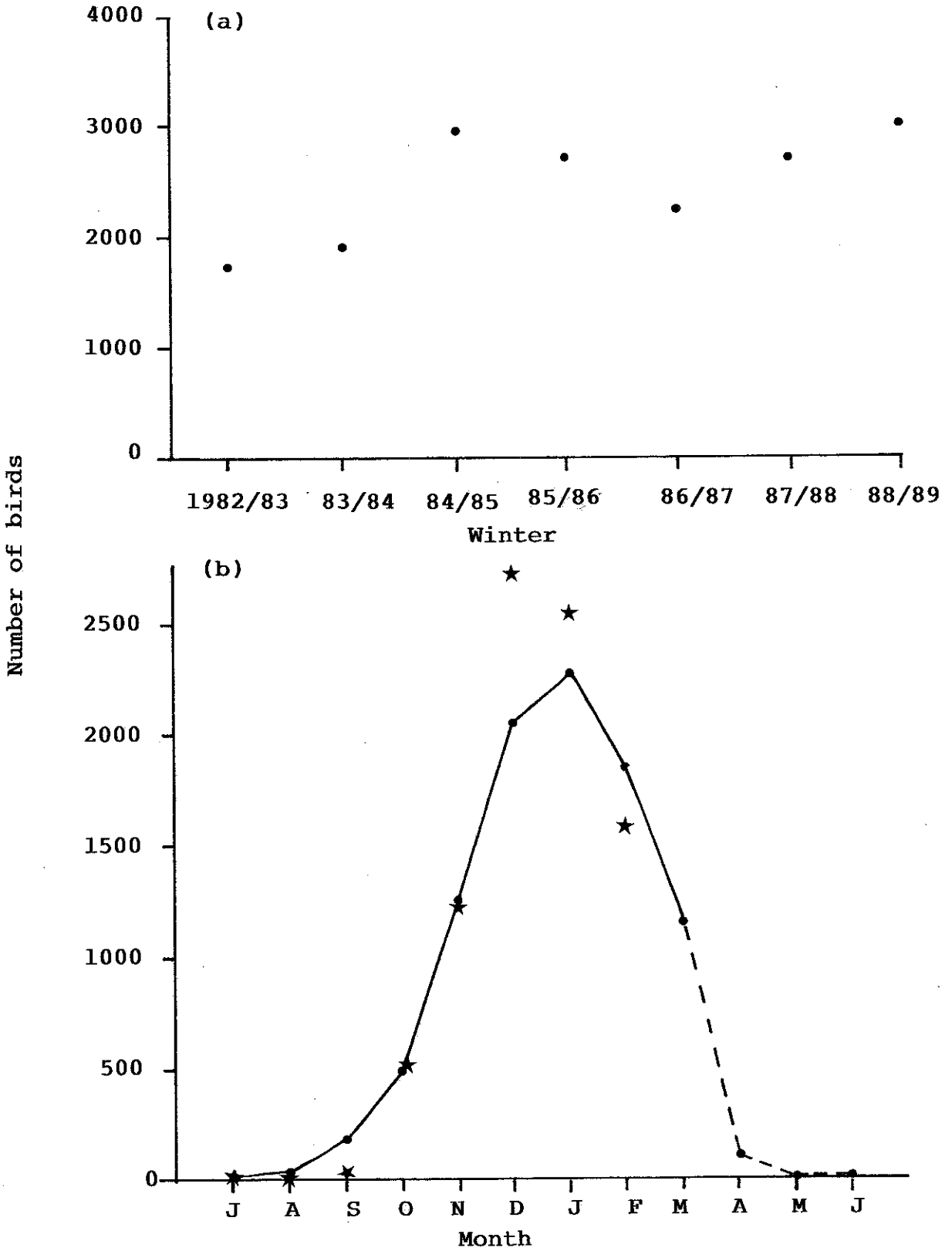

Figure 4.5 Teal on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

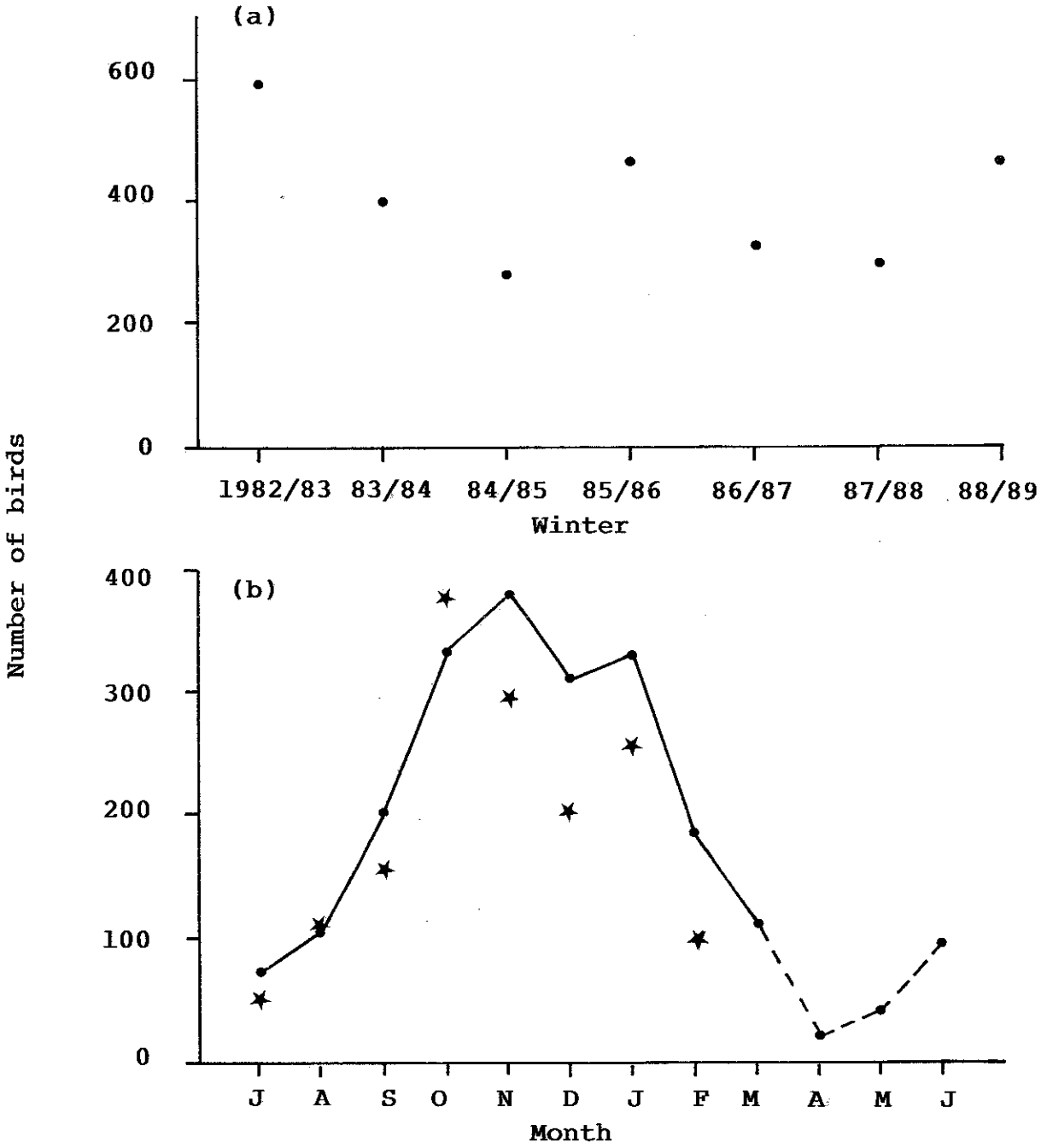

Figure 4.6 Mallard on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

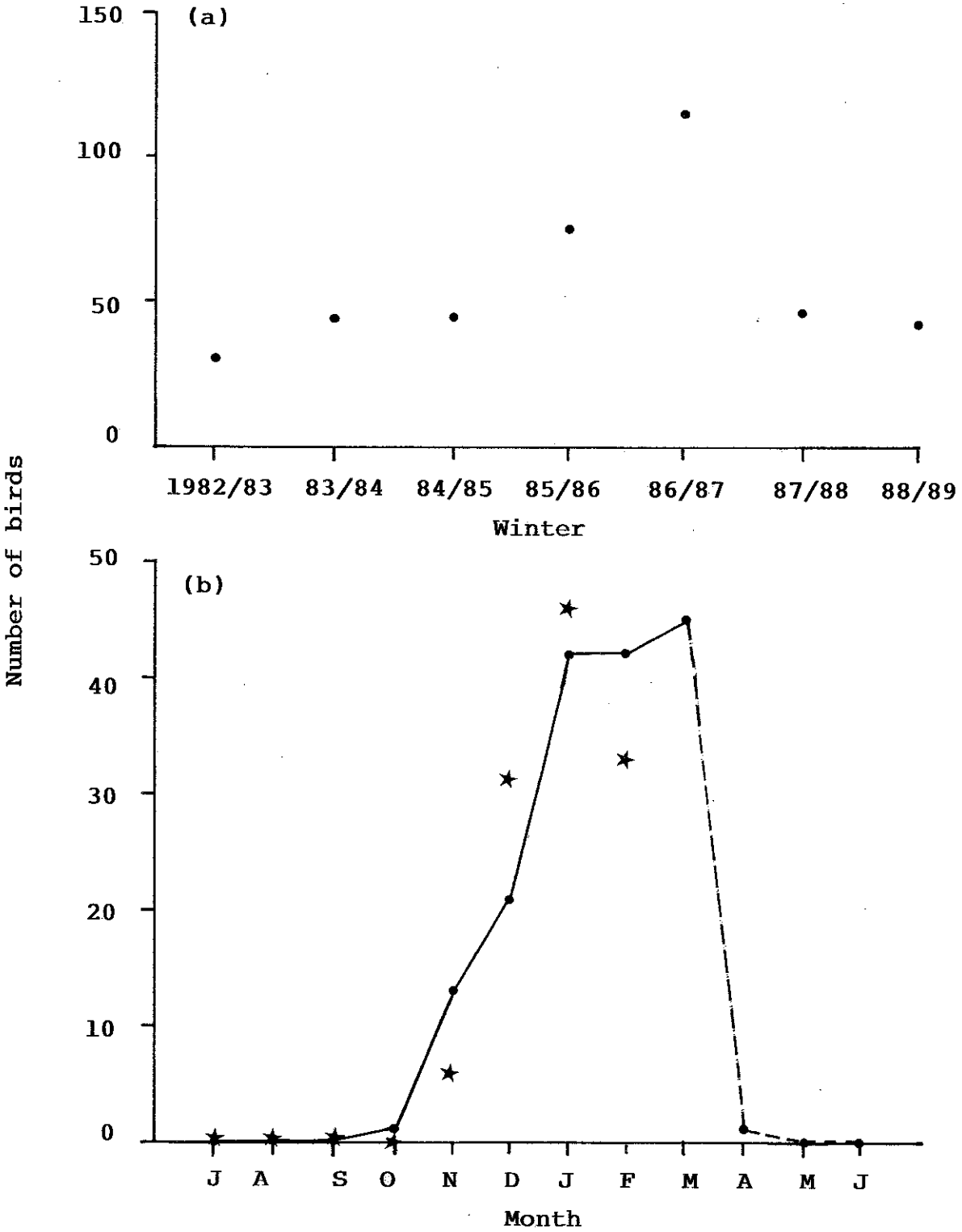

Figure 4.7 Goldeneye on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

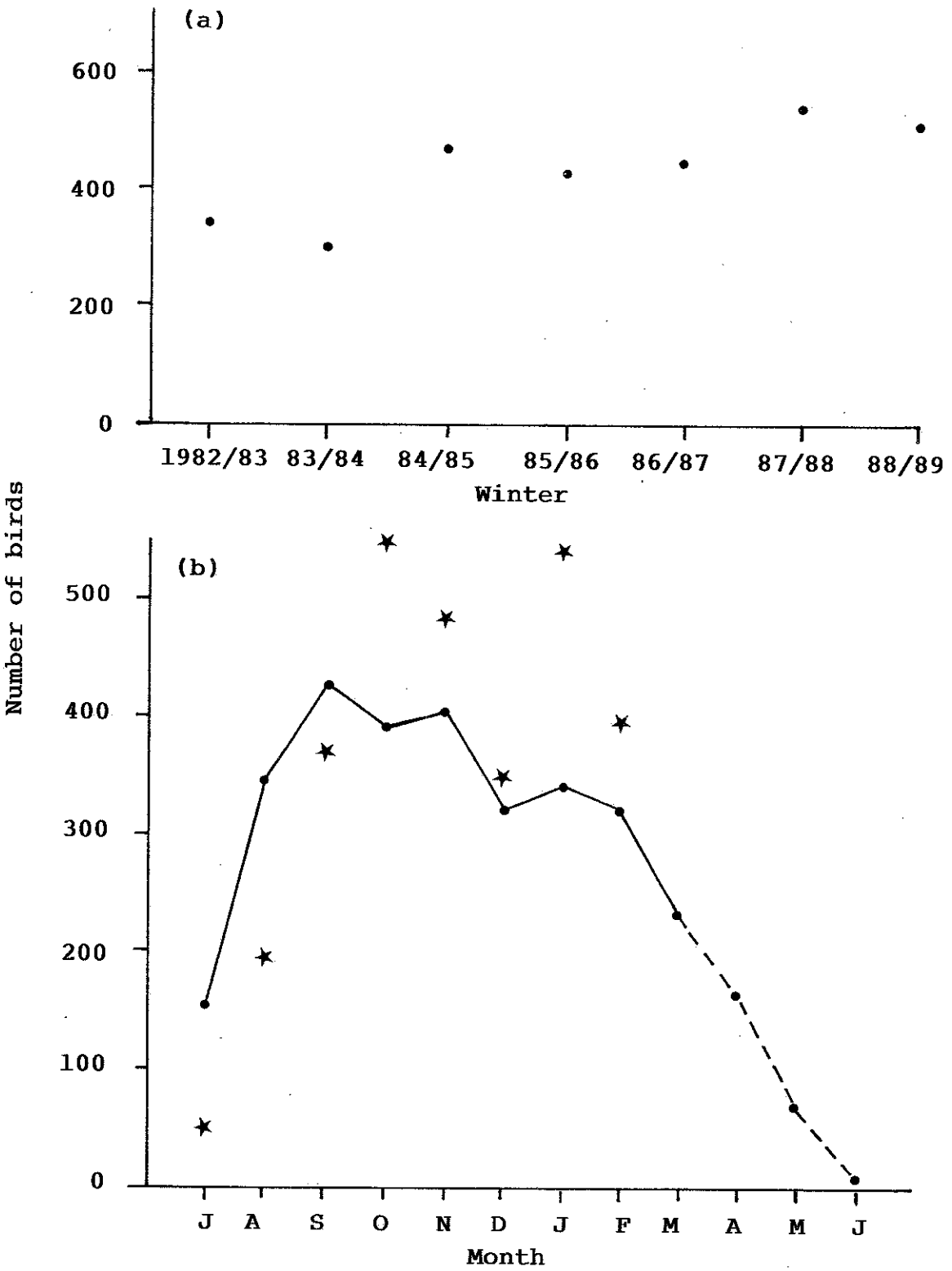

Figure 4.8 Oystercatcher on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars) April-June data from a single year only.

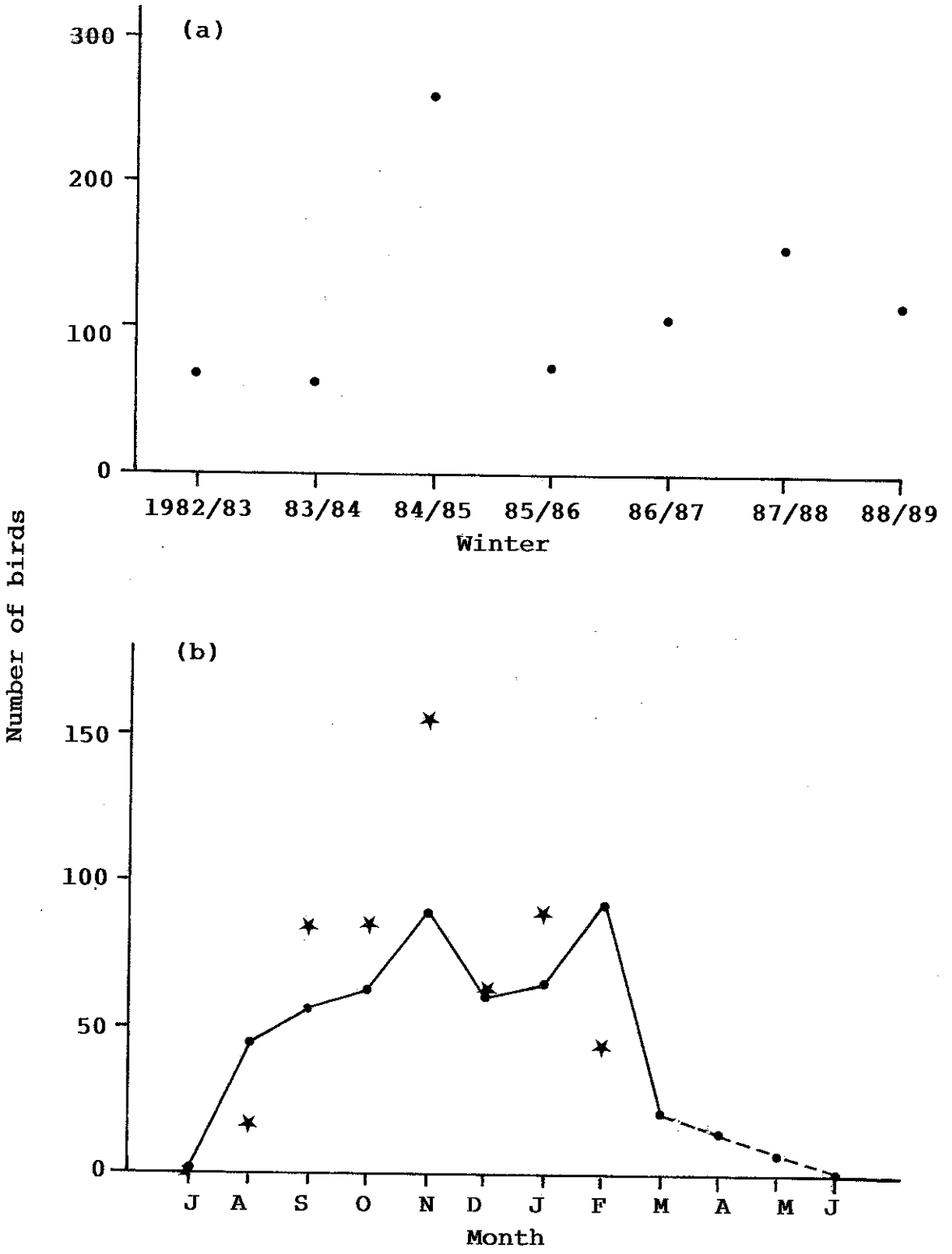

Figure 4.9 Ringed Plover on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

4.10. GOLDEN PLOVER Pluvialis apricaria

Peak counts of Golden Plovers on the Cleddau in successive winters may change by an order of magnitude (Figure 4.10a), a level of variability which precludes interpretation of any possible longer term increase (Table 4.1). Birds are absent until October; subsequently, numbers build up rapidly to a November peak and then fall away again progressively to almost zero by March (Figure 4.10b).

4.11. GREY PLOVER Pluvialis squatarola

The Grey Plover is a species whose wintering population in Britain has increased greatly over the past 15 years (Moser 1988). The small population on the Cleddau has responded similarly, with the highest average monthly count up by nearly 70% between the early 1970s and the mid 1980s (Table 4.1). Recent peak winter counts suggest a continuing increase despite the presence of very small numbers in 1987/88 (Figure 4.11a), a winter in which the Burry population was also unexpectedly low (Prys-Jones et al. 1989). Seasonally, numbers tend to build up through the late autumn and early winter, peak in January/February, and subsequently almost entirely depart by April (Figure 4.11b).

4.12. LAPWING Vanellus vanellus

A 16% overall decline between the early 1970s and mid 1980s in the highest average monthly count of Lapwing present (Table 4.1) is negligible in comparison with annual fluctuations in wintering populations of up to four-fold (Figure 4.12a). Lapwing movements into South Wales are strongly influenced by weather patterns, and the relatively low wintering populations on the Cleddau since 1986/87 mirror the situation on the Burry Inlet (Prys-Jones et al. 1989). Numbers of Lapwings on the Cleddau increase rapidly during October and November to peak in December, before falling away to low levels by March (Figure 4.12b).

4.13. KNOT Calidris canutus

An already small Knot population on the Cleddau in the early 1970s had declined by an order of magnitude by the mid 1980s (Table 4.1), a decline which appears to be continuing (Figure 4.13a). A tiny, but regular, autumn passage occurs in September, with wintering birds peaking in January and February (Figure 4.13b).

4.14. DUNLIN Calidris alpina

The decline in the national wintering population of the species over the past 15 years (Goss-Custard & Moser 1988) is not reflected in a comparison of highest average monthly BOEE counts on the Cleddau during the early 1970s and mid 1980s (Table 4.1). Winter peak counts over recent years also suggest a relatively stable population (Figure 4.14a). The BOEE count data further suggest that the presence of the species on the Cleddau is largely confined to the winter months, between November and March, with no evidence of significant passage populations (Figure 4.14b).

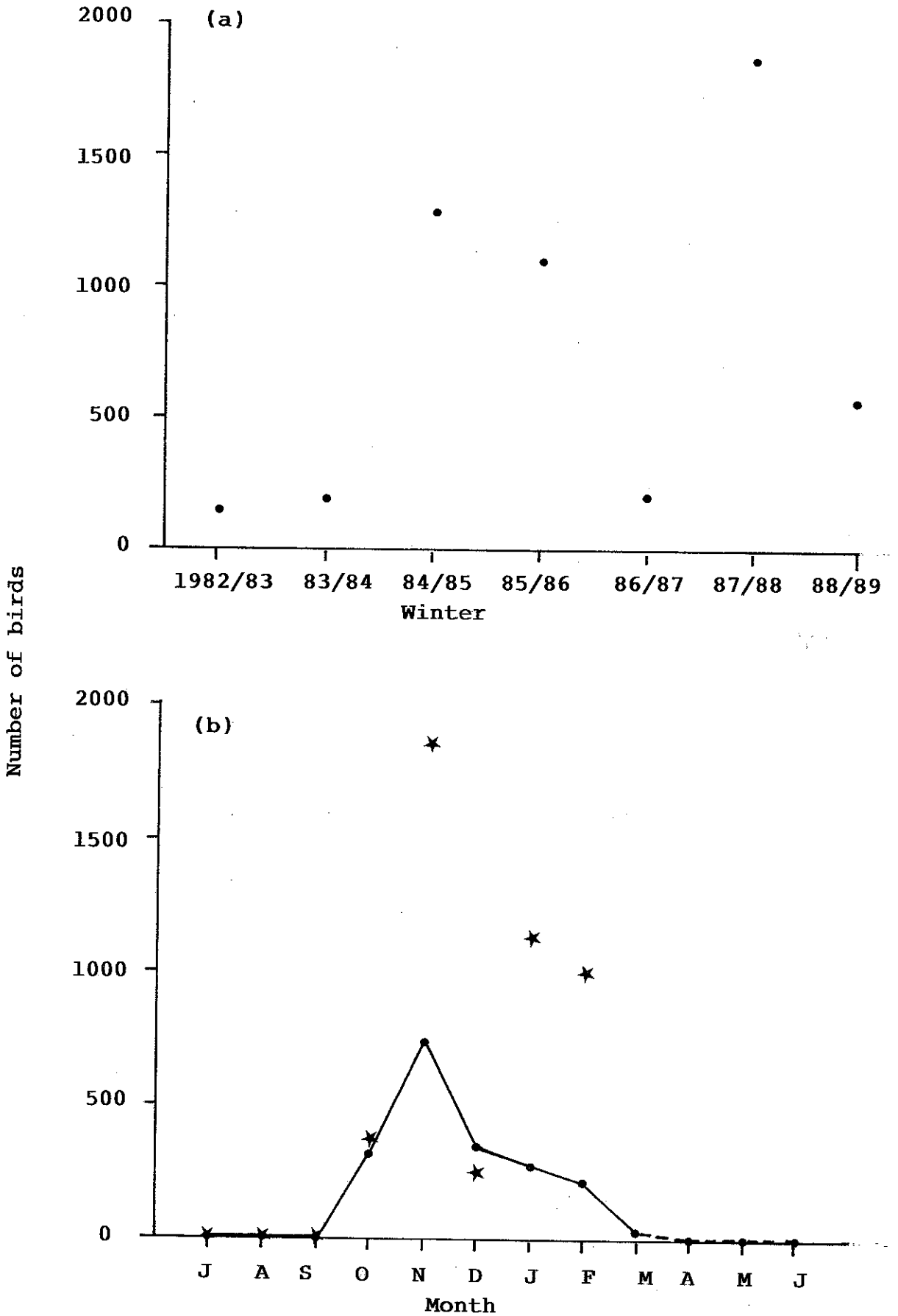

Figure 4.10 Golden Plover on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

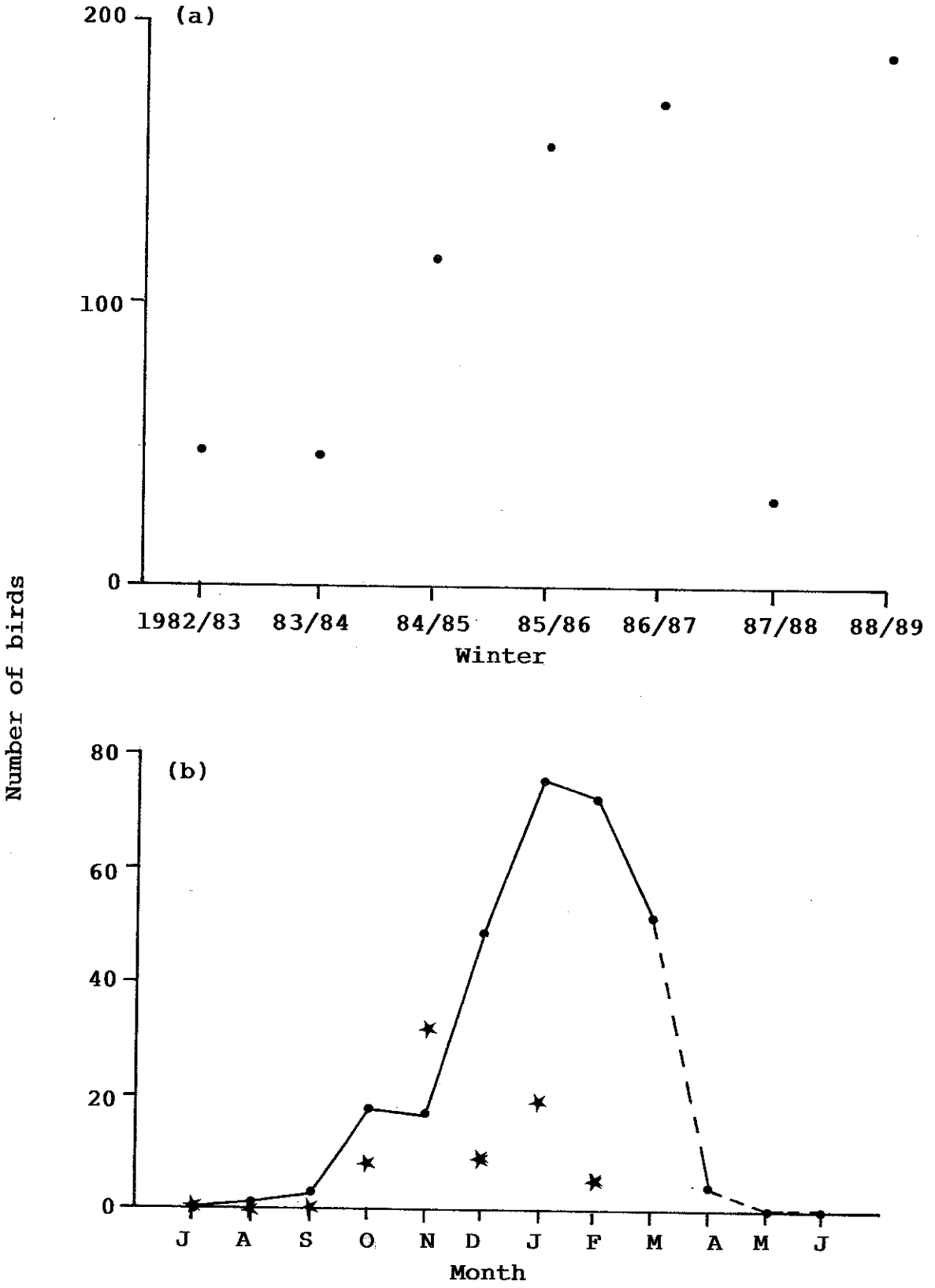

Figure 4.11 Grey Plover on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars) April-June data from a single year only.

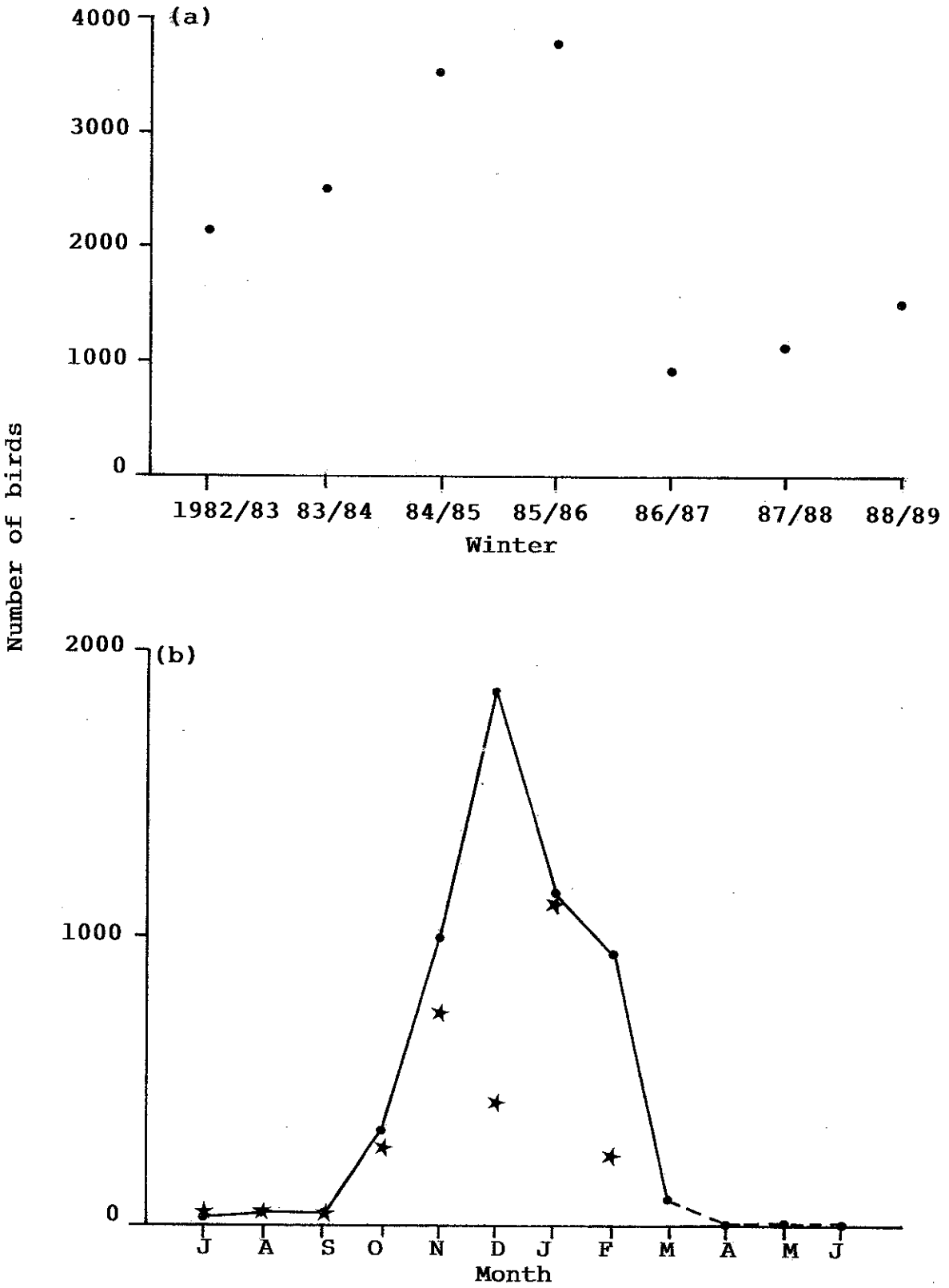

Figure 4.12 Lapwing on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

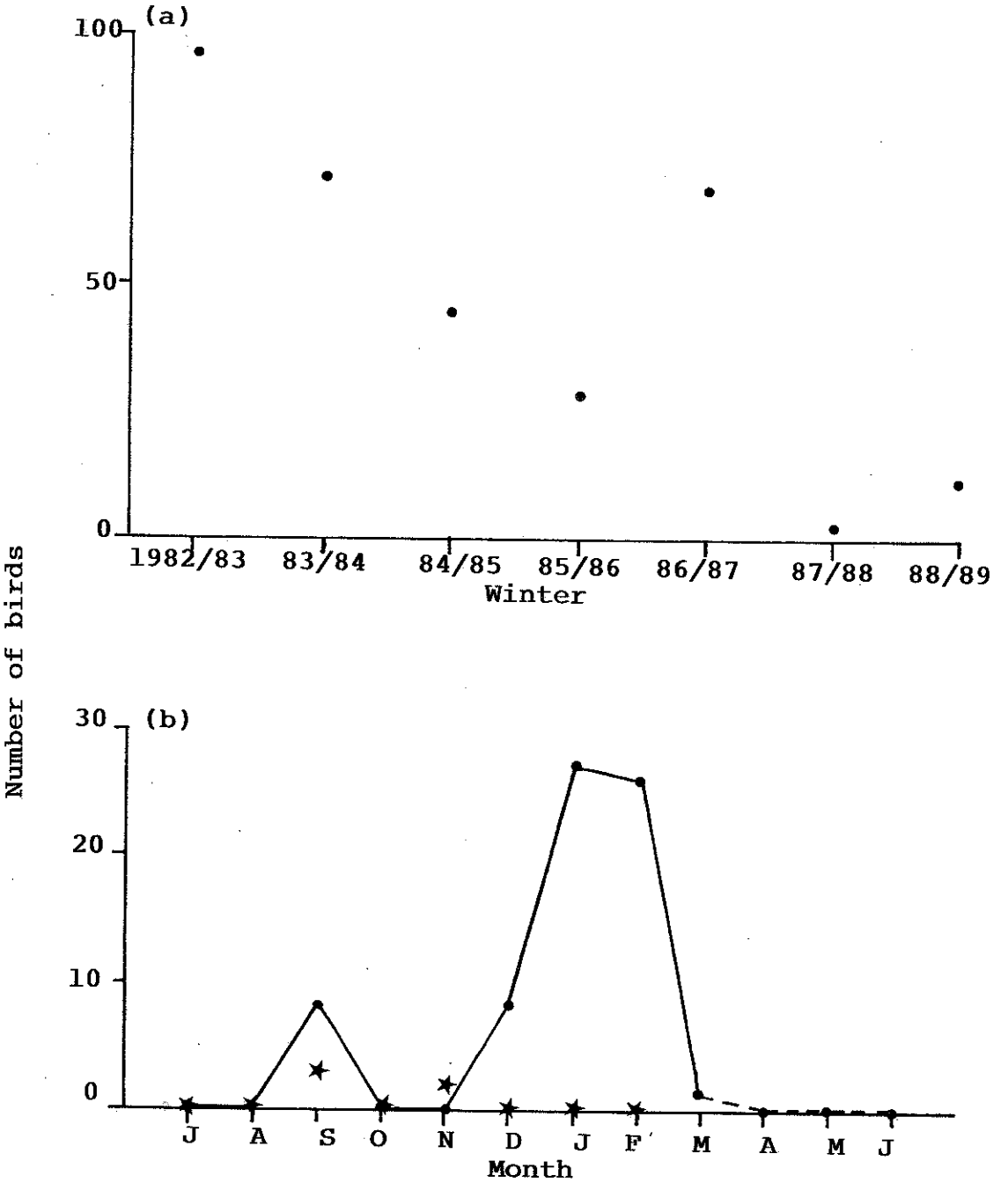

Figure 4.13 Knot on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

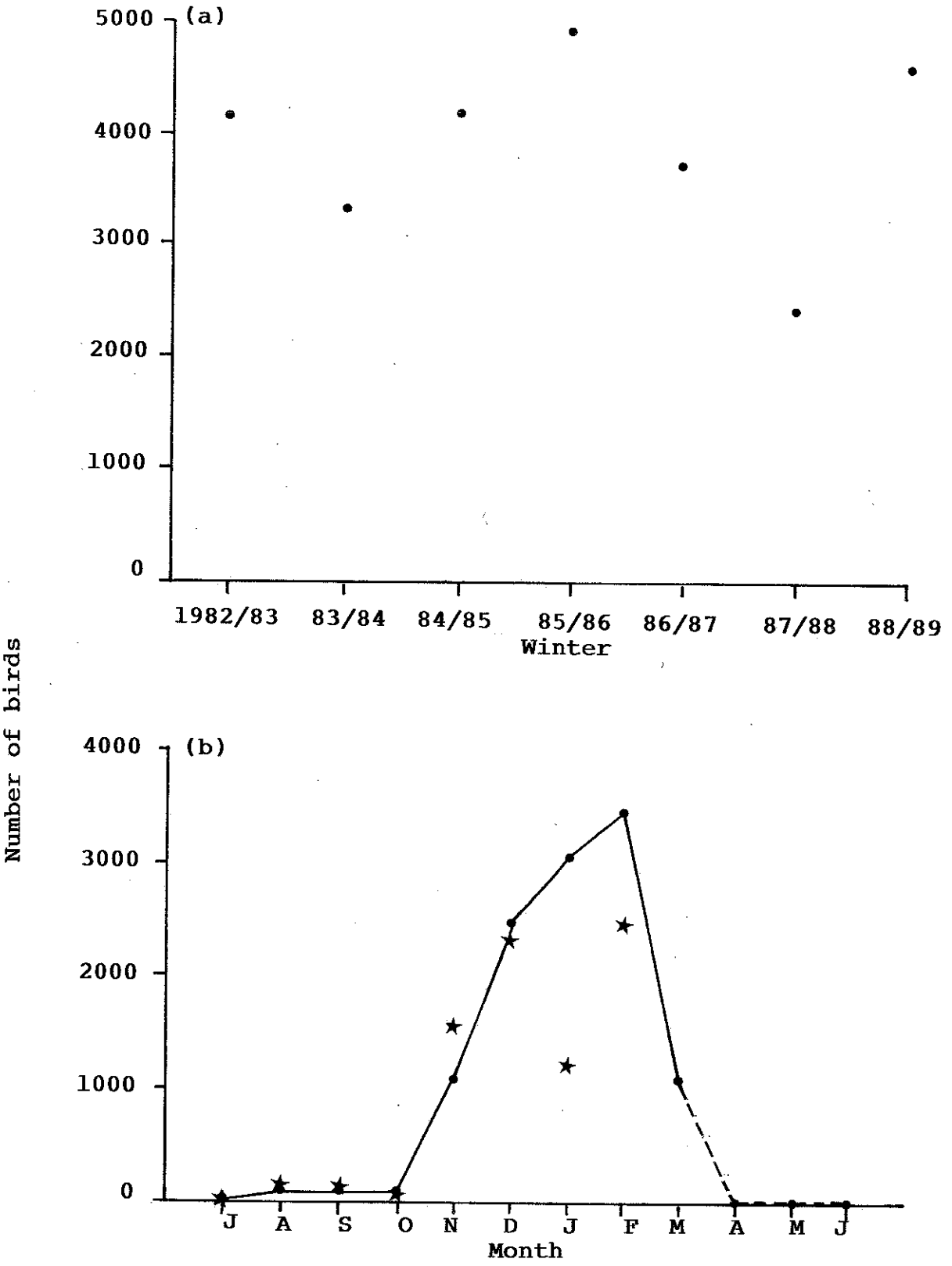

Figure 4.14 Dunlin on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

4.15. SNIPE Gallinago gallinago

A comparison of highest average monthly counts from the early 1970s and mid 1980s suggests a massive increase in Snipe on the Cleddau (Table 4.1), but the suspicion must remain that the apparent change in status of this cryptic wetland species may be at least in part a product of intervening changes in personnel, coverage and counting technique. Recent winter peak counts show no evidence of a consistent trend (Figure 4.15a). Records of Snipe build up during autumn and early winter to a peak in December, falling away again to low levels by the end of the winter (Figure 4.15b).

4.16. BAR-TAILED GODWIT Limosa lapponica

The very small population of Bar-tailed Godwit which normally occurs on the Cleddau is episodically augmented by larger flocks. This was particularly noticeable during 1988/89: winter numbers approaching 150 were considerably higher than usual (Figure 4.16a), and an exceptional autumn flock of over 300 birds was entirely responsible for the apparent September peak in the seasonal pattern of occurrence (Figure 4.16b).

4.17. WHIMBREL Numenius phaeopus

Whimbrel are very largely a passage species on the Cleddau. Autumn numbers peak at ca 50 in August, declining through September, and a small spring passage occurs in April and May (Figure 4.17).

4.18. CURLEW Numenius arquata

The highest average monthly count of Curlew on the Cleddau rose by over 50% between the early 1970s and the mid 1980s (Table 4.1). Recent winter peak counts suggest a continuing increase (Figure 4.18a), a trend also noticeable on the neighbouring Burry Inlet (Prys-Jones et al. 1989). By contrast, the seasonal pattern of occurrence of Curlew is quite distinct from that on Burry. Both estuarine systems show a peak in August/September and a trough between April and June but, whereas the population on the Burry declines steadily from autumn through to spring, that on the Cleddau remains almost constant until February before declining rapidly (Figure 4.18b).

4.19. REDSHANK Tringa totanus

The highest average monthly BoEE count of Redshank in the mid 1980s was over 30% up on that of the early 1970s (Table 4.1); more recent peak winter counts also point to a continuing increase (Figure 4.19a). The seasonal pattern shows a build up through the autumn to an early winter peak, followed by a slow late winter decline and a rapid departure between March and April counts (Figure 4.19b). This pattern presents a striking contrast to that for the Burry Inlet, where peaks in autumn and late winter are separated by an early/mid winter trough (Prys-Jones et al. 1989).

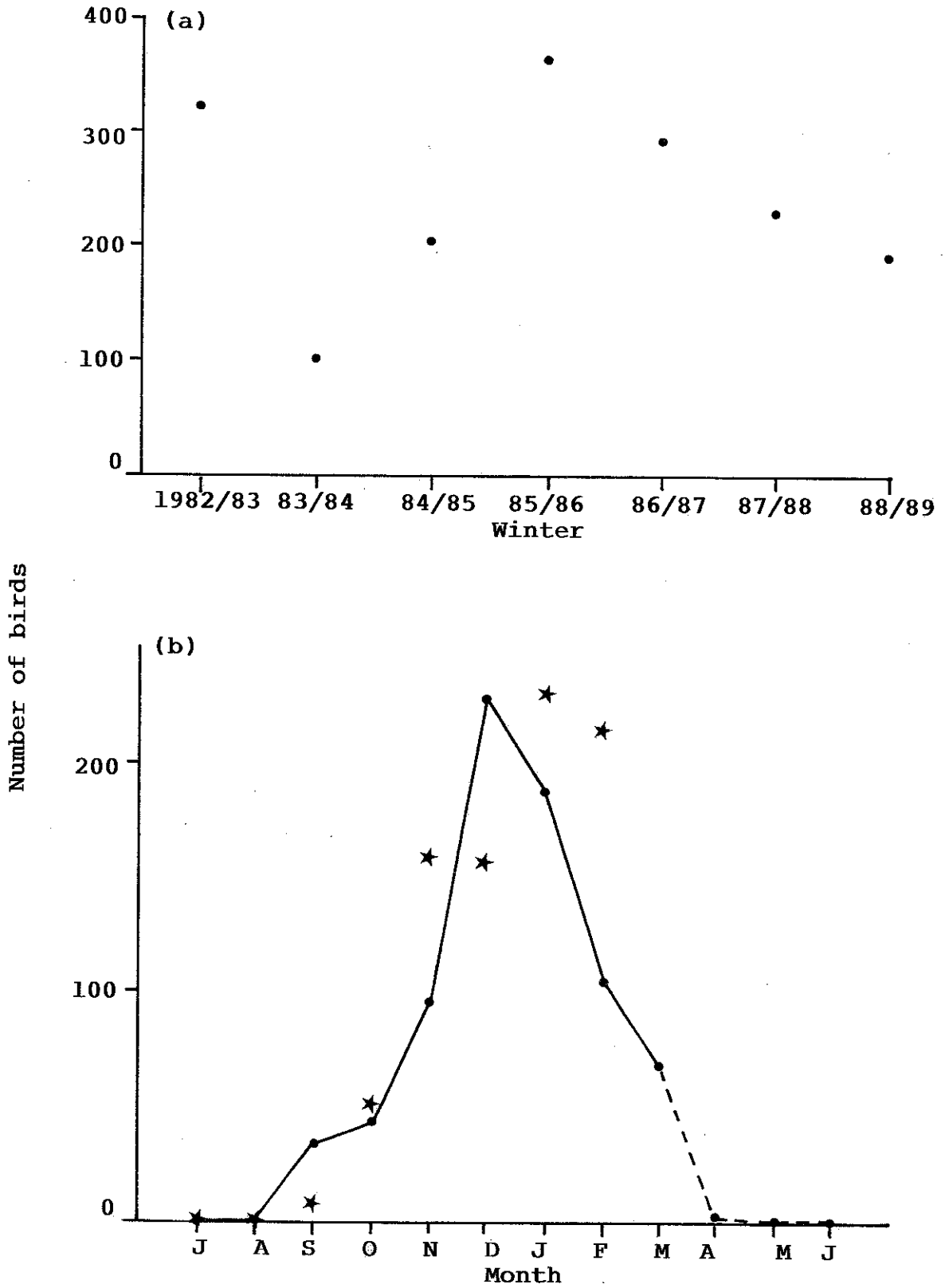

Figure 4.15 Snipe on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

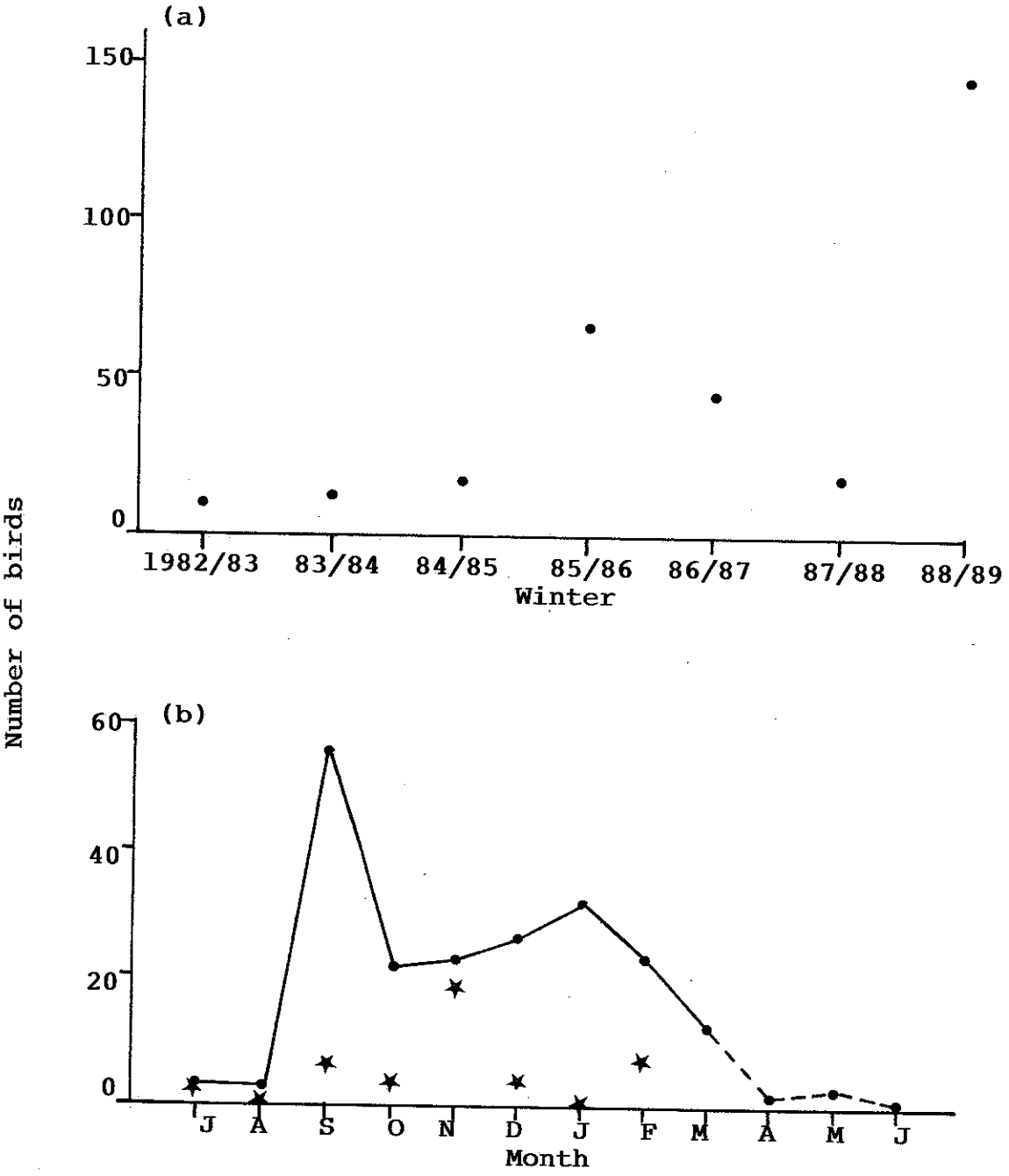

Figure 4.16 Bar-tailed Godwit on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

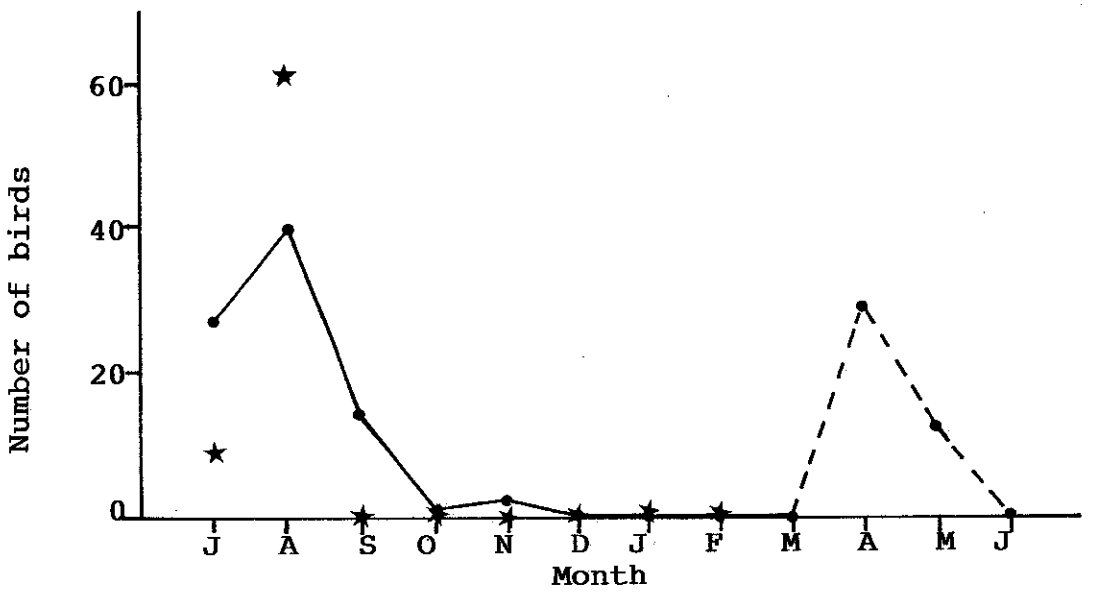

Figure 4.17 Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars) of Whimbrel on the Cleddau. April-June data from a single year only.

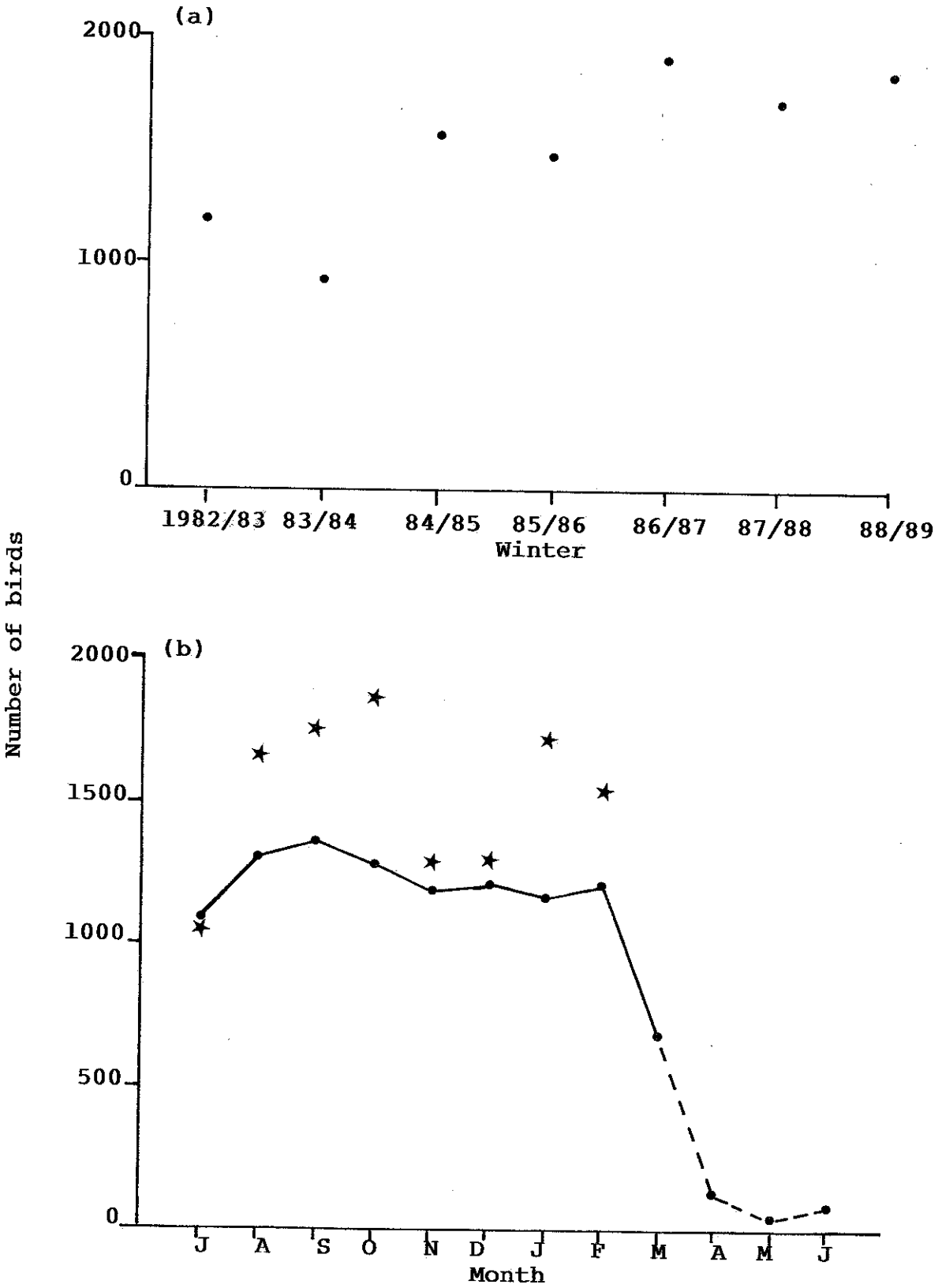

Figure 4.18 Curlew on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

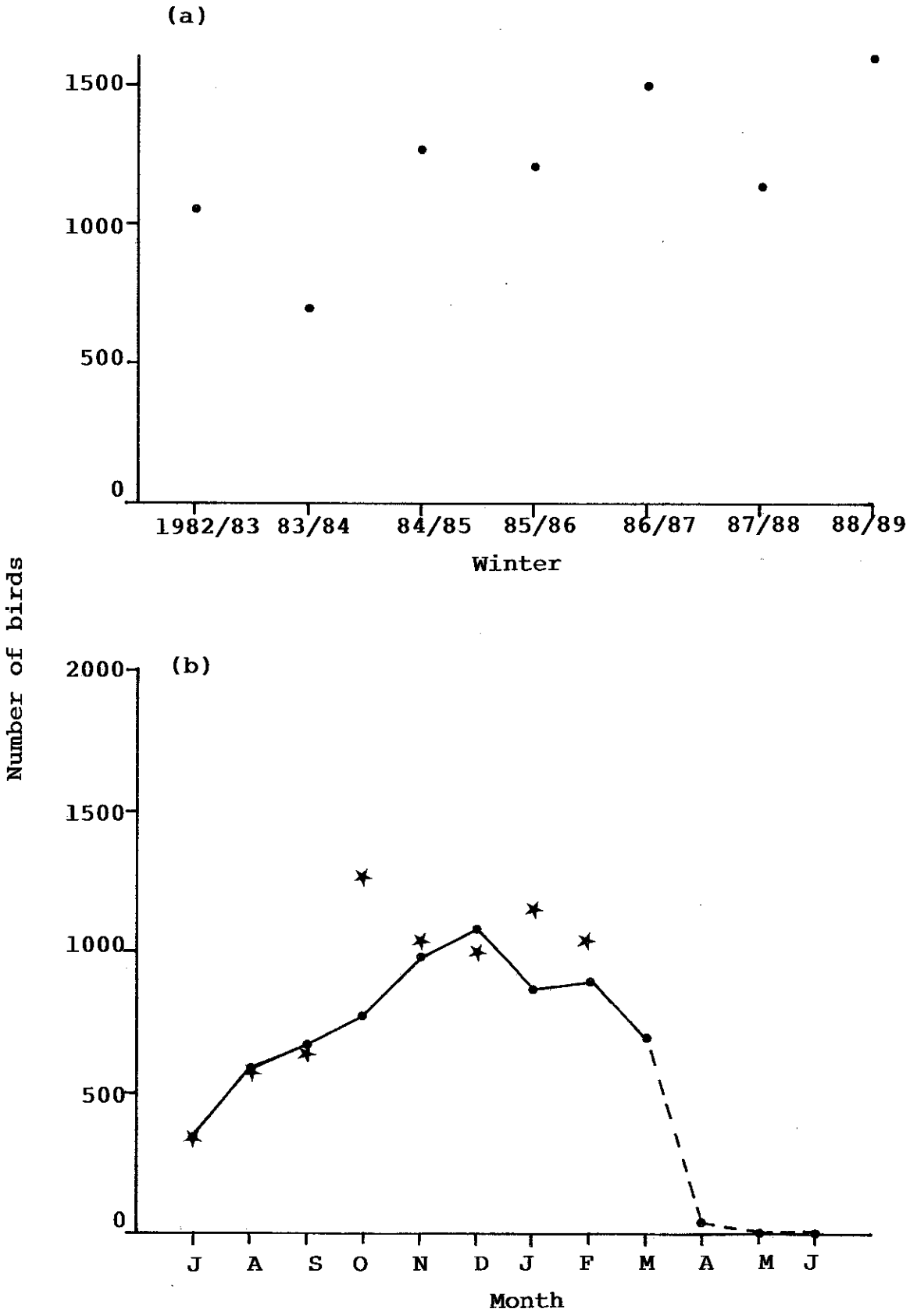

Figure 4.19 Redshank on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars) April-June data from a single year only.

4.20. GREENSHANK Tringa nebularia

Recent BoEE counts provide no evidence for a consistent trend in the wintering population of Greenshank on the Cleddau (Figure 4.20a), an estuary which, despite holding only ca 25 birds, is probably the most important site in Britain for the species at this time of year. Somewhat larger numbers of passage birds are recorded by autumn counts (Figure 4.20b), but the proportional importance of the site in a national context is then less.

4.21. COMMON SANDPIPER Actitis hypoleucos

A pronounced autumn passage of this species on the Cleddau during July and August tails off subsequently to leave a minute wintering population (Figure 4.21). A probable small spring passage is inadequately documented.

4.22. TURNSTONE Arenaria interpres

Both a comparison of highest average monthly counts from the early 1970s and mid 1980s and examination of recent peak winter counts indicate a stable population of Turnstone on the Cleddau (Table 4.1, Figure 4.22a). Numbers build up during the autumn to a peak in October, remain high until February, and then decline rapidly during March (Figure 4.22b). Available BoEE data are inadequate to reveal the scale of any possible spring passage.

4.23. OTHER SPECIES

Species listed below comprise only those relatively commonly recorded on BoEE counts. Comprehensive annual sytheses of all recorded occurrences of vagrant wildfowl and waders on the Cleddau may be found in the Pembrokeshire Bird Report.

Up to 20 Gadwall Anas strepera, 30 Pintail Anas acuta and 30 Shoveler Anas clypeata may at times be present on the Cleddau during the winter, in particular after the turn of the year; the occurrence of the first species appears to be a relatively recent phenomenon related to the national population increase in the species (Fox 1988). Small numbers of Red-breasted Mergansers Mergus serrator are regular during the late autumn and winter months, with peak totals of up to 35 birds on record during the 1980s.

Among waders, Sanderling Calidris alba are scarce, with a peak BoEE count of only eight since 1982. Likewise, the highest monthly count of Jack Snipe Lymnocryptes minimus has been seven, but the difficulty of positively identifying this cryptic species may have resulted in under-recording relative to the much more numerous Snipe. A record of 15 Curlew Sandpiper Calidris ferruginea in September 1988 was exceptional. Black-tailed Godwit Limosa limosa are most frequently seen in autumn and spring, when up to five may be present. In a British context, the Cleddau is an important site for Spotted Redshank Tringa erythropus, with records of 10-15 birds present in autumn, winter and spring. Up to five Green Sandpiper Tringa ochropus may be present from July onwards during autumn passage, and one or two of these regularly winter.

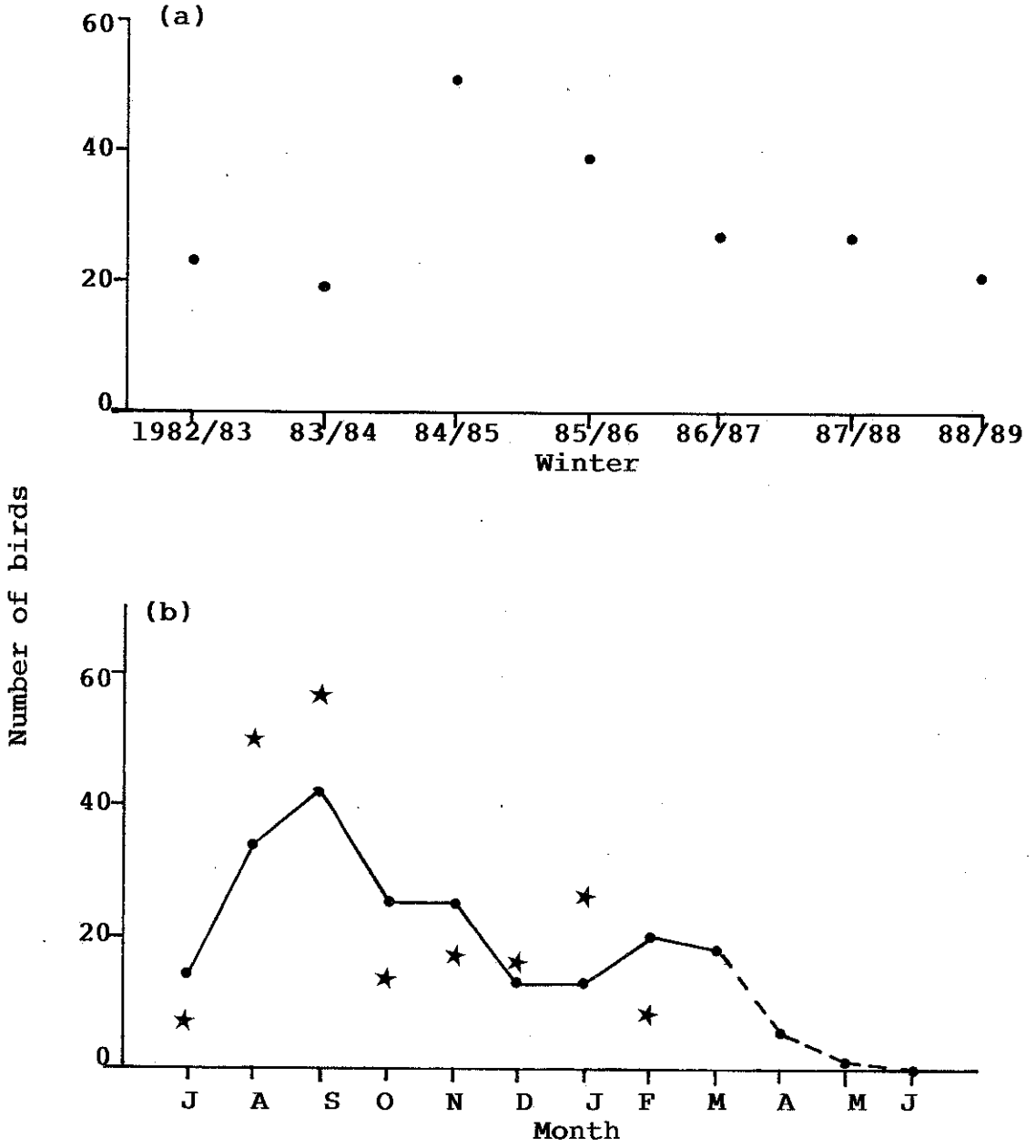

Figure 4.20 Greenshank on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

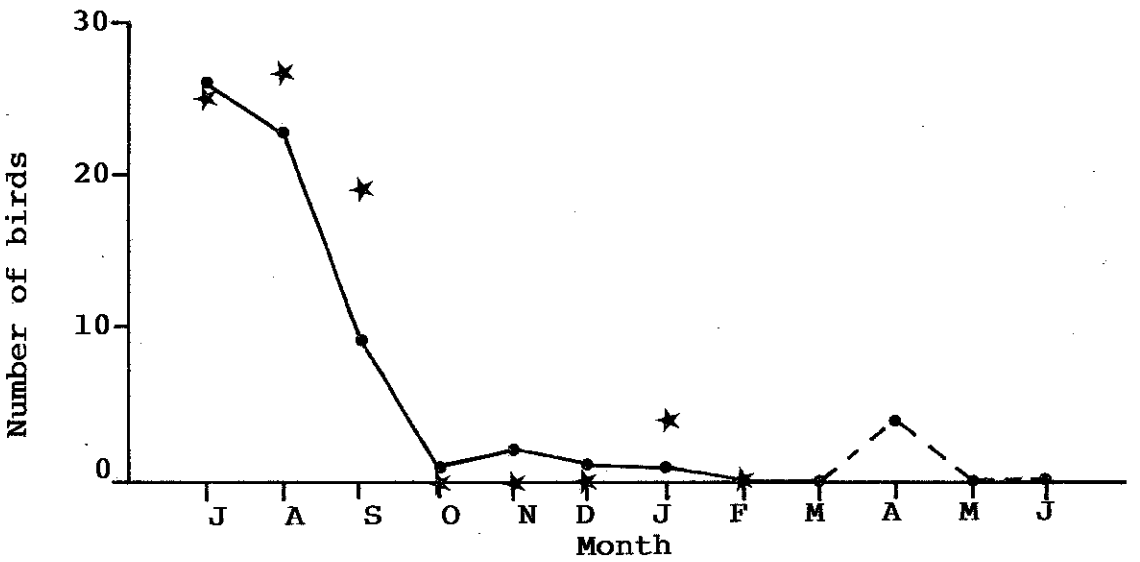

Figure 4.21 Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars) of Common Sandpiper on the Cleddau. April-June data from a single year only.

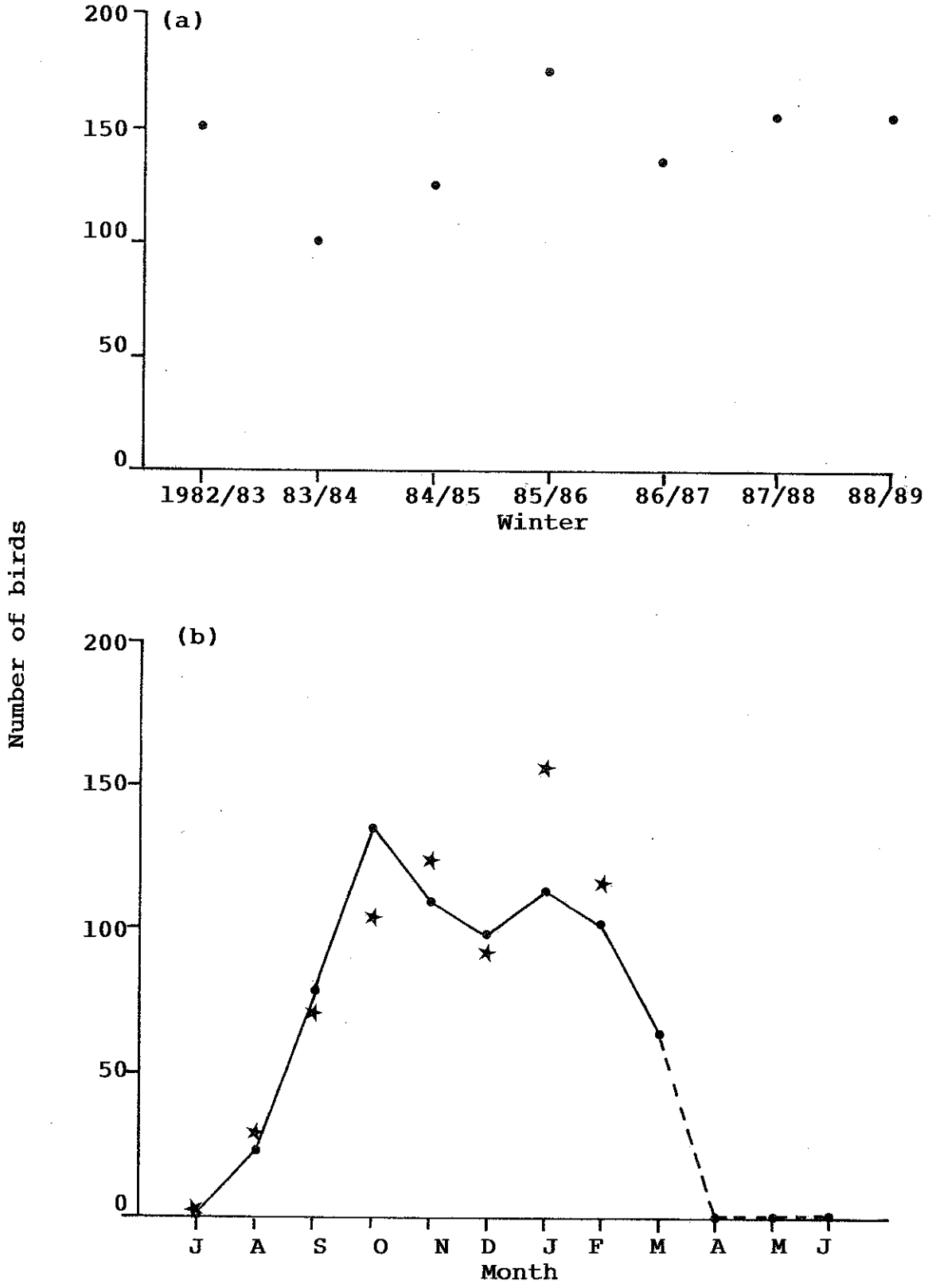

Figure 4.22 Turnstone on the Cleddau:
a) Annual trends in peak winter counts;
b) Seasonal trends in 1982/83-1988/89 average monthly counts (joined dots) and 1987/88 counts (stars). April-June data from a single year only.

4.24. ANNUAL TRENDS IN OVERALL WINTERING NUMBERS

Figure 4.24 summarizes information on annual trends in the combined peak winter BoEE counts of wildfowl, waders and waterfowl (= wildfowl + waders) on the Cleddau. Total recorded waterfowl numbers were higher between 1984/85 and 1986/87 than during the pairs of years either before or after. In 1984/85 and 1985/86, increased numbers of waders were responsible for this peak, but in 1986/87 the surge in Wigeon numbers (see section 4.4) was almost entirely responsible.

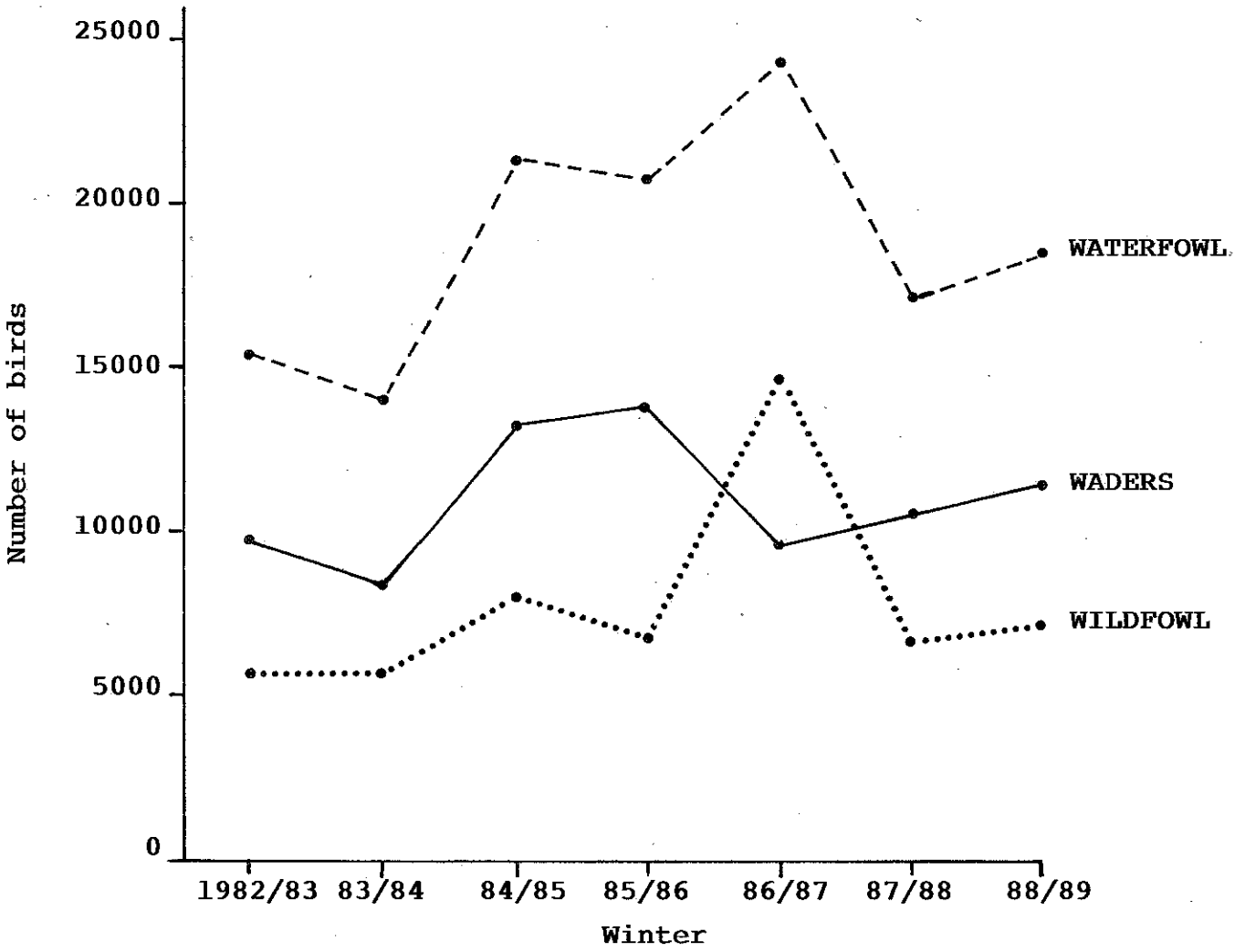

Figure 4.24 Annual trends in peak winter counts of wildfowl, waders and total waterfowl on the Cleddau.

5. NATIONAL AND INTERNATIONAL IMPORTANCE

Criteria for international importance have been agreed by the Contracting Parties to the Ramsar Convention. Under one criterion, a wetland is considered internationally important if it regularly holds 1% of the individuals in a population of one species or subspecies of waterfowl (Atkinson-Willes et al. 1982), while any site regularly holding a total of 20,000 waterfowl (wildfowl and waders) also qualifies (Smart, in press). Britain's and Ireland's wildfowl belong to the north-west European populations, and the waders to the west European. A wetland in Britain is considered nationally important if it regularly holds 1% of the estimated British population of one species or subspecies of waterfowl (Prater 1981). The currently accepted national and international qualifying levels used in this report are taken from Salmon et al. (1988).

5.1. WINTERING POPULATIONS

Table 5.1 contains the average peak winter counts on the Cleddau for each wildfowl and wader species over the five-year period 1984/85 - 1988/89, along with the appropriate qualifying levels for national and international importance. Three species of wildfowl (Shelduck, Wigeon, Teal) and two species of wader (Curlew, Redshank) have wintering populations exceeding the relevant qualifying levels for national importance; in addition, the population of Dunlin present falls not far short. Of these species, Shelduck and Teal also exceed the relevant qualifying levels for international importance.

Table 5.1 further shows that the average total wintering waterfowl population of the Cleddau just exceeds the qualifying level of 20,000 required for international importance based on total numbers. In addition, the separate wintering totals of over 8,500 wildfowl and over 11,500 waders also each exceed the separate qualifying levels for national importance of 5,000 wildfowl and 10,000 waders respectively (Prater 1981).

5.2. PASSAGE POPULATIONS

In addition to species already mentioned in section 5.1, two further ones have significant passage populations. The five-year average peak autumn (July-October) count of Whimbrel totals 51, making the population of this species on the Cleddau of national importance. For Greenshank, the equivalent statistic totals 48, on the verge of the population size (50) normally accepted as denoting national importance for this species (Salmon et al. 1988). Table 5.2 summarizes the waterfowl species with populations of national or international importance on the Cleddau, taking account of both wintering and passage populations.

Table 5.1 Average peak winter (November-March) counts of wildfowl and waders on the Cleddau, 1984/85-1988/89, in relation to qualifying levels for national and international importance.

	Average peak winter count, 1984/85-1988/89	Qualifying level for national importance+	Qualifying level for international importance+
Mute Swan	38	180	1,200
Greylag Goose	1	1,000	1,000
Canada Goose	122	-	-
Brent Goose	2	900	1,300
Shelduck	1,396**	750	1,250
Wigeon	3,870*	2,000	5,000
Gadwall	11	50	550
Teal	2,734**	1,000	2,000
Mallard	367	5,000	20,000
Pintail	9	250	750
Shoveler	13	90	1,000
Pochard	2	500	2,500
Tufted Duck	3	600	5,000
Scaup	3	(40)	1,500
Eider	1	700	20,000
Goldeneye	65	150	2,000
Red-breasted Merganser	25	100	400
Goosander	1	50	750
Total wildfowl:	8,663	5,000	
Oystercatcher	480	2,800	7,500
Ringed Plover	141	230	400
Golden Plover	1,009	2,000	10,000
Grey Plover	137	210	800
Lapwing	2,178	10,000	20,000
Knot	31	2,200	3,500
Sanderling	2	140	150
Dunlin	3,993	4,300	20,000
Jack Snipe	4	?	?
Snipe	256	?	10,000
Black-tailed Godwit	2	50	400
Bar-tailed Godwit	58	610	5,500
Whimbrel	3	50	500
Curlew	1,707*	910	3,000
Spotted Redshank	8	(2)	500
Redshank	1,348*	750	2,000
Greenshank	33	(4)	500
Green Sandpiper	1	?	?
Common Sandpiper	4	?	?
Turnstone	149	450	500
Total waders:	11,544	10,000	
Total waterfowl:	20,207		20,000

NB + : 1% of British wintering population, with 50 birds as a minimum qualifying level (from Salmon et al. 1988).

++ : 1% of north-west European population for wildfowl; 1% of west European population for waders (from Salmon et al. 1988).

* : population of species exceeds qualifying level for national importance.

** : population of species exceeds qualifying level for national and international importance.

Table 5.2 Species with populations of national or international importance on the Cleddau.

National Importance	International Importance
Shelduck	Shelduck
Wigeon	Teal
Teal	
Whimbrel	
Curlew	
Redshank	

NB In addition, Dunlin and Greenshank have populations which verge on national importance (see text)

6. WINTER DISTRIBUTION WITHIN THE CLEDDAU

Only very limited information on the distribution of wildfowl and waders within the Cleddau has been published, but more is available in various unpublished reports. Owen et al. (1986) presented a summary of the wildfowl data available for nine count areas between 1970 and 1982. Elliott (1978) gave a more detailed breakdown of data for all wildfowl and wader species, but only for a single late autumn and winter (October 1977-March 1978) and only for the areas from Cosheston Pill upriver. Rees (1984) presented, but did not interpret, BoEE data collected in 14 count areas between September 1982 and March 1984. Haycock (1987) analysed the results of a single all- day count made in February 1986; observers for this were stationed at eight key viewing points along the estuarine system, with the primary aim of documenting patterns of movement between count areas over a tidal cycle. Most recently, Hellawell & Phillips (1987) presented, and partially interpreted, the results of studies made around the tidal cycle during February and March 1987 on a few species, notably Shelduck, in the five parts of the Cleddau ".... known to harbour the highest numbers of birds".

The aims of this chapter are threefold. Firstly, to document the overall relative importance to wintering waterfowl of the 14 Cleddau count areas (Table 3.1) between 1984/85 and 1988/89, based on BoEE data for all species having average peak Cleddau populations over this period of 10 or more (Table 5.1). Spotted Redshank was additionally included despite having an average peak winter count of only eight, as this total nevertheless still exceeds 1% of the estimated national wintering population (Table 5.1). Secondly, to describe the winter distribution patterns of these species throughout the Cleddau, mapping these for species having average peak Cleddau populations of 100 or more. Presentation here is standardized across species by expressing the average peak winter count for each species in each count area (Table 6.1) as a % of the overall average peak count of that species on the Cleddau as a whole (Table 5.1). Thirdly, to assess the limited evidence available regarding the probable overall scope of inter-area movements by waterfowl, a factor of particular potential significance within the Cleddau system. BoEE counts are generally made at high tide, when many intertidal birds are roosting and can be counted most easily; in addition, efforts are generally made to synchronise the timing of counts throughout a single estuarine site. On the Cleddau, however, the varied physical nature of the count areas requires that some, notably the Eastern Cleddau, Daugleddau and Carew/Cresswell, be censused between half tide and low tide in order to produce satisfactory results (Rees 1984).

6.1 OVERALL IMPORTANCE OF COUNT AREAS

Table 6.1 summarizes the data for all 14 count areas. Considerably the most important site in terms of total numbers of waterfowl is Pembroke River, which supports over 5,000 birds; also supporting over 2,000 birds are Lower Western Cleddau, Carew/Cresswell, Upper Western Cleddau and Angle Bay, listed in declining order of importance. Each of these count areas supports over 10% of the average peak winter count of waterfowl on the Cleddau as a whole; by contrast, both Llanreath/Front St. and Castle Pill support less than 1% (Figure 6.1). No count area by itself attains National Importance either in terms of the overall number of wildfowl or waders it supports or for any individual species.

Table 6.1 Average peak winter (November-March) counts of wildfowl and waders, 1984/85-1988/89, on each of the 14 count areas of the Cleddau.

	Upper Western Cleddau	Lower Western Cleddau	Eastern Cleddau	Daugleddau	Llangwm	Carew/Cresswell	Cosheston Pill	Pembroke River	Llanstadwell	Llanreath/Front St.	Castle Pill	Sandy Haven Pill	Angle Bay	Gann
Mute Swan	-	-	-	4	2	2	5	15	6	3	4	7	-	6
Canada Goose	68	113	22	24	-	-	-	-	-	-	-	-	-	-
Shelduck	28	139	87	109	6	314	150	598	43	9	-	8	125	13
Wigeon	618	278	74	243	-	626	42	1,309	-	-	-	51	776	175
Gadwall	-	-	-	-	-	-	-	4	-	-	-	-	-	9
Teal	644	814	383	127	88	711	133	254	-	-	-	7	-	123
Mallard	165	104	79	20	2	26	17	22	-	-	-	1	43	5
Shoveler	-	-	-	-	-	2	-	8	-	-	-	-	1	4
Goldeneye	32	3	6	4	-	11	-	8	-	-	1	-	-	9
Red-breasted Merganser	3	17	10	5	1	1	-	2	-	-	-	-	-	1
Total wildfowl:	1,558	1,468	661	536	99	1,693	347	2,220	49	12	5	74	945	345
Oystercatcher	6	32	10	67	1	16	7	153	5	15	20	35	146	109
Ringed Plover	6	20	-	9	-	20	25	22	22	-	-	9	42	23
Golden Plover	62	546	116	228	44	142	55	-	-	-	-	11	85	-
Grey Plover	1	9	-	-	-	10	3	79	-	-	-	2	42	17
Lapwing	617	507	156	470	93	304	239	81	-	-	2	18	11	194
Knot	-	-	-	1	1	1	-	12	1	-	-	3	17	-
Dunlin	134	986	217	221	323	418	130	1,841	212	124	4	21	430	31
Snipe	91	12	5	18	1	91	53	29	-	-	-	1	1	54
Bar-tailed Godwit	-	9	-	-	1	9	7	20	6	-	-	-	23	3
Curlew	221	174	143	179	5	333	94	329	7	9	2	88	278	231
Spotted Redshank	-	8	1	-	-	-	-	1	-	-	-	-	-	-
Redshank	277	163	165	41	21	272	226	272	11	32	39	44	77	25
Greenshank	-	3	-	3	1	3	12	12	-	-	2	1	-	4
Turnstone	-	-	-	2	-	2	7	46	23	7	13	-	69	30
Total waders:	1,415	2,469	813	1,239	491	1,621	858	2,897	287	187	82	233	1,221	721
Total waterfowl:	2,973	3,937	1,474	1,775	590	3,314	1,205	5,117	336	199	87	307	2,166	1,066

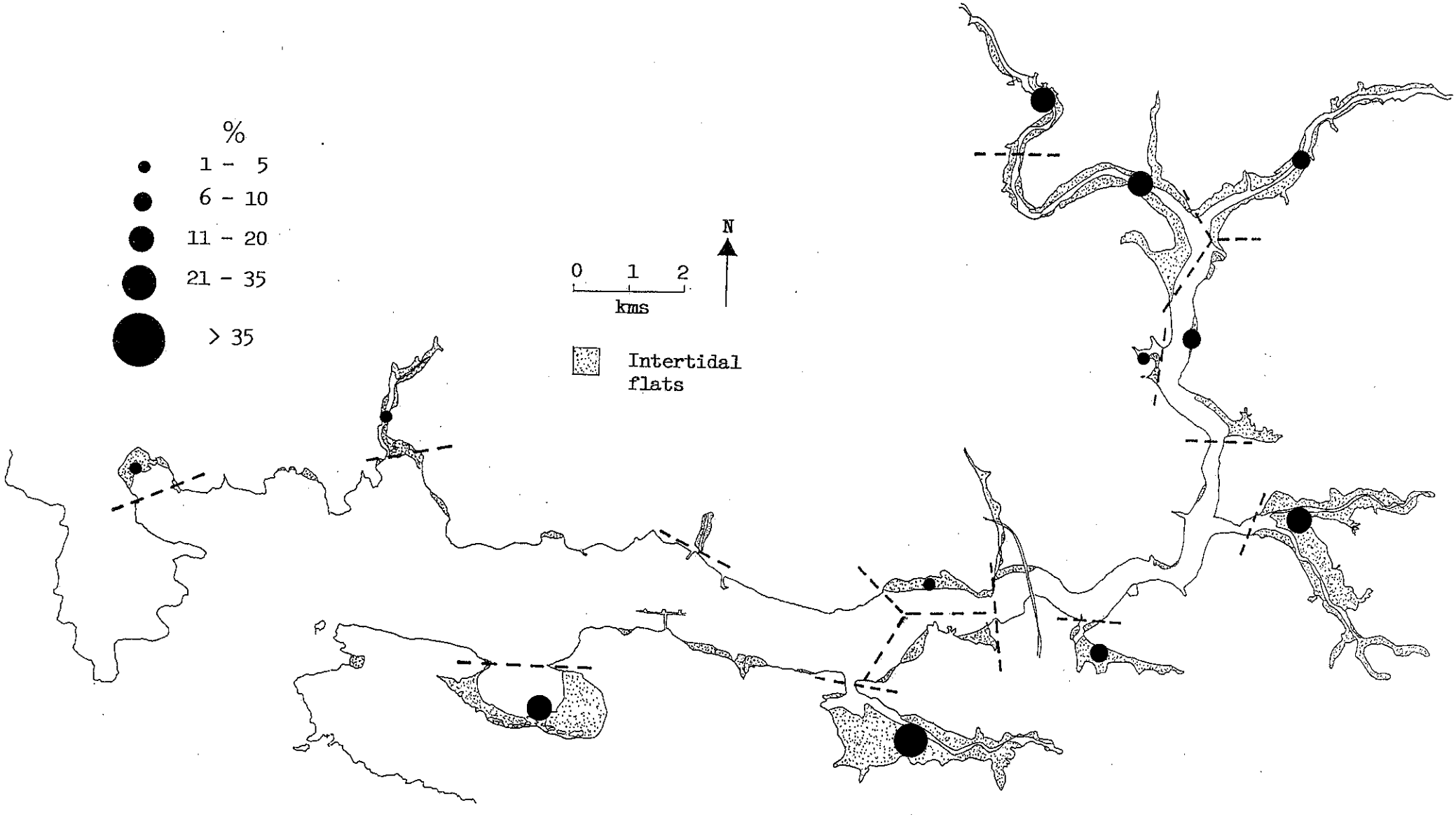

Figure 6.1 Overall distribution of wintering waterfowl among the Cleddau count areas, 1984/85-1988/89. The average peak count of each count area is expressed as a percentage of the average peak count for the entire Cleddau.

6.2 CANADA GOOSE

Entirely a bird of the upper reaches of the Cleddau, with almost all individuals occurring in a single flock around the boundary of the Upper and Lower Western Cleddau although some stray on occasion into the Eastern Cleddau and Daugleddau (Figure 6.2). The distribution of this feral species is unchanged from that recorded in the late 1970s (Elliott 1978).

6.3 SHELDUCK

Widely distributed except along the outer north shore, but with a major concentration at Pembroke River (Figure 6.3). Good numbers are also present on the Carew/Cresswell, whereas during the 1970s the upper reaches of the Cleddau ranked proportionately higher (Elliott 1978, Owen et al. 1986). The comment of Elliott (1978) that "Shelduck were recorded at all localities except Cosheston Pill .." in 1977/78 is surprising in view of the population now present there.

6.4 WIGEON

Occurs widely, but with much the largest numbers on Pembroke River and other notable concentrations on Angle Bay, the Carew/Cresswell and the Upper Western Cleddau (Figure 6.4). The pre-eminence of Pembroke River for the species is long-standing (Owen et al. 1986).

6.5 TEAL

Predominantly a bird of the creeks and marshes of the Carew/Cresswell and the Western and Eastern Cleddau (Figure 6.5).

6.6 MALLARD

Widely distributed in small numbers, but with a major concentration along the Eastern and, in particular, Western Cleddau (Figure 6.6). The latter is the traditionally favoured region for Mallard on the Cleddau (Elliott 1978, Owen et al. 1986).

6.7 OYSTERCATCHER

Occurs throughout the Cleddau, but much commoner on the lower reaches, where concentrations are present on Pembroke River, Angle Bay and the Gann (Figure 6.7). Most birds on the upper reaches are along the Daugleddau, as was also noted by Elliott (1978).

6.8 RINGED PLOVER

Widely distributed throughout much of the Cleddau, with a major concentration in Angle Bay (Figure 6.8).

6.9 GOLDEN PLOVER

Very much a bird of the upper reaches of the system except for a flock intermittently present at Angle Bay (Figure 6.9). The average peak winter count on the Lower Western Cleddau exceeds 50% of that for the Cleddau as a whole.

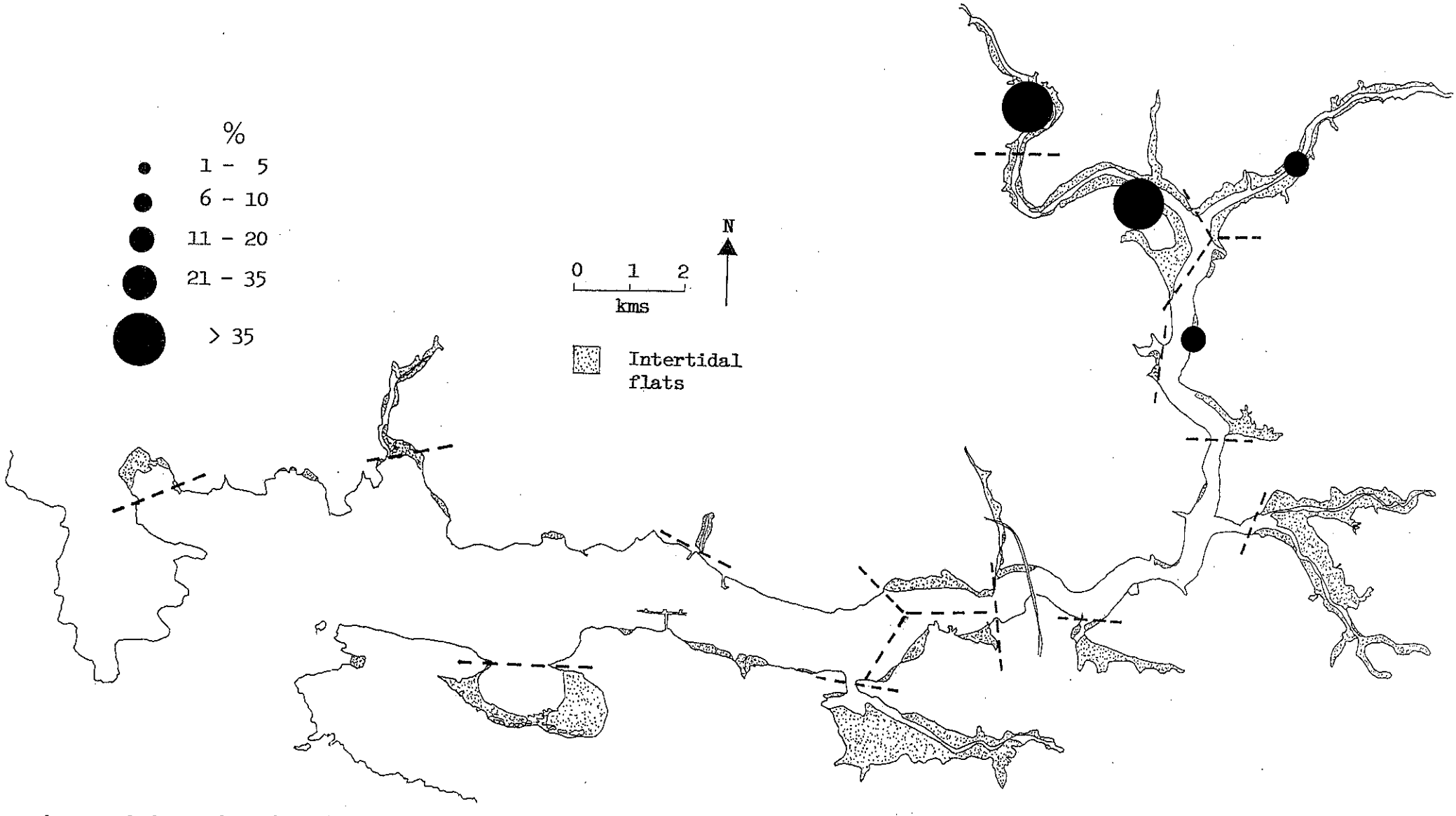

Figure 6.2 Distribution of Canada Geese in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

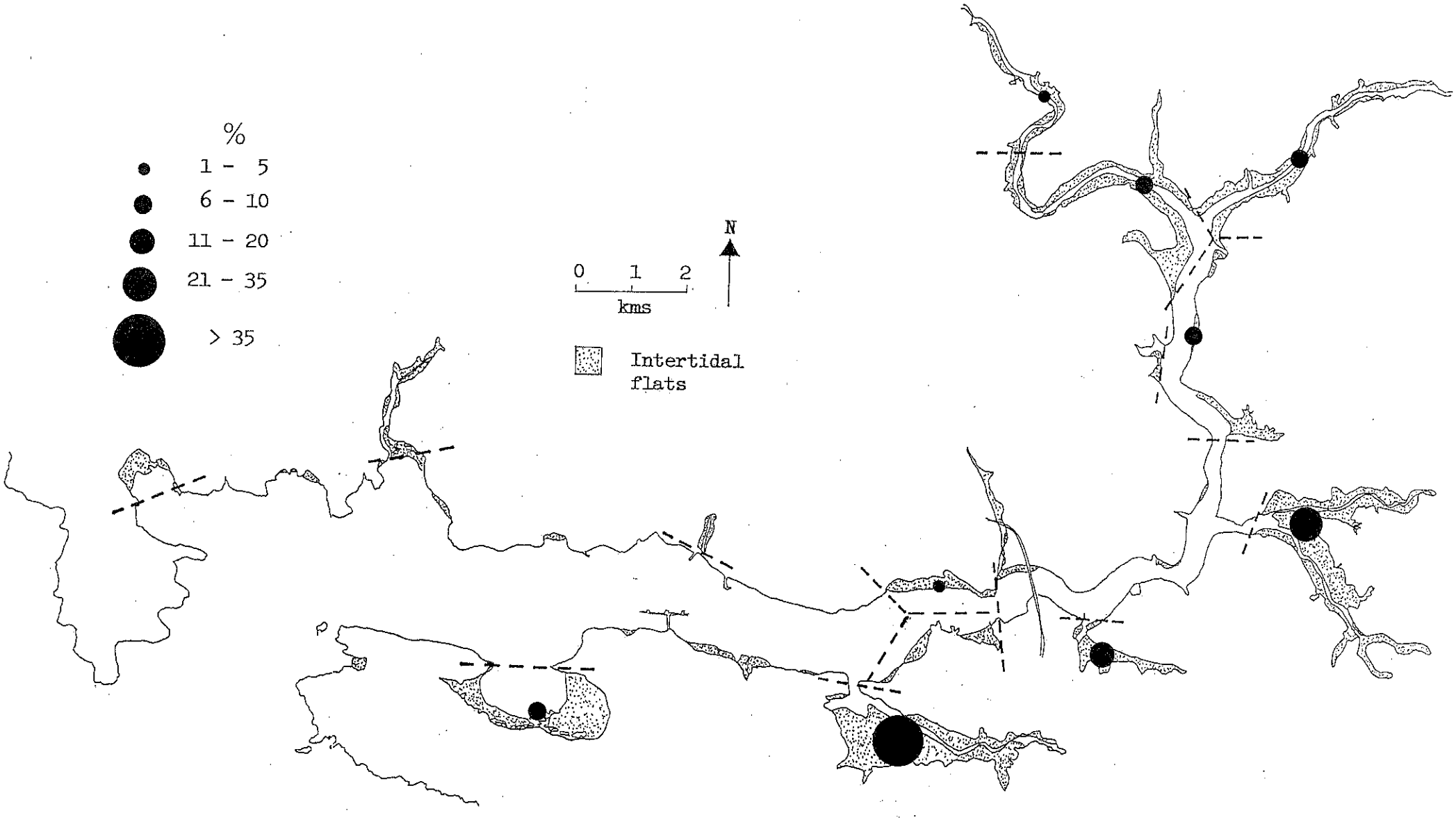

Figure 6.3 Distribution of Shelduck in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

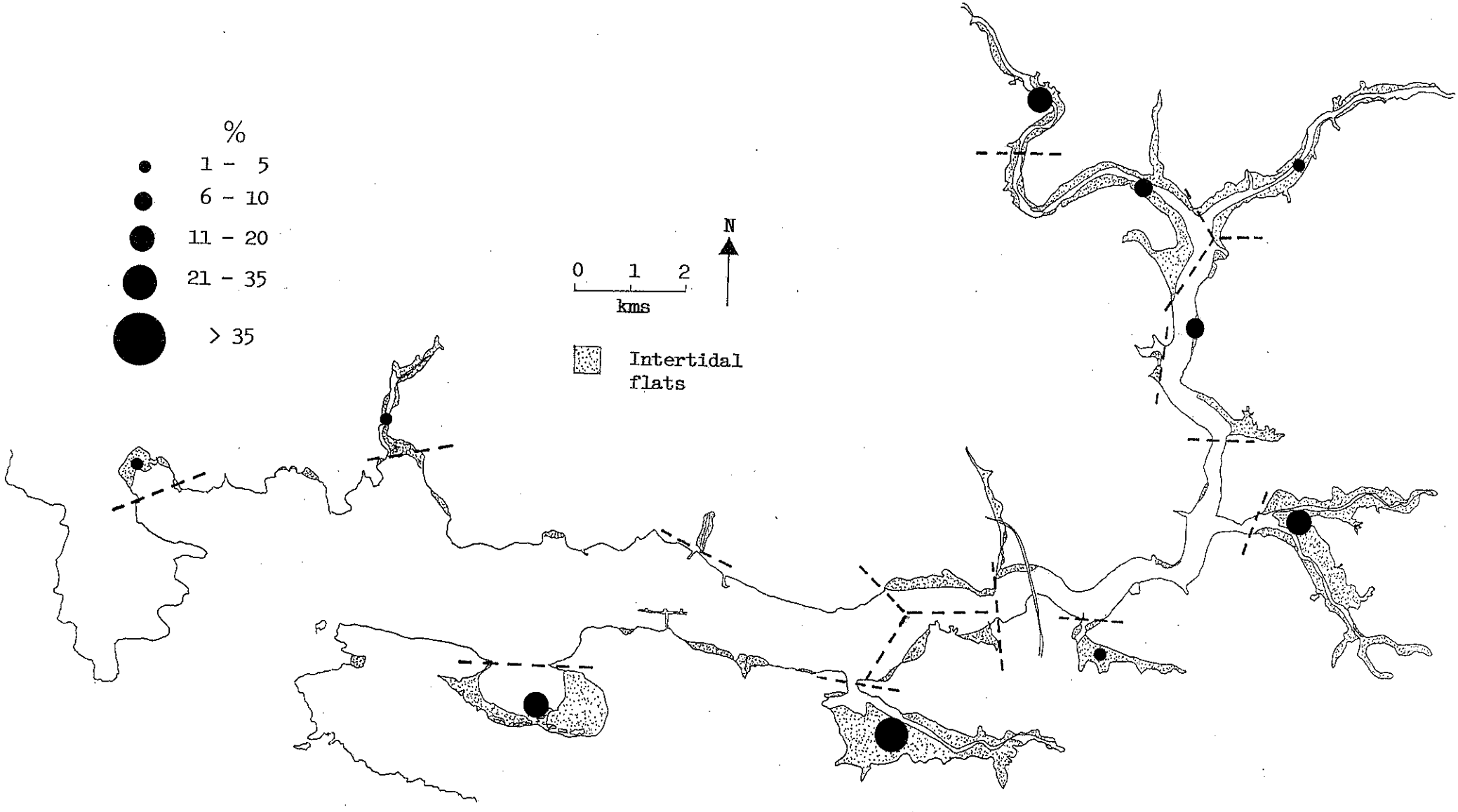

Figure 6.4 Distribution of Wigeon in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

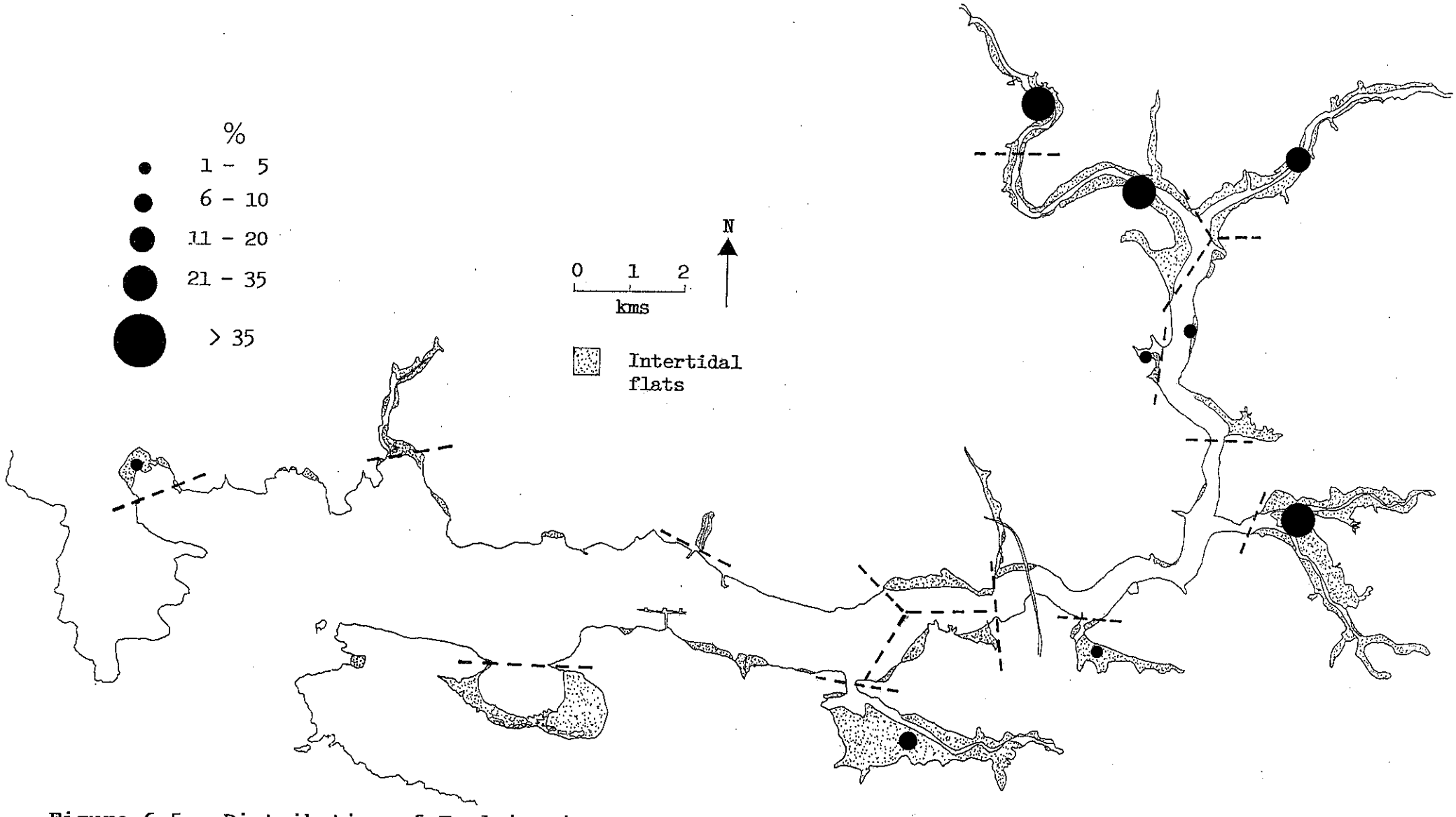

Figure 6.5 Distribution of Teal in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

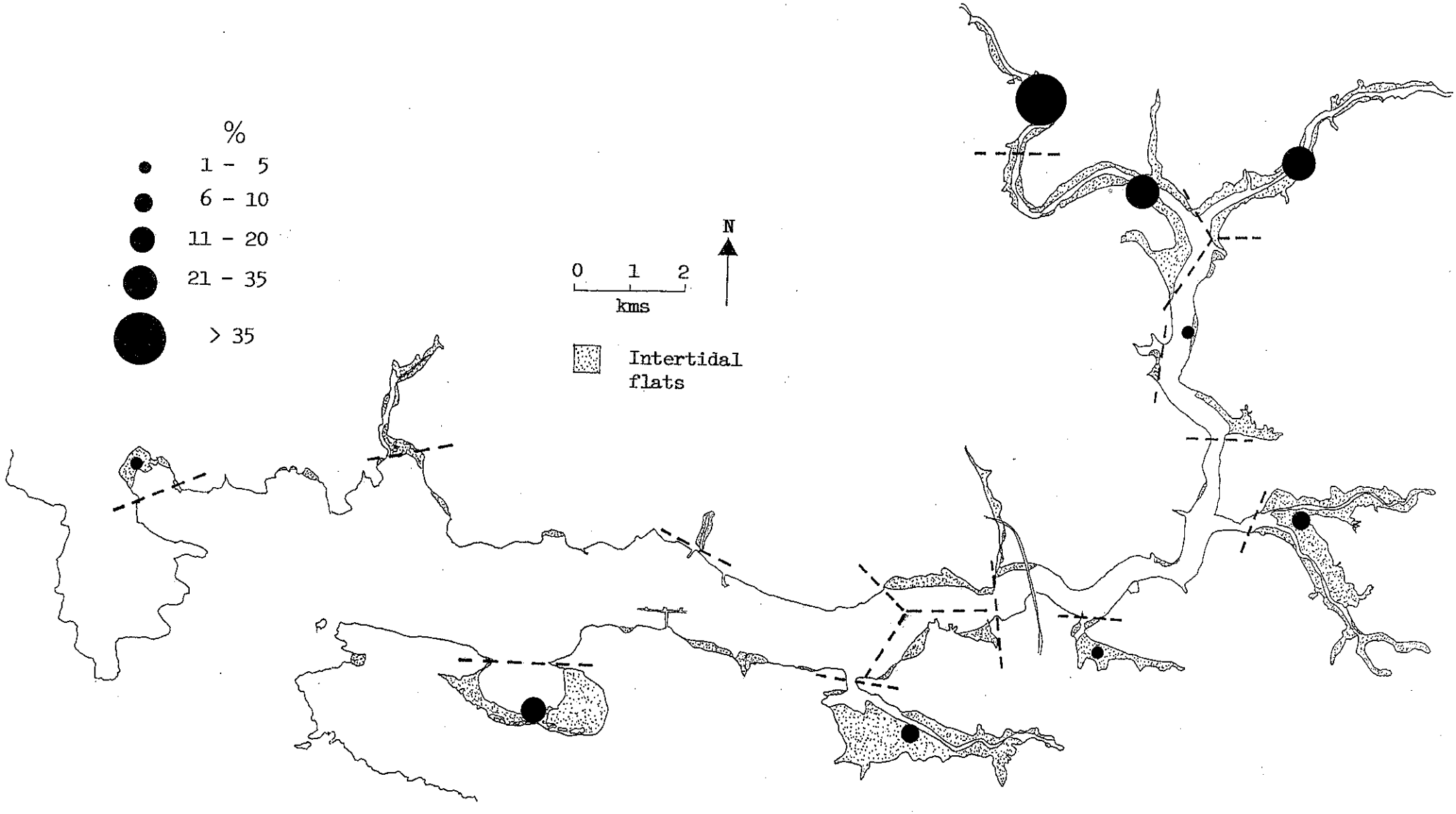

Figure 6.6 Distribution of Mallard in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

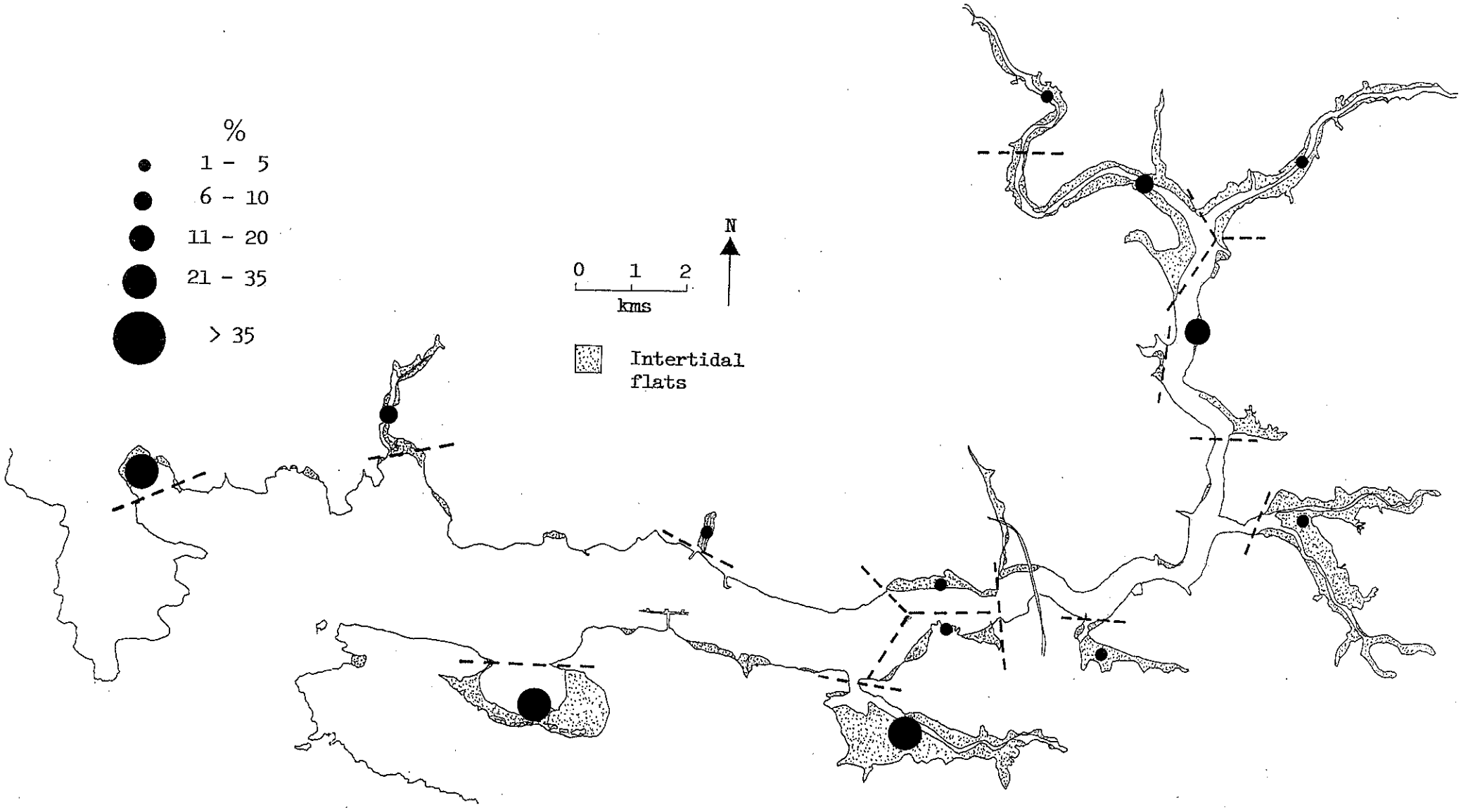

Figure 6.7 Distribution of Oystercatcher in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

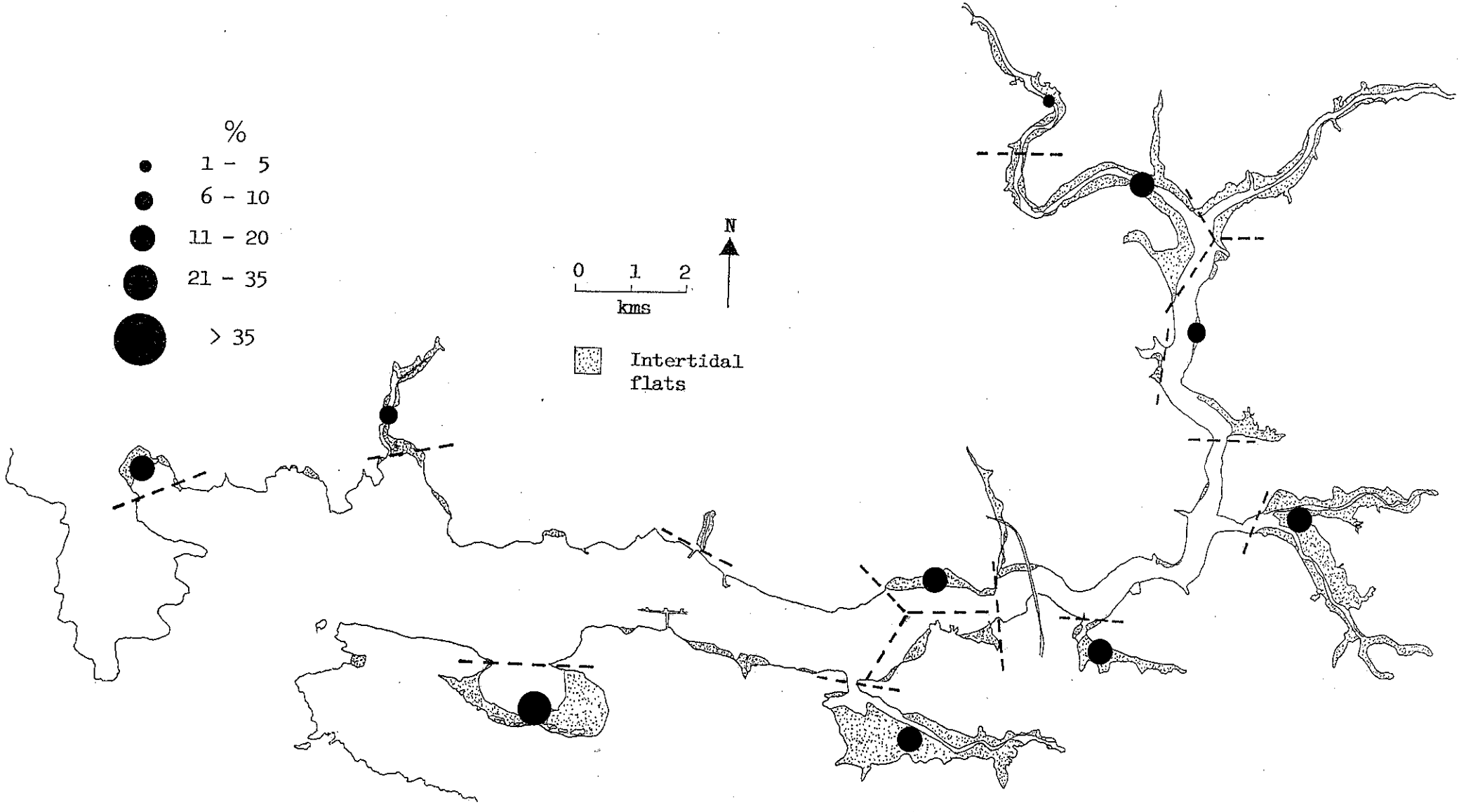

Figure 6.8 Distribution of Ringed Plover in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

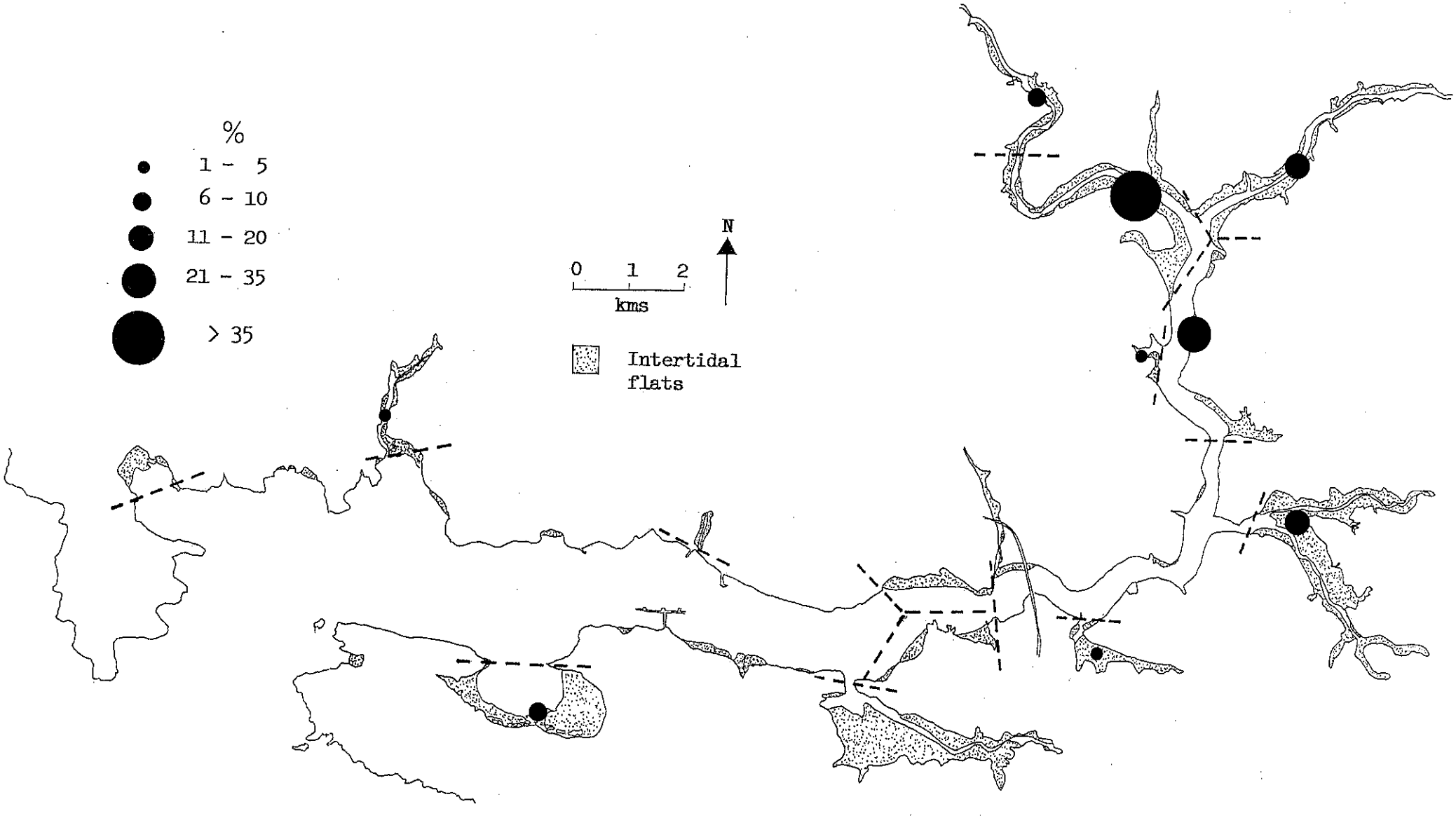

Figure 6.9 Distribution of Golden Plover in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

6.10 GREY PLOVER

Concentrated largely onto just two sites, Pembroke River and Angle Bay (Figure 6.10), with the average peak winter count on the former exceeding 50% of that on the Cleddau as a whole.

6.11 LAPWING

Most flocks are recorded from Cosheston Pill northwards, with numbers tending to peak along the Western Cleddau (Figure 6.11).

6.12 DUNLIN

Most birds present are concentrated in only two count areas, Pembroke River and Lower Western Cleddau (Figure 6.11). The average peak winter count for the former area approaches 50% of that for the Cleddau as a whole and for the latter area totals 25% of the overall average peak count. The largest flock recorded by Elliott (1978) on the upper reaches of the Cleddau in winter 1977/78 was also on the Lower Western Cleddau.

6.13 SNIPE

BoEE counting techniques are poorly suited to censusing a cryptic marshland species such as the Snipe, and the distribution pattern revealed in Figure 6.13 should be interpreted with caution. Nevertheless, available results show that up to 100 or more wintering birds are present along the Upper Western Cleddau and Carew/Cresswell and over 50 on both Cosheston Pill and the marshes of the Gann (Table 6.1).

6.14 CURLEW

Widely distributed without any major concentrations (Figure 6.14), although Carew/Cresswell and Pembroke River have the highest average peak winter counts (Table 6.1).

6.15 REDSHANK

Most common on the Upper Western Cleddau, Carew/Cresswell and Pembroke River (Table 6.1) although, as with Curlew, generally widely distributed without major concentrations (Figure 6.15).

6.16 TURNSTONE

Very much a bird of the outer estuary, with Angle Bay having an average peak winter count of nearly 50% that of the Cleddau as a whole and Pembroke River one of over 30% (Figure 6.16).

6.17 OTHER SPECIES

Of the other wildfowl in Table 6.1, Mute Swans occur widely in small numbers except, perhaps surprisingly, on the Western and Eastern Cleddau. Gadwall appear episodically on Pembroke River and the Gann, areas also favoured by Shoveler. Goldeneye occur more widely. Rees (1984) noted that they "..... penetrate upstream to all sorts of obscure corners of the Western Cleddau, at high tide, and are difficult to locate"; in addition, Rees (in litt.) noted that numbers were continuing to use Westfield Pill in winter 1986/87 despite the habitat modification there. In consequence, the species

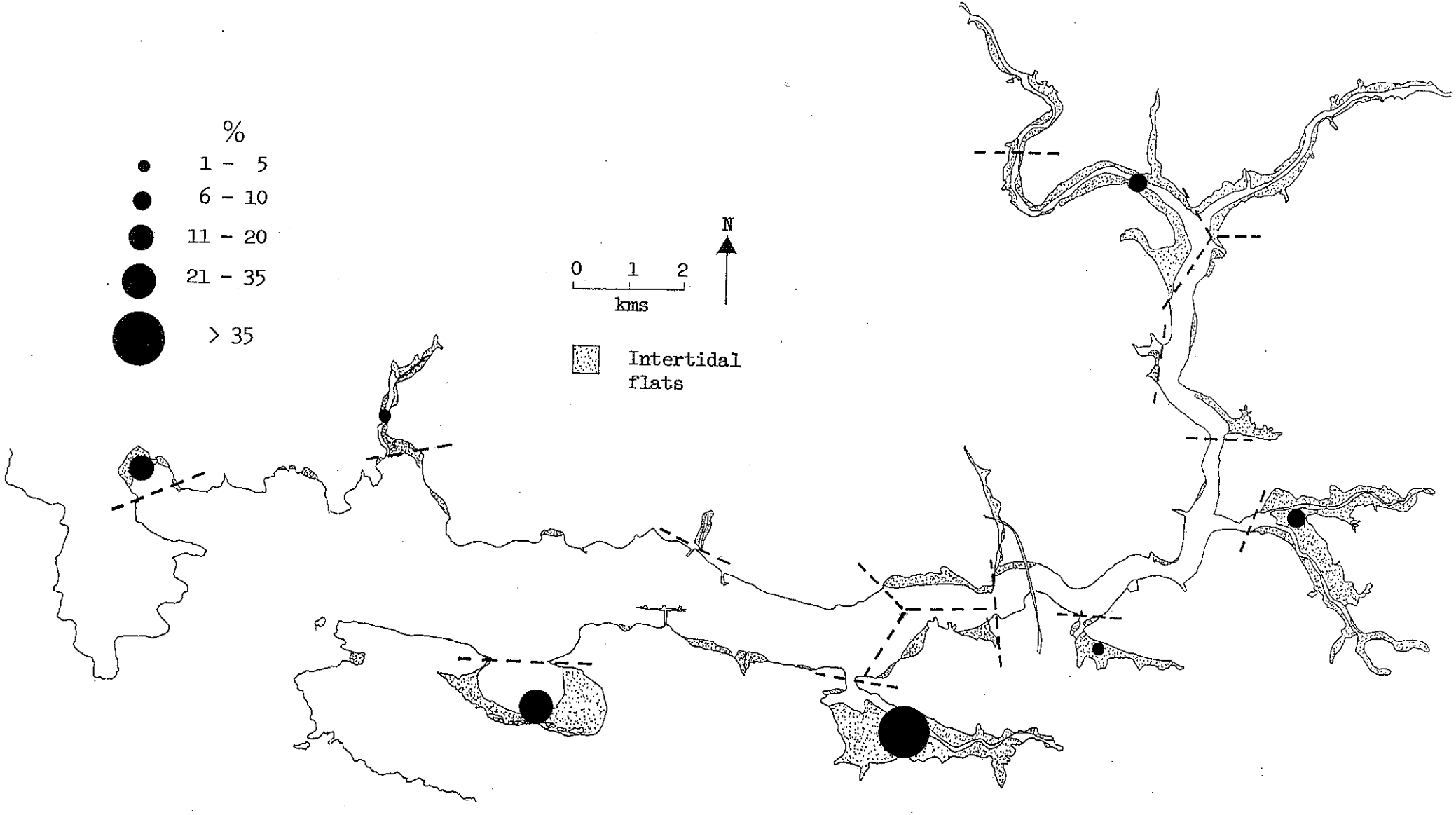

Figure 6.10 Distribution of Grey Plover in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

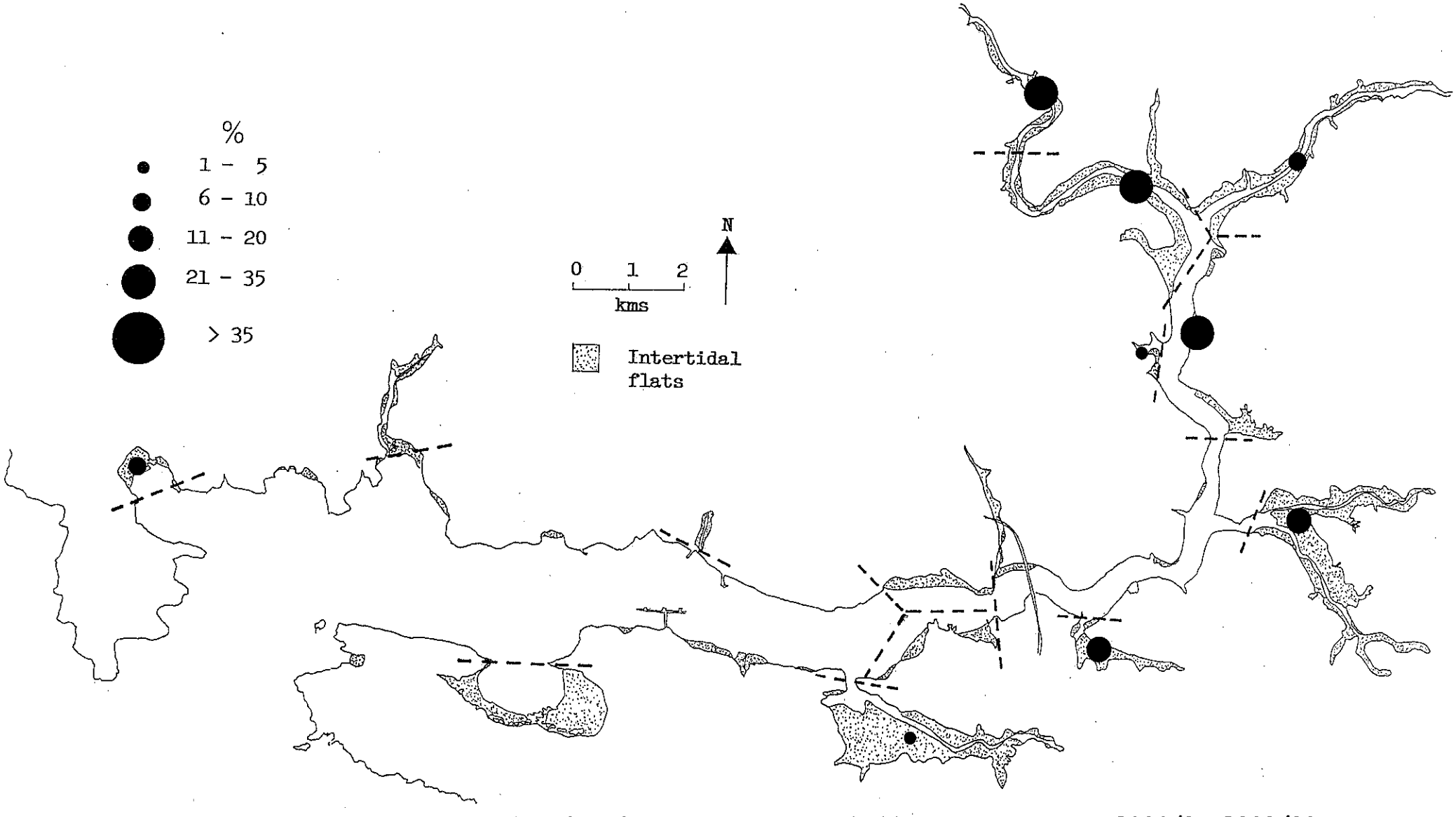

Figure 6.11 Distribution of Lapwing in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

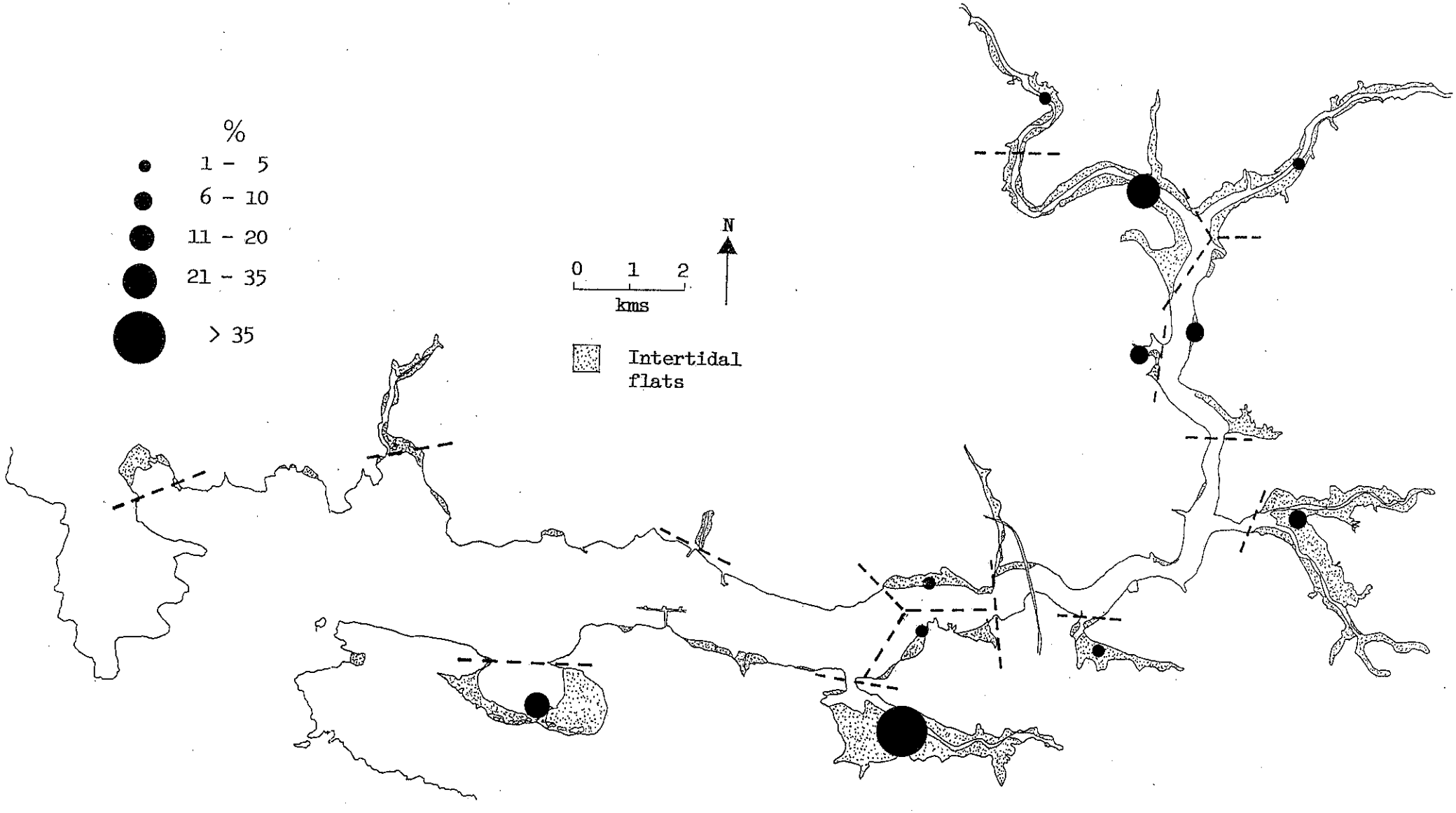

Figure 6.12 Distribution of Dunlin in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

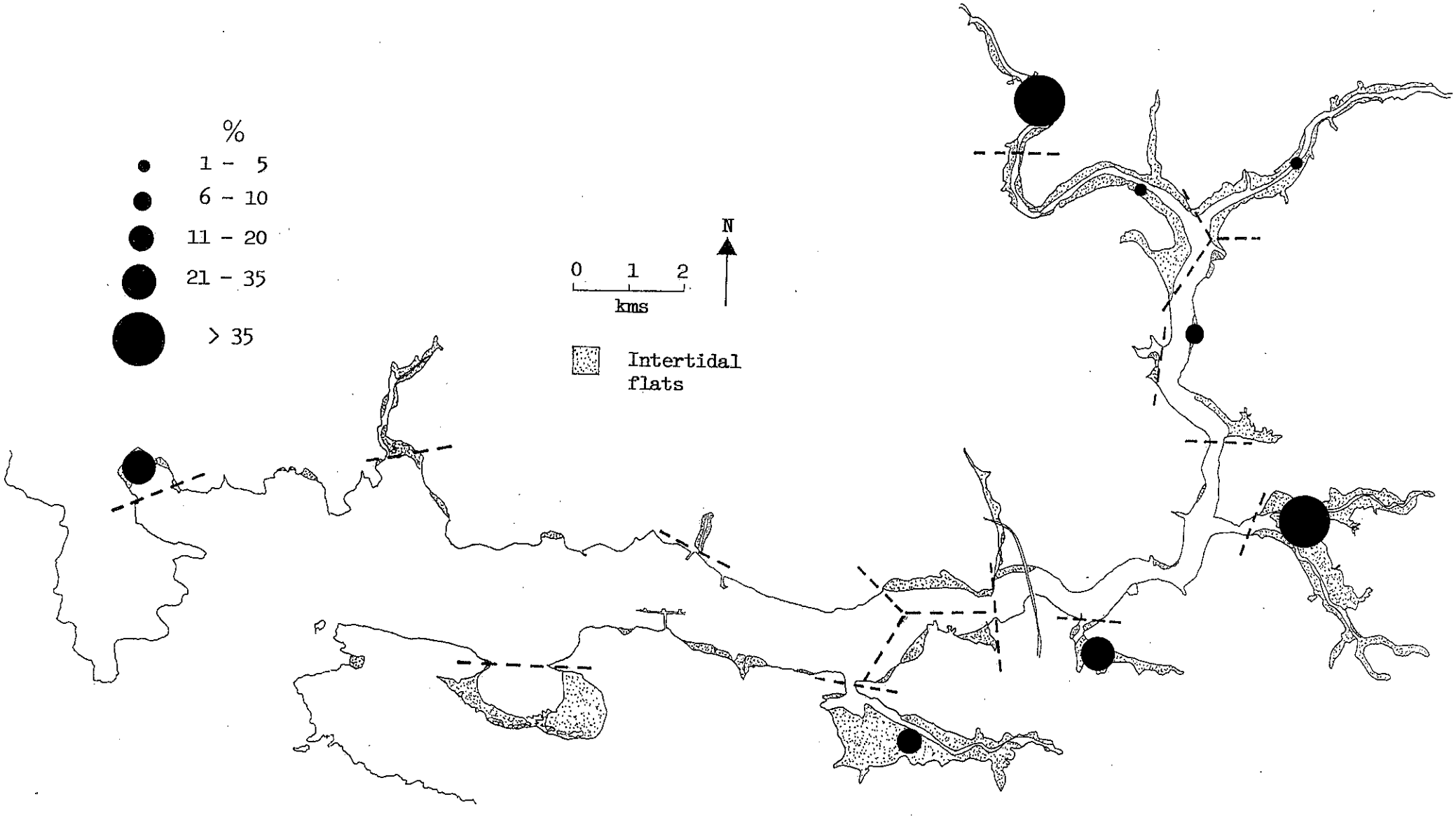

Figure 6.13 Distribution of Snipe in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

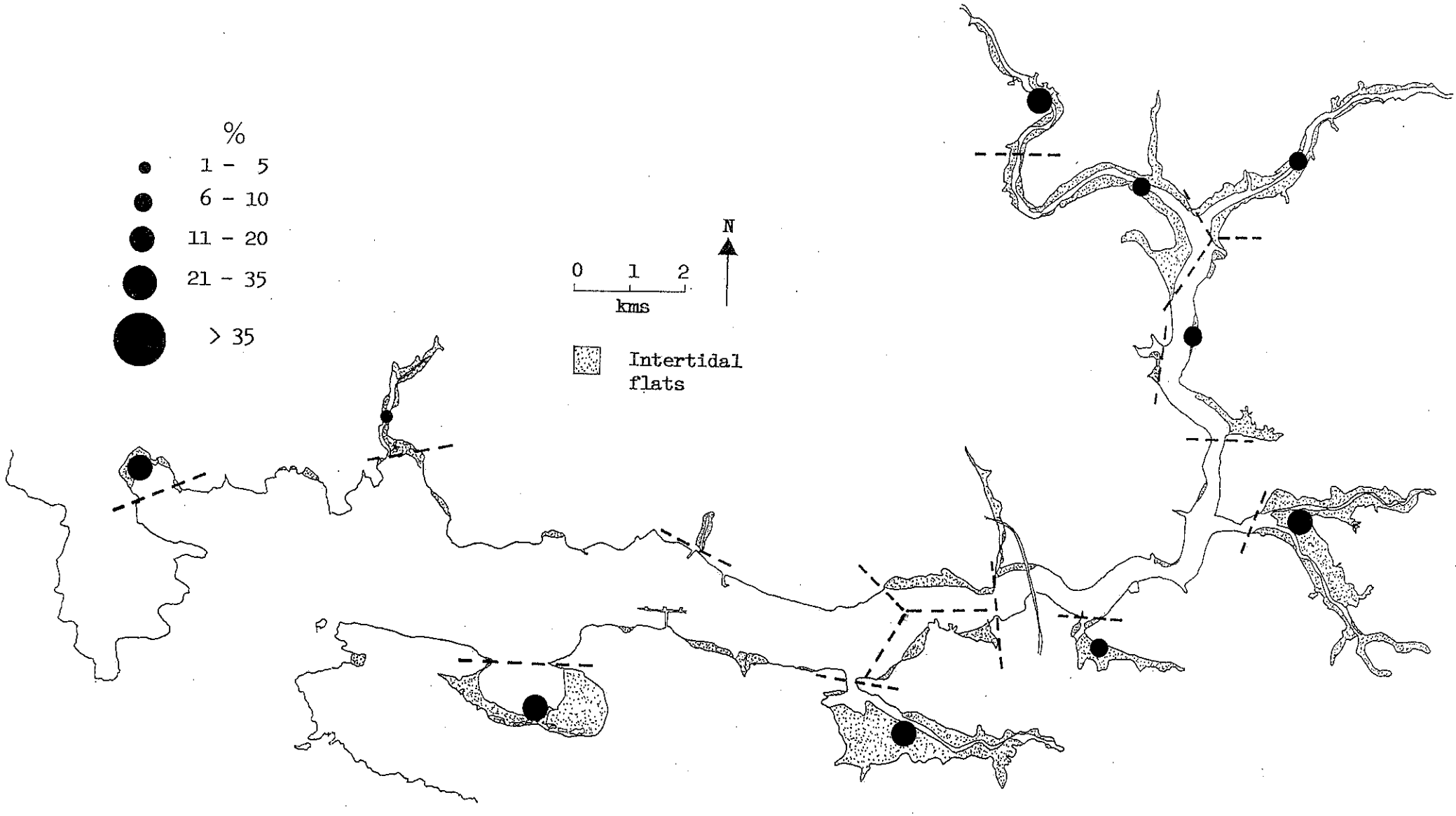

Figure 6.14 Distribution of Curlew in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

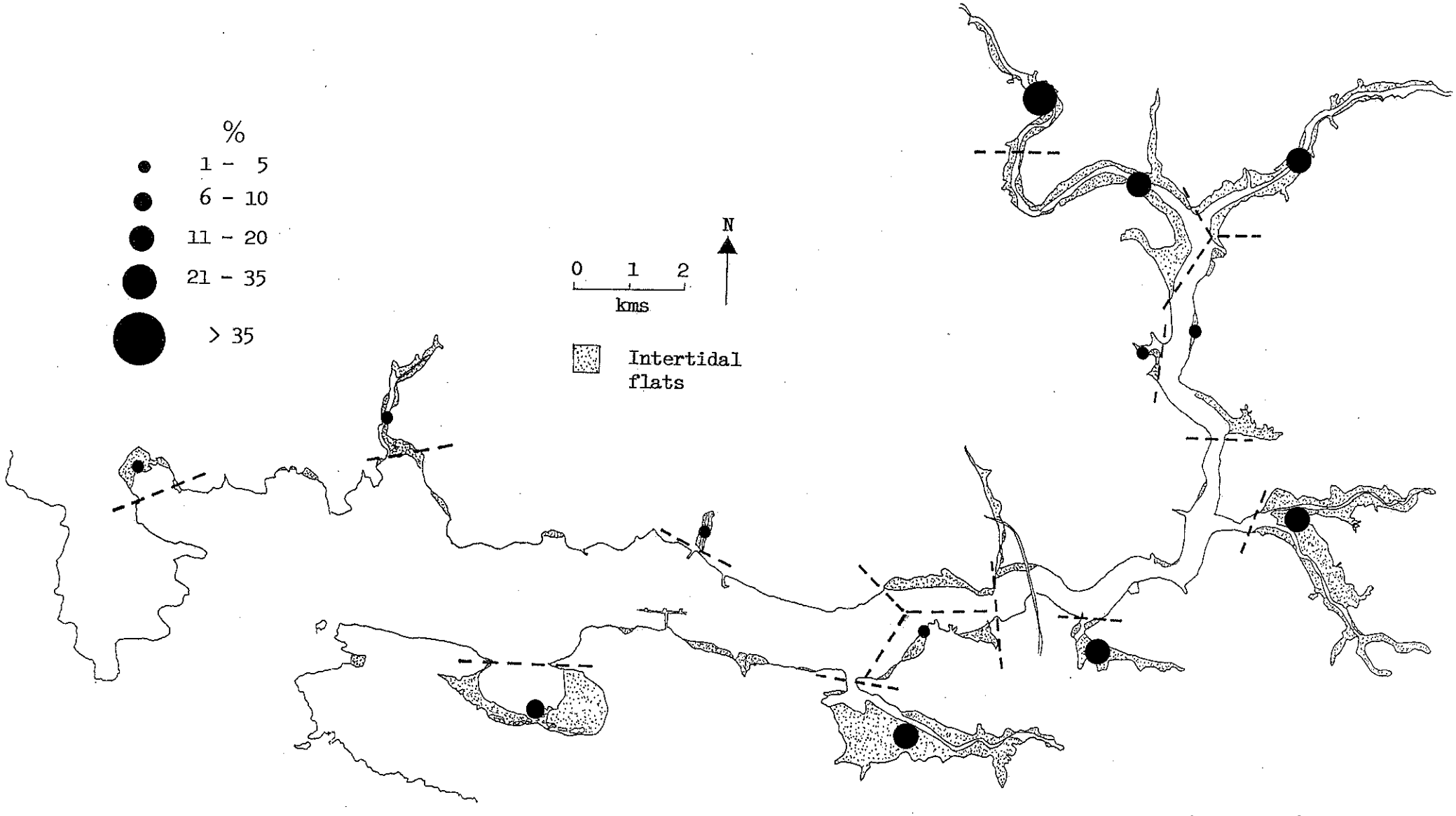

Figure 6.15 Distribution of Redshank in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

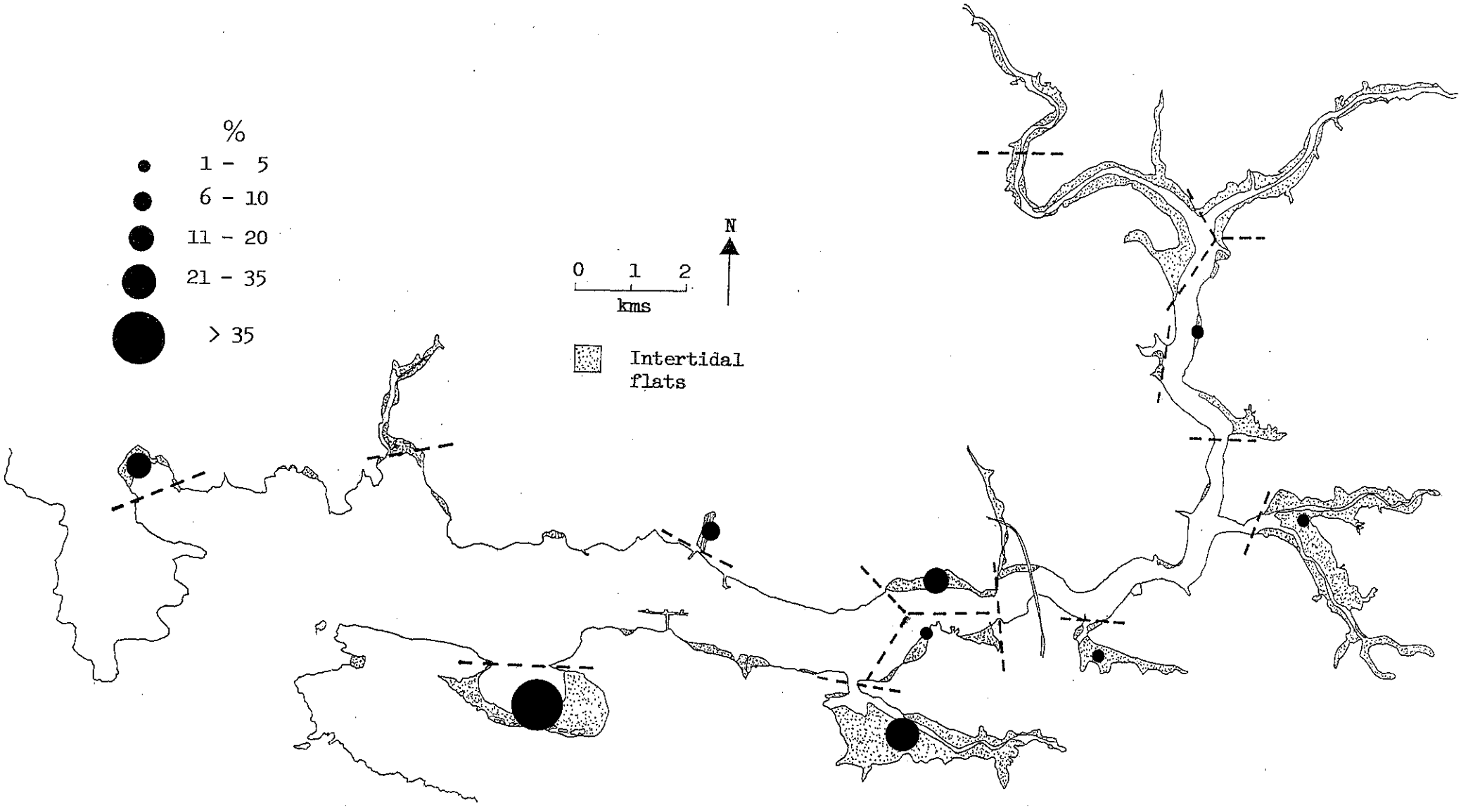

Figure 6.16 Distribution of Turnstone in winter among the Cleddau count areas, 1984/85-1988/89. The average peak count for each count area is expressed as a percentage of the average peak count for the entire Cleddau.

is almost certainly under-recorded. Red-breasted Mergansers are overwhelmingly birds of the upper reaches of the Cleddau.

Among waders, the few Knot now present occur mainly in Angle Bay and Pembroke River, areas also favoured by the Bar-tailed Godwit. Most Spotted Redshank now are recorded on the Lower Western Cleddau, notably Millin Pill (Rees 1986), although Elliott (1978) found a flock of eight in Milton Pill in winter 1977/78. As for Goldeneye, there is reason to believe BoEE counts under-record this species (Rees 1984). Greenshank occur more widely, though with major concentrations at Cosheston Pill and Pembroke River. Although outside the winter period, the exceptional concentration of 60 Greenshank on the Gann in late September 1969 compels mention (Edington et al. 1973).

6.18 MOVEMENTS AMONG COUNT AREAS

In the absence of any work involving colour-marking or radio-tagging, information regarding the scale of movements of birds among the count areas of the Cleddau is necessarily limited and circumstantial. Two classes of movement need to be considered. The first, especially relevant because the monthly BoEE counts on the Cleddau are not completely synchronized in relation to tide height, is within-month, in particular tidal-related, movement. The second relates to between-month shifts in populations of particular species among the count areas.

The best evidence covering the entire Cleddau regarding movements among count areas in relation to the tidal cycle is provided by the synchronized all-day February count summarized by Haycock (1987). His overall conclusion was that "There was no indication ... that large scale movements of birds occurred between sections during the day and tidal range." Among wildfowl, only for Red-breasted Merganser is evidence recorded of regular local movement (Rees 1984, Haycock 1987), predominantly among the count areas of the upper reaches of the Cleddau, although there is some tidal-related movement of Shelduck between Llanstadwell and Pembroke River (Rees 1984). Among waders, Haycock (1987) found some evidence pointing to small-scale movement of Oystercatcher between Pembroke River and Cosheston Pill. For Dunlin, there was more general evidence of local movement, but mostly involving small numbers of birds; the most notable movements were of flocks of up to 100 birds along the river near the southern boundary of the Lower Western Cleddau. Rees (1984) further suggested that Dunlin which feed at Llanstadwell may on occasion move to Pembroke River at high tide.

Some information on the scale of movements between months can be adduced by comparing the average peak winter count of each species for the Cleddau as a whole (from Table 5.1) with its summated average peak winter counts from the individual count areas (Table 6.1). For any species, the degree of difference between these totals will provide information regarding its tendency to peak on different count areas in different months; this, in turn, may reflect movements of birds among count areas within a winter or tendencies towards concentrating on different count areas in different winters.

This comparison is made in Table 6.2, from which it can be seen that the ratios of summated counts to overall average counts exceed 1.4 for only two species, Canada Goose and Red-breasted Merganser, and

Table 6.2 Comparison of summated average peak winter counts from the 14 count areas with average peak winter counts for the entire Cleddau.

	1. Average peak winter count on entire Cleddau (from Table 5.1)	2. Summated average peak winter counts from the 14 Cleddau count areas (from Table 6.1)	3. Ratio of column 2 to column 1.
Mute Swan	38	54	1.4
Canada Goose	122	227	1.9
Shelduck	1,396	1,629	1.2
Wigeon	3,870	4,192	1.1
Gadwall	11	13	1.2
Teal	2,734	3,284	1.2
Mallard	367	484	1.3
Shoveler	13	15	1.2
Goldeneye	65	74	1.1
Red-breasted Merganser	25	40	1.6
Oystercatcher	480	622	1.3
Ringed Plover	141	198	1.4
Golden Plover	1,009	1,289	1.3
Grey Plover	137	163	1.2
Lapwing	2,178	2,692	1.2
Knot	31	36	1.2
Dunlin	3,993	5,092	1.3
Snipe	256	356	1.4
Bar-tailed Godwit	58	78	1.3
Curlew	1,707	2,093	1.2
Spotted Redshank	8	10	1.3
Redshank	1,348	1,665	1.2
Greenshank	33	41	1.2
Turnstone	149	199	1.3

are as low as 1.1 for some species. The highest ratio, 1.9 for Canada Goose, is a product of the single main flock of this species moving back and fore between the Upper and Lower Western Cleddau. That for Red-breasted Merganser similarly accords with the known tendency, mentioned above, for birds to move among the adjacent count areas of the Western Cleddau, Eastern Cleddau and Daugleddau. For the remaining species, it can again be concluded that there is little evidence of large-scale, inter-area movements.

7. PATTERNS OF USE OF KEY SITES IN WINTER

Chapter 6 identified the BoEE count areas of particular importance to wildfowl and waders. In order to obtain increased understanding of the distribution of birds within key sites, special studies were conducted throughout the tidal cycle in winter 1987/88 on the Western Cleddau, Eastern Cleddau, Carew/Cresswell, Pembroke River and Angle Bay. The results of this work are given below. In all text discussion, "low tide" refers to the interval spanning four hours on either side of low water and "high tide" to the remainder of the tidal cycle.

7.1 WESTERN CLEDDAU

7.1.1 Study area and methods

For the purposes of detailed distributional study, the Western Cleddau was divided into 13 sectors (Figure 7.1.1), the same as those used previously by Hellawell & Phillips (1987). Sectors 1-3 are situated in the Upper Western Cleddau BoEE count area whereas sectors 4-13 comprise the Lower Western Cleddau count area (Figure 3.2). Between 13 November 1987 and 22 February 1988, part or all of the Western Cleddau was visited at varying states of the tide on 16 days. Data on bird distribution were collected by observers moving along the length of the stretch. Adequate coverage was achieved except in sector 13 (Millin Pill), which was only scanned from the southern shore of the Western Cleddau, and the upper reaches of sector 1.

7.1.2 Shelduck

Shelduck present were heavily concentrated into sector 11, around the mouth of Sprinkle Pill, with sector 8, around the mouth of Millin Pill, being the only other area of any importance to them (Figure 7.1.2). This distribution pattern concurs closely with that found by Hellawell & Phillips (1987) during February and March 1987. Peak numbers recorded in both sectors in winter 1987/88 were, however, only about half those noted by Hellawell & Phillips (1987), whose work was conducted during a winter of exceptional Shelduck abundance (Figure 4.3). Despite some evidence of movement both within the Lower Western Cleddau and to the Eastern Cleddau and Daugleddau (cf Hellawell & Phillips 1987), numbers present around the mouth of Sprinkle Pill did not change markedly in relation to the tidal cycle; the smaller numbers of birds found further up the Western Cleddau tended to be present only during low tide, however.

7.1.3 Wigeon

Although clearly quite mobile within the Western Cleddau, the Wigeon present showed three regular centres of abundance: in the vicinity of Uzmaston (sector 1), near Little Milford (sectors 4/5) and up Sprinkle Pill (sectors 11/12) (Figure 7.1.3). The concentration adjacent to Little Milford was most predictable, with birds moving from the river onto the adjoining banks both to feed and roost.

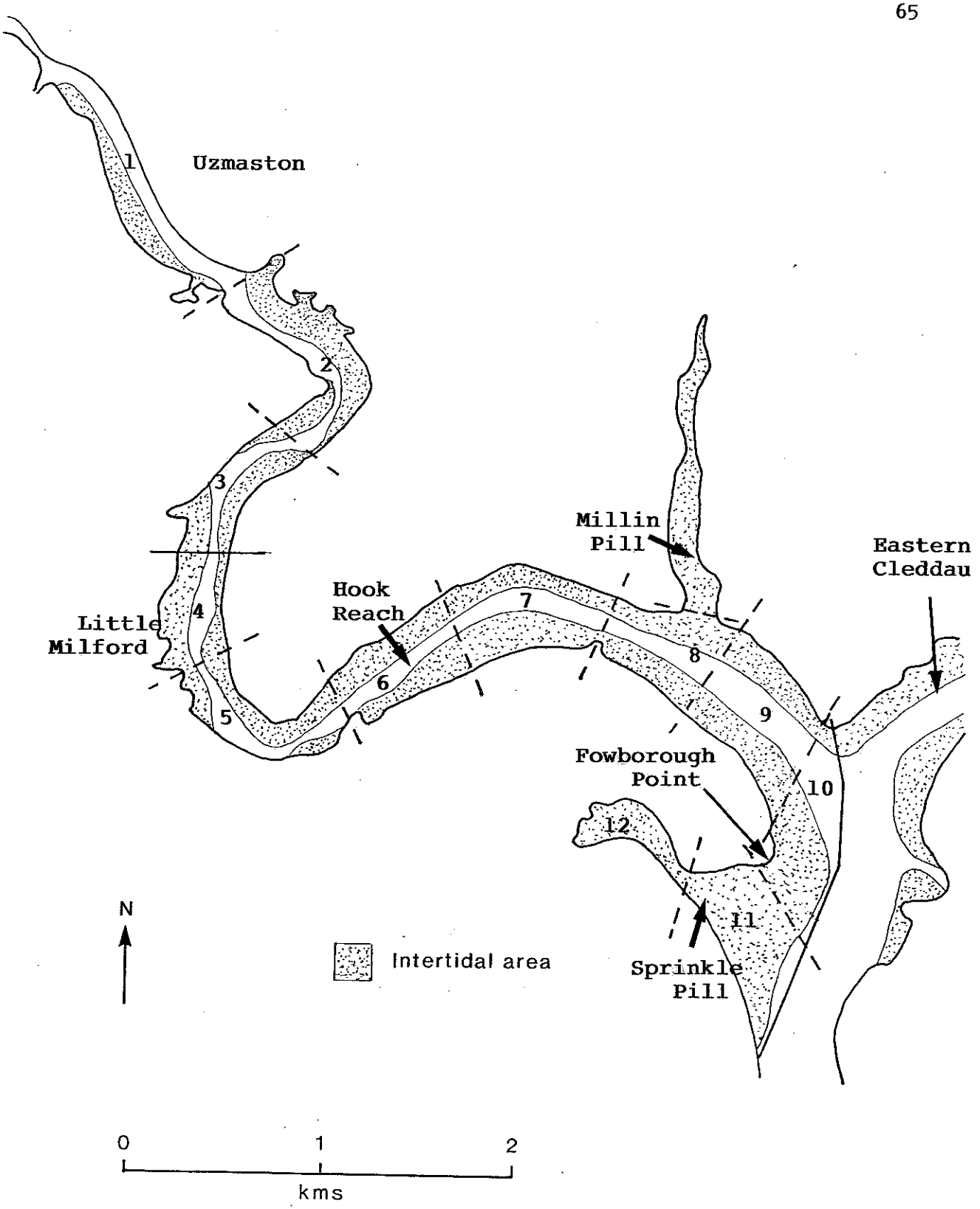

Figure 7.1.1 The Western Cleddau, showing count sectors and place names mentioned in the text.

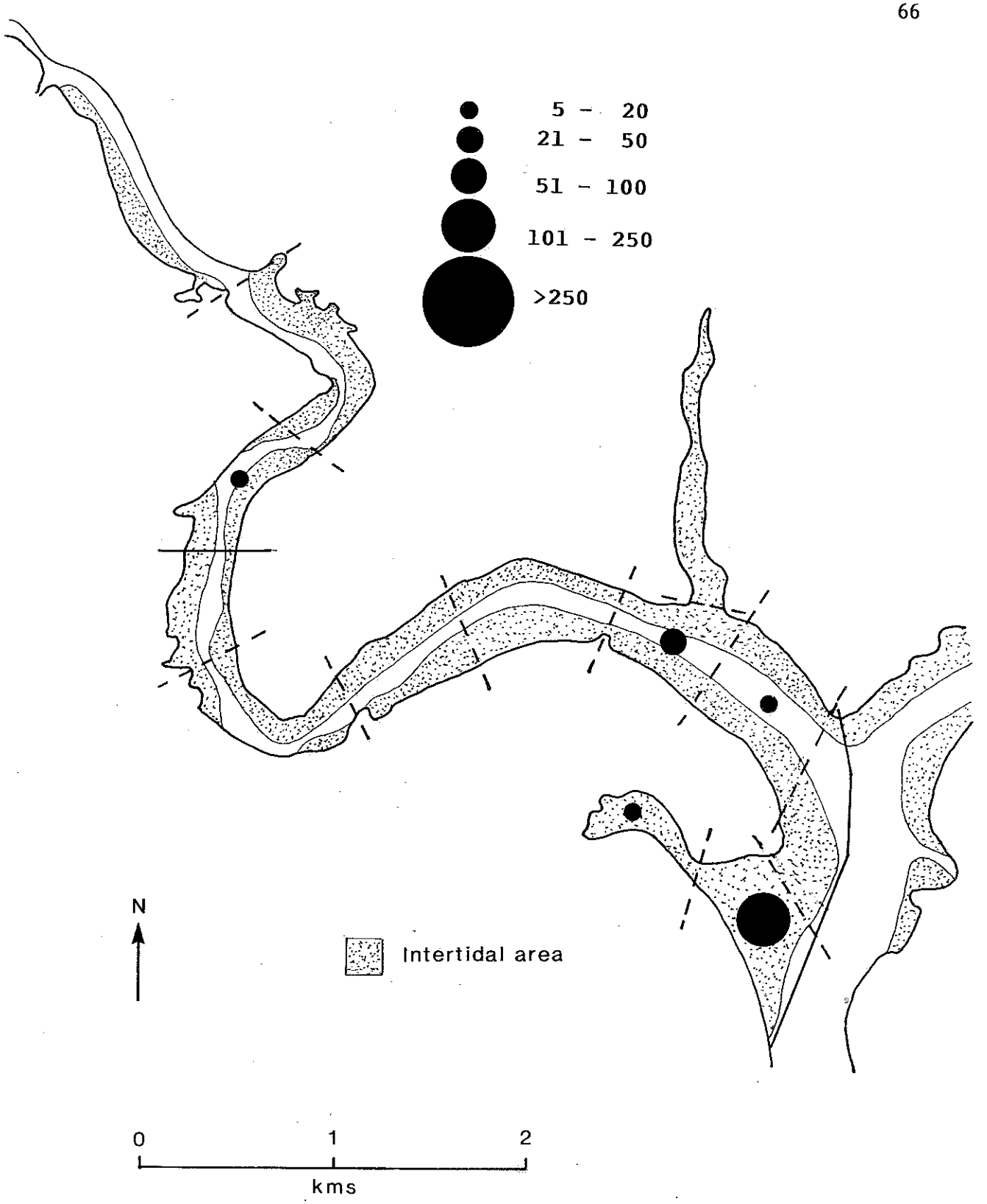

Figure 7.1.2. Distribution of Shelduck on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

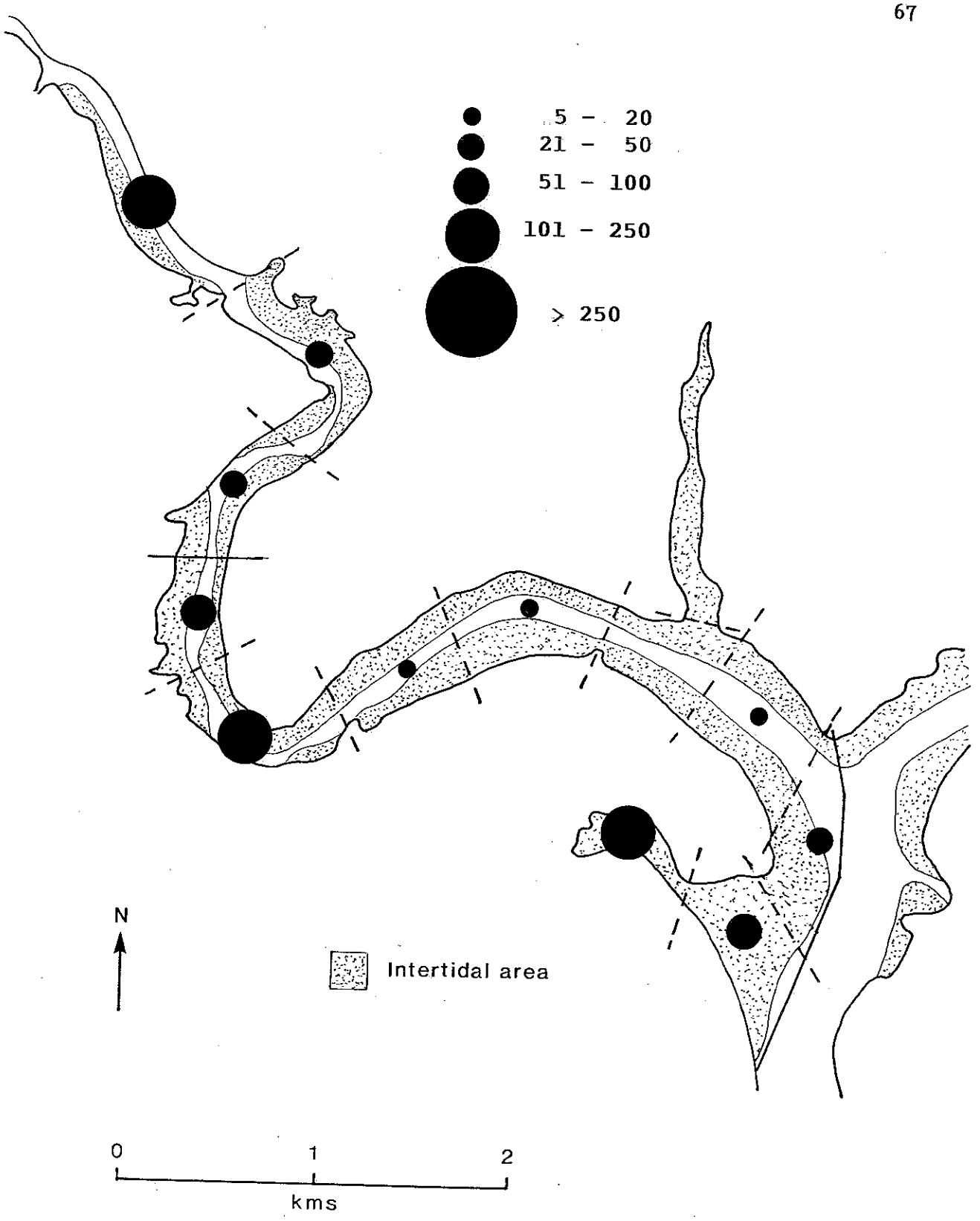

Figure 7.1.3 Distribution of Wigeon on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

7.1.4 Teal

Teal were not only somewhat more numerous than Wigeon along the Western Cleddau (cf Table 6.1), but also more widely distributed along it (Figure 7.1.4), a feature noted also by Hellawell & Phillips (1987). Nevertheless, the single major population concentration made use of the Sprinkle Pill area (sectors 11/12), a traditionally important site for Teal (Rees 1984), where at least 400 birds were present during mid winter.

7.1.5 Golden Plover

BoEE counts indicate that over half the Golden Plover on the Cleddau system occur along the Lower Western Cleddau (section 6.9), with an average peak winter count there of ca 550 (Table 6.1). The current study shows that most of these birds tended to occur in a single flock, up to 450 strong, which moved predominantly within sectors 8-12 (Figure 7.1.5). On most of the frequent (>50%) occasions it was not found here, it had presumably moved to the Eastern Cleddau (see section 7.2.5) or to adjacent sites inland, but was once located at high tide along the river bank opposite Little Milford (sectors 4/5). Records at all tidal states, on both fields and mudflats, referred to birds recorded as roosting.

7.1.6 Lapwing

Most birds were concentrated in two areas, between Uzmaston and the Little Milford environs (sectors 2-5) and around Millin Pill (sectors 8/9), with small numbers also present along Sprinkle Pill (Figure 7.1.6). Almost all birds were recorded as roosting, either on fields or along the water's edge.

7.1.7 Dunlin

The Lower Western Cleddau holds about 25% of Dunlin in the Cleddau system (section 6.12), and these occurred very largely in the lower reaches between Millin and Sprinkle Pills (Figure 7.1.7). At high tide, a roost of 500 or more birds was present just north-west of Fowborough Point; as the tide fell, these birds were seen to move to feeding grounds at the mouth of Sprinkle Pill, off Millin Pill, and further afield up the Eastern Cleddau (cf Hellawell & Phillips 1987). The former of these, Sprinkle Pill, was particularly important, with flocks of up to 700 birds seen feeding there. Elsewhere, Dunlin were much more scattered and unpredictable in their occurrence, although over 50 birds were noted arriving from upstream and feeding opposite Little Milford early on the falling tide.

7.1.8 Curlew

Curlew were widely distributed along the length of the Western Cleddau (Figure 7.1.8). Concentrations of over 100 birds in any sector occurred only at high tide, when roosts formed in the bend of the river between Little Milford and Hook Reach (sectors 5/6) and north-west of Fowborough Point (south-east corner of sector 9). All these sectors, as well as some others (Figure 7.1.8), supported between 50 and 100 birds at low tide.

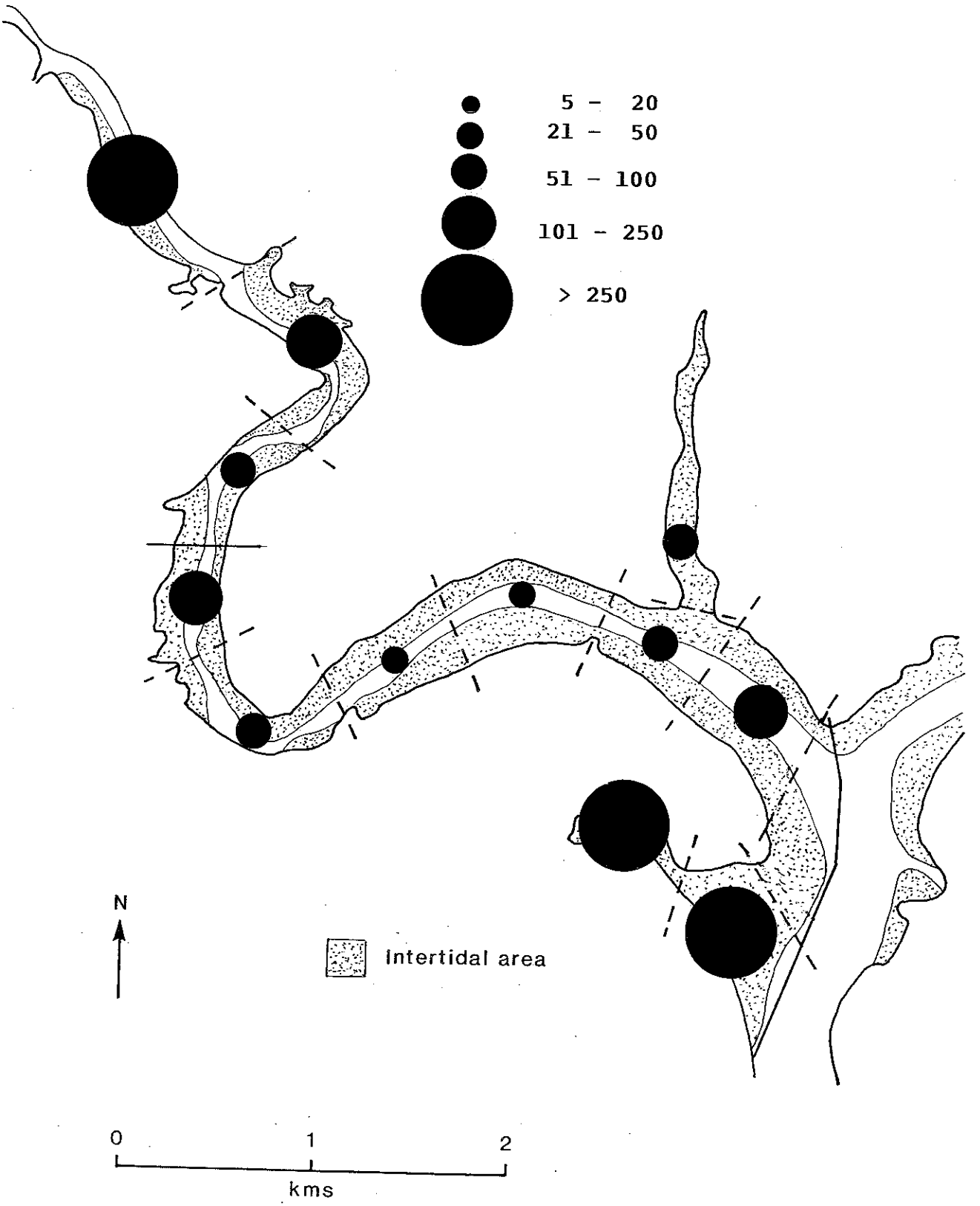

Figure 7.1.4. Distribution of Teal on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

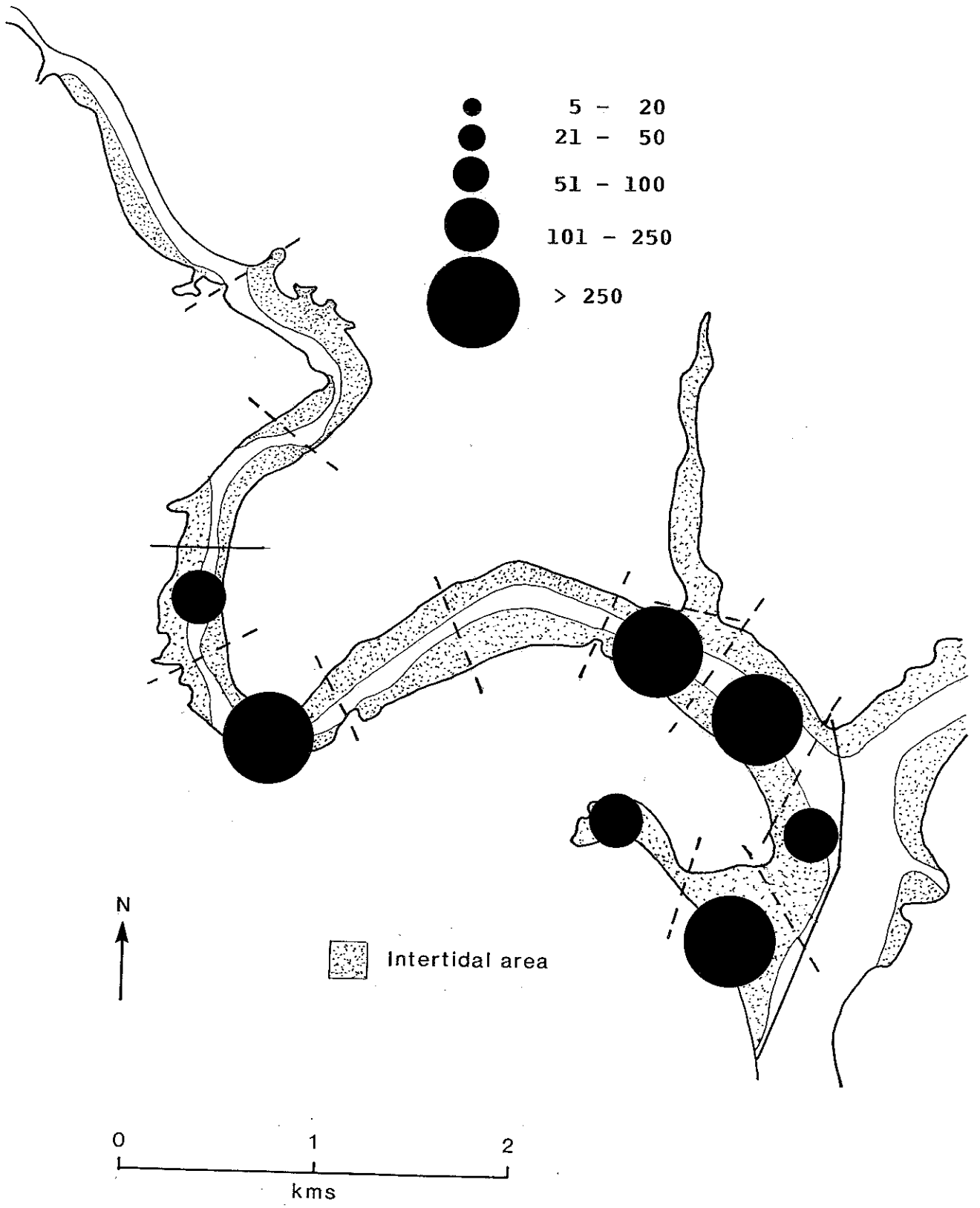

Figure 7.1.5 Distribution of Golden Plover on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

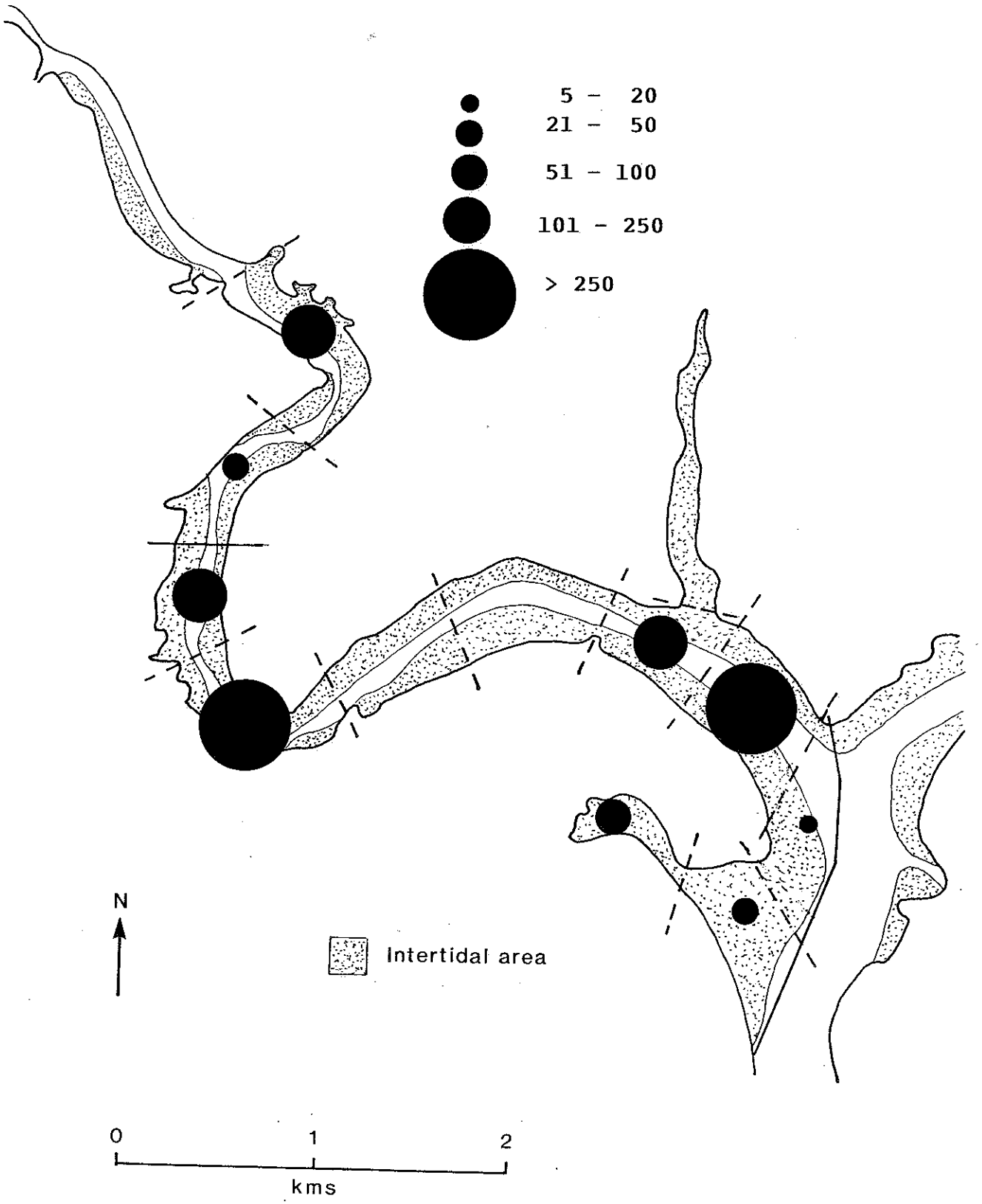

Figure 7.1.6 Distribution of Lapwing on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

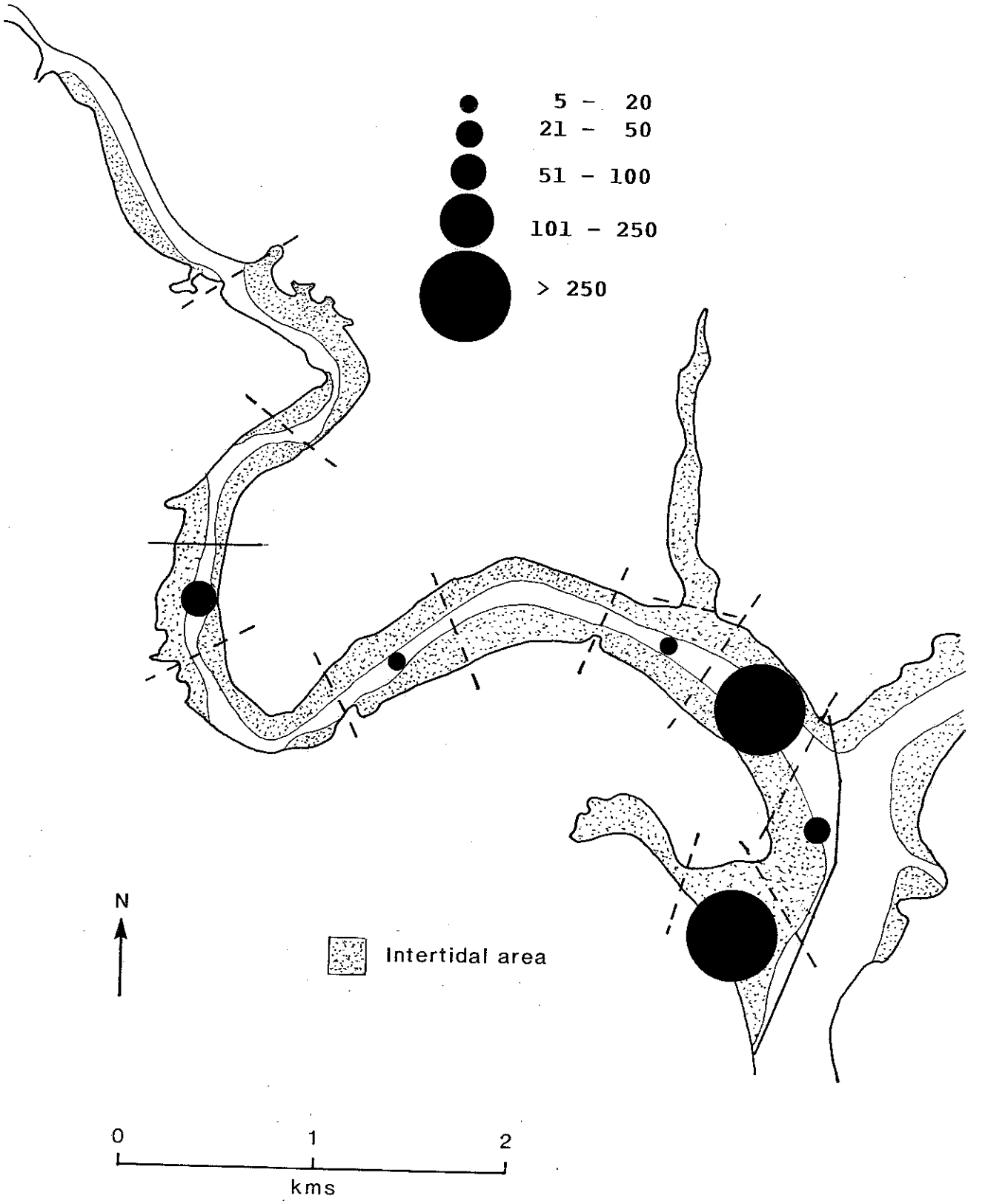

Figure 7.1.7 Distribution of Dunlin on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

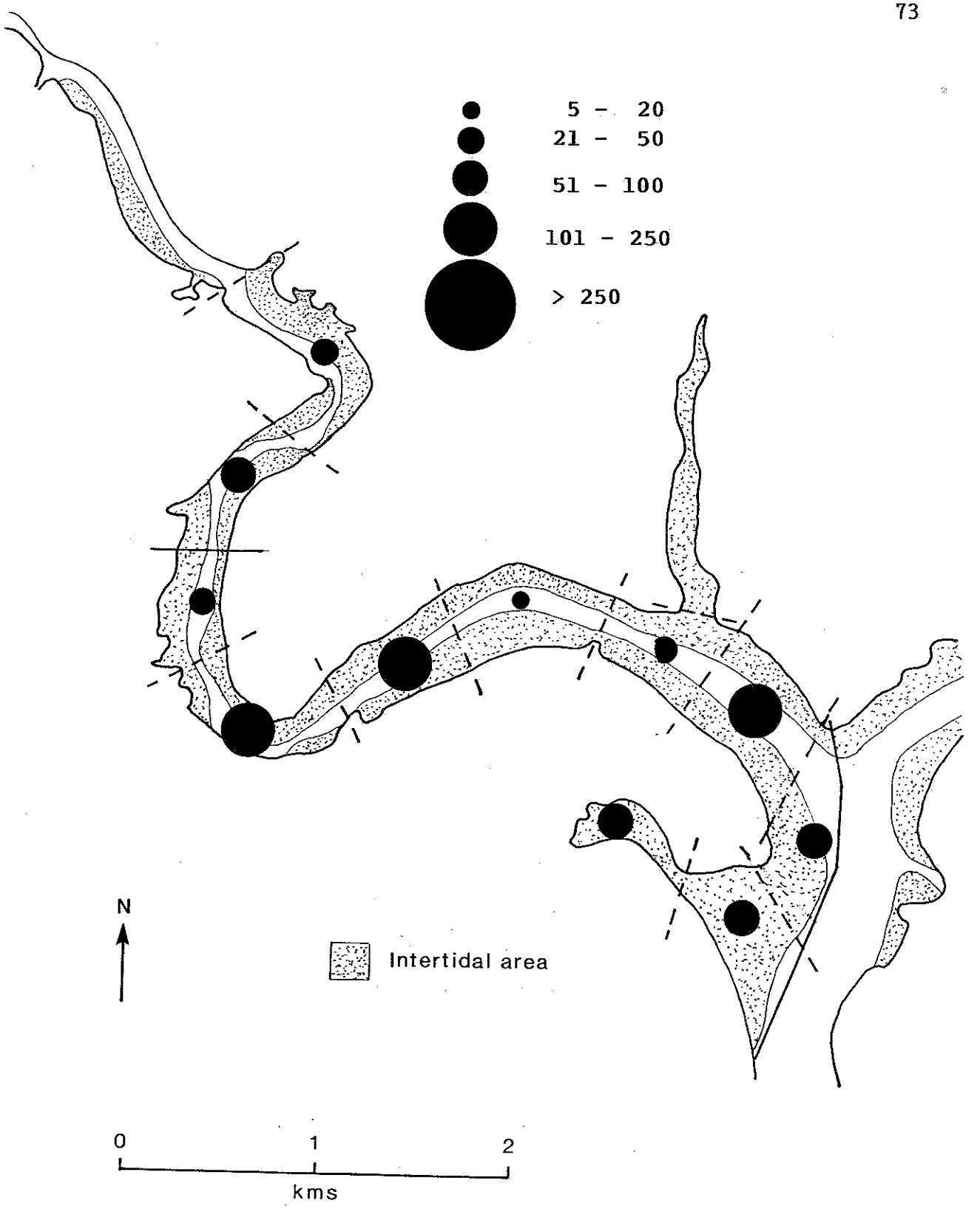

Figure 7.1.8 Distribution of Curlew on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

7.1.9 Redshank

Redshank were the most ubiquitous wader on the Western Cleddau (Figure 7.1.9), although with a notable concentration along the stretch of river either side of Little Milford (sectors 3-5); Hellawell & Phillips (1987) likewise concluded that sector 4 was an area "..... where larger than average flocks were regularly observed." Localized movements in relation to the changing tide were noted within sectors 3-6, but no large-scale population shifts (cf Hellawell & Phillips 1987).

7.1.10 Other species

Mallard were not systematically recorded during the counts, but a falling tide concentration of 150 birds below Uzmaston was nevertheless noted in November, a similar total to that recorded by BoEE counts for the Upper Western Cleddau (Table 6.1). Goldeneye were largely restricted to the upper reaches near Uzmaston, where up to 20 were recorded, whereas Red-breasted Merganser were commonest lower down between Hook Reach and Millin Pill; both distribution patterns again tie in well with BoEE count results (Table 6.1).

Small numbers of Oystercatcher were scattered all along the Lower Western Cleddau, but the only double-figure group was 30 birds roosting at high tide in late January to the north-west of Fowborough Point. Up to five Grey Plover could also be found foraging in this vicinity. Ringed Plover and Turnstone were each noted once only: 11 Ringed Plover were present along Hook Reach in late January and 20 Turnstone were off Fowborough Point in mid December, both roosting at high tide.

7.2 EASTERN CLEDDAU/LANDSHIPPING QUAY

7.2.1 Study area and methods

The Eastern Cleddau was divided into six sectors for detailed coverage, identical to those used by Hellawell & Phillips (1987); in addition, the contiguous bay at Landshipping Quay, part of the Daugleddau BoEE count area, was considered as a seventh sector (Figure 7.2.1). Between 16 November 1987 and 22 February 1988, part or all of this area was visited at varying states of the tide on 16 days. Adequate coverage was achieved in all sectors, although a tendency by one observer to over-generalize regarding the pattern of distribution of more widespread species made data interpretation awkward on occasion. Results presented for Landshipping, in particular, may in consequence underestimate the true status of some species there.

7.2.2 Shelduck

Although the largest count of feeding birds (60) was made at Landshipping, Shelduck were most regularly seen on the mudflat area in the north-west of sector 4 (Figure 7.2.2). Groups of over 25 birds were also found in sectors 1 and 3. These findings conform closely to those of Hellawell & Phillips (1987) and indicate that Shelduck make somewhat greater use of the higher reaches of the Eastern Cleddau than was true for the Western Cleddau (Figure 7.1.2).

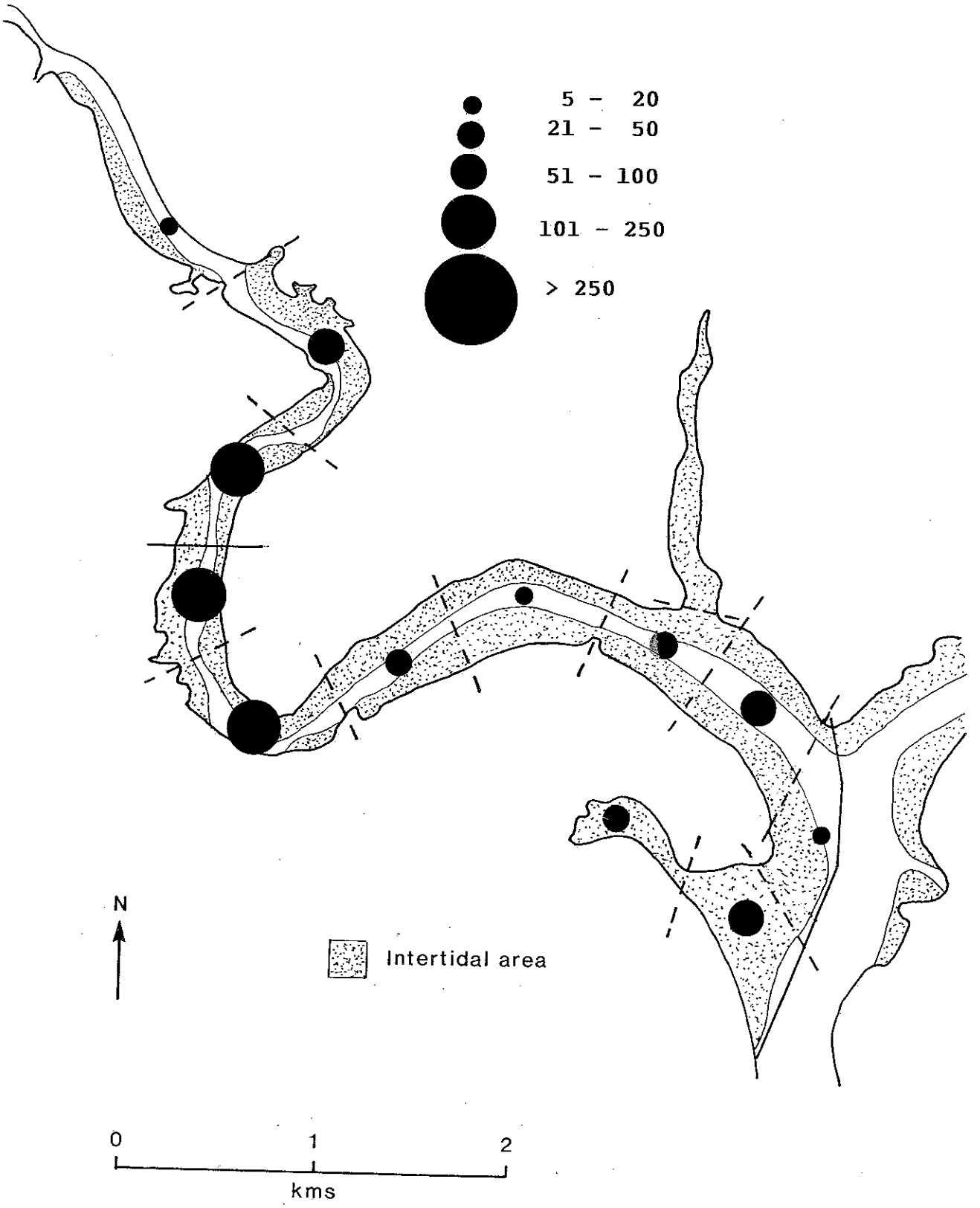

Figure 7.1.9 Distribution of Redshank on the Western Cleddau during winter 1987/88, based on peak counts recorded in each sector.

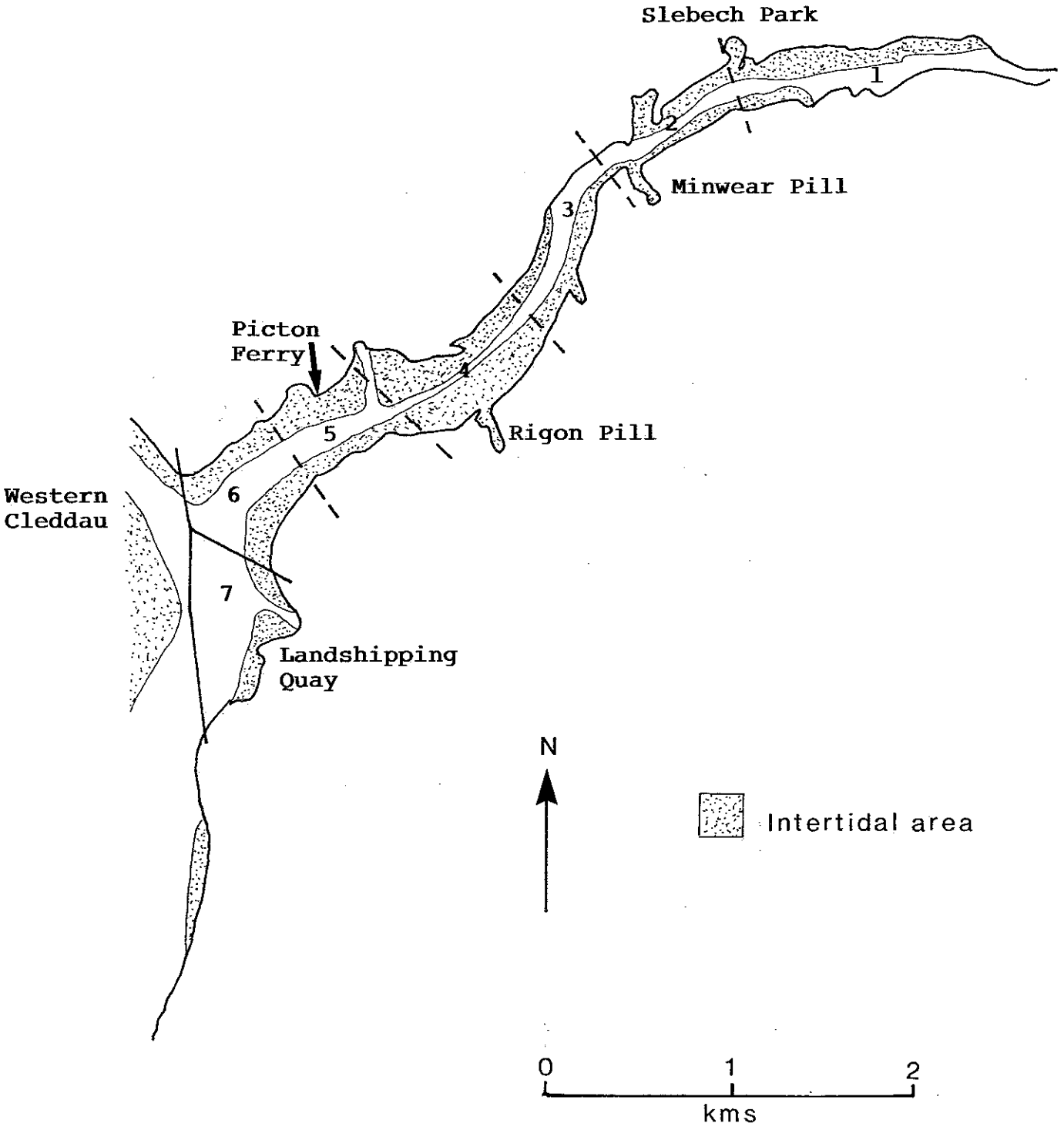

Figure 7.2.1 The Eastern Cleddau/Landshipping Quay, showing count sectors and place names mentioned in the text.

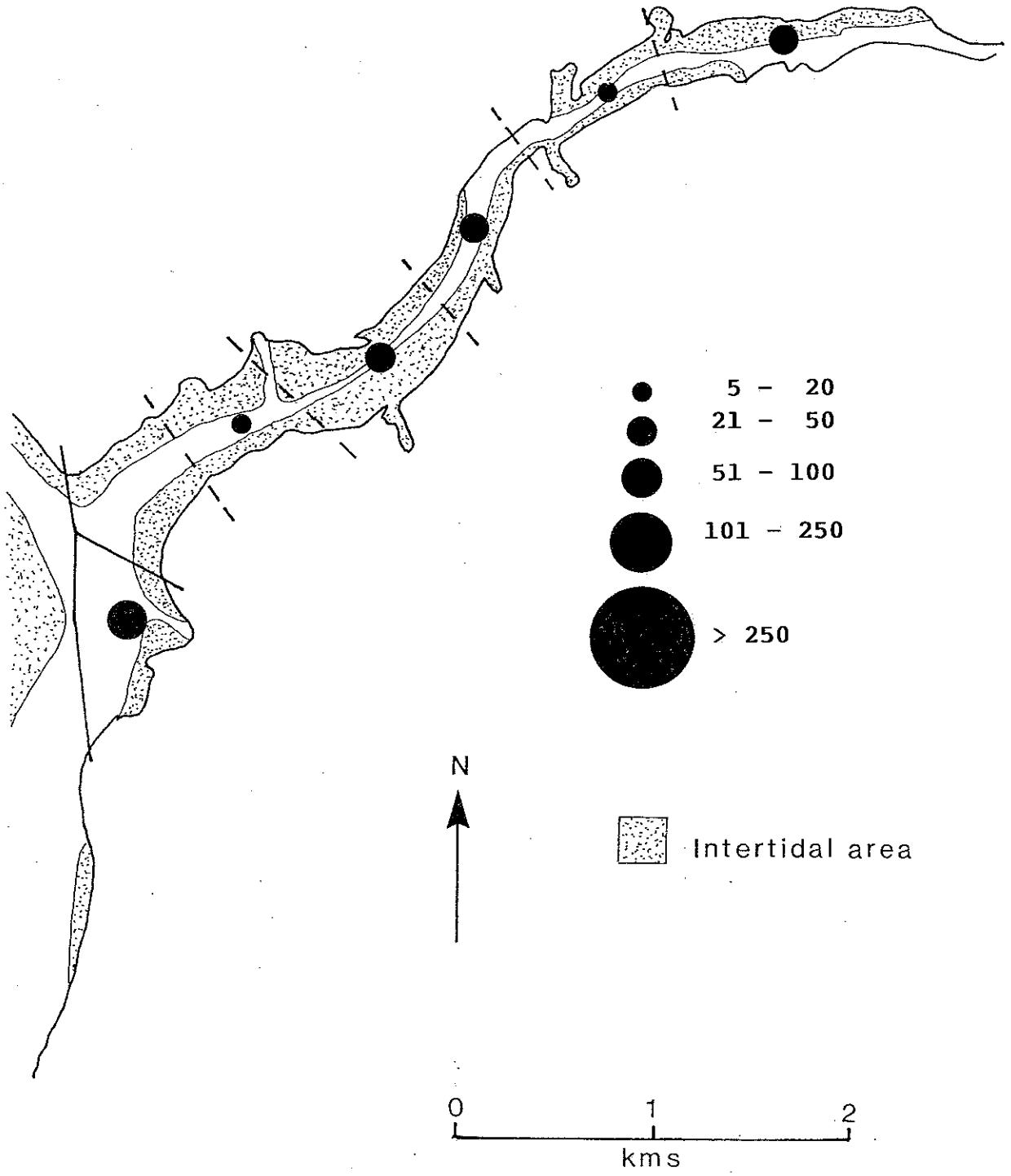

Figure 7.2.2 Distribution of Shelduck on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

7.2.3 Wigeon

BoEE counts indicate that Wigeon are considerably less abundant on the Eastern than on the Western Cleddau (Table 6.1) and results here bear out this generalization. The maximum concentration found was of only 70 birds, and the species was rarely noted above Minwear Pill (Figure 7.2.3).

7.2.4 Teal

As with Wigeon, Teal are less numerous on the Eastern than on the Western Cleddau (Table 6.1). On both rivers, however, they are more evenly distributed than Wigeon. Along the Eastern Cleddau, there was some tendency for highest numbers to occur in the upper reaches of the area covered (Figure 7.2.4).

7.2.5 Golden Plover

The Golden Plover found along the lower reaches of the Eastern Cleddau (Figure 7.2.5) seem very likely to have been part of the same flock as that located around the Lower Western Cleddau (Figure 7.1.5). The species was only uncommonly present in any Eastern Cleddau sector, invariably on days when it was not noted along the Western Cleddau.

7.2.6 Lapwing

Groups of 50 or more Lapwing were quite frequently present along the lower reaches of the Eastern Cleddau, but only episodically further upstream. Most birds observed on the shore were roosting, but feeding was noted at times, particularly in sector 5 (Figure 7.2.6).

7.2.7 Dunlin

Although BoEE counts indicate the Eastern Cleddau to be considerably less important for Dunlin than the Lower Western Cleddau (Figure 6.12), the more detailed data recorded here did not support this. Instead, as on the Western Cleddau, the lower reaches (sectors 4-6) of the Eastern Cleddau supported substantial (>200 birds) feeding flocks (Figure 7.2.7), whereas only a single flock of this size was noted higher upstream. Observations of flock movements revealed considerable interchange of birds with the Lower Western Cleddau, pointing to the confluence of the two rivers being effectively a single site for the species.

7.2.8 Curlew

Curlew were widely distributed along the Eastern Cleddau (Figure 7.2.8), but in generally smaller numbers than those found along the Western Cleddau (Figure 7.1.8).

7.2.9 Redshank

Widely distributed throughout the Eastern Cleddau but, as also noted by Hellawell & Phillips (1987), with largest numbers in sector 1, west from Slebech Park (Figure 7.2.9).

7.2.10 Other species

Sectors 2 and 3 of the Eastern Cleddau held Goldeneye at times, with

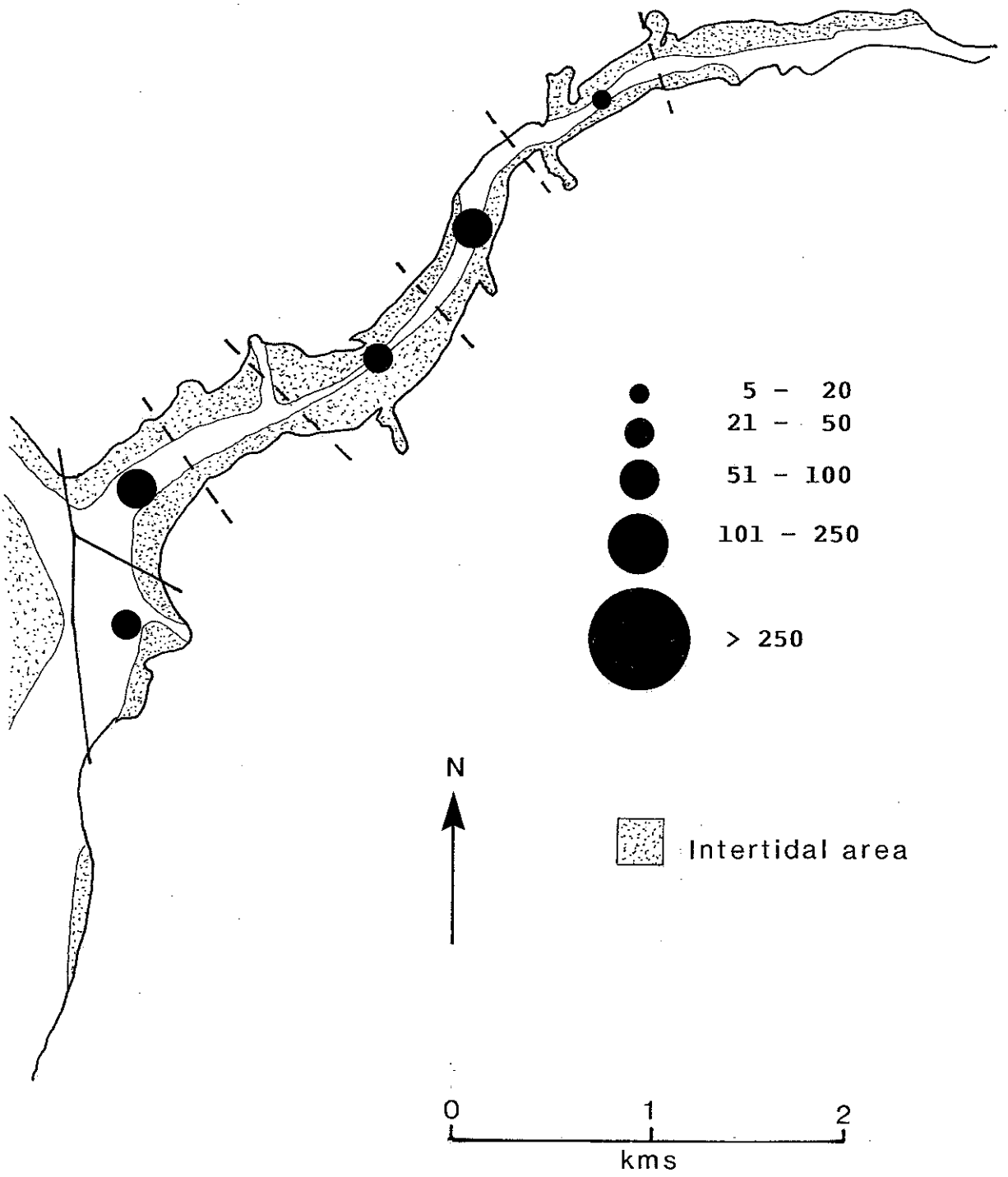

Figure 7.2.3 Distribution of Wigeon on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

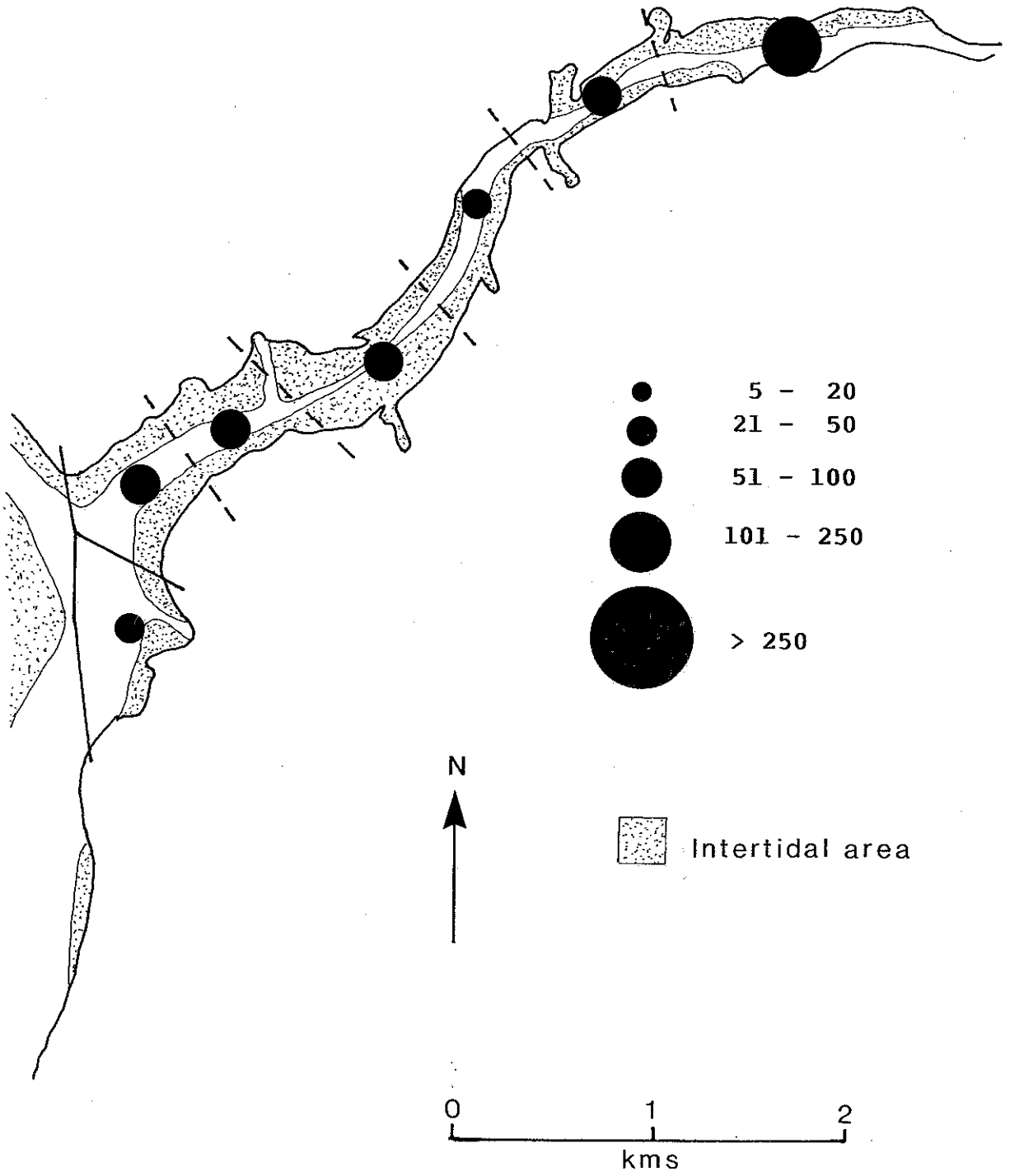

Figure 7.2.4 Distribution of Teal on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

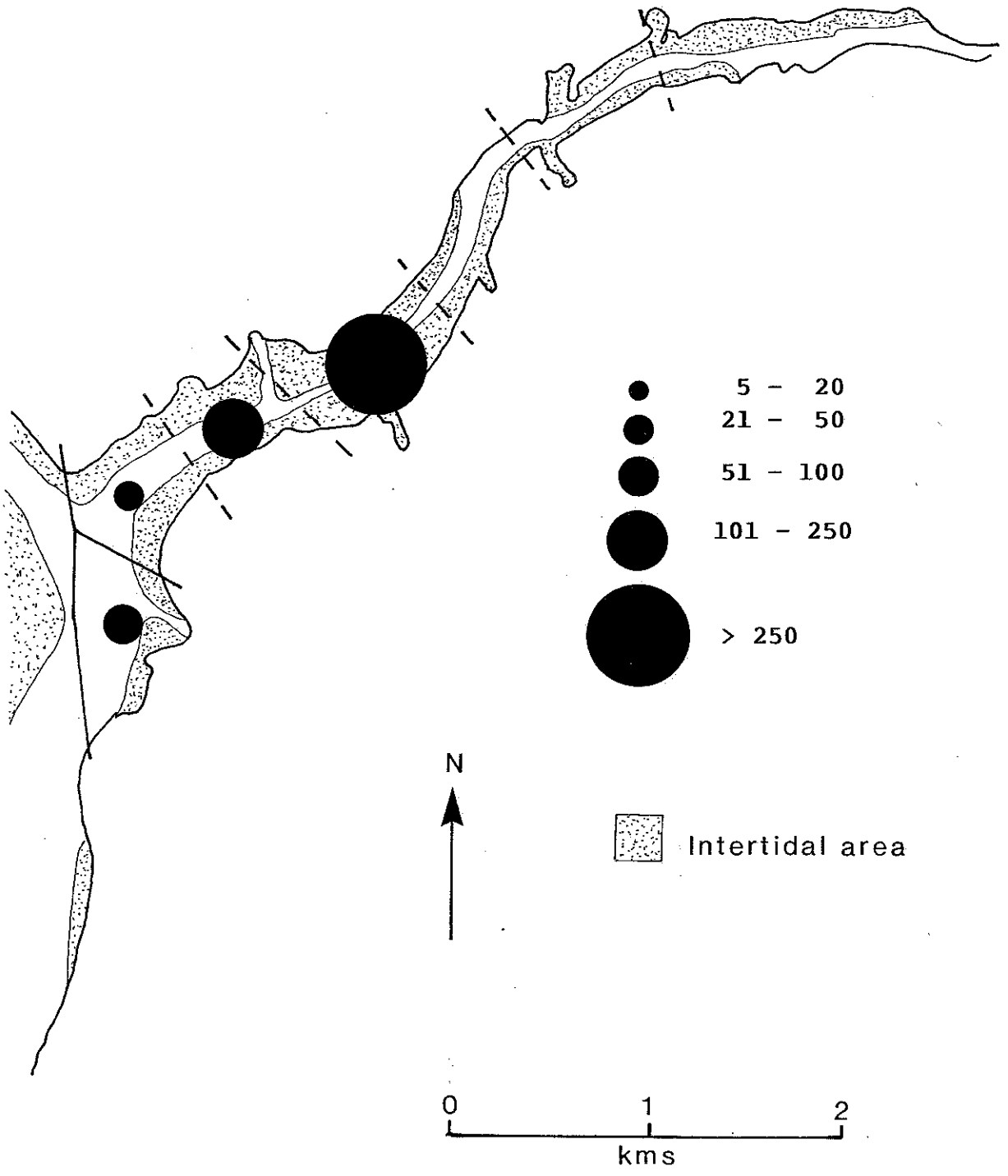

Figure 7.2.5 Distribution of Golden Plover on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

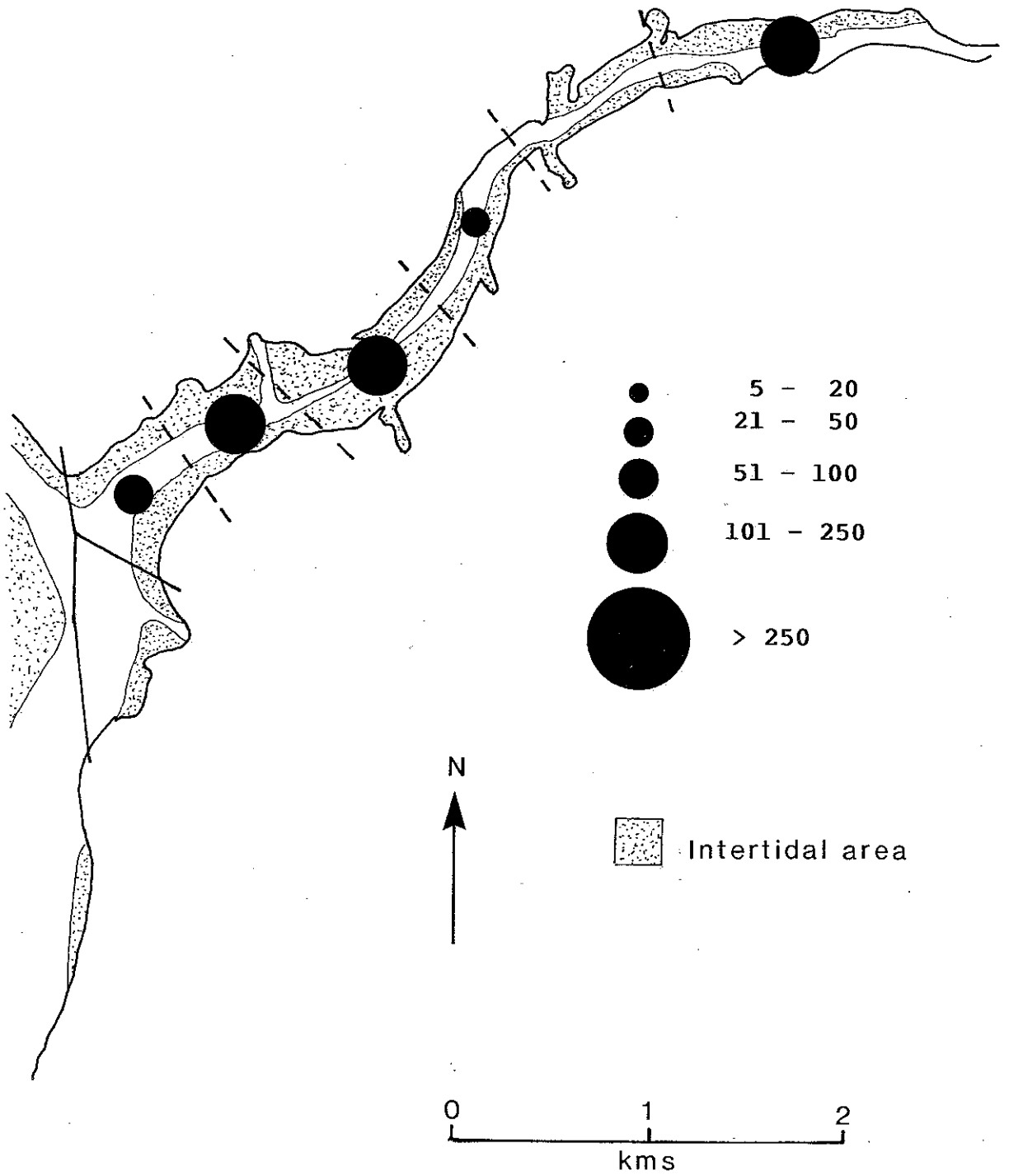

Figure 7.2.6 Distribution of Lapwing on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

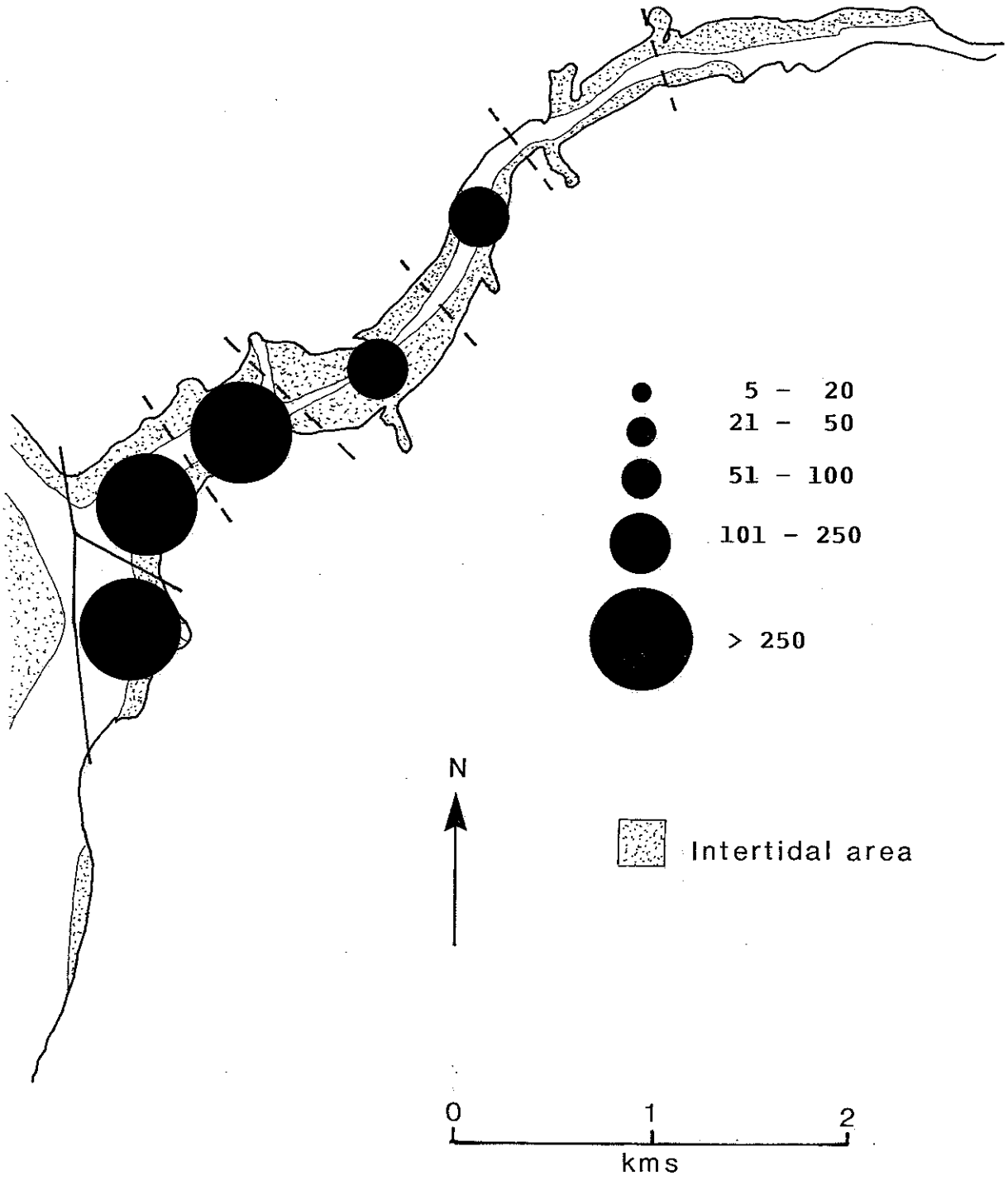

Figure 7.2.7 Distribution of Dunlin on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

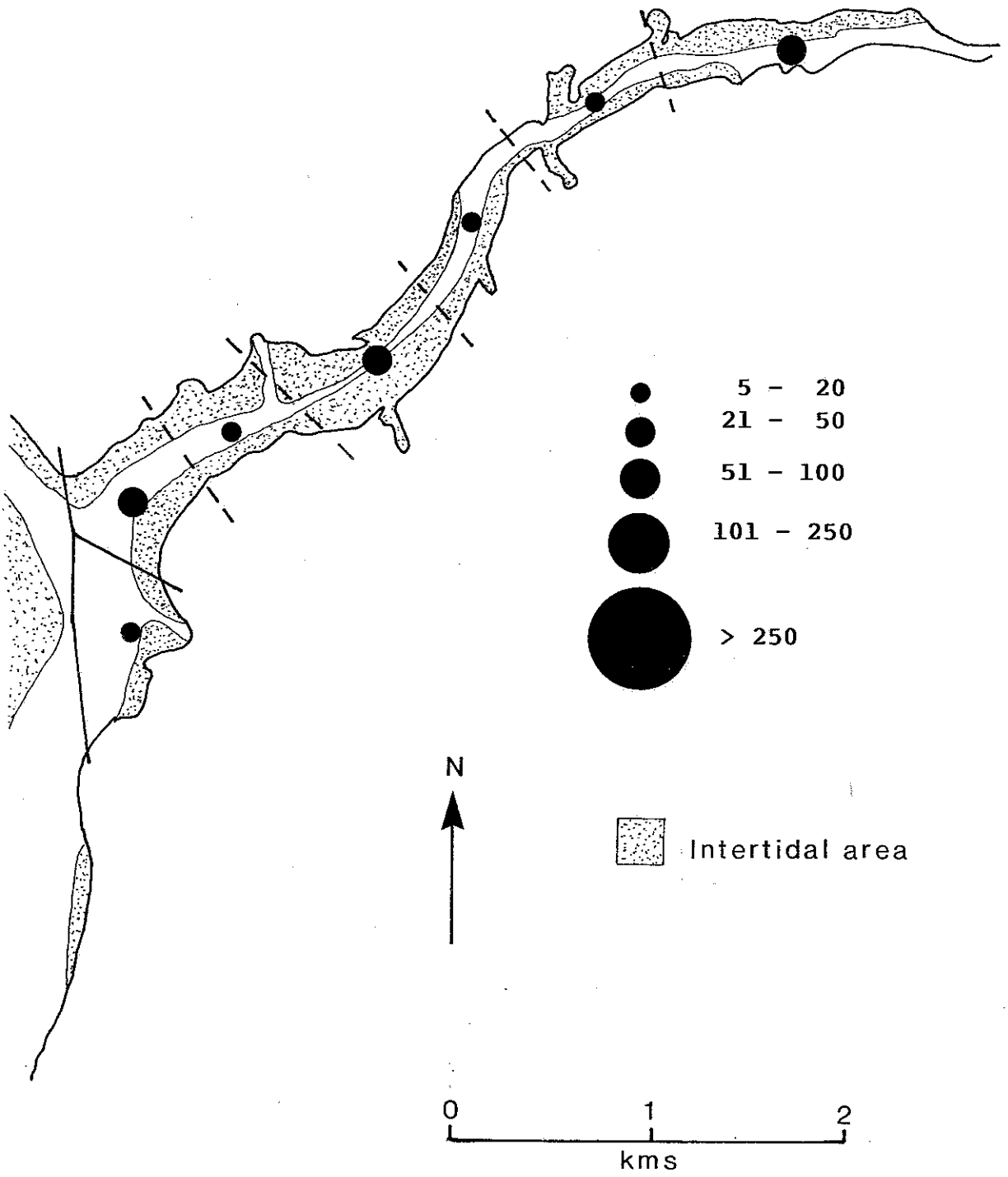

Figure 7.2.8 Distribution of Curlew on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

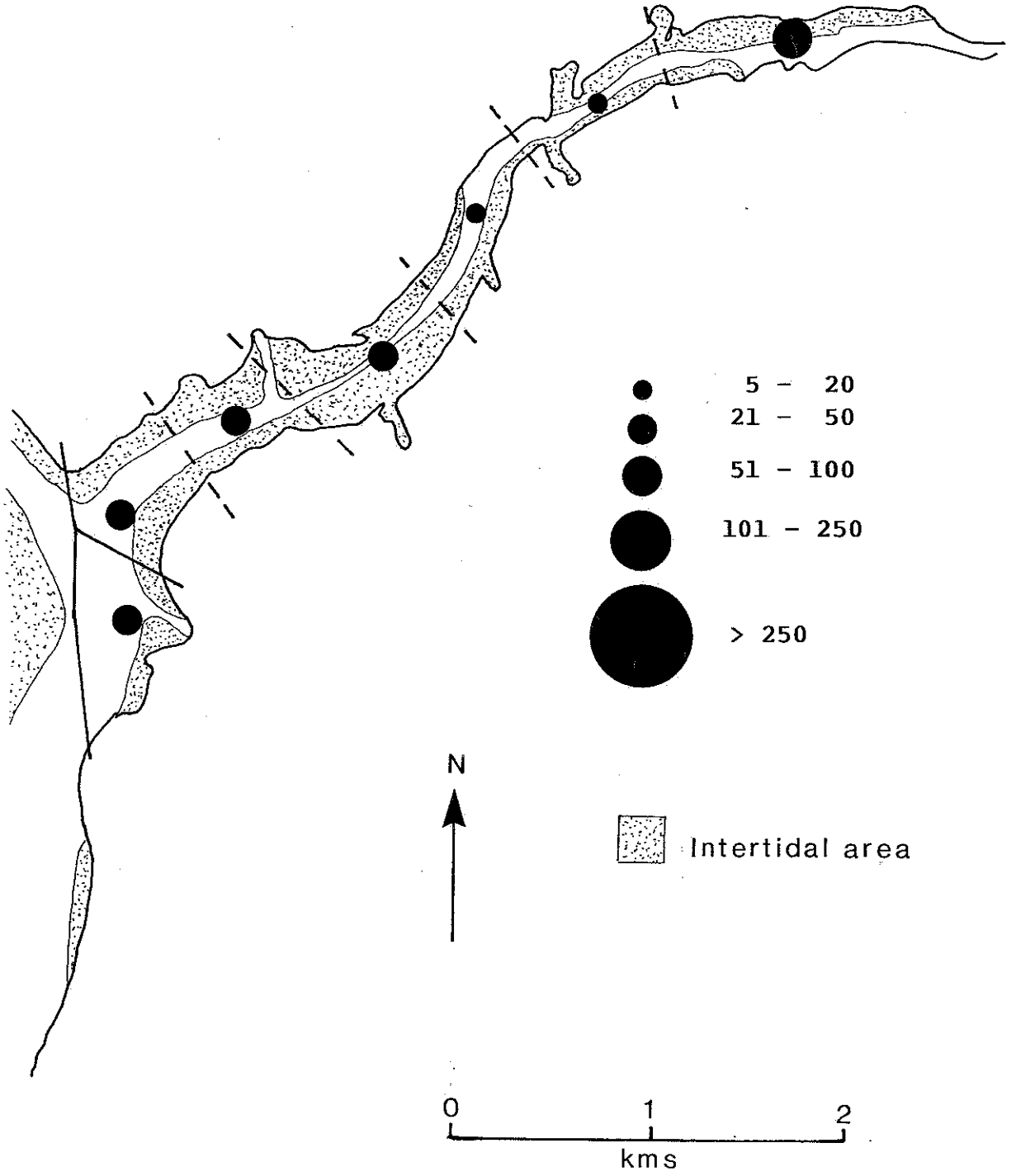

Figure 7.2.9 Distribution of Redshank on the Eastern Cleddau/Landshipping Quay during winter 1987/88, based on peak counts recorded in each sector.

up to seven birds present in mid December on the former. Red-breasted Merganser were noted only offshore in sector 6, where up to 11 were recorded near the confluence of the Eastern and Western Cleddau. Mallard distribution remains unclear as they were not systematically recorded.

Oystercatcher were recorded only in the lower reaches of the Eastern Cleddau, with a maximum count of 10 birds near the mouth; up to 25 were, however, noted roosting on the rocks either side of the bay at Landshipping Quay. Up to four Grey Plover were found at the mouth of the Eastern Cleddau; these may well have comprised the same individuals noted directly across the river channel on the Western Cleddau (section 7.1.10). A single record of over 100 Snipe flushed from a Typha bed in the south-east corner of sector 5 is notable in that it far exceeds any Eastern Cleddau BoEE count (Table 6.1); this adds a further area of the Cleddau to those already noted (section 6.12) as holding good numbers of this species.

7.3 CAREW/CRESSWELL

7.3.1 Study area and methods

All or part of the Carew/Cresswell rivers was censused at varying stages of the tide on 14 days between 16 November 1987 and 22 February 1988. Censusing was conducted in two ways: first, and most commonly, by watches from a fixed point south of Lawrenny, near the confluence of the Carew and Cresswell (Figure 7.3.1), which gave good views along both river channels; secondly, by means of transect walks, usually along the eastern shore of the Carew and southern shore of the Cresswell rivers. For the purpose of discussing distribution patterns, this overall area has been divided into seven sectors (Figure 7.3.1). Data for the upper reaches of each river, notably sectors 1 and 7, are relatively less comprehensive than for lower down because of the methodology used, however, and this limitation must be borne in mind in interpreting the results. In particular, the Ford and Radford (=Milton) Pills, off the upper Carew river, were totally inadequately covered.

7.3.2 Shelduck

Highest numbers of Shelduck were observed at the confluence of the two rivers, and lowest numbers on the upper reaches of each (Figure 7.3.2). Considerable movement of birds between adjacent sectors 2-6 was noted, but apparently very little between the Carew/Cresswell and Daugleddau (cf Hellawell & Phillips 1987).

7.3.3 Wigeon

Wigeon were most abundant up the lower reaches of both the Carew and Cresswell rivers (Figure 7.3.3), with considerable movement between the two occurring. Although most observed movement was within the study area, birds were noted in mid January flying in from the west at mid flood tide to feed at the river confluence; possibly they had been feeding on neighbouring fields over the low tide period.

7.3.4 Teal

Teal were widely distributed throughout the Carew/Cresswell, with a

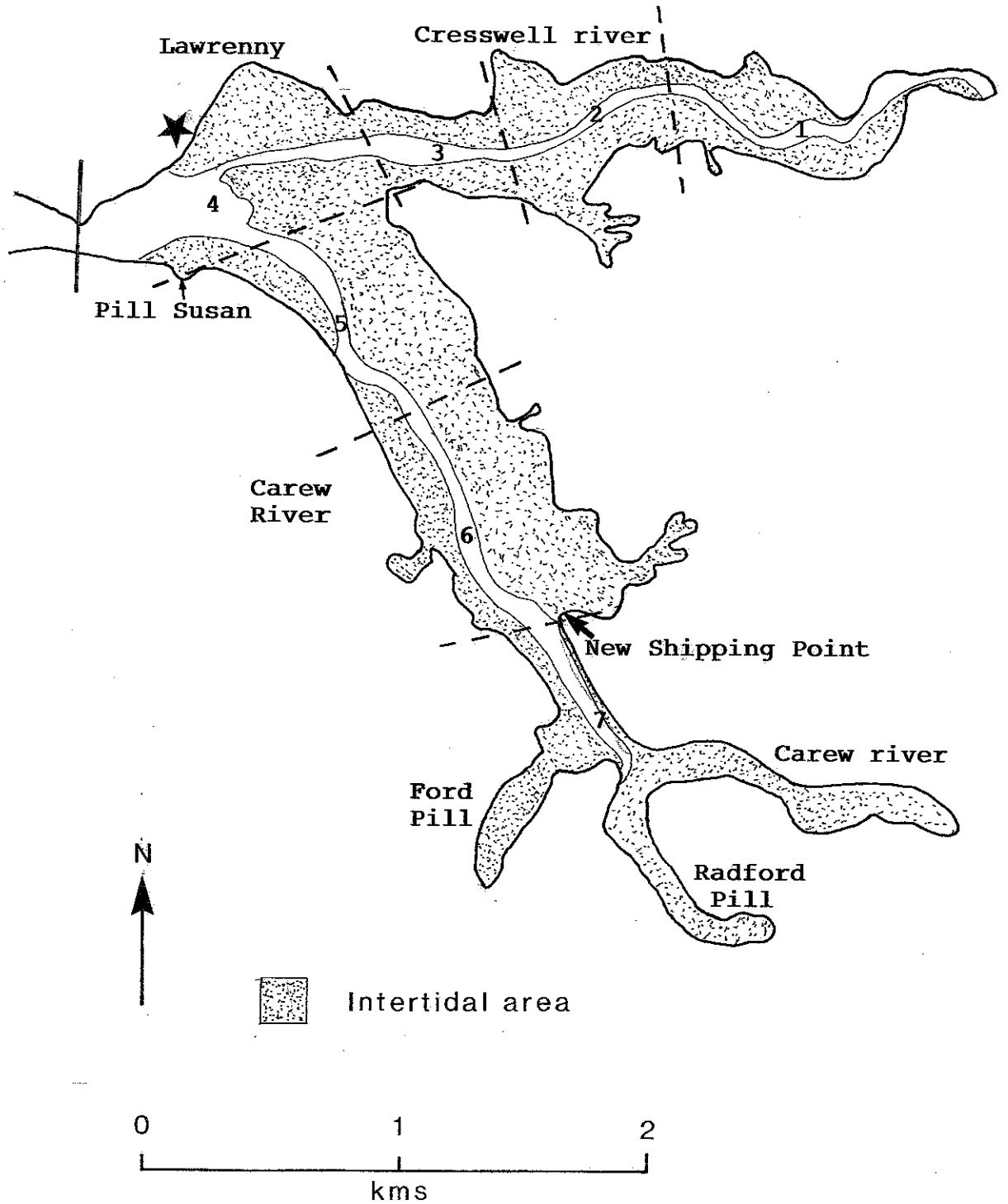

Figure 7.3.1 The Carew/Cresswell rivers, showing count sectors and place names mentioned in the text. The star shows the Lawrenny viewpoint (see text).

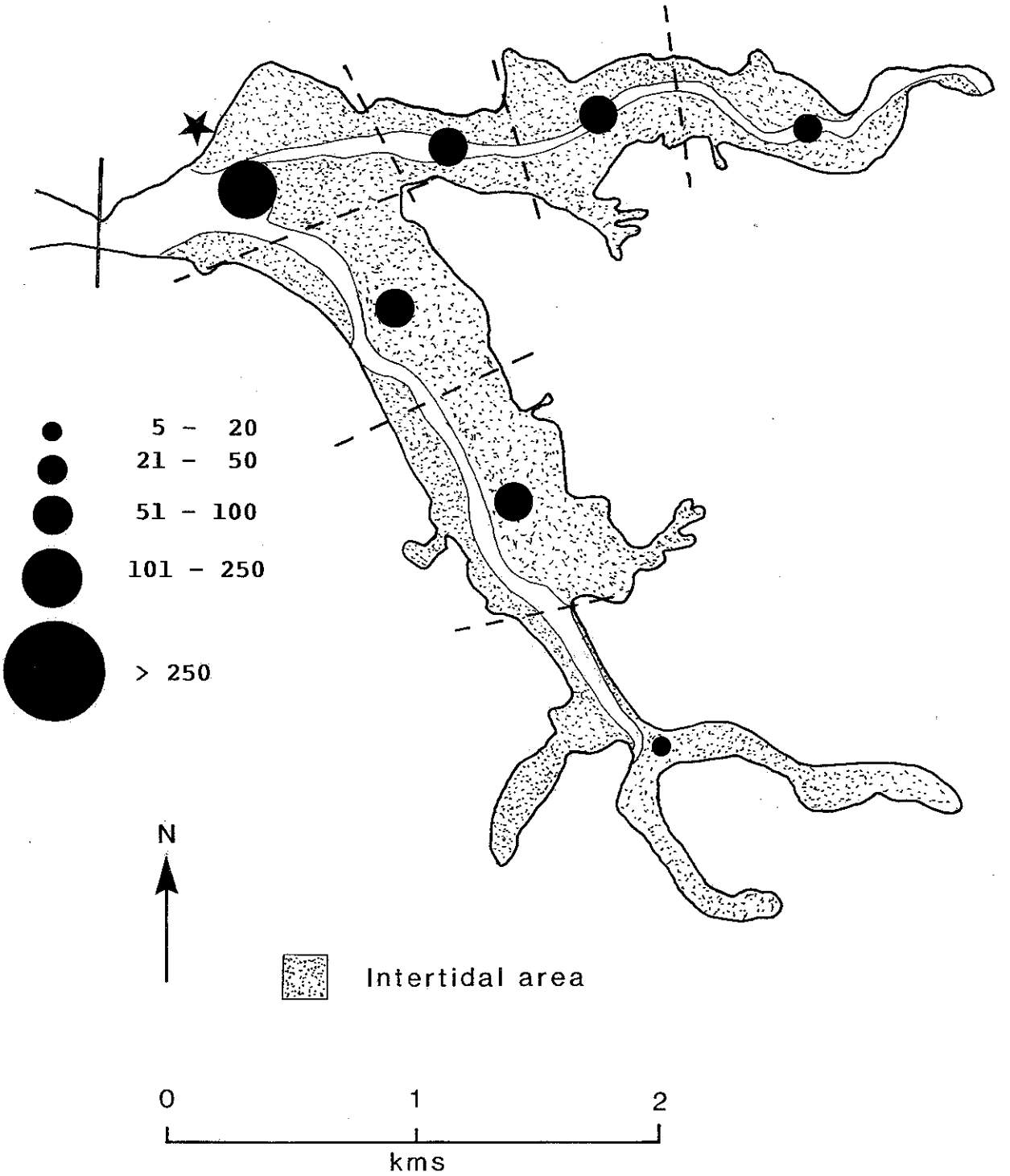

Figure 7.3.2 Distribution of Shelduck on the Carew/ Cresswell during winter 1987/88, based on peak counts recorded in each sector.

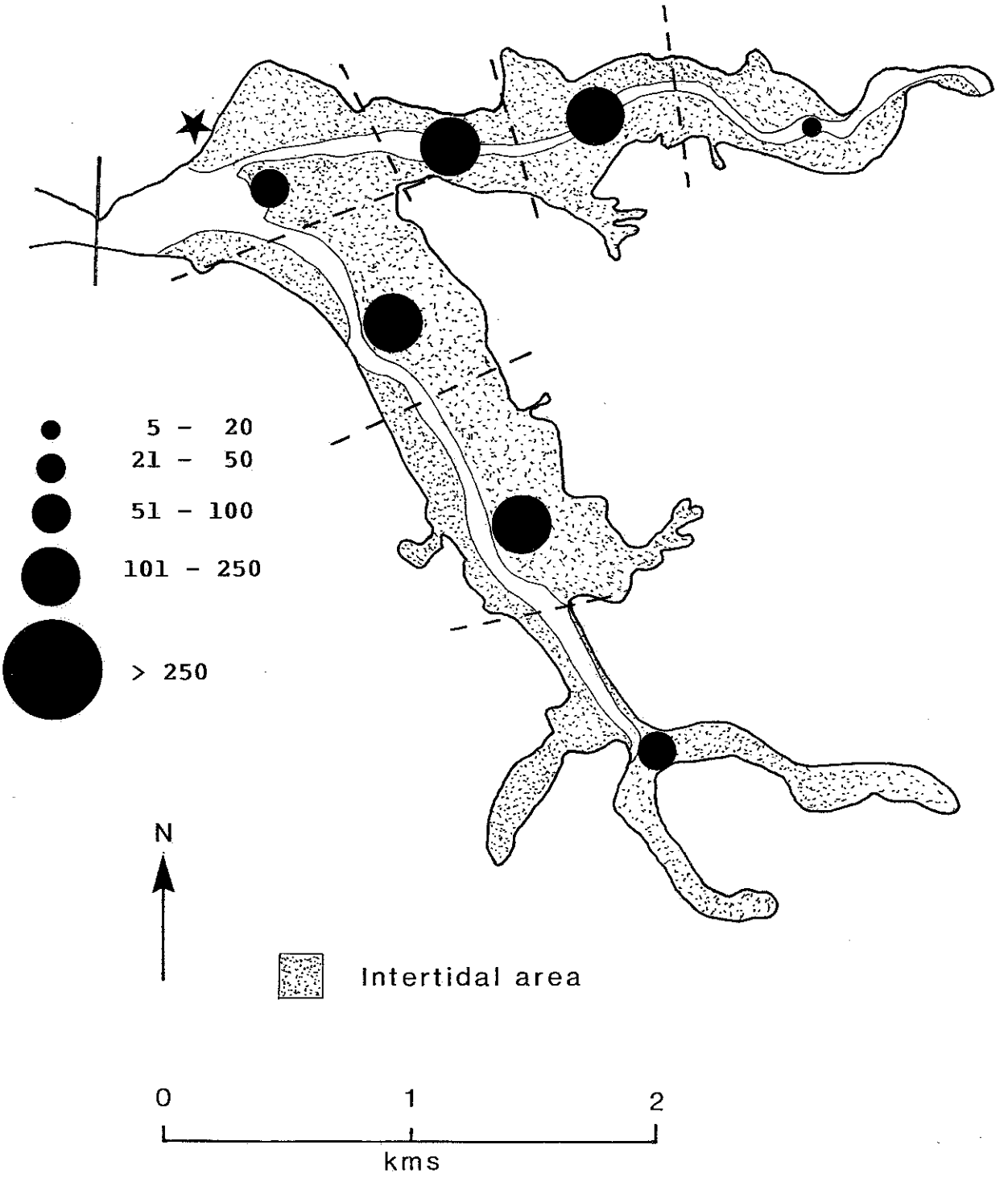

Figure 7.3.3. Distribution of Wigeon on the Carew/ Cresswell during winter 1987/88, based on peak counts recorded in each sector.

notable concentration along the middle Cresswell (Figure 7.3.4). Considerable movement, often as a result of human disturbance, was noted both along and between the two rivers, with flocks of over 100 birds involved on occasion. By contrast, although birds were often difficult to observe up pills and creeks, there was no evidence of any extensive movement in and out of the study area.

7.3.5 Dunlin

Dunlin were noted along the middle and lower reaches of both the Carew and Cresswell rivers (Figure 7.3.5). However, the largest flocks recorded comprised only 70 birds, surprisingly small given the numbers recorded on BoEE counts (Table 6.1), which are carried out at low tide on the Carew/Cresswell (Rees 1984), and the species was recorded at all on less than half the observation days. It seems probable that recording from the fixed point at Lawrenny tended to underestimate or entirely overlook feeding groups of this small species away from the immediate vicinity of the observer. The results should thus be interpreted with caution, and the apparent low numbers or absence of the species along the upper reaches of each river requires confirmation.

7.3.6 Curlew

As noted by Hellawell & Phillips (1987), this species was widely distributed throughout the Carew/Cresswell, with all sectors at times holding ca 40-80 feeding birds spread out through them. As on the Western Cleddau, flocks of over 100 birds recorded in some sectors (Figure 7.3.6) were invariably composed predominantly of roosting birds, either on the intertidal area itself or on the immediately adjacent fields. The tendency of the species to move to and from fields precluded reliable assessment of wider movement within the Cleddau system.

7.3.7 Redshank

Redshank were, if anything, even more uniformly distributed than Curlew throughout the Carew/Cresswell (Figure 7.3.7). Small concentrations of up to 25 or more birds came together at times in roosts or to feed along muddy creeks, but birds were more commonly seen widely dispersed.

7.3.8 Other species

Two Mute Swans were present in November at the river confluence. Two Red-breasted Mergansers were also commonly observed in this area, and a single Goosander was noted here in early January. Small numbers of Goldeneye were present, most frequently along the lower river reaches although the maximum single count of six birds was made on the upper part of the Carew. Mallard were not systematically recorded, but a flock of 19 was noted off Pill Susan (sector 4) in November.

Oystercatcher were present along the lower reaches of each river, the maximum simultaneous count of 17 birds agreeing well with the BoEE average count of 16 (Table 6.1). Lapwing and Golden Plover were rarely recorded in the intertidal area, with peak counts of only 60 and six respectively. A number of less common waders were recorded either predominantly or solely at the river confluence (sector 4): these included up to five Grey Plover and eleven

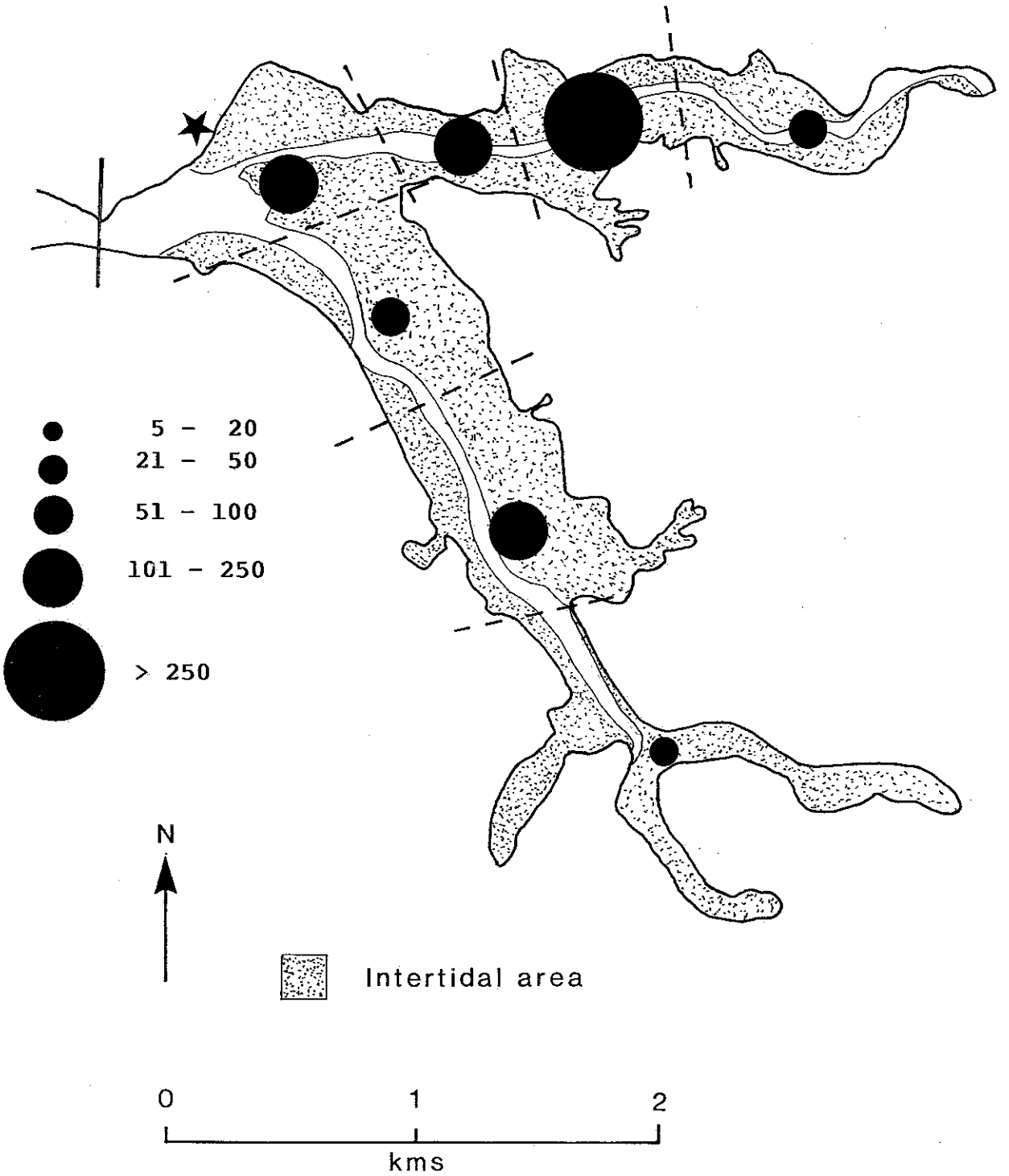

Figure 7.3.4 Distribution of Teal on the Carew/ Cresswell during winter 1987/88, based on peak counts recorded in each sector.

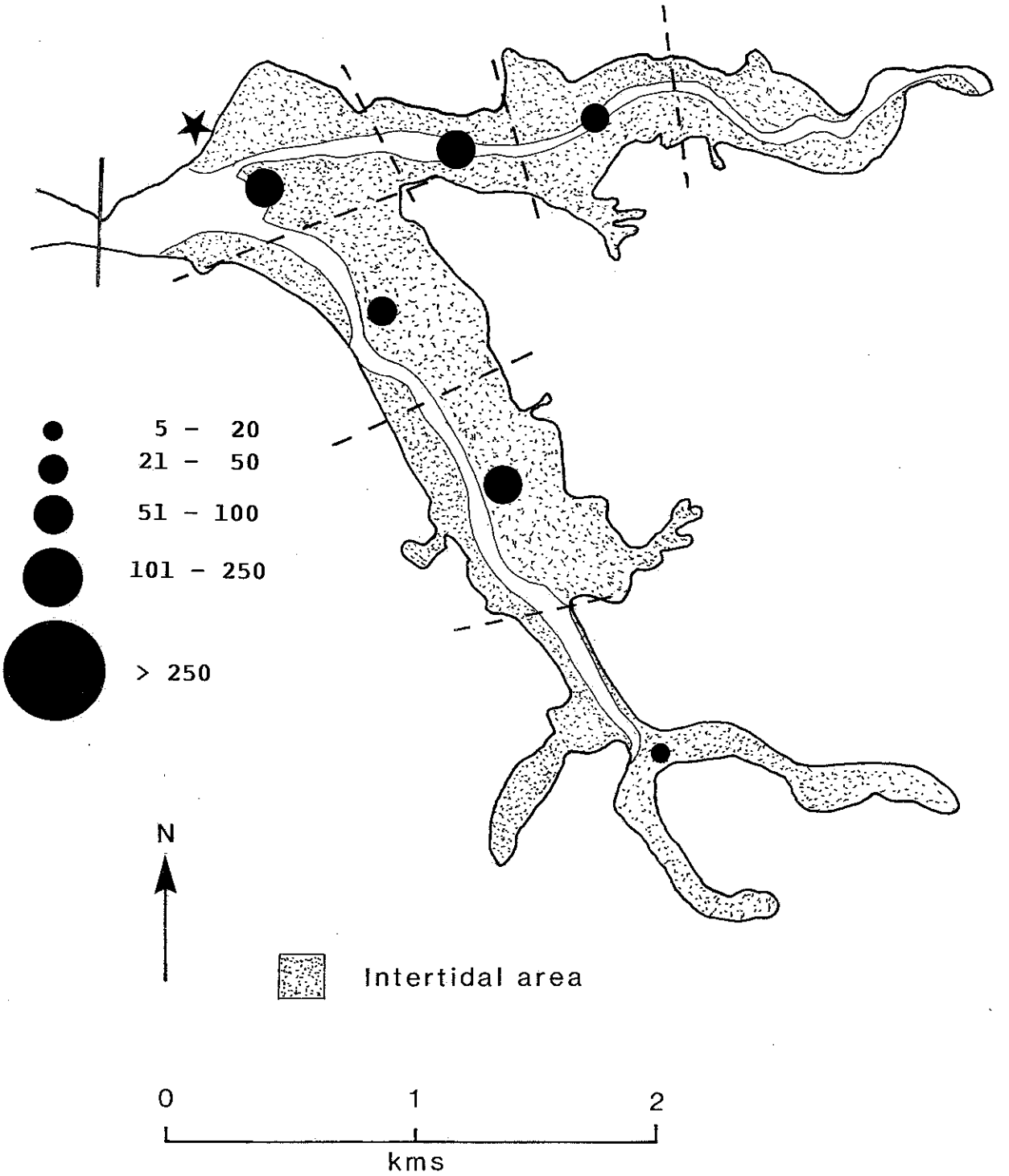

Figure 7.3.5 Distribution of Dunlin on the Carew/Cresswell during winter 1987/88, based on peak counts recorded in each sector.

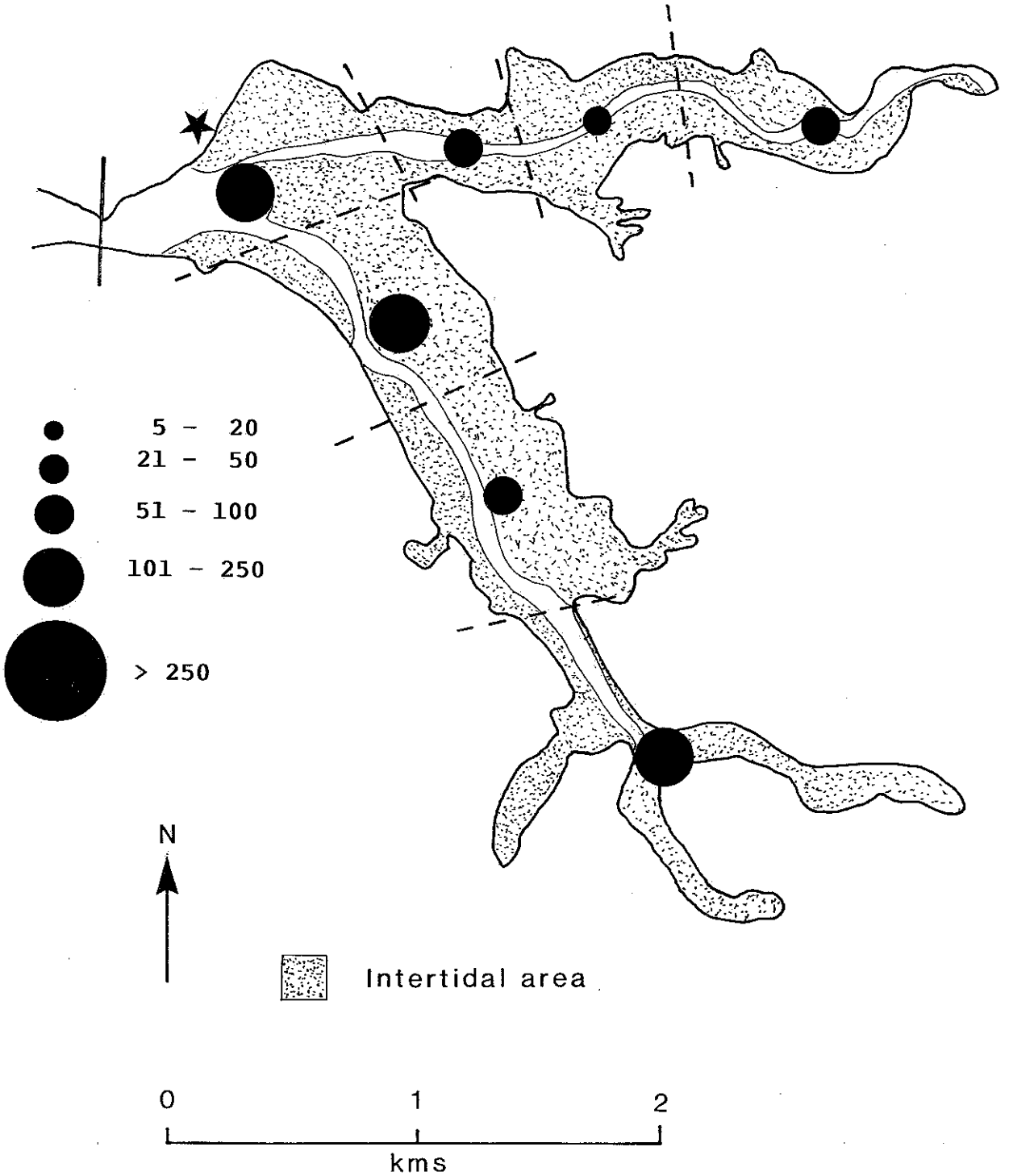

Figure 7.3.6 Distribution of Curlew on the Carew/ Cresswell during winter 1987/88, based on peak counts recorded in each sector.

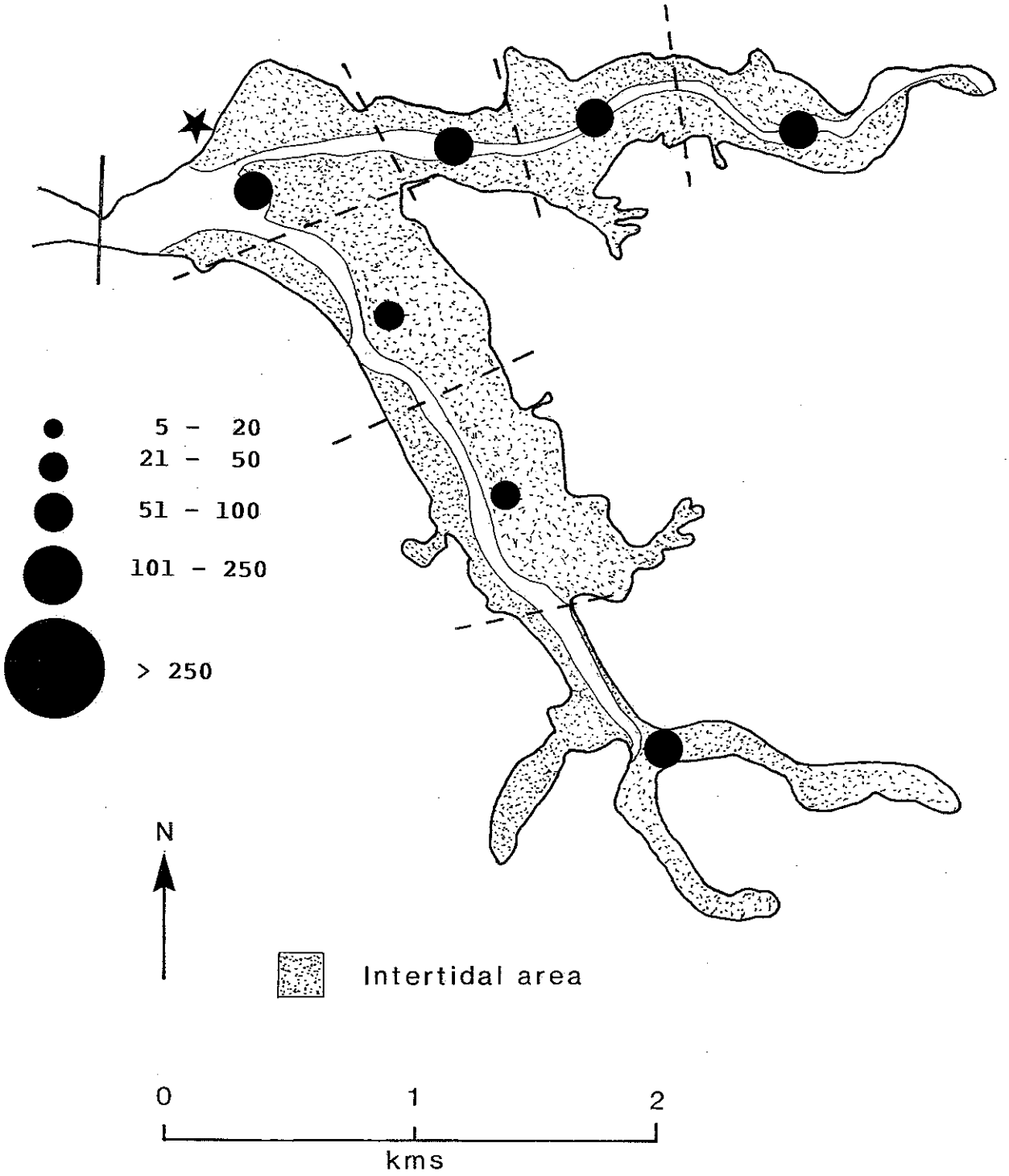

Figure 7.3.7 Distribution of Redshank on the Carew/ Cresswell during winter 1987/88, based on peak counts recorded in each sector.

Bar-tailed Godwit, as well as single sightings of groups of six Ringed Plover and three Black-tailed Godwit.

7.4 PEMBROKE RIVER

7.4.1 Study area and methods

All or part of Pembroke River was censused at varying stages of the tide on eight days between 18 November 1987 and 25 February 1988. Much of the work was carried out from two observation points near Lambeeth Farm and Bentlass (Figure 7.4.1), often by two observers working simultaneously. In addition, further data were obtained from transects along the southern shore of the river. For purposes of data presentation, the site has been split into seven sectors (Figure 7.4.1), although no birds were recorded along the narrow rocky shore of sector 1. The area south of the river channel is undoubtedly the most important for wildfowl and waders, but the siting of the two main observation points may mean that some under-recording of birds north of the river channel occurred. Sector 6 may appear disproportionately large relative to the others, but it comprises the single drainage unit of Goldborough Pill and its tributaries and, for the purposes of bird recording, is not sensibly subdivisible.

7.2.4 Shelduck

The most important part of Pembroke river to feeding Shelduck was sectors 5 and 6 (Figure 7.4.2), the middle and outer south shores, both of which regularly supported over 200 birds and sector 6 on occasion over 350. Sector 2, north of the channel, tended to support fewer birds, rarely over 100, and sector 7, near the river mouth, was more frequently used by roosting than feeding birds. Considerable movement throughout the study area occurred, with small flocks of birds moving to the upper reaches on occasion. No movement of Shelduck in or out of the study area was noted, however, despite the comment by Rees (1984) that birds move between Pembroke river and both Pwllcrochan and Llanstadwell.

7.4.3 Wigeon

Much the most important area for feeding Wigeon, supporting over 1,000 birds at times, was Goldborough Pill and its tributaries (Figure 7.4.3). Up to a couple of hundred feeding birds were also noted in the neighbouring sectors 5 and 7, but records of large flocks in the latter were of roosting birds.

7.4.4 Teal

The relatively small numbers of Teal present on Pembroke river (Table 6.1) were almost entirely restricted to the Goldborough Pill area (Figure 7.4.4), where they were often very difficult to count when hidden in the creeks. Small roosting flocks occasionally drifted north-west into the waters off the power station. Perhaps surprisingly, no records at all were made upstream in the Quoits Water Pill area.

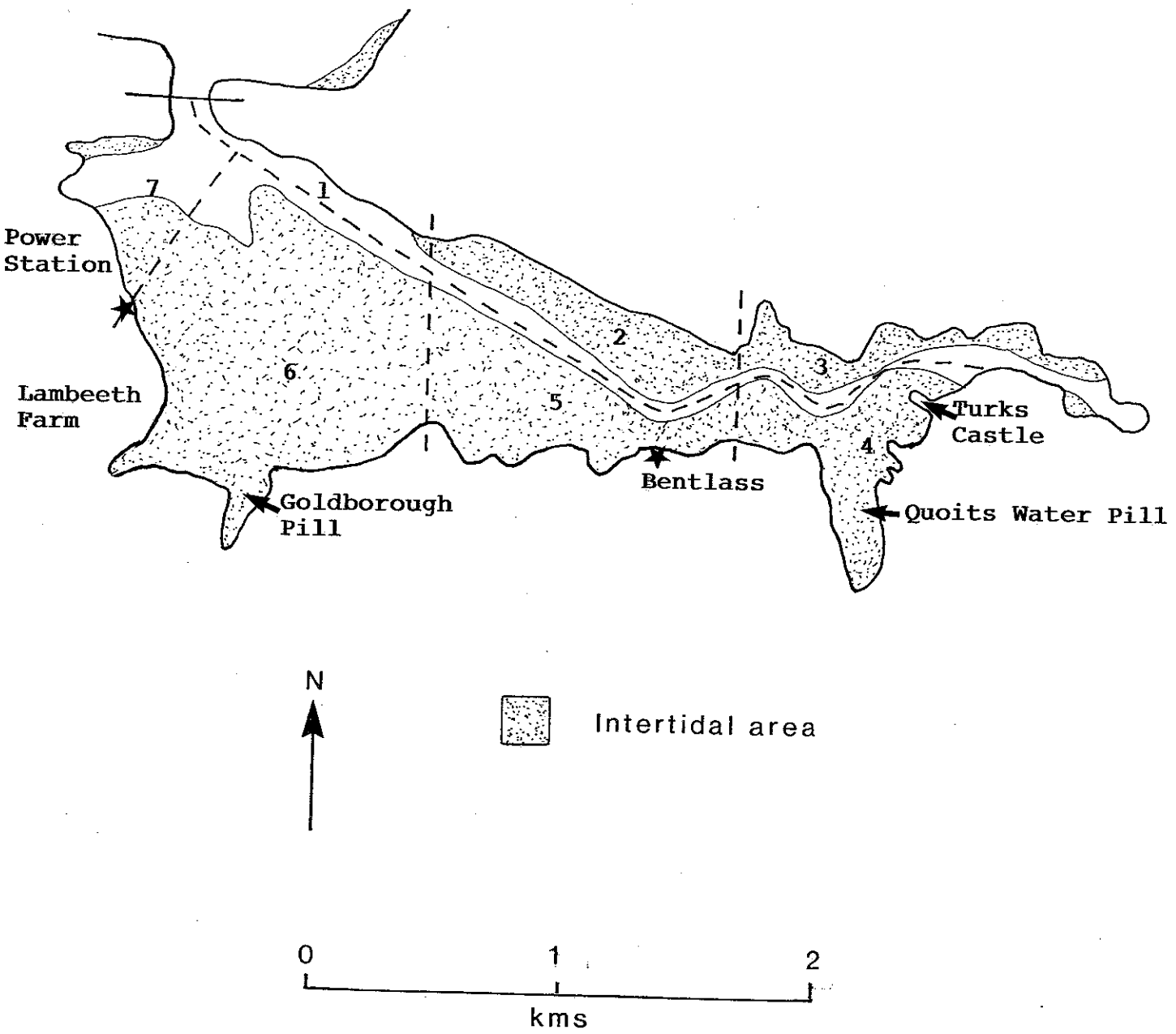

Figure 7.4.1 Pembroke River, showing count sectors and place names mentioned on the text. The stars show the Lambeeth and Bentlass viewpoints.

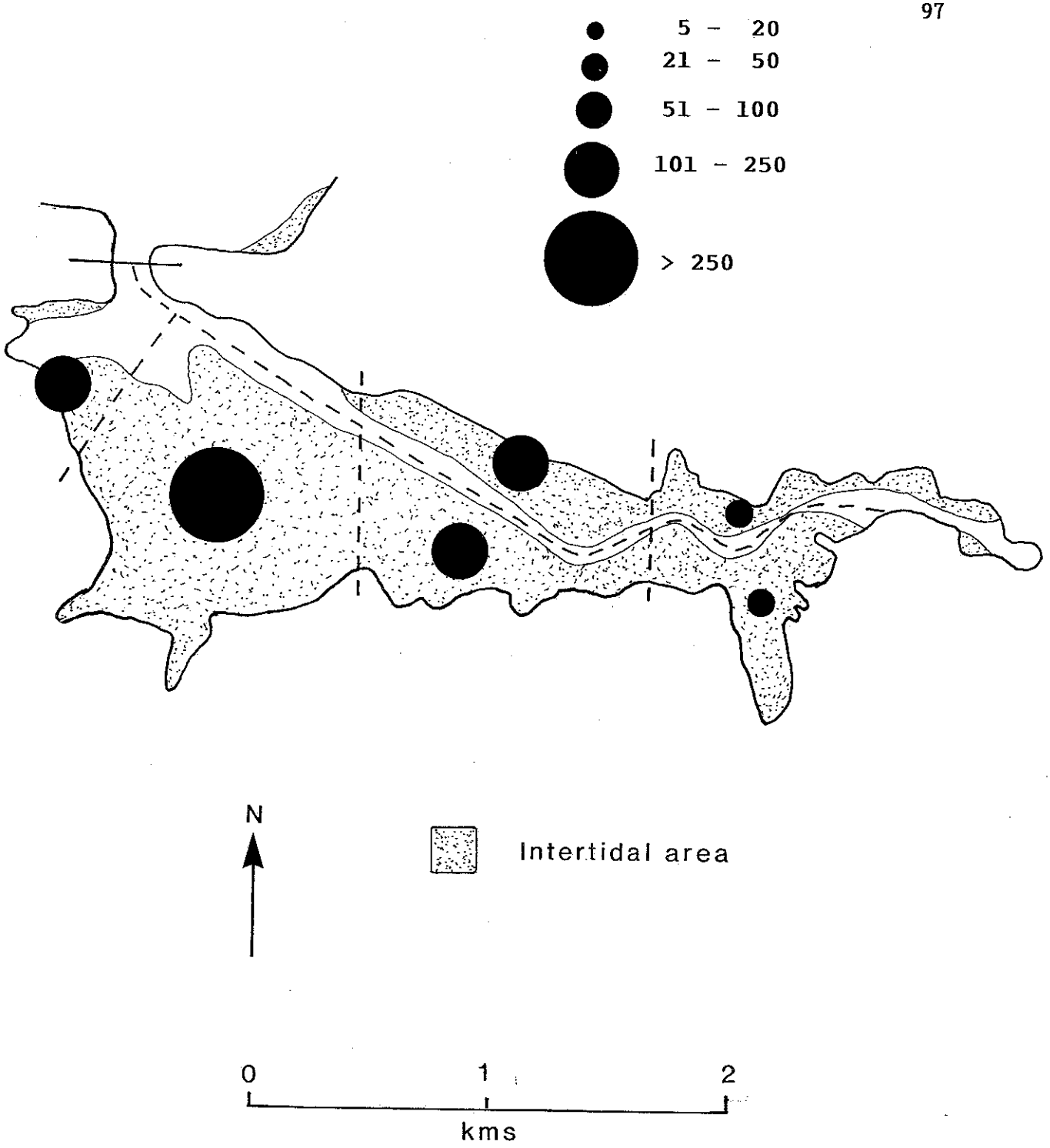

Figure 7.4.2 Distribution of Shelduck on Pembroke River during winter 1987/88, based on peak counts recorded in each winter.

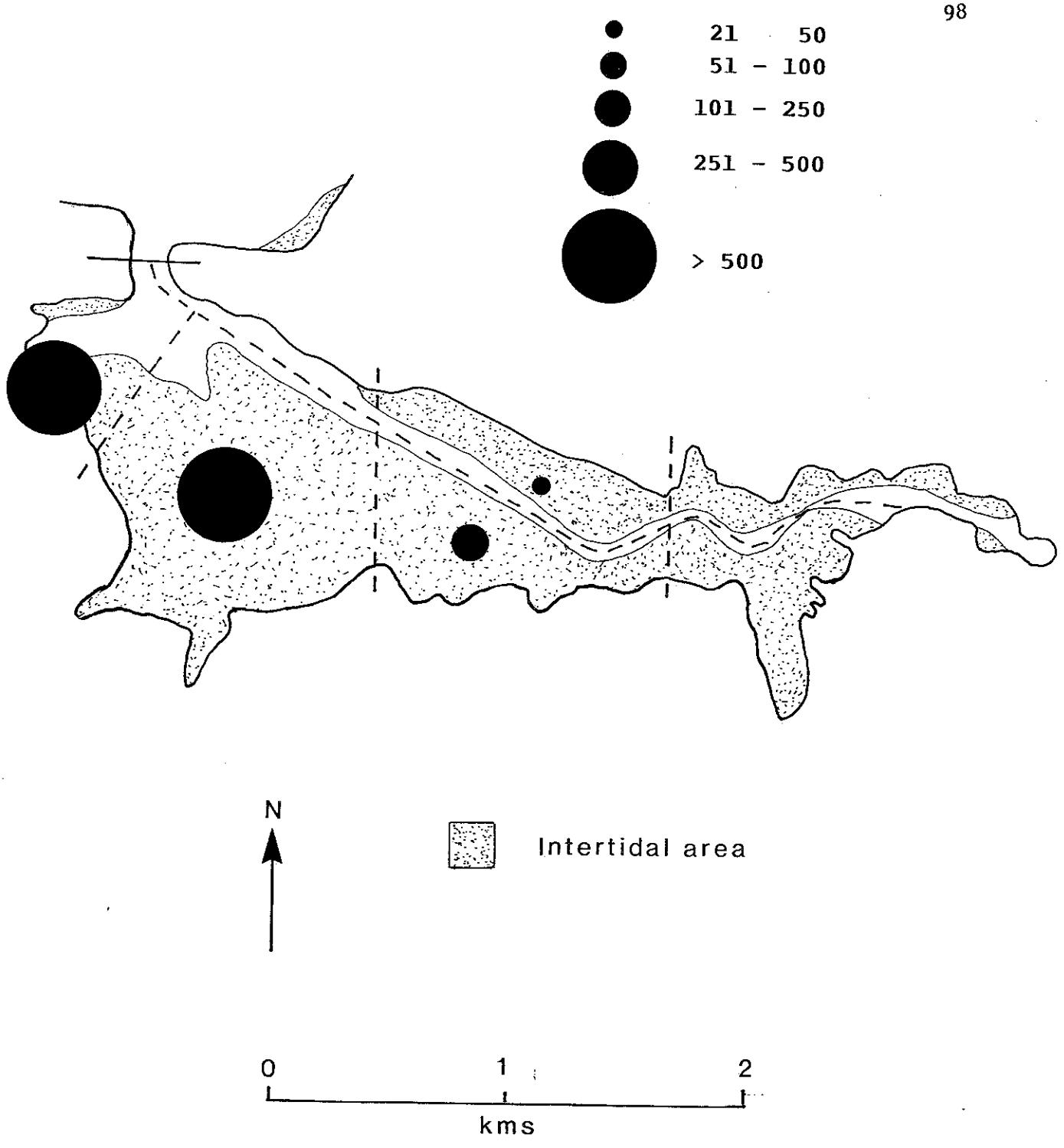

Figure 7.4.3 Distribution of Wigeon on Pembroke River during winter 1987/88, based on peak counts recorded in each winter.

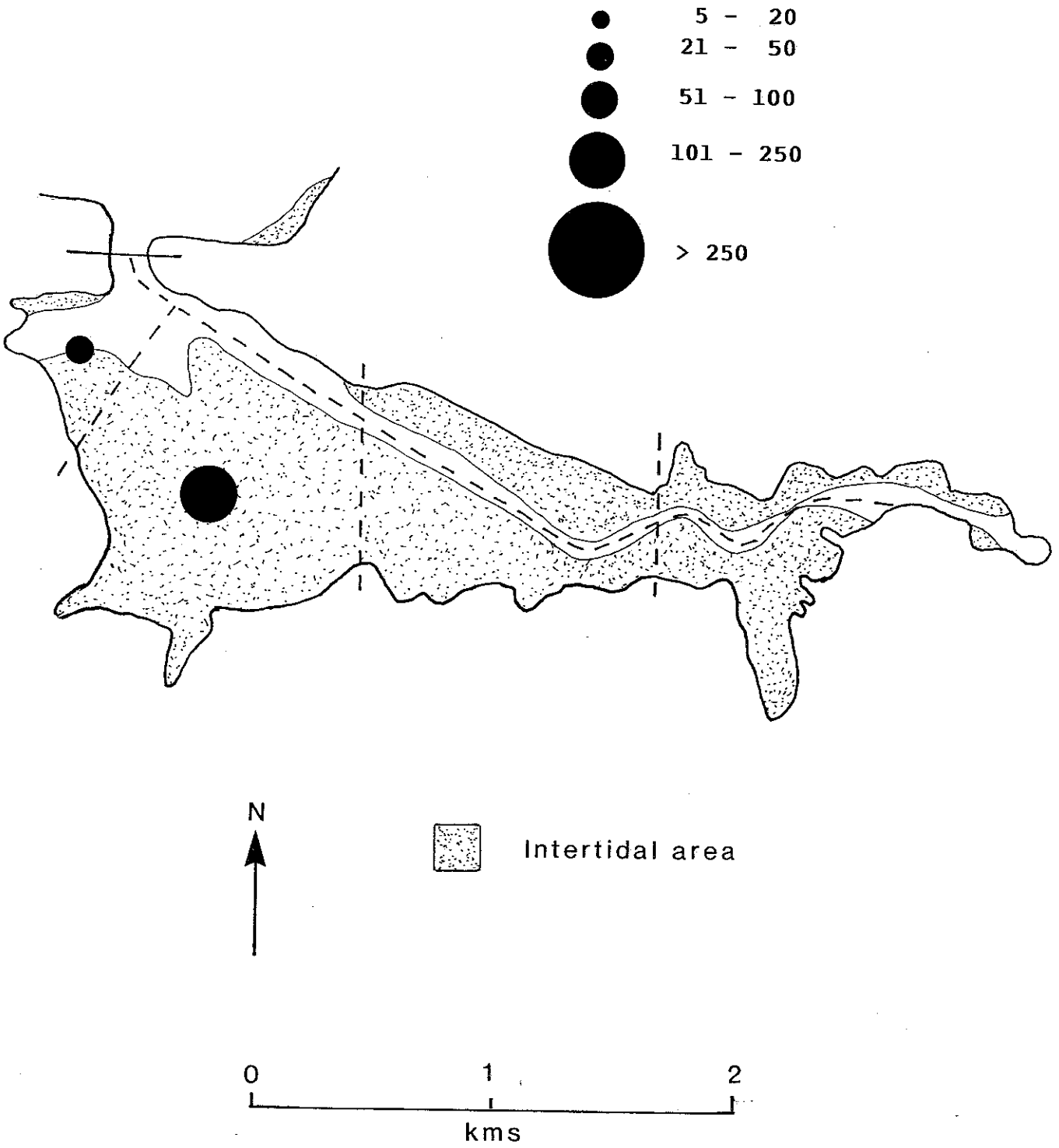

Figure 7.4.4 Distribution of Teal on Pembroke River during winter 1987/88, based on peak counts recorded in each winter.

7.4.5 Oystercatcher

Small groups of feeding Oystercatcher made use of much of the intertidal area of Pembroke river, but the largest concentrations noted, of up to 75 individuals, were of birds collected into regular high tide roosts. One of these was on the north shore of sector 7, east of the power station, from which up to 40 birds were once noted leaving the study area during the high tide period via the mouth of the Pembroke river. The other was in fields adjacent to sector 2, north from Bentlass, although on occasion birds also used fields near Fleet Farm, west of Quoits Water Pill in sector 4.

7.4.6 Dunlin

Nearly 50% of Dunlin on the Cleddau system occur on Pembroke river (section 6.12). Much the most important feeding area here for the species was on the intertidal flats of sectors 5 and 6, in each of which flocks of 1,000 or more birds were present at times (Figure 7.4.6). Smaller numbers (<500) were also noted both feeding and roosting in sectors 4 and 7. Dunlin were very mobile within the confines of Pembroke river, and small flocks of ca 50 birds were also noted moving out through the river mouth, possibly to Llanstadwell (Rees 1984).

7.4.7 Curlew

Curlew were widely distributed throughout the Pembroke river while feeding, but there was a notable high tide roost of up to 250 birds in sector 7 (Figure 7.4.7), north-east of the power station. Birds sometimes gathered first to the south-east of the power station on the rising tide, but then moved to the north-east side over the high tide period itself. Many birds arrived here from well upriver, although numbers of smaller roosts also formed at times elsewhere along the river edge.

7.4.8 Redshank

Feeding Redshank were well spread through the Pembroke river, although with the bulk of the population south of the main channel. Numbers in the Goldborough Pill area, in particular, may have been underestimated as birds were often hidden in the creeks. Redshank tended to concentrate together into small roosts on the rising tide, but no extensive movements were noted.

7.4.9 Other species

A flock of up to 15 Mute Swans was present around Quoits Water Pill, and occasionally a pair further downriver. Up to five Shoveler and five Goldeneye, as well as two Red-breasted Merganser, frequented the lower reaches of Pembroke river in mid winter.

Among waders, peak totals of around 45 Ringed Plover, 25 Grey Plover, 45 Knot and 35 Turnstone were all noted feeding on the intertidal flats south of the middle and lower river channel, although smaller numbers of Ringed Plover and Turnstone also occasionally were present further upstream in the Quoits Water Pill area. Small flocks of 20-30 Lapwing occurred around the Bentlass. A few Greenshank frequented Quoits Water Pill, with the occasional individual also noted on Goldborough Pill.

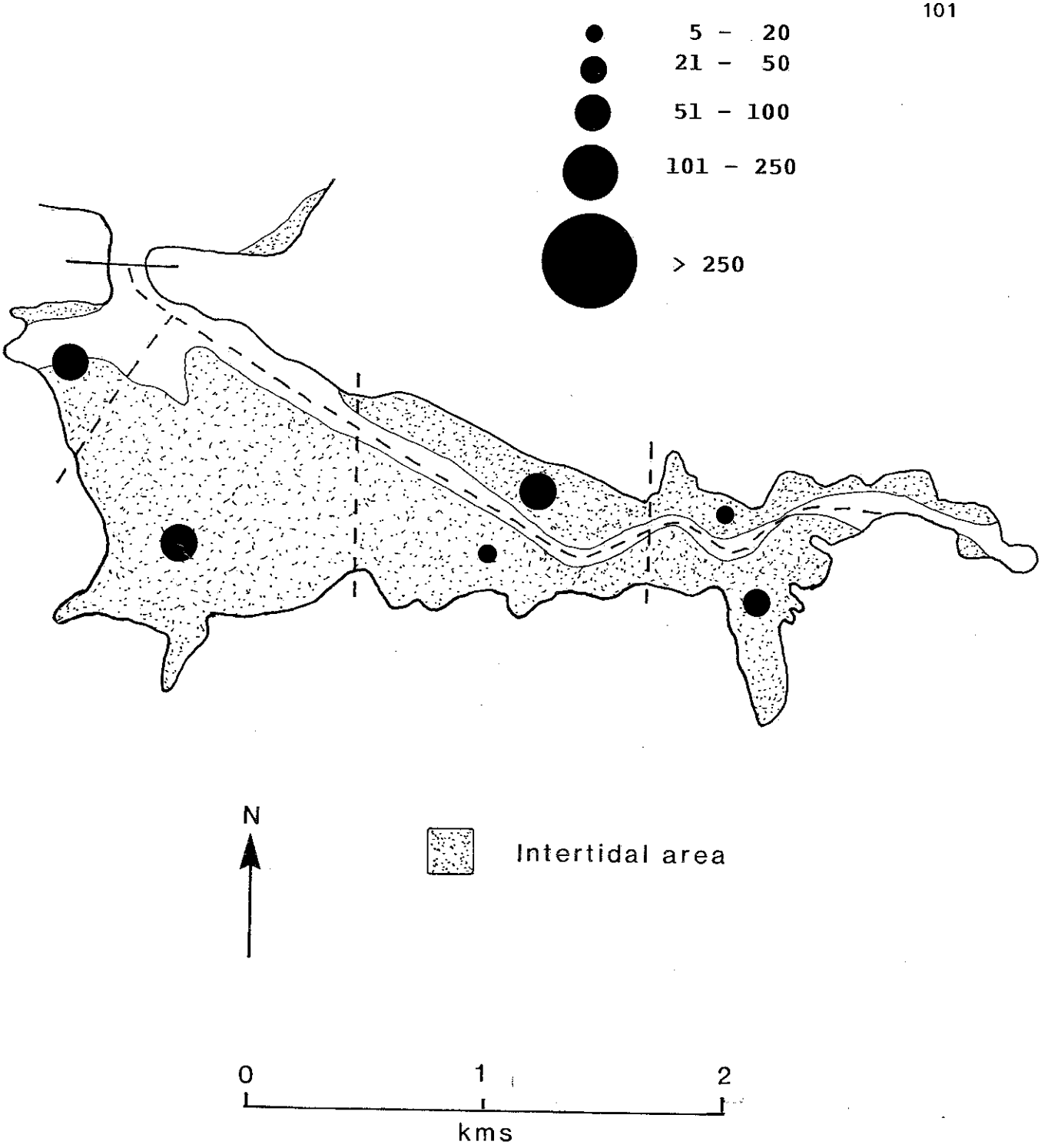

Figure 7.4.5 Distribution of Oystercatcher on Pembroke River during winter 1987/88, based on peak counts recorded in each winter.

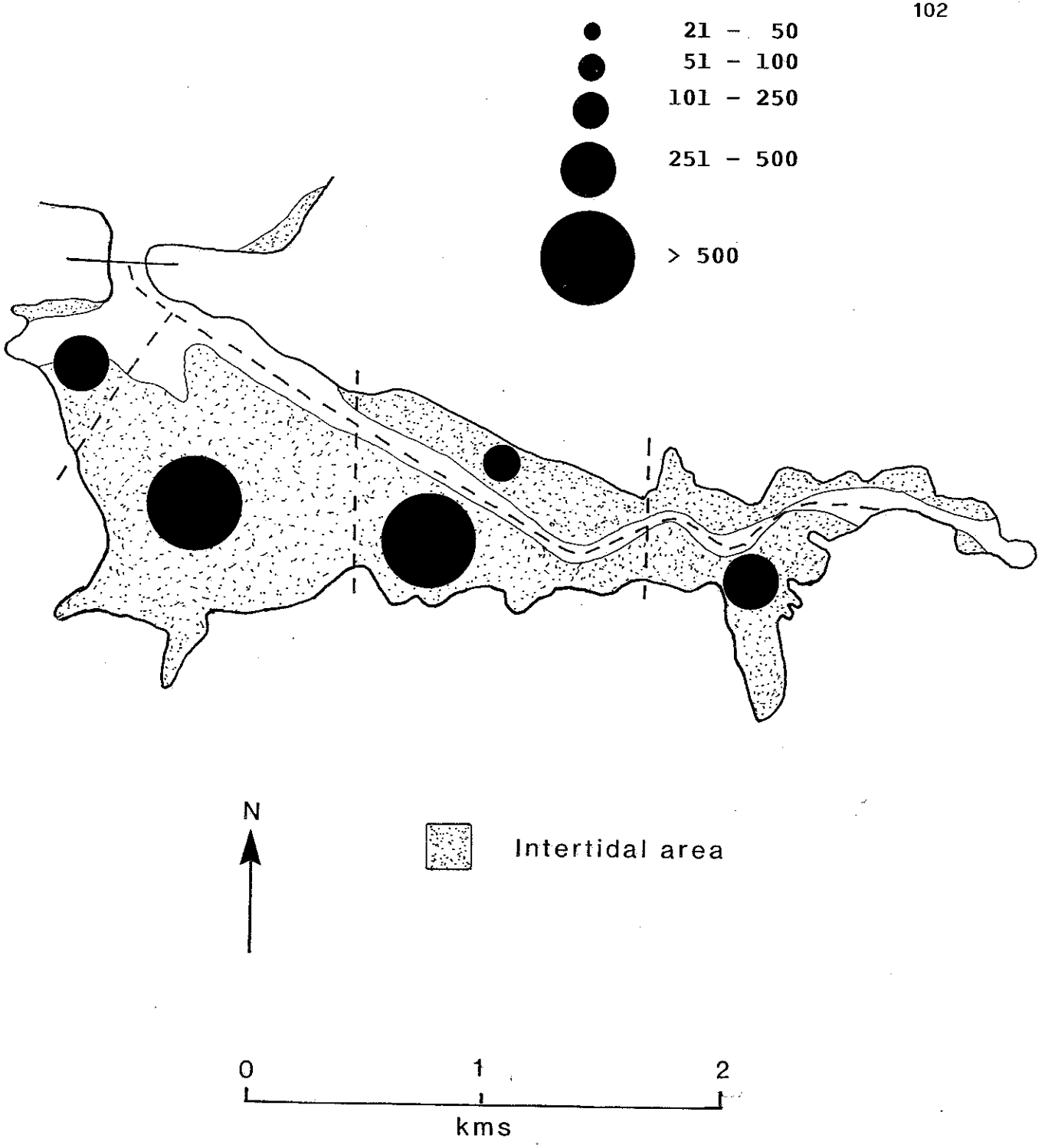

Figure 7.4.6 Distribution of Dunlin on Pembroke River during winter 1987/88, based on peak counts recorded in each winter.

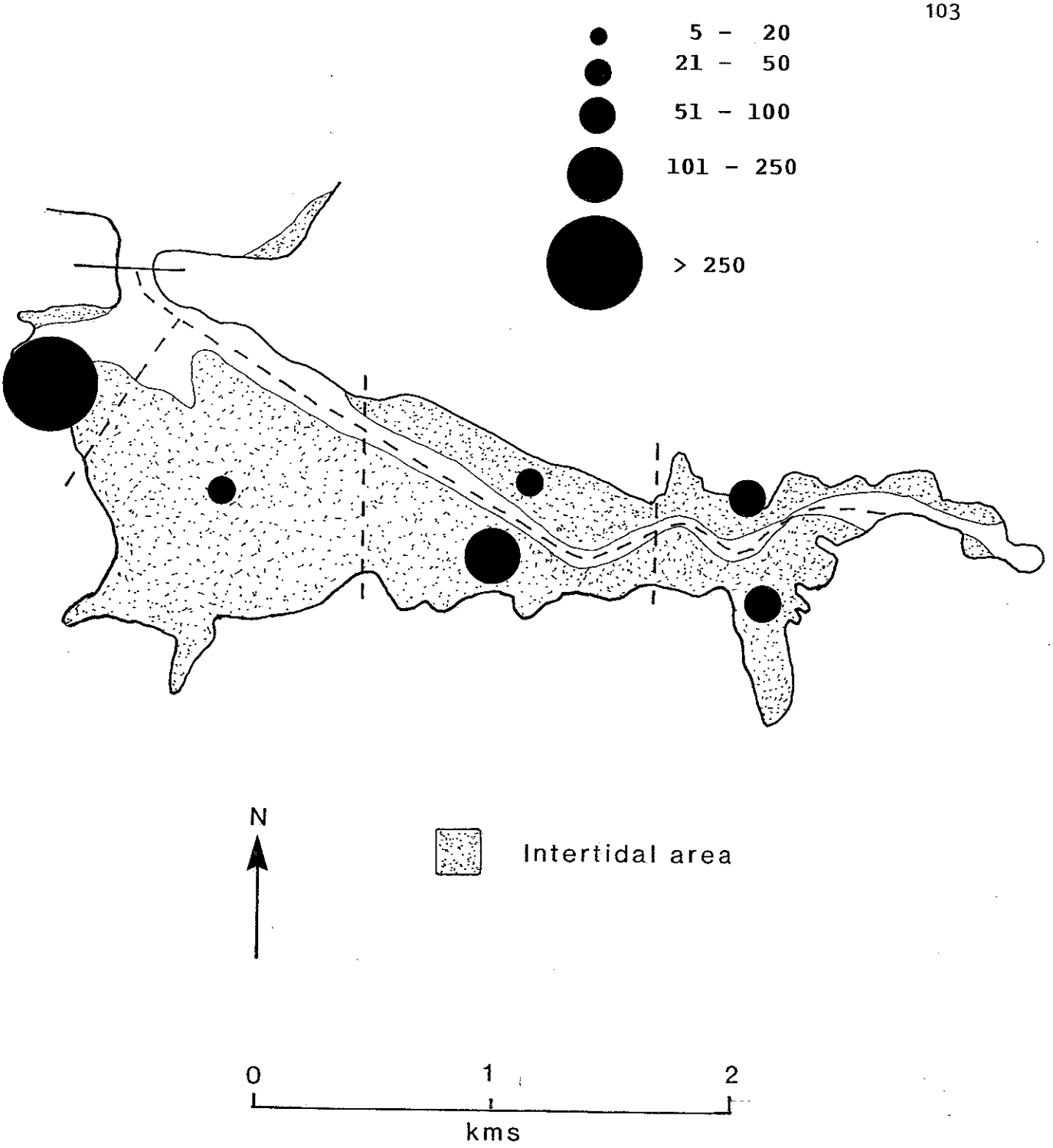

Figure 7.4.7 Distribution of Curlew on Pembroke River during winter 1987/88, based on peak counts recorded in each winter.

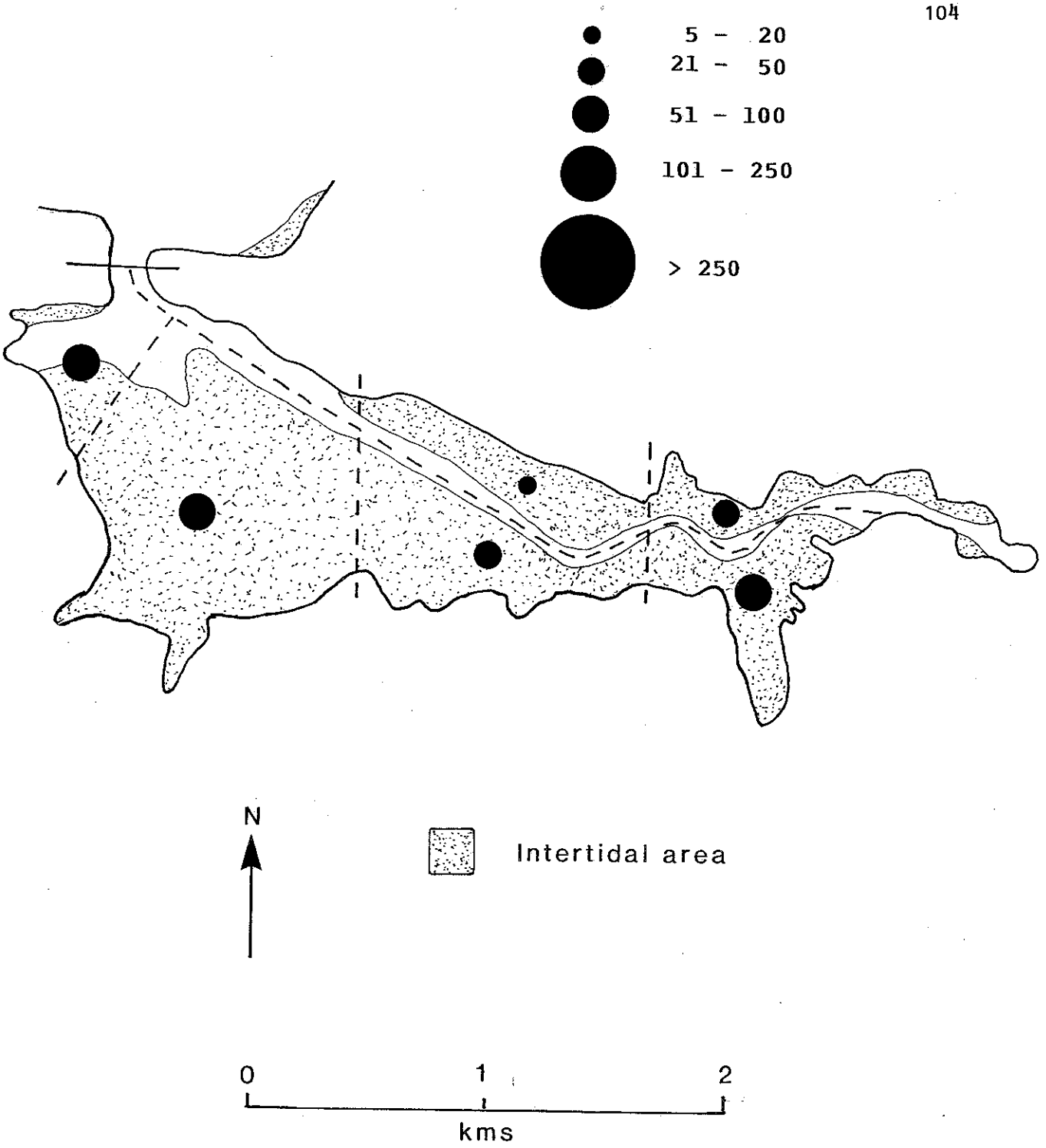

Figure 7.4.8 Distribution of Redshank on Pembroke River during winter 1987/88, based on peak counts recorded in each winter.

7.5 ANGLE BAY

7.5.1 Study area and methods

All or part of Angle Bay was censused at varying stages of the tide on 13 days between 17 November 1987 and 19 February 1988. The shape of the bay affords many observation points and good visibility of birds present but is difficult to divide into discrete sub-units for recording purposes. Overall, the south-east corner of the bay is undoubtedly the focus of most bird feeding activity, but movement throughout the bay is considerable. For the purposes of data presentation here, the bay was split into four sectors (Figure 7.5.1): from Angle Point to the south side of Angle harbour; from here to the mass of beach rock on the southern shore; from here to the start of beach rock on the mid eastern shore; and from here to Sawdern Point.

7.5.2 Shelduck

Feeding groups of up to 75 Shelduck were present, concentrated in the south-east of the bay but frequently spilling over into the two adjacent sectors (Figure 7.5.2). Most birds remained in the bay throughout the tidal cycle, but limited interchange with outside was observed.

7.5.3 Wigeon

Wigeon had a similar distribution in Angle Bay to Shelduck (Figure 7.5.3). Most feeding occurred along the east side of the bay; some feeding was also recorded in the south-west, but most birds there were roosting on the water.

7.5.4 Oystercatcher

There are a number of small, apparently traditional roosts of Oystercatcher around Angle Bay, in particular along its southern and eastern shores, with a maximum of 80 birds observed together (Figure 7.5.4). From these roosts, birds spread out widely to feed, both in the intertidal area and, not infrequently, on neighbouring fields.

7.5.5 Dunlin

Based on the results of the current studies, Dunlin occur exclusively along the eastern side of Angle Bay, with almost all feeding taking place in the south-east sector where flocks of up to 250 birds were recorded. The apparently similar importance of the north-east sector of the bay on Figure 7.5.5 is misleading; few birds fed there, but an occasional roost of over 100 birds formed on the beach-head rocks near its southern boundary.

7.5.6 Curlew

Substantial roosts of Curlew formed in particular along the high water mark of the southern and south-eastern shores of Angle Bay, from where birds dispersed to feed on both the intertidal area of the bay and on neighbouring fields. The extensive use of fields for feeding made the extent of interchange with other sites difficult to assess, but flocks of up to 50 birds were seen arriving and departing through the mouth of the bay; possibly these were moving to and from the Gann, which also holds good numbers of Curlew (Table 6.1), or

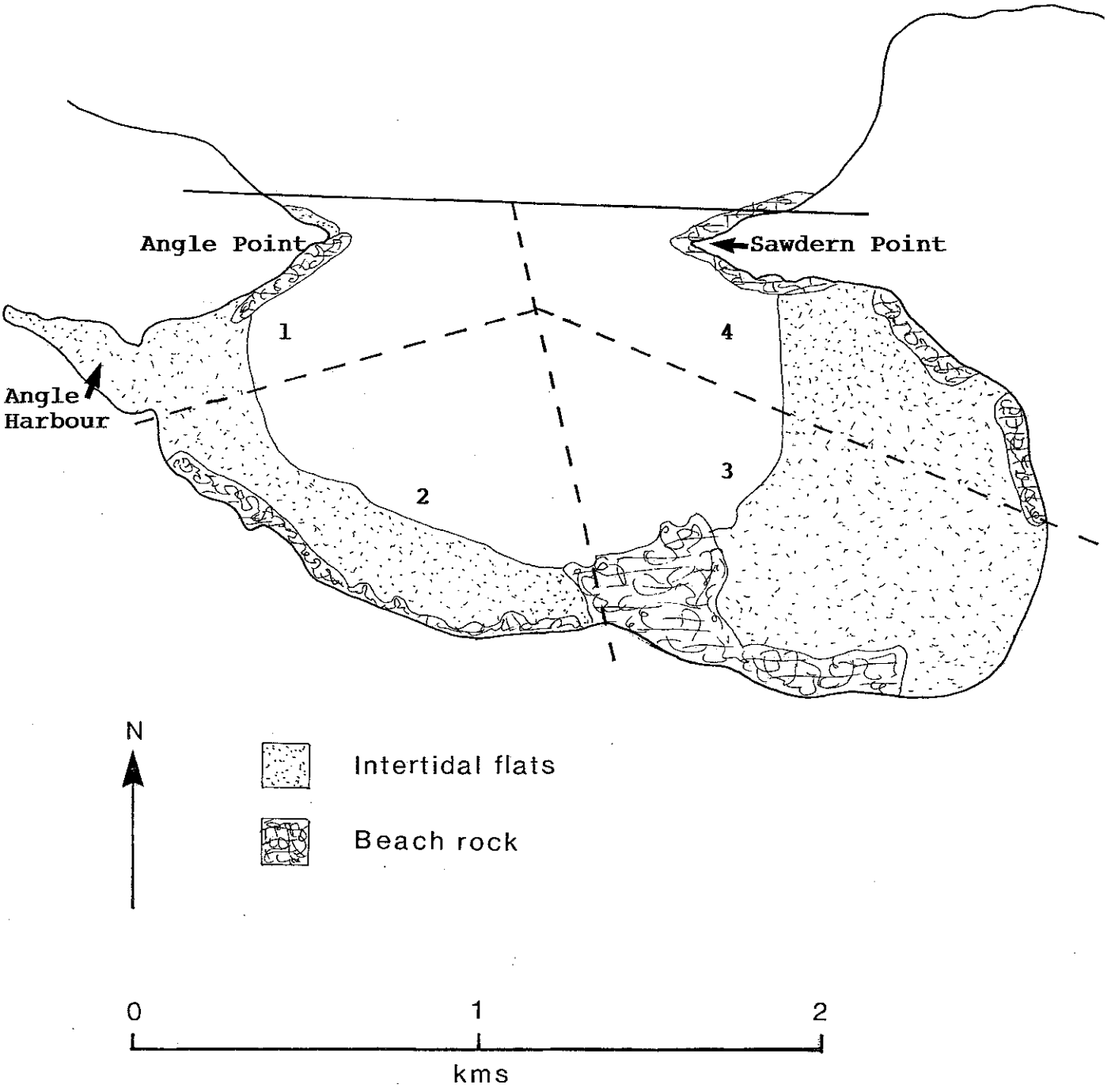

Figure 7.5.1 Angle Bay, showing count sectors and place names mentioned in the text.

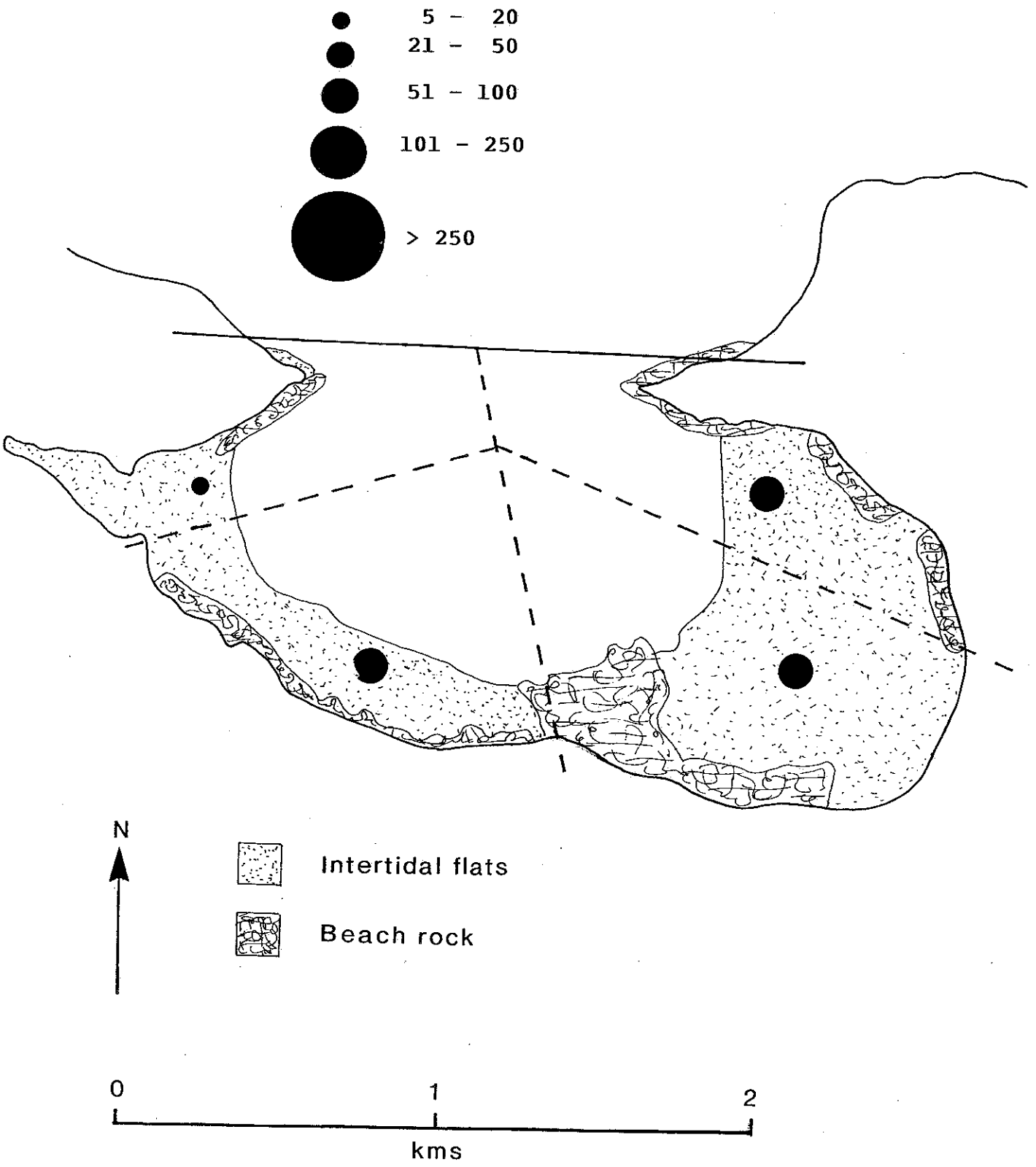

Figure 7.5.2 Distribution of Shelduck on Angle Bay during winter 1987/88, based on peak counts recorded in each winter.

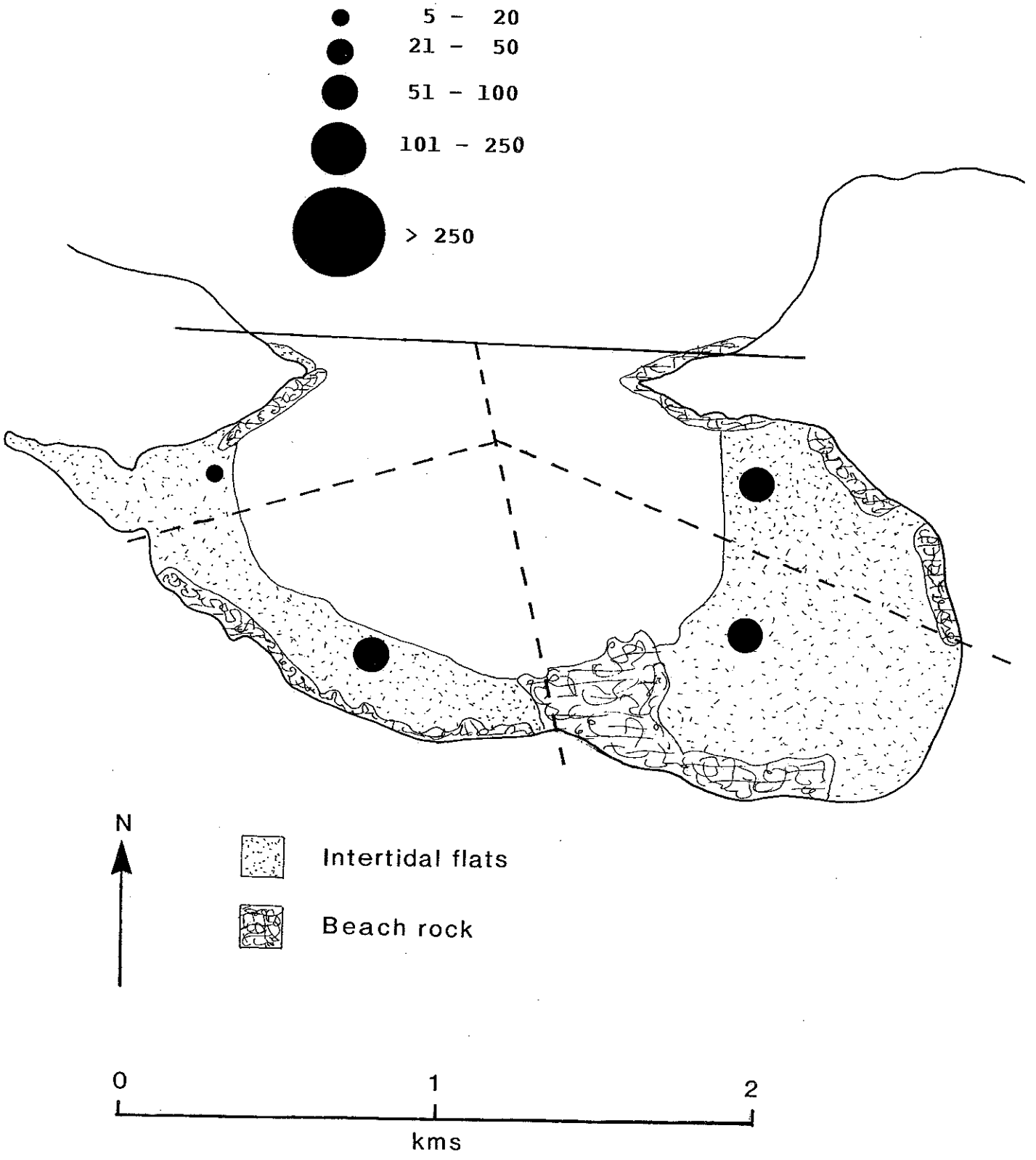

Figure 7.5.3 Distribution of Wigeon on Angle Bay during winter 1987/88, based on peak counts recorded in each winter.

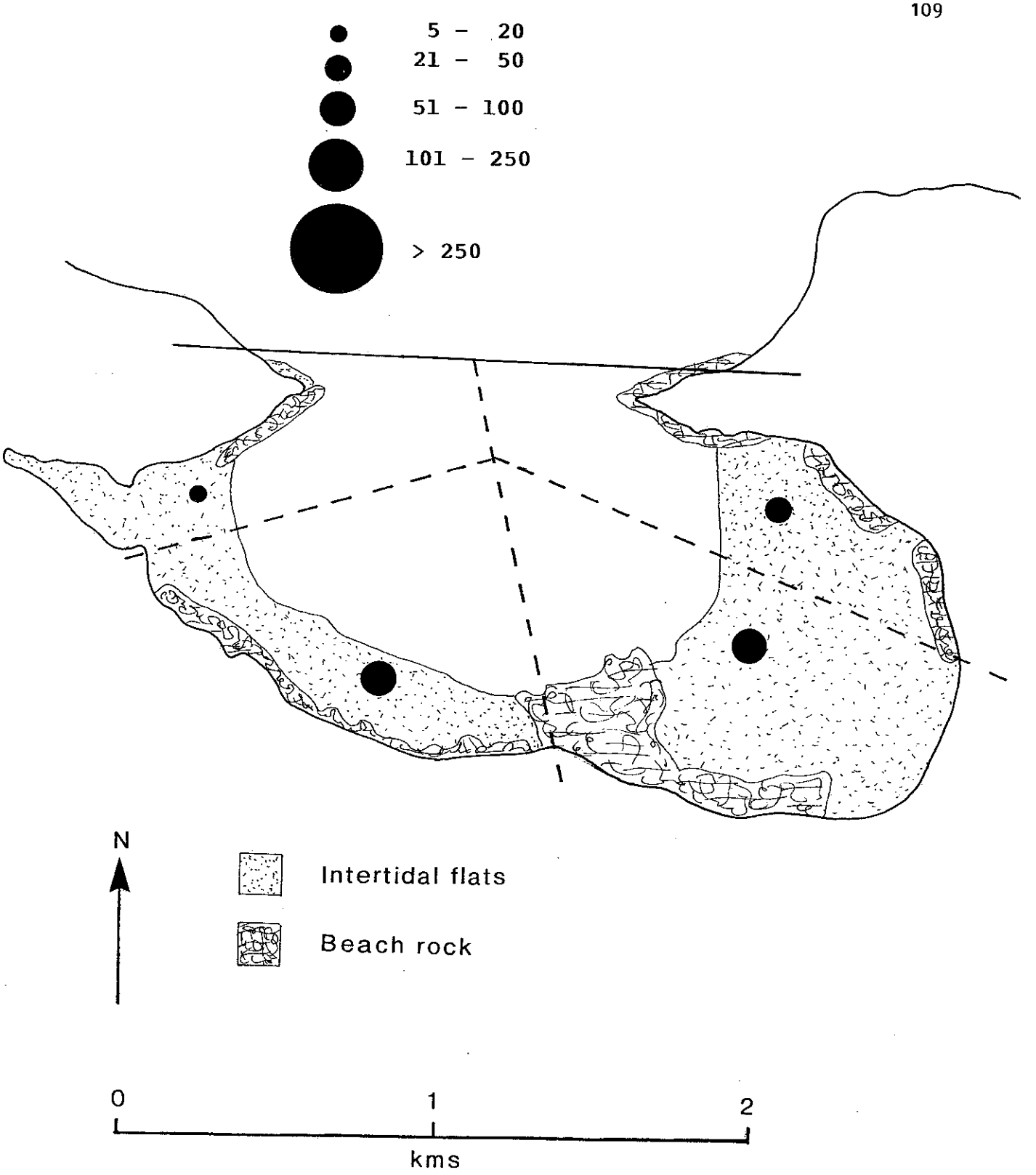

Figure 7.5.4 Distribution of Oystercatcher on Angle Bay during winter 1987/88, based on peak counts recorded in each winter.

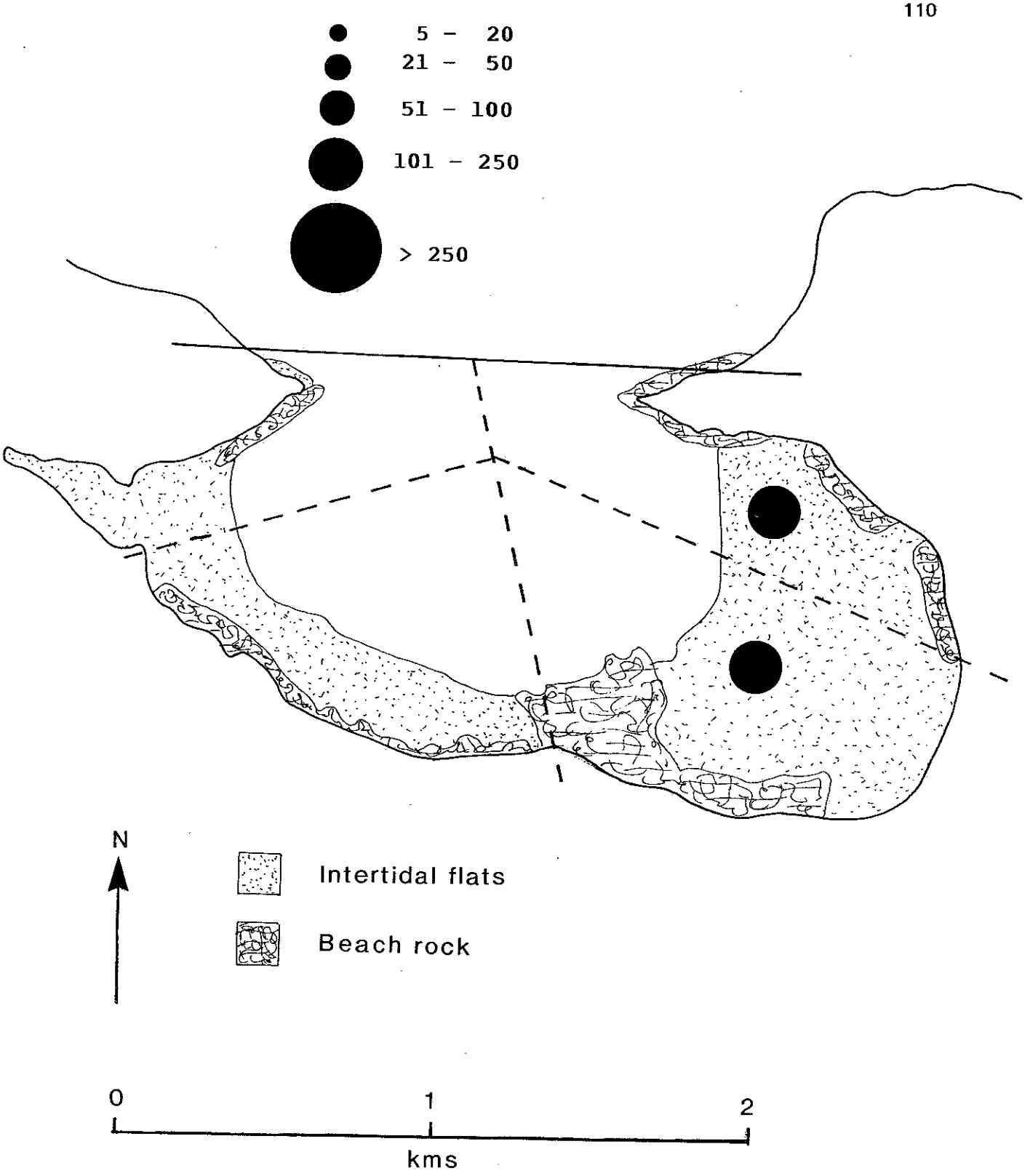

Figure 7.5.5. Distribution of Dunlin on Angle Bay during winter 1987/88, based on peak counts recorded in each winter.

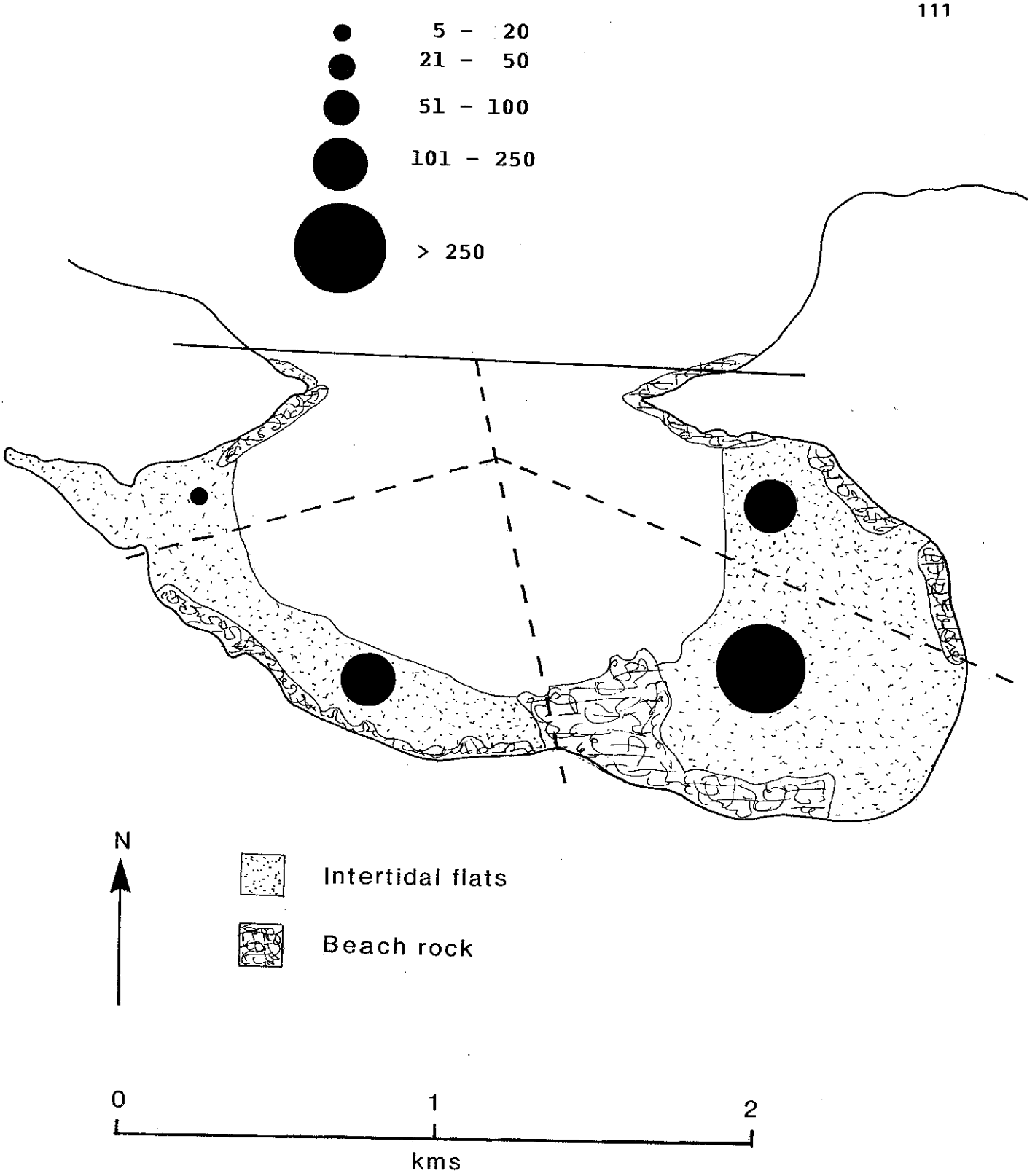

Figure 7.5.6 Distribution of Curlew on Angle Bay during winter 1987/88, based on peak counts recorded in each winter.

Sandy Haven Pill, which holds fewer but is closer.

7.5.7 Redshank

Only relatively small numbers of Redshank occur in Angle Bay (Table 6.1), and these were well distributed without notable concentrations (Figure 7.5.7).

7.5.8 Other species

Mallard were not systematically recorded, but up to 25 were noted simultaneously along the west side of Angle Bay. A flock of up to 50 Ringed Plover was frequently present, invariably within the south-east sector, whereas groups of up to 20 Turnstone were more widely scattered. Given the average BoEE counts for Angle Bay (Table 6.1), it seems remarkable that only one Grey Plover and two Bar-tailed Godwit were recorded over the 13 days on which the special winter 1987/88 studies were conducted.

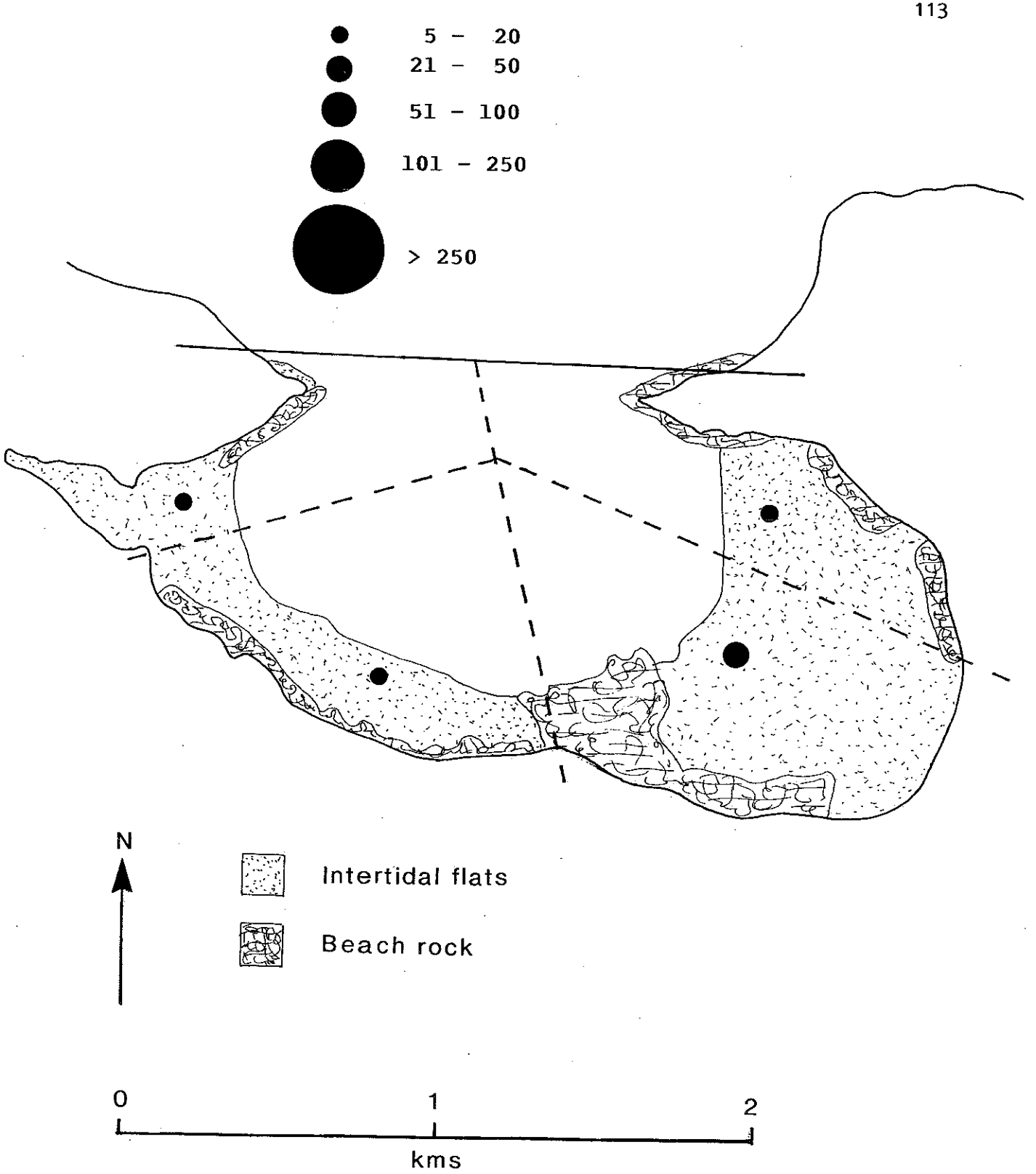

Figure 7.5.7 Distribution of Redshank on Angle Bay during winter 1987/88, based on peak counts recorded in each winter.

8. SYNTHESIS AND CONCLUSIONS

A total of seven years of standardized BoEE data for the Cleddau is too short a time span for any comprehensive assessment of population trends. Nevertheless, the data presented in Chapter 4 imply increasing Teal, Oystercatcher, Curlew, Redshank and Grey Plover populations, although with one very anomalous year for the last-named species, and a pronounced decline in an already small Knot population. Over a longer period, comparison of mid 1980s data with those available from the early 1970s suggests increases in Shelduck, Wigeon and, especially, Teal populations so great that it does not seem credible to ascribe them solely to potential differences in counting technique. For waders, changes over this time scale have been generally less, but tend to support longer-term increases in Curlew and Grey Plover populations and a decrease in Knot. Overall, the balance of evidence suggests that the Cleddau system has to some extent improved as a waterfowl habitat during the past twenty years.

Analysis of average peak numbers of birds present over the most recent five years (Chapter 5) shows that the Cleddau system is a site of International Importance for its overall wintering waterfowl population. In addition, two species (Shelduck, Teal) have wintering populations that are individually of International Importance, and these and a further three species (Wigeon, Curlew, Redshank) exceed the relevant qualifying levels for National Importance. Although BoEE data available for the spring (April-June) period are very limited, the Cleddau does not appear overall to be a major passage site (Chapter 4). Nevertheless, the autumn passage population of Whimbrel is Nationally Important and that of Greenshank falls only just short of the appropriate qualifying level (Chapter 5).

The Cleddau system is somewhat unusual among estuarine sites in Britain in comprising a number of geographically more or less discrete areas attractive to wildfowl and waders. Analysis of data from the 14 main BoEE count areas within the Cleddau (Figure 3.2) revealed that five of these have average peak winter BoEE counts of waterfowl exceeding 10% of that for the Cleddau as a whole (Chapter 6). Listed in declining order of importance, these are Pembroke River, Lower Western Cleddau, Carew/Cresswell, Upper Western Cleddau and Angle Bay. Certain areas stood out as being particularly important for the Nationally Important wildfowl species, holding in excess of 20% of the average peak winter BoEE count of one or more of these species on the Cleddau as a whole: Pembroke River for both Shelduck and Wigeon, and Carew/Cresswell and both parts of the Western Cleddau for Teal. By contrast, the two Nationally Important wader species were relatively more evenly distributed over a number of count areas.

Evidence adduced from both the BoEE counts and from a special all-day study carried out in February 1986 suggested only very limited movement by most species between count areas (Chapter 6). Special studies of five key sites (Western Cleddau, Eastern Cleddau/Landshipping Quay, Carew/Cresswell, Pembroke River, Angle Bay) during winter 1987/88 (Chapter 7) tended, with certain qualifications, to confirm their discrete nature relative to the degree of movement by birds within the sites themselves. The most important qualification is that considerable movement by an array of species occurs between the Western Cleddau, Eastern Cleddau and at

least the Landshipping part of the Daugleddau, such that treatment of them as a single unit for conservation purposes would seem highly desirable. Whereas there also appears to be daily movement by some species between Pembroke River and the smaller count areas neighbouring it (Figure 3.1), and between Angle Bay and elsewhere, this is on a relatively smaller scale. Thus, although some links between them almost certainly exist, conservation plans can be formulated for the Western Cleddau/Eastern Cleddau/Landshipping Quay, the Carew/Cresswell, Pembroke River and Angle Bay on the basis that they are relatively discrete units ornithologically. Confirmation of these conclusions would naturally be desirable, but would require colour-marking and/or radio-tracking studies.

9. ACKNOWLEDGMENTS

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