BTO Research Report No. 43

THE ABUNDANCE AND DISTRIBUTION OF WILDFOWL AND WADERS ON THE BURRY INLET

by

R.P. Prys-Jones, R.J. Howells & J.S. Kirby

A report from the British Trust for Ornithology
to the Nature Conservancy Council

April 1989

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ABSTRACT

The report draws on information from long-term Birds of Estuaries Enquiry (BoEE) monthly high tide counts on the south shore of the Burry, from more limited BoEE data for the north shore of the Burry and for the Upper Loughor, and from special low tide studies carried out in winter (November-March) 1987/88 in order to provide a comprehensive assessment of the abundance and current wintering distribution of wildfowl and waders throughout the Burry Inlet.

Winter is the time of year when the Burry Inlet is of major overall importance to intertidal bird populations, although notable passages of some species, e.g. Whimbrel, occur in spring and autumn. Only for Dunlin, Bar-tailed Godwit and Redshank is there good evidence for declines in wintering populations since the mid 1970s; populations of the remaining species have either remained stable overall or, for species such as Brent Goose, Shoveler and Grey Plover, shown marked increases. Total recorded waterfowl (wildfowl and wader) numbers have been distinctly higher in the 1980s relative to the late 1970s.

Average peak winter counts on the Burry south shore over the five-year period up to 1987/88 show 12 species of waterfowl to have wintering populations exceeding the relevant qualifying levels for National Importance; of these, four species of wildfowl (Shelduck, Wigeon, Teal, Pintail) and four waders (Oystercatcher, Knot, Sanderling, Turnstone) also exceed the relevant qualifying levels for International Importance. Additional information from BoEE counts during the passage periods as well as from the counts on the Burry north shore and the Upper Loughor, together with data from the low tide studies, suggest four further species may also have populations of National Importance on the Burry; one of these, the Redshank, very probably also qualifies as of International Importance.

For all the main species considered, both high tide and low tide distributions during winter 1987/88 are mapped. Considered together with recorded information on movement patterns, these data support the view that the entire Burry Inlet below the Llanelli-Swansea rail bridge must be viewed as a single entity for the purposes of waterfowl conservation. Nevertheless, within this whole there are certain areas of particular importance. Notable among these are the very limited patches of mussel scar, which form low tide foci for large numbers of feeding birds of a diversity of species.

1. INTRODUCTION

The Burry Inlet (51-39N, 4-10W) has a total wintering population of around 50,000 wildfowl and waders, making it of International Importance for these species and the major estuarine site for intertidal birds contained wholly within Wales (Salmon et al. 1988). It was designated as a grade 1 Nature Conservation Review site by Ratcliffe (1977), and Figure 1.1 outlines its current protection by means of three Sites of Special Scientific Interest (SSSI). One of these (Whiteford Burrows/Landimore Marsh SSSI) is also a National Nature Reserve, and most of the southern shore of the Burry Inlet lies within the Gower Area of Outstanding Natural Beauty. An area comprising the Burry Inlet and Whiteford Burrows/Landimore Marsh SSSIs, together with the eastern end of the Pembrey Coast SSSI, has been proposed as a "Ramsar" site and as a Special Protection Area (SPA) under the European Communities Directive (Figure 1.2). Much information on the physical and biological characteristics of the Burry Inlet, as well as on the impact that man has had upon it, has been brought together in a symposium volume edited by Nelson-Smith & Bridges (1977).

In recent years the Burry Inlet, 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 wader and wildfowl populations present, on which more detailed studies commissioned in relation to specific development proposals may be grounded.

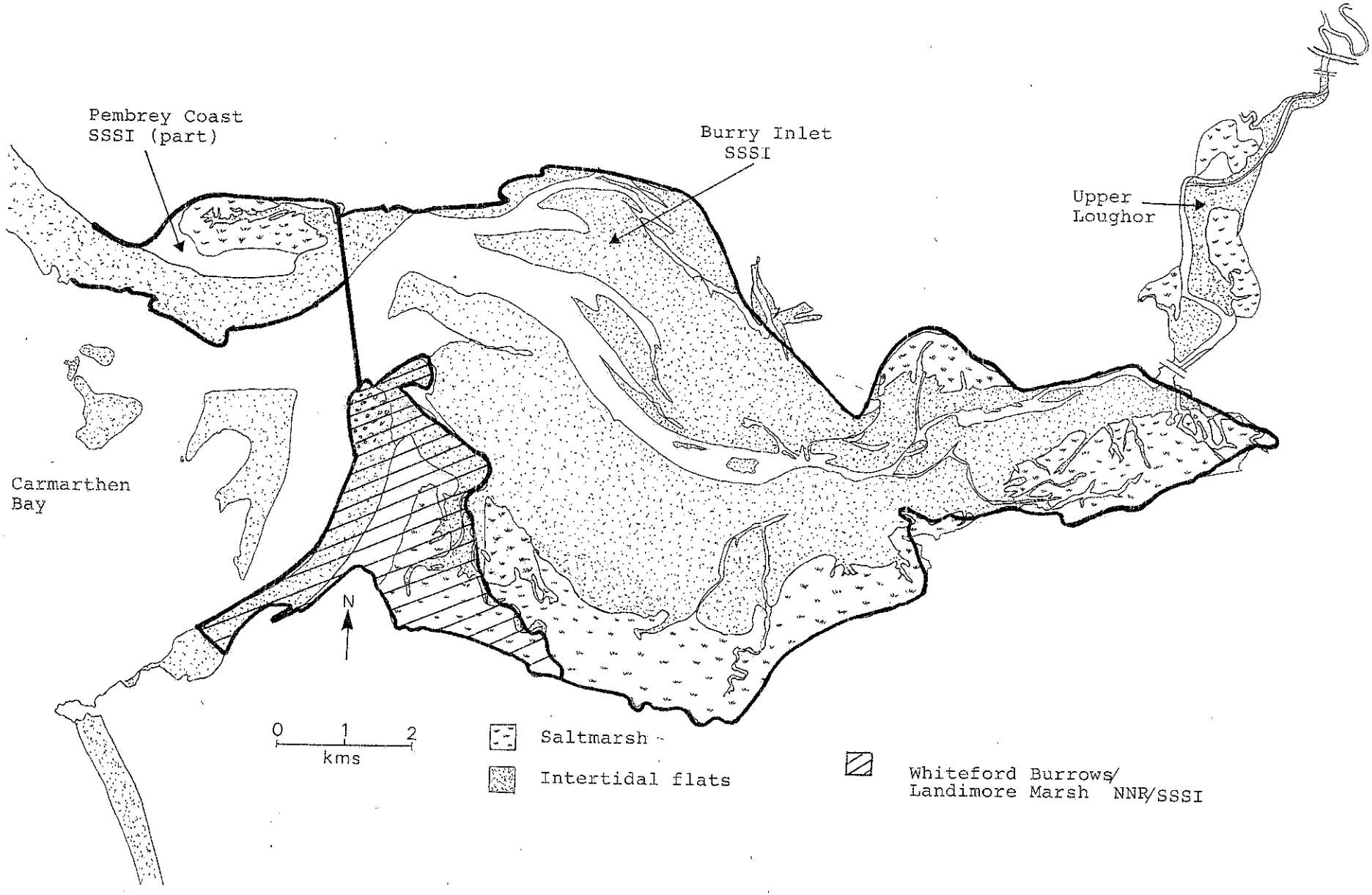

FIGURE 1.1 The Burry Inlet, showing its current protection by means of three Sites of Special Scientific Interest (SSSI) and one National Nature Reserve (NNR).

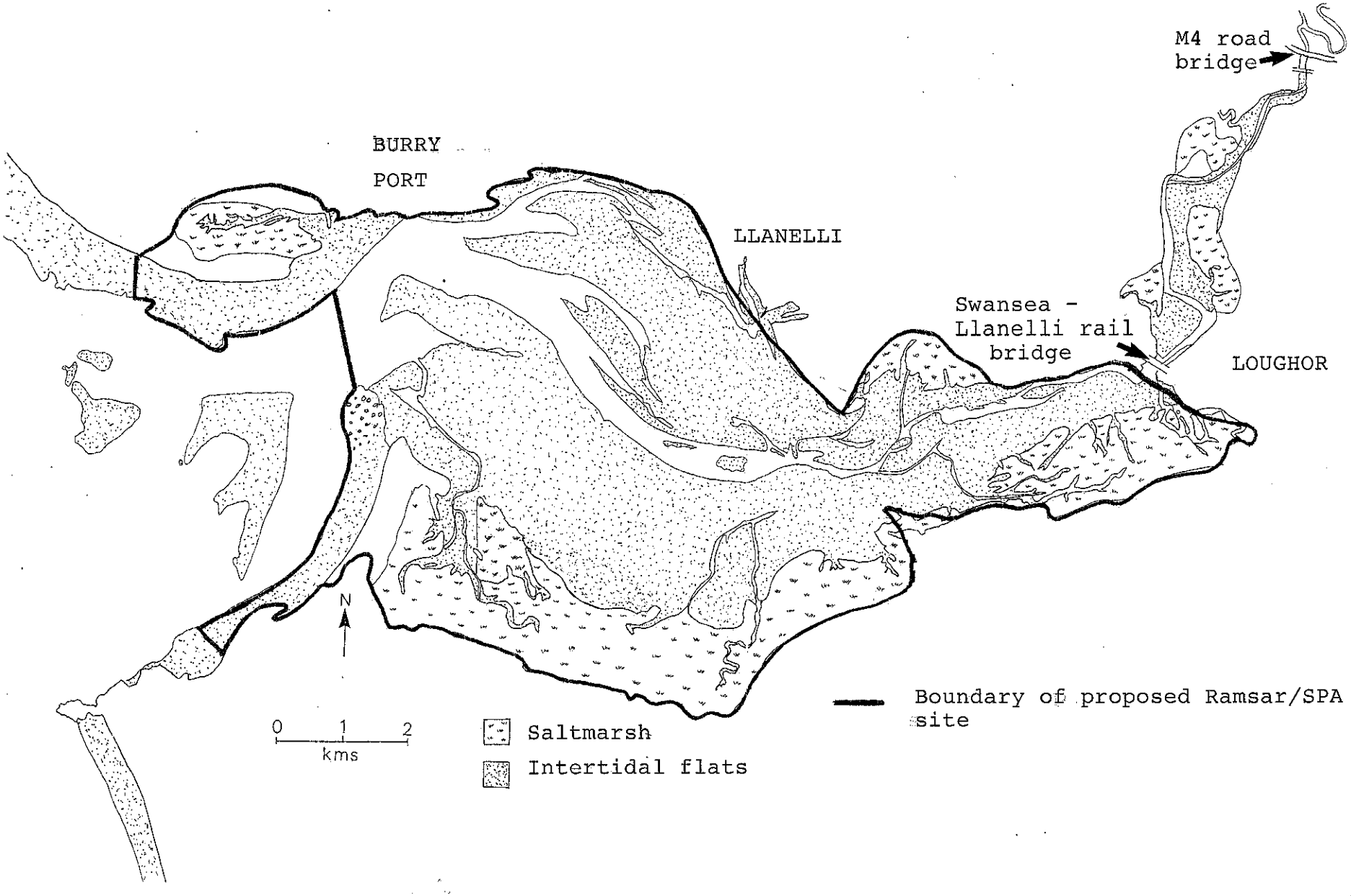

FIGURE 1.2 The Burry Inlet, showing the major bordering towns and the boundary of the proposed Ramsar site and Special Protection Area (SPA) under the European Community Directive.

2. AIMS

The study had four major aims:

i) To obtain detailed, preferably monthly, coverage by the Birds of Estuaries Enquiry (BoEE) of roosting wildfowl and waders on the Burry Inlet for the year July 1987-June 1988.

ii) To analyse the 1987-88 BoEE data in conjunction with those available from previous years to provide an overview of seasonal and annual trends in abundance and distribution of roosting wildfowl and waders on the Burry Inlet.

iii) To evaluate patterns of usage of intertidal areas of the Burry Inlet by wildfowl and waders during winter 1987-88 in order to establish which are their preferred areas for feeding.

iv) To synthesize the information obtained with that available in the literature to provide an assessment of the conservation importance of the Burry Inlet to wildfowl and waders.

3. STUDY AREA

The geographical limits of the Burry Inlet as covered in this report correspond closely with those of the proposed Ramsar/SPA site (Figure 1.2). The single major exception was the additional inclusion in the present study of the Upper Loughor estuary, from the Swansea-Llanelli rail bridge upstream to the M4 road bridge. This was done in the light of the proposed tidal barrage development adjacent to the rail bridge, which is currently the subject of preliminary feasibility studies (Wallace Evans & Partners 1988). The mode of data presentation adopted throughout the report is, however, such that key quantitative information relating to the Burry Inlet below the rail bridge and to the Upper Loughor can be extracted separately. All mention of the term "Upper Loughor estuary" in this report implies the area above the Swansea-Llanelli rail bridge.

The environment of the Burry Inlet is well described in Nelson-Smith & Bridges (1977). Briefly, there is a major contrast between the heavily industrialized coastline of the north side and the almost entirely rural south side. At the western end of the south side is the large dune system of Whiteford Burrows, and the remainder of the shore comprises an extensive area of grazed saltmarsh backed by rising agricultural land which becomes steeper towards the western end. The north shore is dominated by the major conurbations of Burry Port and, especially, Llanelli; the only largely natural habitat is provided by the dune system of Pembrey Burrows at the western end and the small saltmarsh around Tir Morfa, now being protected and developed as a Wildfowl Trust Centre. Large intertidal sand and mud flats extend out from both the southern shore and the central part of the north shore towards the river channel (Figure 1.2). The Upper Loughor estuary is small but has areas of saltmarsh on each side.

4. METHODS

4.1 HIGH WATER COUNTS

Regular counts of the numbers of wildfowl and waders present along the southern shore of the Burry Inlet have been collected by the BTO through the Birds of Estuaries Enquiry (BoEE) since 1969 and, prior to this, for wildfowl only by the Wildfowl Trust since 1949 under the National Wildfowl Counts. The southern shore normally supports the great majority of roosting birds and, largely as a result, the north shore and the Upper Loughor estuary have been much less regularly covered by BoEE counts. All count data available up to 1975 were reviewed by Prater (1977, 1981), and information on wildfowl along the southern shore has been presented up to 1982 by Owen et al. (1986). In addition, the scattered information available up to 1984 on birds along the north shore of the Burry Inlet was collated by Davis (1984), and Howells & Roberts (1988) provide an up-to-date general review of the status of birds on and around the Upper Loughor estuary.

BoEE counts are usually made on a pre-selected date near the middle of each month, chosen to coincide with spring tides when roosting waders can normally be counted most satisfactorily. Full details of general BoEE methodology are provided by Prater (1981); its actual application in the case of the south shore of the Burry Inlet is detailed by Howells (1972). The Burry Inlet south shore counts are probably unique among those covering much of a major estuary in having been carried out by one man, R.J. Howells, in almost every month since the inception of the BoEE. This largely eliminates potential problems of bias due to observer differences in recording. In addition, the frequency of counting by R.J. Howells has normally been weekly or fortnightly, rather than just monthly; the data provided are thus monthly maxima rather than single counts (Howells 1972). Problems caused by bird movements or poor weather conditions, whereby an individual count may underestimate the peak population of any species actually present during a particular month, are thus considerably mitigated in the data set available.

High water roosts tend to form at sites where the birds are relatively safe from predators and disturbance. For this reason, birds may fly considerable distances from their low water feeding areas to roost. It is therefore not generally possible to assess the importance of different parts of the estuary for feeding by examining the high tide distribution of intertidal waders, although useful information may be forthcoming for those wildfowl species which feed either on the water or graze on the upper saltmarsh. Almost all information on the feeding distribution of birds in the Burry Inlet was obtained from separate low water counts (see below), whereas the high tide counts provided much the best information on the total numbers of most species present in the estuary.

The results of the high water counts have been used in this report in a number of contexts:

Estimation of current population levels: Data from the most recent

five years of south shore counts (1983/84 - 1987/88) have been used to provide estimates of current regular wintering population levels of each species. In addition, almost complete coverage of the north shore and Upper Loughor estuary was obtained during 1987/88; these data were analysed in conjunction with the 1987/88 south shore results to provide an estimate as to by how much the south shore counts alone may fall short of the total Burry Inlet population size for each species.

Annual trends in population levels: Information from the south shore counts for each wader species since the start of the BoEE (1969), and for each wildfowl species since 1976, was analysed on a year-on-year basis to throw light on possible trends in winter (November-March) population levels.

Seasonal trends in population level: The most recent ten years (1978/79 - 1987/88) of data from the south shore counts for each wader and wildfowl species were averaged on a monthly basis in order to describe average seasonal patterns of occurrence. Data on the actual seasonal pattern of occurrence in 1987/88 are also presented.

Patterns of use of roost sites: The BoEE count sectors on the Burry Inlet are shown and named in Figure 4.1. The high tide distribution patterns of each of the main species present within the Burry Inlet were documented from the BoEE counts made in winter 1987/88. For the south shore, these data were placed in a broader context by the additional presentation of a synopsis of average annual peak counts of species in the six BoEE sectors there over the period 1978/79 to 1986/87.

4.2 LOW WATER COUNTS

Data on the feeding distribution of each wader and wildfowl species present on the entire Burry Inlet were obtained through special studies between November 1987 and March 1988 inclusive. An average of ten man-days per month was devoted to this, with eight of these actually being spent in the field. During this eight man-day period, the aim was to cover all parts of the Burry Inlet twice during an interval spanning four hours on either side of low water. This was achieved during November to February inclusive, despite problems on about 30% of counting days with mist, heavy rain or strong winds. In March, however, prolonged adverse weather prevented a full data set being obtained. Observations were limited to daylight hours.

For the purposes of low tide recording, the entire Burry Inlet (including the Upper Loughor estuary) was split into 24 sectors, numbered as shown in Figure 4.2. All except sector 7 were covered by the low tide counts. The saltmarsh sectors included narrow muddy channels penetrating them, but no larger areas of intertidal flats. For most purposes of text discussion, the sectors have been amalgamated into seven regions (Figure 4.3), each consisting of 3-4 sectors. Some areas could be counted most easily from a raised vantage point on the shore; others, notably much of the central and outer southern shore, required that large distances be walked, including far out onto the intertidal area. Considerable tidal-related movements of birds

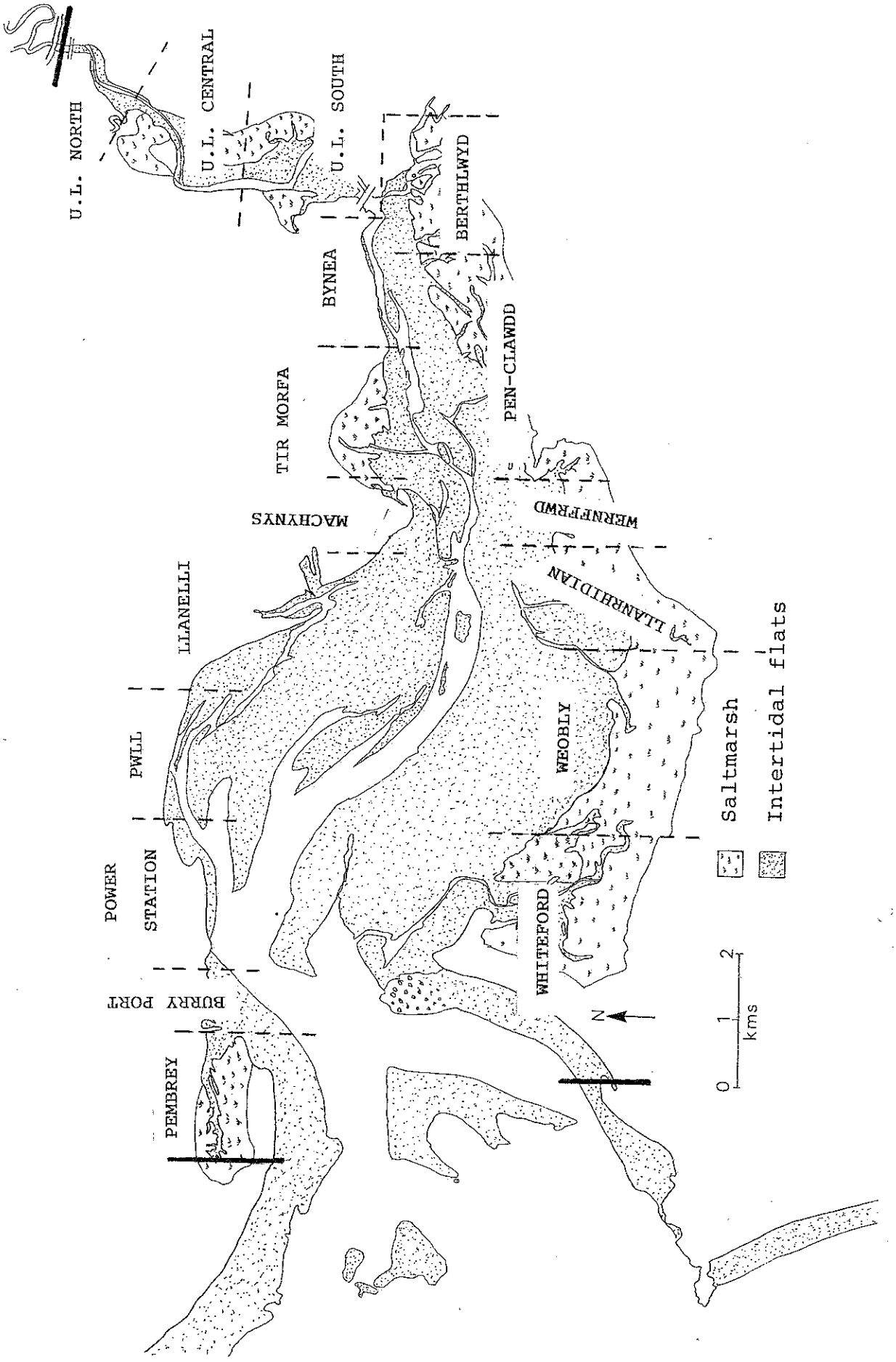

FIGURE 4.1 BoEE high tide count sectors on the Burry Inlet

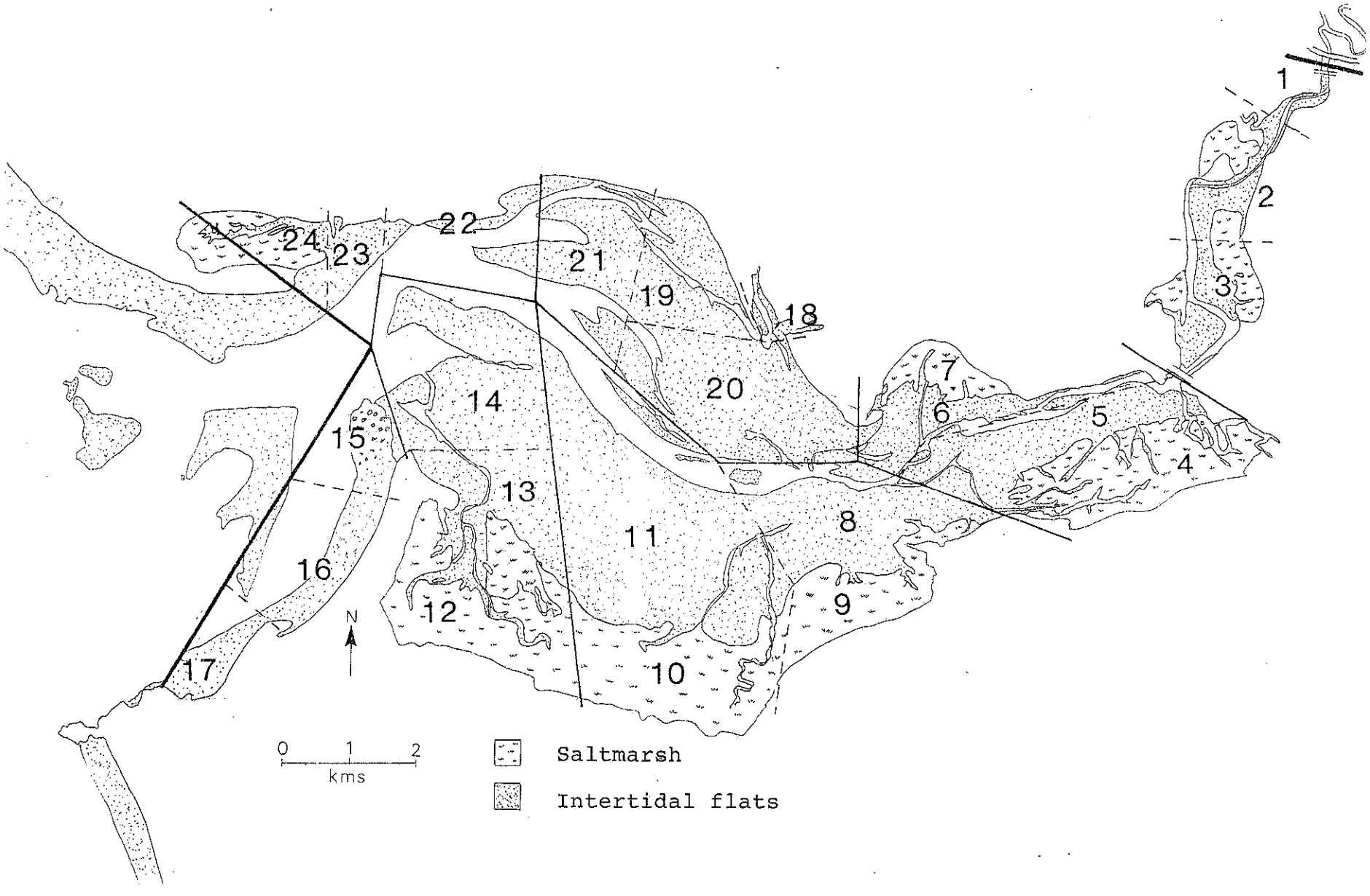

FIGURE 4.2 Low tide count sectors on the Burry Inlet. Boundaries between sectors within a single region (see Figure 4.3) comprise either the saltmarsh edge or a dotted line. Boundaries between regions comprise a thin continuous line.

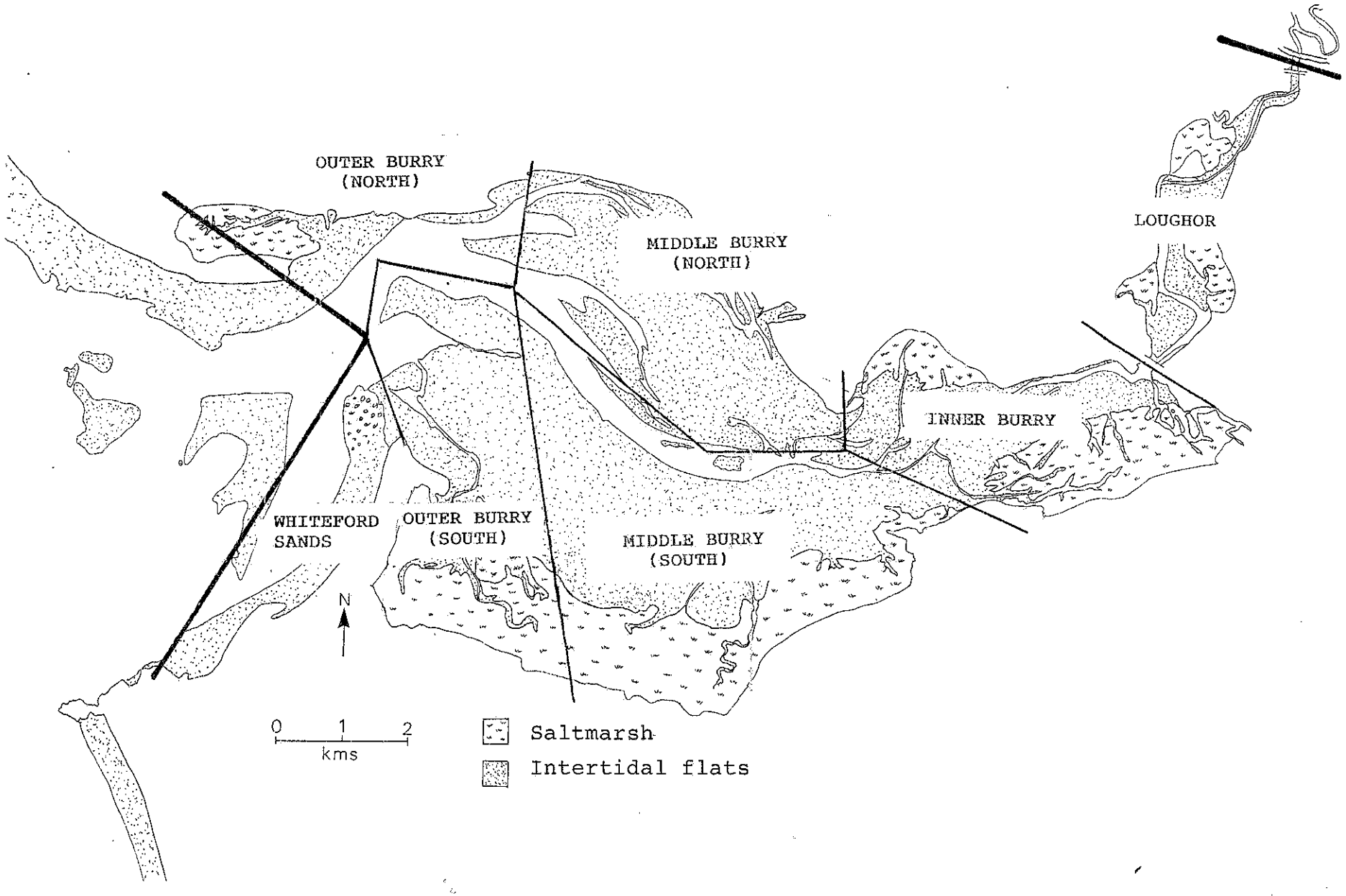

FIGURE 4.3 Regions of the Burry Inlet into which low tide count sectors (see Figure 4.2) are combined for most purposes of text discussion.

occurred throughout much of the Burry Inlet, and these were recorded whenever noted.

Timings of low tide observations in relation to tidal state were ascertained from the Admiralty tide tables; these were necessarily approximate as variable tidal lag differences occur in some parts of the Burry Inlet (Moore 1977). Inclusion of the period between four hours before low water until four hours after low water as "low tide" accorded with general impressions of the availability of tidal flats to feeding birds. Thus, at the east end of the Burry south shore, the tide dropped off the saltmarsh edge between ca 4.25 and 4.75 before low tide, depending on tide height. Further west, opposite Weobley castle, the tide dropped off the saltmarsh edge 4.5 hours before low tide on 19 February, following an exceptionally high spring tide; by 3.75 hours before low tide it had raced out over the flats. Outside the Burry Inlet proper, on Whiteford Sands (Figure 4.3), the last important feeding habitat to become available was the smaller, more southerly, mussel scars in sector 16, which were only exposed within three hours of low tide.

On the north shore, the flats and mussel scars off Tir Morfa saltmarsh started to expose ca 4.25 hours before low tide and were covering fast 4.25 hours after. The large intertidal flats off Llanelli were exposed by 3.5 hours before low tide and covering fast four hours after, with little left visible 4.5 hours after. At Pembrey saltmarsh, some sand and mud was available soon after high tide, but the rubble-strewn shore in front of the Power Station was largely covered until 3.5 hours before low tide. Burry Port Harbour itself was still water-filled three hours prior to low tide, draining over the next half-hour.

Two constraints on the specific identification of birds sometimes occurred during low tide observations. Ducks well out on the central river channel sometimes had to be recorded merely as "ducks". Similarly, flocks of small "grey" waders, notably of Knot/Dunlin, far out on, in particular, Llanrhidian Sands, sometimes could not be divided up according to species. This was a particular problem on the not infrequent misty days.

5. ANNUAL AND SEASONAL TRENDS IN NUMBERS

Data presented in this chapter derive entirely from the regular south shore BoEE counts submitted by R.J. Howells (see section 4.1). Annual trends are considered for all species of wildfowl and waders having peak wintering populations of 50 or more birds in any individual year, and seasonal trends for all species having average populations during any month of over 20 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 Burry south shore.

5.1 BRENT GOOSE Branta bernicla

The wintering population of Brent Geese present on the Burry has increased from under 200 birds during the mid 1970s to a current total of around 700 (Figure 5.1a), paralleling the national population increase that has occurred in this species (Salmon et al. 1988). The great majority of birds are of the dark-bellied race B.b bernicla, but up to 24 of the pale-bellied race B.b hrota have been seen simultaneously (Llanrhidian, December 1985).

Within the overall increasing trend in numbers of wintering Brent Geese, three major surges in population are apparent, in 1979/80, 1982/83 and 1985/86. These surges follow the three most recent successful breeding seasons for dark-bellied Brent in Siberia (Summers & Underhill 1987).

Numbers of Brent Geese begin building up during October and November, reach a plateau between December and March, and then almost entirely disappear before the April count (Figure 5.1b).

5.2 SHELDUCK Tadorna tadorna

In the early 1970s, recorded numbers of wintering Shelduck averaged only ca 600 (Prater 1977). They increased markedly to around 1,500 in the late 1970s, a time of national population increase (Salmon et al. 1988), since when they have remained relatively stable except for a strikingly high population in 1981/82 (Figure 5.2a).

Numbers present reach a minimum in August, when birds are away at their traditional moulting grounds, increasing thereafter up to a peak in December and January before falling away again during the late winter and spring (Figure 5.2b). Nevertheless, small numbers of birds are frequently recorded between May and July, with pairs breeding in suitable areas along the southern shore, notably between Whiteford and Llanrhidian.

5.3 WIGEON Anas penelope

Wigeon numbers increased during the early 1970s on the Burry Inlet (Prater 1977) and appear to have continued to do so, although the picture is complicated by marked surges in numbers in some recent years (Figure 5.3a). In addition, whereas peak numbers are on average reached during December and January (Figure 5.3b), there are occasional

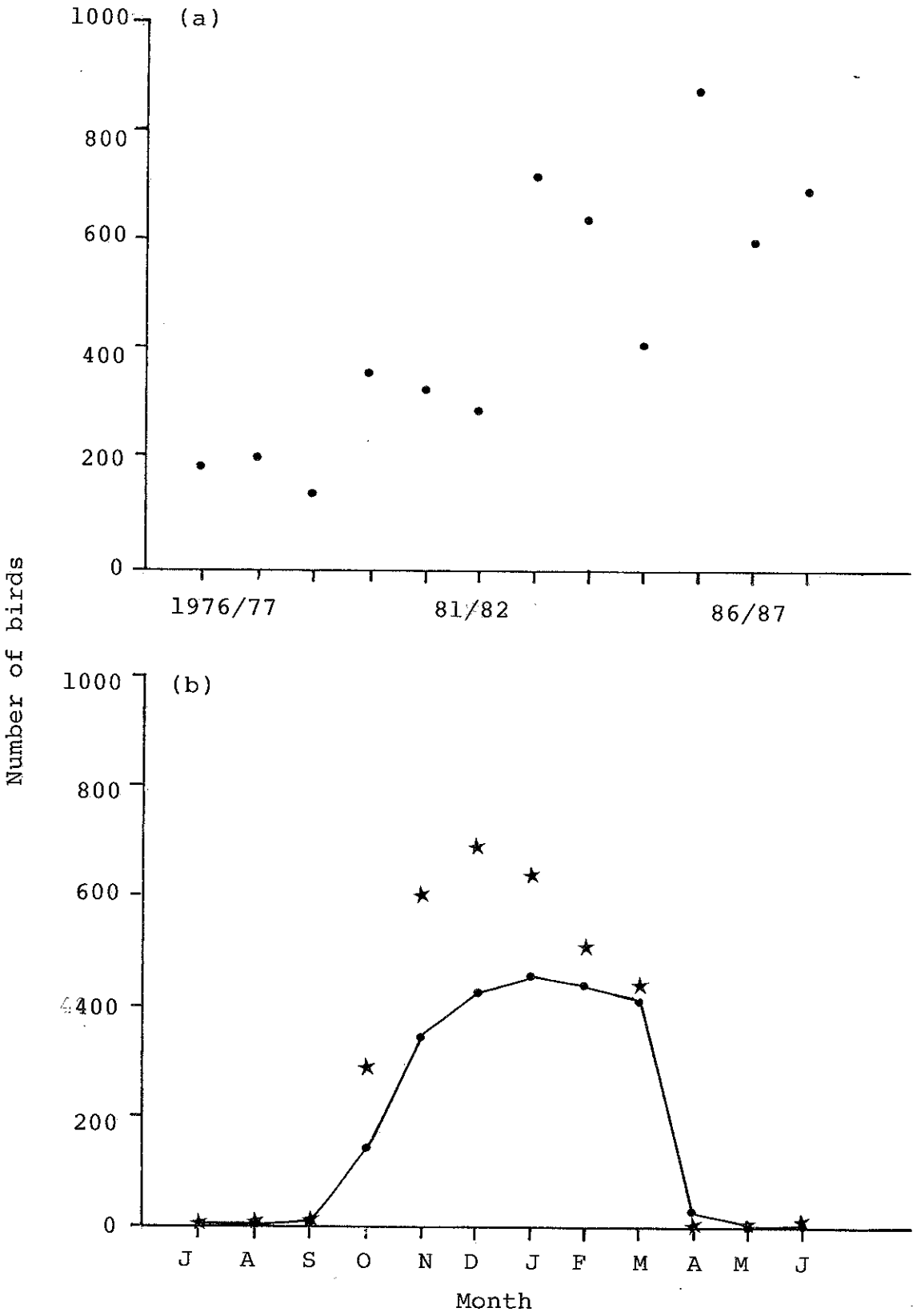

FIGURE 5.1 Brent Goose on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

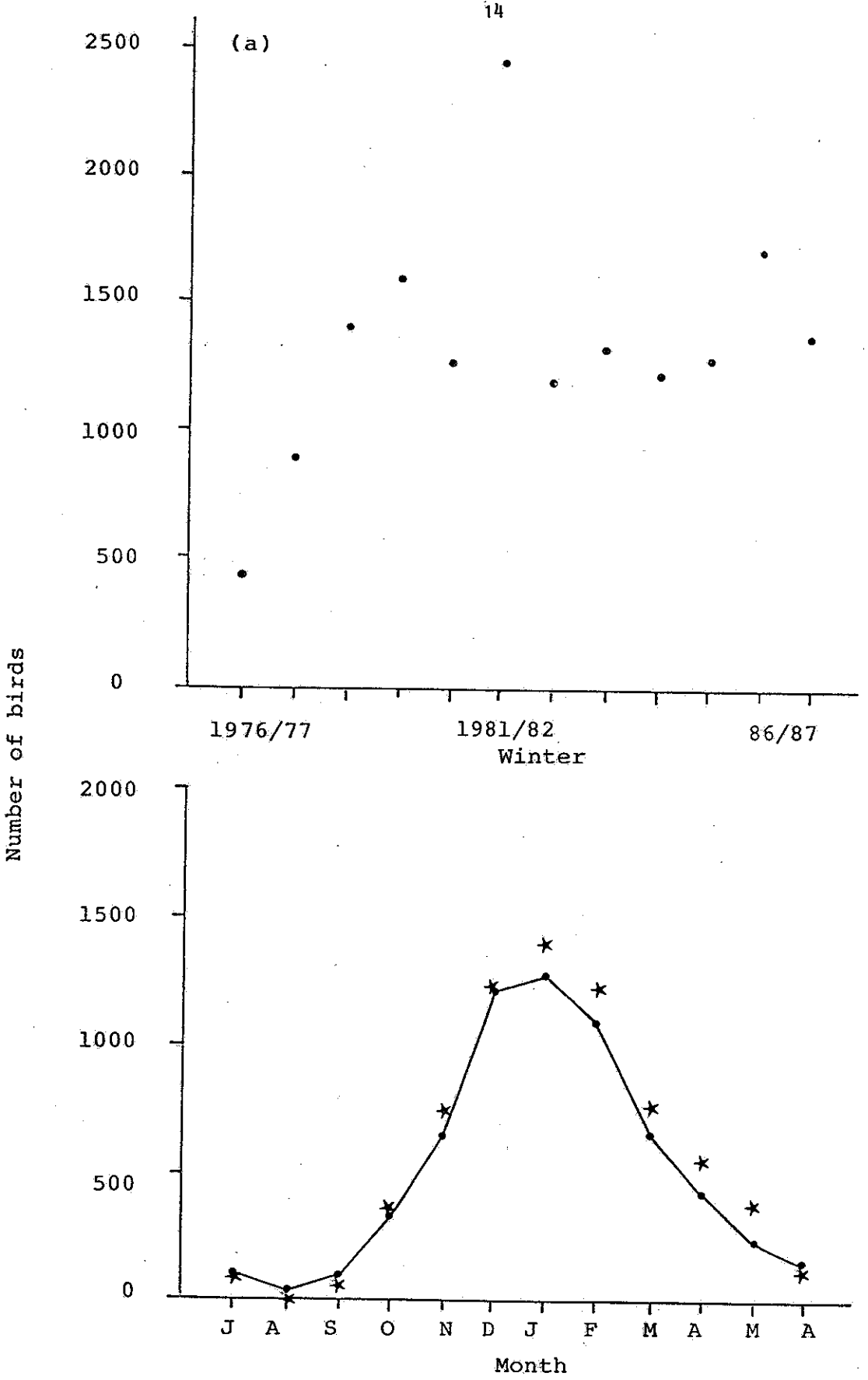

FIGURE 5.2 Shelduck on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

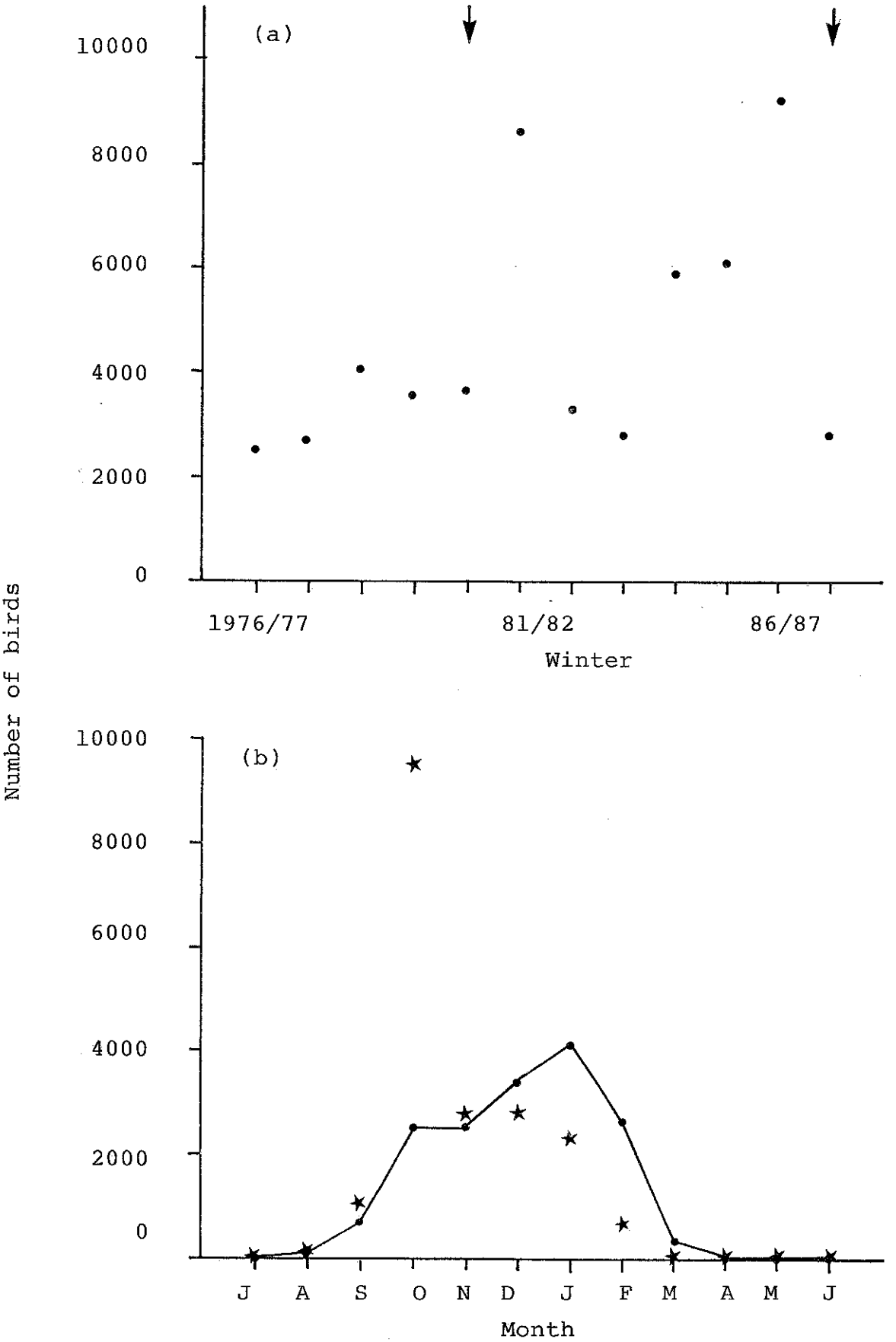

FIGURE 5.3 Wigeon on the Burry Inlet south shore:
a) annual trends in peak winter counts; arrows show years in which October maxima occurred (see text);
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

pronounced, short-lived influxes in October. A particularly striking October influx occurred in 1987, with 9,510 birds recorded in that month but no more than 2,770 subsequently during the winter (Figure 5.3b). Salmon et al. (1988) suggest that the characteristic October peak of Wigeon numbers in Northern Ireland may comprise Icelandic birds; possibly these spill over into Wales in some autumns.

5.4 TEAL Anas crecca

Prior to the 1970s, less than 200 Teal were recorded on the Burry Inlet, but this jumped to 500-600 in the early 1970s (Prater 1977). A further striking increase had occurred by the mid 1970s (Figure 5.4a), since when the peak monthly count has averaged well over 1,500 birds (Figure 5.4b). These increases have occurred simultaneously with a national population increase (Salmon et al. 1988), but are proportionately greater.

Over the past decade, peak winter counts have varied markedly; a surge in numbers occurred during cold weather periods in the three winters from 1982/83 to 1984/85, when between 3,000 and 5,000 birds were present (Figure 5.4a). Numbers build up rapidly from September to a pronounced peak in December/January, before falling away again to near zero by May (Figure 5.4b).

5.5 MALLARD Anas platyrhynchos

Recorded numbers of Mallard present in mid winter have fluctuated from about 100-300 birds since the mid 1970s, with no consistent trend (Figure 5.5a). Unlike for other duck species, the peak monthly count normally is made in mid autumn, with numbers then falling off through the winter to reach a minimum in March/April. The peak monthly count in September averages under 300 individuals, but an exceptional total of nearly 700 was recorded in September 1987 (Figure 5.5b).

5.6 PINTAIL Anas acuta

Numbers of Pintail in the Burry Inlet almost tripled between the mid 1970s and the early 1980s, with peak winter populations rising from under 1,000 to approaching 3,000 (Figure 5.6a); national populations changed little over the same period (Salmon et al. 1988). Since then there has been some decline, but average wintering populations are still above 2,000.

Numbers of Pintail present build up rapidly during October and November, reaching a peak in December/January followed by almost complete departure before the March count (Figure 5.6b).

5.7 SHOVELER Anas clypeata

Numbers of wintering Shoveler recorded along the Burry south shore have surged almost five-fold since the mid 1970s (Figure 5.7a), a change far greater than any noted at the national level (Salmon et al. 1988). Numbers build up during October and November to peak in December, subsequently declining slowly until February followed by almost

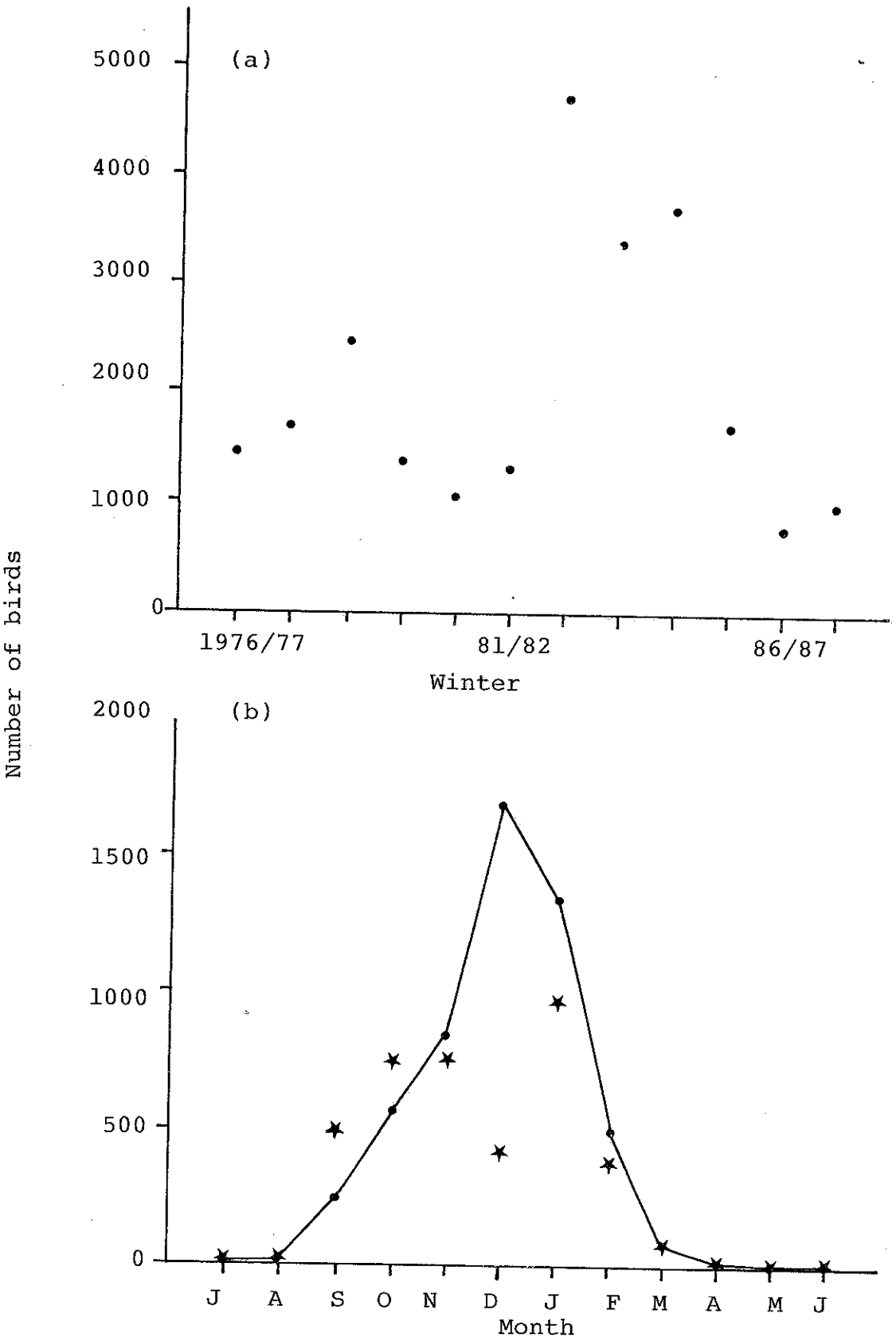

FIGURE 5.4 Teal on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

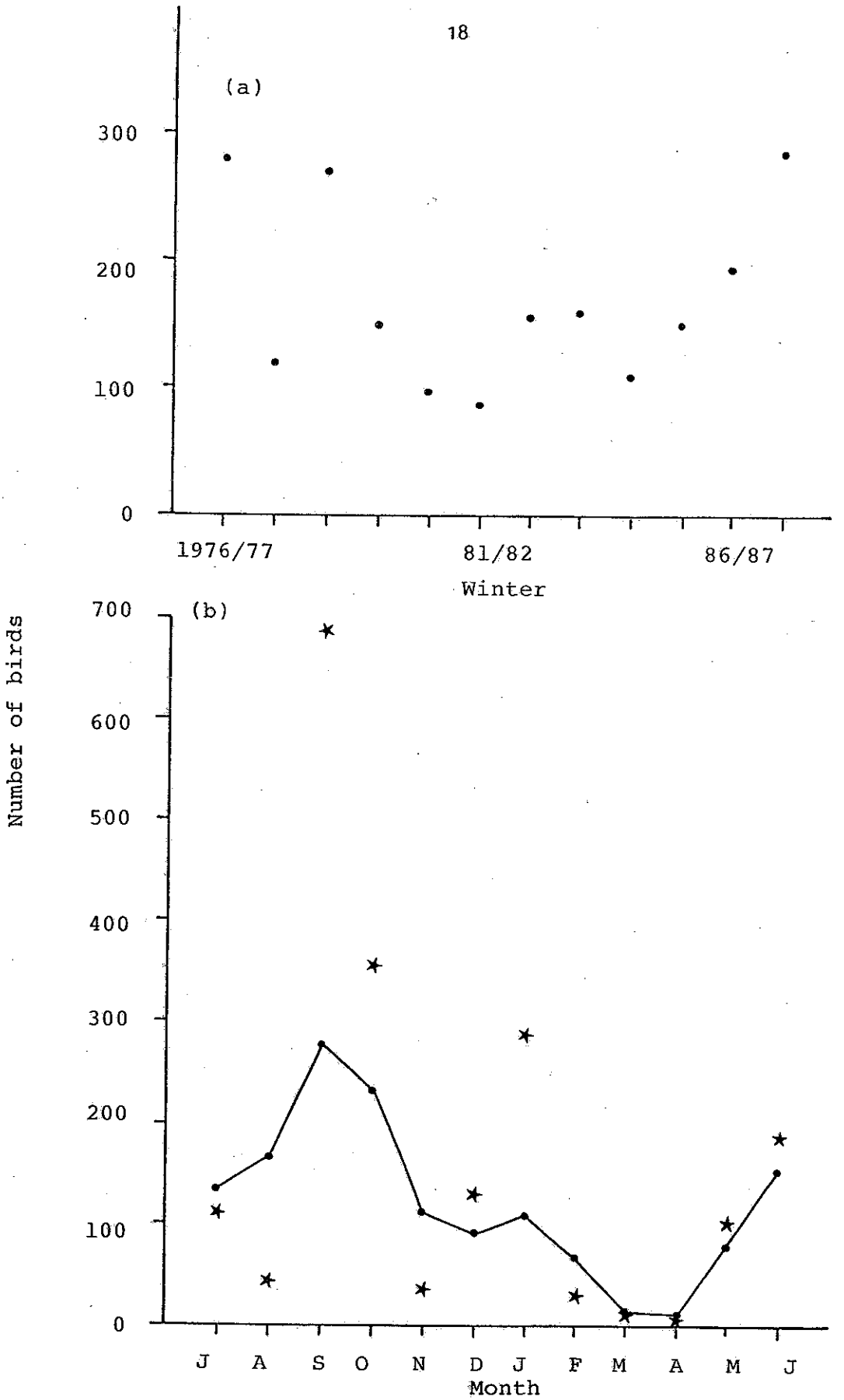

FIGURE 5.5 Mallard on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

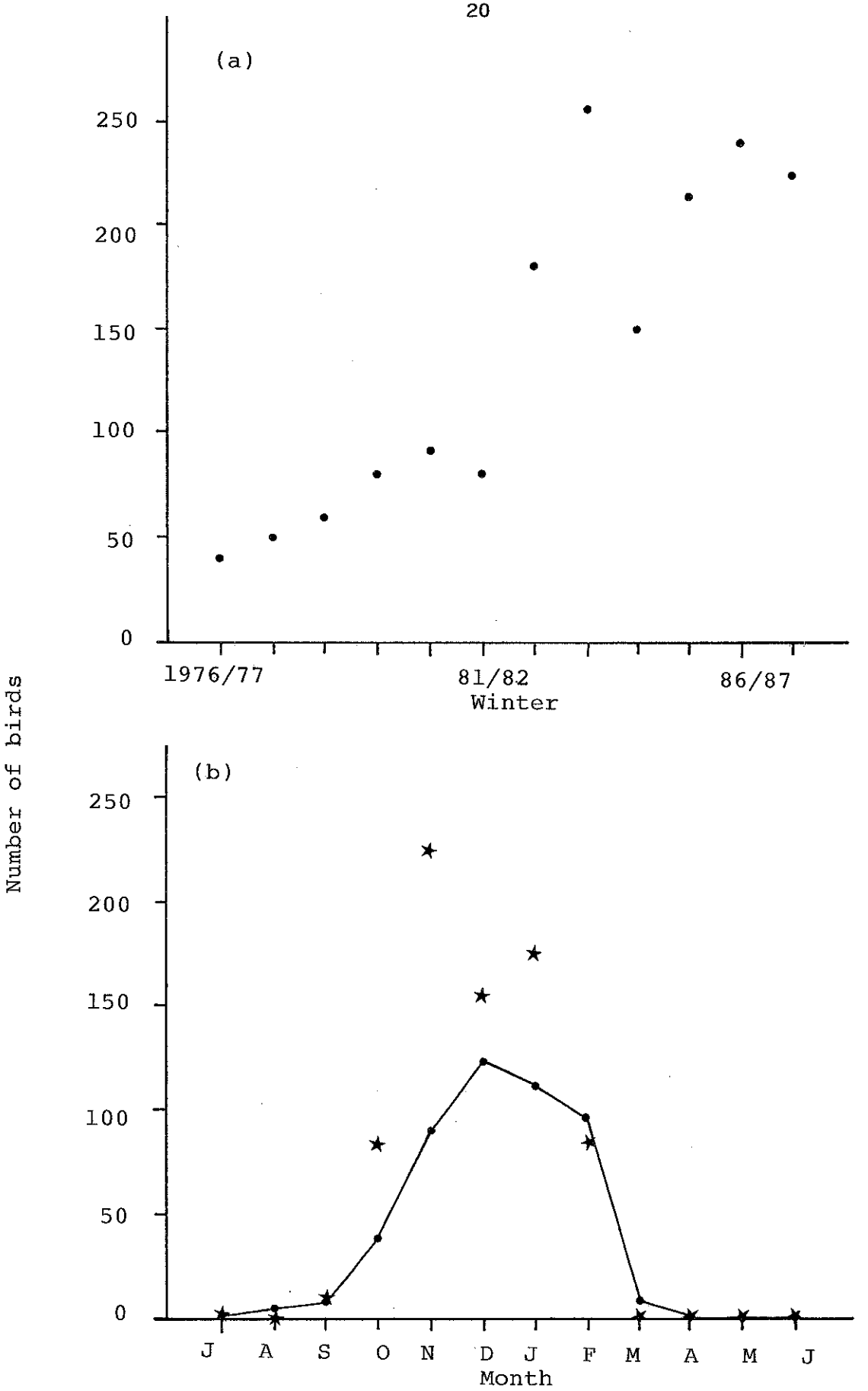

FIGURE 5.7 Shoveler on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

complete departure before the March count (Figure 5.7b).

5.8 EIDER Somateria mollissima

Since the mid 1970s numbers of wintering Eider have fluctuated around 150 (Figure 5.8a), well up on the 50 or so recorded previously (Prater 1977). Birds are present throughout the year, although without any evidence of breeding, but build up to a peak in January/February (Figure 5.8b).

5.9 OYSTERCATCHER Haematopus ostralegus

The Oystercatcher is the most numerous species of wader present on the Burry Inlet. Because of its supposed role in the decline of local cockle stocks, a cull of the species was carried out by the relevant fisheries authorities during 1973/74 and 1974/75, with 11,000 birds being killed (Prater 1981). Prior to this cull, wintering numbers averaged ca 15,000, dropping to ca 10,000 during the years of the cull. Since then the wintering population has almost doubled, rising faster than the national increase which has also occurred over this period (Salmon et al. 1988), and now averages around 20,000 birds (Figure 5.9a).

The non-breeding population of Oystercatchers which spends the spring and summer on the Burry is greatly swelled by birds returning from their breeding grounds between the July and September counts. On average, numbers are at a plateau between the September and February counts, before rapidly declining again by April (Figure 5.9b).

5.10 RINGED PLOVER Charadrius hiaticula

No trend in the wintering population of Ringed Plovers on the Burry south shore is apparent since the start of the 1970s; year-to-year variation is considerable however (Figure 5.10a). In common with the national pattern for the species, peaks of migrating birds tend to occur in August and May (Figure 5.10b), although their short-lived nature means they are not recorded in every year (e.g. 1987/88). A generally lower population is recorded during the winter, but at this time birds may roost predominantly on the north shore (Prater 1977); short-term changes in roosting sites between sides of the estuary may possibly account for the apparent third peak in November. A few pairs breed in suitable places on both the north shore (Prater 1977) and south shore (e.g. a pair at Whiteford NNR in 1986).

5.11 GOLDEN PLOVER Pluvialis apricaria

During the early 1970s, as well as over the past two winters, a peak winter population of around 1,000 Golden Plovers was recorded; in between, numbers fluctuated around 2,500, with one exceptional winter (1976/77) when a peak of over 6,000 birds were present in March (Figure 5.11a). On average, numbers build up through the autumn to a peak in November/December, falling away again progressively during the late winter and spring to almost zero by May (Figure 5.11b). However individual years may vary markedly in the timing of the winter peak

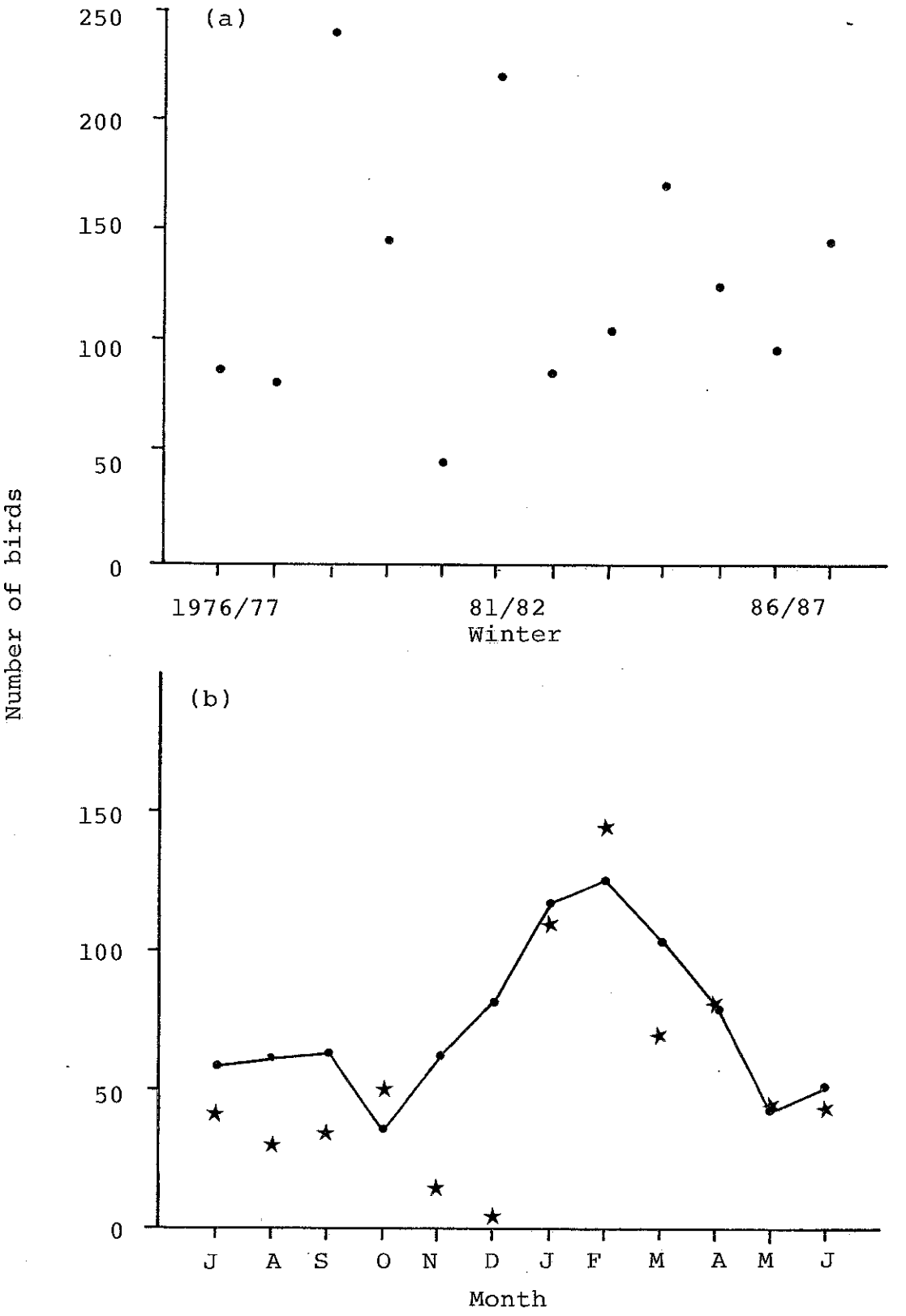

FIGURE 5.8 Eider on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

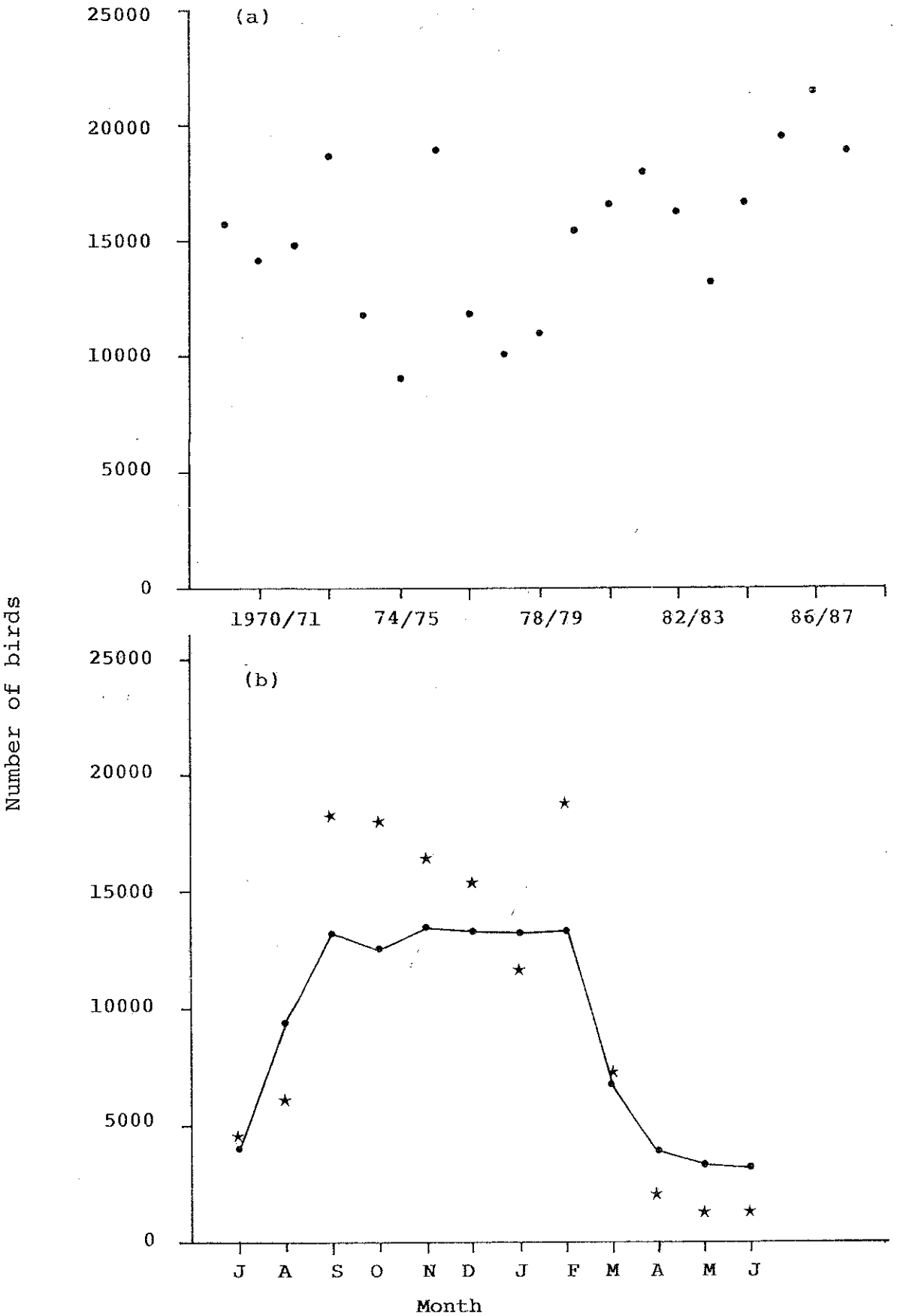

FIGURE 5.9 Oystercatcher on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

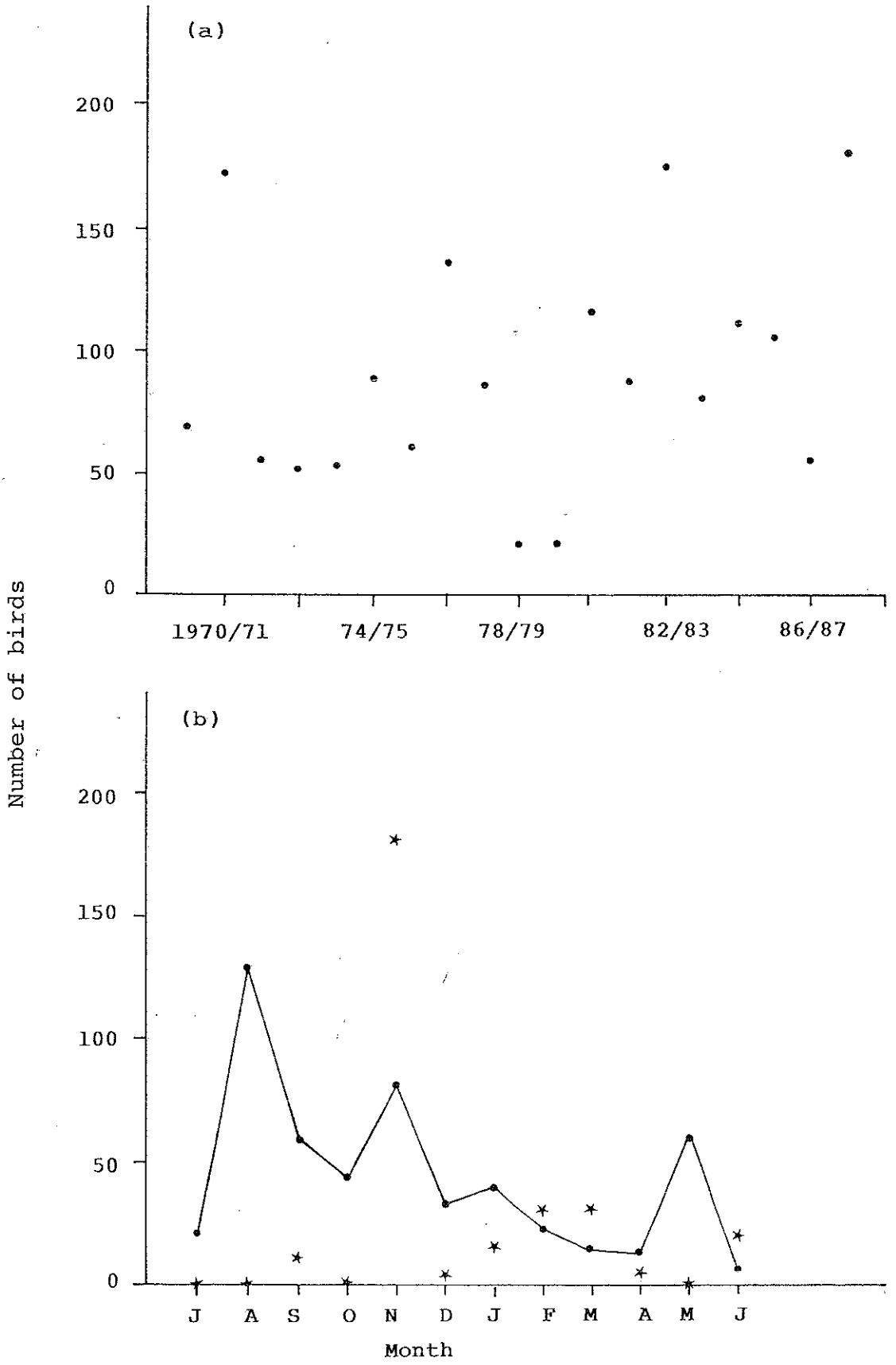

FIGURE 5.10 Ringed Plover on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

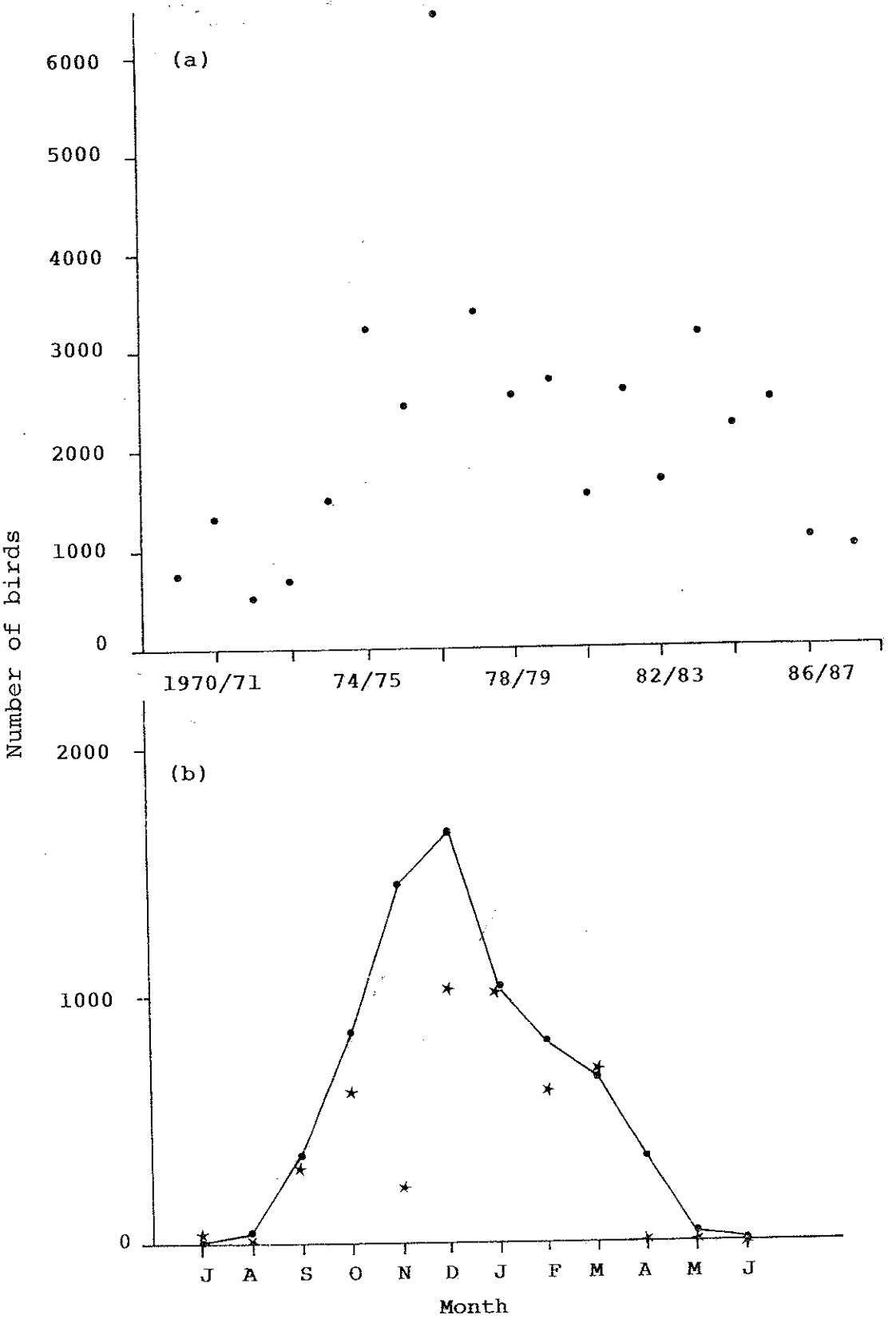

FIGURE 5.11 Golden Plover on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

depending on the prevailing weather, a characteristic true also of the British population as a whole (Salmon et al. 1988).

5.12 GREY PLOVER Pluvialis squatarola

Peak wintering populations of Grey Plovers on the Burry Inlet have increased about three-fold since the start of the 1970s (Figure 5.12a), a proportionately similar rise to that observed nationally over the same period (Salmon et al. 1988). The exceptional count of over 1,200 birds made in winter 1981/82 accords with evidence from other estuaries that itinerancy of large flocks occurs (Salmon et al. 1988).

A progessive seasonal build-up in numbers occurs throughout the autumn and early winter, on average peaking in late winter and with a subsequent rapid disappearance of most birds before the April count (Figure 5.12b).

5.13 LAPWING Vanellus vanellus

Between the early 1970s and mid 1980s there was evidence for an overall rise in peak wintering numbers of Lapwing on the south shore of the Burry Inlet from ca 1,000 to over 3,000, with an exceptional winter in 1973/74 when 5,000 were recorded. However, during the last couple of years, numbers have failed to reach even 1,000 (Figure 5.13a). This may well be only a temporary decline as the magnitude and timing of Lapwing movements are strongly influenced by weather patterns, resulting in great variation in numbers present between successive years.

On average, numbers of Lapwing build up slowly through the late summer and autumn and then rapidly in early winter to peak in December; subsequently, most birds depart between the February and March counts (Figure 5.13b).

5.14 KNOT Calidris canutus

Wintering Knot recorded on the Burry Inlet south shore declined strikingly from over 7,500 in the early 1970s to a low point of under 2,000 birds in 1978/79, since when there has been a partial recovery with wintering numbers up to over 5,000 (Figure 5.14a). The major fall in numbers between 1973/74 and 1974/75 ties in with a pronounced national decline between these years (Salmon et al. 1987), but the changes otherwise do not correlate closely with the national pattern.

Good numbers of Knot begin arriving after the October count, build up to a pronounced peak in mid winter, and then fall away sharply until almost none is left by the April count (Figure 5.14b).

5.15 SANDERLING Calidris alba

The predominant characteristic of the peak winter counts of Sanderling over the years is their variability, though four of the past five years indicate populations averaging about twice as large as previously (Figure 5.15a). However, almost all Sanderling recorded are at

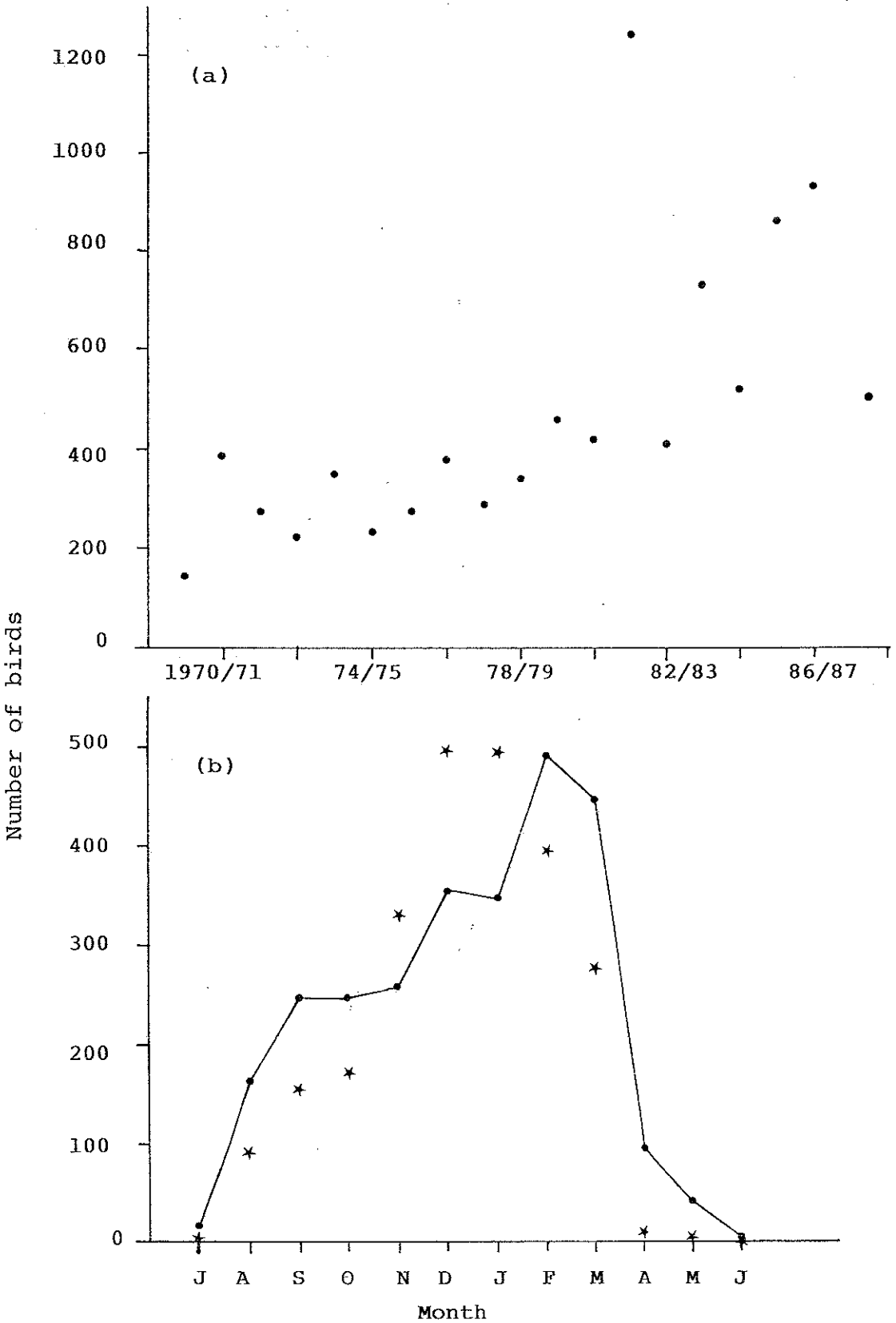

FIGURE 5.12 Grey Plover on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

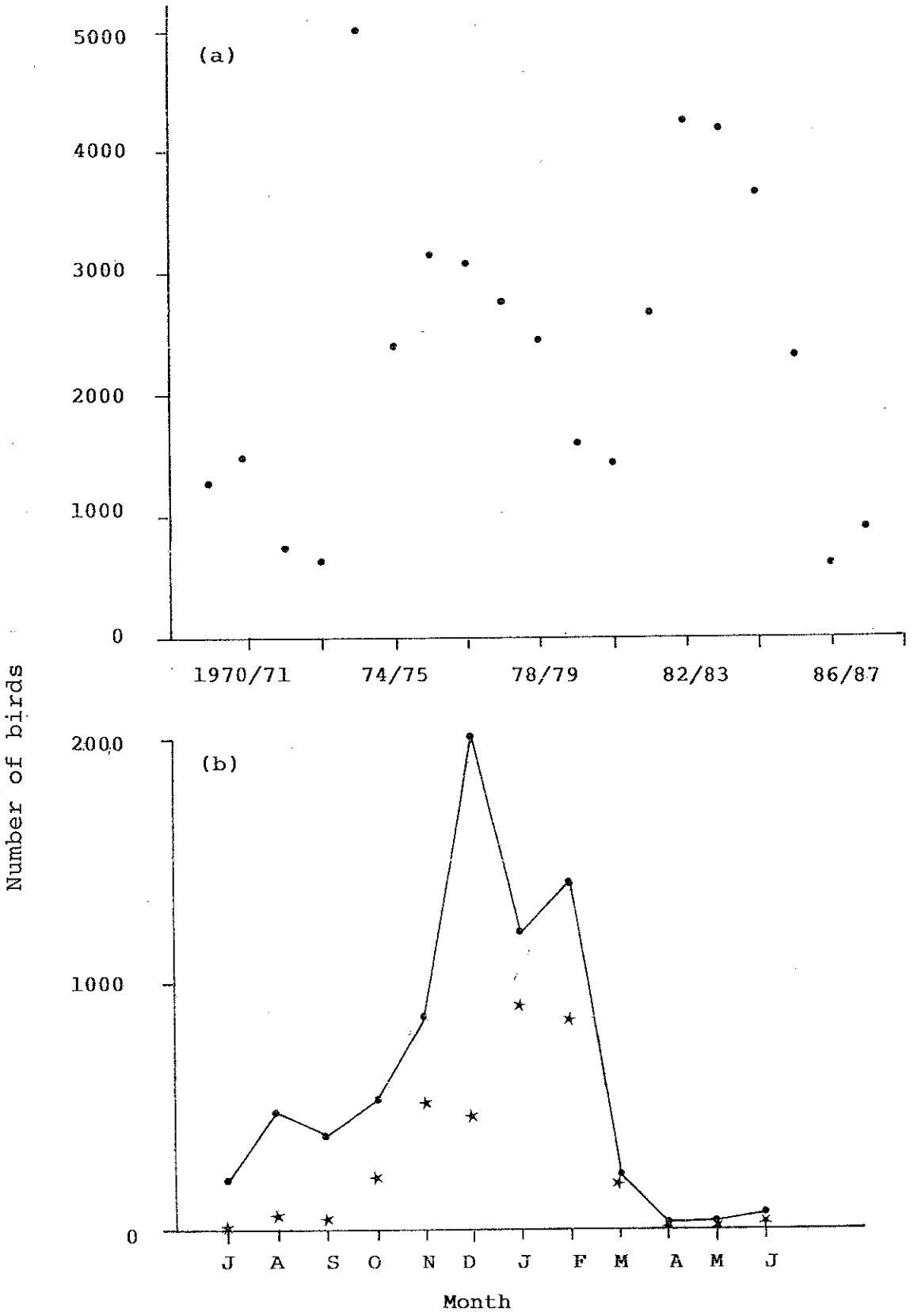

FIGURE 5.13 Lapwing on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

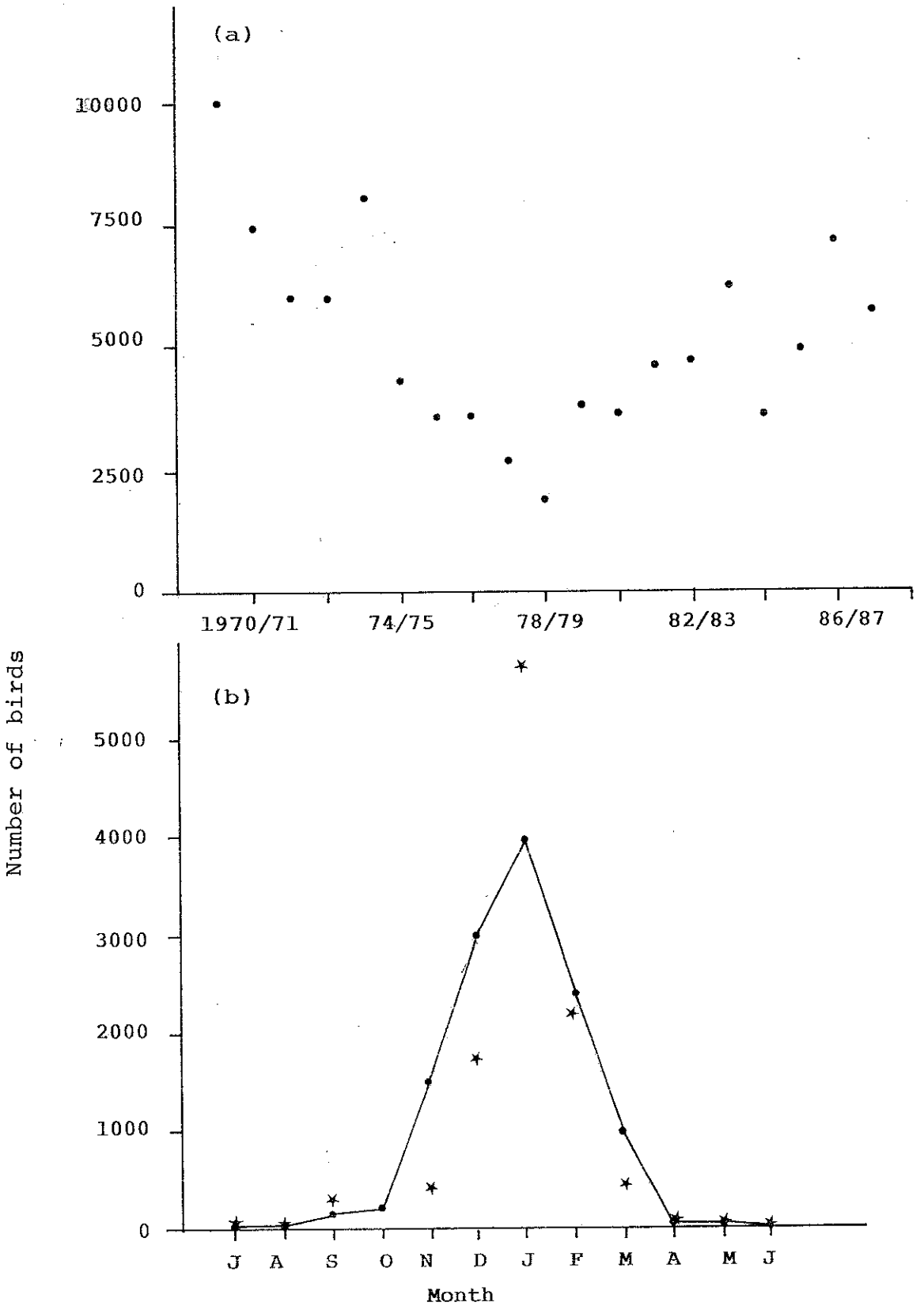

FIGURE 5.14 Knot on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

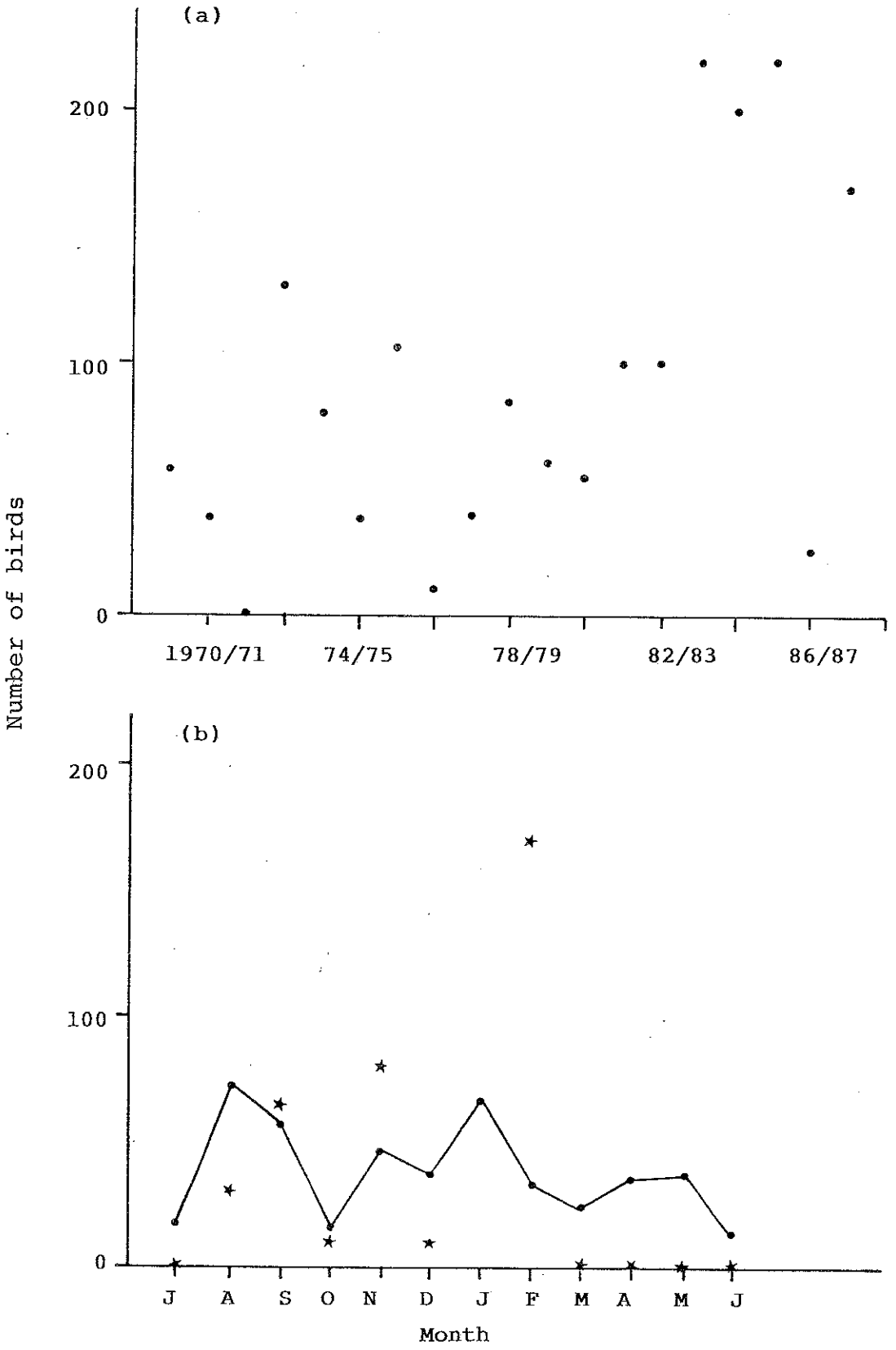

FIGURE 5.15 Sanderling on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

Whiteford, and these are probably birds which spend the greater part of their time along the Cefn Sidan shore (Prater 1977), outside the limits of the Burry Inlet as considered in this report. The counts should thus be interpreted with caution.

Some Sanderling are present throughout the year, but their recorded pattern of occurrence in any single year is irregular (Figure 5.15b). Autumn passage of birds is indicated by the August peak; nearly 500 birds have been recorded in this month in some years, but none in others. Similarly, over 400 individuals have occurred in May, but normally very few spring passage birds are noted.

5.16 DUNLIN Calidris alpina

Peak winter populations of Dunlin recorded on the Burry Inlet south shore in the early 1970s were variable, but up to 8,000 birds were present in some years. Since the mid 1970s all winter counts have been under 6,000, and over the past four years under 4,000 (Figure 5.16a). This is in line with the pronounced national decrease in wintering numbers of this species that has occurred (Goss-Custard & Moser 1988). The seasonal pattern of Dunlin occurrence was well described by Prater (1977): there is a small through migration in August and again in May, but the principal numbers arrive in November and remain until March (Figure 5.16b).

5.17 SNIPE Gallinago gallinago

The BoEE counting technique is unsuitable for making an accurate assessment of populations of Snipe, an extremely cryptic species. As might be expected, winter peak counts on the Burry Inlet are notable mainly for their variability, within which no clear trend can be distinguished (Figure 5.17a). Most birds are recorded during the winter (Figure 5.17b).

5.18 BLACK-TAILED GODWIT Limosa limosa

Few Black-tailed Godwit have recently been recorded wintering on the Burry Inlet (Figure 5.18a). Similarly, there has been little recent sign of the "strong autumn passage" noted by Prater (1977) in the early 1970s; the most recent count exceeding 100 was in 1977/78. Counts in 1987/88 were, however, higher than the recent average (Figure 5.18b).

5.19 BAR-TAILED GODWIT Limosa lapponica

The pattern of winter peak counts of Bar-tailed Godwit on the Burry Inlet south shore is complex, with data from most years since the early 1970s indicating a decline from roughly 800 to 400, but with occasional years departing markedly from the trend for no obvious reason (Figure 5.19a). There has been little recent sign of the large August influx noted formerly by Prater (1977); instead, numbers rise slowly from the late spring/summer low until November, peak in December-January, and then fall off rapidly before the March count and more slowly thereafter (Figure 5.19b).

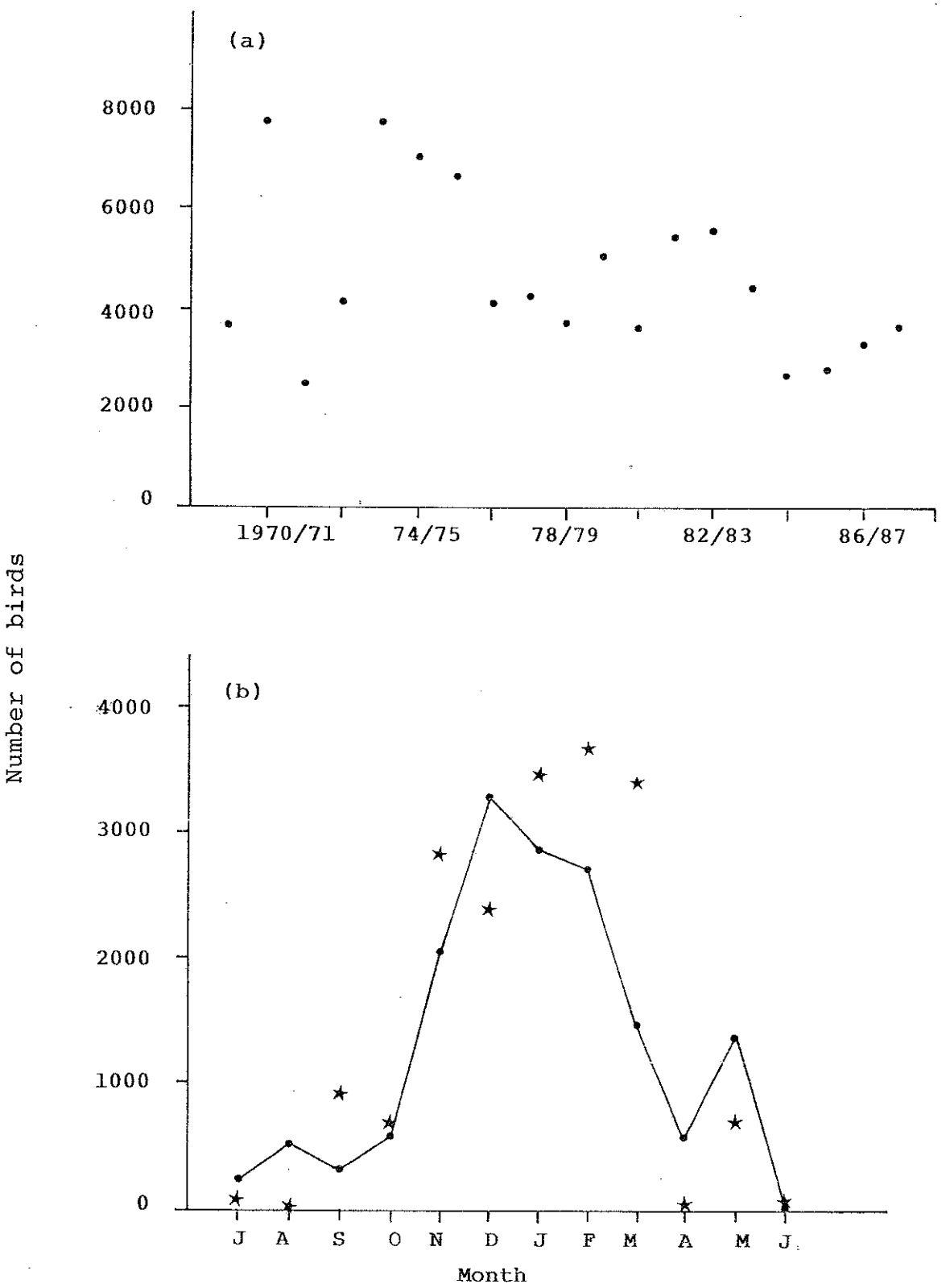

FIGURE 5.16 Dunlin on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

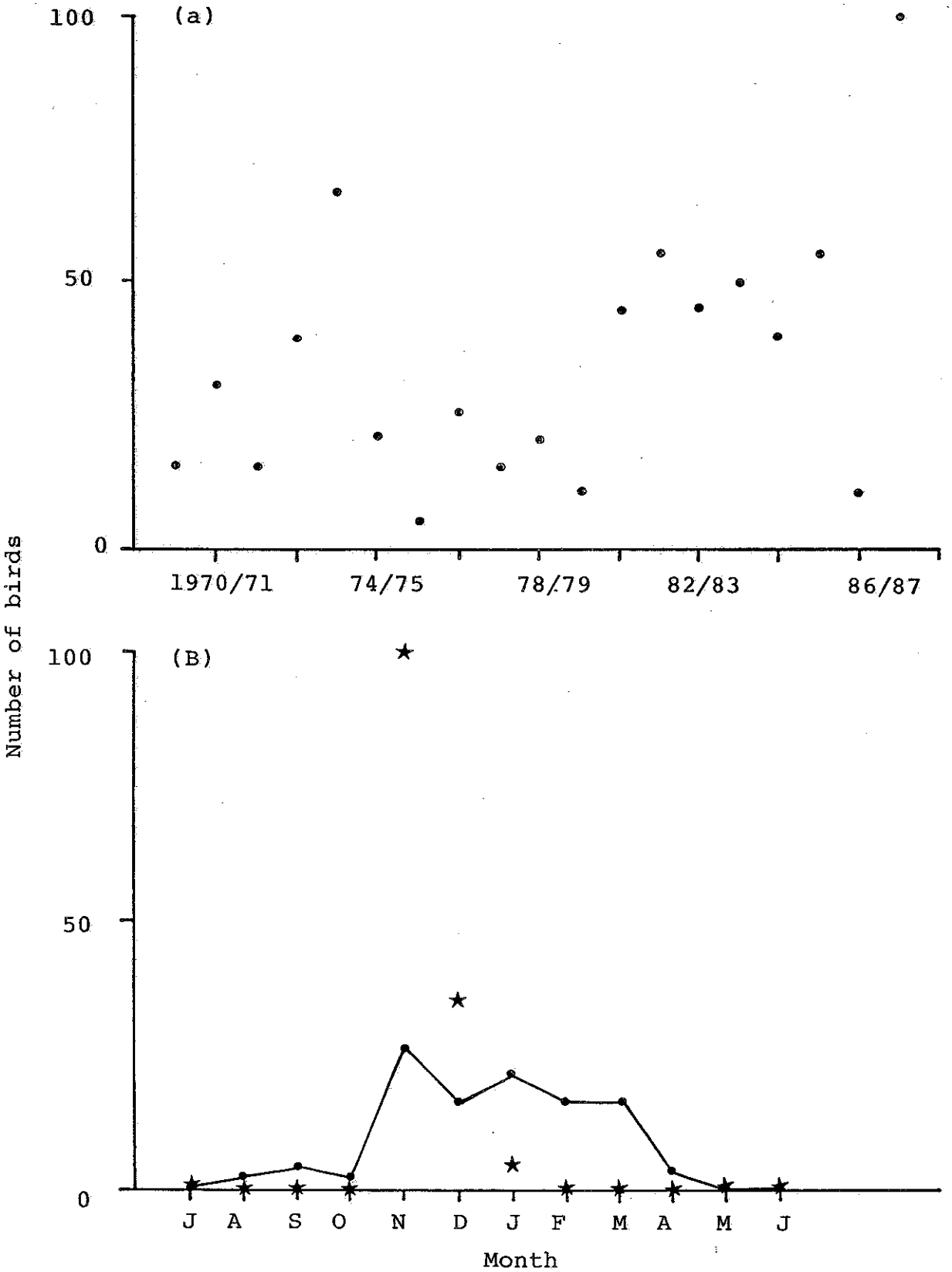

FIGURE 5.17 Snipe on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

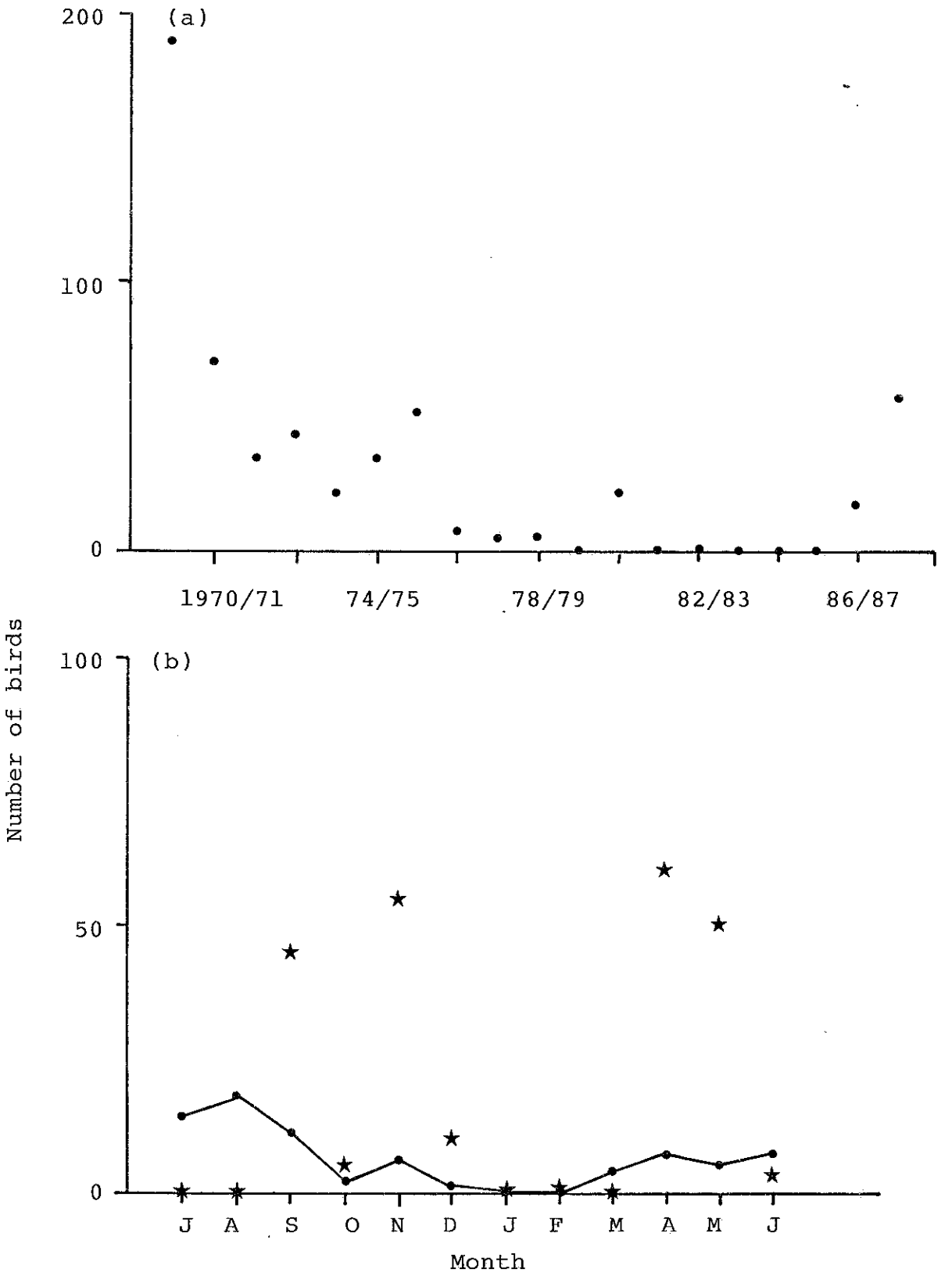

FIGURE 5.18 Black-tailed Godwit on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

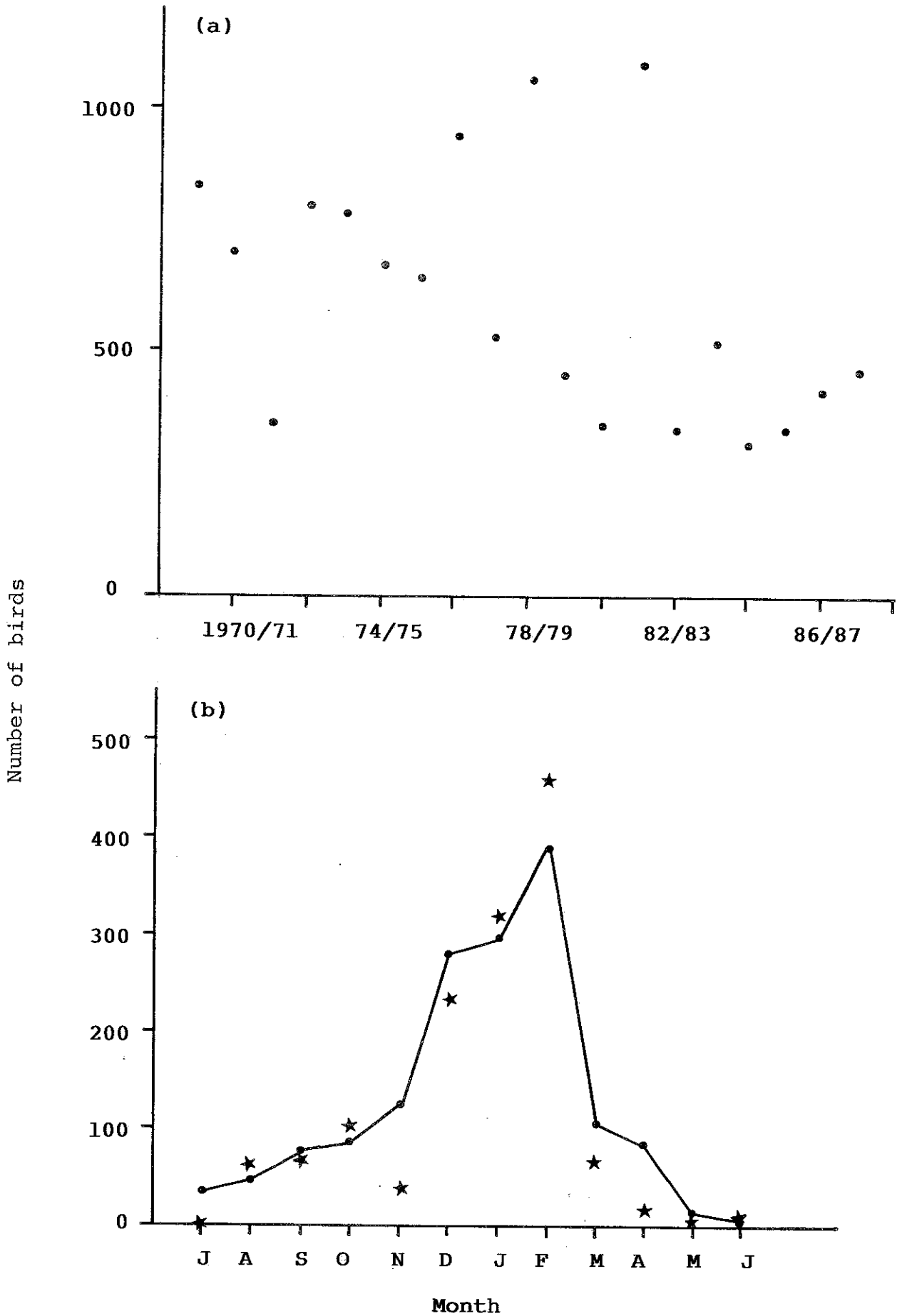

FIGURE 5.19 Bar-tailed Godwit on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

5.20 WHIMBREL Numenius phaeopus

Whimbrel occur only as a passage species on the Burry Inlet. Average autumn passage counts approaching 100 individuals occur as early as July, declining through August. Slightly smaller spring passage numbers are noted in April and May (Figure 5.20).

5.21 CURLEW Numenius arquata

Winter peak counts of Curlew on the Burry south shore have shown a slow but steady rise of around 25% since the early 1970s (Figure 5.21a),a pattern not reflected nationally (Salmon et al. 1988). On a seasonal basis, the population peaks in August, following which an extended decline occurs to a low point in May/June, and with a rapid recovery in July (Figure 5.21b). The average August count of 1,750 is about twice that in mid winter.

5.22 REDSHANK Tringa totanus

Peak counts of Redshank on the Burry south shore over the most recent six winters have averaged about 25% lower than previously (Figure 5.22a), and the evidence points to a continuing decline from the high levels reached in the mid 1970s. The seasonal pattern of occurrence reveals highest average monthly counts during the autumn, somewhat lower numbers through the winter, and a major departure between the March and April counts (Figure 5.22b). The average autumn peak of the past ten years is, however, well down on the 1,000 or more recorded during the early 1970s (Prater 1977), although individual counts still exceed this figure (e.g. September 1987).

5.23 GREENSHANK Tringa nebularia

The Greenshank is very much an autumn passage species on the Burry Inlet, with peak numbers occurring in September. Smaller peaks are recorded much less frequently during spring passage in May (e.g. in 1988), but under five birds normally winter (Figure 5.23).

5.24 TURNSTONE Arenaria interpres

Winter peak counts of Turnstone indicate a steady rise in the Burry south shore population from the 200-300 recorded in the early 1970s (Prater 1977) to an average of approaching 600 in recent years (Figure 5.24a). There has, however, traditionally been a large late autumn concentration on the Burry (Prater 1977), and the "winter" increase may at least partly have resulted from these birds tending to remain later; October and November are clearly the peak time of year for the species (Figure 5.24b). After November, numbers decline by half as the winter progresses, before briefly increasing again as spring passage birds pass through. These are recorded predominantly in April, but an exceptional peak count of almost 1,350 birds was made on 6 May 1978.

5.25 OTHER SPECIES

Species listed below comprise only those recorded on BoEE counts and/or

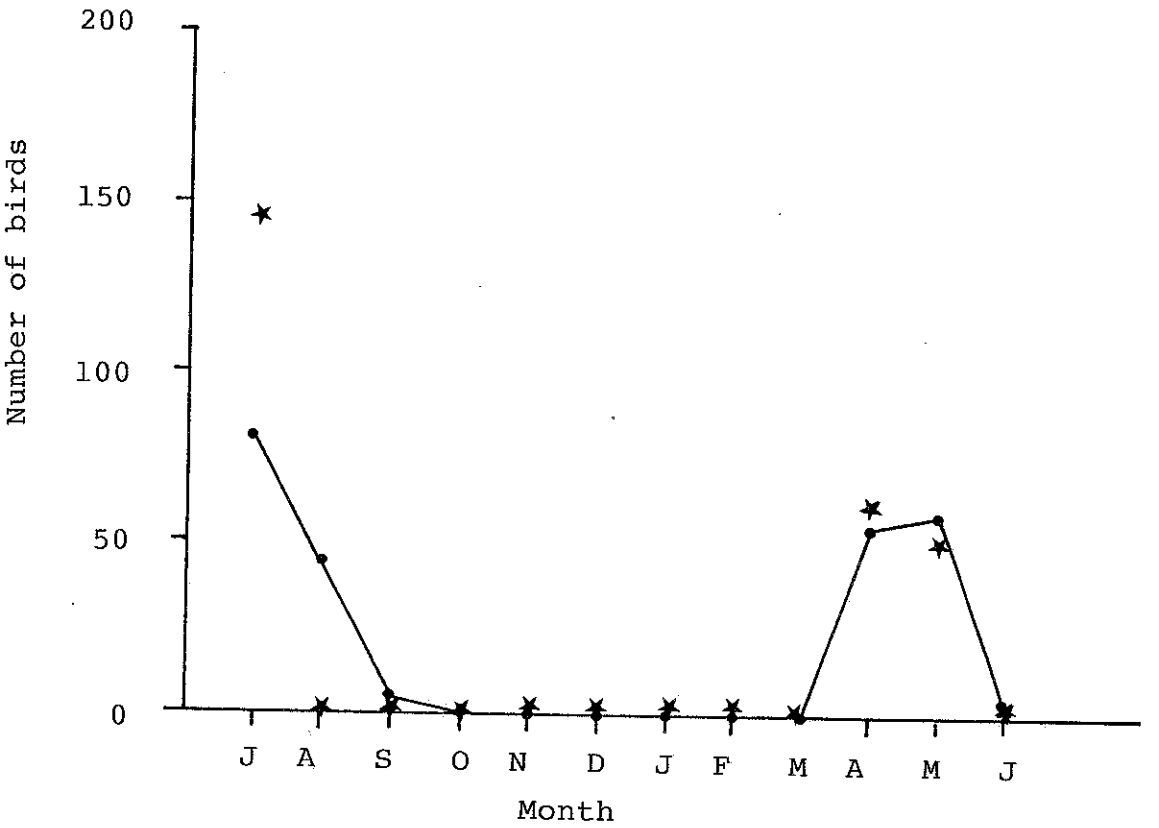

FIGURE 5.20 Seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars) of Whimbrel on the Burry Inlet south shore.

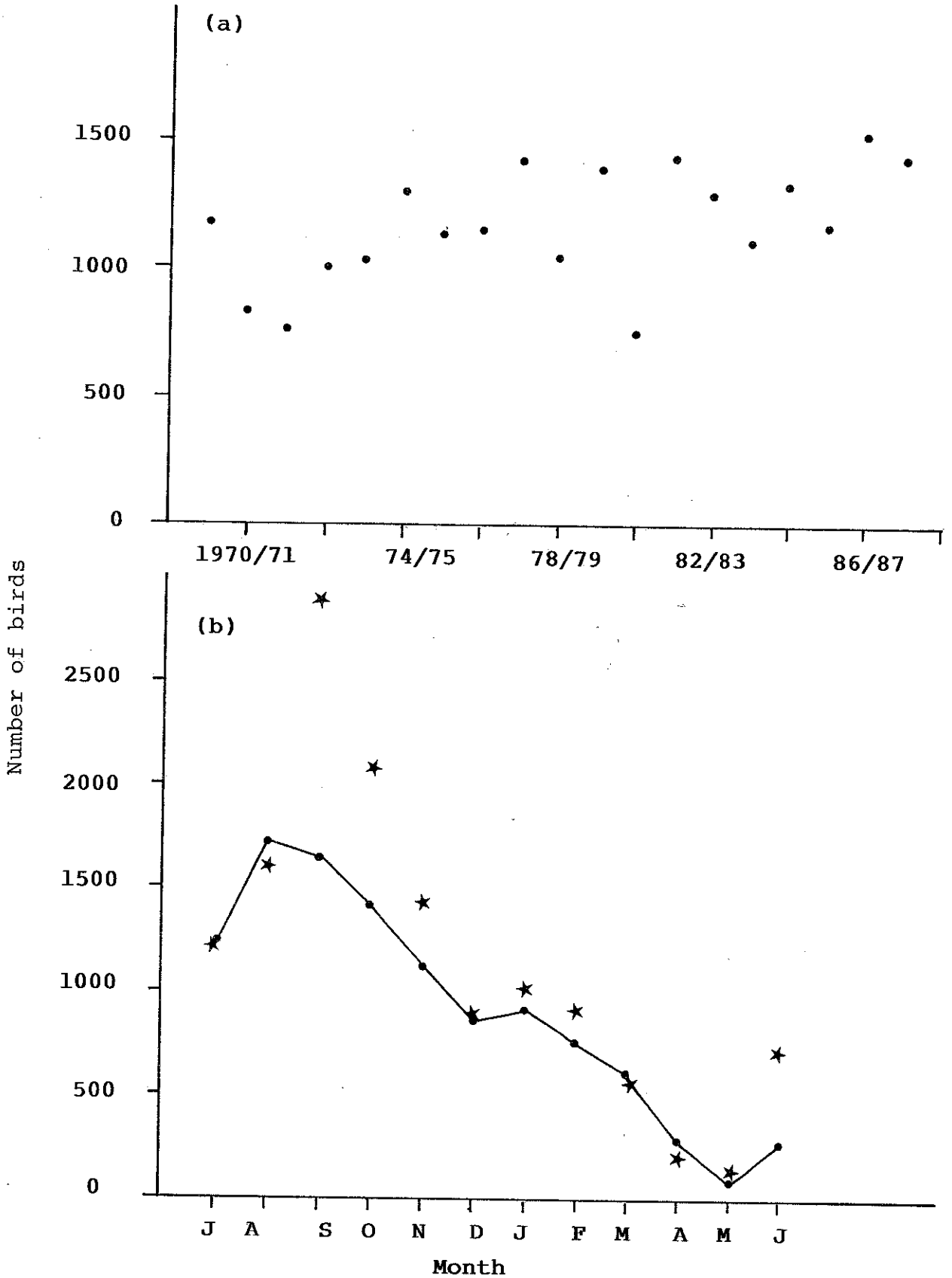

FIGURE 5.21 Curlew on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

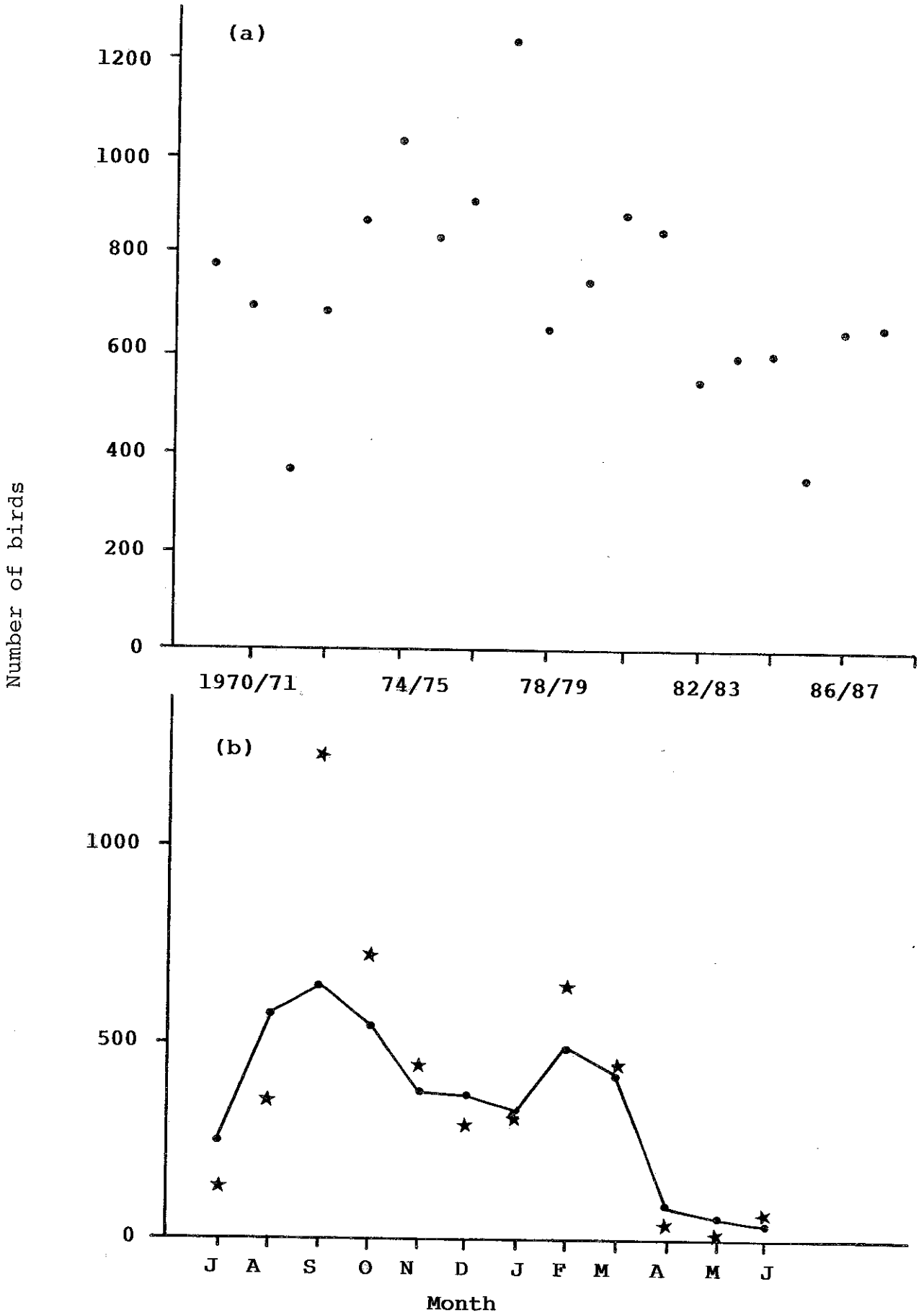

FIGURE 5.22 Redshank on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

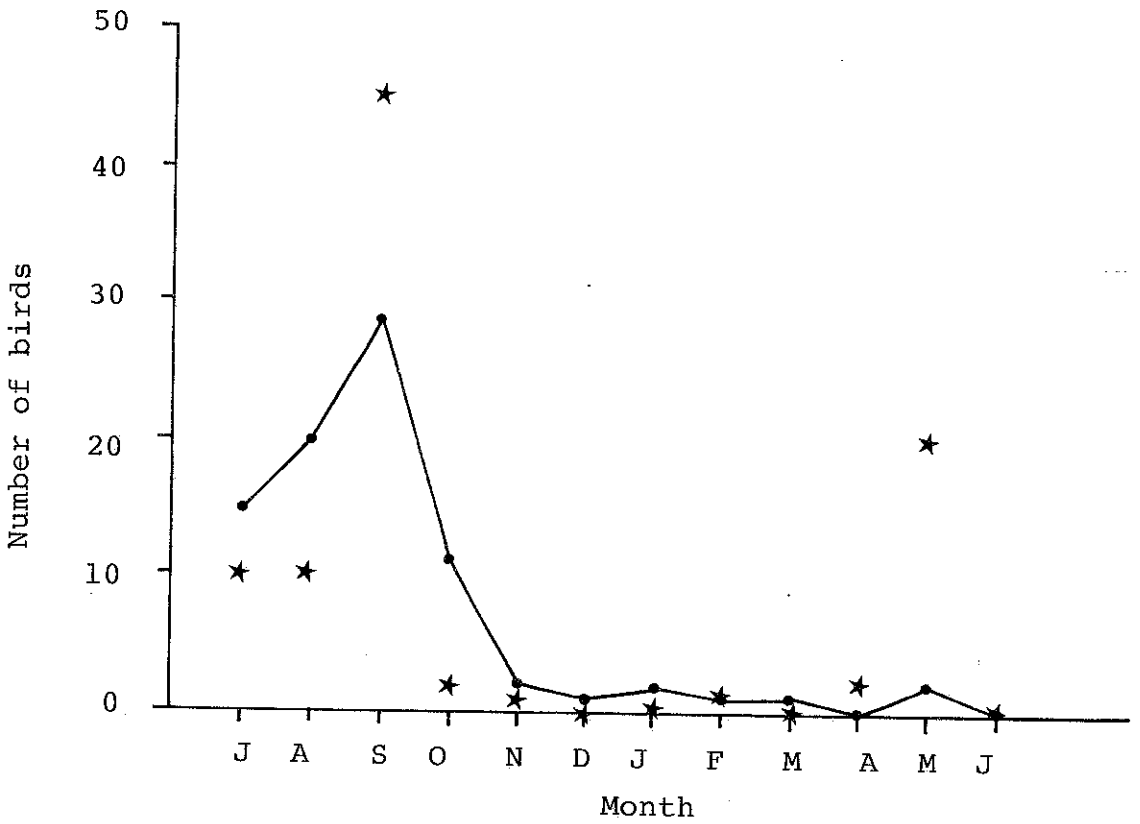

FIGURE 5.23 Seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars) of Greenshank on the Burry Inlet south shore.

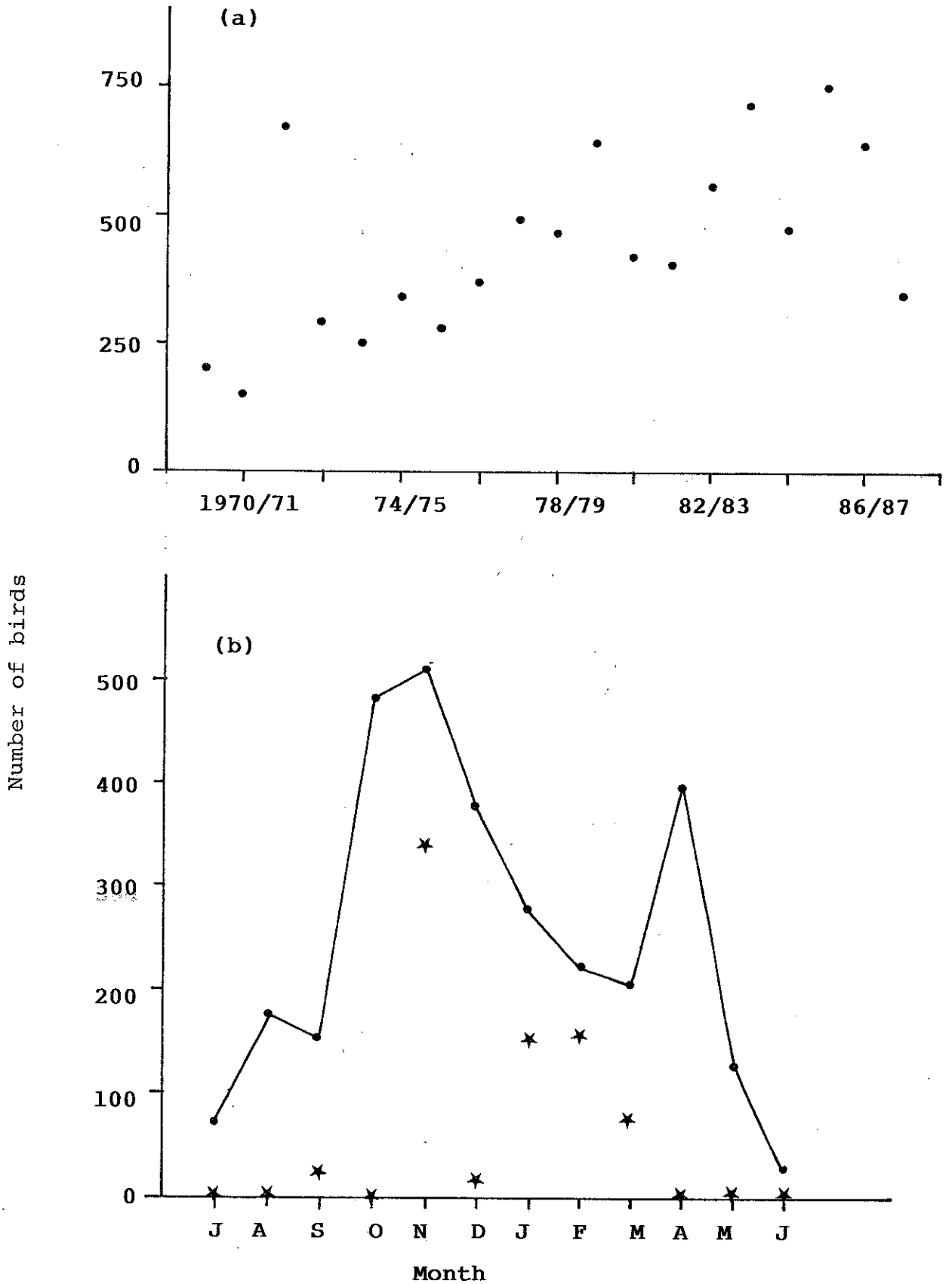

FIGURE 5.24 Turnstone on the Burry Inlet south shore:
a) annual trends in peak winter counts;
b) seasonal trends in ten-year average monthly counts (joined dots) and 1987/88 counts (stars).

ones known to occur more or less frequently in noteworthy numbers. Comprehensive annual syntheses of all recorded occurrences of vagrant wildfowl and waders along the south shore of the Burry Inlet may be found in the journal Gower Birds.

In the 1950s, flocks of White-fronted Geese Anser albifrons were regularly present on the Burry Inlet (Prater 1977), but occurrences of this species are now much more sporadic. Maximum counts in the 1980s have been 140 in December 1980 and an exceptional 360 in November 1981, the latter grazing on Weobley Saltings; however, even irregular sightings of over 15 individuals are now extremely uncommon. The only other goose species worthy of note is the Barnacle Branta leucopsis, which occasionally is present in winter in flocks of up to 20 individuals in the Llanrhidian Marsh area.

Among duck, Scaup Aythya marila may be present in small numbers in winter; 42 recorded in January 1988 appears to be the maximum count recorded. Common Scoter Melanitta nigra form wintering flocks of thousands in Carmarthen Bay (Owen et al. 1986), but only penetrate Burry Inlet itself in small numbers particularly in rough weather. Red-breasted Merganser Mergus serrator are present in numbers up to about 30 between October and April and in smaller numbers at other times; birds move back and forth across the limits of the Burry Inlet as defined here, with small flocks frequently feeding off Pembrey.

Four additional wader species are regularly present in small numbers. Totals of up to 15 Jack Snipe Lymnocryptes minimus have been recorded in winter, but this species is exceptionally difficult to census and must be widely overlooked. Spotted Redshank Tringa erythropus have been noted throughout the year, but are most common on autumn passage, between July and September/October, when over 20 may occur together; peak numbers in winter tend to vary between 1 and 10. The autumn peak of Green Sandpiper Tringa ochropus rarely exceeds 10 individuals, with only up to 5 wintering. Finally, the Common Sandpiper Actitis hypoleucos is a passage species, notably in autumn when up to 10 or more individuals may be present at any time between July and October.

5.26 ANNUAL TRENDS IN OVERALL WINTERING NUMBERS

Figure 5.26 summarizes information on annual trends in the combined peak winter BoEE counts of wildfowl, waders and waterfowl (= wildfowl + waders) on the Burry Inlet south shore. Total recorded waterfowl numbers have been distinctly higher in the 1980s relative to the late 1970s, with the increase apparent in both wildfowl and wader numbers. In the case of waders at least, however, the population increase at the start of the 1980s merely restored numbers to the average level of the early 1970s.

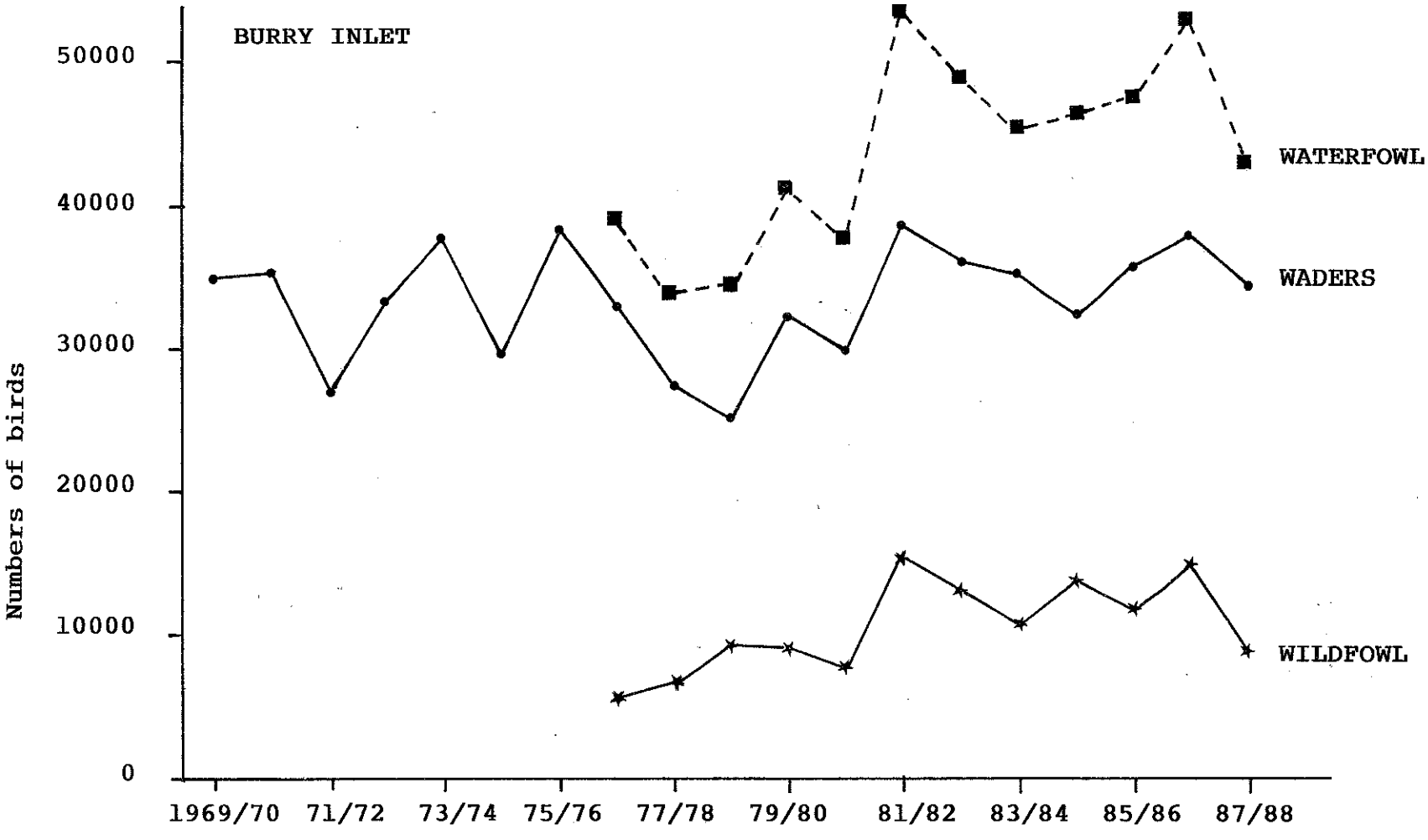

FIGURE 5.26 Annual trends in peak winter counts of wildfowl, waders and total waterfowl on the Burry Inlet south shore.

6. NATIONAL AND INTERNATIONAL IMPORTANCE

Derivation of comprehensive, up-to-date estimates of the National and International Importance of the entire Burry Inlet for wildfowl and waders is complicated by the far less complete BoEE coverage of the north shore and Upper Loughor relative to the southern shore. Considering the most recent five-year period, from which assessments of current importance are normally derived, relatively complete coverage of the Burry north shore is available only for 1987/88 and for the Upper Loughor only for 1986/87 and 1987/88. The course of action therefore adopted in this chapter has been as follows: firstly, to assess the Burry south shore data alone; secondly, to present the comprehensive information available for 1987/88 seperately for the south shore, north shore and Upper Loughor; thirdly, to combine all 1987/88 information in order to ascertain whether results based on the south shore data alone may for some species seriously underestimate the real importance of the Burry (both including and excluding the Upper Loughor) for waterfowl species.

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 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).

6.1 BURRY SOUTH SHORE

6.1.1 Wintering populations

Table 6.1 contains the average peak winter counts on the Burry south shore for each wildfowl and wader species over the five-year period 1983/84 - 1987/88, along with the appropriate qualifying levels for National and International Importance. Five species of wildfowl (Shelduck, Wigeon, Teal, Pintail, Shoveler) and seven species of wader (Oystercatcher, Golden Plover, Grey Plover, Knot, Sanderling, Curlew, Turnstone) have wintering populations exceeding the relevant qualifying levels for National Importance; of these, four species of wildfowl (Shelduck, Wigeon, Teal, Pintail) and four species of wader (Oystercatcher, Knot, Sanderling, Turnstone) also exceed the relevant qualifying levels for International Importance.

Table 6.1 further shows that the average total wintering waterfowl population of the Burry south shore is nearly 47,000, far exceeding the

Table 6.1 Average peak winter (November-March) counts of wildfowl and waders on the Burry Inlet south shore, 1983/84 - 1987/88, in relation to qualifying levels for National and International Importance.

	Average peak winter count, 1983/84-1987/88	Qualifying level for National Importance +	Qualifying level for International Importance ++
Brent Goose (dark-bellied)	639	900	1,300
Shelduck	1,385**	750	1,250
Wigeon	5,353**	2,000	5,000
Teal	2,083**	1,000	2,000
Mallard	180	5,000	20,000
Pintail	1,889**	250	750
Shoveler	217*	90	1,000
Eider	128	700	20,000
Red-breasted Merganser	21	100	400
Total wildfowl:	11,895	5,000	
Oystercatcher	17,812**	2,800	7,500
Ringed Plover	106	230	400
Golden Plover	2,020*	2,000	10,000
Grey Plover	705*	210	800
Lapwing	2,333	10,000	20,000
Knot	5,488**	2,200	3,500
Sanderling	167**	140	150
Dunlin	3,374	4,300	20,000
Jack Snipe	5	?	?
Snipe	51	?	10,000
Black-tailed Godwit	14	50	400
Bar-tailed Godwit	410	610	5,500
Curlew	1,312*	910	3,000
Spotted Redshank	4	(2)	500
Redshank	563	750	2,000
Greenshank	3	(4)	500
Green Sandpiper	3	?	?
Common Sandpiper	2	?	?
Turnstone	579**	450	500
Total waders:	34,951	10,000	
Total waterfowl:	46,846		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.

qualifying level of 20,000 for International Importance. In addition, the separate wintering totals of nearly 12,000 wildfowl and nearly 35,000 waders also each exceed the previously used, separate qualifying levels for International Importance of 10,000 wildfowl and 20,000 waders respectively (Prater 1981).

6.1.2 Spring and autumn populations

Species considered here fall into one of three groups: firstly, ones which occur solely on passage; secondly, species for which passage qualifying levels for National and/or International Importance differ from those applicable in winter; thirdly, any other species not of International Importance based on its wintering population and having an average peak spring (April-June) or autumn (July-October) population exceeding that present in winter.

The only species occurring in substantial numbers on passage alone is the Whimbrel. The average peak count of Whimbrel on the Burry south shore, 1983/84 - 1987/88, has been 90 in spring and 102 in autumn. These totals both exceed the passage qualifying level for National Importance for the species (50), but fall well short of that for International Importance (500).

For the Ringed Plover and Sanderling, both national and international qualifying levels for passage populations (Salmon *et al.* 1988) are greater than those applicable in winter. Numbers of both species recorded on the Burry south shore on passage are similar to or below those occurring in winter, however, and for neither do average peak populations in spring or autumn approach National Importance. For Redshank, the passage qualifying level for National Importance (1,200) is also greater than the wintering one (750); although the average peak autumn count of Redshank (679) exceeds that in winter (563), it again does not approach National Importance.

For Dunlin, the passage qualifying level for National Importance is only 2,000, less than half that applicable in winter. However, average peak passage populations for the species on the Burry south shore do not exceed *ca* 1,000 in either spring or autumn. The average peak autumn population of Curlew (2,048) far exceeds that present in winter (1,312), but does not reach the qualifying level for International Importance (Table 6.1). Average peak autumn populations of both Spotted Redshank (10) and Greenshank (32) are also considerably higher than those present in winter.

Overall, therefore, consideration of spring and autumn populations causes only one key alteration to the conclusions based on wintering populations alone, *i.e.* the addition of the Whimbrel population as of National Importance.

6.2 BURRY NORTH SHORE

6.2.1 Wintering populations

Peak high tide counts of wildfowl and waders made for the BoEE on the Burry north shore during winter 1987/88 are shown in Table 6.2, alongside the equivalent data for the Burry south shore. The overall peak waterfowl count for the north side totalled 3,701 birds, ca 8.7% of that recorded on the south side. Substantial populations of some species were at times present along the north shore. Thus the peak winter north shore counts for Wigeon, Teal, Mallard, Ringed Plover, Lapwing, Snipe, Curlew, Redshank and Turnstone all totalled 20% or more of their peak south shore counts. The north shore peak Redshank count was particularly notable, equalling that recorded on the south shore.

Best estimates of the total high tide populations of wildfowl and wader species on the Burry Inlet south of the rail bridge, i.e. the proposed Ramsar site, cannot be derived simply by adding together the peak north and south shore counts, as these were not necessarily made in the same months. Instead, in order to minimize the likelihood of double-counting resulting from movements of birds across the Inlet between months, data for each species in each winter month were totalled separately and the resultant peak counts identified. These are shown for each species in Table 6.3, along with the % increase in population estimate that inclusion of the north shore data causes over that based on south shore data alone.

Inclusion of the north shore data results in a 6% increase in the overall wintering waterfowl population estimate, from ca 42,500 to ca 45,150. For six species (Brent Goose, Wigeon, Teal, Mallard, Redshank, Turnstone), the increase in population estimate exceeds 10%. Among these, the 100% increase in the Redshank population estimate is of particular significance, as the overall peak winter population of 1,290 is well in excess of the qualifying level for National Importance (750). By contrast, five-year averages for Redshank based only on south shore data fall short of National Importance (Table 6.1). These results confirm the findings of Prater (1977) from the early 1970s in showing the north shore to hold roughly half the Redshank present in winter on the Burry Inlet. Contrary to Prater (1977), however, but in agreement with the later data of Davis (1984), was the absence of roosting Sanderling at the western edge of the area covered by the north shore BoEE counts.

6.2.2 Spring and autumn populations

The most significant concentrations of waders noted on the Burry north shore during the passage periods in 1987/88 were of Redshank, Turnstone and Ringed Plover. Contrary to Prater (1977), large numbers of Redshank were present throughout the autumn, with a peak of 945 in September 1987; the combined north and south shore total of 2,207 for this month substantially exceeds the qualifying level for an Internationally Important population (2,000). A September 1987 BoEE

Table 6.2 Peak winter counts of wildfowl and wader species on the south and north shores of the Burry Inlet and on the Upper Loughor in 1987/88.

	South shore	North shore	Upper Loughor
Mute Swan	0	4	0
Whooper Swan	0	1	0
White-fronted Goose	0	1	0
Brent Goose	690	87	0
Shelduck	1,390	39	35
Wigeon	2,770	600	44
Teal	970	300	0
Mallard	285	117	52
Pintail	2,005	120	0
Shoveler	225	4	0
Pochard	0	3	0
Eider	145	0	0
Red-breasted Merganser	20	5	0
Total wildfowl:	8,500	1,281	131
Oystercatcher	18,775	554	13
Ringed Plover	180	141	85
Golden Plover	1,060	4	0
Grey Plover	495	19	13
Lapwing	900	177	320
Knot	5,740	0	2
Sanderling	170	0	0
Dunlin	3,660	152	204
Jack Snipe	1	0	0
Snipe	100	40	0
Black-tailed Godwit	55	3	0
Bar-tailed Godwit	460	0	0
Curlew	1,430	354	149
Spotted Redshank	2	0	0
Redshank	645	645	64
Greenshank	1	0	0
Green Sandpiper	3	0	0
Turnstone	340	331	0
Total waders:	34,017	2,420	850
Total waterfowl:	42,517	3,701	981

Table 6.3 Peak winter counts of wildfowl and wader species on the Burry Inlet below the rail bridge in 1987/88.

	Burry Inlet below rail bridge+	% increase caused by inclusion of north shore data
Mute Swan	4	-
Whooper Swan	1	-
White-fronted Goose	1	-
Brent Goose	777	13%
Shelduck	1,402	*
Wigeon	3,328	20%
Teal	1,270	31%
Mallard	402	41%
Pintail	2,017	*
Shoveler	225	0
Pochard	3	-
Eider	145	0
Red-breasted Merganser	22	-
Total wildfowl:	9,597	13%
Oystercatcher	19,329	3%
Ringed Plover	295	8%
Golden Plover	1,064	*
Grey Plover	514	4%
Lapwing	917	2%
Knot	5,740	0
Sanderling	170	0
Dunlin	3,757	3%
Jack Snipe	1	-
Snipe	100	0
Black-tailed Godwit	55	0
Bar-tailed Godwit	460	0
Curlew	1,475	3%
Spotted Redshank	2	-
Redshank	1,290	100%
Greenshank	1	-
Green Sandpiper	3	-
Turnstone	481	41%
Total waders:	35,554	4.5%
Total waterfowl:	45,151	6%

NB + : peak winter counts for each species after merging of monthly north and south shore data sets (see text).
- : not calculated as total population <50.
* : <1%.

count of 874 Turnstone confirms earlier findings (Prater 1977, Davis 1984) that the north shore is where passage Turnstone concentrate; by contrast, the peak autumn south shore count of Turnstone in 1987 was only 20. Numbers of Ringed Plover on the north shore reached 188 in September 1987 but, as in winter, the peak combined north and south shore autumn count failed to exceed the qualifying level for National Importance.

Although no more than ca 150 Curlew were noted on the north shore in autumn 1987, much larger numbers occur at times. Examples include a high tide roost of ca 2,500 near Tir Morfa in August 1986 (D.M. Powell et al., in litt.) and another flock of over 2,000 birds on the estuary off Tir Morfa marsh in September 1988 (A. Richardson, in litt.). According to the south shore data, August/September is the peak time for Curlew on the Burry Inlet (Figure 5.21b); the sizes of the above mentioned flocks suggest that each must have comprised essentially the entire population present at the time. Occasional records of this type are perhaps to be expected in view of the degree of tidal-related movement across the Burry Inlet that many species, including Curlew, exhibit (see Chapter 7).

6.3 UPPER LOUGHOR

Table 6.2 presents information on the peak high tide counts for each wildfowl and wader species on the Upper Loughor during winter 1987/88. The overall peak waterfowl count is less than 1,000, and populations of individual species are also relatively modest.

Best estimates of the total high tide population of wildfowl and wader species on the entire Burry Inlet up to the M4 road bridge can be obtained by combining the 1987/88 data sets for the Upper Loughor and the Burry Inlet below the rail bridge following the methodology outlined in section 6.2.1. Results are shown in Table 6.4. Inclusion of the Upper Loughor data results in a 1.5% increase above the total waterfowl population estimate derived from data from below the rail bridge alone. For only two species (Ringed Plover and Lapwing) does the increase in population estimate exceed 10%. The 44% increase in the Ringed Plover population estimate is especially noteworthy, as it brings the population estimate for the species for the entire Burry Inlet to 280, above the winter qualifying level for National Importance (230).

Counts of waterfowl on the Upper Loughor during the spring and autumn passage periods in 1986/87 and 1987/88 revealed no populations which either approach National Importance in themselves or materially alter estimates of the status of any species in the Burry Inlet as a whole.

6.4 OVERALL

The data presented in this chapter suggest that although the south shore BoEE counts provide a generally good impression of the importance of the Burry Inlet for most wildfowl and waders, more comprehensive counting over a longer period may upgrade the status of others. The five-year average peak counts based on the south shore BoEE data-set

Table 6.4 Peak winter counts of wildfowl and wader species on the entire Burry Inlet in 1987/88.

	Entire Burry Inlet +	% increase caused by inclusion of Upper Loughor data
Mute Swan	4	-
Whooper Swan	1	-
White-fronted Goose	1	-
Brent Goose	777	-
Shelduck	1,432	2%
Wigeon	3,372	1%
Teal	1,270	0
Mallard	421	5%
Pintail	2,017	0
Shoveler	225	0
Pochard	3	0
Eider	145	0
Red-breasted Merganser	22	-
Total wildfowl:	9,690	1%
Oystercatcher	19,334	*
Ringed Plover	280	44%
Golden Plover	1,064	0
Grey Plover	519	*
Lapwing	1,237	35%
Knot	5,740	0
Sanderling	170	0
Dunlin	3,761	*
Jack Snipe	1	-
Snipe	100	0
Black-tailed Godwit	55	0
Bar-tailed Godwit	460	0
Curlew	1,590	8%
Spotted Redshank	2	-
Redshank	1,299	*
Greenshank	1	-
Green Sandpiper	3	-
Turnstone	481	0
Total waders:	36,097	1.5%
Total waterfowl:	45,787	1.5%

NB + : peak winter counts for each species after merging of monthly data sets from the Burry Inlet (below rail bridge) and Upper Loughor (see text).
- : not calculated as total population <50.
* : <1%.

show that populations of 13 species are definitely of National Importance, of which those of eight species are also of International Importance (Table 6.5). The status of two further species requires confirmation from longer runs of BoEE data covering the entire Burry Inlet. One is the Redshank, which almost certainly is present in Nationally Important numbers, and very possibly in Internationally Important ones, divided roughly equally between the north and south shores. The other is the Ringed Plover, which occurs at times in good numbers on the south shore, north shore and Upper Loughor (see also section 5.10); overall, these may well comprise a Nationally Important wintering population. Data collected during low tide counts in winter 1987/88 additionally suggest that Dunlin may be present in Nationally Important numbers (see section 7.28).

Table 6.5 Species with populations of National or International Importance on the Burry Inlet.

National Importance	International Importance
Shelduck	Shelduck
Wigeon	Wigeon
Teal	Teal
Pintail	Pintail
Shoveler	Oystercatcher
Oystercatcher	Knot
(Ringed Plover)	Sanderling
Golden Plover	(Redshank)
Grey Plover	Turnstone
Knot	
Sanderling	
(Dunlin)	
Whimbrel	
Curlew	
(Redshank)	
Turnstone	

NB Status of species in brackets requires further confirmation (see section 6.4).

7. INTRA-ESTUARY DISTRIBUTION IN WINTER 1987/88

This chapter analyses the high and low tide distribution patterns of the individual wildfowl and wader species present on the Burry Inlet between November 1987 and March 1988. The regions into which the estuary was split for the purposes of high and low tide data collection are shown in Figures 4.1, 4.2 and 4.3. The high tide distribution data for winter 1987/88 are derived from BoEE counts, qualified as appropriate in the text by any additional information available. The low tide data are almost entirely derived from the special low tide fieldwork carried out in winter 1987/88. Reference is made to findings from previous years, notably those synthesized by Prater (1977), Davis (1984) and Howells & Roberts (1988), where these appear to contribute importantly to understanding current distribution patterns. In particular, the winter 1987/88 high tide results for the Burry south shore are placed in a broader context by presentation of a synopsis of average annual peak counts of the more common duck and wader species in the six BoEE sectors there for the period 1978/79 to 1986/87 (Table 7.1). Further information on methodology is contained in Chapter 4.

7.1 MUTE SWAN *Cygnus olor*

Four birds were present on the north shore at Tir Morfa in February, after a single bird had previously been seen there in November and December.

7.2 BEWICK'S SWAN *Cygnus columbianus*

A flock of 34 individuals was present along the south shore in early March.

7.3 WHOOPER SWAN *Cygnus cygnus*

A single bird was noted at Tir Morfa in November and December, and one was also seen at Wernffrwd in late March.

7.4 WHITE-FRONTED GOOSE

A single bird was present at Tir Morfa in January.

7.5 BARNACLE GOOSE

Ten Barnacle Geese were present on the saltmarsh between Llanrhidian and Whiteford from mid to end December.

7.6 BRENT GOOSE

Brent Geese are predominantly birds of the outer southern part of the Burry Inlet but, as the population has risen (see section 5.1), are now increasingly seen elsewhere. Up to 1982, the south shore BoEE counts indicated they were limited to the Whiteford and Weobley sectors, where the population is still concentrated (Figure 7.6a). Since then, up to 100-200 birds have on occasion been seen at high tide as far up the estuary as Pen-clawdd, although they remain very rare on the Upper

Table 7.1 Distributions of the main species of duck and wader among the high tide counting sectors on the south shore of the Burry Inlet, based on average annual maxima recorded on BoEE counts between 1978/79 and 1986/87.

SPECIES	WHITEFORD	WEOBLEY	LLANRHIDIAN	WERNFFRWD	PEN-CLAWDD	BERTHLWYD
Shelduck	729	723	379	319	334	225
Wigeon	2925	2026	663	808	1527	567
Teal	2289	63	74	82	69	62
Pintail	335	158	1657	1215	579	171
Shoveler	-	6	88	129	8	-
Oystercatcher	7925	9655	5411	5614	2465	655
Ringed Plover	147	14	16	5	47	30
Grey Plover	277	164	357	204	161	63
Knot	2409	2367	1412	1902	624	192
Sanderling	164	1	-	-	-	-
Dunlin	1926	1893	1810	1306	1488	920
Black-tailed Godwit	17	-	1	1	18	15
Bar-tailed Godwit	117	166	161	387	97	29
Curlew	651	558	524	812	497	158
Redshank	330	162	198	158	386	265
Turnstone	628	4	41	-	-	-

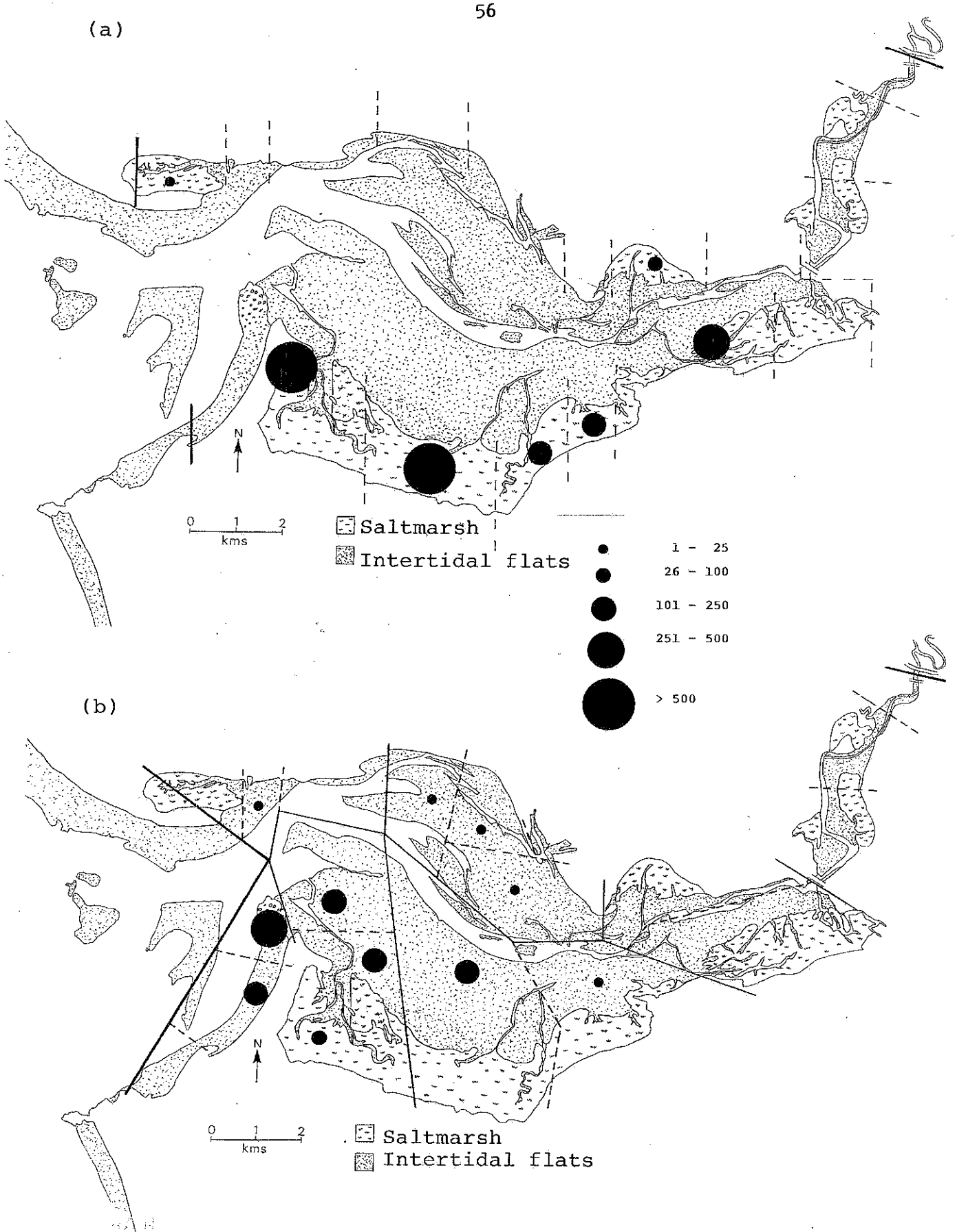

FIGURE 7.6 High tide (a) and low tide (b) distributions of Brent Geese on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

Loughor (Howells & Roberts 1988). Brent Geese occur irregularly on the north shore at high tide, predominantly off Tir Morfa marsh where just under 100 were noted on two BoEE counts in winter 1987/88 (Figure 7.6a); on one of these the birds were seen to fly in from the Whiteford direction soon after high tide and settle on the water.

The low tide distribution of the species was again concentrated around Whiteford Point (Figure 7.6b), with much feeding taking place on the mussel scars on its north-west side. As the tide fell, birds moved first onto the major scar around the old lighthouse, which begans to emerge earlier than the smaller ones further south; these latter remained submerged until within three hours of low water, whereupon some Brent Geese moved onto them. As the tide began to rise again, birds started to move to the east side of Whiteford Point, where some Brent may have remained throughout the low tide period. Here many birds kept to the water and feeding tended to be more desultory, although on occasion over 50 birds were noted grazing on the saltmarsh near low water. Grazing on saltmarsh has definitely become increasingly important to Brent Geese on the Burry as the population has risen during the 1980s (R.J. Howells, pers. obs.), mostly on Landimore Marsh but sometimes much more widely along the southern shore.

The maximum count made of feeding birds during the low tide period around Whiteford Point was just over 400, substantially less than the peak high tide counts of up to 600 or more. Small numbers of Brent could be found towards low tide scattered along both the north and south shores of the Burry, with up to 50 individuals on the intertidal flats of the Middle Burry (south) being the main concentration. However, much the largest flock observed towards low tide away from Whiteford Point was noted in mid February, when over 160 Brent were on the river channel of the Middle Burry (south) following an exceptionally high spring tide which had completely inundated the saltmarsh; these birds fed actively on the large amounts of floating debris being swept downstream by the falling tide. This part of the river channel is difficult to view unless one is well out on the intertidal flats, and it is possible that good numbers of Brent may regularly be present there.

7.7 SHELDUCK

Shelduck occurred at high tide along the entire south shore of the Burry in winter 1987/88 (Figure 7.7a), with a pronounced concentration in the Weobley sector where peak counts exceeded 1,000 birds. A concentration in the Whiteford and Weobley sectors is also revealed by average annual peak counts for the past decade (Table 7.1). Elsewhere, up to 200 birds occurred on the water off Tir Morfa on the north shore, with small numbers (<50) usually present at Pembrey and on each of the three sectors of the Upper Loughor (Figure 7.7a).

The most consistent large (>100) concentrations of Shelduck at low tide were found on the pills east of Whiteford Point and on the intertidal flats off Tir Morfa and Llanelli on the north shore (Figure 7.7b). Large groups of birds often formed along the channel edge of the latter

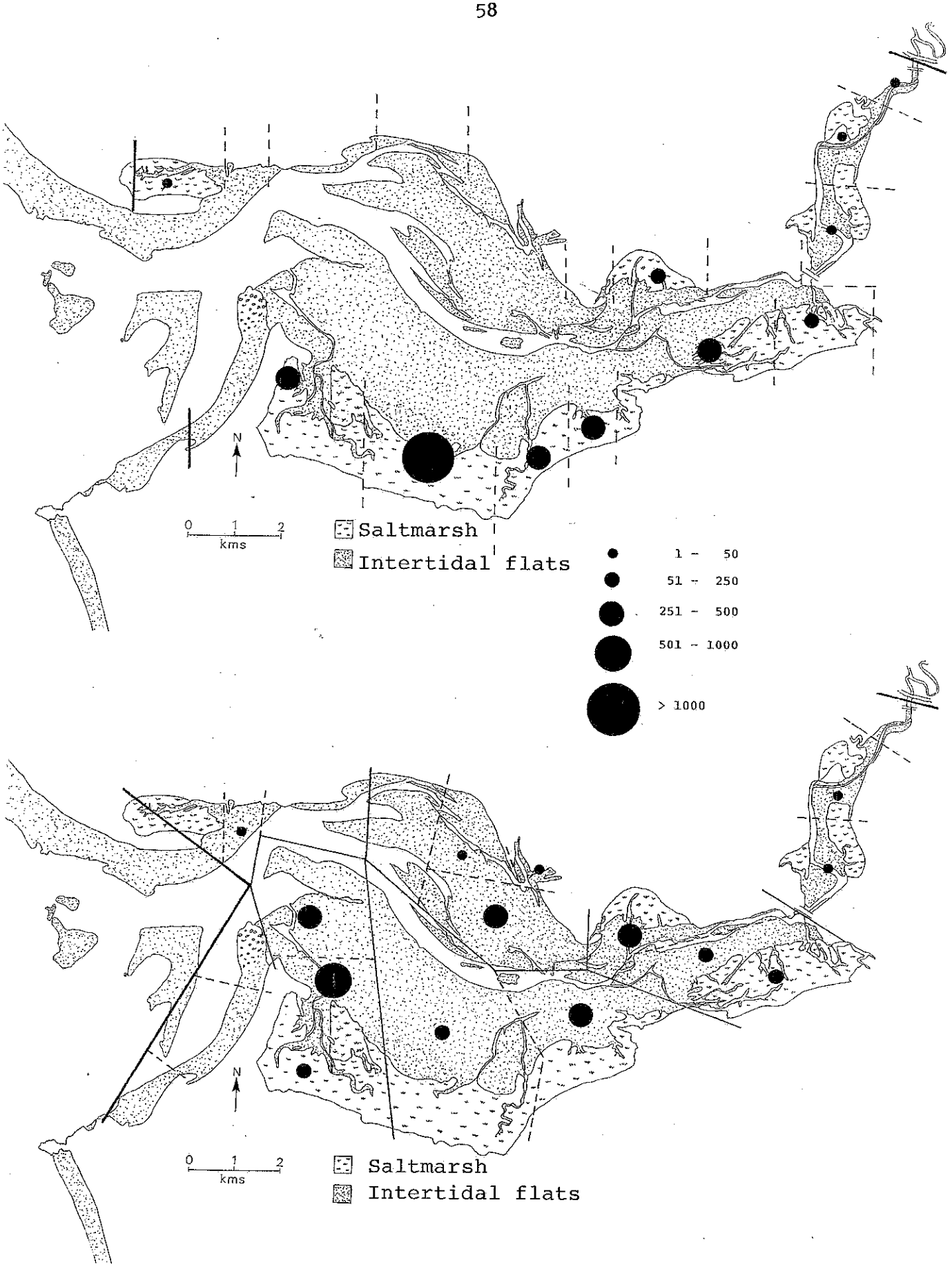

FIGURE 7.7 High tide (a) and low tide (b) distributions of Shelduck on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

area (sector 20), where they could be difficult to see except when viewed from the southern side of the river channel. Elsewhere along the southern shore, smaller groups of birds were well distributed and clearly quite mobile, spreading out widely from their major roosting concentrations. No use at all, however, was seen to be made by Shelduck of the area west of Whiteford Burrows.

7.8 WIGEON

Another species shown by the winter 1987/88 high tide counts to occur all along the southern shore of the Burry Inlet, although with the major part of its population (peak count >2,000 birds) centred on the east side of Whiteford (Figure 7.8a). This distribution pattern closely resembles that revealed by average annual peak counts for the past decade (Table 7.1). On the north shore, substantial numbers (>500) were noted at Tir Morfa, and the species is an occasional visitor in small numbers (<50) to the Upper Loughor.

As at high tide, the main concentration of Wigeon at low tide was on the Outer Burry (south) (Figure 7.8b). In both November and December, a flock of well over 1,000 was present in the saltmarsh creeks along the border between sectors 12 and 13, from which birds would emerge en masse to graze. Further east, flocks of up to 500 loafed on the river channel along the northern edge of the Middle Burry (south). Further east again, up to 300 Wigeon were present at times on the intertidal areas and river channel of the Inner Burry, from which small numbers were seen to commute up onto the saltmarsh of the southern shore to graze. Very few Wigeon were noted on the intertidal areas of the northern side of the Middle and Outer Burry.

7.9 GADWALL Anas strepera

Between eight and ten Gadwall were present on the Inner Burry river channel shortly before low tide on 20 December.

7.10 TEAL

The total population of Teal present on the Burry Inlet in winter 1987/88 was unusually low (Figure 5.4), but the south shore distribution was typical, with most birds concentrated on the east side of Whiteford at high tide (Figure 7.10a, Table 7.1). On the north shore, a substantial population was present at Tir Morfa, with smaller numbers at Pembrey (Figure 7.10a). None was recorded on the Upper Loughor although the species is an occasional winter visitor there.

The low tide distribution resembled that at high tide (Figure 7.10b). Most birds were present in the saltmarsh creeks of Burry Pill, in the area spanning the boundaries of sectors 12 and 13 to the east of Whiteford Burrows. Smaller numbers were seen in the intertidal and river channel area off Tir Morfa saltmarsh; the marsh itself was not included in the low tide counts. The only other notable numbers of birds observed were in loafing flocks, mainly along the Middle Burry river channel.

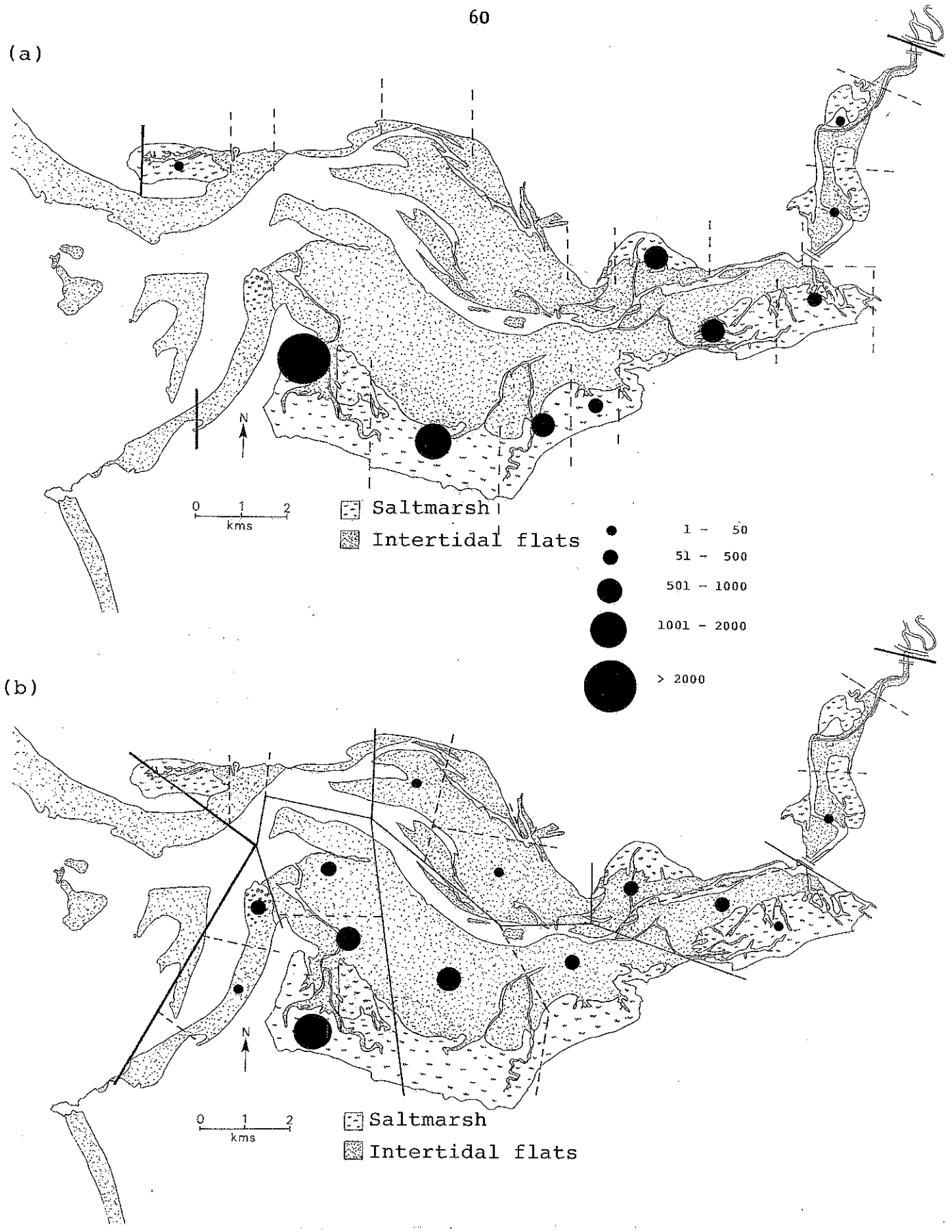

FIGURE 7.8 High tide (a) and low tide (b) distributions of Wigeon on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

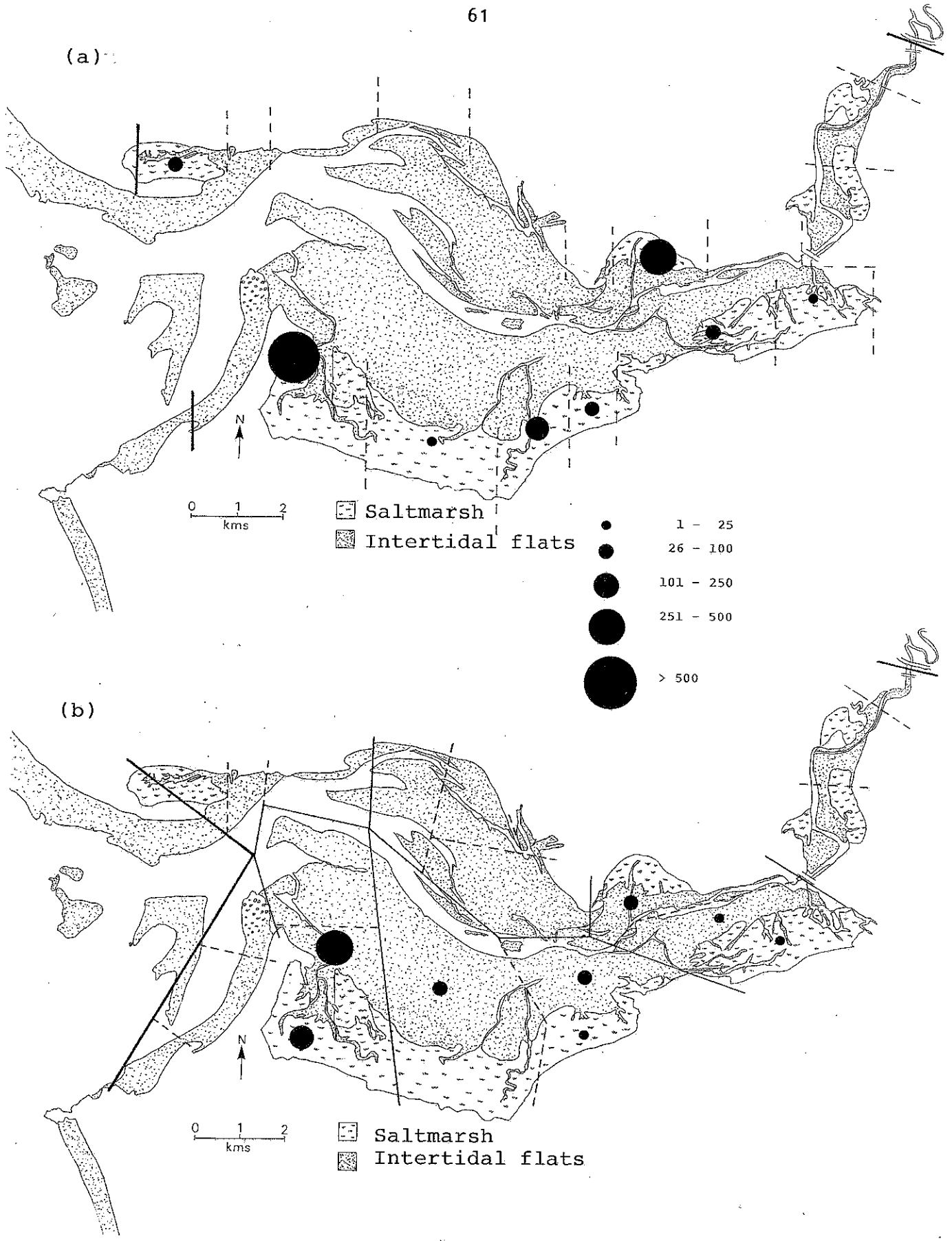

FIGURE 7.10 High tide (a) and low tide (b) distributions of Teal on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

7.11 MALLARD

BoEE counts in winter 1987/88 showed Mallard to occur in generally small flocks throughout the south shore of the estuary, on the north shore at Pembrey and Tir Morfa, and along the Upper Loughor. The apparently overriding importance of the Outer Burry depicted by Figure 7.11a is to some extent misleading, as it reflects single exceptional January counts at both Whiteford and Pembrey when almost all birds seemed to be gathered there. Nevertheless, the results of the low tide counts confirm that the Burry Pill area east of Whiteford Burrows is certainly a favoured region for the species (Figure 7.11b).

7.12 PINTAIL

The high tide concentration of Pintail along the central southern shore in winter 1987/88 (Figure 7.12a) is typical for the Burry Inlet (Table 7.1), although numbers at Weobley were certainly higher than the long-term average. Tir Morfa was the only north shore site where Pintail regularly occurred (Figure 7.12a), and the species is only a vagrant to the Upper Loughor.

At low tide, most Pintail seen were loafing on, or on the banks of, the central river channel (Figure 7.12b). Feeding was uncommonly observed, but on the rising and falling tide good numbers of birds made use of the area around the Llanrhidian Pill channels in the Middle Burry (south). A group of 40 birds was also once noted feeding near the sewage outfall at the mouth of Llanelli Docks. On the rising tide, a flock of around 100 birds was very noticeable as it floated into the Tir Morfa marsh from the river channel.

7.13 SHOVELER

Almost all Shoveler recorded at high tide were between Weobley and Wernffrwd on the southern shore (Figure 7.13a), a typical distribution pattern for this species (Table 7.1). At low tide, almost all birds seen were again in the same general vicinity (Figure 7.13b); they apparently made intensive use of the area around Llanrhidian Pill for feeding on the rising and falling tides.

7.14 POCHARD Aythya ferina

Three individuals were present at Tir Morfa in February.

7.15 SCAUP

Peak high tide counts of 42 birds off Weobley and 41 off Llanrhidian during late January were almost certainly the same flock, as were 31 birds (3 males, 28 females) seen during this period on the Middle Burry river channel towards low tide. Records were confined to the Middle and Outer Burry (south), with no other count exceeding 20 individuals.

7.16 EIDER

Eider were confined to the area surrounding Whiteford Burrows, where

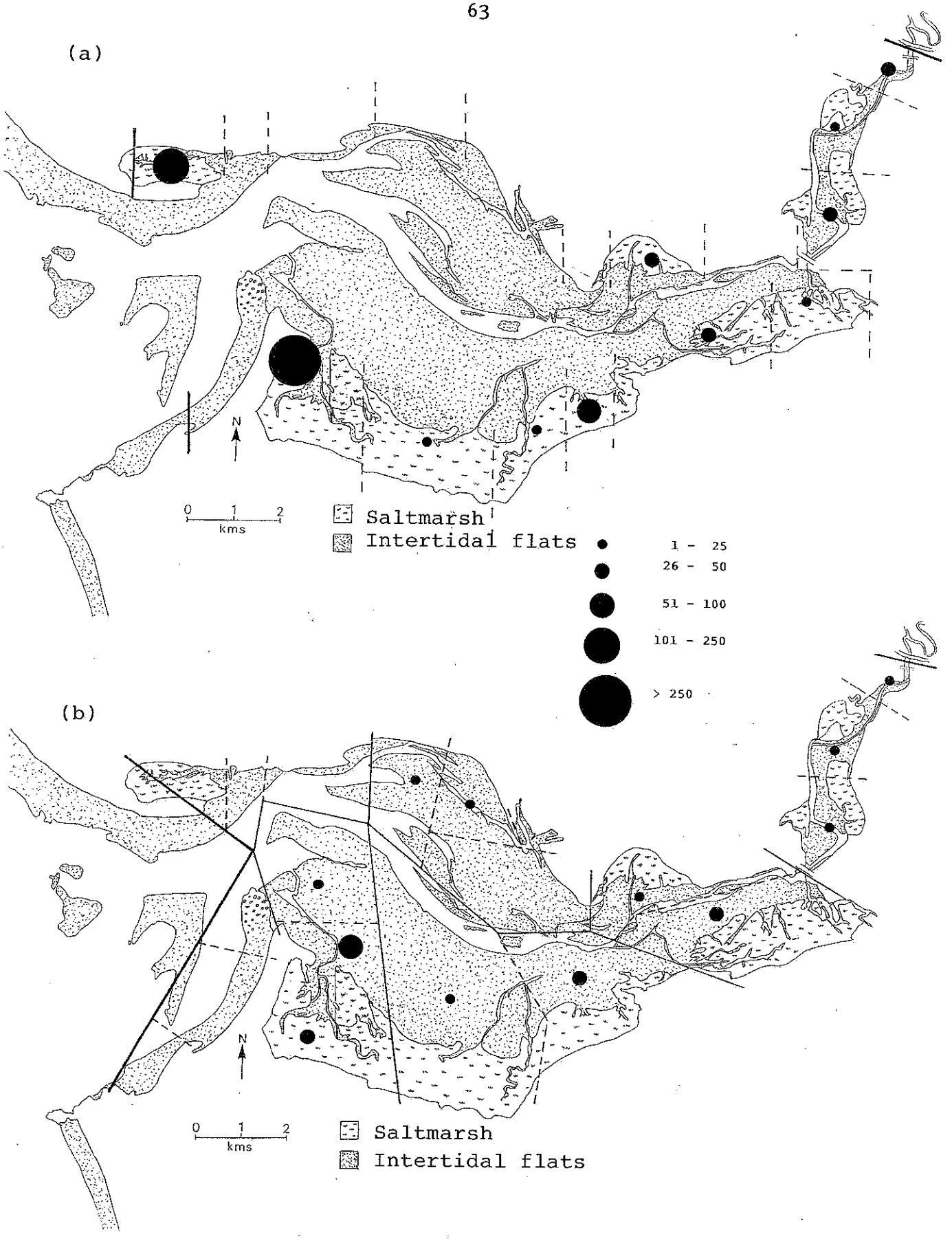

FIGURE 7.11 High tide (a) and low tide (b) distributions of Mallard on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

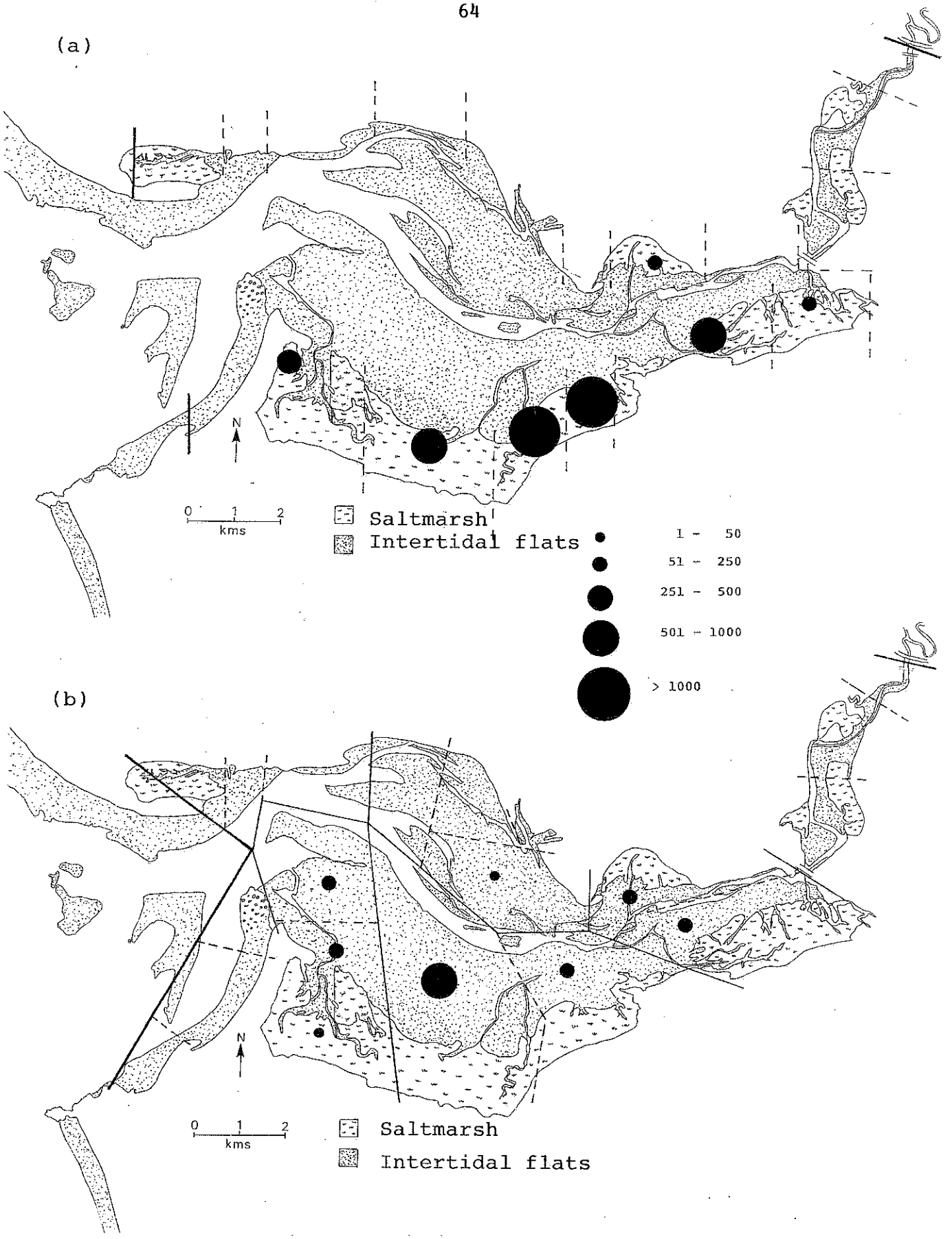

FIGURE 7.12 High tide (a) and low tide (b) distributions of Pintail on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

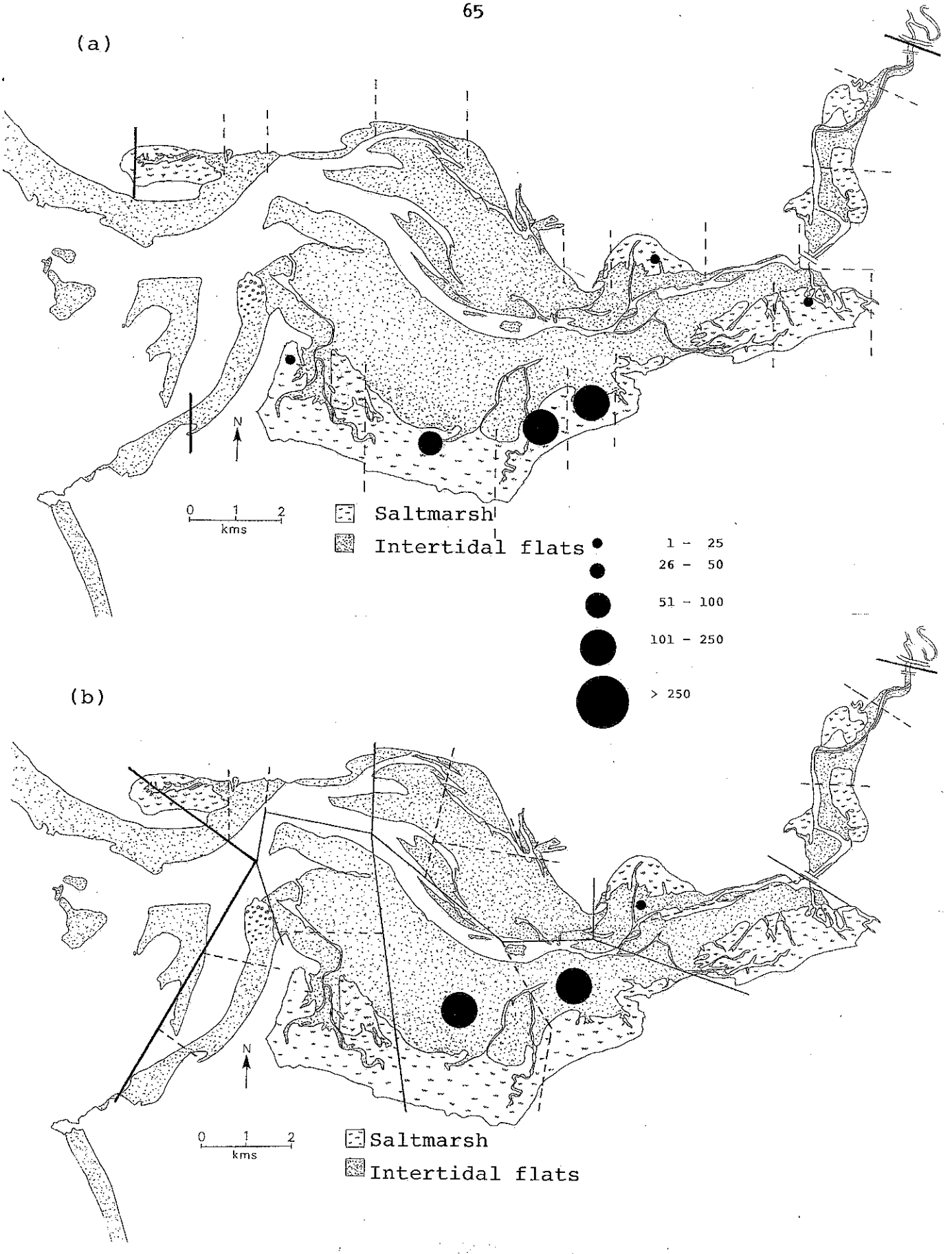

FIGURE 7.1 3 High tide (a) and low tide (b) distributions of Shoveler on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

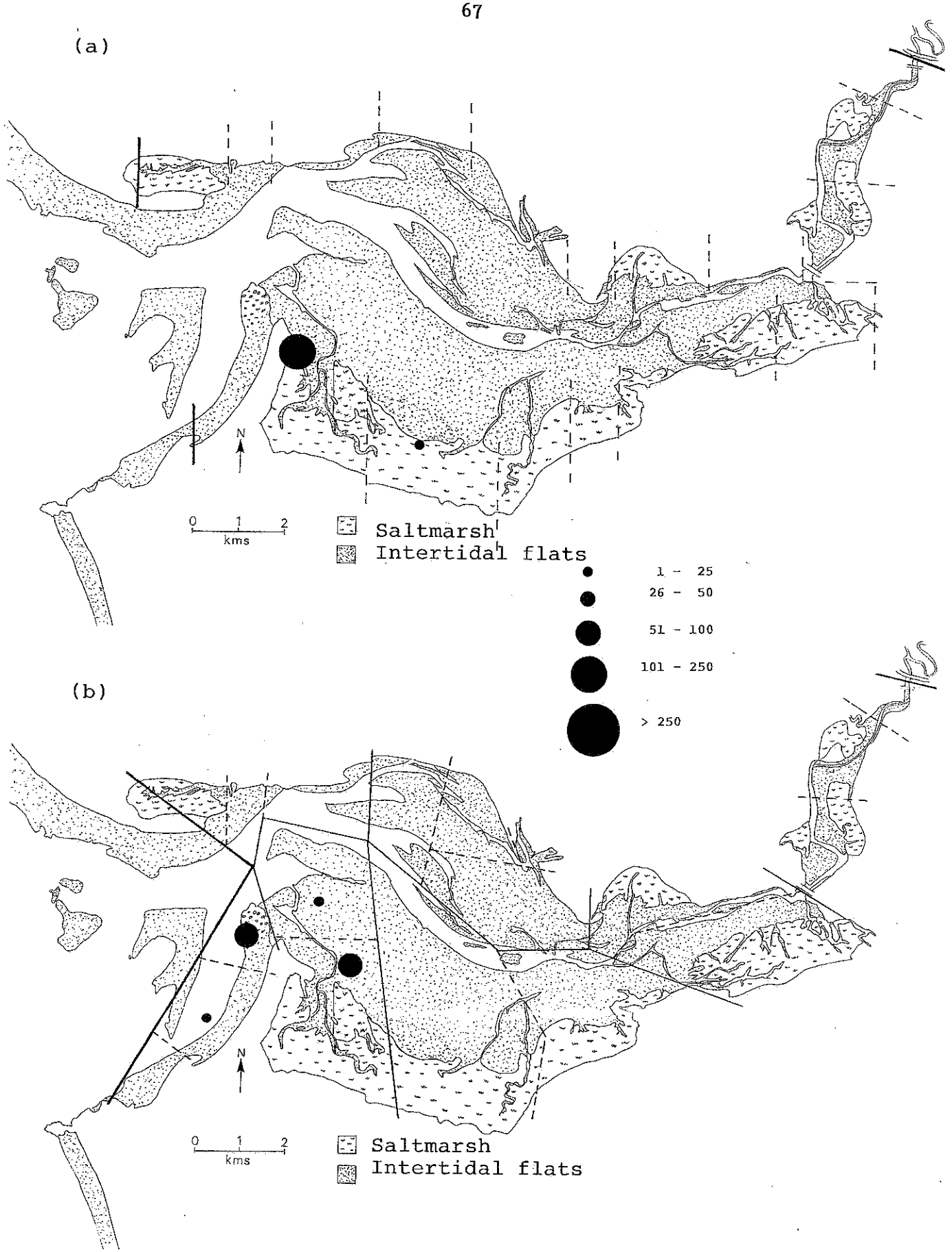

FIGURE 7.16 High tide (a) and low tide (b) distributions of Eider on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

flocks of over 100 birds were recorded at times at high tide, with occasional individuals penetrating as far as Weobley (Figure 7.16a). Low tide counts generally showed largest numbers off the mussel scar to the north-west of Whiteford Burrows, but on 30 January a flock of over 50 birds was sheltering on its east side from gale force westerly winds (Figure 7.16b).

7.17 LONG-TAILED DUCK Clangula hyemalis

One individual was present west of Whiteford Burrows in mid November and two in early February. A single bird was also seen on the Middle Burry river channel towards low tide.

7.18 COMMON SCOTER

Few birds from the Carmarthen Bay flock were normally visible, but an exceptional 1,000 were off Whiteford Burrows on 23 November. In late January, small numbers of Common Scoter were noted sheltering on the water east of Whiteford Point from gale force westerly winds, but a single male off Llanrhidian in early February was the only bird seen well within the Burry Inlet.

7.19 GOLDENEYE Bucephala clangula

Groups of three birds were present in mid December at high tide off Weobley and towards low tide on the Inner Burry river channel.

7.20 RED-BREASTED MERGANSER

Small numbers of birds were noted in winter 1987/88 off the southern Burry shore from Pen-clawdd westwards and, with particular regularity, to the west of Whiteford Point. On the north shore, individuals occurred from the Power Station westwards, with a loose flock of ten or more present at low tide off Pembrey, just outside the study area.

7.21 OYSTERCATCHER

Almost all Burry Oystercatchers roost on spring high tides along the southern shore from Pen-clawdd westwards, with the largest concentrations in recent years tending to occur in the Weobley sector (Figure 7.21a, Table 7.1); at neap high tides, birds may be spread out more evenly along the southern shore (Howells 1983). Few birds are found at spring high tides on the north shore (Figure 7.21a), although substantial numbers may remain in the Llanelli/Machynys sectors on neap high tides, e.g. ca 1,200 on 30 January 1988.

Previous recent reviews of Oystercatchers on the Burry Inlet tend to concur in implying the Llanrhidian Sands region of the Middle Burry (south) to be the most important feeding site for the species (e.g. Prater 1977, Howells 1983), although Davis (1984) noted the presence of up to 7,000 feeding birds on the intertidal flats off the Llanelli/Machynys foreshore of the Middle Burry (north). Our studies in winter 1987/88 showed the largest concentration of feeding birds to occur on the flats to the north of the river channel (Figure 7.21b),

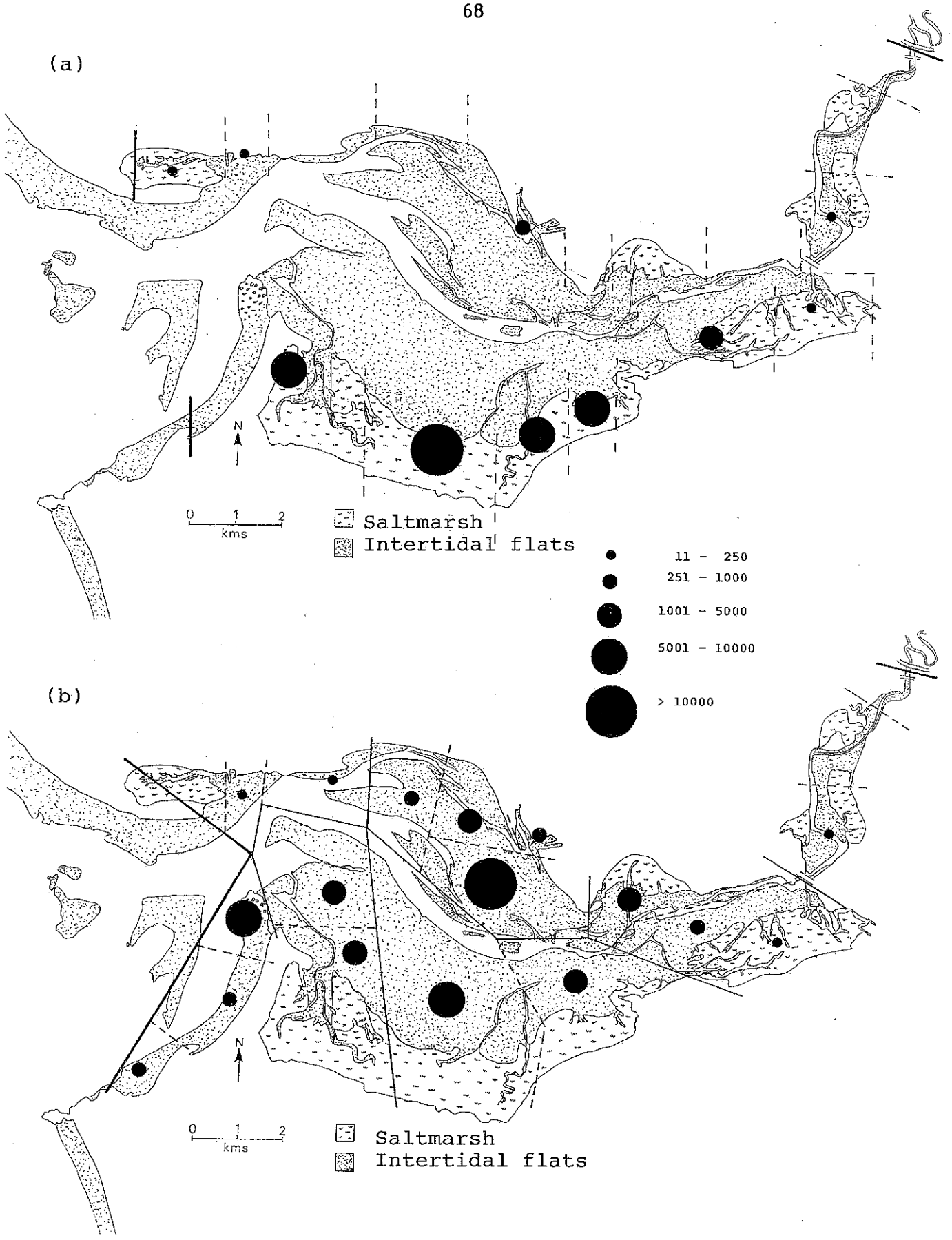

FIGURE 7.21 High tide (a) and low tide (b) distributions of Oystercatcher on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

with a maximum of over 13,000 birds observed feeding simultaneously on sector 20. Nevertheless, large numbers of feeding Oystercatchers (up to ca 12,000 in sectors 8 and 11 taken together) were also seen on the southern flats. Oystercatchers on both the south and north Middle Burry prey largely on cockles (e.g. Horwood & Goss-Custard 1977), the location of whose spat settlement is very variable generally; in addition, on-going changes in sedimentation, resulting from continuing variation in the path of the main river channel (Howells 1983), are probably also influencing the local distribution of cockle stocks on the Burry. The third major concentration of feeding birds utilized the mussel scars off the north-west edge of Whiteford Burrows (Figure 7.21b). We regularly observed 4-6,000 birds there, well above previous estimates of site usage (e.g. Howells 1983). Elsewhere on the Burry, smaller numbers of Oystercatchers were widely distributed at low tide (Figure 7.21b).

Our studies of the low tide distribution of Oystercatchers could not be synchronized over the three main feeding areas of the Burry Inlet, so our results cannot be used to produce a good estimate of total population size; Figure 7.21b shows merely the peak population observed in each sector. Nevertheless, it is of interest that the sum of the highest single counts of cockle-feeding birds within the main body of the Burry Inlet (i.e. 13,000+) and of mussel-feeding birds on the Whiteford scars (6,000) equals the peak high tide population estimate for the entire Burry Inlet in winter 1987/88 (Table 6.3). Possibly the cockle-feeding birds are mobile between feeding areas within the main body of the estuary, but form a largely separate sub-population from the mussel-feeding birds at its mouth. In this context, it is noteworthy that the largest counts on the Middle Burry (south) were made in the feeding period prior to low tide, whereas those on the Middle Burry (north) were made in the feeding period following low tide (see below also).

Movements of Oystercatchers within the Burry Inlet in relation to the tidal cycle were pronounced, as might be deduced from comparison of Figures 7.21a and b. As soon as the tide retreated from the edge of the southern saltmarsh, i.e. from ca 4.75 hours before low tide on a high spring tide (see section 4.2), birds would move out onto the exposing flats to feed. Some movement occurred almost immediately over to the mussel scars off Tir Morfa, which began exposing by 4.5 hours before low tide, and from here some birds subsequently moved back across to the south side (sectors 5 and the east end of 8) as the water fell further. The main movement north occurred somewhat later, however, as the intertidal flats of the Middle Burry (north) began to expose from within four hours of low water. A period of intensive feeding ensued, following which most birds collected from about two hours before low water into large roosts along the central river channel and in the sewage outfall area immediately off Llanelli docks. Following low tide, birds gradually resumed feeding, building up to a peak shortly before they were forced off the intertidal flats by the rising tide. On the Middle Burry (north), this occurred from about 4.25 hours after low water, whereupon birds moved back across the river channel where they continued to feed while being pushed towards their high tide roosts on the southern shore. Off Whiteford Burrows,

Oystercatchers began moving onto the mussel scars as soon as they began exposing, remaining there until rising water forced them off again; by contrast with the cockle-feeding birds there was less evidence of a communal low tide break in feeding.

7.22 RINGED PLOVER

Data from winter 1987/88 (Figure 7.22a) and from average annual peak counts over the past decade (Table 7.1) concur in showing Whiteford to hold the major high tide concentration of Ringed Plovers on the south shore. A peak of 180 birds was present there in late November 1987, but fewer than 50 subsequently. Elsewhere, there were important high tide roosts in the Llanelli and Burry Port sectors, as well as in the south sector of the Upper Loughor (Figure 7.22a); the 85 birds seen in the latter area in mid November constitute the highest count to date from the Upper Loughor.

The low tide distribution pattern of Ringed Plovers matched that at high tide quite closely. Groups of birds appeared to be centred on the Burry Port foreshore, the Llanelli foreshore, the Inner Burry/Upper Loughor, and Whiteford Burrows (Figure 7.22b). In the latter area, birds were seen to move back and fore across the Burrows, indicating the presence of a single population there. The Burry Port and Llanelli birds could also very possibly have belonged to the same flock, as concentrations were never observed at both places on the same tide.

7.23 GOLDEN PLOVER

At both high and low tide, almost all birds present were on the south shore saltmarsh. Much the major, regular concentration was in front of Weobley castle (Figures 7.23a and b), where the birds appeared to spend much of their time loafing. Although absent during winter 1987/88, 100 or more Golden Plovers occasionally occur on the Upper Loughor and on fields adjacent to the north Burry shore.

7.24 GREY PLOVER

Grey Plover roosts were well spread along the southern shore of the Burry at high tide during winter 1987/88, in particular from Wernffrwd westwards (Figure 7.24a). Largest numbers occurred at Llanrhidian and Whiteford, a typical distribution pattern (Table 7.1). Only small numbers were noted elsewhere, with little evidence for the roost in the Tir Morfa area mentioned by Davis (1984).

As at high tide, Grey Plovers were widely distributed when feeding, with the only notable congregations being around the mussel scars south-west of Tir Morfa and west of Whiteford Burrows (Figure 7.24b). Birds arrived off Tir Morfa as soon as the tide fell off the scar and were watched departing to the south shore as the incoming tide covered it again. Birds on the Whiteford scars moved to the north and east sides of the Burrows as the tide came in. Elsewhere, birds were often very scattered when feeding, and it is likely that low tide numbers were underestimated on the vast intertidal flats of the Middle Burry (south).

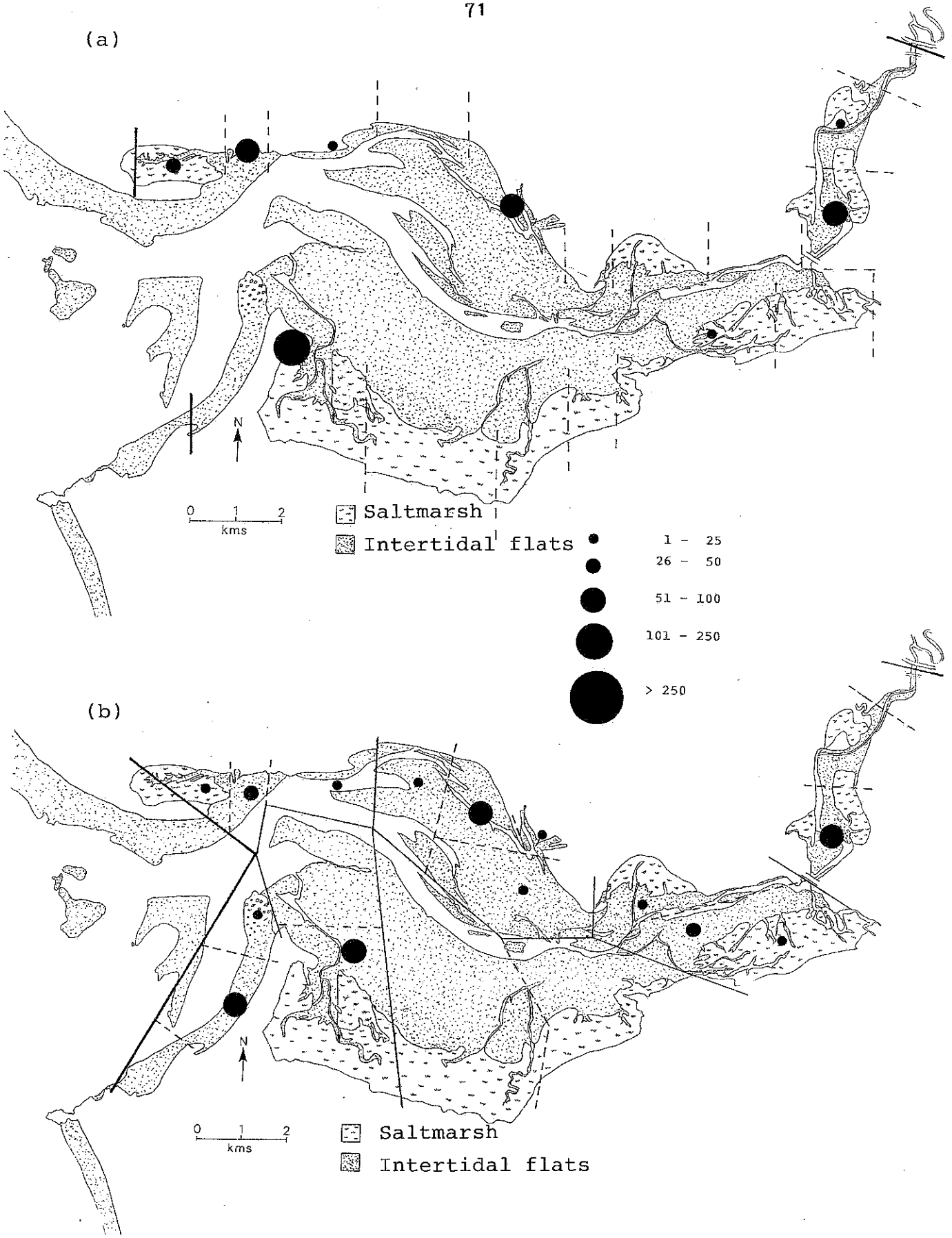

FIGURE 7.2.2 High tide (a) and low tide (b) distributions of Ringed Plover on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

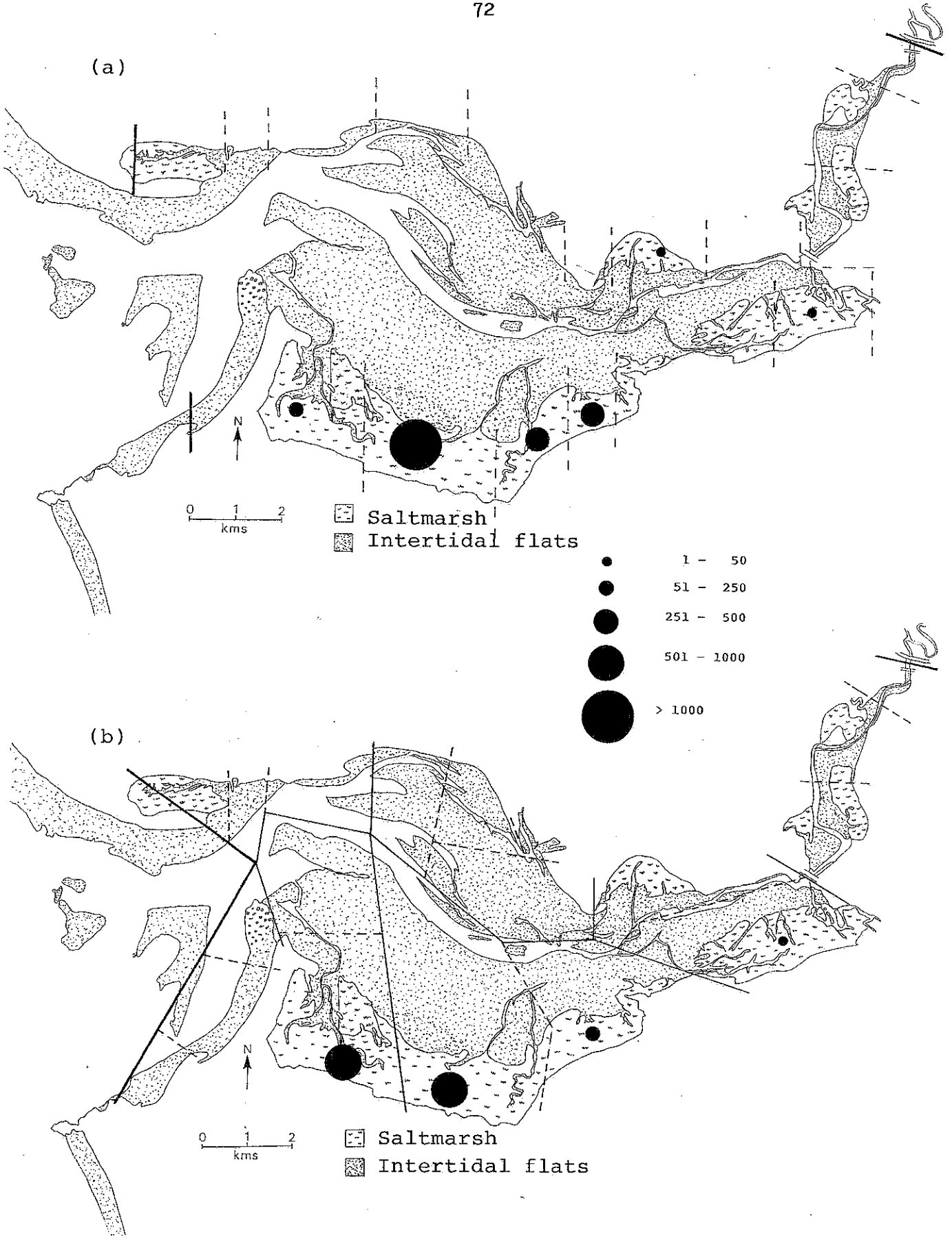

FIGURE 7.23 High tide (a) and low tide (b) distributions of Golden Plover on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

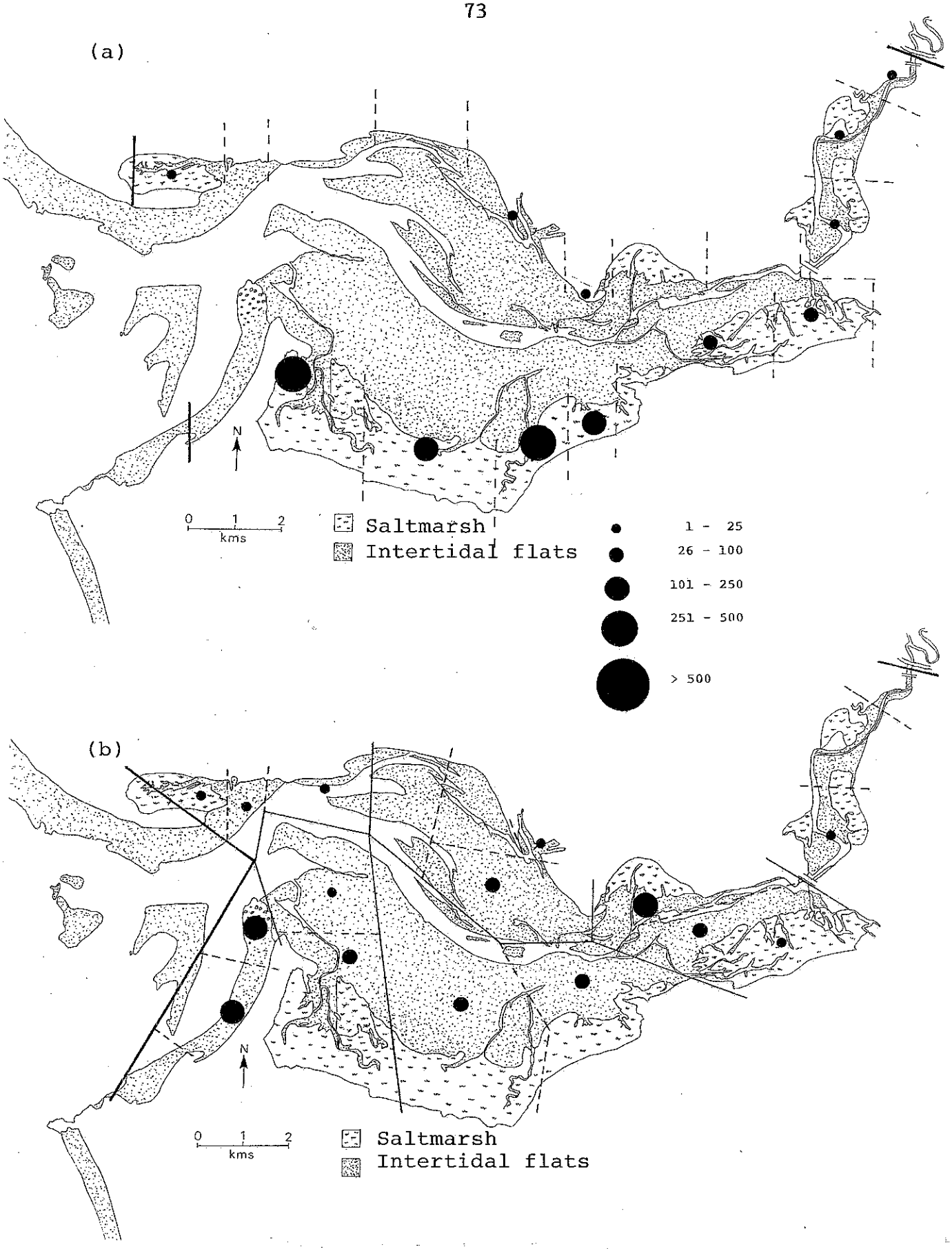

FIGURE 7.24 High tide (a) and low tide (b) distributions of Grey Plover on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

7.25 LAPWING

Much the major concentration of Lapwings in winter 1987/88 was with that of the Golden Plovers in the Weobley area, but fair numbers occurred all along the southern saltmarsh as well as on the Upper Loughor (Figure 7.25a). At low tide, moderate numbers of individuals could also be found at times on the intertidal flats of the Inner Burry (Figure 7.25b).

7.26 KNOT

High tide roosts of Knot in winter 1987/88 occurred exclusively from Pen-clawdd westwards on the southern shore (Figure 7.26a). The largest numbers were present at Whiteford which, along with Weobley, is normally the species' centre of abundance on the Burry (Table 7.1).

The low tide distribution of Knot showed a similar southerly bias to that at high tide, with the exception of a concentration of feeding birds north of the river channel around the mussel scar off Tir Morfa saltmarsh (Figure 7.26b). Knot arrived here from the south as the flats began to uncover and left again to the south when the tide returned. Finding the mobile Knot flocks at low tide on the huge intertidal flats of the Middle and Outer Burry (south) was difficult, and the species was undoubtedly undercounted at this time. Towards high water, however, large mixed flocks of Knot and Dunlin, up to 8,000 strong, would form along the water's edge in these areas, moving up towards the saltmarsh edge with the incoming tide. Substantial numbers of Knot were at times present during low water along Whiteford Sands, with apparently loafing birds predominating.

7.27 SANDERLING

Almost the only Sanderling recorded on the Burry in winter 1987/88 were at Whiteford, where a flock of up to 170 was occasionally to be found. These birds, present in typical numbers (Table 7.1), made some use of the western sandy shore of Whiteford Burrows for feeding, but probably more commonly fed and, possibly, roosted along the Cefn Sidan shore, outside the limits of the Burry Inlet as adopted in this study. As previously noted by Davis (1984), there was no evidence at Pembrey Burrows itself of the roost referred to by Prater (1977). The only birds noted elsewhere were two individuals seen once at low tide on the Inner Burry.

7.28 DUNLIN

Major concentrations of Dunlin recorded on BoEE counts in winter 1987/88 occurred all along the southern shore from Pen-clawdd westwards (Figure 7.28a), a typical pattern (Table 7.1). Additional small roosts were present at sites on the north shore, notably at Burry Port, and on the Upper Loughor.

At low tide, large numbers of Dunlin were found throughout much of the Burry estuary (Figure 7.28b). Although their considerable mobility at this time prevented any accurate population estimate, the results

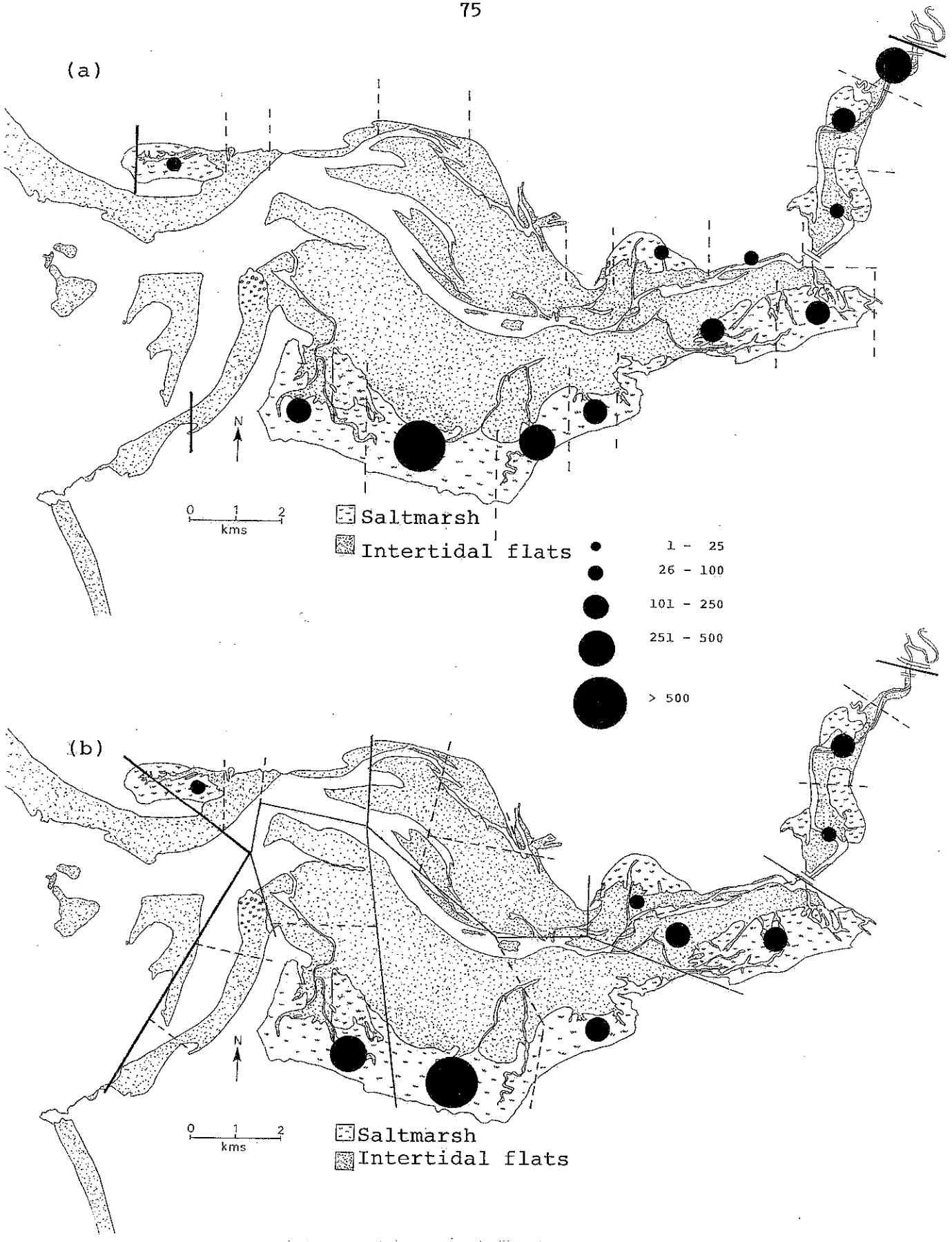

FIGURE 7.2 5 High tide (a) and low tide (b) distributions of Lapwing on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

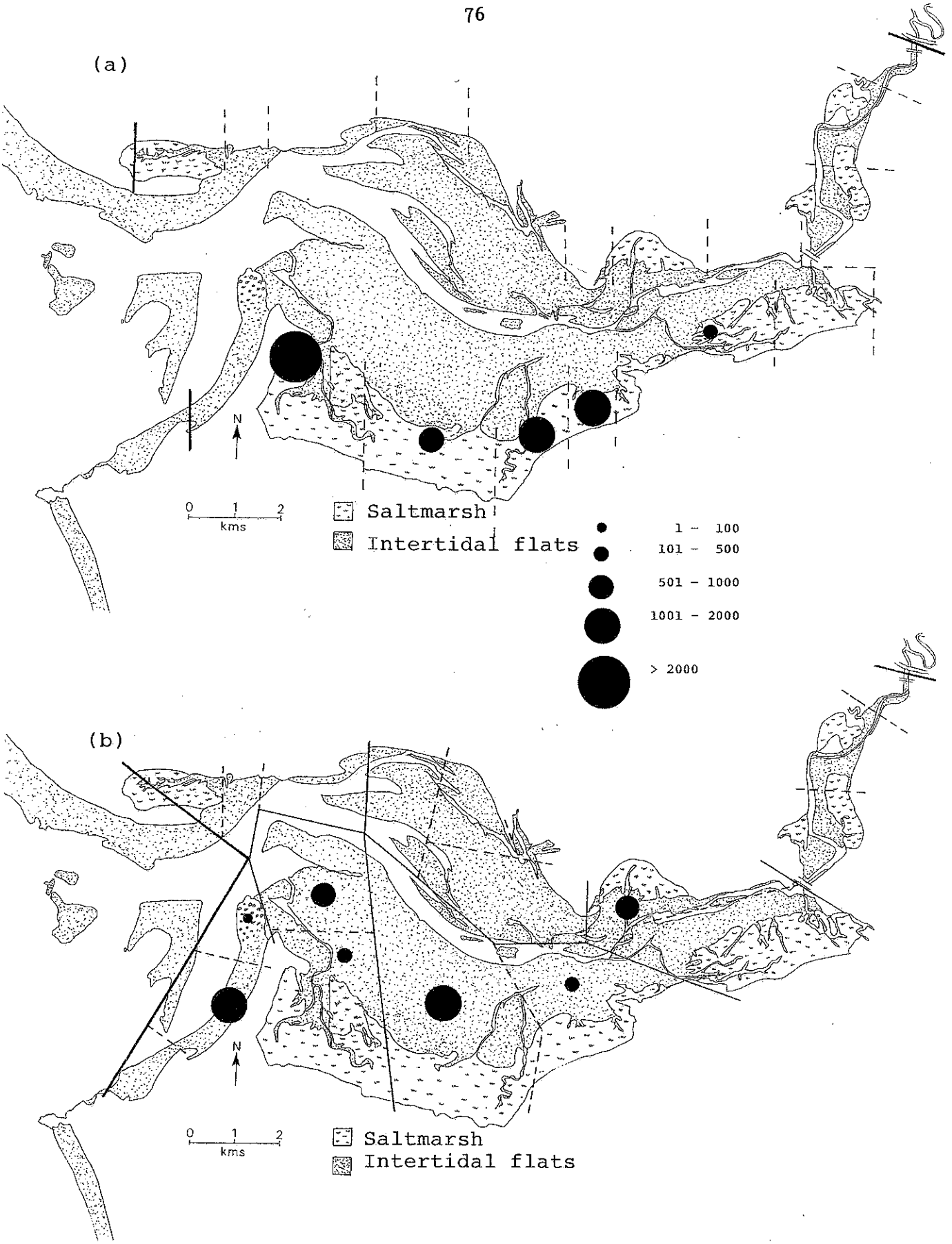

FIGURE 7.26 High tide (a) and low tide (b) distributions of Knot on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

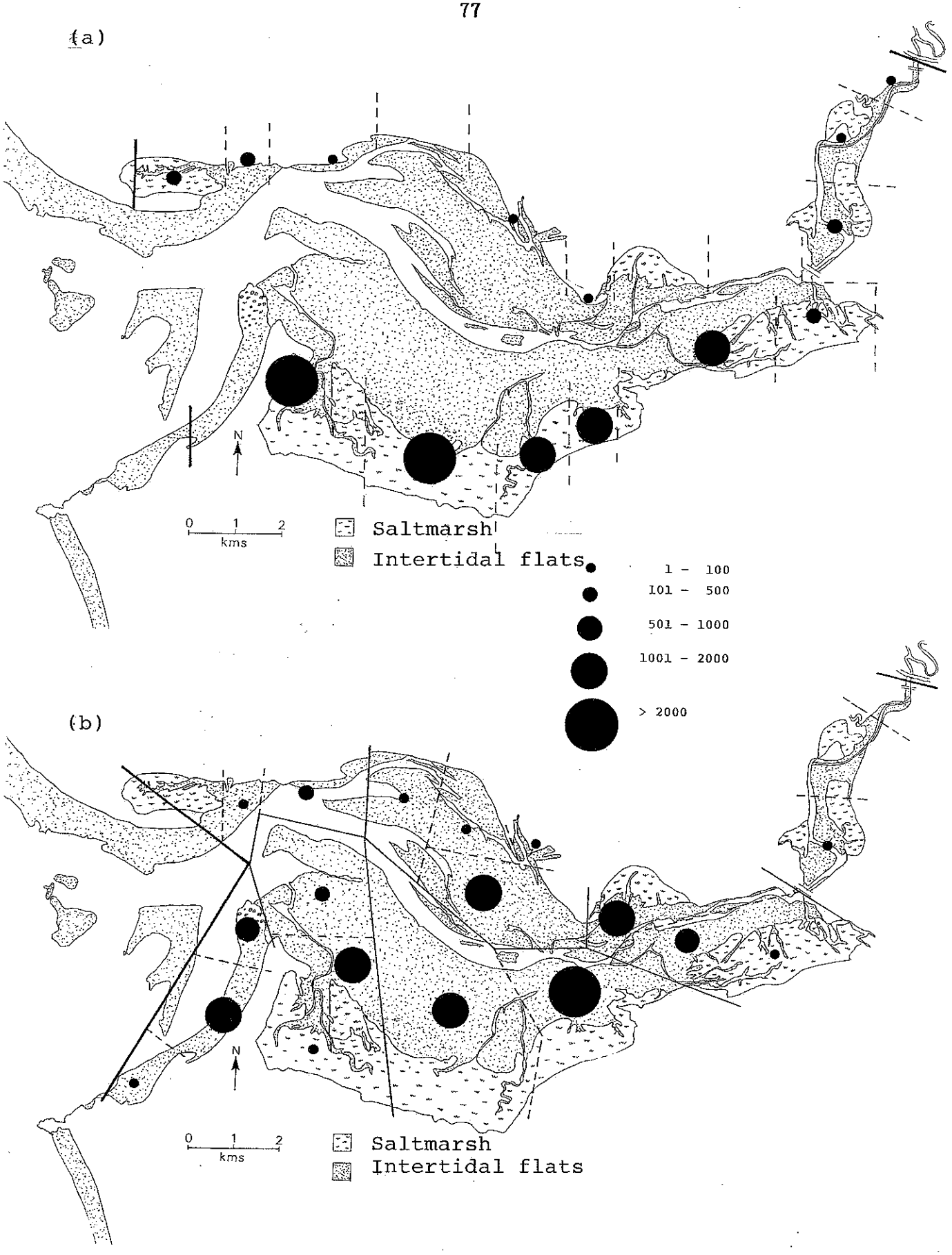

FIGURE 7.28 High tide (a) and low tide (b) distributions of Dunlin on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

available nevertheless indicate that the species may be considerably under-recorded by BoEE counts. Thus a single flock of 3,750 birds was noted in sector 8 of the Middle Burry (south) on 20 January, equalling the peak BoEE count for the entire Burry Inlet for winter 1987/88 (Table 6.4) and exceeding the five-year average based on south shore counts alone (Table 6.1). Further, simultaneous counts by two observers on the rising tide in the Whiteford and Weobley sectors on 19 December revealed a minimum of 5,000 birds moving up towards the saltmarsh with the incoming tide. Results such as these strongly suggest that the true population of wintering Dunlin on the Burry is likely to exceed the 4,300 individuals necessary for National Importance.

7.29 JACK SNIPE

Only a single bird was recorded in winter 1987/88, but both the BoEE and low tide counting techniques employed were totally inappropriate for this cryptic and easily overlooked species.

7.30 SNIPE

Although most Snipe recorded in winter 1987/88 were at Whiteford (100) and Tir Morfa (40), many may have been overlooked elsewhere as neither the BoEE or low tide counting techniques are appropriate for this cryptic species.

7.31 BLACK-TAILED GODWIT

Few Black-tailed Godwits have been recorded in winter on the Burry in recent years (Figure 5.18a). However, up to 55 birds were seen on the BoEE counts during winter 1987/88 near Salthouse Point, Pen-clawdd sector; at low tide, up to 47 Black-tailed Godwits could be found feeding in the Middle Burry (south), predominantly towards the saltmarsh in sector 8, just west of the high tide observations. Elsewhere, up to three birds were seen directly across the estuary at Tir Morfa saltmarsh, but the once favoured feeding site at Landimore Marsh (Prater 1977) was deserted. Nevertheless, maintenance of the 1987/88 wintering population over the next few years would result in the Burry Inlet verging on national importance for the species.

7.32 BAR-TAILED GODWIT

The only Bar-tailed Godwits noted at high tide in winter 1987/88 were on the southern shore from Pen-clawdd westwards (Figure 7.32a); the major concentration at Wernffrwd is of regular occurrence (Table 7.1). At low tide, most birds occurred on the Middle Burry (south), where a peak count of over 500 individuals seen together exceeded the peak BoEE winter count for the entire Burry Inlet (Figure 7.32b, Table 6.3). Good numbers were also present on occasion around Whiteford Burrows, but elsewhere only odd small flocks were noted. Overall, the birds were mobile and unpredictable in their occurrence at low tide.

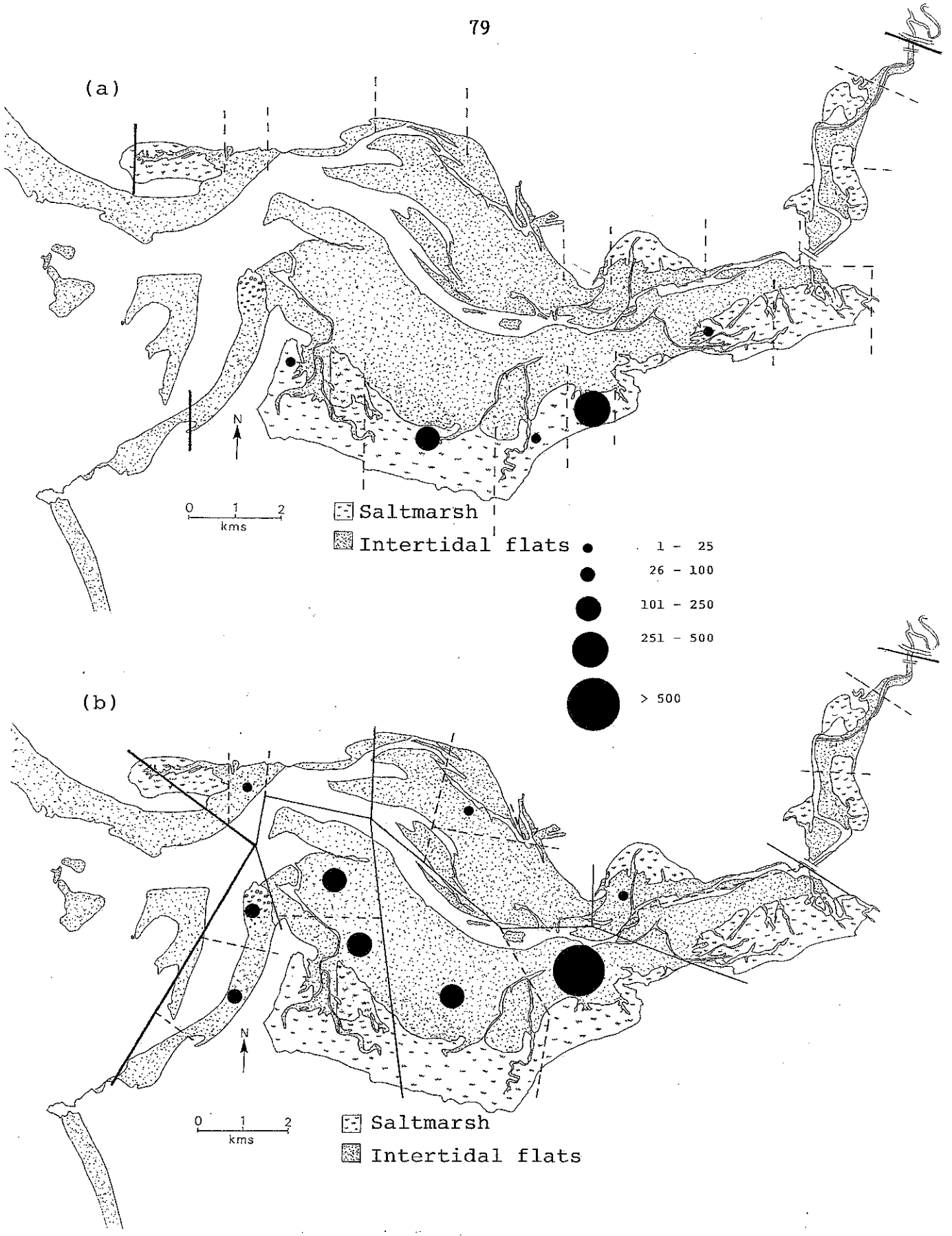

FIGURE 7.32 High tide (a) and low tide (b) distributions of Bar-tailed Godwit on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

7.33 CURLEW

The species was widely distributed at high tide in winter 1987/88, with largest numbers from Pen-clawdd westwards along the southern shore and at Tir Morfa marsh on the north side; smaller concentrations were present at Berthlwyd and throughout the Upper Loughor (Figure 7.33a). A widespread occurrence along the southern shore is typical (Table 7.1).

At low tide, Curlew were the most ubiquitous wader on the Burry Inlet, occurring in every censused sector (Figure 7.33b). Nevertheless, certain areas were clearly favoured. Notable among these were the intertidal flats and associated scars off Tir Morfa marsh, where up to 1,000 birds were recorded at low tide although never with more than half this number feeding simultaneously. Some of these birds roosted on Tir Morfa marsh at high tide, but others arrived from the southern shore on the falling tide and departed thence as the feeding sites covered again. Another concentration occurred on the scars around the lighthouse to the north-west of Whiteford Point; these birds arrived from high tide roosts on the eastern side of Whiteford. Elsewhere, feeding birds tended to be well spread out, and numbers making use of the large intertidal flats of the Middle Burry (south) may have been underestimated to some extent. Although birds could be found feeding all along the southern saltmarsh, the large low tide concentrations which sometimes formed on Landimore Marsh at the western end were always predominantly of roosting birds.

7.34 SPOTTED REDSHANK

The only birds noted in winter 1987/88 were two individuals seemingly resident in the Whiteford sector.

7.35 REDSHANK

In addition to those present all along the southern saltmarsh shore, large high tide roosts of Redshank occurred in winter 1987/88 on the north shore at Tir Morfa saltmarsh and on the Llanelli breakwater (Figure 7.35a). Although peak south shore counts in this winter were made in the Berthlwyd and Llanrhidian sectors, the largest numbers are more typically found at Pen-clawdd (Table 7.1).

At low tide, Redshank were almost as widespread as Curlew (Figure 7.35b). The most noticeable concentrations occurred on the Inner Burry, in particular along the edge of Tir Morfa marsh where birds moved back and fore between the marsh itself, which was not censused, and the flats abutting it. Along the Middle Burry (south), the saltmarsh/mudflat interface was more difficult to observe without disturbing the birds, and numbers here may have been relatively underestimated; similarly, Redshank foraging in the many creeks and gullies within the saltmarsh posed counting problems. Good numbers of birds occurred well away from saltmarsh on the intertidal flats in the eastern half of the Middle Burry (north); up to 250 of these could at times be found loafing within the Llanelli docks (sector 18) (Figure 7.35b).

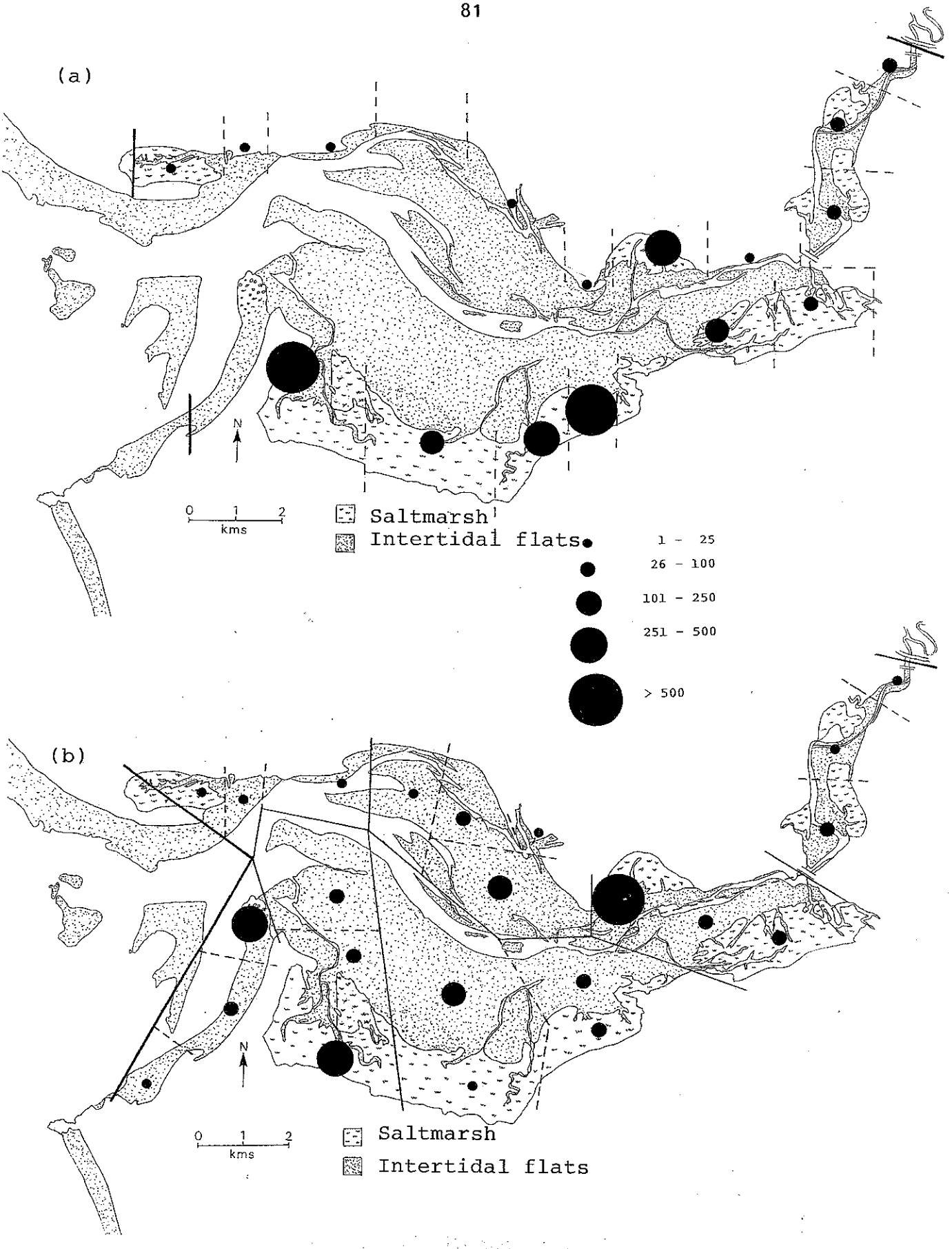

FIGURE 7.33 High tide (a) and low tide (b) distributions of Curlew on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

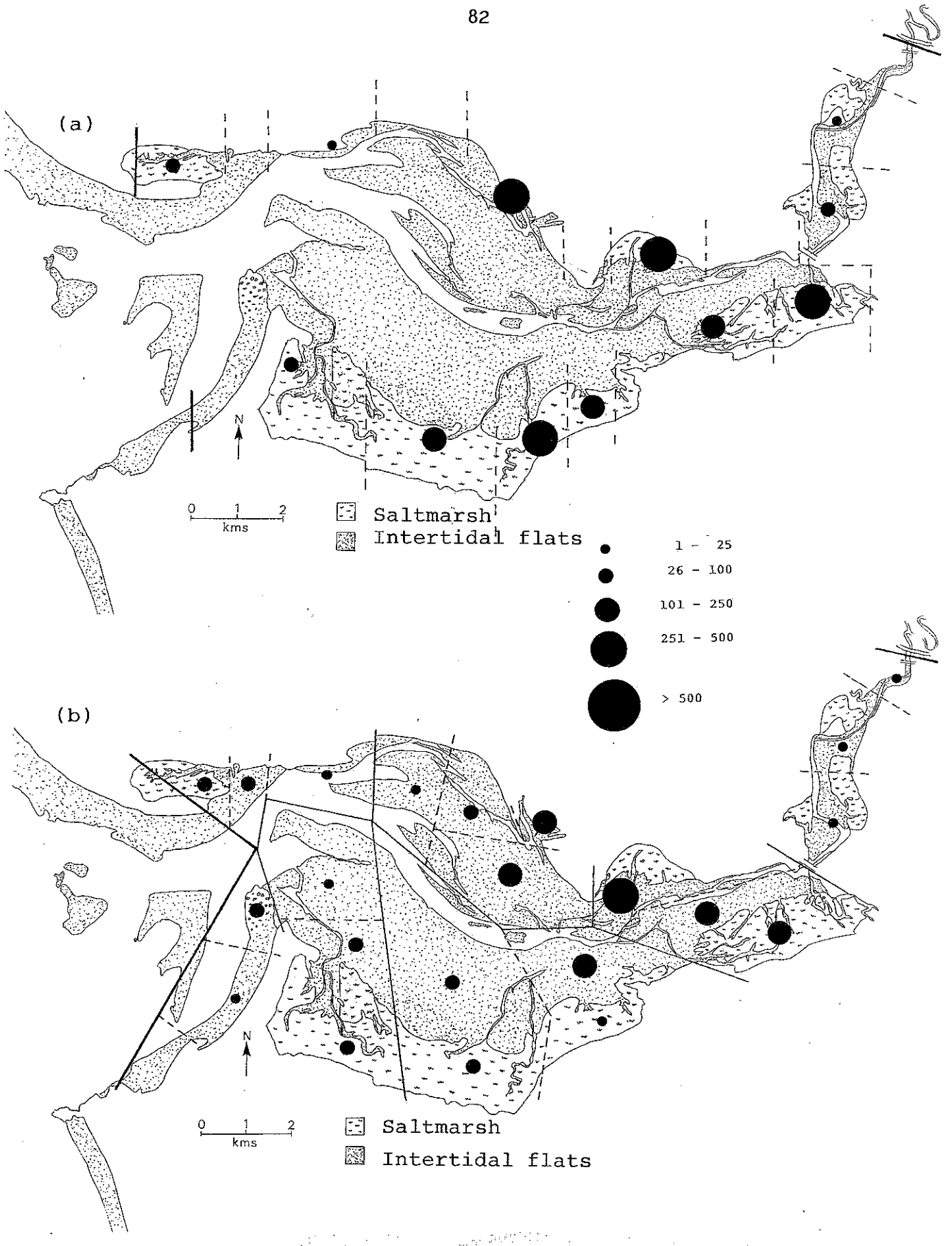

FIGURE 7.35 High tide (a) and low tide (b) distributions of Redshank on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

7.36 GREENSHANK

The only records in winter 1987/88 were of one bird feeding near high tide in late November at the mouth of the Lliw/Llan rivers (Berthlwyd sector) and of another seen at high tide in February in the Llanrhidian sector.

7.37 GREEN SANDPIPER

A maximum of three birds were present along the Burry south shore in December 1987. In addition, a bird which had been colour-ringed on the Lleidi reservoir, north of Llanelli, was present from December 1987 to April 1988 on the Upper Loughor.

Ormerod & Tyler (1988) studied the feeding ecology of Green Sandpipers in, among other sites, the estuarine environments of the Loughor and Gwendraeth in 1986 and 1987. In both places, birds fed at low tide along muddy, sunken channels, 1-3 m wide, draining through the saltmarsh. At high tide, they moved to adjacent shallow pools of brackish water, in which Phragmites australis formed the dominant vegetation. Annelid worms, notably Nereis, formed the major prey in the channels, whereas the crustacean Gammarus and the salt-tolerant caddis larva Limnephilus affinis predominated at the pools.

7.38 COMMON SANDPIPER

A single bird present on the Berthlwyd saltmarsh in mid November was the only record in winter 1987/88.

7.39 TURNSTONE

The largest high tide Turnstone roosts (200 or more) in winter 1987/88 were in the Machynys and Burry Port sectors on the north shore, but substantial flocks (ca 150) were also recorded at Whiteford and Llanrhidian on the south shore (Figure 7.39a). Nevertheless, numbers at Whiteford were well down on expectations based on average annual peak counts over the past decade (Table 7.1).

At low tide, the largest concentrations of birds occurred on mussel scars, notably in the Whiteford lighthouse area but also south-west of Tir Morfa saltmarsh (Figure 7.39b). Turnstone can be remarkably cryptic in such situations and this, combined with problems inherent in locating small feeding flocks widely distributed elsewhere, means that recorded totals for at least some sectors are likely to be on the low side. As the tide rose, Turnstone from the Whiteford scars roosted around Whiteford Burrows, some moving down its east side; many birds from the scar area off Tir Morfa marsh moved west onto the Machynys and Llanelli foreshore.

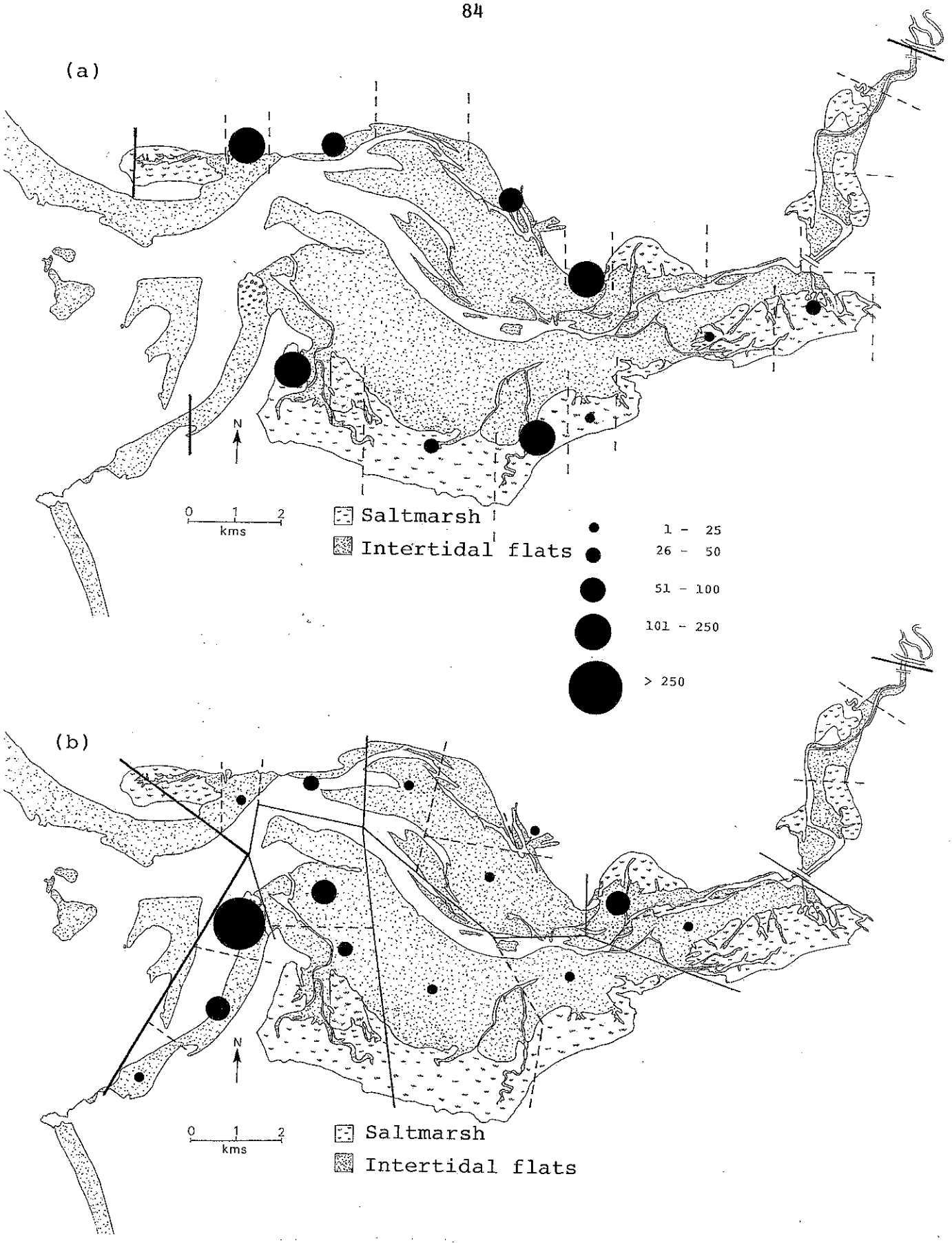

FIGURE 7.39 High tide (a) and low tide (b) distributions of Turnstone on the Burry Inlet during winter 1987/88, based on peak counts recorded in each sector.

8. SYNTHESIS AND CONCLUSIONS

Wintering populations of most of the main species of wildfowl and waders present on the Burry Inlet appear to have increased, in some cases substantially, since the study of Prater (1977) or to have remained more or less stable overall (Chapter 5). Only for Dunlin, Bar-tailed Godwit and Redshank is there good evidence pointing towards a sustained decline since the mid 1970s. The data for both Bar-tailed Godwit and Redshank must be interpreted with caution, however. The size of the population of Bar-tailed Godwit present in some years departs markedly from the overall downwards trend, pointing perhaps to factors external to the Burry Inlet having a major controlling influence. A greater proportion of the high tide population of Redshank than of any other wader on the Burry Inlet occurs on the north shore, which has not been covered by long-term BoEE counts (Chapter 6), and the sudden south shore decline in this species might therefore not be representative of the situation on the Burry as a whole. For Dunlin, the downwards trend in the recorded population has been unequivocal but parallels a similar decline in the national wintering population of this species (Goss-Custard & Moser 1988); it is thus difficult to distinguish possible effects of local change in the Burry environment from that occurring more widely in causing the decline. Overall, the evidence suggests that the intertidal environment of the Burry has retained or even increased its importance for wildfowl and waders over the past fifteen years.

Chapter 5 further shows that, despite notable passages of some species in spring and autumn, winter is clearly the time of year when the Burry Inlet is of major overall importance to intertidal bird populations. Five-year BoEE count averages for the Burry south shore, given in Chapter 6, reveal twelve species as having wintering populations of National Importance, of which eight are also of International Importance. Data from spring and autumn counts add only a single additional species of National Importance, the Whimbrel, and no additional species of International Importance (Table 6.4).

Reliance on the available recent BoEE five-year average counts for identifying the wildfowl and wader populations of National and International Importance on the Burry Inlet probably underestimates the true situation for two reasons: first, a five-year span of data is only available for the Burry south shore; second, the population of at least one species may be significantly under-recorded on BoEE counts. Consideration in Chapter 6 of the 1987/88 BoEE data available from the Burry north shore and Upper Loughor in conjunction with that from the Burry south shore suggests that two additional species, Ringed Plover and Redshank, may have populations present of National and International Importance respectively. In the case of the Redshank, counts peak during the autumn months and it is at this time that an Internationally Important population is probably present.

These results for Ringed Plover and Redshank obviously require confirmation from additional years of data collection, as does evidence in Chapter 7 from the 1987/88 low tide counts that Dunlin on the Burry may in fact comprise a Nationally Important wintering population. The

small size and widespread occurrence of this species make it a difficult one for the Burry south shore BoEE counts to record comprehensively, especially as these counts are necessarily conducted largely across considerable expanses of saltmarsh. However, even if undercounting of the Dunlin population on the Burry south shore has been occurring, there is no *a priori* reason why this should have altered systematically with time, and thus no reason to doubt the validity of the recorded decline in the species. Both the high and low tide counts in winter 1987/88 further suggest that a potentially Nationally Important wintering population of Black-tailed Godwit may be re-establishing itself on the Burry.

The evidence from the high and low tide distribution studies, notably for winter 1987/88, presented in Chapter 7, together with the recorded data on movement patterns, combine to support the view that the entire Burry Inlet below the rail bridge must be viewed as a single entity for the purposes of waterfowl conservation. Large-scale, tidal-related movements occur both north/south across the estuary and east/west along it. Nevertheless, within this whole it is worthwhile highlighting the particular importance of certain areas. Notable among these are the very limited patches of mussel scar, which form low tide foci for populations of a diversity of species. Much the largest of these scars is that around Whiteford lighthouse in sector 15 (Figure 4.2), the importance of which to species such as Brent Goose, Eider, Oystercatcher and Turnstone has been appreciated previously. The results in Chapter 7, however, additionally document the major importance for species such as Grey Plover, Knot, Curlew and Redshank of the area encompassing the scars off Tir Morfa saltmarsh, which lie largely in the western end of sector 6 but extend into the extreme eastern end of sector 20 (Figure 4.2). The small scars in the southern end of sector 15 and in sector 16 also attract concentrations of birds over the more restricted tidal period for which they are exposed. The role of all these scar areas in supporting intertidal birds on the Burry deserves more comprehensive documentation; for example, is there evidence to support the suggestion of distinct cockle flat and mussel scar sub-populations of Oystercatcher on the Burry?

The mud and sand flats of the Middle Burry, both north and south, comprise the area within which the commercially exploited cockle beds are present. Whereas the major recorded feeding concentration of Oystercatcher in winter 1987/88 occurred on the more eastern intertidal flats of the Middle Burry (north), the flats on the southern side supported large numbers of a greater diversity of both wildfowl (*e.g.* Pintail, Shoveler) and waders (*e.g.* Knot, Dunlin, Bar-tailed Godwit). These latter flats are contiguous with the topographically more complex area of the Outer Burry (south) where sheltered (by Whiteford Burrows) and protected (by NNR status) areas of intertidal flats and saltmarsh merge in a miasma of creeks and gullies. This area is the most important on the Burry Inlet for feeding by Shelduck, Wigeon and Teal, as well as providing sheltered high tide roost sites for concentrations of birds from both the mussel scars west of Whiteford and from within the Burry Inlet. Although the saltmarsh along the entire southern shore of the Burry is of major significance for roosting birds, it is the two westerly sectors of Whiteford and Weobley that attract the

highest regular populations (Table 7.1). These sectors also provide the saltmarsh on which most of the Golden Plover and Lapwing concentrate.

On the north shore, the relatively small area of saltmarsh at Tir Morfa is clearly a key site at high tide for species such as Teal, Curlew and Redshank. It is situated in close proximity to scar areas foraged over by numerous birds (see above) and, although not investigated during the present study, its significance as a low tide feeding site is likely to be considerable. With the recent setting up of a Wildfowl Trust Centre there, both its future protection should be ensured and more information become available on the use made of it by bird populations.

9. ACKNOWLEDGMENTS

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