



BTO Research Report No. 304

**The Role of Birds as a Potential Source
of Bacterial Contamination Along
the Blackpool Shoreline – Year 2 (2002)**

Authors

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Executive Summary

Monthly counts of the waterbirds and pigeons on the intertidal area between the Metropole Hotel and the Pleasure Beach were made between May and September 2002. The number of Starlings roosting on North and Central Piers was recorded.

Analysis relating the bird distributional data to the water quality data was not carried out.

Key Points

- The results of this study showed that large numbers of gulls and also Starlings continue to use both the intertidal area for feeding and roosting (gulls) and the piers for roosting (Starlings).
- The results suggest an increase in the numbers of gulls on the intertidal area particularly around the piers compared to 2001. The numbers of Starlings roosting on North and Central Piers also appeared to be higher than at the same period in 2001, particularly in July, when 60% of all birds were juveniles. However, the commencement of an experiment to scare roosting Starlings from the piers in early August depressed roosting numbers for the remainder of the study.
- Continued monitoring of the numbers of waterbirds, particularly gulls and Starlings, is recommended, especially if further experiments to scare roosting birds from the piers are to be undertaken in the future.
- It is recommended that these bird distributional data are related to the water quality data obtained by the Environment Agency to confirm the relationships between water quality and gull and Starling numbers determined using the 2001 data (Holloway *et al.* 2002).

1. INTRODUCTION

Concern that the designated bathing waters at Blackpool on the Fylde coast have frequently failed to comply with imperative microbiological standards, and evidence to suggest that birds may be a possible source of the contaminants involved, resulted in the Environment Agency commissioning a study by the British Trust for Ornithology (BTO) to investigate the issue further. The results of this study, undertaken between May and October 2001 (Holloway *et al.* 2002), were consistent with the hypothesis that birds (particularly gulls and Starlings) may be a source of microbiological contaminants in Blackpool's designated bathing waters.

To further quantify these data, and to determine whether or not the relationships identified during 2001 still persisted, additional monitoring of the birds, particularly gulls and Starlings, was undertaken along Blackpool seafront between May and September 2002. Some of the Starling monitoring took place during an experimental period of bird scaring on the three Blackpool piers during August (Blackburn *et al.* 2002).

The objectives of the present project were:

- To continue monitoring the birds making use of the Blackpool seafront during the bathing season (May to September) for a second summer.
- To collect bird distributional data from the intertidal area and piers during the two EA intensive surveys carried out during 18-19 June and 21-22 August 2002.
- To carry out three further general counts in May, July and September 2002.
- To produce GIS coverages with the data and to produce smoothed plots of the bird distribution data along a matrix of the site by the four stages of the tidal cycle (high, low, ebb and flood).

2. METHODS

2.1 Study Area

The survey area comprised a 4 km stretch of the Blackpool seafront (Figure 2.1.1), encompassing the area between the Pleasure Beach and the Metropole Hotel. The survey area was thus shorter than the 8.5 km of coastline between Bispham and Starr Gate covered during the 2001 survey (see Holloway *et al.* 2002).

The extent of the present study area was defined to encompass areas of both high levels of faecal coliforms and *streptococci* as well as high concentrations of gulls and Starlings on and around the three piers. The majority of the 2002 Environment Agency weekly sampling locations were also within this area.

2.2 Bird Observations

The methods basically followed those used in 2001 (See Holloway *et al.* 2002), but for the present survey, a total of five monthly visits were conducted between May and September (during 2001 a total of 24 weekly visits were made between May and November). Generally, each of these visits lasted for two days, and covered the four stages of the tidal cycle (high, ebb, low and flood). These visits were timed to coincide with water compliance sampling undertaken by the Environment Agency. However, the visits in June and August coincided with an intensive period of sampling carried out over a two-day period by the Environment Agency, and bird observations covered two complete tidal cycles per visit.

Bird observations were made on foot and all species of bird present on the intertidal area were counted and mapped. The numbers and distributions of intertidal waterbirds were quantified by digitally capturing maps of flock locations. These were processed within a Geographic Information System to derive gull, wader and waterbird (gulls + waders) "proximity indices" (the proximity index for a given location being a distance weighted measure, based on Kriging, of bird numbers, weighted by species basal metabolic rate (BMR), in the local area).

Roost counts of Starlings were undertaken at North and Central Piers during each visit (with two counts made at each pier during June and August). South Pier was not counted by BTO staff as a part of this survey.

2.3 Analyses

The main object of this study was to produce BMR and bird proximity indices comparable with those generated for the 2001 study. The **BMR Indices** are bird numbers, weighted by species basal metabolic rates and summed across the entire study area and give an indication of the faecal loading across the study area. Geostatistical interpolation (ESRI 2001) was used to derive **Group Proximity Indices** for gulls, waders and Feral Pigeons and an **Intertidal Proximity Index** for all species combined. A BMR index was not generated for Starlings as these data were from a point source, and therefore cannot be used to produce distributional proximity indices. For an explanation of the interpretation procedure involved see Holloway *et al.* 2002. No further statistical modelling was undertaken for the current study.

3. RESULTS

3.1 Bird Observations

The numbers of gulls

The distributions of birds found on Blackpool seafront between May and September inclusive during 2002 are depicted in terms of proximity indices for gulls (Figure 3.1.1.4), waders (Figure 3.1.2.2), Feral Pigeons (Figure 3.1.3.1) and, together with Starling numbers, for all birds combined (Figure 3.1.5.1).

It should be borne in mind when comparing data between the two years of surveys that the area counted in 2001 comprised an 8.5 km stretch of coastline, whilst that counted in 2002 comprised a 4.0 km length of coastline. For the purposes of between-year comparisons of the proximity index figures, only those parts of the intertidal area counted during both years of the surveys have been included. Overall, the datasets are much smaller for 2002, with only a single visit made each month between May and September. Conversely, during 2001, weekly visits were made between May and early November.

3.1.1 Gull observations

Five species of gull were recorded during the survey period feeding and roosting within the intertidal area. As with the 2001 survey, Herring Gull (*Larus argentatus*) was the commonest species recorded throughout, with a peak count of 1,794 individuals within the study area in September (Table 3.1; Figure 3.1.1.1). This compares with the peak count of 2,000 birds along the entire survey area in August 2001. During the present survey, Black-headed Gull (*L. ridibundus*) was the second most abundant gull species overall, gradually increasing in numbers during the late summer, peaking at 368 birds in September (Table 3.1; Figure 3.1.1.2). A similar trend was noted during 2001, when more than 700 gulls were present in late August along the entire survey area. Of the remaining three species, Lesser Black-back Gull (*L. fuscus*) was present throughout the period, usually associating with the groups of Herring Gulls. The maximum count was of 91 individuals recorded in August (Table 3.1; Figure 3.1.1.3). This compares with a peak count of 220 gulls along the entire survey area in June 2001. Common Gull (*L. canus*) and Great Black-backed Gull (*L. marinus*) were both present in very small numbers (Table 3.1), as noted in 2001.

The majority of individuals present in the early part of the summer (*i.e.* between April and mid-July) were immature non-breeding stock (Holloway *et al.* 2002). However, during both the 2001 and 2002 surveys, all five species of gull showed an increase in numbers within the intertidal area from mid-July onwards, with the arrival of adults accompanied by juveniles, indicating post-breeding dispersal from other sites. Species such as Lesser Black-backed Gull are known to move well south of their breeding areas, with birds ringed in north-west Britain being recorded as far south as Spain and North Africa during the winter months (Wernham *et al.* 2002). Hence, the majority of Lesser Black-backed Gulls arriving at Blackpool from July onwards are likely to eventually continue southwards to their principal wintering areas. The post-breeding dispersal of Herring Gulls is less obvious, with birds gradually moving away from their natal areas (Parsons and Duncan 1978), and wintering within much of the UK. Therefore, it is quite possible that some of the birds arriving at Blackpool from mid-July onwards overwinter, with some of the young birds remaining during the subsequent year.

Overall, the temporal distribution of the gulls feeding and roosting along the intertidal area at Blackpool between May and September 2002 was similar to that recorded in 2001. However, using the Gull Proximity Index (for further information on the index, see Holloway *et al.* 2002), to compare the individual visit data from 2002 with the nearest equivalent date in the 2001 survey, several differences are apparent. In May 2001, there were fewer gulls around North Pier compared to the equivalent date in 2002 (Figure 3.1.1.4), and more birds on the inter-tidal area to the south of both North and South Piers by late August 2002. However, the greatest difference between the two years was evident in September 2002, when larger numbers of gulls were present along virtually the entire

survey area, but particularly around North and South Piers (Figure 3.1.1.4). The adjusted gull BMR indices for both years are shown in Figure 3.1.1.5.

3.1.2 Wader observations

In keeping with 2001, waders were virtually absent from the survey area for much of the summer, with the exception of a few locally breeding Oystercatchers (*Haematopus ostralegus*), that fed on the intertidal area during the quieter periods of the day. Overall, Oystercatcher was the most abundant species of wader in 2002, with a maximum count of 168 individuals in August (Table 3.1; Figure 3.1.2.1). In 2001, the peak count of more than 230 Oystercatcher was also made in August, with numbers gradually increasing from late July (Figure 3.1.2.2), particularly between Central and South Piers. During 2002, Oystercatcher also showed a gradual increase in numbers from late July, with the birds mostly concentrated between North and Central Piers, and to the south of South Pier (Figure 3.1.2.2). Towards the end of August, Oystercatcher numbers showed a substantial increase during both 2001 and 2002, with the birds fairly generally distributed along the intertidal area (Figures 3.1.2.1 & 3.1.2.2). The greatest concentrations in 2002 were adjacent to North Pier and to the south of South Pier. During 2001, the greatest numbers were around South Pier. In September, there were fewer Oystercatchers recorded during both years, with the greatest numbers around Central Pier in 2002, compared to a lesser concentration to the north of South Pier in 2001. Overall, there were more Oystercatchers using the intertidal area between the three piers in 2002 than in the equivalent period of 2001.

The only other species of wader recorded on the intertidal area during 2002 were Redshank (*Tringa totanus*) and Sanderling (*Calidris alba*), and both of these were occasional in their appearance, and in single figures. During 2001, most of the Redshank occurred north of the present survey area, and were therefore not covered by the 2002 counts. The adjusted wader BMR indices for both years are shown in Figure 3.1.2.3.

3.1.3 Feral Pigeon observations

Feral pigeons were recorded on the intertidal area during all visits in 2002, but always centred around the three piers (Table 3.1; Figure 3.1.3.1). The greatest concentrations were around South Pier in June and North Pier in August. Many more pigeons were recorded around the piers in September 2002 than over the equivalent period in 2001. No attempt was made to assess the numbers of breeding pairs on the piers during the present study, as the previous survey had suggested that many pairs remain totally hidden amongst the under-pier superstructure, occasionally calling. Throughout the survey period, pigeons were fed scraps along the promenade, with flocks of up to 40 birds noted. There was further evidence to suggest that pigeons feeding further afield roosted on the piers, as small groups were regularly observed flying onto the piers, often arriving with flocks of high-flying Starlings (*Sturnus vulgaris*) (Holloway *et al.* 2002). The adjusted pigeon BMR indices for both years are shown in Figure 3.1.3.2.

3.1.4 Starling observations

Starling numbers were recorded for both North and Central Piers. The counts were only made on single dates for both piers during May, July and September, and on two successive nights for both piers in June and August (coinciding with the Environment Agency's intensive sampling periods). However, the August counts coincided with the start of an experiment to scare roosting Starlings away from the piers, and the ensuing disturbance rendered accurate counting at dusk impossible. However, as a part of this experiment, counts were made of Starlings leaving the pier roosts at dawn (Blackburn *et al.* 2002), and these data have been incorporated into the figures.

The numbers of roosting Starlings showed a steady increase through the season, as post-breeding adults and juveniles moved from their breeding areas. North Pier once again held the largest numbers, with the peak count of 19,000 birds recorded in September (Figure 3.1.4.1). This is lower

than the peak of more than 25,000 birds recorded on North Pier in late August 2001, but the bird scaring experiment affected the build up of the roost. An estimated 18,000 birds were roosting on North Pier on the night before the bird scaring began (Blackburn *et al.* 2002). The highest count of birds roosting on Central Pier in 2002 was of 6,450 individuals in July (Figure 3.1.4.1). This is substantially lower than the peak of 9,193 birds recorded at the end of August in 2001, but as outlined above, there was disruption to roost development by the bird scaring during August. However, a count of Starlings roosting on the pier the night before scaring began suggested a total in the region of 9,000 birds, very similar to the equivalent date in 2001 (Blackburn *et al.* 2002). Interestingly, only 544 Starling roosted on Central Pier in mid-September, compared to around 6,000 at the same time in 2001. This is presumably a legacy of the scaring carried out in the previous month. The Starlings chose the same areas of both North and Central piers for roosting as detailed in the previous study (Holloway *et al.* 2002).

One difference apparent between the two years was the date when an appreciable component of the roost comprised juvenile birds. During the third week of June 2002, an estimated 60% of the 12,000 roosting Starlings were juveniles. This is a much higher proportion than recorded in June 2001, when even at the very end of June, only around 10% of the roosting Starlings on North Pier were juveniles. During the previous study, the numbers of juveniles steadily increased through July and August, reaching an estimated 60% of the total of roosting Starlings by the second week of August. There is little reason to suppose that a greater proportion of juvenile Starlings within a roost would appreciably effect the associated faecal indicator.

During the observations at the roosts, it was not possible to say with any certainty that there was regular interchange of Starlings between the three piers. However, during the period of bird scaring in August, there was a lot of interchange between all three piers, as the roosting flocks were disturbed (Blackburn *et al.* 2002).

3.1.5 All species proximity index

Figure 3.1.5.1 shows the proximity index for all species, including Starlings, recorded during the five visits. It was not possible to get a representative count of the numbers of Starlings coming into roost in August due to intensive bird scaring taking place. Overall, the index suggests that there were more birds on and around the piers, particularly gulls, waders and pigeons in September. The number of roosting Starlings were reduced from mid August onwards by the bird scaring experiment, and this is reflected in the numbers recorded in September, which were likely to have been higher had the experiment not taken place.

4. DISCUSSION

Preliminary survey work undertaken between May and November 2001 by the BTO produced data consistent with the hypothesis that birds (particularly gulls and Starlings), may be a source of microbiological contaminants in Blackpool's designated bathing waters. The principal aim of this report was to further quantify these data using Geostatistical interpolation to produce BMR and proximity indices. To generate these data, additional monitoring of the birds, particularly gulls and Starlings, was undertaken along Blackpool seafront between May and September 2002.

It is difficult to make direct comparisons between the two surveys as the amount of data collected during 2002 was considerably less than that collected during 2001. The length of intertidal area covered in 2002 was less than half of that counted in 2001, only single monthly visits were carried out between May and September in 2002 compared to weekly visits between May and November in 2001, and only the North and Central Piers were monitored for Starlings in 2002, as opposed to all three piers in 2001. However, wherever possible comparisons have been made between the comparable stretches of intertidal area, and on the nearest comparable dates. In addition, when comparing the gull proximity index for September 2002 with September 2001, the values of the latter were derived from only three parts of the tidal cycle (high, ebb and low tides), and this will have reduced the overall density of gulls presented in the figure. The Starling data collection was somewhat disrupted by the bird scaring experiment which took place for several days during August, and appeared to have successfully depressed roosting numbers on both North and particularly Central Pier over four weeks later.

4.1 Intertidal Birds

Gulls were predictably the commonest species group on the intertidal area, with Herring Gull the most abundant species. This was the case during the previous survey. Although the highest count of Herring Gull (c.1,800 individuals), was 20% lower than the maximum count of 2001, there appeared to be a greater number of gulls concentrated around and between the three piers, particularly during September 2002. Several sections of the intertidal area containing large concentrations of gulls (mostly Herring) were outside of the boundaries of the 2002 survey area, and therefore were not counted. However, the difference between the peak count of Herring Gulls in 2001 (which included these areas with appreciable numbers well away from the piers), and the 2002 counts is relatively small. This suggests that more Herring Gulls utilised the intertidal area around and between the piers during 2002.

Waders were only present in appreciable numbers during August, with Oystercatcher the most abundant species. The feeding distribution of waders was influenced by human disturbance, the birds being easily disturbed. During August, the greatest concentrations of waders were around North and South Piers, with a lesser concentration in September around South Pier. This was broadly similar to the results of 2001, but with greater numbers around the piers during 2002.

No counts were made of the numbers of pigeons breeding on the piers during 2002, but all pigeons feeding on the intertidal area were counted and mapped. Pigeons feeding on the intertidal were concentrated around the three piers, particularly South Pier in June.

4.2 Starlings

Starling roosts were present on the three piers, with North Pier holding the greatest numbers. Only North and Central Piers were monitored for the survey. Roosting birds were present throughout the survey period, increasing in numbers from June onwards. The numbers roosting on North Pier in late June were substantially greater than the equivalent period in 2001, and the proportion of juveniles was substantially greater at 60%, than in June 2001. In fact the proportion of roosting juveniles in 2001 did not reach 60% until the second week of August. The reasons for these differences are not clear, but may indicate a very early and successful breeding season, and /or a change in the roosting habits.

The numbers roosting on both North and Central Piers continued to exceed the comparable counts recorded in 2001 up to the beginning of August. However, the start of a Starling scaring experiment from early August rendered comparable counts impossible. During September, the bird scaring operation was apparently still affecting the pier roosts, with depressed numbers on North Pier, and very few birds at all on Central Pier.

4.3 Future Monitoring

Given that the results of this study suggest a possible increase in the numbers of gulls and Starlings both on and around the piers, further monitoring of the situation is recommended. If further experiments to scare Starlings from the piers are planned for 2003, background monitoring of the roosting behaviour prior, during and post scaring would be required in order to gauge the success of such an operation.

4.4 Conclusions

The results of this study suggest an increase in the numbers of gulls on the intertidal area around the piers, particularly in the latter part of the summer between 2001 and 2002. The distribution of gulls on the intertidal area was broadly similar over both years. The monitoring of roosting Starlings on North and Central Pier suggested that greater numbers were using the piers than during the equivalent period of 2001. However, with the advent of the birds scaring experiment in early August, the numbers fell, and were still relatively low on Central Pier in September.

Acknowledgements

We would like to thank Andrew Wither and John Greaves of the Environment Agency for helping to co-ordinate the project and for obtaining the necessary funding.

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Wernham, C.V., Toms, M.P., Marchant, J.H., Clark, J.A., Siriwardena, G.M. & Baillie, S.R. (eds). (2002). *The Migration Atlas: movements of the birds of Britain and Ireland*. T. & A.D. Poyser, London.

Species	Visit				
	May Visit 1	June Visit 2	July Visit 3	August Visit 4	September Visit 5
Oystercatcher	2	5	80	168	64
Sanderling	3				
Redshank			1		
Black-headed Gull	4	22	178	368	172
Common Gull				2	1
Lesser Black-backed Gull	13	39	15	82	91
Herring Gull	396	614	565	918	1794
Great Black-backed Gull	2	1	1	9	9
Feral Pigeon	53	155	85	224	78

Table 3.1 Maximum number of the waterbirds and Feral Pigeons recorded on the Blackpool Study Area during each visit.

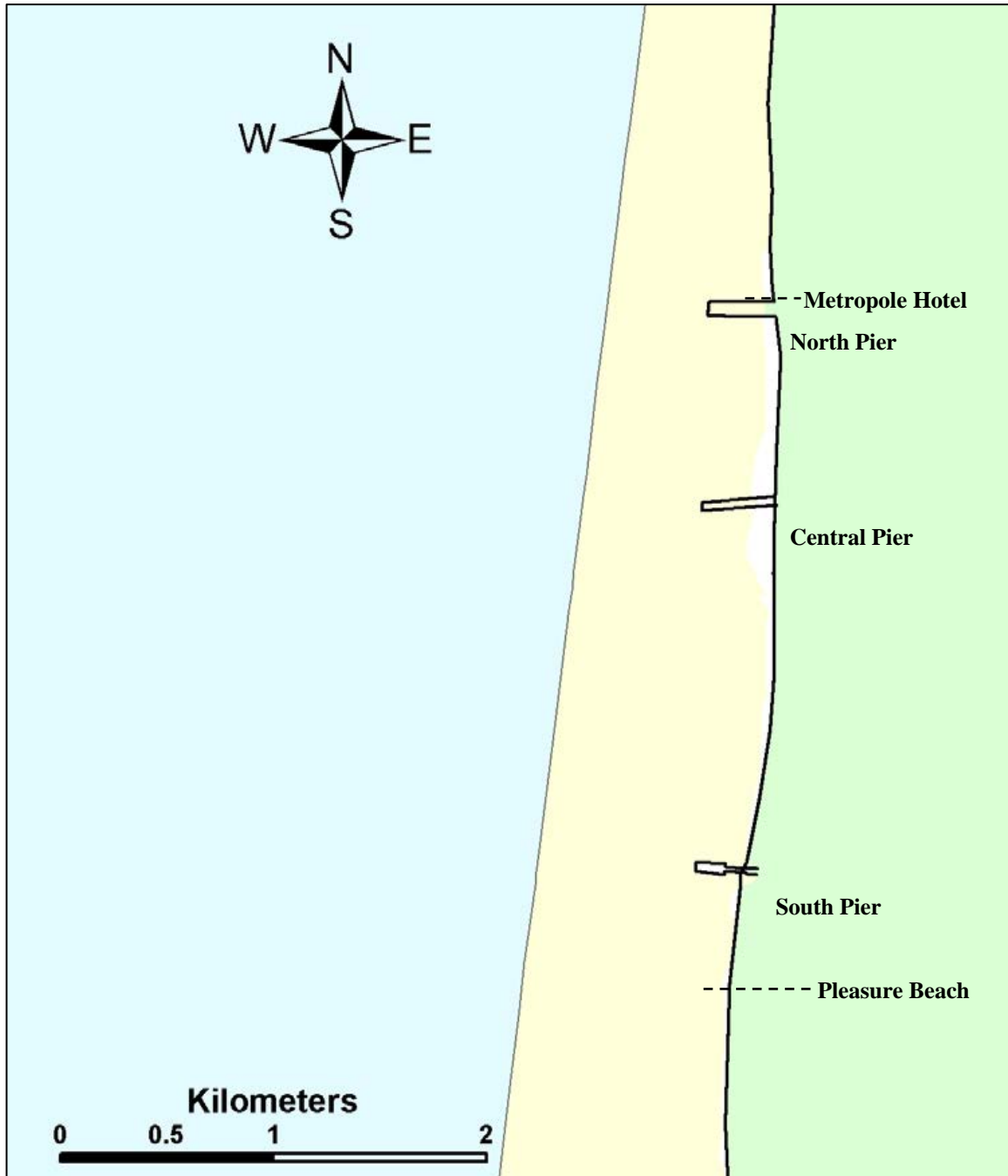
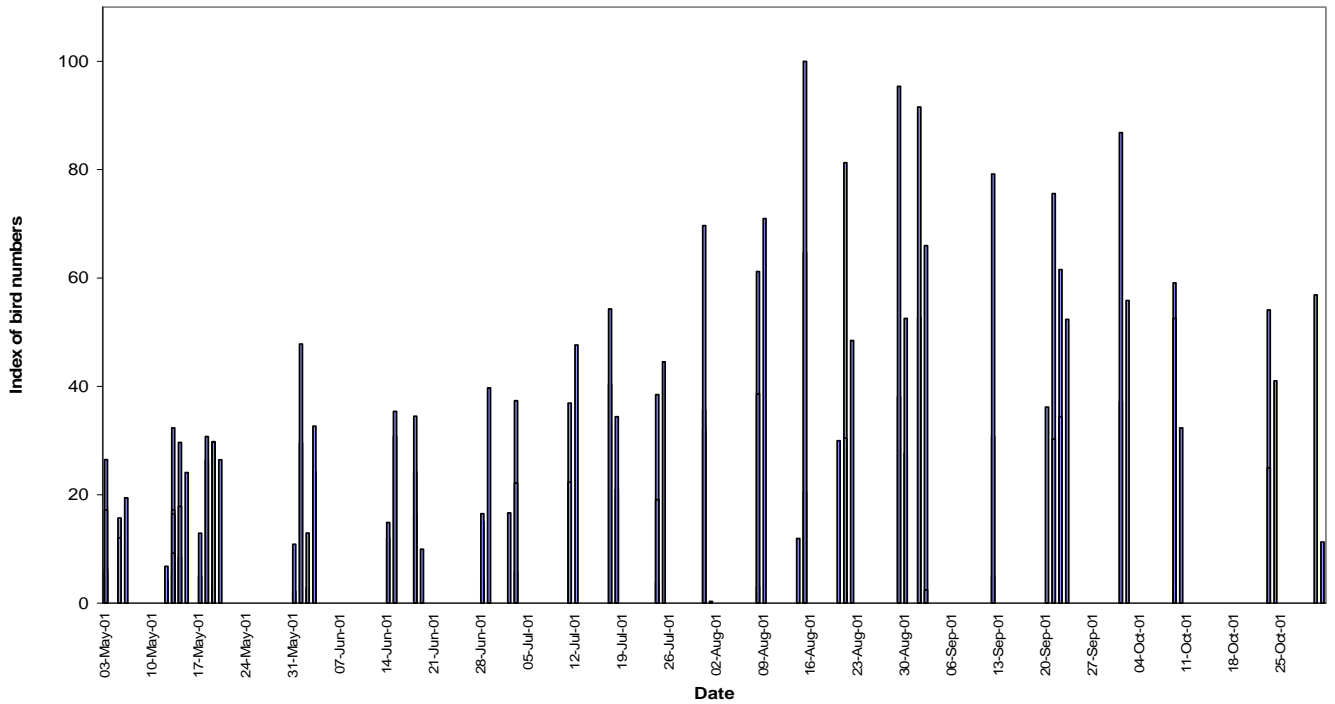


Figure 2.1.1 Blackpool beach and piers study area.

2001



2002

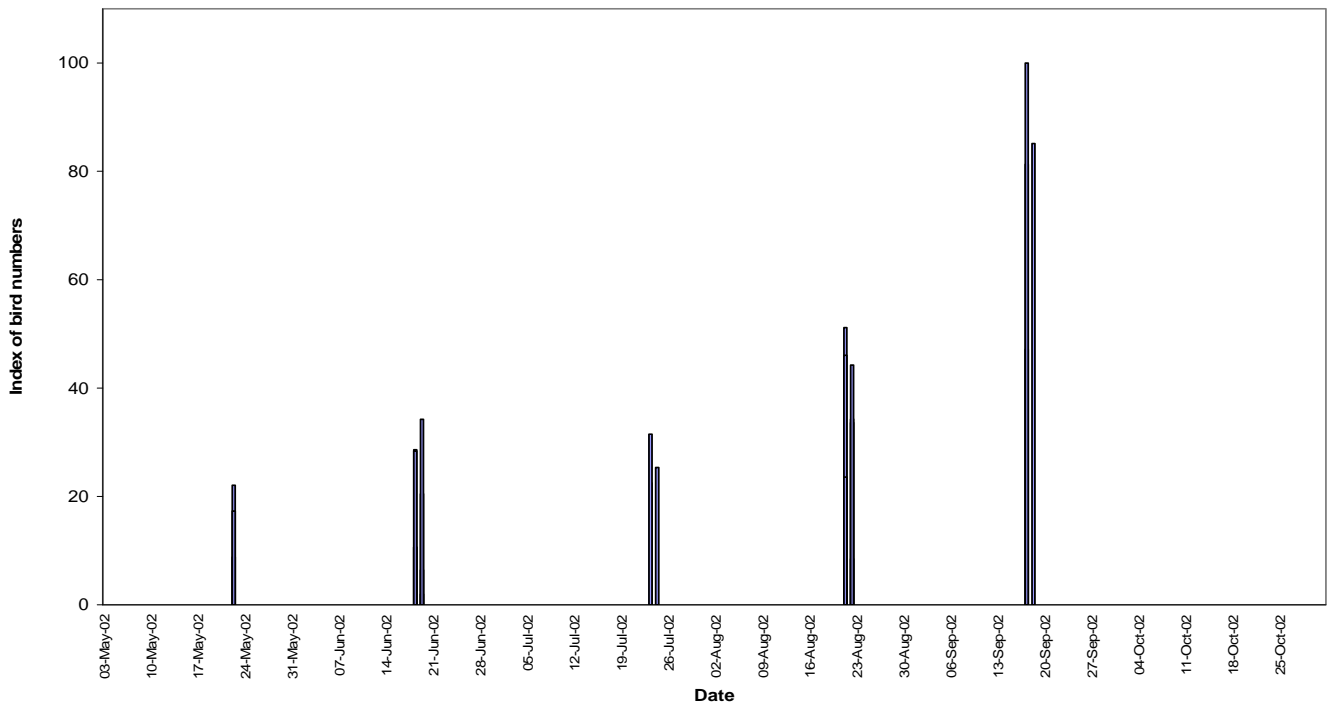
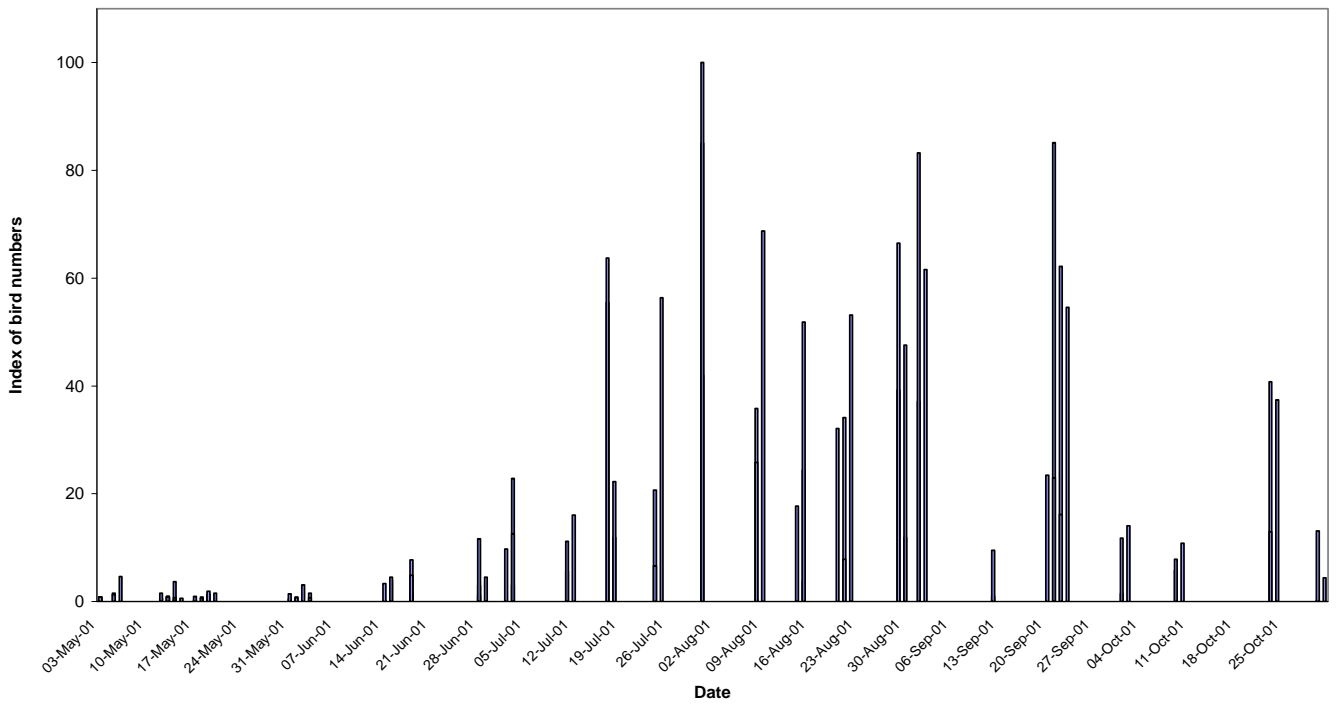


Figure 3.1.1.1 Index of Herring Gull numbers observed during shoreline surveys in 2001 and 2002. Both graphs have been scaled to a maximum of 100 for comparative purposes. A shorter length of shoreline was surveyed in 2002, so numbers of birds are not directly comparable between years.

2001



2002

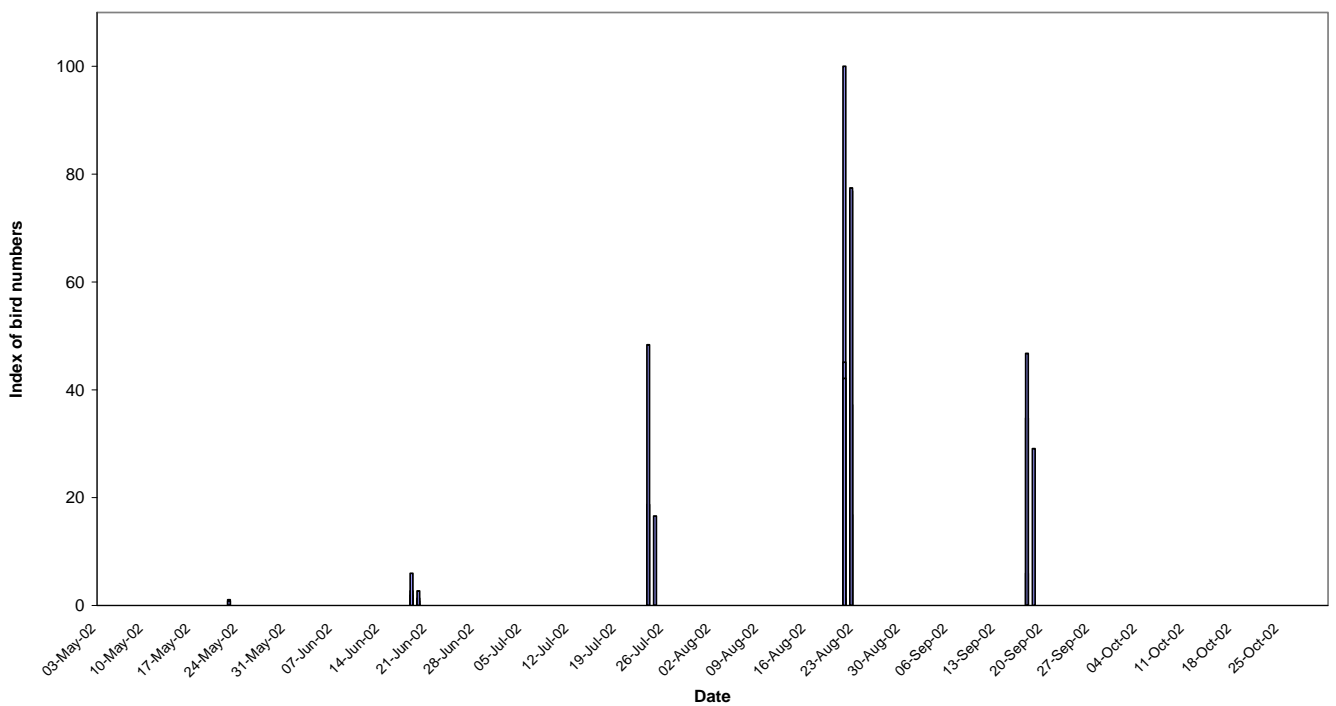
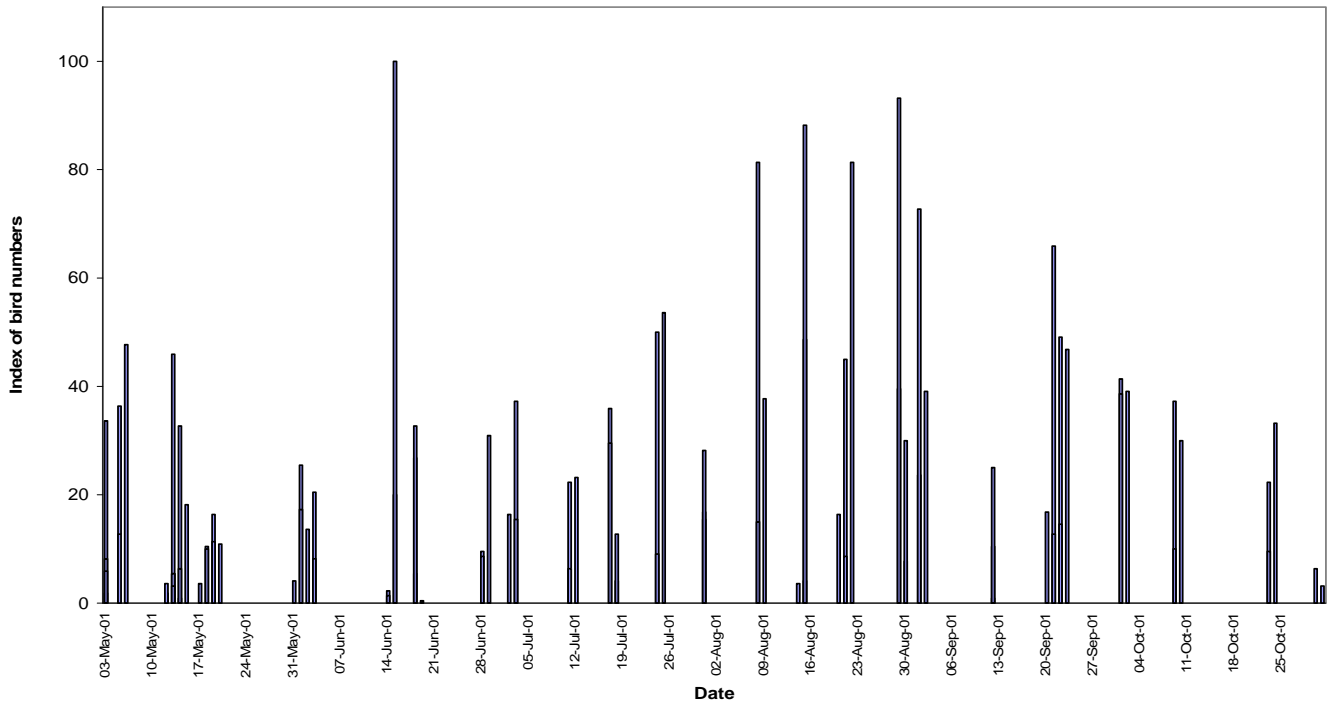


Figure 3.1.1.2 Index of Black-headed Gull numbers observed during shoreline surveys in 2001 and 2002. Both graphs have been scaled to a maximum of 100 for comparative purposes. A shorter length of shoreline was surveyed in 2002, so numbers of birds are not directly comparable between years.

2001



2002

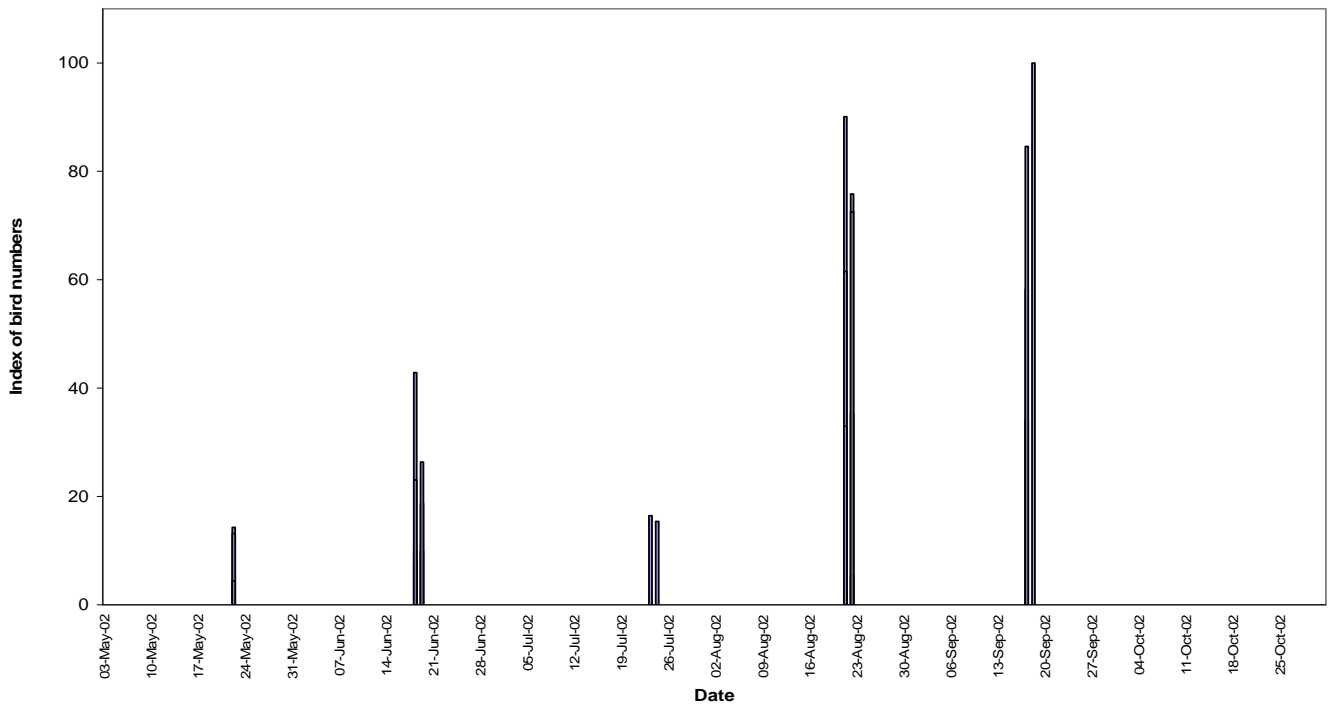


Figure 3.1.1.3 Index of Lesser Black-backed Gull numbers observed during shoreline surveys in 2001 and 2002. Both graphs have been scaled to a maximum of 100 for comparative purposes. A shorter length of shoreline was surveyed in 2002, so numbers of birds are not directly comparable between years.

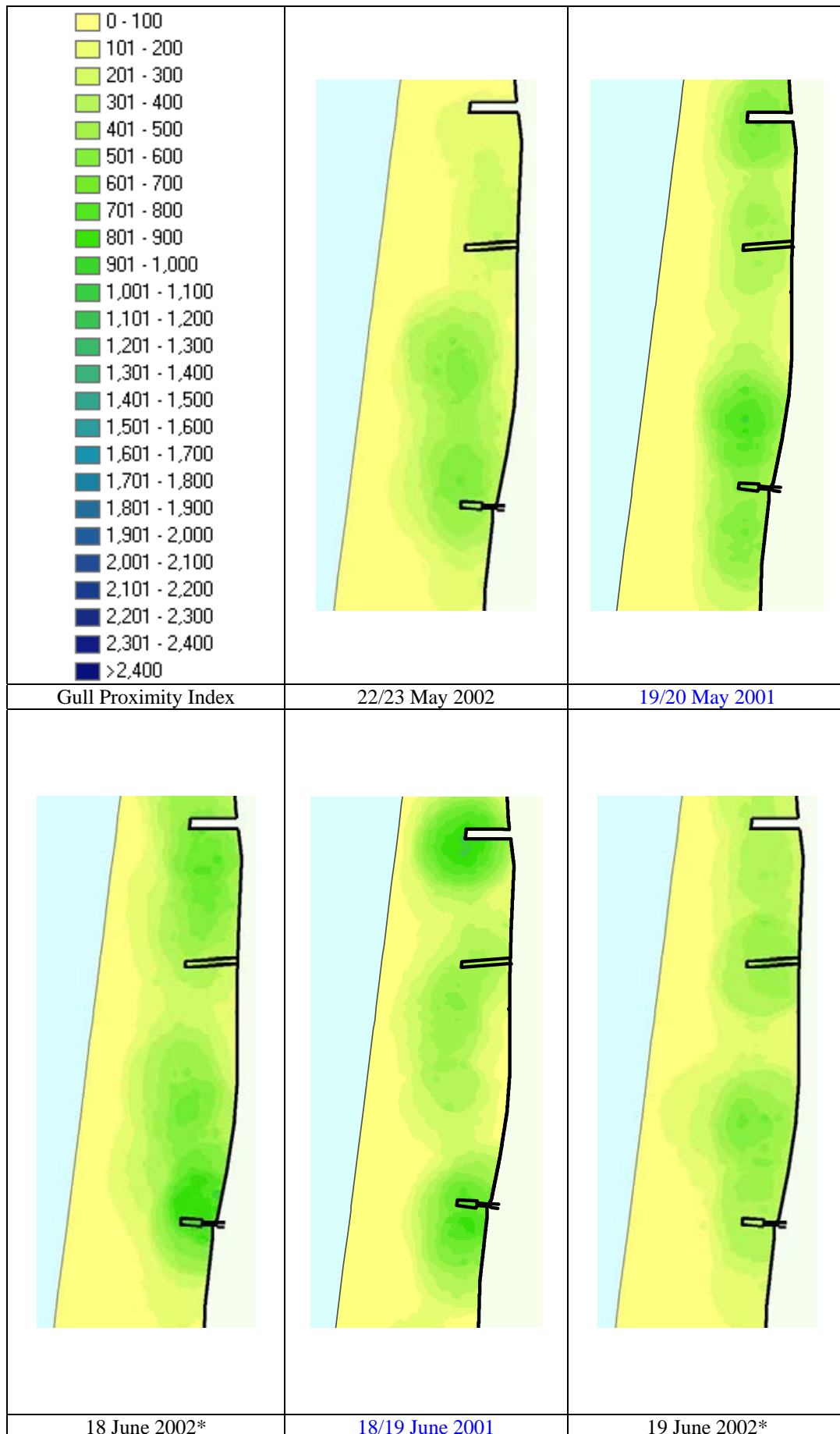


Figure 3.1.1.4 Distribution of gulls observed on the Blackpool shoreline during 2002 depicted using the gull proximity index. The equivalent index for 2001 is also included for comparison. * Intensive counts ** count based upon only three tides.

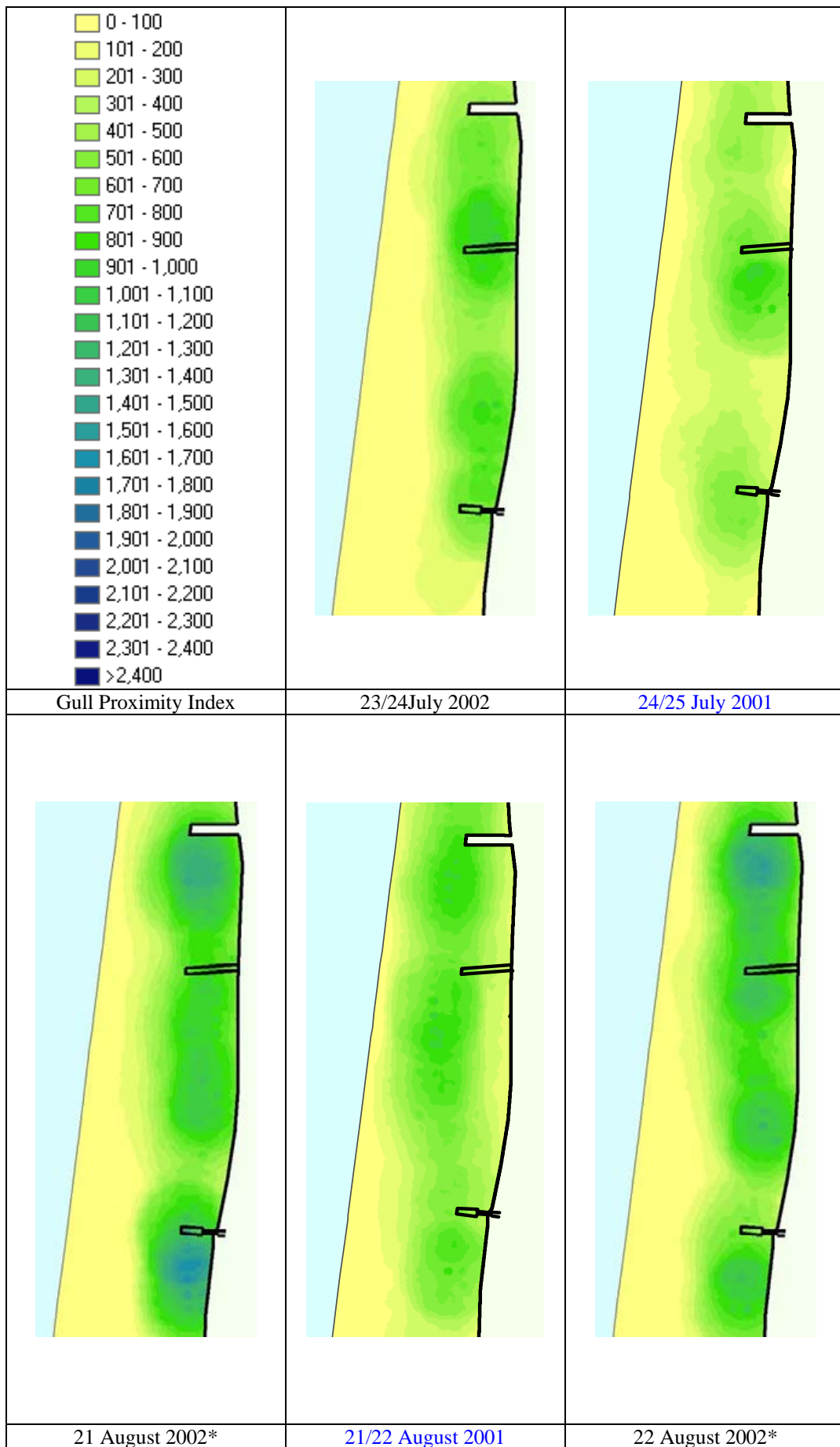


Figure 3.1.1.4 Continued.

* Intensive counts

** count based upon only three tides.

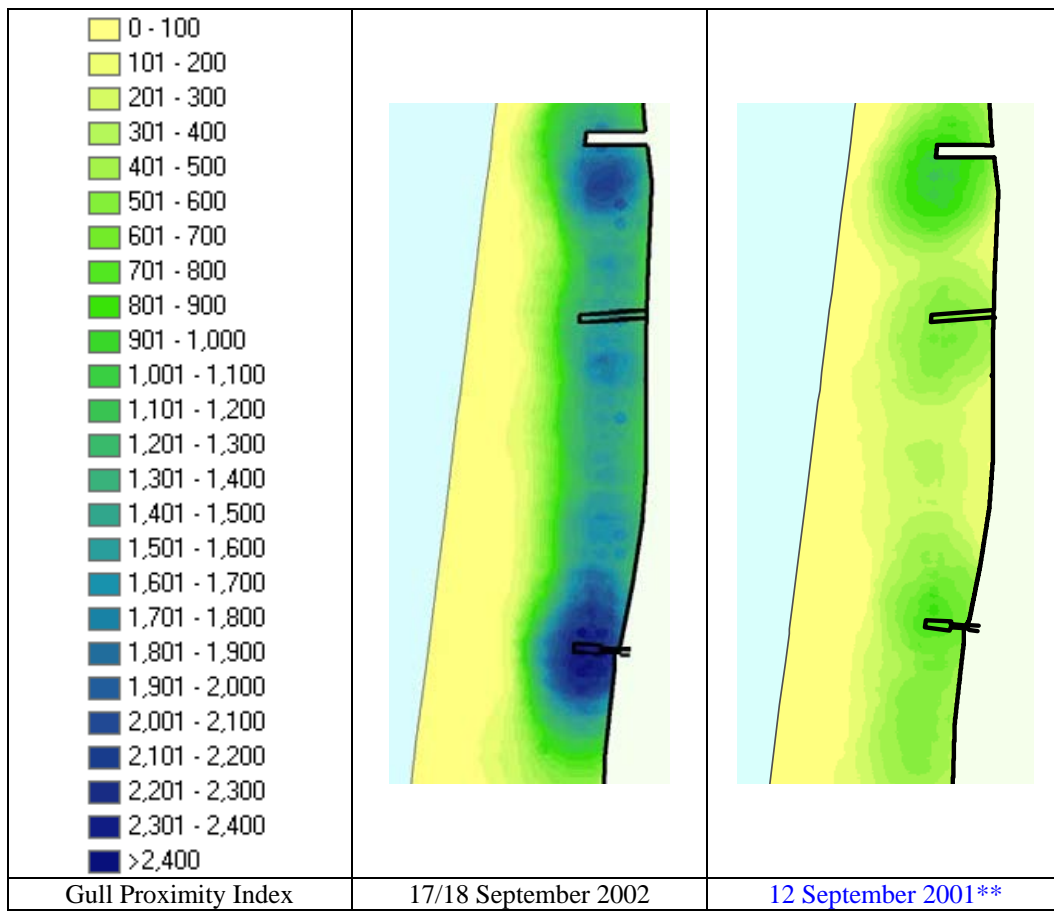
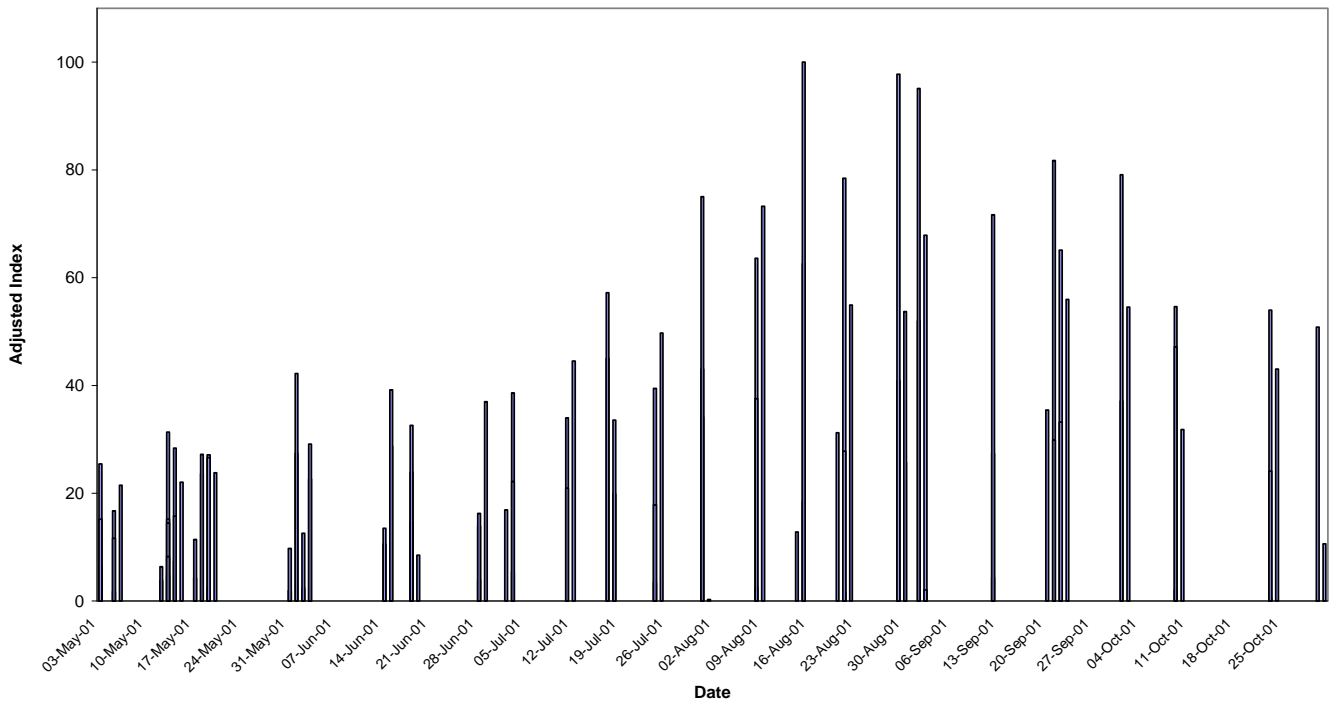


Figure 3.1.1.4 Continued.

* Intensive counts

** count based upon only three tides.

2001



2002

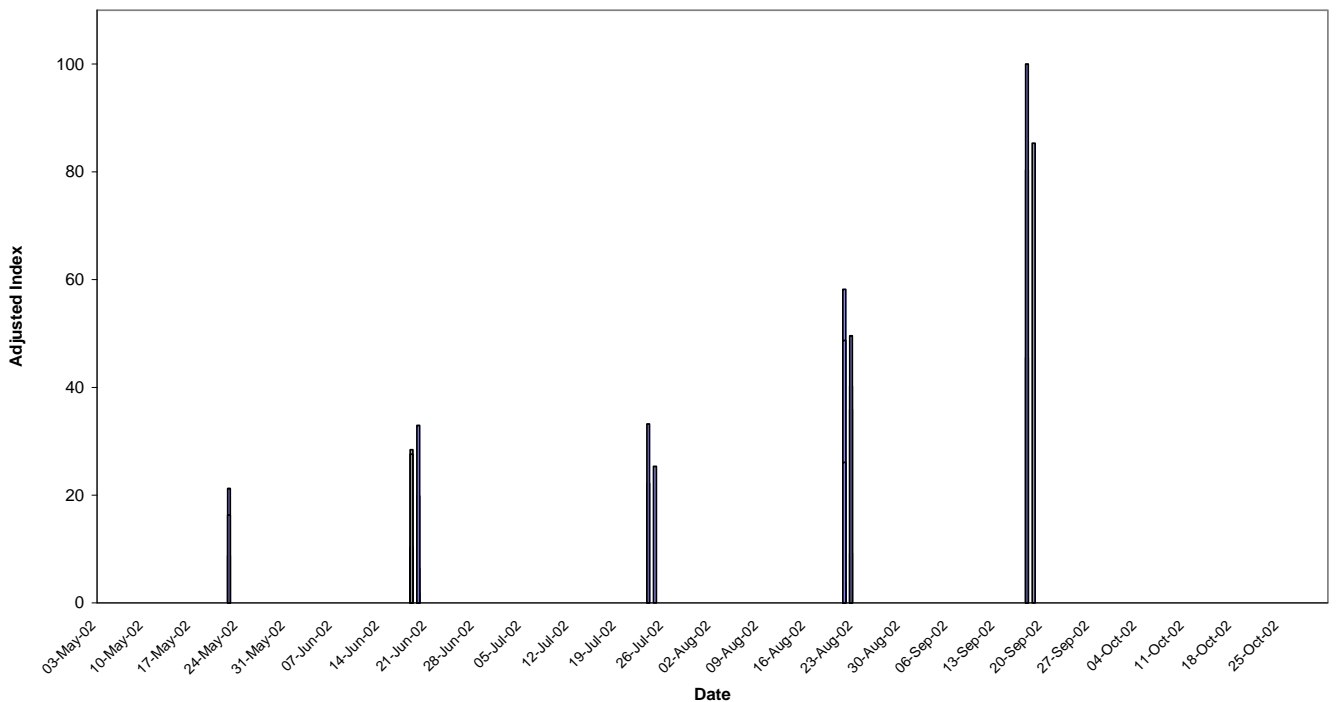
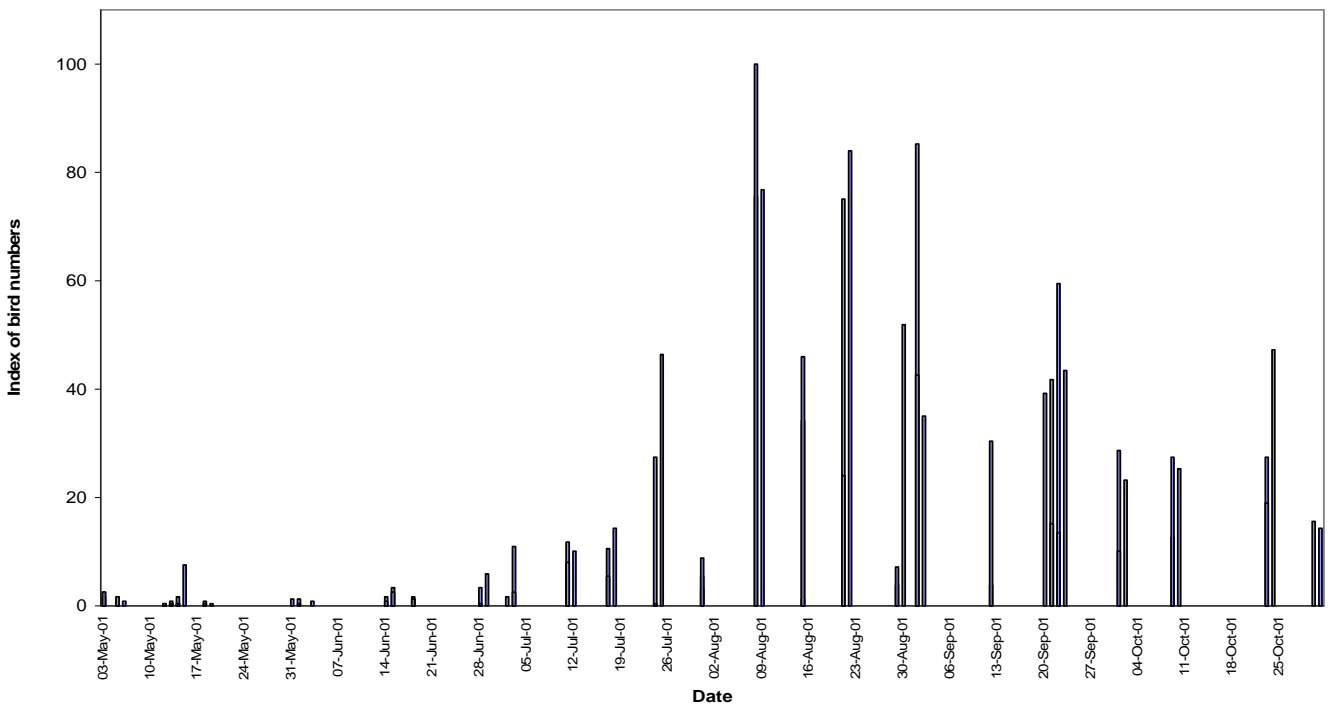


Figure 3.1.1.5 Adjusted gull BMR index for shoreline surveys in 2001 and 2002. Both graphs have been scaled to a maximum of 100 for comparative purposes. A shorter length of shoreline was surveyed in 2002, so the BMR index values are not directly comparable between years.

2001



2002

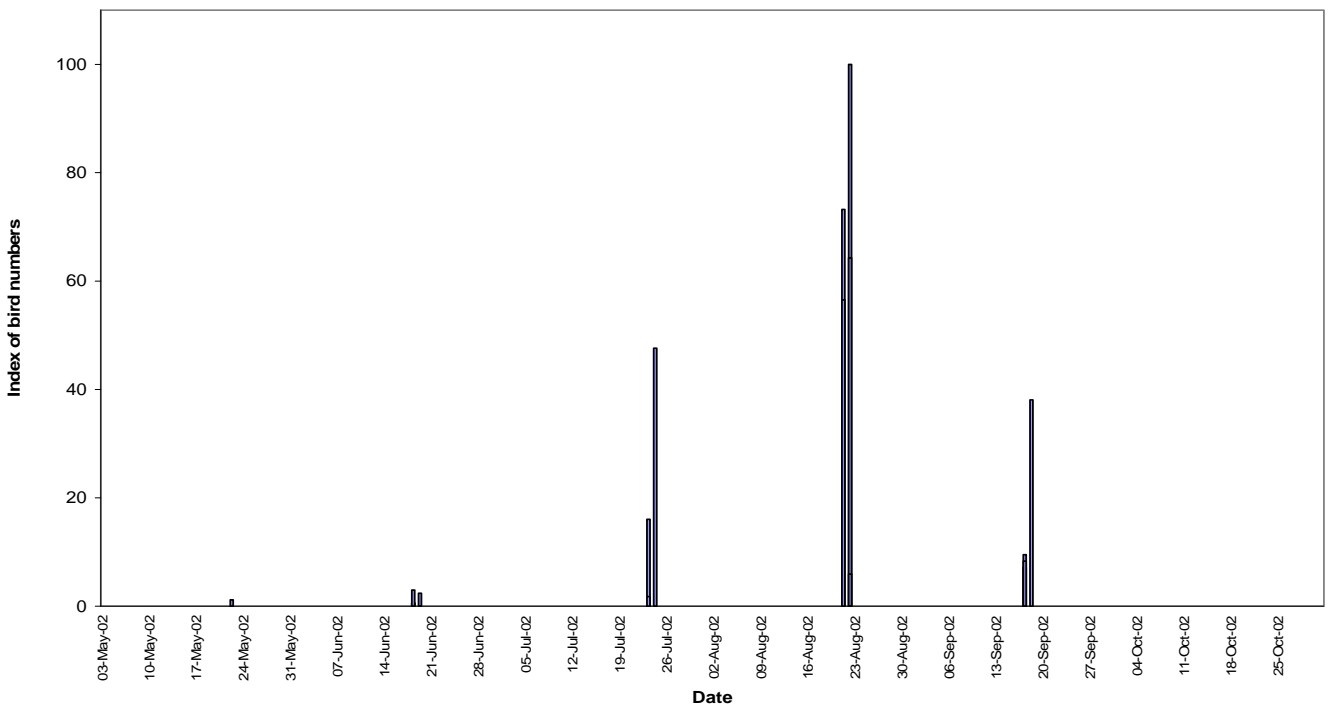


Figure 3.1.2.1 Index of Oystercatcher numbers observed during shoreline surveys in 2001 and 2002. Both graphs have been scaled to a maximum of 100 for comparative purposes. A shorter length of shoreline was surveyed in 2002, so numbers of birds are not directly comparable between years.

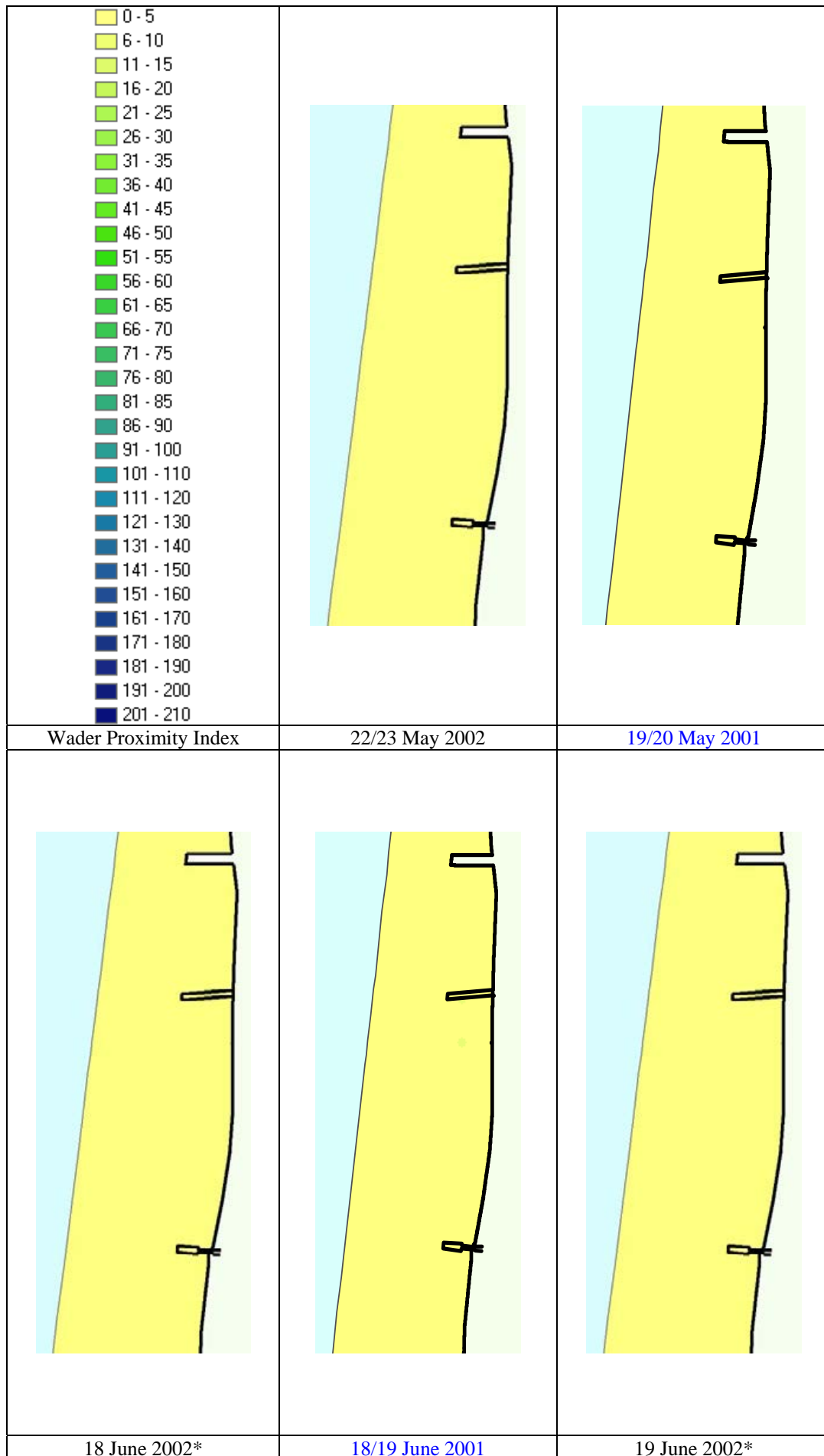


Figure 3.1.2.2 Distribution of waders on the Blackpool shoreline during 2002 depicting using the wader proximity index. The equivalent index for 2001 is also included for comparison. * Intensive counts ** count based upon only three tides.

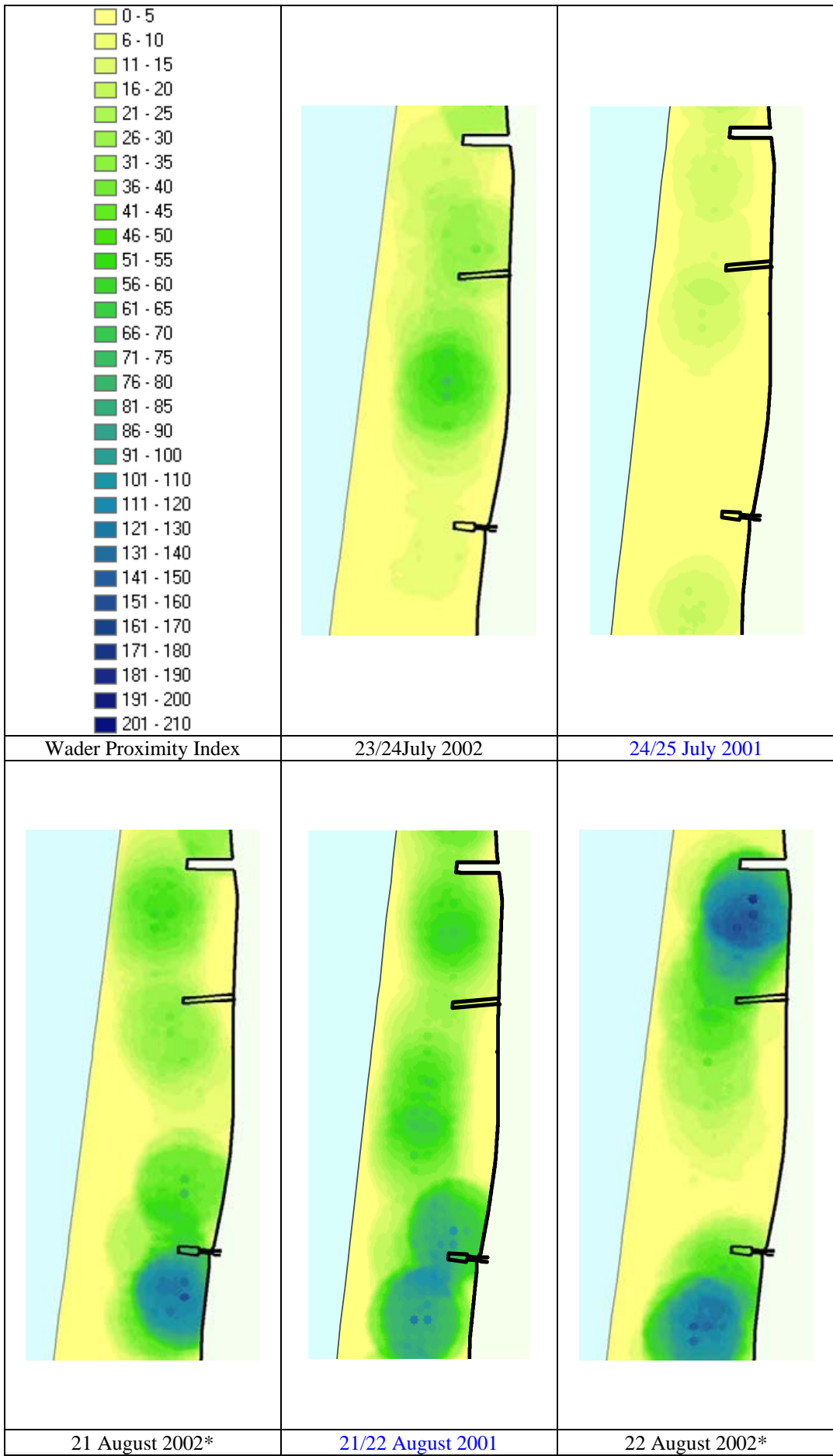


Figure 3.1.2.2 Continued.

* Intensive counts

** count based upon only three tides.

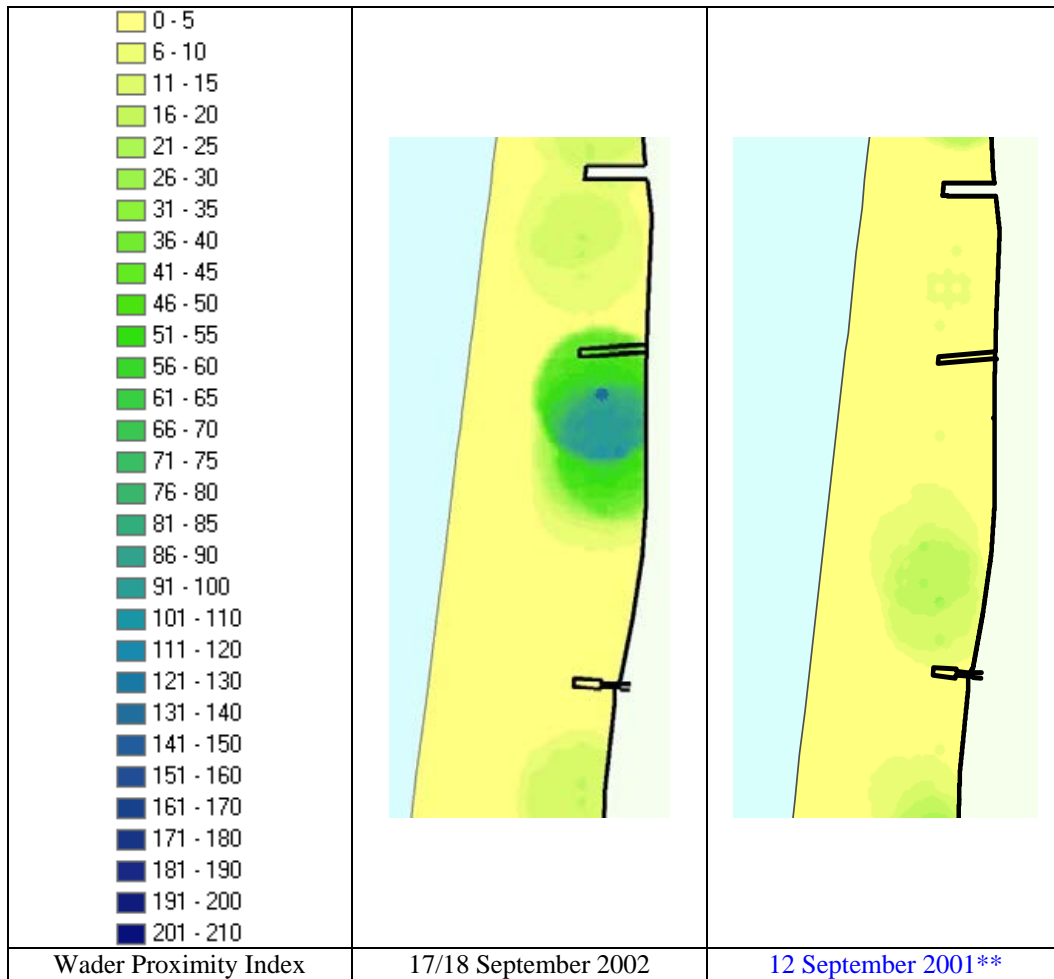
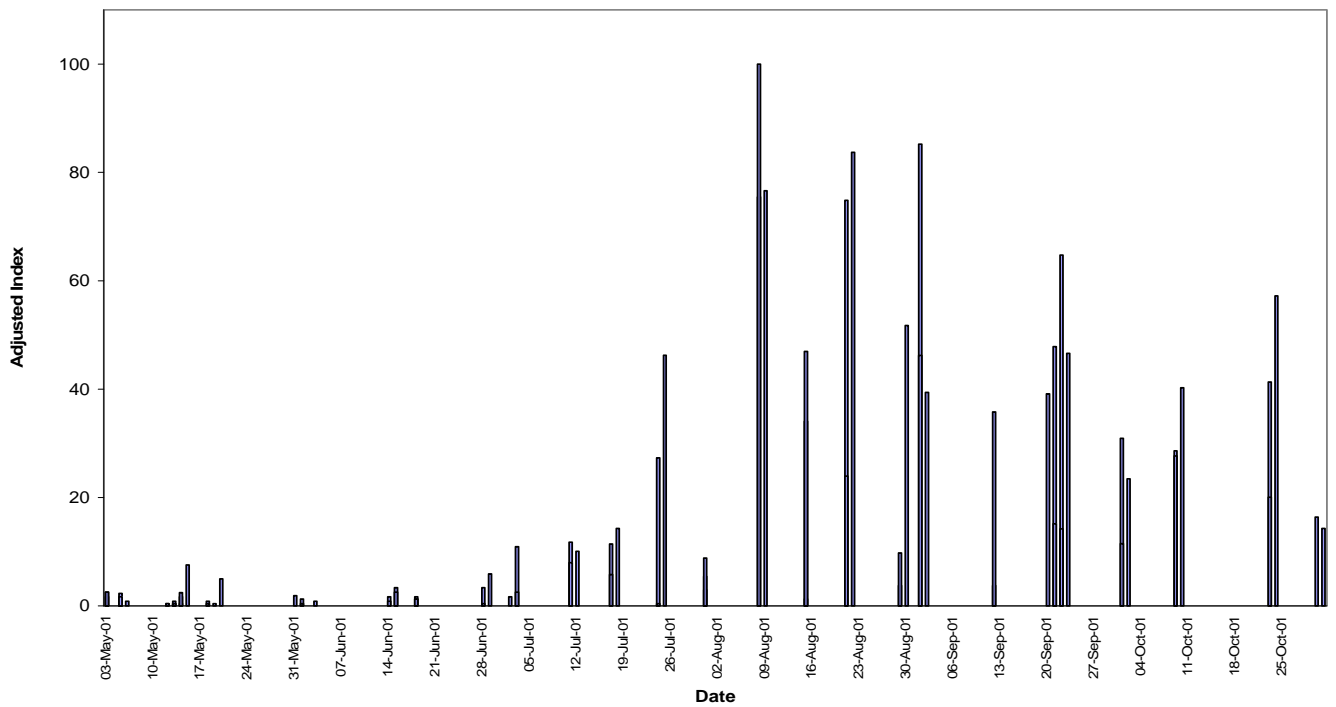


Figure 3.1.2.2 Continued.

* Intensive counts

** count based upon only three tides.

2001



2002

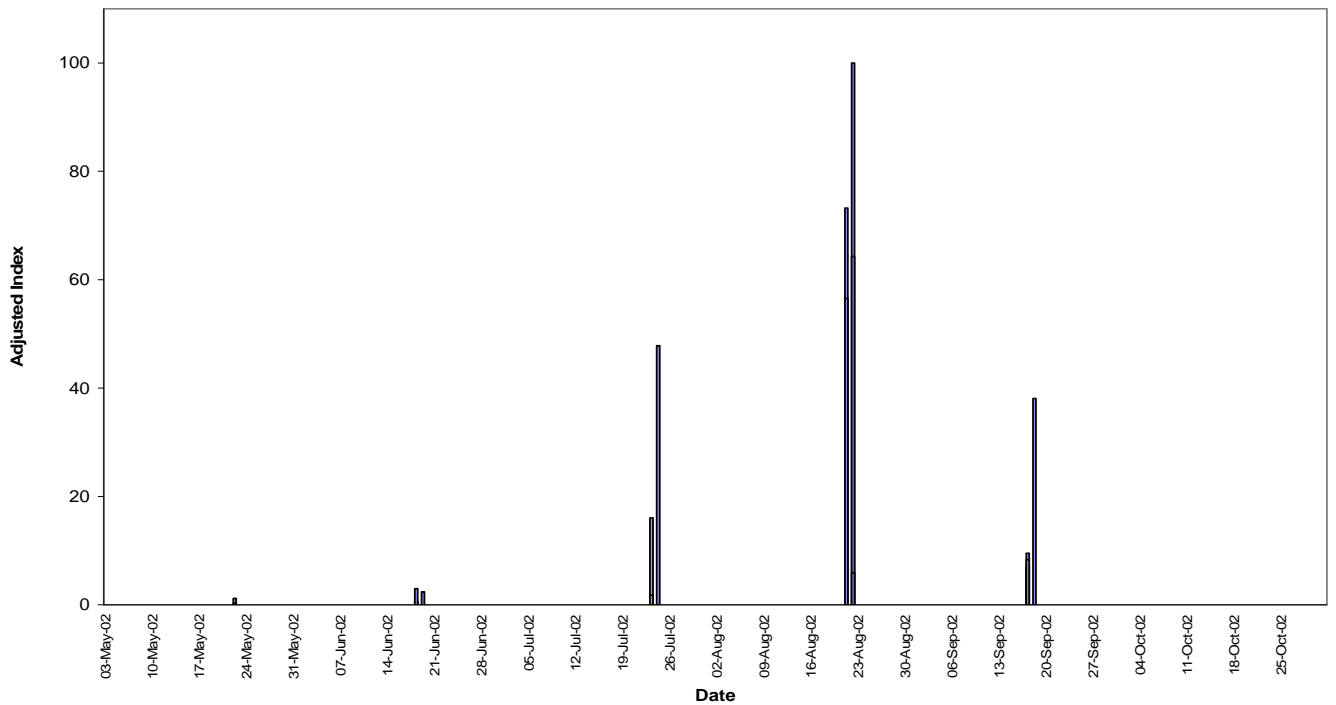


Figure 3.1.2.3 Adjusted wader BMR index for shoreline surveys in 2001 and 2002. Both graphs have been scaled to a maximum of 100 for comparative purposes. A shorter length of shoreline was surveyed in 2002, so the BMR index values are not directly comparable between years.

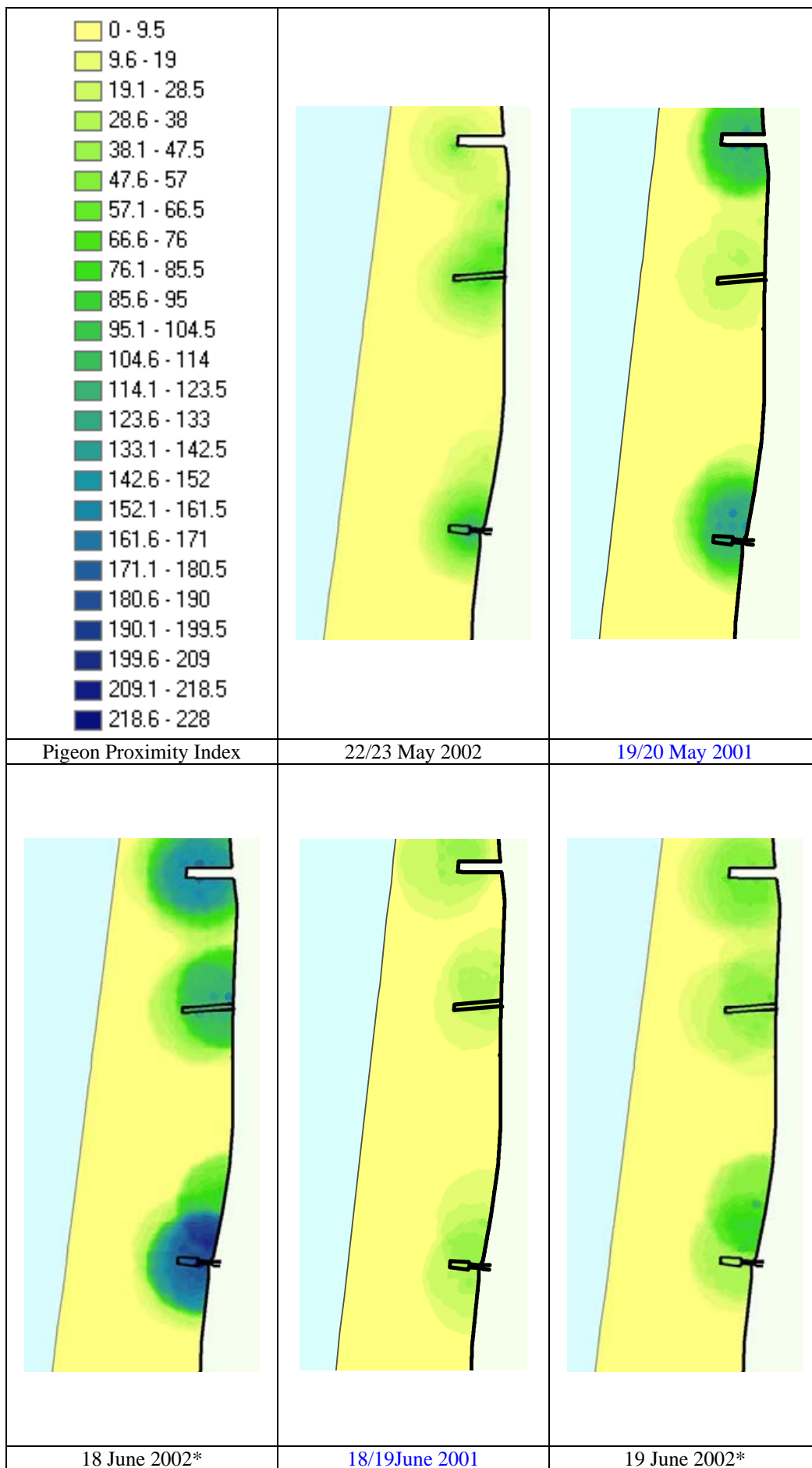


Figure 3.1.3.1 Distribution of Pigeons on the Blackpool shoreline during 2002 depicted using the Pigeon proximity index. The equivalent index for 2001 is also included for comparison. * Intensive counts ** count based upon only three tides.

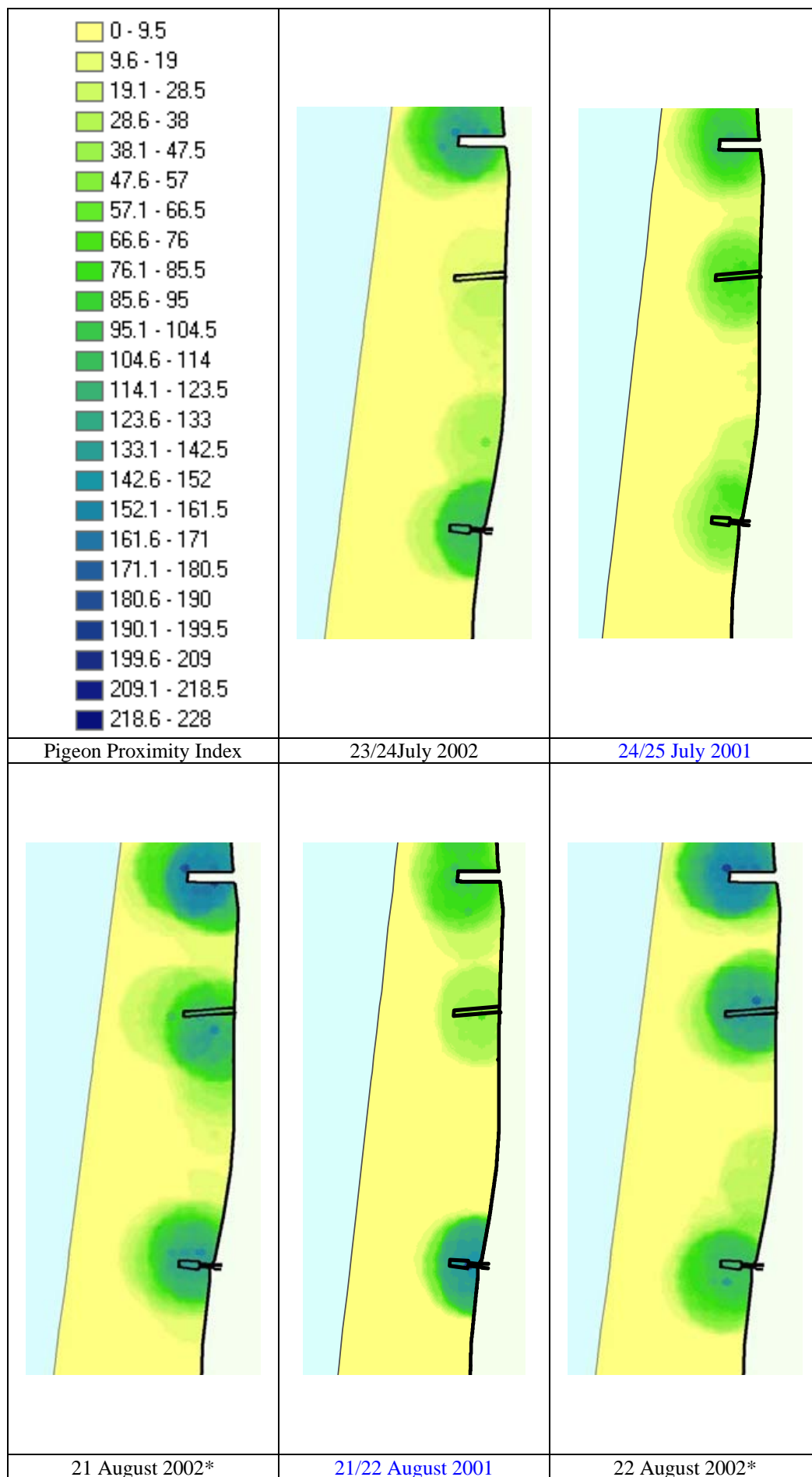


Figure 3.1.3.1 Continued.

* Intensive counts

** count based upon only three tides.

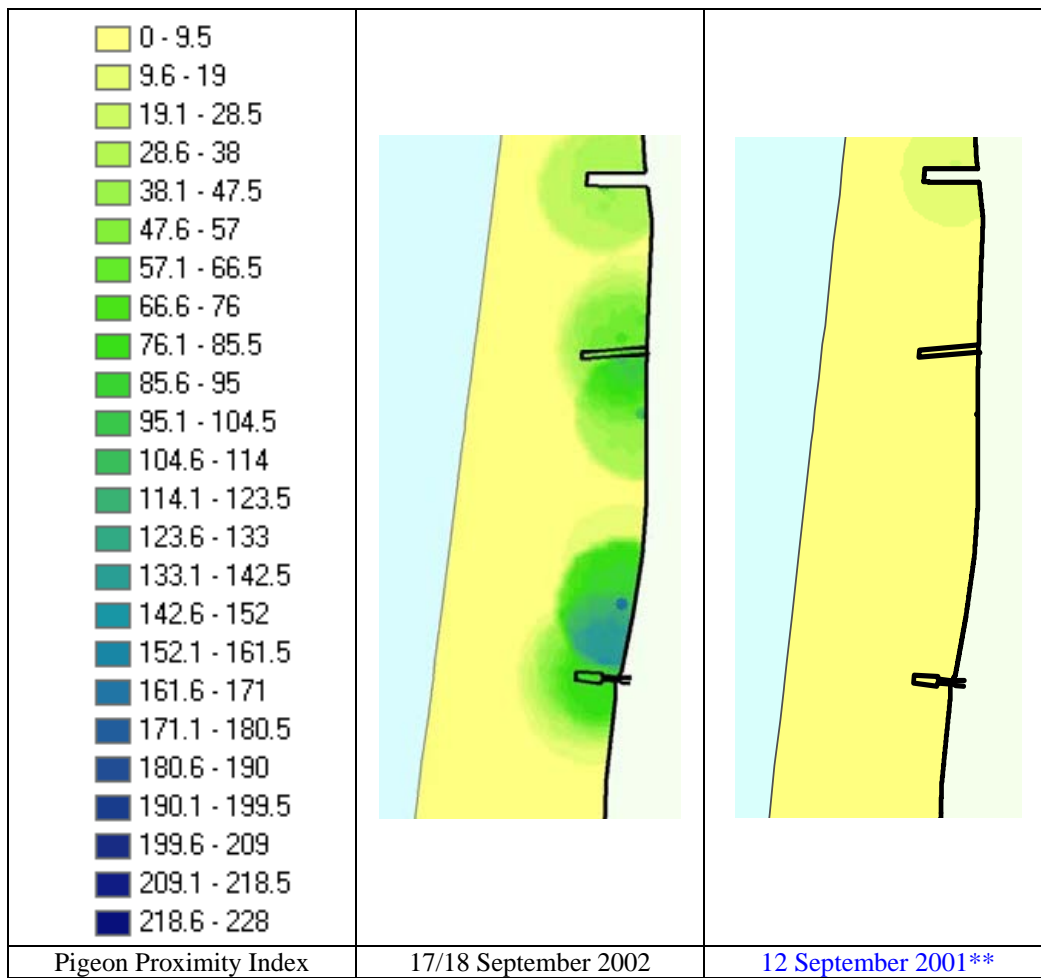
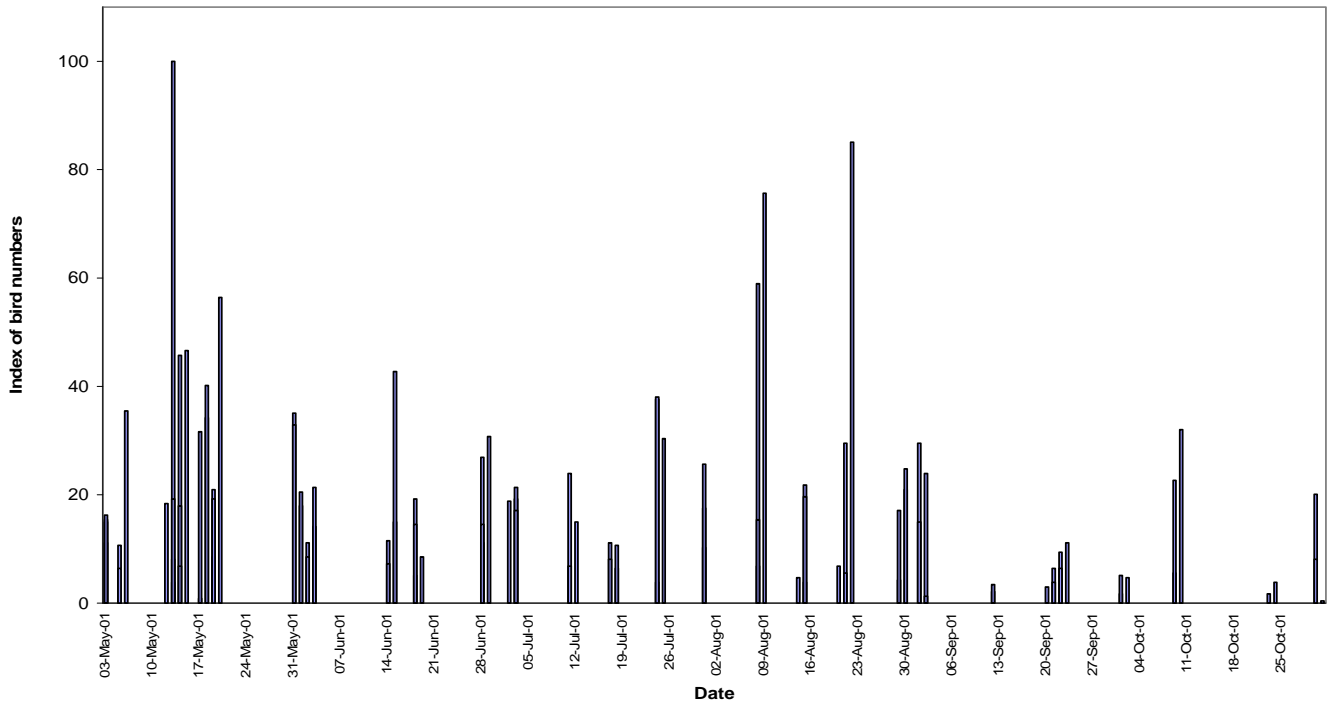


Figure 3.1.3.1 Continued.

* Intensive counts

** count based upon only three tides.

2001



2002

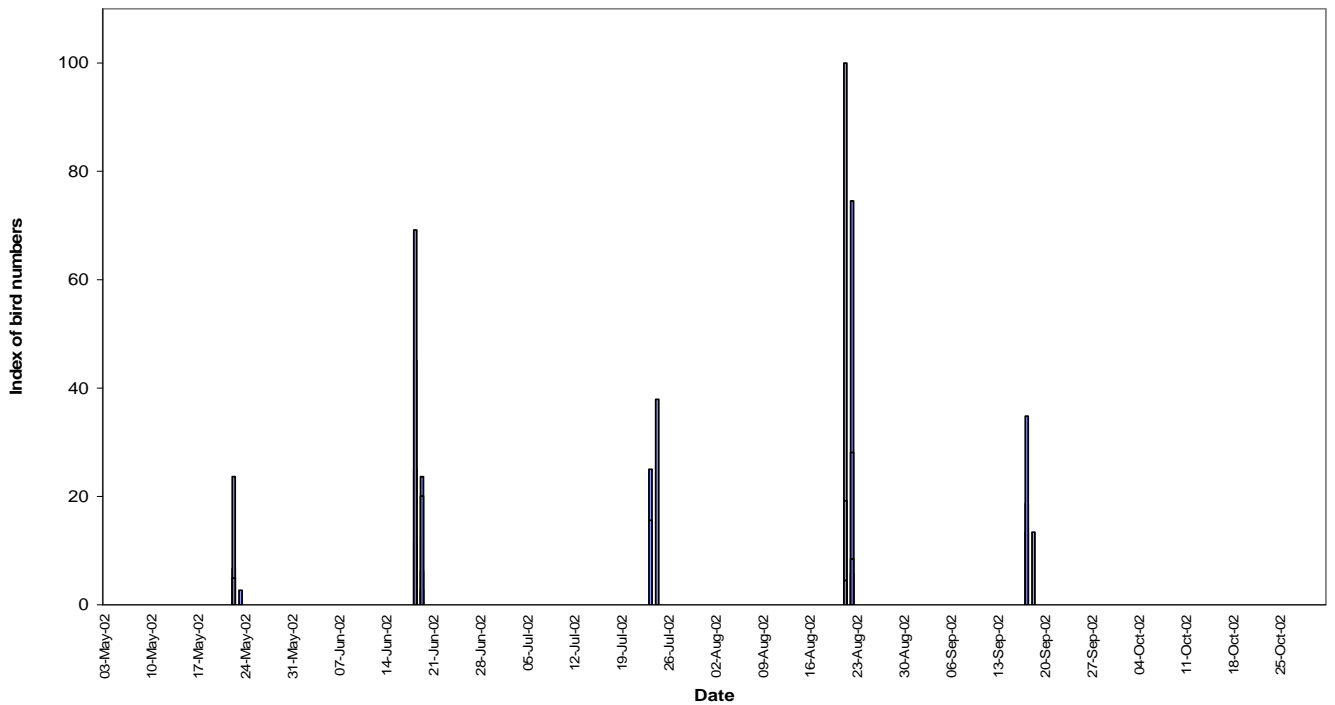


Figure 3.1.3.2 Index of Pigeon numbers observed during shoreline surveys in 2001 and 2002. Both graphs have been scaled to a maximum of 100 for comparative purposes. A shorter length of shoreline was surveyed in 2002, so numbers of birds are not directly comparable between years.

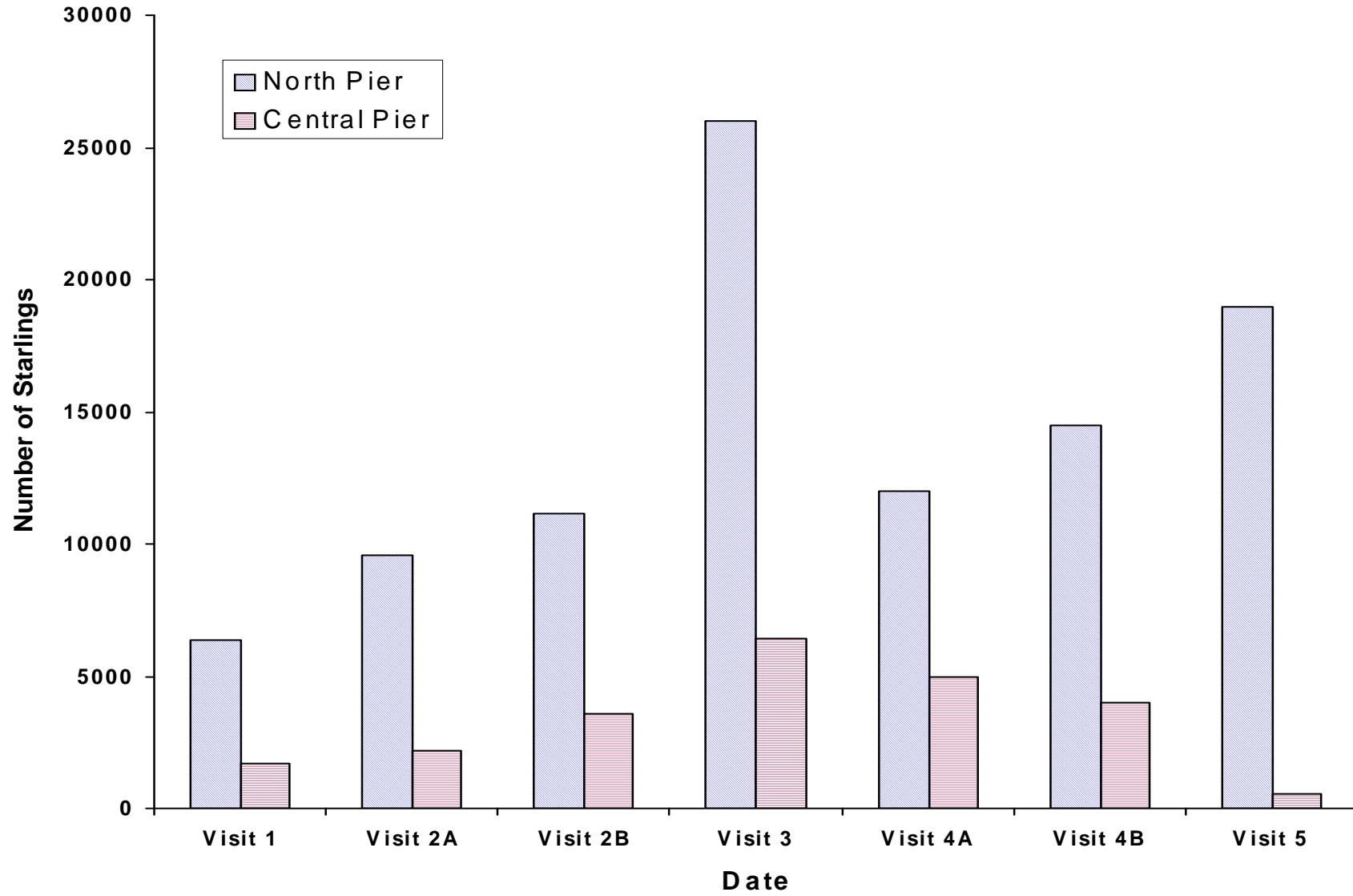


Figure 3.1.4.1 Monthly maximum number of Starlings observed at North and Central piers between May and September 2002.

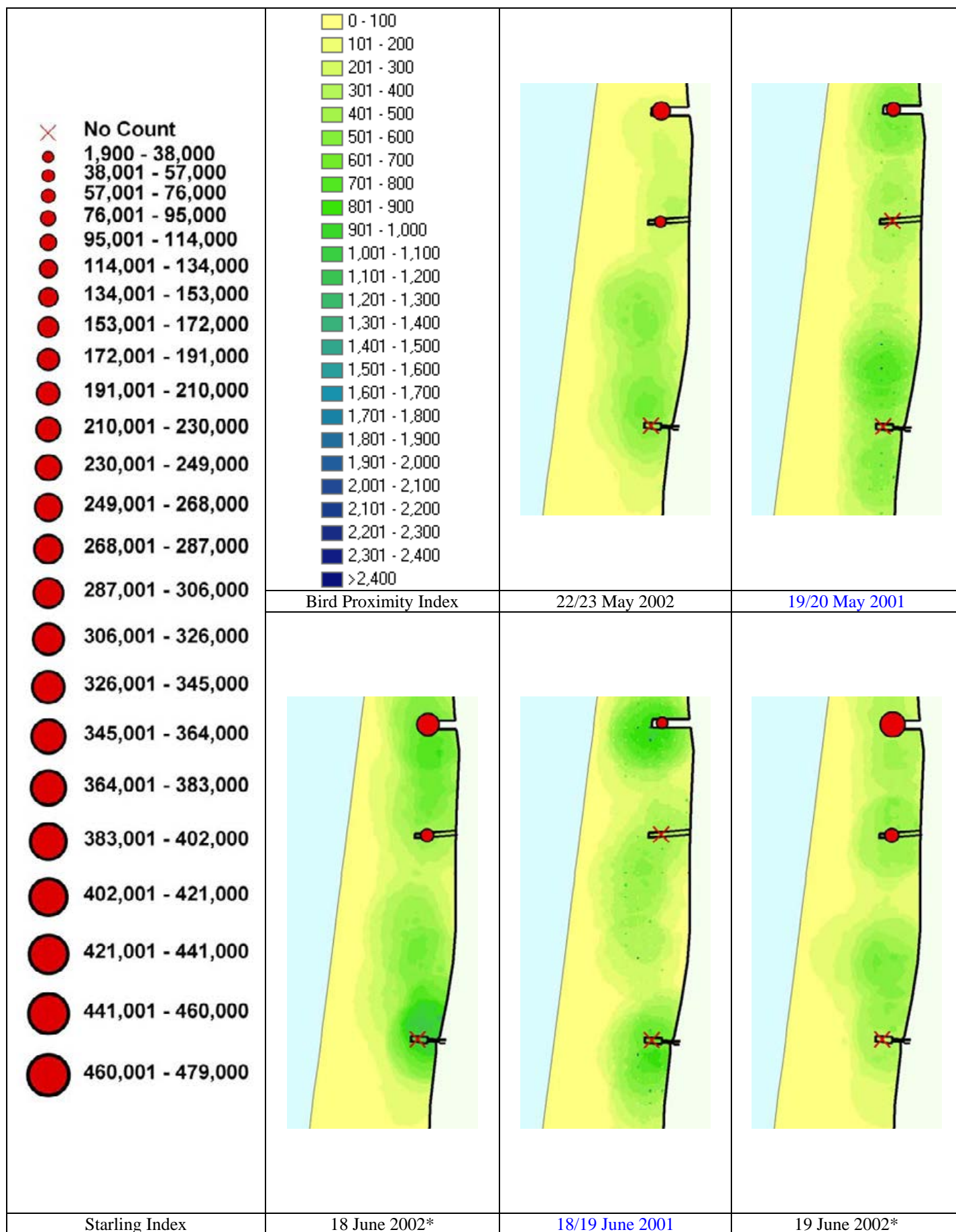


Figure 3.1.5.1 Distribution of birds observed on the Blackpool shoreline during 2002 depicted using the intertidal bird proximity index and Starling roosts counts. The equivalent index for 2001 is also included for comparison. No roost counts of Starlings were possible on August 21st and 22nd 2002 due to the bird scaring operations.
 * Intensive counts ** count based upon only three tides.

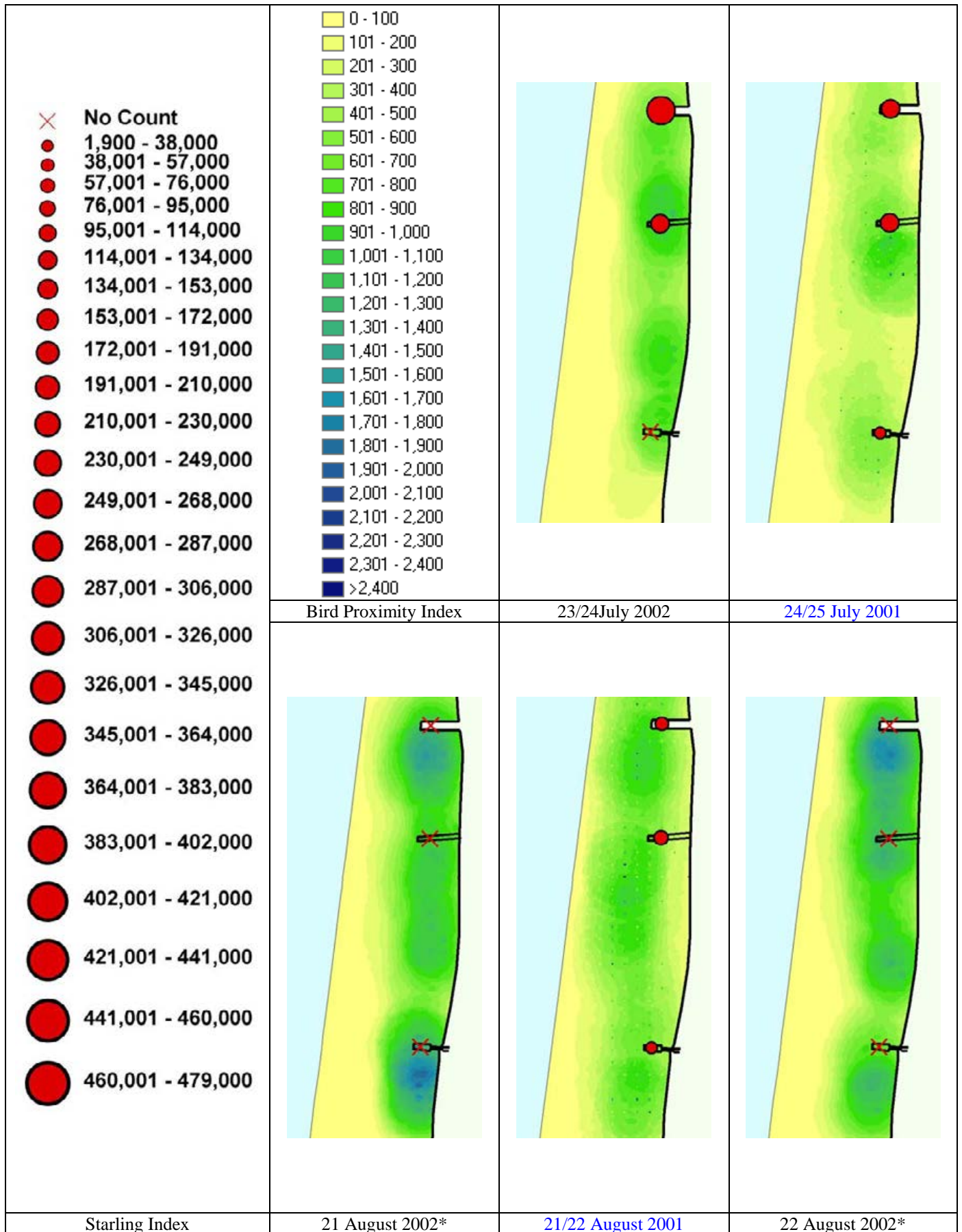


Figure 3.1.5.1 Continued.

* Intensive counts

** count based upon only three tides.

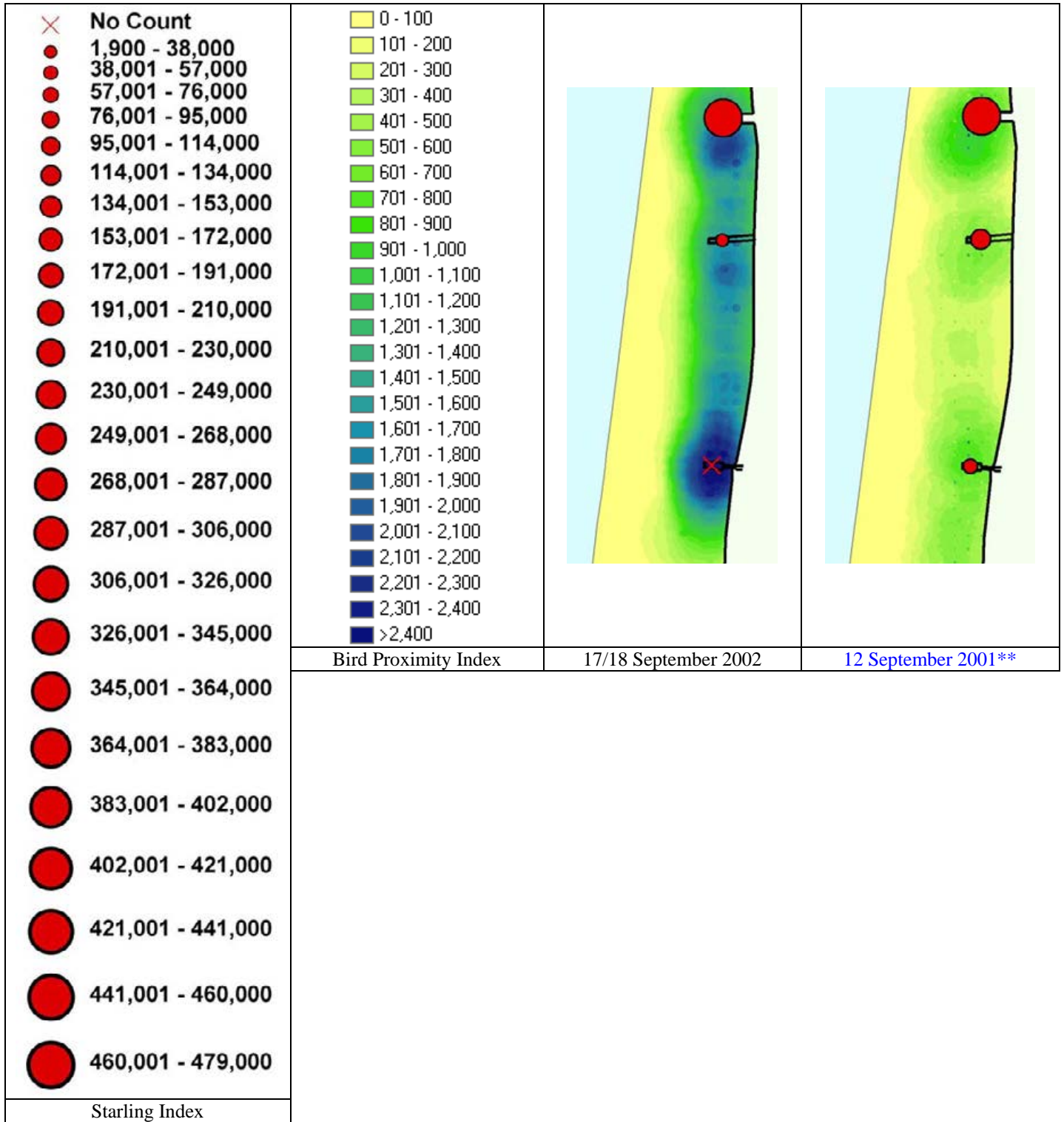


Figure 3.1.5.1 Continued.

* Intensive counts

** count based upon only three tides.

