Natural England Commissioned Report NECR172

Waterbird population trend analysis of the Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore pSPA and Ribble & Alt Estuaries SPA

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

The Ribble and Alt Estuaries, Mersey Estuary and The Dee Estuary are sites of national and international importance for their wader and wildfowl populations. They have been classified as Special Protection Areas (SPAs) for many waterbird species. The Mersey Narrows and North Wirral Foreshore is also an important site for birds and is currently a potential Special Protection Area (pSPA).

The Wetland Bird Survey (WeBS) is a long-running survey that records the number of all waterbird species on different geographical count units (sectors) of the Ribble and Alt Estuaries SPA, the Mersey Estuary SPA, the Mersey Narrows and North Wirral Foreshore pSPA and The Dee Estuary SPA (as well as many other sites nationally) at monthly intervals. These data can be used to assess population trends in different parts of these sites. Specific aims of this report were to:

- Utilise WeBS data to identify the abundance trends over the last 15 years in each of the WeBS count sectors within the project area for a total of 29 species and to compare these trends within their respective SPAs/pSPA, across the project area, with The Dee Estuary SPA and across the North West region as a whole.
- Identify those WeBS sectors in which substantial numbers of species are declining or increasing contrary to, or more rapidly than, on the SPA/pSPA as a whole.
- Identify those sectors that support a substantial proportion of species that are declining on the SPA/pSPA as a whole.
- Where possible, identify potential drivers of change in the sectors where changes in waterbird populations are observed, such as changes in food supply, suitable roosting/feeding habitats.

The findings of this report and NECR173 - *Review and analysis of changes in waterbird use of the Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore pSPA and Ribble & Alt Estuaries SPA* will be used to:

- Inform the review and revision of Natural England's Regulation 33 and 35 conservation advice for the Mersey Estuary, potential Mersey Narrows & North Wirral Foreshore and Ribble & Alt Estuaries Special Protection Area (SPA) sites.
- Bring together, review and improve the evidence baseline for bird use of the above SPAs and pSPA as a contribution to strengthening the environmental baseline as a part of the Liverpool City Region Pilot.
- Inform Natural England's condition assessment of the three sites.
- Inform the consenting of operations and appropriate assessments of plans and projects within these SPAs and pSPA.

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Further information
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BTO Research Report No. 640

Waterbird population trend analysis of the Mersey Estuary SPA, Mersey Narrows & North Wirral Foreshore pSPA and Ribble & Alt Estuaries SPA

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Summary

1. The Ribble and Alt Estuaries, Mersey Estuary and The Dee Estuary are sites of national and international importance for their wader and wildfowl populations (Holt and others 2012). They have been designated as Special Protection Areas for many waterbird species. The Mersey Narrows and North Wirral Foreshore is also an important site for birds and is currently a potential Special Protection Area.

2. The Wetland Bird Survey (WeBS) is a long-running survey that records the number of all waterbird species on different geographical count units (sectors) of the Ribble and Alt Estuaries SPA, the Mersey Estuary SPA, the Mersey Narrows and North Wirral Foreshore pSPA and The Dee Estuary SPA (as well as many other sites nationally) at monthly intervals. These data can be used to assess population trends in different parts of these sites.

3. This study aimed to assess population trends of waterbird species in different parts of the Ribble and Alt Estuaries SPA, the Mersey Estuary SPA, and the Mersey Narrows and North Wirral Foreshore pSPA, in order to identify areas where species were declining contrary to, or in excess of, the trend for the sites as a whole and, furthermore, to identify sectors that support an increasing proportion of species that are declining across the sites as a whole. Furthermore, site trends on the nearby SPA of The Dee Estuary are compared with the three Liverpool area sites.

4. Smoothed population trends were generated using data from the period 1994/95 to 2010/11, and assessed for the most recent winter period for each of the 29 waterbird species specified by Natural England, on each count sector for which there were sufficient data. In addition, for each species the importance of each sector in relation to the SPA population over time was assessed by investigating whether the proportion of the entire SPA population supported by each sector had increased or decreased significantly. Each SPA population was also compared to overall population supported by these sites and in relation to the population across the wider region of North West England.

5. Populations of most wader species had declined across a wide geographical area, although these declines were particularly marked on the Mersey Estuary SPA. There were also widespread declines in wildfowl, although they were not as marked as those for waders. Gulls and terns largely increased in population size.

6. The Mersey Estuary SPA was the site most badly affected by declines. There were also declines across the other SPAs, but to a lesser extent. There was some evidence of movement of birds from the Mersey SPA to the Ribble and Alt Estuaries SPA and the Mersey Narrows and North Wirral Foreshore pSPA.

7. Many of the population changes described in this report either outpaced or were in contrast to trends in the wider region, such that the SPAs/pSPA lost importance in terms of the proportion of the regional population they supported. This suggests that there are pressures specific to these sites that are not found (or exist to a lesser extent) in North West England.

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SUPPORTING MATERIAL

'Guidance to Interpretation of Wetland Bird Survey Within-Site Trends' – www.bto.org/sites/default/files/u196/downloads/rr661.pdf

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1 Introduction

1.1 Background

The rivers Ribble, Alt, Mersey and Dee form major waterways and estuaries draining into Liverpool Bay. The entire area is important for bird life, and therefore has received various levels of protection. Several sites in particular are designated as Special Protection Areas (SPAs) under the European Birds Directive (Directive 2009/147/EC - the codified version of Directive 79/409/EEC as amended), including the Ribble and Alt Estuaries SPA and the Mersey Estuary SPA. Furthermore, the Mersey Narrows and North Wirral Foreshore is currently a potential SPA (pSPA). This report analyses waterbird trends for these protected sites, hereafter collectively referred to as the Liverpool City Region SPAs. Some consideration is also given to waterbird numbers on The Dee Estuary SPA, which also drains into Liverpool Bay, but this site is not included in the Liverpool City Region SPAs. Together, these SPAs form part of a chain of SPAs on the northwest coast of England, that fringe the Irish Sea. Many wintering waterbirds move readily between the four SPA sites considered here and other nearby SPAs such as Morecambe Bay and Martin Mere (Stroud and others 2001).

The Ribble and Alt Estuaries SPA is the northernmost of the four SPAs considered here, lying between the Mersey Estuary and Morecambe Bay. The Ribble is by far the larger of the two estuaries within the SPA, and the SPA also encompasses a considerable stretch of sandy foreshore along the Sefton Coast. Other habitats include extensive areas of sandflats, mudflats and saltmarsh, as well as some coastal grazing marsh. This SPA is the second most important site for waterbirds in the UK (its bird numbers are surpassed only by The Wash), supporting a peak of around 235,700 birds during winter and passage periods (Holt and others 2012). It supports internationally important numbers of 14 species (Holt and others 2012) and nationally important numbers of several others (Stroud and others 2001, Thaxter and others 2010).

The Mersey Estuary SPA is a large, sheltered estuary with large areas of sandflats, mudflats and saltmarsh. It is one of the top 20 sites in the UK for waterbirds, supporting a peak of around 60,000 birds during winter and passage periods (Holt and others 2012). It supports internationally important numbers of four species (Holt and other 2012) and nationally important numbers of several others (Stroud and others 2001, Thaxter and others 2010).

The Mersey Narrows and North Wirral Foreshore pSPA is located at the mouths of the Mersey and Dee Estuaries. Habitats include man-made lagoons at Seaforth Nature Reserve, intertidal habitat at Egremont foreshore and large areas of intertidal flats at North Wirral Foreshore. The site supports large numbers of waders and is particularly important for turnstone *Arenaria interpres* (Stroud and others 2001), though numbers of this species have declined considerably at the site in recent years (Thaxter and others 2010).

The Dee Estuary SPA lies on the boundary between England and Wales and is a large, funnel-shaped, sheltered estuary. Like the other SPAs considered here, the main habitats for waterbirds are the large areas of intertidal sandflats, mudflats and saltmarsh. It is one of the top ten sites for waterbirds in the UK, supporting a peak of more than 110,000 waterbirds during winter and passage periods (Holt and others 2012). It supports internationally important numbers of eight species (Holt and others 2012) and nationally important numbers of several others (Stroud and others 2001, Thaxter and others 2010).

In addition to supporting large numbers of wintering waterbirds, all of these sites are particularly important for wader populations that migrate along the west coast of Britain during spring and autumn (Stroud and others 2001). Because of the turnover of individuals during migration as birds pass through these sites, the peak numbers reported here are likely to considerably underestimate the total numbers of individual birds that rely on these sites as critical stopover points that allow them to fuel up during their migrations.

At all of these sites, some of the species of waterbirds for which they are important have declined in numbers in recent years (Thaxter and others 2010).

Monthly counts of waterbirds are undertaken across the Liverpool City Region SPAs as part the Wetland Bird Survey (WeBS). This report includes an analysis of these data held by the British Trust for Ornithology (BTO) for each of the different geographical count units (sectors) of the Liverpool City Region SPAs. Twenty-two sectors were considered in total (16 for the Ribble and Alt Estuaries SPA, three for the Mersey Estuary SPA and three for the Mersey Narrows and North Wirral Foreshore pSPA) to provide a better understanding of fluctuations in bird numbers across the Liverpool City Region SPAs and to assess the potential impact of activities and developments on SPA populations. Furthermore, trends for each individual SPA were compared with the overall trend across all three SPAs in order to gain understanding of the relative fortunes of each species between these sites, and along with those for The Dee Estuary SPA, were placed in a wider context by comparing them with waterbird numbers across North West England.

1.2 Objectives

The objective of this study was to assess population trends of waterbird species within and across the Ribble and Alt Estuaries SPA, the Mersey Narrows and North Wirral Foreshore pSPA and the Mersey Estuary SPA. Where possible, trends observed in the project area should be both related to the populations of the qualifying species found across north-west England as a whole and specifically related to any corresponding changes in bird populations of The Dee Estuary SPA (part of the Liverpool City Region Pilot area). The study also aimed to identify areas where species populations are changing contrary to, or in excess of, the trend for each SPA/pSPA and north-west England and to identify sectors that support an increasing proportion of species that are declining across the SPAs/pSPA.

The species analysed, where data allowed, included all those species relevant to each site designation (listed below). Where species are listed for only one or two of the sites, but numbers on the remaining site(s) are sufficient to support an analysis, this was also undertaken so as to enhance interpretation across the project area.

Table 1.1 Species for which trends and analyses were undertaken

Ribble & Alt Estuaries SPA	**Mersey Estuary SPA**	**Mersey Narrows & North Wirral Foreshore pSPA***
Bewick's swan	Shelduck	Cormorant
Whooper swan	Wigeon	Oystercatcher
Shelduck	Teal	Grey plover
Wigeon	Pintail	Knot
Teal	Great crested grebe	Sanderling
Pintail	Golden plover	Dunlin
Common scoter	Grey plover	Bar-tailed godwit
Cormorant	Lapwing	Redshank
Oystercatcher	Dunlin	Turnstone
Ringed plover	Black-tailed godwit	Little gull
Golden plover	Curlew	Common tern
Grey plover	Redshank	
Lapwing		
Knot		
Sanderling		
Dunlin		
Black-tailed godwit		
Bar-tailed godwit		
Curlew		
Redshank		
Common tern		

*The Mersey Narrows and North Wirral Foreshore was first proposed for designation as an SPA in 2000, but no decision was made to designate the site at the time. Due to length of time since the original consultation the data supporting the justification for designation was reviewed. As a result the list of qualifying species for this site has changed. For the purpose of this study all qualifying species from both the original consultation and the review will be included.

We also include analysis of the following gull species although it must be recognised that under the WeBS count scheme gull counts are optional and so data may be incomplete compared to other waterbirds. Indeed, no gull counts were available for the Mersey Estuary SPA. Furthermore, important gull roosts are not routinely monitored by WeBS, WeBS counts being undertaken during the middle of the day.

Ribble & Alt Estuaries SPA	Mersey Narrows & North Wirral Foreshore pSPA
Black-headed gull	Black-headed gull
Lesser black-backed gull	Lesser black-backed gull
Great black-backed gull	Great black-backed gull
Herring gull	Herring gull
Common gull	Common gull.

Note that trends and numbers of Lesser black-backed gull and Common tern are based on summer numbers (April to September inclusive) whereas all other species are assessed on 'winter numbers' (November to March for wader, September to March for all others) based on standard WeBS practise.

Specific aims are to:

- Utilise WeBS data to identify the abundance trends over the last 15 years (up to and including 2010/11) in each of the WeBS count sectors within the project area for a total of 29 species including six gulls, one tern, one grebe, one cormorant, seven wildfowl and 13 waders. Compare these trends within their respective SPAs/pSPA, across the project area, with The Dee Estuary SPA and across the North West region as a whole.
- Identify those WeBS sectors in which substantial numbers of species are declining/increasing contrary to, or more rapidly than on the SPA/pSPA as a whole.
- Identify those sectors that support a substantial proportion of species that are declining on the SPA/pSPA as a whole.
- Where possible identify potential drivers of change in the sectors where changes in waterbirds population are observed, such as changes in food supply/suitable roosting/feeding habitats.

2 Methodology

2.1 Waterbird data

WeBS is a long-running survey that monitors waterbird numbers on sites throughout the UK via monthly site visits, when numbers of all waterbird species are recorded (Holt and others 2012). On large sites, such as the Liverpool City Region SPAs, where it is not feasible, or indeed desirable, to make a single count for the entire site, synchronous counts of smaller count sectors are undertaken (Figure 2.1.i). These sector counts are routinely summed to give the overall site total, and during this process the completeness of the overall count assessed. This is required because all sectors are not necessarily counted on all occasions. This is undertaken in a species specific manner because the absence of data from a given sector would not be expected to affect the overall total equally for all species. Furthermore, completeness is assessed on a month by month, year by year basis using algorithms that allow for both seasonal and long-term trends in site usage. Thus a consolidated count for a site composed of multiple sectors is considered complete when those sectors counted on the month in question would be expected to hold at least 75% of the site total for the species in question for the season and year in question. Whilst the division of large sites into sectors has evolved principally in response to the practicality of undertaking counts, the divisions between sectors typically follow distinctive features of the environment. Thus an analysis of waterbird trends on the individual sectors can inform in a biologically meaningful manner.

Over time, and particularly on larger sites a complex hierarchy of site structure can develop as sectors are subdivided by WeBS counters, however, importantly, existing sector boundaries are retained and incorporated into the new divisions to ensure that counts from divided sectors can be combined and numbers compared over long time series. Thus the hierarchical structure of the Liverpool City Region SPAs (Figure 2.1.ii to 2.1.iv) has evolved through time as existing sectors have been subdivided, in particular that associated with the Ribble and Alt Estuaries SPA (Figure 2.1.ii). Twenty-two constituent and extant WeBS sectors of the Liverpool City Region SPAs were considered in this report. As shown in Figure 2.1, the Ribble and Alt Estuaries SPA, the Mersey Narrows and North Wirral Foreshore pSPA and the Mersey Estuary SPA are composed of more sectors than this. However, many of these are either no longer counted (for example, Oglet, 46408), or are composite sectors (for example, Alt Estuary, 46421). Analysis and interpretation in this report is carried out at the finest spatial resolution where possible. In some cases information at the finest spatial scale was not available for a sufficient number of winters, so composite sectors were analysed instead if information is available at this scale (for example, Ainsdale Beach, 46430, is in Tables 3.1.i to 3.1.vi, instead of Ainsdale Beach South, 46401, and Southport Beach, 46402).

Currently, WeBS holds sector level data computerised back to the winter of 1993/94. Because of a statistical constraint of excluding the first and last winter in the time series when calculating percentage change against the smoothed trend the maximum period that we would be able to assess change for is 16 years. We therefore report change over 5, 10 and 15 year periods so as to use a standard increment (Figure 2.1.v). Furthermore 5-year spans of data are typically requested for site assessment work.

Pre-1993/94 data held by WeBS relate to whole WeBS sites. In some cases the traditional WeBS site boundaries match well to SPA boundaries but unfortunately this is not so for the four SPAs being considered in this report and Liverpool City Region SPAs and the Dee Estuary SPA correspond to three WeBS sites. Specifically, The Mersey Estuary WeBS site includes several sectors not within the Mersey Estuary SPA but does include two sectors that

are actually within the Mersey Narrows and North Wirral Foreshore pSPA. The Ribble and Alt Estuaries SPA corresponds to two WeBS sites, the Ribble Estuary and the Alt Estuary, both of which include sectors outside of the Ribble and Alt SPA. Furthermore, the Alt Estuary WeBS site includes a sector of the Mersey Narrows and North Wirral Foreshore pSPA. Finally, the Dee Estuary WeBS site contains two sectors that are part of the Mersey Narrows and North Wirral Foreshore pSPA. Consequently, although we have been able to match bird data to the SPAs using sector data from winter 1993/94 onwards, we are unable to go beyond the winter of 1993/94 because of these confounding issues. Accordingly, we are unable to consider trends over the past 25 years for these SPAs. We have therefore restricted all analyses that relate to the whole SPA level to the same 5, 10 and 15 year periods used for the sector level comparisons.

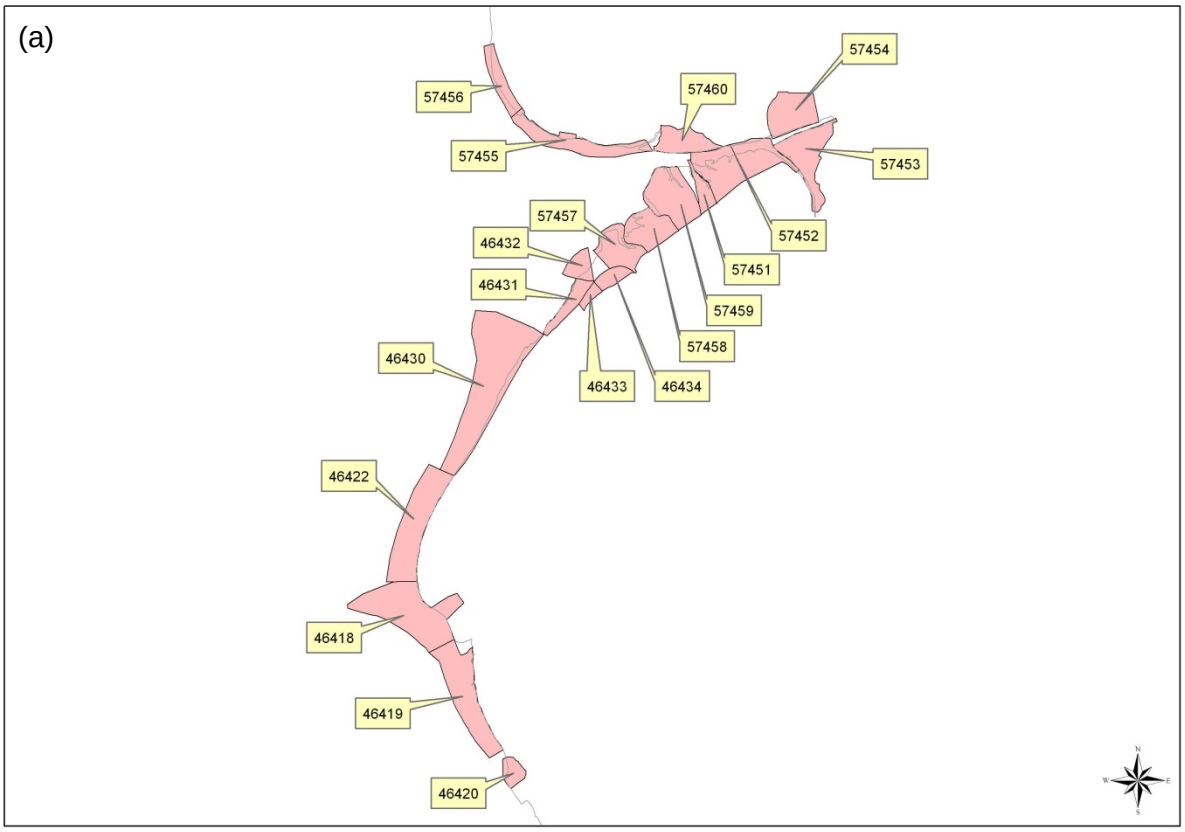

Figure 2.1.i Locations of each count sector on (a) the Ribble and Alt Estuaries SPA, (b) the Mersey Narrows and North Wirral Foreshore pSPA and (c) the Mersey Estuary SPA

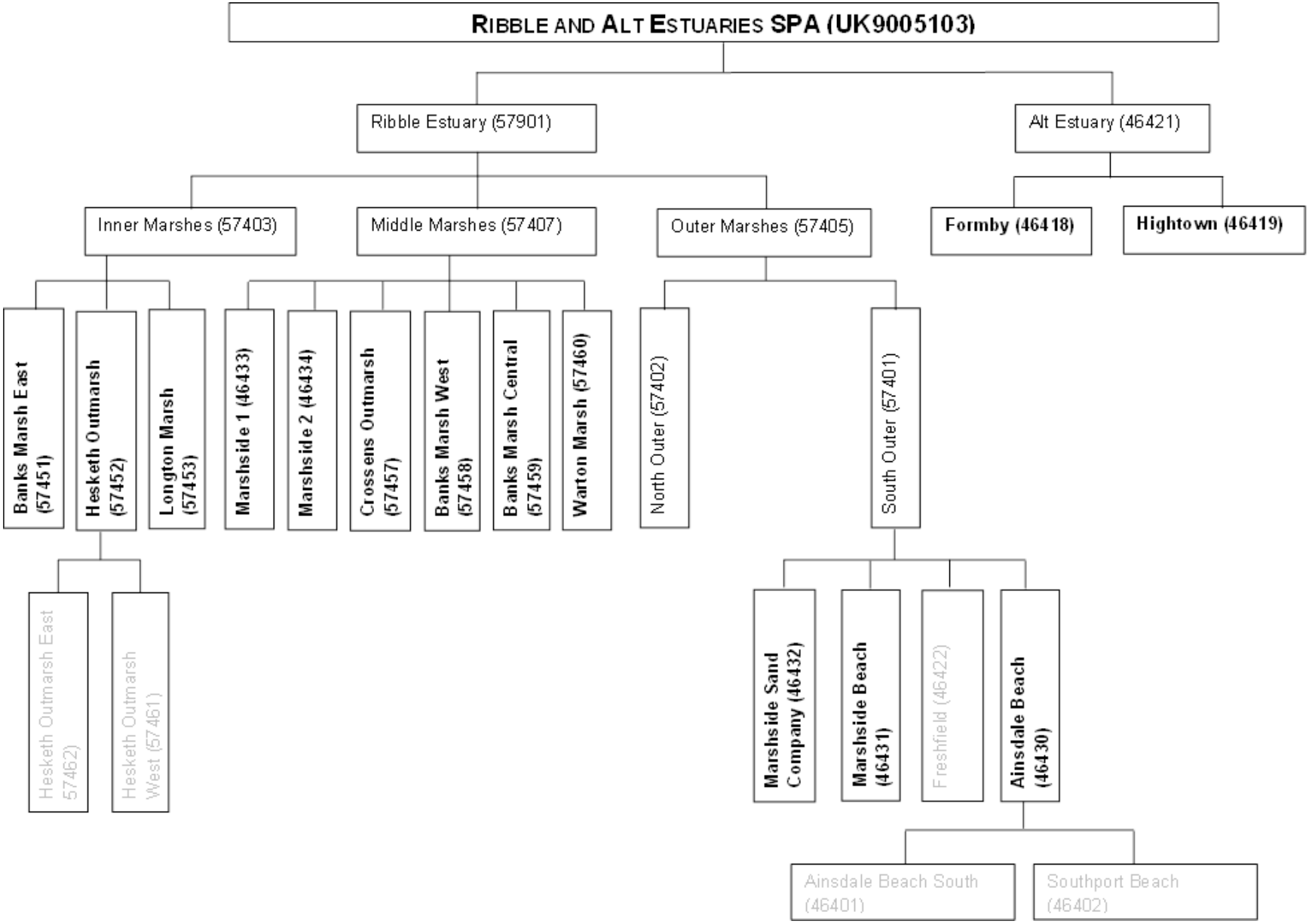

Figure 2.1.ii Structural hierarchy of WeBS count sectors on the Ribble and Alt Estuaries SPA. Greyed out boxes identify sectors for which data for at least the most recent five winters are unavailable. Sectors at the finest spatial scale for which a sufficiently long time series is available for analysis (in bold) are those primarily considered for interpretation in this report.

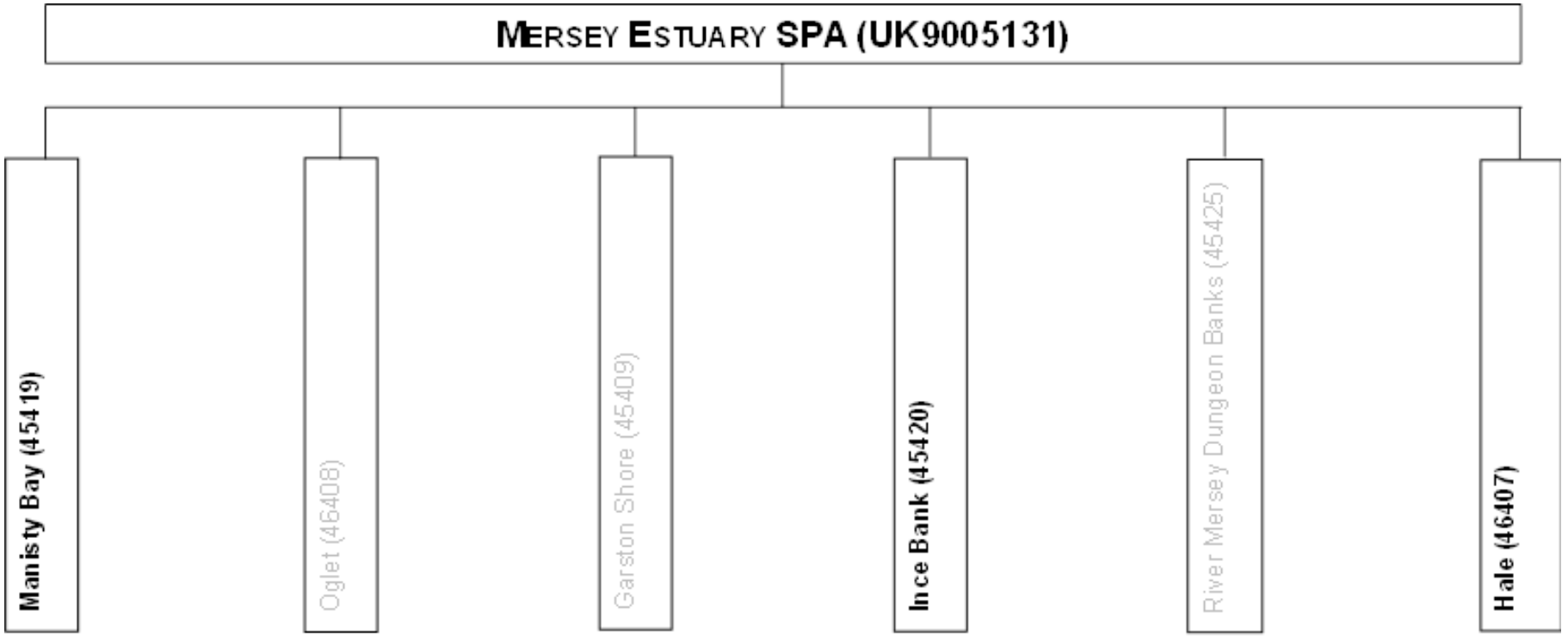

Figure 2.1.iii Structural hierarchy of WeBS count sectors on the Mersey Estuary SPA. Greyed out boxes identify sectors for which data for at least the most recent five winters are unavailable. Sectors at the finest spatial scale for which a sufficiently long time series is available for analysis (in bold) are those primarily considered for interpretation in this report.

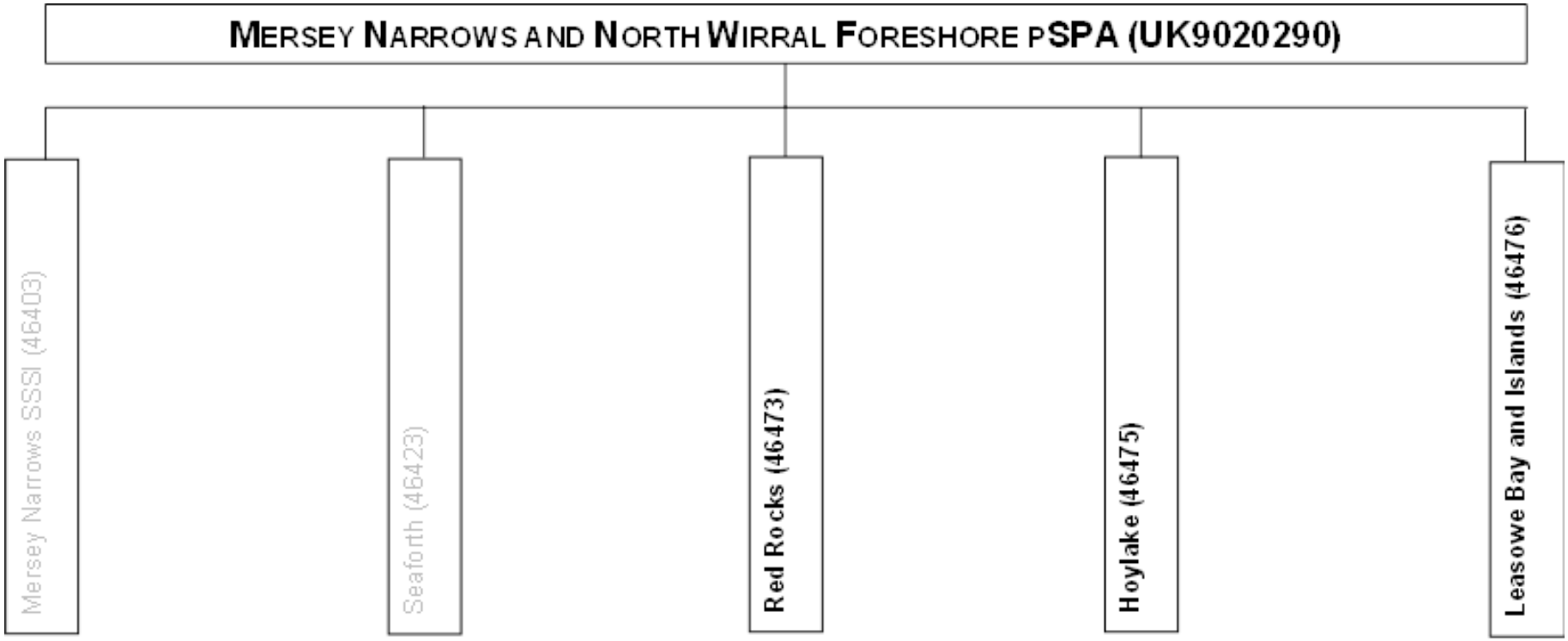

Figure 2.1.iv Structural hierarchy of WeBS count sectors on the Mersey Narrows and North Wirral Foreshore pSPA. Greyed out boxes identify sectors for which data for at least the most recent five winters are unavailable. Sectors at the finest spatial scale for which a sufficiently long time series is available for analysis (in bold) are those primarily considered for interpretation in this report.

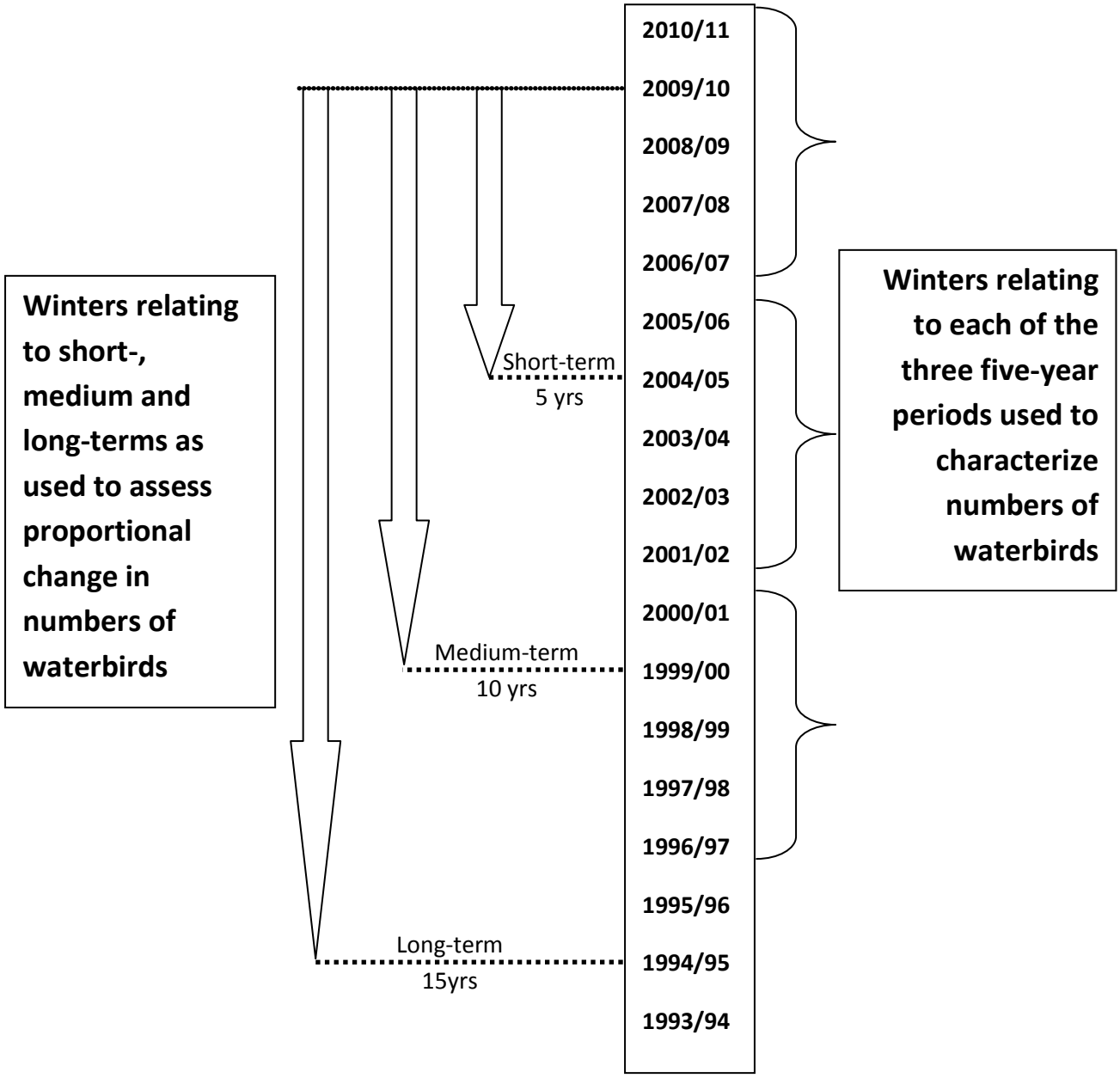

Figure 2.1.v Schematic of reference winters used for reported waterbird numbers and change

2.2 Analysis

The BTO has prepared a guidance document 'Guidance to interpretation of Wetland Bird Survey within-site trends' (Austin & Ross-Smith 2013) to aid the interpretation of WeBS sector trend analyses. These guidelines give full details of analyses included in this report and the rationale behind them as an aid to the interpretations of numbers and trends on WeBS count sectors. In addition to the information given below, that document includes examples with explanations that may help clarify some of the concepts.

2.2.1 Smoothed waterbird trends and percentage change

The methodology used to produce smoothed site, regional and national trends as reported by WeBS Alerts (Thaxter and others 2010) can be usefully extended to generate trends on smaller areas of interest such as WeBS count sectors or appropriately grouped count sectors. It is, however, important to recognise that the numbers of birds underlying the observed trend on sectors are generally much lower than those underlying site trends reported by WeBS Alerts which are, by definition, are at least equal to the national qualifying threshold. Consequently, individual trends should not be 'over-interpreted'. For example, a 50% decline from 30 birds to 15 birds would give much less cause for concern than a 50% decline from 1000 to 500 birds the latter being much more likely to reflect a real and substantial loss of birds from an area than the former. While bearing this in mind, a consistent pattern of decline across multiple species, even when the numbers involved for some of them are comparatively low, is strongly indicative of adverse factors affecting the sector in question and the particular suite of species showing a decline in numbers can guide us in where to look for problems (for example, does the suite of species represent those known to be particularly sensitive to disturbance or those with similar ecological requirements). However, the causes of any such declines cannot be identified from trends alone; further research is needed for this.

Thus, using the latest available validated WeBS data (to winter 2010/11 inclusive), following Atkinson and others (2000, 2006), smoothed trends were calculated using Generalized Additive Models (GAMs) for the relevant species. The smoothing is to ensure that year-specific factors, such as poor conditions on the breeding grounds or particularly harsh weather on the wintering grounds, that are not related to changes in the quality of the Liverpool City Region SPAs themselves, do not contribute overly to the trend. Percentage change has been calculated for short- (5 year) medium- (10 year) and long-term (15 year). To ensure statistical robustness, percentage change is calculated with reference to the penultimate winter in the time series available so as to avoid referring to the end points of the smoothed trend. WeBS does not have the necessary data collated at the sector level to support analysis of longer time-series. By way of analogy with the WeBS Alerts system, declines of at least 25% but below 50% are flagged as medium-declines, and declines of 50% or greater are flagged as high-declines (we specifically do not use the terms medium- and high-Alerts because unlike the percentage change reported by WeBS Alerts, medium and high declines reported at the sector level do not constitute a formal WeBS Alert). The corresponding percentage change required to balance the numbers to their former level following a decline or increase are likewise termed medium- (at least 33% but below 100%) and high- (100% or greater) increases.

2.2.2 Placing the smoothed waterbird indices into context

Once the smoothed sector indices have been produced the observed trends are placed in context of the site trends. The standard WeBS methodology (Banks & Austin 2004) as used to compare site trends with regional and national trends when reporting WeBS Alerts (Thaxter and others 2010) is extended here to compare counts sector trends with site trends. If waterbird numbers of a given species on a given count sector follow those of the species across the site as a whole then the proportion contribution of numbers on the site would remain constant. Any significant deviation from this gradient of zero would indicate that the waterbird populations on the relevant count sector are doing either better or less well than would be expected from the site trend. Consequently:

- where a decline on a sector reflects a decline across the site as a whole it is unlikely that the observed site trend is being driven by factors affecting that sector. If this is true of the majority of sectors, then this may indicate that the observed site decline in the species in question is due to factors external to the site and are thus not due to site management issues *per se*;

- where a decline on a sector is more substantial than that across the site as a whole, this may suggest that factors affecting that sector could be contributing to the overall decline;

- where a decline on a sector is less than the decline across the site as a whole, this suggests that relatively favourable conditions on that sector are helping buffer site declines;

- where an increase on a sector is less than that across the site as a whole, this suggests that the sector is already at carrying capacity for the species in question or, if historically it supported greater numbers, that the quality of the sector to that species has diminished; and

- where an increase on a sector is greater than that across the whole site, this suggests that trends on that sector are driving the increase across the site or that the sector in question is relatively attractive compared to the site as a whole when increased numbers arrive at the site due to external factors.

The comparisons between sectors and site are derived from a logistic regression model with a binomial error term. The resulting plots depict the percentage contribution of the sector to the site as a whole and the associated confidence limits represent both variation in this proportion between months in a given year and the underlying sample size (for example, we would be more confident of our estimate that a sector contributed 10% of the site total if 100 birds out of 1000 on the site were counted there than we would be if this was 10 out of 100). This is based on the winter period as routinely used for all WeBS reporting, November to March for waders and September to March for other species, or for summer visitors April to September. Only data from months where counts consolidated across the site as a whole had been assessed as complete were used - following standard WeBS protocol described above.

Having considered the trends on the sectors, each in the context of trends across the site as a whole, it is important to consider the site trends in the context of the region – here the area covered by the Environment Agency (EA)'s North West Region (following standard WeBS Alerts reporting), as this can modify our interpretation of the pattern of change across sectors. This is especially important where there has been an increase or decline regionally. Consequently:

- where there has been an apparent re-distribution of a species within the Liverpool City Region SPAs (that is, declines on some sectors appear to be balanced by increases on other sectors), but the proportional contribution of the Liverpool City Region SPAs to increasing regional numbers is declining, then this implies that those sectors on the Liverpool City Region SPAs with static or declining numbers are actually of concern because we would expect them to be increasing in parallel with the other sectors. Thus, in such cases, the apparent redistribution within the Liverpool City Region SPAs is misleading and the species in question may be facing problems on those sectors not supporting an increase in numbers; and

- where a species is in regional decline we would expect declines on at least some of the sectors of the Liverpool City Region SPAs regardless of whether birds are being

affected by adverse factors locally. Thus, we would expect those sectors of least suitable habitat to a given species to be the first to show a decline in numbers.

2.2.3 Key outputs

The analyses undertaken are contained in a number of key outputs as detailed below:

- Proportional change in the numbers of each species assessed over the long-, medium- and short-terms (Overview: Tables 3.1.i to 3.1.iii, for underlying values see 'TableOfChange' sheets in 'Liverpool City Region Pilot 2013 Results Tables.xls').

- Underlying linear trend across the 15 winter period and the significance of this trend from zero (see 'TableOfProportions' sheets in 'Liverpool City Region Pilot 2013 Results Tables.xls').

- Means of peak counts of each species for the most recent five-winter period (Overview: Tables 3.1.iv to 3.1.vi, for underlying values together with equivalent values for the previous two five-winter periods and the Peak value in the most recent winter, see 'TableOfPeaks' sheets in 'Liverpool City Region Pilot 2013 Results Tables.xls').

- The proportion of species assessed as falling into each of the five categories from high decline through to high increase (mapped pie-charts: Figure 3.1.i to 3.1.iv).

- For each species for each sector, graphs depicting both annual mean and annual peak numbers together with smoothed trends through each. Accompanying each of these is a graph showing the proportional contribution of each sector to the overall numbers across the whole of the SPA concerned. The equivalent graphs are also available for the Liverpool City Region SPAs relative to the entire north-west of England (EA North West Region) (Annex A).

- Maps depicting relative numbers across all sections of the Liverpool City Region SPAs. Provided in both GIS shapefile and as colour-ramp maps (Annex E).

3 Results

It should be noted that while standard WeBS methodology has been used in the analyses presented, this has been applied at a finer scale (within site sector count level) than is typically used for WeBS analyses such as WeBS Alerts (Thaxter *et al.* 2010). Some of the within site numbers and data coverage are low, and for some species trends are based on a small proportion of the within site sectors. There may also be greater variability and uncertainty around the within site distribution of birds compared to site level data and therefore the results comparing sectors and site trends should be interpreted with care.

3.1 Analysis of sector trends

The trends of each species on each SPA and a comparison of each relative to the broader region (North West England) are given in Annex A. These comparisons provide the broader scale context in which the SPA trends should be considered.

The trends of each species on each SPA and a comparison of each relative to a composite of all three are given in Annex B. These comparisons consider the relative performance between these SPAs and additional context in which the trends on individual count sectors should be considered.

The trends of each species on each WeBS sector of the three Liverpool City Region SPAs are given in Annex C, together with plots comparing the count sector trends with those across the SPA of which they are a part, the latter providing the principal context in which the trends on the sector in question should be considered. Plots are grouped by sector and species presented in taxonomic order. This information is summarised below (Tables 3.1.i to 3.1.iii)[1] and the underlying values representing percentage change to the Liverpool City Region SPAs are available in the accompanying Excel™ Workbook ('Liverpool City Region Pilot 2013 Results Tables.xls'). Colour coding is used to represent declines or increases; species are listed in taxonomic order and sectors have been listed to represent geographical proximity. Caution is advisable in interpreting individual cells in these tables in isolation as, for example, a 50% decline (shown in red) could represent a decline from 10,000 to 5,000 birds or could be a decline from 20 to 10, and therefore the plots in the annex should also be referred to. However, consistency between adjacent cells would suggest that either a group of species or a group of adjacent sectors have similar trends even when numbers of individuals involved are relatively low. Where this is the case, this may suggest that the trends represent real ecological changes.

This information is further summarised in map format, which better facilitates a geographic interpretation using pie-charts to indicate the proportion of species falling into each category of percentage change. Maps are presented for the overall 15 winters and each constituent five-winter period. Both whole SPAs (Figure 3.1.i) and the sectors of each SPA (Figures 3.1.ii to 3.1.iv) are presented. Note that gulls and terns have been excluded from these pie-charts because data are not available for all SPAs which would preclude direct comparison between those sites and, furthermore, are considered less reliable that data for wildfowl and waders and so may have introduced 'noise' into the pie-charts.

The importance of individual sectors for given species can be determined by considering the five-year mean of peak counts (Tables 3.1.iv to 3.1.vi) and underlying values are available in the supporting material ('Liverpool City Region Pilot 2013 Results Tables.xls'), the

[1] For purposes of clarity and parsimony, information in these tables does not include composite sectors where data were available at a finer resolution.

importance of individual sectors to particular species clearly influencing one's level of concern regarding the characteristics of the trends.

Table 3.1.i Overview of population trends of wildfowl within the Liverpool City Region SPAs over the long- (1994/95 – 2009/10) the medium- (1999/00 – 2009/10) and the short- (2004/05 – 2009/10) terms. Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green – an increase in numbers of at least 33% but less than 100%; Dark Green – an increase in numbers of at least 100%; Grey - species has not been recorded, or occurs too infrequently or in numbers too low to support meaningful analysis.

Sector		Bewick's Swan			Whooper Swan			Shelduck			Wigeon			Teal			Pintail			Common Scoter			Great Crested Grebe			Cormorant		
		Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term
57456	St Anne`s Beach																											
57455	Lytham Beach																											
57460	Warton Marsh																											
57453	Longton Marsh																											
57452	Hesketh Out-Marsh																											
57451	Banks Marsh East																											
57459	Banks Marsh Central																											
57458	Banks Marsh West																											
57457	Crossens Out-Marsh																											
46434	Marshside 2																											
46433	Marshside 1																											
46432	Marshside Sand Company																											
46431	Marshside Beach																											
46430	Ainsdale Beach																											
46418	Formby																											
46419	Hightown																											
UK9005103	**Ribble & Alt Estuaries SPA**																											
46407	Hale																											
45420	Ince Bank																											
45419	Manisty Bay																											
UK9005131	**Mersey Estuary SPA**																											
46476	Leasowe Bay and Islands																											
46475	Hoylake																											
46473	Red Rocks																											
UK9020287	**Mersey Narrows and North Wirral Foreshore pSPA**																											

Table 3.1.ii Overview of population trends of waders within the Liverpool City Region SPAs over the long- (1994/95 – 2009/10) the medium- (1999/00 – 2009/10) and the short- (2004/05 – 2009/10) terms. Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green – an increase in numbers of at least 33% but less than 100%; Dark Green – an increase in numbers of at least 100%; Grey - species has not been recorded, or occurs too infrequently or in numbers too low to support meaningful analysis.

Sector		Oystercatcher			Ringed Plover			Golden Plover			Grey Plover			Lapwing			Knot			Sanderling			Dunlin			Black-tailed Godwit			Bar-tailed Godwit			Curlew			Redshank			Turnstone		
		Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term
57456	St Anne`s Beach																																					
57455	Lytham Beach																																					
57460	Warton Marsh																																					
57453	Longton Marsh																																					
57452	Hesketh Out-Marsh																																					
57451	Banks Marsh East																																					
57459	Banks Marsh Central																																					
57458	Banks Marsh West																																					
57457	Crossens Out-Marsh																																					
46434	Marshside 2																																					
46433	Marshside 1																																					
46432	Marshside Sand Company																																					
46431	Marshside Beach																																					
46430	Ainsdale Beach																																					
46418	Formby																																					
46419	Hightown																																					
UK9005103	**Ribble & Alt Estuaries SPA**																																					
46407	Hale																																					
45420	Ince Bank																																					
45419	Manisty Bay																																					
UK9005131	**Mersey Estuary SPA**																																					
46476	Leasowe Bay and Islands																																					
46475	Hoylake																																					
46473	Red Rocks																																					
UK9020287	**Mersey Narrows and North Wirral Foreshore pSPA**																																					

Table 3.1.iii Overview of population trends of gulls and terns within the Liverpool City Region SPAs over the long- (1994/95 – 2009/10) the medium- (1999/00 – 2009/10) and the short- (2004/05 – 2009/10) terms. Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green – an increase in numbers of at least 33% but less than 100%; Dark Green – an increase in numbers of at least 100%; Grey - species has not been recorded, or occurs too infrequently or in numbers too low to support meaningful analysis.

Sector		Black-headed Gull			Little Gull			Common Gull			Lesser Black-backed Gull			Herring Gull			Great Black-backed Gull			Common Tern		
		Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term
57456	St Anne`s Beach																					
57455	Lytham Beach																					
57460	Warton Marsh																					
57453	Longton Marsh																					
57452	Hesketh Out-Marsh																					
57451	Banks Marsh East																					
57459	Banks Marsh Central																					
57458	Banks Marsh West																					
57457	Crossens Out-Marsh																					
46434	Marshside 2																					
46433	Marshside 1																					
46432	Marshside Sand Company																					
46431	Marshside Beach																					
46430	Ainsdale Beach																					
46418	Formby																					
46419	Hightown																					
UK9005103	**Ribble & Alt Estuaries SPA**																					
46407	Hale																					
45420	Ince Bank																					
45419	Manisty Bay																					
UK9005131	**Mersey Estuary SPA**																					
46476	Leasowe Bay and Islands																					
46475	Hoylake																					
46473	Red Rocks																					
UK9020287	**Mersey Narrows and North Wirral Foreshore pSPA**																					

Table 3.1.iv The most important sectors for wildfowl in the Liverpool City Region SPAs shown by colour: Dark Blue – sectors with a mean peak count over the last five winters (2005/06 – 2010/11) that is at least 20% of the total mean peak counts for the Liverpool City Region SPAs over the same period; Light Blue – sites with a mean peak count over the last five winters that is between 10% and 20% of the total mean of peak count for the Liverpool City Region SPAs over the same period; Dark Green Sites with a peak count in the latest year (2010/11) that is at least 20% of the total peak count for the Liverpool City Region SPAs in the latest year; Light Green – sites with a peak count in the latest year that is between 10% and 20% of the total peak count for the Liverpool City Region SPAs in the latest year.

Sector		Bewick's Swan	Whooper Swan	Shelduck	Wigeon	Teal	Pintail	Common Scoter	Great Crested Grebe	Cormorant
57456	St Anne`s Beach									
57455	Lytham Beach									
57460	Warton Marsh									
57453	Longton Marsh									
57452	Hesketh Out-Marsh									
57451	Banks Marsh East									
57459	Banks Marsh Central									
57458	Banks Marsh West									
57457	Crossens Out-Marsh									
46434	Marshside 2									
46433	Marshside 1									
46432	Marshside Sand Company									
46431	Marshside Beach									
46430	Ainsdale Beach									
46418	Formby									
46419	Hightown									
UK9005103	**Ribble & Alt Estuaries SPA**									
46407	Hale									
45420	Ince Bank									
45419	Manisty Bay									
UK9005131	**Mersey Estuary SPA**									
46476	Leasowe Bay and Islands									
46475	Hoylake									
46473	Red Rocks									
UK9020287	**Mersey Narrows pSPA**									

Table 3.1.v The most important sectors for waders in the Liverpool City Region SPAs shown by colour: Dark Blue – sectors with a mean peak count over the last five winters (2005/06 – 2010/11) that is at least 20% of the total mean peak counts for the Liverpool City Region SPAs over the same period; Light Blue – sites with a mean peak count over the last five winters that is between 10% and 20% of the total mean of peak count for the Liverpool City Region SPAs over the same period; Dark Green – Sites with a peak count in the latest year (2010/11) that is at least 20% of the total peak count for the Liverpool City Region SPAs in the latest year; Light Green – sites with a peak count in the latest year that is between 10% and 20% of the total peak count for the Liverpool City Region SPAs in the latest year.

Sector		Oystercatcher	Ringed Plover	Golden Plover	Grey Plover	Lapwing	Knot	Sanderling	Dunlin	Black-tailed Godwit	Bar-tailed Godwit	Curlew	Redshank	Turnstone
57456	St Anne`s Beach													
57455	Lytham Beach													
57460	Warton Marsh													
57453	Longton Marsh													
57452	Hesketh Out-Marsh													
57451	Banks Marsh East													
57459	Banks Marsh Central													
57458	Banks Marsh West													
57457	Crossens Out-Marsh													
46434	Marshside 2													
46433	Marshside 1													
46432	Marshside Sand Company													
46431	Marshside Beach													
46430	Ainsdale Beach													
46418	Formby													
46419	Hightown													
UK9005103	**Ribble & Alt Estuaries SPA**													
46407	Hale													
45420	Ince Bank													
45419	Manisty Bay													
UK9005131	**Mersey Estuary SPA**													
46476	Leasowe Bay and Islands													
46475	Hoylake													
46473	Red Rocks													
UK9020287	**Mersey Narrows pSPA**													

Table 3.1.vi The most important sectors for gulls and terns in the Liverpool City Region SPAs shown by colour: Dark Blue – sectors with a mean peak count over the last five winters (2005/06 – 2010/11) that is at least 20% of the total mean peak counts for the Liverpool City Region SPAs over the same period; Light Blue – sites with a mean peak count over the last five winters that is between 10% and 20% of the total mean of peak count for the Liverpool City Region SPAs over the same period; Dark Green – Sites with a peak count in the latest year (2010/11) that is at least 20% of the total peak count for the Liverpool City Region SPAs in the latest year; Light Green – sites with a peak count in the latest year that is between 10% and 20% of the total peak count for the Liverpool City Region SPAs in the latest year.

Sector		Black-headed Gull	Little Gull	Common Gull	Lesser Black-backed Gull	Herring Gull	Great Black-backed Gull	Common Tern
57456	St Anne`s Beach							
57455	Lytham Beach							
57460	Warton Marsh							
57453	Longton Marsh							
57452	Hesketh Out-Marsh							
57451	Banks Marsh East							
57459	Banks Marsh Central							
57458	Banks Marsh West							
57457	Crossens Out-Marsh							
46434	Marshside 2							
46433	Marshside 1							
46432	Marshside Sand Company							
46431	Marshside Beach							
46430	Ainsdale Beach							
46418	Formby							
46419	Hightown							
UK9005103	**Ribble & Alt Estuaries SPA**							
46407	Hale							
45420	Ince Bank							
45419	Manisty Bay							
UK9005131	**Mersey Estuary SPA**							
46476	Leasowe Bay and Islands							
46475	Hoylake							
46473	Red Rocks							
UK9020287	**Mersey Narrows pSPA**							

Table 3.1.vii Overview of population trends of wildfowl across the Liverpool City Region SPAs and The Dee Estuary over the long- (1994/95 – 2009/10) the medium- (1999/00 – 2009/10) and the short- (2004/05 – 2009/10) terms. Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green – an increase in numbers of at least 33% but less than 100%; Dark Green – an increase in numbers of at least 100%.

Sector		Bewick's Swan			Whooper Swan			Shelduck			Wigeon			Teal			Pintail			Common Scoter			Great Crested Grebe			Cormorant		
		Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term
UK9005103	Ribble/Alt SPA																											
UK9005131	Mersey Estuary SPA																											
UK9020287	Mersey Narrows pSPA																											
	Liverpool City Region SPAs																											
UK9013011	The Dee Estuary SPA																											
	EA North West Region																											

Table 3.1.viii Overview of population trends of waders across the Liverpool City Region SPAs and The Dee Estuary over the long- (1994/95 – 2009/10) the medium- (1999/00 – 2009/10) and the short- (2004/05 – 2009/10) terms. Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green – an increase in numbers of at least 33% but less than 100%; Dark Green – an increase in numbers of at least 100%.

Sector		Oystercatcher			Ringed Plover			Golden Plover			Grey Plover			Lapwing			Sanderling			Knot			Dunlin			Black-tailed Godwit			Bar-tailed Godwit			Curlew			Redshank	Turnstone		
		Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term		Short-term	Medium-term	Long-term
UK9005103	Ribble/Alt SPA																																			
UK9005131	Mersey Estuary SPA																																			
UK9020287	Mersey Narrows pSPA																																			
	Liverpool City Region SPAs																																			
UK9013011	The Dee Estuary SPA																																			
	EA North West Region																																			

Table 3.1.ix Overview of population trends of gulls and terns across the Liverpool City Region SPAs over the long- (1994/95 – 2009/10) the medium- (1999/00 – 2009/10) and the short- (2004/05 – 2009/10) terms. Cells are coloured to indicate trend status as follows: Red – a decline in numbers of at least 50%; Orange – a decline in numbers of at least 25% but less than 50%; White – a decline in numbers of less than 25% or an increase of less than 33%; Pale Green – an increase in numbers of at least 33% but less than 100%; Dark Green – an increase in numbers of at least 100%.

Sector		Black-headed Gull			Little Gull			Common Gull			Lesser Black-backed Gull			Herring Gull			Great Black-backed Gull			Common Tern		
		Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term	Short-term	Medium-term	Long-term
UK9005103	Ribble/Alt SPA																					
UK9005131	Mersey Estuary SPA																					
UK9020287	Mersey Narrows pSPA																					
	Liverpool City Region SPAs																					

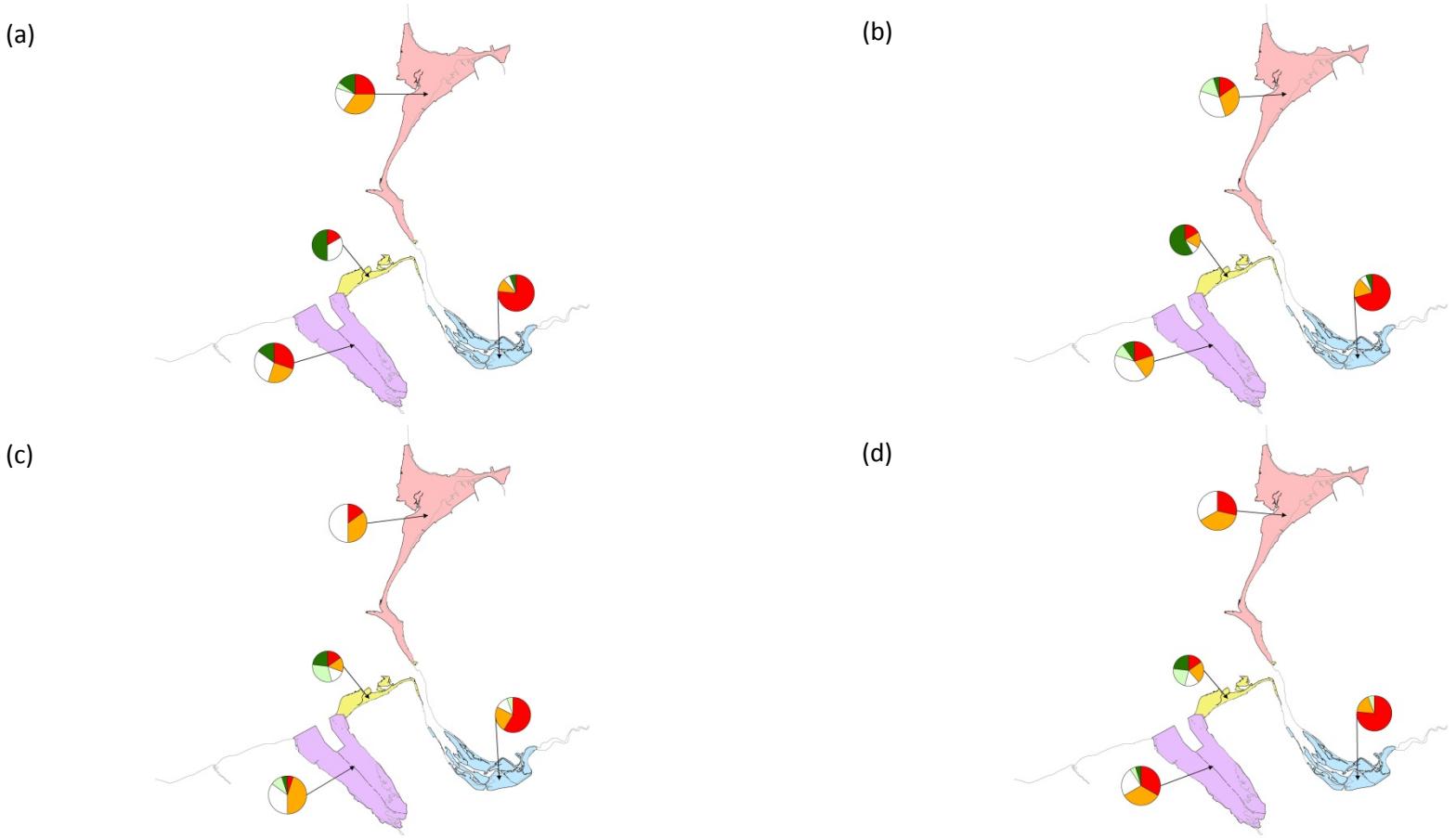

Figure 3.1.i Population trends of waterbirds within the Ribble and Alt Estuaries SPA (pink), the Mersey Estuary SPA (blue), the Mersey Narrows and North Wirral Foreshore pSPA (green) and The Dee Estuary SPA (purple) for (a) the long-term (1994/95 – 2009/10); (b) the medium-term (1999/00 – 2009/10); (c) the short-term (2004/05 – 2009/10) and (d) the "worst case" scenario from any one of the three timeframes. The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale green) and sharp increase (dark green).

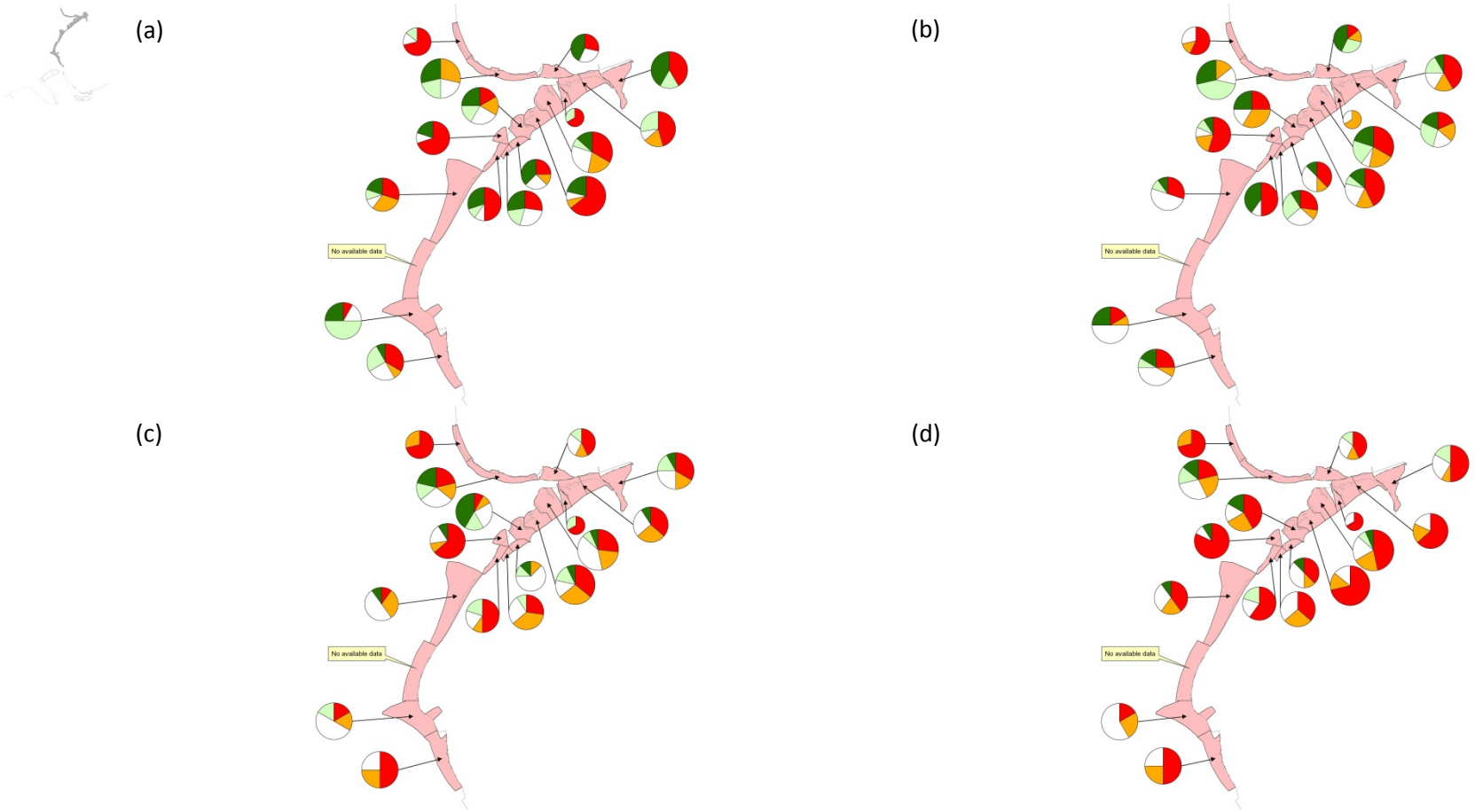

Figure 3.1.ii Population trends of waterbirds within the Ribble and Alt Estuaries SPA over (a) the long-term (1994/95 – 2009/10); (b) the medium-term (1999/00 – 2009/10); (c) the short-term (2004/05 – 2009/10) and (d) the "worst case" scenario from any one of the three timeframes. The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale green) and sharp increase (dark green).

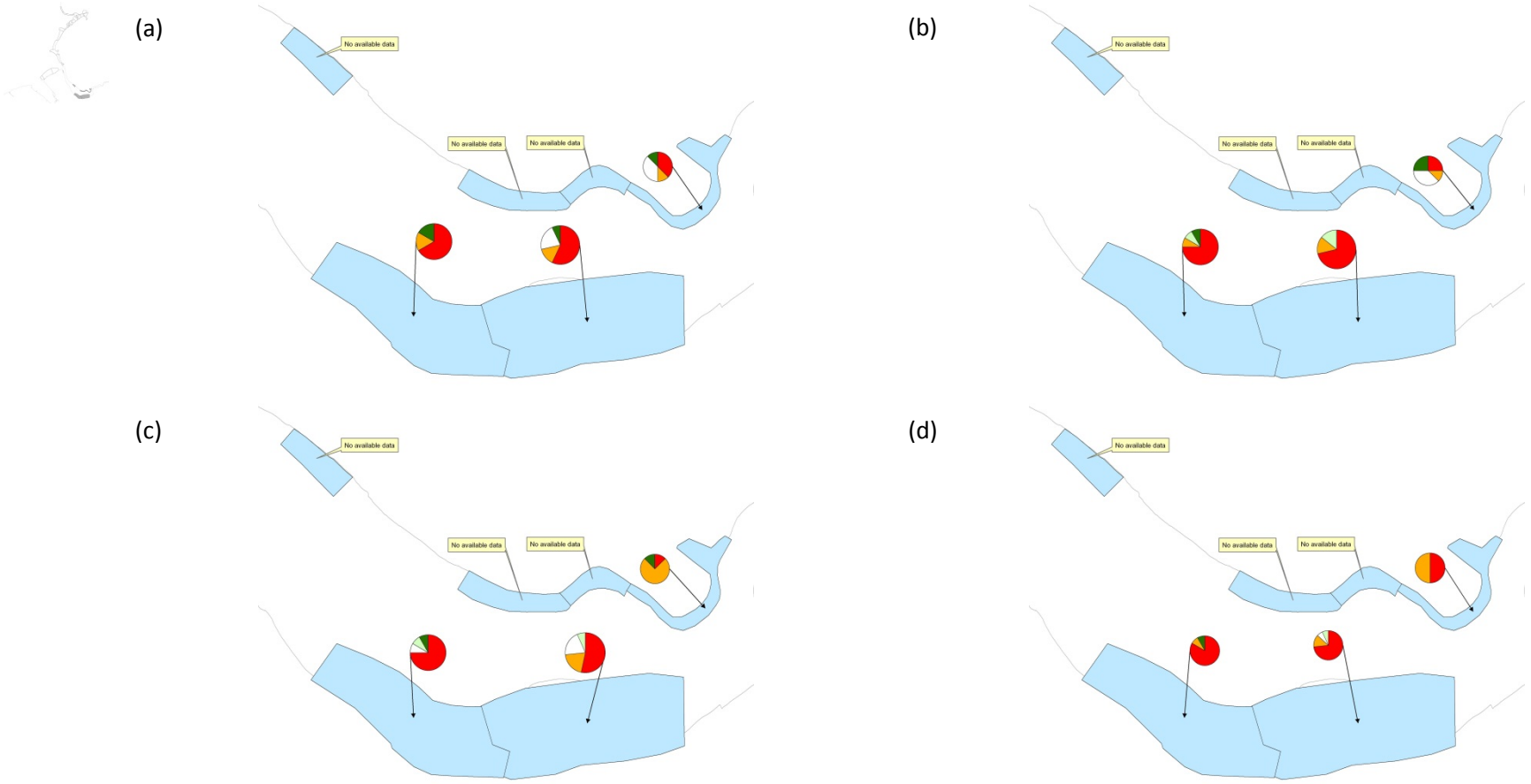

Figure 3.1.iii Population trends of waterbirds within the Mersey Estuary SPA over (a) the long-term (1994/95 – 2009/10); (b) the medium-term (1999/00 – 2009/10); (c) the short-term (2004/05 – 2009/10) and (d) the "worst case" scenario (1994/94 – 2009/10). The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale green) and sharp increase (dark green).

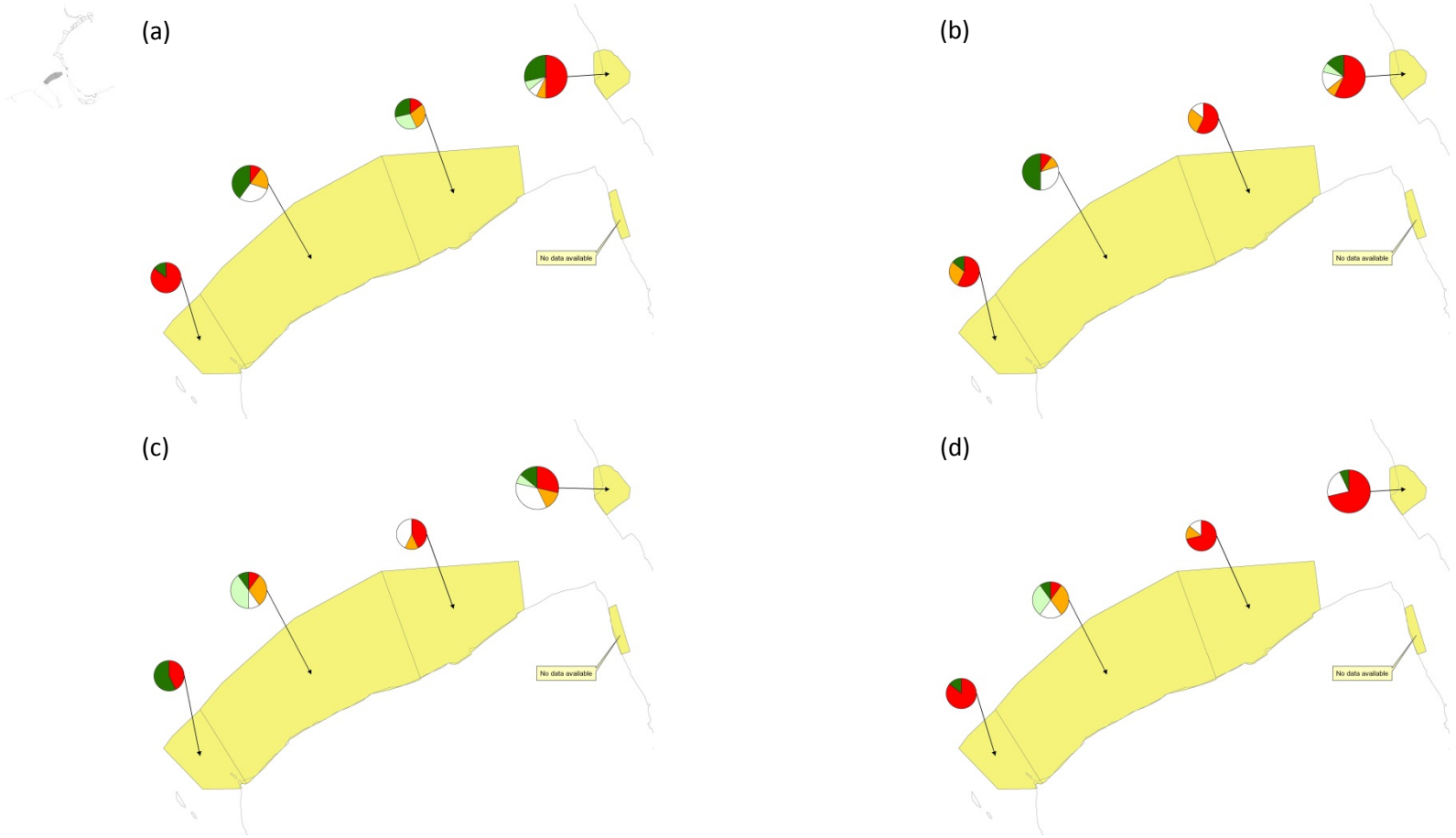

Figure 3.1.iv Population trends of waterbirds within the Mersey Narrows and North Wirral Foreshore pSPA over (a) the long-term (1994/95 – 2009/10); (b) the medium-term (1999/00 – 2009/10); (c) the short-term (2004/05 – 2009/10) and (d) the "worst case" scenario from any one of the three timeframes. The area of each pie chart relates to the number of species for which trends could be determined on the WeBS count sector in question and within each pie chart the proportions of those species that have undergone a substantial decline (red), a moderate decline (orange), "no" change (white), moderate increase (pale green) and sharp increase (dark green).

4 Discussion and conclusions

It should be noted that while standard WeBS methodology has been used in the analyses presented, this has been applied at a finer scale (within site sector count level) than is typically used for WeBS analyses such as WeBS Alerts (Thaxter *et al.* 2010). Some of the within site numbers and data coverage are low, and for some species trends are based on a small proportion of the within site sectors. There may also be greater variability and uncertainty around the within site distribution of birds compared to site level data and therefore the results comparing sectors and site trends should be interpreted with care.

4.1 Species trends

The trends described herein consider waterbird numbers in isolation, such that the drivers of any changes cannot be inferred from this information alone. The trends can, however, highlight where changes are occurring and whether they are in contrast to or are following broader scale changes be those at site or regional level. If local pressures are implicated by the trends, then this information can be used as a platform for initiating focused research to identify causes.

4.1.1 Bewick's swan *Cygnus columbianus*

Across the Liverpool City Region SPAs, overwintering numbers of Bewick's swan fell by about half from the mid- to late-1990s, before rising again in the early-2000s, and then dropping to almost zero in the most recent winters. As such, as sharp decline was found in the long-, medium- and short-terms. This pattern was broadly reflected in the overall in the EA North West Region (with the same long-, medium- and short-term trends), and the Liverpool City Region SPAs held approximately 40% of the area's Bewick's swans across most of the winters considered.

At a finer spatial scale, the site most affected by Bewick's swan declines was the Ribble and Alt Estuaries SPA, and in particular the Longton Marsh sector (57353), which had held the large majority of the SPA's birds (and indeed the majority of this species in the entire Liverpool City Region SPAs), but where no Bewick's swans were counted in the most recent winter. In this sector (and the Ribble and Alt Estuaries overall) there was a sharp decline over every timeframe. In the Mersey Estuary SPA and the Mersey Narrows and North Wirral Foreshore pSPA, Bewick's swan numbers were too low for meaningful trends to be calculated over the whole time period considered.

On The Dee Estuary SPA, there were moderate declines in the short- and medium-terms, but since this decreasing trend was less marked than then other SPAs and the regional trend, The Dee Estuary has gained in importance as a site for Bewick's swan in the EA North West Region, supporting approximately 95% of the region's swans in winters 2009/10 and 2010/11, up from approximately 20% in the mid-1990s. It should be noted that across the entire EA North West Region, Bewick's swan numbers were relatively low (less than 250 individuals over the time period considered), and as such all trends should be interpreted with caution.

4.1.2 Whooper swan *Cygnus cygnus*

Across the Liverpool City Region SPAs, overwintering numbers of whooper swan rose steadily from the late-1990s to a peak in the mid-2000s. Thereafter numbers declined, returning to levels seen in the early-2000s by winter 2010/11. This has led to a moderate decline in the short-term, but a moderate increase in the medium-term, and a sharp increase in the long-term. In the EA North West Region, the trend has been similar, but the drop

occurred earlier and has been more pronounced. This has resulted in a moderate declines in the short- and medium-terms, but a moderate increase in the long-term.

At a finer spatial scale, there is some indication of redistribution of whooper swans from the Ribble and Alt Estuaries SPA to the Mersey Estuary SPA. Across the Ribble and Alt Estuaries SPA, there was a sharp decrease in whooper swan numbers in the short-term, while there were whooper swan increases over all timeframes for the Mersey Estuary SPA. However, numbers on both sites were low over the entire time periods, with meaningful trends generated for only two sectors across both SPAs due to paucity of data, and neither site supported a substantial proportion of the EA North West Region's whooper swan population. Within the Ribble and Alt Estuaries SPA, the most important sector for this species was Longton Marsh (57353), where there were sharp declines over the short- and medium-terms (although the long-term trend was a sharp increase).

Meaningful trends for whooper swan on The Dee Estuary SPA and the Mersey Narrows and North Wirral Foreshore pSPA could not be generated due to paucity of data. It should be noted that, with a peak of approximately 1600 individuals in the early-2000s, whooper swan numbers were low across the entire EA North West region for the time period considered, and therefore all trends should be interpreted with care.

4.1.3 Shelduck *Tadorna tadorna*

Shelduck numbers across the Liverpool City Region SPAs fell over the entire time period considered, resulting in sharp declines in the medium- and long-terms, and a moderate decrease in the short-term. Although numbers of this species also decreased slightly in the EA North West Region as a whole, this fall was less marked than in the Liverpool City Region SPAs, such that these SPAs have held a steadily diminishing proportion of the regional shelduck population, falling from about 50% in the mid-1990s to around 35% in winter 2010/11.

At a finer spatial scale, there were severe declines over all time periods in the Mersey Estuary SPA, with the southern sectors at Ince Bank (45420) and Manisty Bay (45419), both of which are important for shelduck in terms of the proportion of the Mersey Estuary SPA population held, experiencing declines, many of which were severe, over all time periods. These declines resulted in a reduction in the proportion of the regional shelduck population supported by the Mersey Estuary SPA, which stood at approximately 10% in winter 2010/11, down from approximately 40% in the late-1900s.

There were also moderate declines over every time period in the Ribble and Alt Estuaries SPA, which also reduced in importance as a regional site for this species, supporting approximately 25% of the EA North West Region's shelduck in the mid-1990s, but approximately 15% by the late-2000s. Several sectors in the Ribble and Alt Estuaries SPA had moderate or severe declines over every time period, namely Longton Marsh (57453), Banks Marsh Central (57459), Banks Marsh West (57458) and Marshside Sand Company (46432). All these sectors apart from Longton Marsh were important in terms of the proportion of the Ribble and Alt Estuaries SPA shelduck population they supported. There is some indication of shelduck redistribution across the Ribble and Alt Estuaries SPA. For example, short-term declines on Banks Marsh Central and Banks Marsh West were accompanied by short-term increases on the neighbouring sectors of Banks Marsh East (57451) and Crossens Out-Marsh (57457).

In contrast to the other SPAs, shelduck on the Mersey Narrows and North Wirral Foreshore pSPA increased sharply in numbers over every time period, perhaps indicating an influx of birds from the Mersey Estuary SPA. However, overall numbers were consistently low, such that trends could only be calculated for a single sector (Hoylake, 46485, where there was a marked increase over every time period), and results for this pSPA should be interpreted with care. Shelduck numbers on The Dee Estuary SPA remained relatively stable over the

time period considered, and the site consistently supported approximately 30% of the EA North West Region's population.

4.1.4 Wigeon *Anas penelope*

Overwintering wigeon numbers across the Liverpool City Region SPAs have been gradually falling since the mid-1990s, leading to an overall long-term moderate decline. This is broadly in line with the wigeon trend for the EA North West Region as a whole, although there is some indication that the decline in the Liverpool City Region SPAs has outpaced that at a regional level in the most recent winters, and as such, that the proportion of the region's wigeon supported by the Liverpool City Region SPAs has slightly fallen from around 80% to 60%.

At a finer spatial scale, there were sharp declines in wigeon number over the long-, medium- and short-terms for the Mersey Estuary SPA, which saw wigeon numbers fall from approximately 5000 individuals in the mid-1990s to effectively zero in recent winters. This site's importance at a regional level also diminished, from supporting approximately 10% of the EA North West Region's wigeon in the mid-1990s to a negligible proportion in recent winters. This declines on the Mersey Estuary SPA were primarily due to sharp losses over every timeframe at Ince Bank (45420), the sector that supported the majority of the SPA's wigeon over the entire time period considered.

The most important SPA of Liverpool City Region SPAs for wigeon in terms of numbers was the Ribble and Alt Estuaries, which held approximately ten times more wigeon than did the Mersey Estuary SPA, amounting to almost the entire Liverpool City Region SPAs' population from the mid-2000s onwards, once the Mersey SPA numbers had fallen to almost zero. The Ribble and Alt Estuaries SPA also supported approximately 70% to 80% of the EA North West Region's wigeon population across the entire time period considered. In the Ribble and Alt Estuaries SPA, the wigeon population remained relatively stable over the entire time period considered, although there is some indication of a decline from winter 2008/09 onwards (and a concomitant slight fall in the proportion of the Region's wigeon supported). At a more local level, there were more pronounced changes in wigeon numbers. There were declines (predominantly sharp) over the long-, medium- and short-terms for Banks Marsh East (57351) and Marshside Sand Company (46432), although neither of these sectors supported a substantial proportion of the Ribble and Alt Estuaries SPA wigeon population. The most important sectors of this SPA for wigeon were the adjacent sites of Banks Marsh Central (57459), Banks Marsh West (57458), Crossens Out-Marsh (57457) and Marshside 2 (46434). Of these, there were moderate declines over at least one timeframe for Banks Marsh Central and Banks Marsh West, but increases in one timeframe at Crossens Out-Marsh and Marshside 2, indicating that some local redistribution of wigeon might have taken place. There were also some increases towards the north of the Ribble and Alt Estuaries SPA, with sharp rises in wigeon numbers in the short-, medium- and long-term at Lytham Beach (57455), and the same trend over at least one time period at Warton Marsh (57460), and Longton Marsh (57453), although Warton Marsh had a decline in the short-term, while numbers stabilised at Longton Marsh in the short-term.

Insufficient numbers of wigeon were counted on the Mersey Narrows and North Wirral Foreshore pSPA to generate meaningful trends for any sector, while on The Dee Estuary SPA, there were moderate declines in the short- and long-terms, but this SPA only held a very small proportion of the EA North West Region's wigeon over the whole time period, at less than 5%.

4.1.5 Teal *Anas crecca*

Overall, overwintering teal numbers across the Liverpool City Region SPAs fell over the time period considered, amounting to a sharp decline in the medium- and long-terms, and a moderate decline in the short-term. This fall was broadly in line with the wider regional trend, although the declines in the EA North West Region were less marked, resulting in moderate

decreases in teal over every timeframe. These different rates of decline meant that the Liverpool City Region SPAs progressively lost importance relative to the EA North West Region, supporting approximately 60% of teal in the mid-1990s but only around 40% by the late-2000s.

At a finer spatial scale, the biggest changes in teal numbers were found on the Mersey SPA. This site was the most important of the Liverpool City Region SPAs in terms of teal numbers in the mid-1990s, with almost 8000 individuals present (around 70% of the Liverpool City Region SPAs' population). However, numbers fell to only a few hundred birds (approximately 20% of the Liverpool City Region SPAs' population) by the late-2000s, leading to a sharp decline in the short-, medium- and long-terms. These declines were mirrored at Ince Bank (45420) and Manisty Bay (45419), the most important sectors in the Mersey Estuary SPA for teal in terms of the proportion of the site's population they supported. A further important sector, Hale (46407), had moderate declines in the short- and medium-term, and a sharp decline in the long-term. These marked teal population declines across the Mersey Estuary SPA were associated with a fall in the SPA's importance at a regional level. Having supported between 40% and 50% of the EA North West Region's teal in the mid-1990s, it held less than 10% by the late-2000s.

Teal numbers were far more stable on the Ribble and Alt Estuaries SPA, where between 3500 and 4500 individuals were found over the whole time period. This stability, combined with the diminishing teal population on the Mersey SPA, saw the proportion of the Liverpool City Region SPAs' teal population supported by the Ribble and Alt Estuaries SPA rise from around 30% to about 80% over the time period concerned. The Ribble and Alt Estuaries also increased in importance relative to the EA North West Region, accounting for around 30% of the Region's teal by the late-2000s, up from approximately 20% in the mid-1990s. Although the overall teal population of the Ribble and Alt Estuaries SPA remained stable, there were changes at a more local level. For example, there were declines over each timeframe at Warton Marsh (57460) and Banks Marsh East (57451), but increases over the same period at Longton Marsh (57453) and Crossens Out-Marsh (57457), indicating some local redistribution of this species across the SPA.

Meaningful teal trends could not be generated for the Mersey Narrows and North Wirral Foreshore pSPA due to paucity of data. On The Dee Estuary SPA, there were moderate teal declines in the medium- and long-terms, although as this was consistent with the regional trend, The Dee Estuary SPA held approximately 10% to 20% of the EA North West Region's teal over the whole time period considered.

4.1.6 Pintail *Anas acuta*

The overwintering pintail population of the Liverpool City Region SPAs has fluctuated since the mid-1990s, resulting in a sharp decline in the long-term. These fluctuations were broadly in line with the wider regional trend, although the peaks and troughs were less pronounced across the EA North West Region, although the proportion of the Region's pintail population held by the Liverpool City Region SPAs fell from around 40% in the mid-1990s to approximately 15% by the early-2000s.

The most important of the Liverpool City Region SPAs for pintail was the Ribble and Alt Estuaries SPA. This SPA supported nearly all the pintail found across the Liverpool City Region SPAs from the mid-2000s onwards (following declines on the Mersey Estuary SPA, see below). Overwintering numbers fluctuated on the Ribble and Alt Estuaries SPA, leading to a moderate increase in the medium-term, but a moderate decline in the long-term. This SPA supported between about 10% and 30% of the EA North West Region's pintail population over the entire time period considered. At a finer spatial scale, there was an indication of pintail redistribution across the Ribble and Alt Estuaries SPA. For example, there were sharp declines in the short-, medium- and long-terms at Banks Marsh West (57458), but substantial pintail increases over the same timeframes for Marshside Sand

Company (46432). It should be noted that despite its importance relative to the other Liverpool City Region SPAs, pintail trends could not be generated for the majority of sectors on the Ribble and Alt Estuaries SPA due to the small numbers of pintail counted.

On the Mersey Estuary SPA, pintail numbers fell sharply between the late-1990s (when more than 400 birds were counted) and the mid-2000s (by which time counts were negligible), leading to substantial declines in the long-, medium- and short-terms. At its late-1990s peak, this SPA supported approximately 10% of the EA North West Region's pintail, and 40% of pintail in the Liverpool City Region SPAs, but has held a negligible proportion in recent winters. These declines can be partly attributed to losses at Manisty Bay (45419), where there were sharp losses over every timeframe. However, trends could not be generated for other sectors in this SPA due to insufficient data.

No trends were calculated for pintail on the Mersey Narrows and North Wirral Foreshore pSPA because of paucity of data. On The Dee Estuary SPA, pintail numbers fell steadily, with moderate declines found for every timeframe. The proportion of the wider regional population supported by The Dee Estuary SPA fluctuated between approximately 20% and 50% over the time period concerned.

4.1.7 Common scoter *Melanitta nigra*

Overwintering numbers of common scoter in the Liverpool City Region SPAs were low over the entire time period considered, with less than 1000 individuals counted, and as such, trends for the majority of sectors could not be generated and all results should be interpreted with caution. Furthermore, common scoter is not a species that is well monitored by land-based surveys. Overall, there were sharp rises in common scoter numbers on the Liverpool City Region SPAs in the medium- and long-terms. This is also the pattern seen for the EA North West Region as a whole, which is unsurprising given that the Liverpool City Region SPAs supported approximately 80% of the Region's common scoter for most of the time period concerned.

The vast majority of the Liverpool City Region SPAs' common scoter were found on the Ribble and Alt Estuaries SPA, where there was a substantial increase in numbers in the medium- and long-terms, although some indication of a decline since the mid-2000s. The proportion of the EA North West Region's common scoter found on the Ribble and Alt Estuaries SPA has fluctuated from approximately 60% to about 95% over the time period considered, but appears to have dipped towards the lower end of this range in the winters leading up to 2010/11. The most important sector in the Ribble and Alt Estuaries in terms of the proportion of the SPA's common scoter population supported was Formby (46418). This was also the only sector in this SPA for which trends could be generated. Here there was a moderate short-term decline in numbers, but sharp increases in the medium- and long-terms.

Common scoter numbers on the Mersey Estuary SPA and the Mersey Narrows and North Wirral Foreshore pSPA were too low for meaningful trends to be generated. On The Dee Estuary, there were sharp increases across every timeframe. However, this result masks the fact that numbers were predominantly very low (less than 20 individuals), aside from a brief sharp peak to approximately 250 birds in the mid-2000s, after which time number rapidly returned to their previous levels. The proportion of the EA North West Region's common scoter supported by The Dee Estuary SPA fluctuated, but was consistently low, and never rose above about 20%.

4.1.8 Great crested grebe *Podiceps cristatus*

Numbers of great crested grebe overwintering across the Liverpool City Region SPAs were consistently low (fewer than 100 individuals), meaning that few sector level trends were generated and all results should be interpreted with care. Overall, there was a decline in this species across the SPAs, which was sharp in the medium- and long-terms, but moderate in

the short-term. Declines were also seen at the wider regional scale, but less severely, with moderate falls over each timeframe for the EA North West Region. As such, the proportion of the EA North West Region's great crested grebe fell, from around 15% in the mid-1990s to a negligible proportion by the early-2000s.

Almost all great crested grebe in the Liverpool City Region SPAs were found on the Mersey Estuary SPA, although even at its peak in the late-1990s, this site only supported approximately 70 birds (around 15% of the regional population). In recent winters, the numbers of great crested grebe counted, and the regional population supported, has been negligible. This has resulted in sharp declines across every timeframe for the Mersey Estuary SPA. There were only sufficient data to generate trends for a single sector, Ince Bank (45420), where the trend was the same as that seen across the wider SPA.

No trends were generated for the Ribble and Alt Estuaries SPA or the Mersey Narrows and North Wirral Foreshore pSPA. On The Dee Estuary SPA, there was a sharp long-term decrease in great crested grebe numbers, although again, at its peak, this SPA held only approximately 40 individuals. The Dee Estuary SPA is relatively unimportant for this species at a regional level, holding less than 10% of the EA North West Region's great crested grebe over the entire time period concerned.

4.1.9 Cormorant *Phalacrocorax carbo*

Overwintering cormorant numbers across the Liverpool City Region SPAs rose from the mid-1990s, before stabilising in more recent winters. This overall trend has produced a sharp increase in the long-term and a moderated rise in the medium-term. There were also cormorant increases at the broader scale, but they were less marked, with a long-term moderate rise in numbers across the EA North West Region. The Liverpool City Region SPAs therefore gained in importance for cormorants in the EA North West Region, supporting approximately 20% of the Region's cormorants in the mid-1990s but about 30% by the late-2000s.

The most important of the Liverpool City Region SPAs for cormorant was the Ribble and Alt Estuaries SPA, which held about 90% of the SPAs' population for the time period considered. Here the trend echoed that seen across the Liverpool City Region SPAs (sharp rise in the long-term, moderate rise in the medium-term). This SPA also gained in importance as a site for cormorants at a regional level, supporting approximately 15% of the EA North West Region's cormorants in the late-1990s, but around 25% by the late-2000s. There were gains over at least two timeframes in several sectors, including Banks Marsh Central (57459), Ainsdale Beach (46430) and Marshside Beach (46431), all of which were important in terms of the proportion of the SPA's cormorant population held. A single sector, Longton Marsh (57453) saw substantial losses over every timeframe, although this was not an important sector for cormorant within the SPA.

On the Mersey Estuary SPA, cormorant numbers were consistently low, peaking at approximately 80 individuals in the early-2000s. Since this time, numbers have fallen, generating a moderate decline in the short-term. This SPA is not important at a regional level, supporting only a very small proportion of the EA North West Region's cormorant population.

Until the mid-2000s, there were almost no cormorants counted on the Mersey Narrows and North Wirral Foreshore pSPA. Numbers then rose rapidly to a peak of approximately 480 individuals in winter 2008/09, since which time they have fallen off slightly. This has led to a sharp increase overall in every timeframe. This pSPA has also assumed importance for this species with this cormorant increase, supported between 10% and 20% of the EA North West Region's cormorant population since winters 2007/08, having previously held a negligible proportion. Since the increases on the Mersey Narrows and North Wirral Foreshore pSPA followed declines on the Mersey Estuary SPA, it is possible that some

increases on the former were generated by cormorant relocation from the latter. Two sectors, Hoylake (46475) and Red Rocks (46473), both of which were important in terms of the proportion of the pSPA's cormorants supported, had sharp increases in every timeframe.

On The Dee Estuary, cormorant numbers have risen steadily, from approximately 200 birds in the mid-1990s, to around 700 individuals in winter 2010/11. Overall, this has produced a sharp increase in the medium- and long-terms, and a moderate rise in the short-term. This SPA has assumed importance at a regional level, supported approximately 25% of the EA North West Region's cormorants in recent winters, up from around 10% in the mid- and late-1990s.

4.1.10 Oystercatcher *Haematopus ostralegus*

Overwintering oystercatcher numbers fell overall across the Liverpool City Region SPAs, with moderate declines in the short-, medium- and long-terms. This reduction was greater than the slight downturn recorded in the EA North West Region as a whole, such that the proportion of the Region's oystercatcher supported by the Liverpool City Region SPAs fell from around 20% to 10% over the period considered.

The most important of the Liverpool City Region SPAs for oystercatcher was the Ribble and Alt Estuaries SPA, which held approximately 90% of the SPAs oystercatcher in the mid- to late-1990s, and a slightly lower proportion (around 70%) on some winters since. Here, numbers fell from approximately 15000 birds in the late-1990s, to around 7000 in the late-2000s, although there is some indication that they have since stabilised. The overall trend for this SPA is a moderate decline over each timeframe. This site consistently supported between 10% and 20% of the EA North West Region's oystercatcher population over the whole time period concerned. At a finer spatial scale, declines were particularly sustained and pronounced at Banks Marsh Central (57459), Banks Marsh West (57458), Crossens Out-Marsh (57457), Marshside 1 (46433), Marshside Sand Company (46432) and Marshside Beach (46431). However, the proportion of the SPA's oystercatcher supported by these sectors was relatively small. Sectors that were important included Formby (46418) and Lytham Beach (57455), where there were moderate increases over at least one timeframe.

Oystercatcher numbers on the Mersey Estuary SPA fell from around 200 birds in the late-1990s to approximately 30 in winter 2010/11 (a sharp declines across all timeframes), although these small numbers are indicative of the SPAs relative unimportance in terms of the proportion of the wider regional population held. In contrast, there were sustained increases in oystercatcher numbers on the Mersey Narrows and North Wirral Foreshore pSPA, suggesting that this site might have gained some birds from the Mersey Estuary SPA and the Ribble and Alt Estuaries SPA. The Mersey Narrows and North Wirral Foreshore pSPA had marked increases in the medium- and long-terms, and a moderate increase in the short-term, amounting to a trebling of its oystercatcher population (to approximately 2400 birds in winter 2010/11) over the time period concerned. However, despite this increase, the site still only accounted for less than 5% of the oystercatcher found in the EA North West Region. There were increases (many marked) over at least one time period in the Leasowe Bay and Islands (46476) and Hoylake (46475) sectors, both of which were important for this species in terms of the proportion of the pSPA population held. These increases may partly reflect a movement of birds away from Red Rocks (46473), where there was a sharp decline across all timeframes. Oystercatcher numbers on The Dee Estuary SPA were relatively stable and this area supported between 10% and 30% of the EA North West Region's population over the entire time period concerned.

4.1.11 Ringed plover *Charadrius hiaticula*

In contrast to the trend in the EA North West Region, which was for stability, overwintering ringed plover counts fell across the Liverpool City Region SPAs, with sharp declines in the medium- and long-terms, and a moderate decrease in the short-term. This trend mismatch meant that the proportion of the EA North West Region's ringed plover supported by the

Liverpool City Region SPAs fell from around 20% to approximately 10%. However, it should be noted that overall numbers were always low, with fewer than 150 individuals found in any one winter, such that sector level trends could not be generated in many cases and all results should be interpreted with caution.

Both the Ribble and Alt Estuaries SPA and the Mersey Estuary SPA had moderate short-term declines and substantial long- and medium-term drops in ringed plover numbers. However, neither SPA supported more than approximately 10% of the EA North West Region's ringed plover during the whole time period considered.

On the Mersey Narrows and North Wirral Foreshore pSPA, there was a moderate decline in the short- and medium-terms, which mostly reflected a return to the numbers counted in the mid-1990s (approximately 25 birds) following a peak of about 60 birds in the early-2000s. Again this pSPA supported less than 10% of the EA North West Region's ringed plover over the time period concerned. There were sharp declines in the medium- and long-terms on The Dee Estuary SPA, although numbers have stabilised since the mid-2000s. Having held around 25% of the EA North West Region's golden plover in the early-2000s, this SPA currently supports around 10%.

4.1.12 Golden plover *Pluvialis apricaria*

Numbers of overwintering golden plover fell across the Liverpool City Region SPAs, leading to a sharp long-term decline, and moderate losses in the short- and medium-terms. These declines were slightly more pronounced than those seen in the EA North West Region, where falls were moderate across all timeframes, and as such the proportion of the Region's golden plover supported by the Liverpool City Region SPAs fell from around 50% in the mid-1990s to about 20% in recent winters.

The Mersey Estuary SPA and the Ribble and Alt Estuaries SPA both held between 2000 and 2500 golden plover in the mid-1990s. However, numbers on the Mersey Estuary fell off rapidly, such that counts were negligible by the mid-2000s, and sharp declines were seen in the short-, medium- and long-terms (a trend mirrored in the important sector of Ince Bank, 45420). This SPA also went from supporting approximately 25% of the EA North West Region's golden plover in the mid-1990s, to a very small proportion by winter 2010/11. There were also declines on the Ribble and Alt Estuaries SPA, but they began later, with numbers stable until the mid-2000s, after which they started to fall. This has brought about a moderate decrease over all timeframes, which the proportion of the EA North West Region's golden plover supported by this SPA has dropped from about 40% in the mid-2000s to 10% in winter 2010/11. At a finer spatial scale, declines were seen on important sectors in terms of the proportion of the SPA's population supported, for example, Longton Marsh (57453). There was also evidence of some local redistribution, as declines on Banks Marsh Central (57459), Marshside 2 (46434) and Marshside 1 (46433) occurred alongside increases in the neighbouring sectors of Banks Marsh West (57458) and Crossens Out-Marsh (57457). All these sectors were important for golden plover within the SPA.

Golden plover were not counted on the Mersey Narrows and North Wirral Foreshore pSPA. On The Dee Estuary SPA, there was a sharp short-term decline in numbers, although this SPA was relatively unimportant at a regional scale, supporting less than 5% of the EA North West Region's golden plover over the entire time period considered.

4.1.13 Grey plover *Pluvialis squatarola*

Overwintering grey plover numbers fell across the Liverpool City Region SPAs, with sharp declines in the medium- and long-terms, and a moderate drop in the short-term. This trend was more pronounced than that seen in the EA North West Region, where there was a moderate decrease in the medium-term and a substantial decline in the long-term.

The trend seen across the Liverpool City Region SPAs was primarily influenced by that at the Ribble and Alt Estuaries SPA, which was the most important SPA in terms of grey plover numbers the proportion of the regional population it supported. Here there was a moderate decline in the short-term, and sharp falls in the medium- and long-terms. Although the proportion of the EA North West Region's grey plover fluctuated over the time period considered, there was an overall decline, from around 60% in the late-1990s and early-2000s, to approximately 40% in more recent winters. Sectors within the Ribble and Alt Estuaries showing declines (many of them severe) over every timeframe included Banks Marsh Central (57459), Banks Marsh West (57458) and Marshside Beach (46431), all of which were important in terms of the proportion of the SPA grey plover population they supported.

There were also grey plover declines in the long- (sharp) and medium-terms (moderate) on the Mersey Estuary SPA, although this site consistently supported less than 10% of the EA North West Region's population of this species. The overall SPA trend was repeated at Ince Bank (45420), an important sector in terms of the proportion of the SPA's population supported. However, numbers were too low to generate trends on many sectors and as such results for this SPA should be interpreted with care.

On the Mersey Narrows and North Wirral Foreshore pSPA, grey plover numbers fluctuated. There was a sharp rise in the medium-term, but overall numbers were low (approximately 250 birds since the early-2000s), and as such trends should be interpreted with caution. The pSPA held less than 10% of the EA North West Region's grey plover over the whole time period considered. The most important sector on the pSPA for grey plover was Hoylake (46475), where there was a moderate short-term rise and a sharp medium-term increase in numbers.

On The Dee Estuary SPA, numbers of grey plover fell sharply in the late-1990s, but have stabilised since, giving a substantial decline in the long-term. This SPA has supported between 5% and 20% of the EA North West Region's grey plover during the time period considered.

4.1.14 Lapwing *Vanellus vanellus*

The number of lapwing found overwintering across the Liverpool City Region SPAs declined steadily over the time period considered, resulting in moderate short- and medium-term decreases, and a sharp long-term drop. This trend slightly outpaced that seen in the wider EA North West Region, where there was a moderate drop in lapwing numbers over all timeframes. This mismatch led to a reduction in the importance of the Liverpool City Region SPAs relative to the EA North West Region, with the proportion of the Region's lapwing population supported falling from around 45% to 35%.

The Ribble and Alt Estuaries SPA was the most important of the Liverpool City Region SPAs for lapwing numbers. Numbers at this site fluctuated, with two peaks of approximately 12000 individuals in the mid-1990s and the mid-2000s. The overall trend was of moderate declines in the short- and long-terms, while the SPA supported between about 25% and 35% of the EA North West Region's lapwing across the whole time period considered. Within the SPA, there were declines over all timeframes at Longton Marsh (57453), which was important in terms of the proportion of the SPA's lapwing population it supported.

Sharp lapwing declines were produced for all timeframes on the Mersey Estuary SPA, where numbers fell from approximately 7000 individuals in the early-1990s to around 1000 in winter 2010/11. This coincided with a decline in the importance of the SPA at a regional level, having held approximately 20% of the EA North West Region's lapwing in the mid-1990s, but less than 10% by the late-2000s. There were declines in two important sectors for the proportion of the SPA's lapwing supported, Hale (46407) (moderate short-term decline), and Ince Bank (45420) (sharp drop in the short-, medium- and long-terms).

Lapwing numbers rose overall on the Mersey Narrows and North Wirral Foreshore pSPA, giving a sharp increase across every timeframe. However, this increase was from almost zero in the mid-1990s, and at its peak (in winter 2008/09) was only about 150 birds. As such, all trends should be interpreted with care. The pSPA supported only a negligible proportion of the EA North West Region's lapwing population.

Lapwing numbers on The Dee Estuary SPA fell, especially from the mid-2000s onwards. This produced a moderate decline across every timeframe. As this trend was in line with those found regionally, The Dee Estuary SPA continually supported between 10% and 20% of the EA North West Region's lapwing over the time period considered.

4.1.15 Knot *Calidris canutus*

Overwintering knot numbers fluctuated across the Liverpool City Region SPAs, giving moderate declines in the short- and long-terms. These fluctuations were not seen to the same extent on the broader scale, with knot populations remaining relatively constant over the EA North West Region during the time period concerned.

The Ribble and Alt Estuaries SPA was the most important of those making up the Liverpool City Region SPAs in terms of numbers. Here the trend was for a moderate decline in the long-term, while the proportion of the EA North West Region's knot population supported fluctuated between about 20% and 50% over the 15 winters considered. There were sharp declines across every timeframe for several sectors in the Ribble and Alt Estuaries SPA, including Marshside Beach (an important sector in terms of the proportion of the SPA's population held), Marshside Sand Company (46432), Hightown (46419), Crossens Out-Marsh (57457) and Banks Marsh Central (57459). This pattern is also seen on the two northernmost sectors of the Ribble and Alt Estuaries SPA, St Anne's Beach (57456) and Lytham Beach (57455). There was, however, a moderate long-term rise in knot numbers at Formby (46418), which was the sector on this SPA supporting the largest number and proportion of this species.

On the Mersey Estuary SPA, knot numbers fell sharply from the late-1990s (when approximately 400 individuals were counted) to the mid-2000s (when counts for negligible). This gave rise to a substantial decline over all timeframes. Sectors badly affected by declines included Ince Bank (45420), which supported an important proportion of the SPA's knot population.

Numbers of knot on the Mersey Narrows and North Wirral Foreshore pSPA fell between the early- and late-2000s, leading to a moderate short-term decline. The proportion of the regional population supported fluctuated, but was generally less than 10%. Decreases were found at Hoylake (46475) and Leasowe Bay and Islands (46476), both of which were strongholds for this species within the pSPA.
On The Dee Estuary, knot numbers fluctuated, resulting in moderate short- and long-term declines. These fluctuations were also seen in the proportion of the regional population held, which varied between about 5% and 30% of that found in the EA North West Region.

4.1.16 Sanderling *Calidris alba*

Numbers of sanderling overwintering across the Liverpool City Region SPAs remained relatively constant over the time period considered, although there is some indication of a slight downturn since the late-2000s. This trend is in contrast to that seen in the EA North West Region, where there has been a gradual but sustained rise, giving moderate increases in the short-, medium- and long-terms.

The most important of the Liverpool City Region SPAs for sanderling was the Ribble and Alt Estuaries SPA, which held more than 90% of the SPAs' sanderling population for the whole time period concerned. Given this, the sanderling trend on the Ribble and Alt Estuaries SPA

closely matched that seen across the Liverpool City Region SPAs. The Ribble and Alt Estuaries SPA was also a key site for sanderling within the EA North West Region, supporting between 40% and 80% of the Region's population, although it appears that this importance might be beginning to diminish with the recent sanderling reduction at the SPA level. At a finer spatial scale, there were differences between the Ribble Estuary (57901) and the Alt Estuary (46421), with a short-term moderate decline on the former, but a long-term moderate increase on the latter. Formby (46418), an important sector in the Alt in terms of the proportion of the SPA population held, had a moderate increase in the short- and long-terms. St Anne's Beach (57456), an important Ribble sector, had a long-term moderate increase, but a short-term moderate decline.

Numbers of sanderling counted on the Mersey Estuary SPA were negligible, and as such no trends were produced. On the Mersey Narrows and North Wirral Foreshore pSPA, sanderling numbers rose to a peak of about 180 individuals in the late-2000s, giving sharp increases in the medium- and long-terms, and a moderate rise in the short-term. This trend was mirrored on the important sector of Hoylake (46475), but on Leasowe Bay and Islands (46476), which also supported a large proportion of the pSPA's sanderling, there was a long-term sharp increase, but a medium-term substantial decline. The Mersey Narrows and North Wirral Foreshore pSPA consistently supported a small proportion (around 5%) of sanderling found across the Liverpool City Region SPAs, and about 3% of the EA North West Region's population.

Sanderling numbers on The Dee Estuary fell slowly between the mid-1990s and the early-2000s, before rising again, giving moderate increases in the short- and medium-terms. This SPA consistently held between 5% and 10% of sanderling found in the EA North West Region.

4.1.17 Dunlin *Calidris alpina*

Overwintering dunlin numbers across the Liverpool City Region SPAs have fluctuated, falling until the mid-2000s, after which they appear to have stabilised. This has generated a moderate decline in the medium- and long-terms. The trend in the EA North West Region has been similar, but the declines shallower, such that the overall pattern is of a moderate fall in the long-term.

In the mid-1990s, the Ribble and Alt Estuaries SPA held around 30000 dunlin, and amounting to approximately 50% of the Liverpool City Region SPAs' population, and 30% of the EA North West Region's population. Numbers fell sharply between the mid-1990s and the early-2000s, but have since stabilised. This led to a substantial decline in the long-term. The proportional of EA North West Region's population held has remained relatively constant, at between 15% and 30%. The proportion of the Liverpool City SPAs' population held by the Ribble and Alt Estuaries SPA has fluctuated more widely, ranging from approximately 20% to 55%. At a finer spatial scale, there were dunlin losses (many of which were severe) over at least two timeframes in many sectors, including those that that were important in terms of the proportion of the SPA population supported, such as Marshside Beach (46431), Banks Marsh Central (57459) and Banks Marsh West (57458). However, there were also gains in dunlin numbers over the same timeframes for many sectors, including important ones such as Formby (46418) and Hightown (46419), suggested a general redistribution of dunlin across the Ribble and Alt Estuaries SPA over the time period considered.

The Mersey Estuary SPA held similar numbers and regional population proportion to the Ribble and Alt Estuaries SPA in the mid-1990s. However, here declines did not set in until the early-2000s, bringing about moderate drops in the short- and medium-terms. The proportion of both the Liverpool City Region SPAs' and the EA North West Region's dunlin population supported by the Mersey Estuary SPA has remained relatively stable. There was

a moderate medium-term decline for Ince Bank (45420), which was an important sector in terms of the proportion of the SPA's population held.

Dunlin numbers on the Mersey Narrows and North Wirral Foreshore pSPA were approximately a tenth of those found on either the Mersey Estuary SPA or the Ribble and Alt Estuaries SPA in the mid-1990s. They then rose to a peak of about 9000 birds in the early-2000s, before returning to levels previously found. This has led to a moderate medium-term decline. Relative to the wider region, the Mersey Narrows and North Wirral Foreshore consistently supported between approximately 3% and 15% of the EA North West Region's dunlin, and approximately 5% to 20% of the population found across the Liverpool City Region SPAs for the entire time period considered. At a sector level, there were substantial declines across all timeframes for Red Rocks (46473), although this site was relatively unimportant in terms of the proportion of the pSPA's population supported. Trends were more stable at two important sectors, Hoylake (46475) and Leasowe Bay and Islands (46476).

On The Dee Estuary SPA, dunlin numbers fell to give sharp medium- and long-term declines, and a moderate short-term decrease. These drops outpaced those in the EA North West Region, such that having supported around 20% of the region's dunlin in the late-1990s and early-200s, The Dee Estuary only held about 10% by the late-2000s.

4.1.18 Black-tailed godwit *Limosa limosa*

There were some fluctuations in black-tailed godwit numbers across the Liverpool City Region SPAs, with peaks in the late-1990s and the late-2000s. This led to an overall moderate rise in the long-term, echoing population growth of this species throughout Britain. This population increase was also seen in the EA North West Region, but trend was more pronounced, with moderate increases in the short- and medium-terms, and a sharp rise in the long-term. This mismatch in the rate of increase meant that the Liverpool City Region SPAs held a decreasing proportion of the EA North West Region's black-tailed godwit, falling from around 90% in the mid-1990s to about 40% by winter 2010/11.

The Ribble and Alt Estuaries SPA was the most important of the Liverpool City Region SPAs in terms of the number of black-tailed godwit counted and the proportion of the wider regional population supported. In this SPA there was a moderate rise in the short-term and a sharp-rise in the long term. It should be noted, however, the numbers appear to have fallen off since winter 2007/08. This population growth coincided with this SPA assuming importance for black-tailed godwit within the Liverpool City Region SPAs; in the mid-1990s it held approximately 30% of this region's population, but by the late-2000s it was supporting more than 90%. The proportion of the EA North West Region's black-tailed godwit held by the Ribble and Alt Estuaries remained relatively stable, however, at between 40% and 60%, as the population growth in this SPA kept pace with that seen regionally. At a sector level, marked growth in black-tailed godwit numbers over at least one timeframe was seen at Marshside 1 (46433), Marshside 2 (46434) and Banks Marsh Central (57459), all of which held an important proportion of the SPA's black-tailed godwit population.

Black-tailed godwit trends on the Mersey Estuary SPA were almost the opposite of those seen on the Ribble and Alt Estuaries SPA, suggesting that some of the population growth on the Ribble and Alt Estuaries SPA was a result of birds relocating from the Mersey Estuary SPA. On the Mersey Estuary SPA, there was a decline from the late-1990s, when approximately 1200 birds were found, to the late-2000s, by which time fewer than 100 individuals were counted. This amounted to marked decreases in the medium- and long-terms, and a moderate drop in the short-term. Accordingly, the Mersey Estuary SPA lost importance as a regional site for black-tailed godwit, supporting approximately 70% of the Liverpool City Region's population in the mid-1990s to less than 10% by the mid-2000s. A similar loss of importance was seen in comparison to the EA North West Region. At a finer spatial scale, there were sharp declines in black-tailed godwit numbers over all timeframes

at Manisty Bay (45419), which was an important sector in terms of the proportion of the SPA's population it supported.

Counts of black-tailed godwit on the Mersey Narrows and North Wirral Foreshore pSPA were too low for meaningful trends to be generated. However, there have been reports of this species from the late-2000s, suggesting there black-tailed godwits might be starting to use this part of the Liverpool City Region SPAs, possibly again as the Mersey Estuary SPA has become less favoured.

On The Dee Estuary SPA, black-tailed godwit number rose from the late-1990s to a peak in the early-2000s, after which they fell slightly again. This resulted in a moderate decline in the short-term, but a moderate rise in the medium-term and a sharp increase in the long-term. Although the proportion of the EA North West Region's black-tailed godwit supported by The Dee Estuary SPA fluctuated, overall its importance as a regional stronghold was relatively constant.

4.1.19 Bar-tailed godwit *Limosa lapponica*

There was a gradual and sustained decline in overwintering bar-tailed godwit numbers across the Liverpool City Region SPAs, leading to moderate decreases in the medium- and long-terms. This was broadly in line with the trend seen across the EA North West Region, where there was a moderate long-term decline, and as such the Liverpool City Region SPAs consistently supported around 70% of the Region's bar-tailed godwit.

The Ribble and Alt Estuaries SPA was by far the most important of the Liverpool City Region SPAs for bar-tailed godwit. This site held almost 100% of the SPAs' bar-tailed godwit for the whole time period considered. It was also an important site in the EA North West Region, consistently supporting between 60% and 80% of this area's bar-tailed godwit. As this stability suggests, the overall bar-tailed godwit population trend on the Ribble and Alt Estuaries SPA was in line with that seen at the wider regional level, with moderate declines in the medium- and long-terms. At a finer spatial scale, there were marked declines in bar-tailed godwit on the Ribble Estuary (57901), especially at St Anne's Beach (57456), Banks Marsh West (57458) and Marshside Beach (46431), which all had decreases in every timeframe. However, they were not important sectors in terms of the proportion of the SPA's population held, unlike Formby (46418), where there were moderate rises in bar-tailed godwit numbers in the short- and long-terms.

Bar-tailed godwit counts were too low across the Mersey Estuary SPA for meaningful trends to be calculated. There was a small number of bar-tailed godwit on the Mersey Narrows and North Wirral Foreshore SPA, falling from a peak of approximately 350 individuals in the late-1990s to less than 50 birds by the later-2000s. This gave a sharp decline across every timeframe. Most of the declines on this pSPA reflected losses at the relatively important sectors of Hoylake (46475) and Red Rocks (46473). At a regional level, the Mersey Narrows and North Wirral Foreshore pSPA supported a negligible but stable proportion of bar-tailed godwit found across the Liverpool City Region SPAs and the EA North West Region.

The trend in bar-tailed godwit numbers on The Dee Estuary SPA was similar to that seen on the Mersey Narrows and North Wirral Foreshore pSPA, although the late-1990s peak on The Dee Estuary comprised approximately 700 birds. The declines amounted to sharp losses in the medium- and long-terms, and a moderate decrease in the short-term. These declines coincided with a slight loss of importance of The Dee Estuary SPA at a regional scale, as having supported approximately 10% of the EA North West Region's bar-tailed godwit in the mid-1990s, it supported only a negligible proportion by the late-2000s.

4.1.20 Curlew *Numenius arquata*

Overwintering curlew numbers fell from the early-2000s onwards across the Liverpool City Region SPAs, generating moderate declines in the short- and medium-terms. This was

similar to trend in the EA North West Region, except here the decline began in the late-1990s and levelled off by the late-2000s, giving moderate declines for the medium- and long-terms. The Liverpool City Region SPAs consistently held around 15% of the EA North West Region's curlew.

The trend in curlew numbers on the Ribble and Alt Estuaries SPA mirrored that seen across the Liverpool City Region SPAs, with moderate declines in the short- and medium-terms. It therefore held a relatively constant proportion of the Liverpool City Region SPAs' curlew, at about 60%, while it supported about 10% of the curlew in the EA North West Region. At a finer spatial scale, there were notable losses in curlew on the Alt Estuary (46421), with declines in at least the short-term across all sectors therein, including at Formby (46418) and Hightown (46419), which supported an important proportion of the SPA's curlew. On the Ribble Estuary (57901), there was some indication of redistribution away from central sectors in favour of northern sectors. For example, Banks Marsh West (57458) and Marshside Sand Company (46432) had severe declines over all timeframes, while there were increases at Lytham Beach (57455) and Warton Marsh (57460).

Curlew numbers on the Mersey Estuary SPA fell steadily, leading to moderate short-, medium- and long-term declines. As this was broadly consistent with the regional trends, the Mersey SPA consistently supported between 30% and 40% of curlew found across the Liverpool City Region SPAs, and about 5% of the EA North West Region's population. At a finer spatial scale, there were declines in the three most important sectors in terms of the proportion of the Mersey Estuary SPA curlew population supported, namely Hale (46407), Ince Bank (45420) and Manisty Bay (45419).

Curlew numbers on the Mersey Narrows and North Wirral Foreshore pSPA were low (fewer than 100 birds), but rising from the early-2000s onwards. Some of this increase could be due to movement of curlew from the other Liverpool City Region SPAs. These rises amounted to a moderate short-term increase, and marked increases in the medium- and long-terms. Although the proportion of the regional population supported by the pSPA was very small, there was some indication that it was growing slightly as curlew numbers increased, from around 2% of the Liverpool City Region SPAs to about 5%. Most of the curlew increases in the pSPA could be attributed to the same trend in its most important sector for curlew, Hoylake (46475).

Curlew trends on The Dee Estuary declined gradually, broadly in line with regional trends. The proportion of the EA North West Region's curlew supported by The Dee Estuary SPA remained relatively constant, at around 20%.

4.1.21 Redshank *Tringa totanus*

Overwintering redshank numbers fell across the Liverpool City Region SPAs, with sharp medium- and long-term declines, and a moderate short-term drop. This decline was not in keeping with the trend in the EA North West Region, where redshank numbers were stable, and as such, the proportion of the Region's redshank held by the Liverpool City Region SPAs fell from around 50% in the mid-1990s to 20% by the late-2000s.

Within the Liverpool City Region SPAs, the site affected to the greatest extent by redshank declines was the Mersey Estuary SPA. This SPA went from being the most important of the Liverpool City Region SPAs for redshank in the mid-1990s, to the least important SPA by the late-2000s, following severe decline in the long-, medium- and short-terms. Redshank numbers fell from more than 3500 to less than 1000, and the proportion of the Liverpool City Region SPAs' redshank population supported by the Mersey Estuary SPA decreased from about 50% to approximately 25%. A similar fall was found with respect to the EA North West Region, with the Mersey Estuary SPA supported around 30% of the regional population in the mid-1990s, to less than 10% by the late-2000s. The most important sectors for redshank

within the Mersey Estuary SPA were Hale (46407), Ince Bank (45420) and Manisty Bay (45419), all of which had declines (many severe) over all three timeframes.

The Ribble and Alt Estuaries SPA had taken over as the most important of the Liverpool City Region SPAs by the end of the time period covered in this report. This SPA also had declines over all timeframes (marked in the medium- and long-terms, moderate in the short-term), but they were less pronounced than those of the Mersey Estuary SPA, with the population dropping from about 2500 to around 1500. Because redshank numbers on the Ribble and Alt Estuaries SPA held up better than those on the Mersey Estuary SPA, the proportion of the Liverpool City Region SPAs' population supported by the Ribble and Alt Estuaries SPA grew, from about 35% to more than 60%. Relative to the EA North West Region though, the importance of the Ribble and Alt Estuaries SPA was more constant, with between 10% and 20% of the region's redshank supported throughout the whole time period considered. At a finer spatial scale, numbers on the Ribble Estuary (57901) were relatively stable, whereas on the Alt Estuary (46421), there were moderate declines in the medium- and long-terms. There was some evidence of redshank redistribution on the Ribble, with increases in some sectors, for example, Warton Beach (57460), Banks Marsh Central (57458) and Marshside Beach (46431) coinciding with decreases in others, for instance Marshside Sand Company (46432) and Marshside 2 (46434).

There have been some fluctuations in the number of overwintering redshank on the Mersey Narrows and North Wirral Foreshore pSPA, but the trend has taken an upturn since the mid-2000s (to around 800 birds in 2010/11), leading to a moderate increase in the short-term. This rise has also seen the Mersey Narrows and North Wirral Foreshore pSPA gain in importance relative to the other Liverpool City Region SPAs; having supported around 10% of the SPAs' redshank between the mid-1990s and mid-2000s, it held approximately 25% by winter 2010/11. Compared to the EA North West Region, however, the Mersey Narrows and North Wirral Foreshore pSPA has remained relatively constant, supporting around 5% of the Region's population. Despite the overall pattern of increase, there were local declines, for example, Red Rocks (46473) had a marked fall in redshank over all timeframes.

In keeping with the wider regional trend, redshank numbers on The Dee Estuary SPA were relatively stable throughout the time period considered. Consequently, the proportion of the EA North West Region's redshank supported by The Dee Estuary was fairly constant, at around 30%.

4.1.22 Turnstone *Arenaria interpres*

Overwintering turnstone numbers have declined steeply across the Liverpool City Region SPAs, from around 900 individuals in the mid-1990s to around 100 in winter 2010/11. This has produced sharp decreases in the long-, medium- and short-terms. The pace of decline has been faster than that seen in the EA North West Region, where numbers fell in the late-1990s but have stabilised since, giving a sharp long-term decline. This mismatch had led to a reduction in the importance of the Liverpool City Region SPAs for turnstone, supporting around 50% of the EA North West Region's population in the mid-1990s, but less than 10% by the late-2000s.

The declines in the Liverpool City Region SPAs were also seen on the Ribble and Alt Estuaries SPA, where there were sharp declines in the short- and long-terms, and a moderate medium-term fall. These falls saw the Ribble and Alt Estuaries SPA lose importance as a site for turnstone in the EA North West Region, supporting less than 10% of the regional population by the late-2000s, down from approximately 25% in the mid-1990s. However, as the declines on the Ribble and Alt Estuaries were slightly less marked than those seen in the Liverpool City Region SPAs as a whole, the proportion of the SPAs' turnstone supported by the Ribble and Alt Estuaries SPA actually rose, from about 50% in the mid-1990s to around 75% by the mid-2000s. At a finer scale, declines across the Ribble and Alt Estuaries SPA were more pronounced on the Alt Estuary (46421) (sharp decrease

over all timeframes) than on the Ribble Estuary (57901) (sharp long- and short-term declines, moderate medium-term fall). The most important WeBS sectors in terms of the proportion of the SPA's population held were primarily those on the Alt, and some of the these sectors (Formby, 46418), and Hightown (46419) all had severe declines over two timeframes. This trend was also seen at Lytham Beach (57455), an important sector on the Ribble.

Turnstone were barely recorded on the Mersey Estuary SPA, so meaningful trends could not be calculated. At the start of the time period considered, the Mersey Narrows and North Wirral Foreshore pSPA and the Ribble and Alt Estuaries SPA held roughly equal turnstone numbers, and each supported about 50% of the Liverpool City Region SPAs' population. Declines on the Mersey Narrows and North Wirral Foreshore pSPA were more pronounced than those on the Ribble and Alt Estuaries SPA, being sharp over every timeframe. As such, the proportion of the Liverpool City Region SPAs' turnstone supported by the Mersey Narrows and North Wirral Foreshore pSPA fell to about 25% by the mid-2000s. This site also lost importance for turnstone relative to the EA North West Region, supporting approximately 25% of the Region's population in the mid-1990s, but around 5% by the mid-2000s. The most important sector for turnstone on the Mersey Narrows and North Wirral Foreshore pSPA was Leasowe Bay and Islands (46476), where there were sharp declines in the short-, medium- and long-terms.

Turnstone numbers also fell on The Dee Estuary SPA, with sharp declines in the long- and medium- terms and a moderate short-term reduction. Again these falls outpaced those found in the EA North West Region, and as such The Dee Estuary SPA lost importance, supporting around 40% of the Region's turnstone in the mid-1990s, but about 15% by the late-2000s.

4.1.23 Black-headed gull *Chroicocephalus ridibundus*

Although there were some fluctuations, overwintering black-headed gull numbers across the Liverpool City Region SPAs grew over the time period considered, giving sharp increases in the short- and long-terms, and a moderate rise in the medium-term. This was not the trend in the EA North West Region, where numbers fell in the late-1990s, but have since stabilised.

The Ribble and Alt Estuaries SPA was the most important of the Liverpool City Region SPAs for black-headed gull, supporting more than 80% of the pSPA's' population for the entire time period considered. However, there was a reduction in the proportion held between the early-2000s, when it was close to 100%, and more recent winters when it was around 80%. Overall, the Ribble and Alt Estuaries had sharp increases in black-headed gull numbers in the short- and long-terms. At a more local level, the rises seen across the SPA as a whole were mostly driven by sites on the Ribble Estuary (57901), where several sectors, including Banks Marsh Central (57459), Marshside 2 (46434) and Marshside 1 (46433), saw increases, many of which were sharp. On the Alt Estuary (46421), the picture was more mixed, giving a short-term moderate increase, but a medium-term moderate decline.

Black-headed gulls were not counted on the Mersey Estuary SPA. On the Mersey Narrows and North Wirral Foreshore pSPA, black-headed gull numbers rose steeply across all timeframes, although this was from a very low level in the mid-1990s. As such, the pSPA supported approximately 5% of the Liverpool City Region SPAs' black-headed gulls in the mid-1990s, but about 30% by winter 2010/11. This gain in importance was also found at the wider regional level, with the percentage of the EA North West Region's black-headed gull population supported by the pSPA rising from negligible to around 10%. Hoylake was the most important of the pSPA's sector for black-headed gull, and here there were sharp rises in the short-, medium- and long-terms.

Black-headed gull counts on The Dee Estuary SPA increased sharply, while this site also gained importance at the wider regional level; in the mid-1990s less than 5% of the Region's black-headed gulls were found on The Dee, but by the late-2000s it was almost 20%.

4.1.24 Little gull *Hydrocoloeus minutus*

There was a sharp decline in little gull numbers across the Liverpool City Region SPAs in the short-, medium- and long-terms. However, counts were consistently low, at fewer than 60 birds, and as such all trends should be interpreted with care. The only site within the Liverpool City Region SPAs on which meaningful counts of this species were made was the Ribble and Alt Estuaries SPA, where there was a marked decline over all timeframes. This was primarily due to losses on the Alt Estuary (46421). The Ribble and Alt Estuaries SPA also held almost all of the little gull population of the EA North West Region, so the wider regional trend closely matched that seen across the Liverpool City SPAs. There were no meaningful trends generated for the Mersey Estuary SPA, the Mersey Narrows and North Wirral Foreshore pSPA and The Dee Estuary SPA due to paucity of data.

4.1.25 Common gull *Larus canus*

Common gull numbers across the Liverpool City Region SPAs rose in the late-1990s, before stabilising, giving moderate increases in the medium- and long-terms. In contrast, there has been a decline in common gull in the EA North West Region since the late-1990s.

The most important site for common gull within the Liverpool City Region SPAs was the Ribble and Alt Estuaries SPA, which supported almost all the common gulls found in the area and where trends echoed those seen overall (moderate increases in the medium- and long-terms). This SPA held a rising proportion of the EA North West Region's common gulls, having supported between 10% and 20% in the late-1990s, but between 30% and 40% by the late-2000s. At a more local level, common gulls declined on the Alt Estuary (46421) but rose on the Ribble Estuary (57901) over the same timeframes (medium- and long-terms), indicating some local redistribution of this species across the SPA.

There were no counts of common gulls undertaken on the Mersey Estuary SPA. On the Mersey Narrows and North Wirral Foreshore pSPA, numbers were very low throughout most of the period considered, although they rose sharply in the late-2000s, giving substantial rises over all timeframes. This rise translated into an increased proportion of the Liverpool City Region SPAs' and the EA North West Region's common gull population supported by the pSPA, but the level was still low in both cases (less than 10%).

Common gull numbers on The Dee Estuary rose in the late-1990s to a peak in the early-2000s, before falling again. Numbers increased again in the late-2000s. The proportion of the EA North West Region's common gulls supported by The Dee Estuary remained stable at less than 10%.

4.1.26 Lesser black-backed gull *Larus fuscus*

Lesser black-backed gull numbers across the Liverpool City Region SPAs were stable until the mid-2000s, after which they rose sharply, and then fell again to previous levels. Across the EA North West Region, there was a gradual but sustained decline in lesser black-backed gulls from the late-1990s onwards.

The trend on the Liverpool City Region SPAs was mostly driven by numbers on the Ribble and Alt Estuaries SPA, which held upwards of 95% of the SPAs' lesser black-backed gulls over the entire time period concerned. The Ribble and Alt accounted for around 10% of the lesser black-backed gulls found in the EA North West Region. Within the Ribble and Alt Estuaries SPA, there was evidence of redistribution from the Alt Estuary (36321), where there were sharp declines in the medium- and long-terms, to the Ribble Estuary (57901), where there were sharp increases over the same timeframes.

Lesser black-backed gulls were not counted on the Mersey Estuary SPA. On the Wirral Narrows and North Mersey Foreshow pSPA, numbers were very low until the late-2000s, when they rose to about 150 birds before starting to fall again. This has given a sharp rise over every timeframe, but the low counts concerned mean these trends should be interpreted with care.

Lesser black-backed gull numbers on The Dee Estuary SPA were stable and low (50 to 100 individuals) over the time period concerned. The Dee Estuary SPA held a negligible proportion of the lesser black-backed gulls found in the EA North West Region.

4.1.27 Herring gull *Larus argentatus*

Following a period of stability, herring gull numbers across the Liverpool City Region SPAs rose from the early-2000s onwards, translating into a moderate rise in the short- and long-terms, and a sharp medium-term increase. This trend was broadly similar to that seen in the wider EA North West Region.

The Ribble and Alt Estuaries SPA was the most important of the Liverpool City Region SPAs for herring gull. Here there was a moderate increase over all timeframes. This trend was mostly driven by increases on the Ribble Estuary (57901), where there were sharp rises in the medium- and long-terms. Numbers on the Alt Estuary (46421) were stable. The Ribble and Alt Estuaries SPA consistently held more than 90% of the herring gulls found across the Liverpool City SPAs, and approximately 20% of the herring gulls in the EA North West Region.

Herring gull counts were not made on the Mersey Estuary SPA. On the Mersey Narrows and North Wirral Foreshore pSPA, herring gull numbers rose slowly to the late-2000s, before quintupling between 2009/10 and 2010/11 to approximately 1600 individuals. Overall, this gave sharp increases in all timeframes. However, this pSPA held a small proportion of herring gulls found in both the Liverpool City Region SPAs and the wider EA North West Region.

Herring gull numbers on The Dee Estuary SPA fluctuated, but again rose in the most recent winters. However, this site was also not important at a regional level, supporting less than 10% of the EA North West Region's herring gulls for the time period considered.

4.1.28 Great black-backed gull *Larus marinus*

Great black-backed gull numbers across the Liverpool City Region SPAs rose steadily, giving moderate increases in the short-, medium- and long-terms. This was in contrast to the EA North West Region, where numbers were stable, meaning that the Liverpool City Region SPAs accounting for an increasing proportion of the great black-backed gull population in the Region, up from approximately 20% to 30%.

The Ribble and Alt Estuaries SPA was the most important of the Liverpool City Region SPAs for great black-backed gull. Here, there were moderate rises in the medium- and long-terms. The Ribble and Alt Estuaries SPA supported nearly all the great black-backed gulls found in the Liverpool City Region SPAs until the mid-2000s, but in recent years this proportion has dropped to around 80%. However, its importance has increased slightly at a regional level, supporting approximately 25% of the EA North West Region's great black-backed gulls in recent winters, up from about 15% in the late-1990s. Numbers of great black-backed gulls on sectors within the Ribble and Alt Estuaries SPA were low, and as such all trends should be interpreted with care.

Great black-backed gulls were not counted on the Mersey Estuary SPA. On the Mersey Narrows and North Wirral Foreshore pSPA, great black-backed gull numbers were low until the mid-2000s, when they rose steeply, giving sharp increases over all timeframes. This population growth coincided with a rise in the proportion of the Liverpool City Region SPAs

held by the Mersey Narrows and North Wirral Foreshore pSPA, up from around 5% between the mid-1990s and the mid-2000s to around 25% in the late-2000s. Hoylake (46475) was the most important sector in the pSPA, and had sharp rises in the short- and medium-terms.

Great black-backed gull numbers on The Dee Estuary SPA were relatively stable, although they have risen since the mid-2000s. This SPA consistently supported less than 10% of the great black-backed gulls found in the EA North West Region.

4.1.29 Common tern *Sterna hirundo*

Common tern numbers across the Liverpool City Region SPAs have risen from the early-2000s onwards, given sharp rises in the short-, medium- and long-terms. The Liverpool City Region SPAs have consistently held approximately 80% of common terns found in the EA North West Region.

The Ribble and Alt Estuaries was the most important of the Liverpool City Region SPAs for common tern over most of the time period concerned, holding approximately 80% of the population. This site had sharp rises over every timeframe.

The Mersey Estuary SPA had only negligible counts of common tern. This was also the case in the Mersey Narrows and North Wirral Foreshore pSPA until the mid-2000s, with numbers rose sharply, giving marked rises in every timeframe.

Common tern numbers on The Dee Estuary SPA increased between the late-1990s and mid-2000s, after which time they fell to levels seen in the mid-1990s. There were therefore fluctuations in the proportion of the EA North West Region's common tern population supported by The Dee Estuary SPA, but the overall trend was of relative stability.

4.2 Broad patterns

4.2.1 Waders and shelduck

Shelduck and waders are discussed together because all these species feed on mudflat invertebrates, and are therefore likely to respond in similar ways to changes in the environment. Of the 14 species considered, 12 have declined across the Liverpool City Region SPAs over at least one timeframe in the 15 winters considered during this report. In eight species, the declines were over all three timeframes – short-, medium- and long-terms. Only a single species, black-tailed godwit, had an increase, and that was only a moderate rise in the long-term.

These declines were not representative of trends in the EA North West Region, where wader and shelduck numbers were more stable. Here only seven of the 14 species declined over at least one timeframe, and only two species decreased over all three timeframes. There were also increases over all three timeframes for two species, sanderling and black-tailed godwit.

Of the sites making up the Liverpool City Region SPAs, wader and shelduck fared worst on the Mersey Estuary SPA. There were declines in all 11 species for which trends could be generated. In nine of these, the declines were in the short-, medium- and long-terms, while in the remaining two species, the declines were in the medium- and long-terms. Shelduck, oystercatcher, golden plover, lapwing, knot and redshank were particularly badly affected, with sharp declines over every timeframe. Of the sectors in the Mersey Estuary SPA, Ince Bank (45420) and Manisty Bay (45419) had the worst declines, and were, in many cases, the most important parts of the SPA in terms of the proportion of the population held.

Wader and shelduck numbers also fell widely on the Ribble and Alt Estuaries SPA, where 12 of the 14 species concerned had declines over at least one timeframe. Declines were found in the short-, medium- and long-terms for seven species. A single species, black-tailed godwit, had increases. Within the SPA, sectors on the Ribble Estuary (57901) were affected

more than those on the Alt Estuary (46421). Twelve of 14 species declined in at least one timeframe on the Ribble, but only eight on the Alt. There were also increases over at least one timeframe for six species on the Alt, but only a single species (black-tailed godwit) on the Ribble.

The picture on the Mersey Narrows and North Wirral Foreshore pSPA was more mixed, with declines over at least one timeframe for six of the 12 species for which trends were generated, but increases over at least one timeframe for the remaining six. Some of these increases could be attributed to birds from the Mersey Estuary SPA and the Ribble and Alt Estuaries SPA relocated to the Mersey Narrows and North Wirral Foreshore pSPA, especially as in all but one species (sanderling), increases on the pSPA were accompanied by declines on the Mersey Estuary and the Ribble and Alt Estuaries. Wader and shelduck numbers on the Mersey Narrows and North Wirral Foreshore pSPA were generally lower than those found on the other two Liverpool City Region SPAs, such that increases here could not compensate for declines elsewhere.

There were wader and shelduck declines over at least one timeframe for nine of the 14 species counted on The Dee Estuary SPA, and increases for two. Decreases were only found in the long-, medium- and short-terms for four species. Overall, The Dee Estuary SPA seems to have been less badly affected by wader and shelduck losses than either the Ribble and Alt Estuaries SPA or the Mersey Estuary SPA.

4.2.2 Wildfowl

Of the eight wildfowl species considered (including cormorant and great crested grebe), six had declines over at least one timeframe across the Liverpool City Region SPAs. Three had increases in the long- and medium-terms, but there were no short-term increases (in one of these species, whooper swan, long- and medium-term increases were offset by a short-term decline).

As with waders and shelduck, these wildfowl decreases were not found to the same extent across the EA North West Region. Here, four species had declines over at least one timeframe, and three had increases (these three again included whooper swan, in which declines and increases were found depending on the timeframe).

Again, as with waders and shelduck, the SPA in which wildfowl declines were the most pronounced was the Mersey Estuary. Five of the six species for which trends could be generated had declines, and in four cases (wigeon, teal, pintail and great crested grebe) they were severe in the long-, medium- and short-terms. The remaining species, whooper swan, had increases in every timeframe, although even at their peak, numbers of this species were low. Sectors on the Mersey Estuary SPA that were particularly badly affected included Ince Bank (45420) and Manisty Bay (45419), which were important in terms of the proportion of the SPA's wildfowl population supported.

Wildfowl numbers on the Ribble and Alt Estuaries SPA were more stable. Of the seven species for which trends were produced, only a single one, Bewick's swan, had declines in all three timeframes. The other two species with declines (whooper swan and pintail) also had increases in different timeframes. Cormorant and common scoter had increases in the medium- and long-terms.

Waterfowl trends were only produced for a single species, cormorant, on the Mersey Narrows and North Wirral Foreshore pSPA. This species increased sharply over every timeframe. There were also increases over every timeframe for cormorant and common scoter on The Dee Estuary SPA. However, there were declines over the same period for Bewick's swan, teal and great crested grebe. Other wildfowl trends were more stable.

4.2.3 Gulls and terns

Increases over at least one timeframe were found for five of the seven gull and tern species counted across the Liverpool City Region SPAs. The only species with a decline was little gull, although the numbers involved were low and should be interpreted with caution. No gull trends were calculated for the Mersey Estuary SPA, as counts were not made. On the Ribble and Alt Estuaries SPA, trends were almost the same for those seen in the Liverpool City Region SPA, as this site accounted for most of the gulls supported. Gull and tern numbers on the Mersey Narrows and North Wirral Foreshore pSPA had increased sharply since the mid-2000s, giving substantial short-, medium- and long-term declines for all six species concerned. However, these increases were from a very low level, so trends should be interpreted with care. It is also worth noting that WeBS counts might not accurately reflect numbers of gulls using a site, as surveys are carried out during the day, when birds might have dispersed to the wider countryside and out to sea.

4.2.4 Summary

Of the 29 species for which trends were assessed across the Liverpool City Region SPAs, declines in numbers over at least one time period were detected in 19, and increases in nine. Declines were particularly severe in the waders and shelduck, and of the sites considered, the Mersey Estuary SPA was the worst affected for all species concerned. There was some indication that species were relocating from the Mersey Estuary SPA and the Ribble and Alt Estuaries SPA to the Mersey Narrows and North Wirral Foreshore pSPA, although the numbers at the latter, even after increases, were generally too small to compensate for declines at the former. On the Mersey Estuary SPA, the sectors at Manisty Bay (45419) and Ince Bank (45420) had the most severe declines. On the Ribble and Alt Estuaries SPA, the sectors encompassed by the Middle Marshes (57507) (see Figure 2.1.ii) saw declines in a number of species, especially for waders and shelduck.

Many of the declines in waterbird population numbers seen on the Liverpool City Region SPAs during the 15 winters to 2010/11 outpaced those found at a wider regional scale, indicating that in general pressures on waterbirds on the Liverpool City Region SPAs are greater those found throughout North West England. These additional site specific pressures could be addressed through management of the Liverpool City Region SPAs.

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