



BTO Research Report 451

**Newport Wetlands Reserve:
Assessment of the SPA Potential
of a Newly Established Wetland
2000/01 to 2005/06**

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EXECUTIVE SUMMARY

1. The Newport Wetlands Reserve was established in March 2000 as part of the compensation measures arising from the impoundment of Cardiff Bay. It was asked to meet two “bird targets” within five years of its establishment. Firstly, to ensure appropriate compensation to the scale of loss of the bird populations from Cardiff Bay, the reserve should support at least two species of wintering waterbird in nationally (GB) important numbers. Secondly, that within five years it would have the potential to qualify for Special Protection Area (SPA) status alongside or within an extended Severn Estuary SPA boundary.
2. This report analyses waterbird counts collected as part of the Wetland Bird Survey (WeBS) together with additional counts supplied by CCW with the aim of assessing whether either or both of these targets have been met.
3. Generally, in the UK, a site is considered to be nationally important for a given species when numbers exceed a level of at least 1% of the estimated national population – the 1% National Threshold. For wintering waterbirds, numbers on a site are generally quantified by taking the five-year average of the peak winter counts – the five-year peak mean.
4. Under this criterion and when using all available data, two waterbird species, Shoveler and Black-tailed Godwit, have attained the 1% National Threshold across the entire reserve during the first five years (winters 2000/01 to 2004/05) following establishment of the reserve. Black-tailed Godwit has also attained the 1% National Threshold on the newly created habitat alone.

	proportion of 1% National Threshold attained			
	new habitat inland of the sea wall		entire reserve	
	standard counts	all available data	standard counts	all available data
Shoveler	0.72	0.78	0.91	1.06
Black-tailed Godwit	0.79	1.09	0.93	1.19

5. Given that the reserve substantially comprises newly created habitat, it is possible that some species are still going through a period of colonisation. While generally, five-year peak means are used to determine if qualifying thresholds have been met, other methods may be acceptable when defensible. Accordingly, annual peak counts were also considered. Aside from the two species that have already surpassed their 1% National thresholds, the annual peaks of Shelduck and Little Grebe have come close to, but have not yet reached, this Threshold. The annual peak for Pintail exceeded the Threshold during the first winter but has declined sharply since.
6. Furthermore, significant upward trends ($P < 0.05$) in annual peak counts were found for five species. Thus if numbers do not reach carrying capacity (upper limit of numbers that can be supported by available resources) in the foreseeable future and these trends continue, then Little Grebe is likely to attain this Threshold in the next two years. None of the other species are likely to attain this level in the immediate future although the annual peak numbers of Gadwall and Wigeon have the potential to do so within the next six years if current trends were to be maintained.
7. It is reasonable to assume that, since it was established, the reserve has become a functional component of the Severn Estuary SPA. Consequently an extension of the boundaries of the Severn Estuary SPA to encompass the newly created habitats within the reserve boundary would be warranted.
8. Underpinning this, an argument could be made for the extension and re-notification for waterbird interest, of the existing Gwent Levels SSSIs complex, of which part of the reserve is already a component, to include all newly established habitat within the reserve inland of the seawall, based on numbers of Black-tailed Godwit, Shoveler and potentially Little Grebe.

CRYNODEB GWEITHREDOL

1. Sefydlwyd Gwarchodfa Wlyptir Casnewydd ym mis Mawrth 2000 fel rhan o fesurau iawndal a oedd yn deillio o Gronni Bae Caerdydd. Gofynnwyd iddi gyflawni dau “darged adar” o fewn pum mlynedd i’w sefydlu. Yn gyntaf, er mwyn sicrhau iawndal priodol yn unol â cholledion y poblogaethau adar o Fae Caerdydd, dylai’r warchodfa gynnal o leiaf ddwy rywogaeth o adar dŵr sy’n gaeafu mewn niferoedd sy’n bwysig yn genedlaethol (Prydain). Yn ail, y byddai, o fewn pum mlynedd, â’r potensial i fod yn gymwys ar gyfer statws Ardal Gwarchodaeth Arbennig (AGA) wrth ymyl neu oddi mewn i ffin AGA Aber Hafren estynedig.
2. Mae’r adroddiad hwn yn dadansoddi cyfrifiadau o adar dŵr wedi’u casglu fel rhan o’r Arolwg Adar Gwlyptir (WeBS) ynghyd â chyfrifiadau ychwanegol wedi’u cyflenwi gan Gyngor Cefn Gwlad Cymru gyda’r nod o asesu a gafodd y naill neu’r llall o’r targedau hyn eu cyflawni.
3. Yn gyffredinol, yn y DG, ystyrir bod safle yn bwysig yn genedlaethol ar gyfer rhywogaeth benodol pan fo’r niferoedd ar lefel sy’n 1% o leiaf o’r boblogaeth genedlaethol amcangyfrifedig – y Trothwy Cenedlaethol o 1%. Ar gyfer adar dŵr sy’n gaeafu, bydd y niferoedd ar safle’n cael eu mesur fel rheol trwy gymryd y cyfartaledd pum-mlynedd o’r cyfrifiadau gaeaf brig – y cymedr brig pum-mlynedd.
4. Yn unol â’r maen prawf hwn a thrwy ddefnyddio’r holl ddata sydd ar gael, mae dwy rywogaeth o adar dŵr, sef yr Hwyaden Lydanbig a’r Rhostog Gynffonddu, wedi cyrraedd y Trothwy Cenedlaethol o 1% ar draws yr holl warchodfa yn ystod y pum gaeaf cyntaf (gaeafau 2000/01 - 2004/05) yn dilyn sefydlu’r warchodfa. Mae’r Rhostog Gynffonddu hefyd wedi cyrraedd y Trothwy Cenedlaethol yn y cynefin newydd a grëwyd yn unig.

	cyfran o’r Trothwy Cenedlaethol o 1% a gyflawnwyd cynefin newydd tua’r tir o’r morglawdd			
	y warchodfa gyfan		y warchodfa gyfan	
	cyfrifiadau safonol	yr holl ddata sydd ar gael	cyfrifiadau safonol	yr holl ddata sydd ar gael
Hwyaden Lydanbig	0.72	0.78	0.91	1.06
Rhostog Gynffonddu	0.79	1.09	0.93	1.19

5. A chofio bod rhan helaeth o’r warchodfa’n cynnwys cynefin a grëwyd yn ddiweddar, mae’n bosibl fod rhai rhywogaethau’n dal i fynd trwy gyfnod o greu nythfeydd. Er bod cymedrau brig pum mlynedd yn cael eu defnyddio fel arfer i ddarganfod a gafodd y trothwyon cymhwysol eu cyflawni, gall y bydd dulliau eraill yn dderbyniol os oes modd eu cyfiawnhau. Felly, cafodd cyfrifiadau brig blynyddol eu hystyried yn ogystal. Ar wahân i’r ddwy rywogaeth sydd eisoes wedi rhagori ar eu Trothwyon Cenedlaethol o 1%, mae brigau blynyddol Hwyaden Yr Eithin a’r Wyach Fach bron â chyrraedd y Trothwy hwn. Roedd brig blynyddol yr Hwyaden Lostfain yn uwch na’r Trothwy yn ystod y gaeaf cyntaf ond mae wedi dirywio’n sydyn oddi ar hynny.
6. Ar ben hyn, darganfuwyd tueddiadau sylweddol tuag i fyny ($P < 0.05$) yn y cyfrifiadau brig blynyddol ar gyfer pum rhywogaeth. Felly, os nad yw’r niferoedd yn cyrraedd y terfyn uchaf y gellir ei gynnal gan yr adnoddau sydd ar gael yn y dyfodol rhagweladwy ac os yw’r tueddiadau hyn yn parhau, yna mae’n debygol y bydd yr Wyach Fach yn cyrraedd y Trothwy hwn yn ystod y ddwy flynedd nesaf. Nid yw’r un o’r rhywogaethau eraill yn debygol o gyrraedd y lefel hwn yn y dyfodol agos er y gallai’r Hwyaden Lwyd a’r Chwiwell wneud hynny â’u niferoedd brig blynyddol yn ystod y chwe blynedd nesaf os cynhelir y tueddiadau presennol.
7. Mae’n rhesymol tybio fod y warchodfa, ers ei sefydlu, wedi dod yn elfen weithredol o AGA Aber Hafren. Felly, gellid cyfiawnhau ymestyn ffiniau AGA Aber Hafren i gynnwys y cynefinoedd newydd oddi mewn i ffin y warchodfa.
8. I danategu hyn, gellid dadlau o blaid ymestyn ac ail-hysbysu SoDdGAau Gwastadeddau Gwent, sydd eisoes yn cynnwys rhan o’r warchodfa, er mwyn cynnwys yr holl gynefinoedd newydd yn y warchodfa sydd tua’r tir o’r morglawdd, yn seiliedig ar niferoedd y Rhostog Gynffonddu, yr Hwyaden Lydanbig a’r Wyach Fach o bosibl.

1. INTRODUCTION

The Newport Wetlands Reserve extends over 438 hectares and is located alongside and partly within the Severn Estuary Site of Special Scientific Interest (SSSI), Wetland of International Importance (Ramsar site), Special Protection Area (SPA) and possible Special Area of Conservation (pSAC). Part of the Reserve is a component of the Gwent Levels SSSI complex, although not currently for any notified bird interest. The Newport Wetlands Reserve was established in March 2000 as part of the compensation measures arising from the impoundment of Cardiff Bay. The UK government set two “bird targets” to be achieved within five years of its establishment. Firstly, to ensure appropriate compensation to the scale of loss of the bird populations from Cardiff Bay, the reserve should support at least two species of wintering waterbird in nationally (GB) important numbers. Secondly, that within five years it would have the potential to qualify for SPA Status alongside or within an extended Severn Estuary SPA boundary.

1.1 Objectives

This report aims to assess whether, during the first five years since the Newport Wetlands Reserve was established, these targets have been achieved. Its two major objectives are therefore:

1. To determine whether the reserve has met its first target of supporting two species of wintering waterbird in nationally (GB) important numbers by the winter of 2004/05.
2. To determine whether the newly established habitat within the reserve has met its second target of potentially qualifying for Special Protection Area Status, alongside or within an extended Severn Estuary SPA boundary.

1.2 Interpretation of objectives

There are well defined guidelines for assessing whether numbers of birds using a site warrant designation. The Ramsar Convention (Ramsar 1988) has established site selection criteria; under its Criterion 5, a site can qualify as internationally important if it supports 20,000 or more waterbirds and its Criterion 6 states that “...a wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.” The waterbird population estimates for the East Atlantic Flyway or NW Europe collated by Wetlands International (Stroud *et al.* 2004) have been used to generate “1% thresholds” for individuals of a biogeographic population of a species or subspecies of waterbird (Atkinson-Willes *et al.* 1982, Rose & Stroud 1994). To attain International Importance for a species and thus protection as a Ramsar site under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention: Ramsar 1988) or as a SPA under the EC Directive 79/409 on the Conservation of Wild Birds (the “Birds Directive”) a site must “regularly support” a sufficient number of waterbirds to meet these 1% thresholds. A SPA may also be designated for supporting EC Annex 1 bird species in numbers that are deemed nationally important, i.e. in this case, numbers that surpass the 1% thresholds generated for Great Britain. National 1% thresholds are also used to help select SSSIs that have statutory protection under the provisions of the Wildlife and Countryside Act 1981 (Nature Conservancy Council 1989). These National thresholds are revised periodically to ensure that the selection of new SSSIs is based on the most current and complete waterbird population estimates. National and international population estimates are revised every three and nine years respectively. The most recent revision of the national population estimates (Kershaw & Cranswick 2003; Rehfish *et al.* 2003), upon which revised National thresholds have been set (Baker *et al.* 2006), were based on the five-year January average from the winter 1994/95 to winter 1998/99. With respect to Newport Wetlands, this led to the target numbers being revised during the five year establishment period. This report assesses waterbird numbers against the current thresholds as it would be with reference to these that new site designations would be proposed.

1.2.1 Objective One: did the reserve meet its target of supporting two species of wintering waterbird in nationally (GB) important numbers by the winter of 2004/05

Ostensibly, objective one is relatively straightforward to assess in that the numbers of each species overwintering on the Newport Wetlands Reserve simply have to be compared against their respective National 1% thresholds for qualification (Baker *et al.* 2006).

In the United Kingdom, counts collated by the Wetland Bird Survey (WeBS) form the primary data source used to determine qualifying species of non-breeding waterbirds during site assessments for SPA or SSSI designation. The assessment of the number of individuals that a site regularly supports is normally defined as being the mean of the most recent five years' peak annual counts, the "five-year peak mean" (Collier *et al.* 2005) and it is this five-year peak mean that is generally used for site assessments of non-breeding waterbirds (Stroud *et al.* 2001).

Although the approach of using five-year peak means has been applied to this assessment of the Newport Wetlands Reserve, its use alone does not adequately reflect the status of species on the site because the reserve was established as recently as 2000. It is reasonable to expect that such newly created habitat will not be immediately colonised by large numbers of waterbirds; some species may take time to discover the new habitat, or else a period of time may be necessary to allow habitat to develop and become attractive to them. Also, some species may colonise during the early stages of habitat development and then abandon the area as the habitat becomes fully mature. In a study of the first five years of the Orplands and Tollesbury managed realignment, Dunlin *Calidris alpina* and Redshank *Tringa totanus* that prey on the early colonizing *Nereis* and *Hydrobia* were most common during the first two years, whereas Knot *Calidris canutus* used the site after four years upon the appearance of a favoured prey species, *Macoma balthica* (Atkinson *et al.* 2004). Man-made lagoons created for wildlife are well known to attract differing wildlife according to their maturity (*e.g.* Rehfish 1994). It is, therefore, quite likely that the site may not yet have reached its maximum usage for some species or that near maximum numbers may only have been reached in the last few years. In either case, the five-year peak mean would underestimate the number of individuals that the reserve is likely to hold when fully mature.

It is therefore also appropriate, as an extension of Objective 1 to consider the current trends for species overwintering on the Newport Wetlands Reserve to establish whether numbers are still increasing and if so whether they have attained the National (or International) 1% Threshold over the last few years even though the five-year peak mean may be below those levels. If not, is it reasonable to expect that they will attain those levels in the foreseeable future?

1.2.2 Objective Two: has the reserve met its second target of potentially qualifying for Special Protection Area Status, alongside or within an extended Severn Estuary SPA boundary

The reserve is immediately adjacent to the Severn Estuary SPA. It is therefore reasonable to assume that, since it was established, the reserve has become a functional component of the Severn Estuary SPA. Consequently, it would be appropriate to incorporate the reserve in an extended Severn Estuary SPA boundary. It is generally UK policy that areas classified as SPAs are first notified as SSSIs (or as Areas of Special Scientific Interest in Northern Ireland) as this provides the legal underpinning for SPAs in domestic legislation. It is therefore also appropriate, as an extension of Objective 2, to consider whether numbers of waterbirds on the newly established habitat inland of the sea wall warrants the extension and re-notification for waterbird interest of the Gwent Levels SSSI complex to include this new habitat.

2. METHODS

2.1 Waterbird data

Two sources of over-wintering waterbird data exist for the Newport Wetlands Reserve including data gathered as part of the monthly 'WeBS Core Counts' and also 'extra counts' carried out on the reserve by CCW. Monthly WeBS Core Counts of the Newport Wetlands Reserve are themselves derived from that subset of those CCW counts made during the standard WeBS count period.

2.1.1 Time series and count frequency

The standard WeBS counts are coordinated to maximise synchronicity and to correspond to times of high-water spring-tides. WeBS also collates additional counts but it is not normal WeBS practise to consider these in standard analyses because they tend to be opportunistic, occurring in response to unique events such as severe weather or to casual observations of unexpectedly high bird numbers. As such using them can lead to over-estimates of typical waterbird numbers. However, the additional counts available from CCW were derived substantially from an increased monitoring effort, especially in the earlier years, rather than opportunistically and are thus less likely to suffer from this bias. Consequently, these counts, available for the period of January 2000 to June 2006 have been used here.

2.1.2 Geographic extents

The Newport Wetlands Reserve is located partly within both the Severn Estuary SPA and the Gwent Levels SSSI complex (Figure 2.1.2.i). Four WeBS count units overlap substantially with the Newport Wetlands Reserve, three behind the sea-wall and one encompassing the foreshore (Figure 2.1.2.ii). Counts provided by CCW for this analysis are available at a much finer spatial resolution (Figure 2.1.2.iii) than those supplied to WeBS. Because the WeBS counts are themselves derived by summation of those finer resolution data, in practise WeBS count unit boundaries correspond to CCW count unit boundaries. However, there are some CCW count units within the reserve that are not incorporated into the WeBS count units (Figure 2.1.2.iv) as they are essentially unaltered habitat rarely frequented by waterbirds (Tony Pickup pers. comm.). Seaward of the sea wall, the match between the 'Nash Foreshore and Goldcliff Pill' WeBS count unit and the CCW Newport Wetlands Reserve is less good as some parts of the former lie outwith the boundary of the latter and *vice versa* (Figure 2.1.2.iv). The Nash Foreshore WeBS counts comprise the CCW counts for the Uskmouth Foreshore, Saltmarsh Foreshore, Goldcliff Point and Goldcliff Pill CCW count units. As these counts are coordinated to coincide with high-water on spring-tides, it is reasonable to assume most waders, wildfowl, Coot *Fulica atra* and Little Grebe *Tachybaptus ruficollis* will be above the high-water spring tide water mark and so within the CCW count units. However, following standard WeBS procedure, in which the seaward extent of intertidal WeBS count units is also surveyed so as to accommodate seaduck, cormorants, divers and grebes (other than Little Grebe), birds offshore from the reserve are included in the counts made by CCW (Kevin Dupé pers. comm.). Thus although differences between data held by WeBS and those held by CCW are expected to be slight the latter have been used where available to ensure a precise match to the reserve boundaries.

The differences between extent of coverage represented in the WeBS database maintained by the BTO and the reserve database maintained by CCW should be taken into consideration in relation to the one analysis presented here that is based solely on data held by WeBS (analysis of numbers on the Nash Foreshore 1995/96 to 1999/2000) and also if comparisons were to be made between the analyses reported here and others based solely on data held by WeBS that may be presented elsewhere.

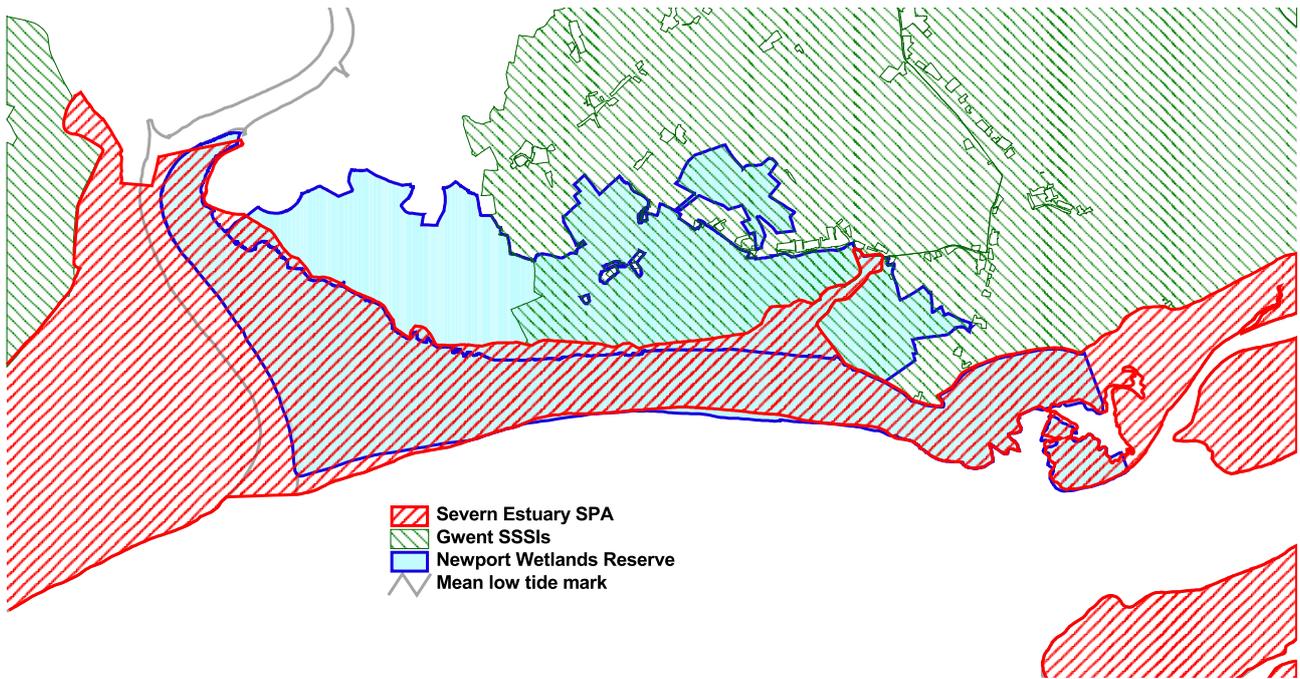


Figure 2.1.2.i: Newport Wetlands Reserve in relation to existing SPA and SSSI boundaries.
Both SSSI and SPA boundaries extend beyond the extent of this figure.

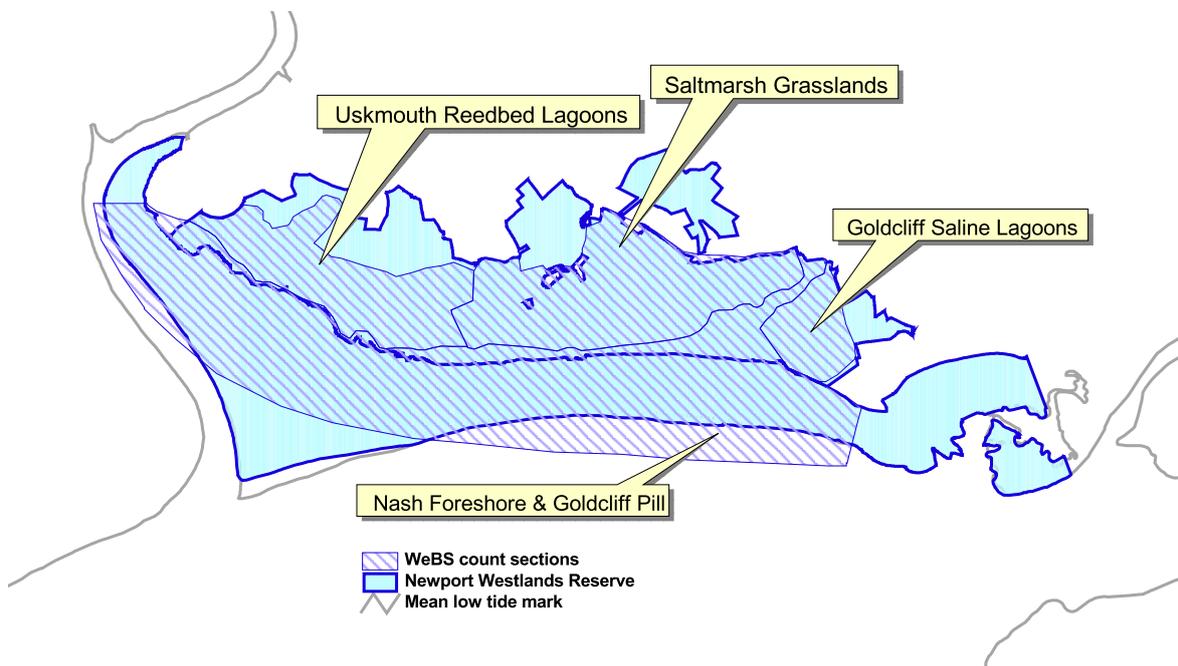


Figure 2.1.2.ii: Wetland Bird Survey count units coincident with the Newport Wetlands Reserve.

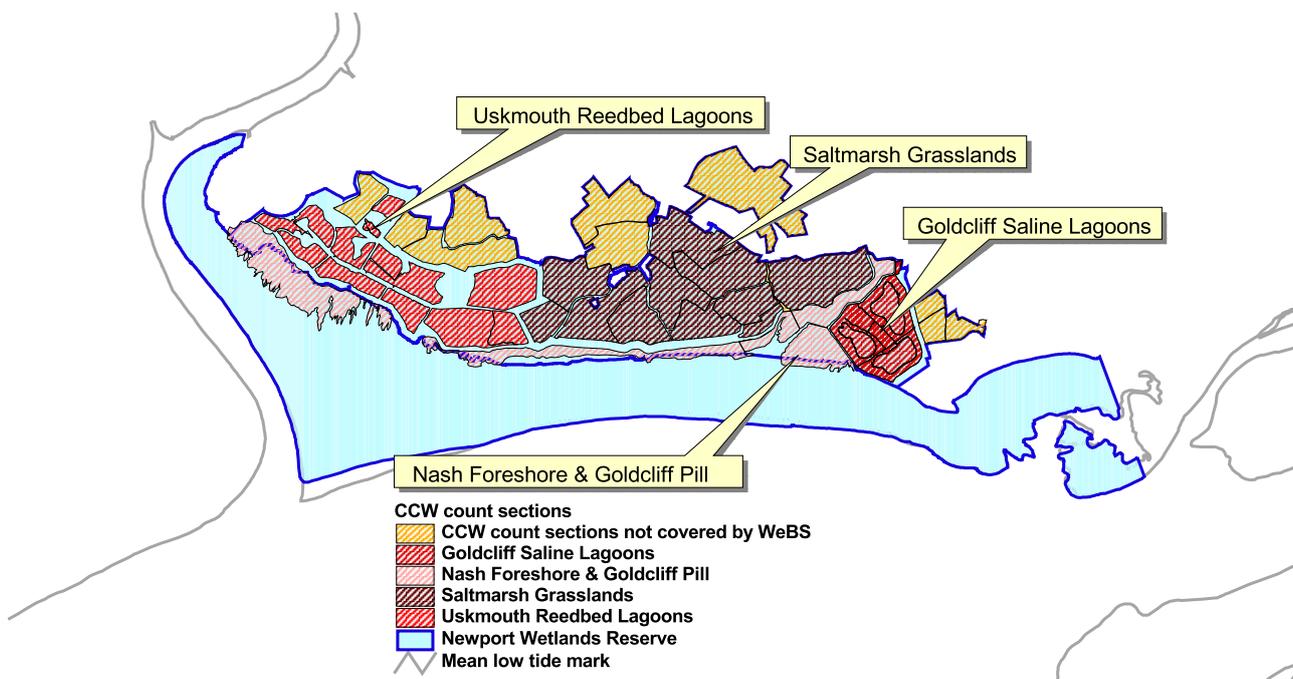


Figure 2.1.2.iii: CCW count units coincident with the Newport Wetlands Reserve.
Labels refer to the WeBS count units to which the CCW count units can be assigned.

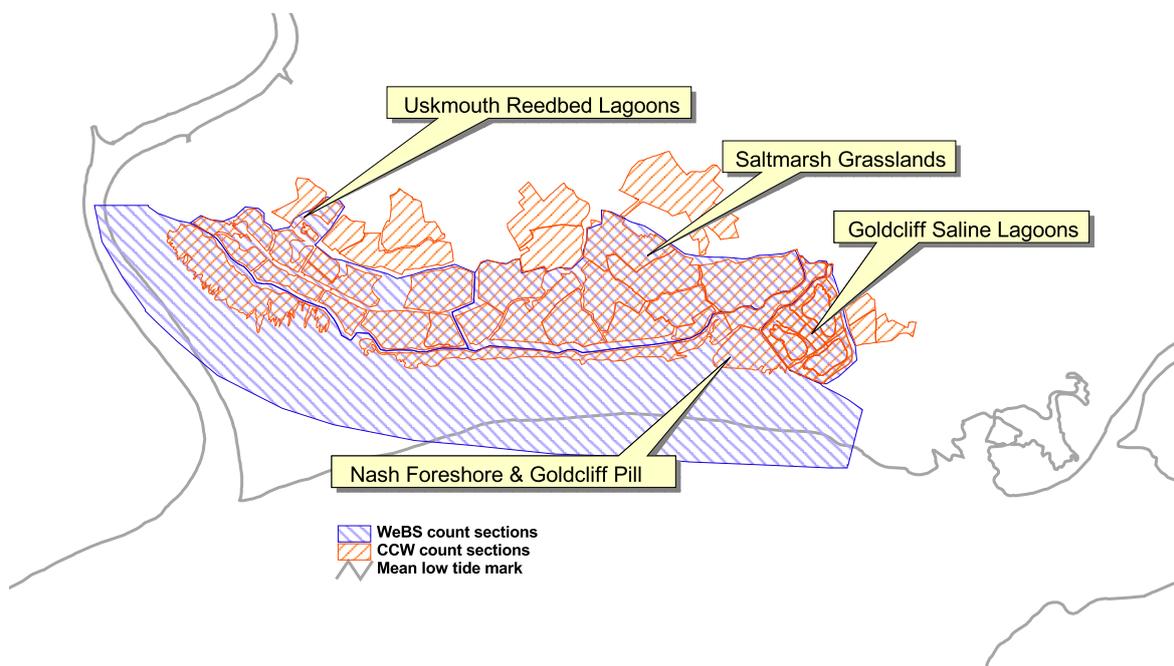


Figure 2.1.2.iv: Details of coincidence between WeBS count units and CCW count units.
Labels refer to the WeBS count units.

2.2 Waterbird numbers on Newport Wetlands Reserve

2.2.1 Assessment of five-year peak means

Following standard WeBS procedure (Collier *et al.* 2005), the five-year peak mean count of each species of waterbird present on the reserve has been calculated. In each case, the five-year peak mean count has been compared to its 1% National (GB) Threshold (Table 2.2.1.i). Five-year peak means have been calculated separately for 'Winter' (November to March), 'Spring passage' (April to June) and 'Autumn passage' (July to October) in common with standard WeBS reporting. Where the Threshold is equalled or exceeded by the five-year peak mean, the relevant species is deemed to be present in nationally important numbers. Note that for some species the 1% National thresholds for winter and passage periods may differ. Current thresholds have been used throughout this report as it would be with reference to these that new site designations would be proposed.

Species	1% National Threshold	1% International Threshold	Pre-revision National Threshold
Mute Swan	380	380	260
Shelduck	782	3,000	750
Wigeon	4,060	15,000	2,800
Gadwall	171	600	80
Teal	1,920	4,000	1,400
Mallard	3,520	20,000	5,000
Pintail	279	600	280
Shoveler	148	400	100
Pochard	595	3,500	440
Tufted Duck	901	12,000	600
Little Grebe	78	3,400	50
Coot	1,750	17,500	1,100
Oystercatcher	3200	3,200	3,600
Ringed Plover	winter 330; passage 300	730	winter 290; passage 300
Grey Plover	530	2,500	430
Lapwing	20,000	20,000	20,000
Knot	2,800	4,500	2,900
Dunlin	winter 5,600; passage 2,000	13,300	winter 5,300; passage 2,000
Black-tailed Godwit	150	350	70 (international 700)
Curlew	1,500	4,200	1,200
Redshank	1,200	1,300	winter 1,100; passage 1,200

Table 2.2.1.i: 1% National and International thresholds, against which waterbird numbers are compared. (from Collier *et al.* 2005). Pre-revision values for National Thresholds are also given (from Pollitt *et al.* 2003). Only species relevant to the subsequent analyses contained within this report are included.

In total, five separate analyses were undertaken (Table 2.2.1.ii). Using data for the winters 2000/2001 to 2004/05, analyses were undertaken for both the reserve inland of the sea wall (i.e. the new habitat) and for the entire reserve (including pre-existing intertidal habitat within the Severn Estuary SPA). There is always a risk when using non-standard counts that those counts have been made in response to events such as particularly high numbers being present. This can lead to misinterpretation where those high numbers are unsustainable. Consequently, separate assessments are made for each of the geographic extents considered. Firstly, a conservative approach that restricts the data to those collected during standard WeBS counts and secondly, an approach that includes all available data.

Although we have made assessments of the entire reserve it must be remembered that had the reserve not been established then waterbirds would still be present on the Nash Foreshore and thus these analyses will over-estimate the benefits of the creation of new habitat and the establishment of the reserve. However, because of the immediate proximity of the newly created habitat and management initiatives implemented on the foreshore that may, for example, have reduced disturbance, the foreshore may have become more attractive to waterbirds. If this is indeed the case, then the analyses of the reserve inland of the sea wall will underestimate the benefits of the reserve to waterbirds. Consequently, for species where substantial

differences in the numbers of birds are found as a result of inclusion of the foreshore in the analyses it is prudent to consider numbers that might have been expected to have occurred had the reserve not been established. The best available estimate of the number of birds that might otherwise be using the Nash Foreshore is the five-year peak mean for this area prior to the establishment of the reserve. This analysis was also undertaken to provide baseline five-year peak means for the Nash Foreshore. We do not use these values to formally adjust the results for the entire reserve as to do so would not take account of existing trends across the Severn Estuary, which might themselves be affected by interactions between the new and established habitats, an approach that would require a much more sophisticated and somewhat speculative analysis.

Geographic extent	Purpose	Time span	Data source	Comments
Reserve inland of the sea wall	Assessment of numbers on newly created habitat for the purpose of possible extension and re-notification for waterbird interest of the Gwent Levels SSSI complex	2000/01 to 2004/05	Standard WeBS counts	Five year assessment period.
		2000/01 to 2004/05	All available counts	Five year assessment period.
Entire reserve	Assessment of numbers on habitat owned or leased by CCW in relation to targets set by the UK government	2000/01 to 2004/05	Standard WeBS counts	Five year assessment period.
		2000/01 to 2004/05	All available counts	Five year assessment period.
Nash Foreshore	To provide baseline numbers for the Nash Foreshore based on the five years immediately prior to establishment of the reserve	1995/96 to 1999/2000	Standard WeBS counts	Best estimate of numbers that might have been present on the foreshore area had the reserve not been established

Table 2.2.1.ii: Summary of separate analyses undertaken of five-year peak means.

Analyses only included species of waterbird recorded on the reserve inland of the sea wall during counts spanning the winters 2000/01 to 2004/05 inclusive (see table 2.2.1.i).

2.2.2 Assessment of trends

Given that the Newport Wetlands Reserve comprised newly established habitat it is possible that waterbird numbers have either yet to attain their ultimate stable levels, or else, while they may have done so in the most recent winters, they were well below the current level in the earlier years such that the five-year peak mean is lower than the numbers now using the reserve. Consequently, trends in the annual peak counts, calculated as the maximum count obtained between July of one year and June of the following year (the winter-centric WeBS count year), since the establishment of the reserve have been considered to determine whether there is any evidence of an upward (or downward) trend in waterbird numbers.

In order to focus attention on ‘key’ species, we only considered those species shown by the preceding analysis (see 2.2.1) to occur in reasonably numbers, arbitrarily taken as 20% of the 1% National Threshold (winter or passage), across the entire reserve. During the preceding analyses it became apparent that the

additional counts were having a marked effect on the annual peaks in the first two years but thereafter the annual peaks generally corresponded to standard WeBS counts. This was largely due to changing effort through time in undertaking additional counts across large parts of the reserve during these first two years, with mainly casual extra records in later years. Unlike the more formalised additional effort in the earlier years, these casual records tend to cover only a small fraction of the reserve on a given day and thus have relatively little impact on reserve totals. Consequently, the trend analyses only uses data collected during the standard WeBS counts, thus ensuring between-year data are comparable.

Linear trend lines were fitted through the annual peak counts using the Thiel-Sen robust estimate of the trend and the Mann-Kendall test for significance (Thiel 1950, Sen 1968). Unlike parametric regression procedures, this non-parametric technique is not sensitive to outliers, especially important given the short time series available. It is considered that fitting and extrapolating from other than linear models is not defensible at this time given the short time series available. Where the Threshold is equalled or exceeded by a significant fitted trend, the relevant species is deemed to have attained nationally important numbers. However, it must be borne in mind that it will not be apparent for several winters whether these numbers will be maintained on a regular basis sufficient for the five-year peak mean to exceed the 1% National Threshold.

2.2.3 Extrapolation of established trends

Species for which there is a positive trend in numbers but that have not yet attained the 1% National Threshold in any one year, may do so in the foreseeable future if those trends are maintained. Species that have this potential have been identified by extrapolation of the linear trend into the foreseeable future, the winter of 2012/13, doubling the current period since the reserve was established, being taken as the arbitrary cut-off. However, these extrapolations make no allowance for carrying capacity (a concept taken to mean the maximum number of an organism that can be held in an area due to limitations of resources such as food, roosting area, *etc.*) which could prevent the 1% National Threshold being attained for a given species. Furthermore, National thresholds are revised periodically and thus may change before current trends intercept current thresholds.

3. RESULTS

3.1 Waterbird numbers on Newport Wetlands Reserve

3.1.1 Five-year Peak Means

Five-year peak means have been calculated separately for 'Winter' (November to March), 'Spring passage' (April to June) and 'Autumn passage' (July to October) in common with standard WeBS reporting. **Because bird counts may be many orders of magnitude smaller than population estimates, the values presented in this report refer to the percentage of the Threshold rather than the percentage of the national population estimate.** This has the presentational advantage of avoiding the necessity of tabulating values to many decimal places to avoid rounding errors equating to many individuals. This is also in accord with the technicality that the comparison of the numbers of waterbirds on the reserve is being made with reference to the National 1% Threshold (a statement of national importance providing a precise value against which numbers can be compared) rather than to an estimate of 1% of the relevant population (a value that is subject to a degree of uncertainty and speculation). Also higher or lower thresholds may be set for passage periods, when turnover of individuals is high, and these values may not therefore equate to 1% of the national population.

Thus, for example, a value of 50% indicates that the five year peak mean count is half that required for this area to qualify as nationally or internationally important as appropriate for the species in question. A value of 100% or higher indicates that the numbers of the species in question have reached the Threshold.

3.1.1.1 Reserve inland of the sea wall

For newly created habitat, inland of the sea wall, the five-year peak mean calculated using only data from standard WeBS counts (Table 3.1.1.1.i) does not exceed the National Threshold for any species. However, when additional counts are also considered the five-year peak mean for Black-tailed Godwit *Limosa limosa* exceeded its National Threshold (109%) for both the winter and the autumn passage period (Table 3.1.1.1.ii).

The winter five-year peak means of several other species are worthy of note, arbitrarily in having surpassed 30% of the 1% National Threshold, including those of Shoveler *Anas clypeata* (WeBS 72%; all available 78%), Shelduck *Tadorna tadorna* (WeBS 34%; all available 40%), Gadwall *Anas strepera* (WeBS 30%, all available 36%) and Pintail *Anas acuta* (WeBS 32%, all available 35%), and for the autumn passage period, Little Grebe (WeBS 33% all available 42%).

Species	Spring <i>cf</i> National Threshold	Autumn <i>cf</i> National Threshold	Winter <i>cf</i> National Threshold	Spring <i>cf</i> International Threshold	Autumn <i>cf</i> International Threshold	Winter <i>cf</i> International Threshold	Spring 5yr peak mean	Autumn 5yr peak mean	Winter 5yr peak mean
Mute Swan	7%	15%	13%	7%	14%	13%	28	55	48
Shelduck	14%	2%	34%	4%	1%	9%	111	19	268
Wigeon	0%	0%	14%	0%	0%	4%	6	13	567
Gadwall	10%	5%	30%	3%	2%	9%	17	9	51
Teal	3%	11%	11%	1%	5%	5%	56	208	212
Mallard	4%	2%	5%	1%	0%	1%	124	60	175
Pintail	1%	4%	32%	1%	2%	15%	4	11	90
Shoveler	5%	22%	72%	2%	8%	27%	7	32	106
Pochard	1%	1%	5%	0%	0%	1%	3	4	30
Tufted Duck	6%	3%	7%	0%	0%	1%	52	25	67
Little Grebe	19%	33%	12%	0%	1%	0%	15	26	9
Coot	5%	6%	8%	0%	1%	1%	82	106	136
Oystercatcher	0%	1%	0%	0%	0%	0%	11	19	8
Ringed Plover	9%	23%	2%	4%	10%	1%	27	70	7
Grey Plover	0%	6%	3%	0%	1%	1%	2	32	17
Lapwing	0%	0%	3%	0%	0%	3%	67	28	636
Knot	0%	8%	8%	0%	5%	5%	6	224	227
Dunlin	15%	14%	5%	2%	2%	2%	298	278	296
Black-tailed Godwit	35%	76%	79%	15%	33%	34%	52	114	118
Curlew	1%	14%	9%	0%	5%	3%	15	206	133
Redshank	3%	1%	2%	3%	1%	2%	41	8	24

Table 3.1.1.1.i: Five year summary for 2000/01 to 2004/05 inclusive, for the Newport Wetlands Reserve inland of the sea wall, based on data collected during standard WeBS counts. The National and International Importance of this area for each species are devolved by season. Figures given indicate the percentage of the relevant 1% Threshold represented by the five year mean peak count (also given) for the species in question. Rare, infrequent, vagrant and naturalised species are excluded as are species not considered well monitored by WeBS methodology (e.g. Snipe). For economy of space, frequently occurring species have also been excluded where their five-year peak mean values are all in single figures. Note that, for some species (e.g. Dunlin), different 1% National thresholds may apply to the winter and passage periods.

Species	Spring <i>cf</i> National Threshold	Autumn <i>cf</i> National Threshold	Winter <i>cf</i> National Threshold	Spring <i>cf</i> International Threshold	Autumn <i>cf</i> International Threshold	Winter <i>cf</i> International Threshold	Spring 5yr peak mean	Autumn 5yr peak mean	Winter 5yr peak mean
Mute Swan	10%	15%	16%	10%	14%	16%	37	55	60
Shelduck	13%	4%	40%	3%	1%	10%	104	29	311
Wigeon	0%	3%	22%	0%	1%	6%	5	124	880
Gadwall	11%	10%	36%	3%	3%	10%	18	17	62
Teal	3%	16%	23%	1%	8%	11%	56	303	439
Mallard	3%	8%	6%	1%	1%	1%	114	264	216
Pintail	2%	7%	35%	1%	3%	16%	6	19	97
Shoveler	11%	27%	78%	4%	10%	29%	17	40	115
Pochard	1%	1%	6%	0%	0%	1%	3	4	35
Tufted Duck	6%	3%	9%	0%	0%	1%	53	29	81
Little Grebe	21%	42%	15%	0%	1%	0%	16	33	12
Coot	5%	9%	9%	0%	1%	1%	86	150	157
Oystercatcher	0%	1%	0%	0%	0%	0%	13	32	8
Ringed Plover	13%	24%	5%	5%	10%	2%	38	72	16
Grey Plover	0%	7%	2%	0%	2%	0%	2	38	10
Lapwing	0%	0%	4%	0%	0%	4%	63	64	758
Knot	0%	8%	8%	0%	5%	5%	5	231	227
Dunlin	13%	30%	9%	2%	5%	4%	265	600	498
Black-tailed Godwit	33%	109%	109%	14%	47%	47%	50	163	163
Curlew	2%	20%	11%	1%	7%	4%	27	305	159
Redshank	3%	2%	3%	3%	2%	3%	39	23	36

Table 3.1.1.1.ii: Five year summary, for 2000/01 to 2004/05 inclusive, for the Newport Wetlands Reserve inland of the sea wall, based on all available data. The National and International Importance of this area for each species are devolved by season. Figures given indicate the percentage of the relevant 1% Threshold represented by the five year mean peak count (also given) for the species in question. Rare, infrequent, vagrant and naturalised species are excluded as are species not considered well monitored by WeBS methodology (e.g. Snipe). For economy of space, frequently occurring species have also been excluded where their five-year peak mean values are all in single figures. Note that, for some species (e.g. Dunlin), different 1% National thresholds may apply to the winter and passage periods.

3.1.1.2 Entire reserve

For the entire reserve, the five-year peak mean calculated using only data from standard WeBS counts (Table 3.1.1.2.i) does not exceed the National Threshold for any species. However, when additional counts are also considered the five-year peak mean for Shoveler (106%) and Black-tailed Godwit (passage 119%, winter 116%) exceeded their 1% National Threshold for winter and for the latter species also the autumn passage period (Table 3.1.1.2.ii).

The winter five-year peak means of several other species are worthy of note including those of Shelduck *Tadorna tadorna* (WeBS 43%; all available 57%), Wigeon *Anas penelope* (WeBS 28%, all available 32%), Gadwall (WeBS 30%, all available 37%), Teal *Anas crecca* (WeBS 32%, all available 39%), Pintail (WeBS 78%, all available 90%) and Dunlin *Calidris alpina* (WeBS 36%, all available 48%). The five-year peak means during the autumn passage period are noteworthy for Little Grebe (WeBS 33% all available 42%) and Dunlin (all available 30%).

Prior to the establishment of the reserve the five-year peak mean (1995/96 to 1999/2000) for Dunlin exceeded the 1% National Threshold (125%). In the context of the results given above, the relatively small values for Shoveler (7%) and Black-tailed Godwit (1%) are also worthy of note.

Species	Spring <i>cf</i> National Threshold	Autumn <i>cf</i> National Threshold	Winter <i>cf</i> National Threshold	Spring <i>cf</i> International Threshold	Autumn <i>cf</i> International Threshold	Winter <i>cf</i> International Threshold	Spring 5yr peak mean	Autumn 5yr peak mean	Winter 5yr peak mean
Mute Swan	8%	15%	13%	8%	15%	13%	30	57	49
Shelduck	16%	6%	43%	4%	2%	11%	126	46	339
Wigeon	0%	9%	28%	0%	3%	8%	19	380	1140
Gadwall	11%	11%	30%	3%	3%	9%	18	18	51
Teal	4%	13%	32%	2%	6%	16%	83	240	622
Mallard	7%	16%	13%	1%	3%	2%	257	563	464
Pintail	3%	8%	78%	1%	4%	36%	8	22	218
Shoveler	5%	22%	91%	2%	8%	34%	7	33	134
Pochard	1%	1%	5%	0%	0%	1%	3	4	30
Tufted Duck	6%	3%	7%	0%	0%	1%	52	25	67
Little Grebe	19%	33%	12%	0%	1%	0%	15	26	9
Coot	5%	6%	8%	0%	1%	1%	82	106	136
Oystercatcher	1%	1%	1%	0%	0%	0%	30	41	32
Ringed Plover	9%	23%	2%	4%	10%	1%	28	70	7
Grey Plover	0%	4%	12%	0%	1%	3%	2	23	65
Lapwing	0%	0%	3%	0%	0%	3%	67	28	636
Knot	0%	7%	10%	0%	4%	6%	9	201	279
Dunlin	16%	18%	36%	2%	3%	15%	314	353	2014
Black-tailed Godwit	35%	76%	93%	15%	33%	40%	52	114	139
Curlew	3%	19%	20%	1%	7%	7%	50	288	297
Redshank	4%	2%	4%	3%	1%	4%	43	18	47
Turnstone	0%	1%	3%	0%	0%	2%	2	3	15

Table 3.1.1.2.i: Five year summary for 2000/01 to 2004/05 inclusive, for the entire Newport Wetlands Reserve, based on data collected during standard WeBS counts. The National and International Importance of this area for each species are devolved by season. Figures given indicate the percentage of the relevant 1% Threshold represented by the five year mean peak count (also given) for the species in question. Rare, infrequent, vagrant and naturalised species are excluded as are species not considered well monitored by WeBS methodology (e.g. Snipe). For economy of space, frequently occurring species have also been excluded where their five-year peak mean values are all in single figures. Note that, for some species (e.g. Dunlin), different 1% National thresholds may apply to the winter and passage periods.

Species	Spring <i>cf</i> National Threshold	Autumn <i>cf</i> National Threshold	Winter <i>cf</i> National Threshold	Spring <i>cf</i> International Threshold	Autumn <i>cf</i> International Threshold	Winter <i>cf</i> International Threshold	Spring 5yr peak mean	Autumn 5yr peak mean	Winter 5yr peak mean
Mute Swan	10%	15%	16%	10%	15%	16%	38	57	60
Shelduck	15%	8%	57%	4%	2%	15%	119	59	447
Wigeon	0%	13%	32%	0%	3%	9%	15	516	1313
Gadwall	11%	11%	37%	3%	3%	11%	19	19	63
Teal	4%	19%	39%	2%	9%	19%	71	373	757
Mallard	6%	18%	14%	1%	3%	2%	226	621	498
Pintail	3%	10%	90%	1%	5%	42%	8	27	252
Shoveler	11%	28%	106%	4%	10%	39%	17	41	157
Pochard	1%	1%	6%	0%	0%	1%	3	4	35
Tufted Duck	6%	3%	9%	0%	0%	1%	53	29	81
Little Grebe	21%	42%	15%	0%	1%	0%	16	33	12
Coot	5%	9%	9%	0%	1%	1%	86	150	157
Oystercatcher	1%	1%	1%	0%	0%	0%	30	44	32
Ringed Plover	13%	24%	5%	5%	10%	2%	38	72	16
Grey Plover	0%	8%	15%	0%	2%	3%	2	45	78
Lapwing	0%	0%	4%	0%	0%	4%	68	64	758
Knot	0%	8%	6%	0%	5%	4%	9	231	170
Dunlin	14%	30%	48%	2%	5%	20%	277	600	2680
Black-tailed Godwit	35%	119%	116%	15%	51%	50%	53	179	174
Curlew	4%	24%	20%	1%	9%	7%	54	363	304
Redshank	3%	2%	4%	3%	2%	4%	40	27	48
Turnstone	1%	1%	4%	1%	0%	2%	6	3	21

Table 3.1.1.2.ii: Five year summary for 2000/01 to 2004/05 inclusive, for the entire Newport Wetlands Reserve, based on all available data. The National and International Importance of this area for each species are devolved by season. Figures given indicate the percentage of the relevant 1% Threshold represented by the five year mean peak count (also given) for the species in question. Rare, infrequent, vagrant and naturalised species are excluded as are species not considered well monitored by WeBS methodology (e.g. Snipe). For economy of space, frequently occurring species have also been excluded where their five-year peak mean values are all in single figures. Note that, for some species (e.g. Dunlin), different 1% National thresholds may apply to the winter and passage periods.

Species	Spring <i>cf</i> National Threshold	Autumn <i>cf</i> National Threshold	Winter <i>cf</i> National Threshold	Spring <i>cf</i> International Threshold	Autumn <i>cf</i> International Threshold	Winter <i>cf</i> International Threshold	Spring 5yr peak mean	Autumn 5yr peak mean	Winter 5yr peak mean
Mute Swan	N/A	0%	1%	N/A	0%	1%	N/C	0	4
Shelduck	N/A	N/A	25%	N/A	N/A	6%	N/C	(53)	192
Wigeon	N/A	2%	5%	N/A	1%	1%	N/C	94	205
Gadwall	N/A	0%	4%	N/A	0%	1%	N/C	0	7
Teal	N/A	10%	14%	N/A	5%	7%	N/C	188	264
Mallard	N/A	N/A	7%	N/A	N/A	1%	N/C	(473)	260
Pintail	N/A	3%	23%	N/A	1%	11%	N/C	8	63
Shoveler	N/A	1%	7%	N/A	0%	3%	N/C	1	11
Pochard	N/A	N/A	N/A	N/A	N/A	N/A	N/C	0	0
Tufted Duck	N/A	N/A	N/A	N/A	N/A	N/A	N/C	0	0
Little Grebe	N/A	N/A	N/A	N/A	N/A	N/A	N/C	0	0
Coot	N/A	N/A	N/A	N/A	N/A	N/A	N/C	0	0
Oystercatcher	N/A	0%	0%	N/A	0%	0%	N/C	4	8
Ringed Plover	N/A	N/A	0%	N/A	N/A	0%	N/C	(1)	0
Grey Plover	N/A	N/A	5%	N/A	N/A	1%	N/C	(2)	26
Lapwing	N/A	N/A	N/A	N/A	N/A	N/A	N/C	0	0
Knot	N/A	N/A	15%	N/A	N/A	9%	N/C	(1)	418
Dunlin	N/A	N/A	125%	N/A	N/A	53%	N/C	(30)	7000
Black-tailed Godwit	N/A	N/A	1%	N/A	N/A	0%	N/C	(0)	1
Curlew	N/A	8%	11%	N/A	3%	4%	N/C	124	158
Redshank	N/A	N/A	7%	N/A	N/A	6%	N/C	(10)	81

Table 3.1.1.2.iii: Five year summary, for 1995/96 to 1999/2000 inclusive, for the Nash Foreshore WeBS count section.

The National and International Importance of this area for each species are devolved by season. Figures given indicate the percentage of the relevant 1% Threshold represented by the five year mean peak count (also given) for the species in question. Rare, infrequent, vagrant and naturalised species are excluded as are species not considered well monitored by WeBS methodology (e.g. Snipe). For economy of space, frequently occurring species have also been excluded where their five-year peak mean values are all in single figures. Note that, for some species (e.g. Dunlin), different 1% National thresholds may apply to the winter and passage periods. N/A = not appropriate (e.g. when not birds counted or when reliable estimates are not available for the species in question – indicated by count in parentheses). N/C no counts available.

3.1.2 Annual peak counts

Species shown by the preceding analysis to only occur in relatively small numbers compared to the 1% National Threshold (arbitrarily taken as 20% of the National Threshold) across the entire reserve have been excluded from further consideration in order to focus attention on remaining species. Consequently, Mute Swan *Cygnus olor*, Mallard *Anas platyrhynchos*, Oystercatcher *Haematopus ostralegus*, Ringed Plover *Charadrius hiaticula*, Grey Plover *Pluvialis squatarola*, Redshank and Turnstone *Arenaria interpres* are not considered further.

For the majority of species there were few noticeable differences between the general patterns in annual peak counts either when considering waterbird numbers on the newly created habitat inland of the sea wall or across the entire reserve. Only for Teal, Pintail and Dunlin, which are recorded regularly on both the foreshore and inland of the sea wall, do the patterns of occurrence for the two extents differ noticeably and then not sufficiently to result in different conclusions with regard to their comparison with National thresholds. Consequently, the following statements can be taken as pertinent to either the newly created habitat inland of the sea wall or the entire reserve.

For the two species for which the five-year peak means exceeded the 1% National Threshold, Shoveler and Black-tailed Godwit, individual annual peaks have been consistently above the Threshold in recent years and can be expected to remain so (Figure 3.1.2.i). Indeed, one annual peak for Black-tailed Godwit across the entire reserve (385 birds) has exceeded the 1% International Threshold. The recent high annual peak for Little Grebe (67 birds) comes at the end of a steady increase in numbers. The recent high annual peak for Shelduck (670 birds in 2005/06) which approached the 1% National Threshold appears to be due to anomalously high counts not consistent with the otherwise downward trend. The annual peak for Pintail exceeded the 1% National Threshold immediately following the establishment of the reserve (380 birds in 2001/02) but numbers have been in decline since.

Figure 3.1.2.i: Annual peak counts of waterbirds on the Newport Wetlands Reserve based on data collected during standard WeBS counts with the 1% National Threshold indicated. Annual peak counts are calculated as the maximum count obtained between July of one year and June of the following year (the winter-centric WeBS count year). Peak counts are presented for both the newly created habitat inland of the sea wall and for across the entire reserve.

Newly created habitat inland of the sea wall

Entire reserve

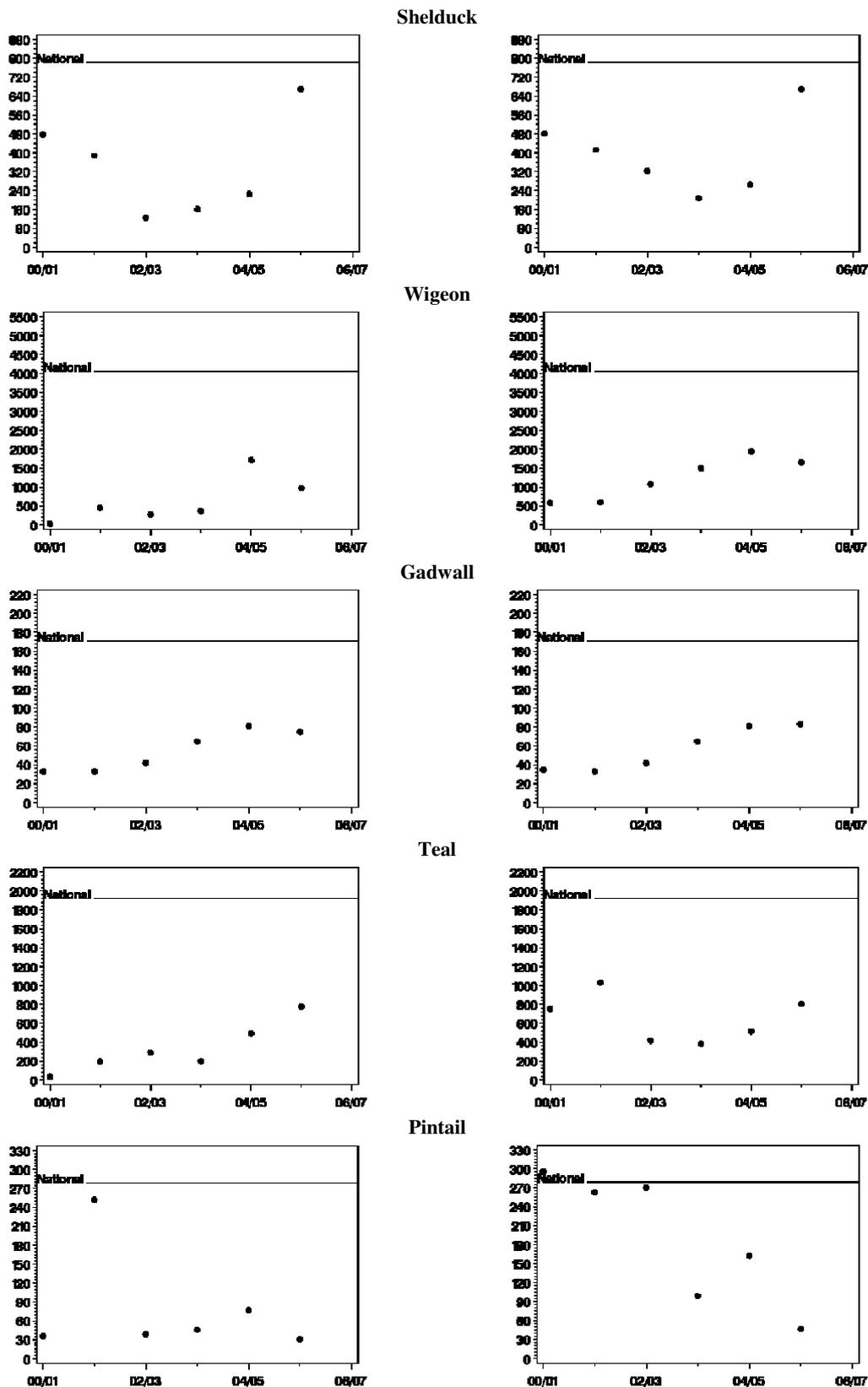
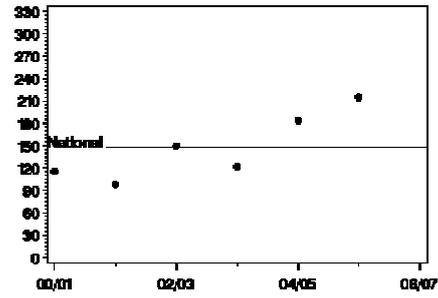
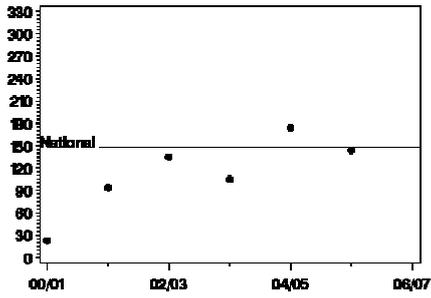


Figure 3.1.2.i: (continued)

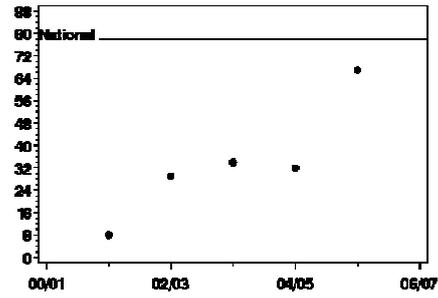
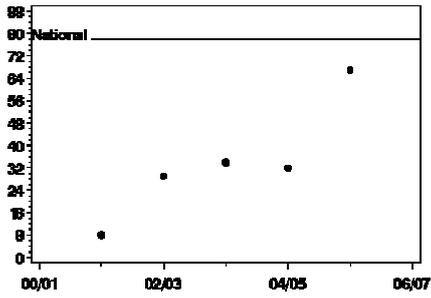
Newly created habitat inland of the sea wall

Entire reserve

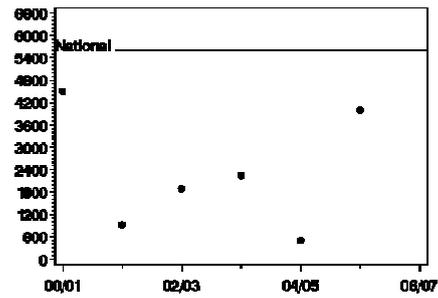
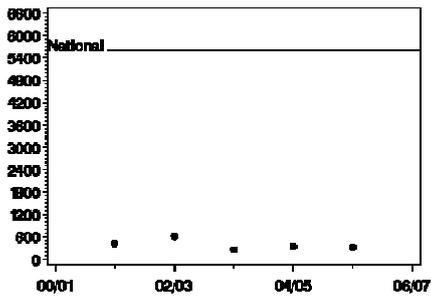
Shoveler



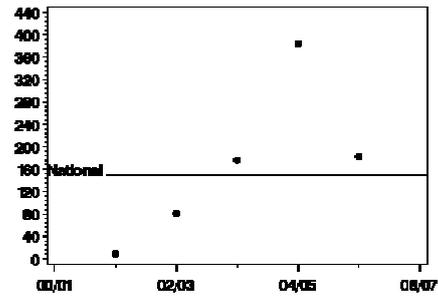
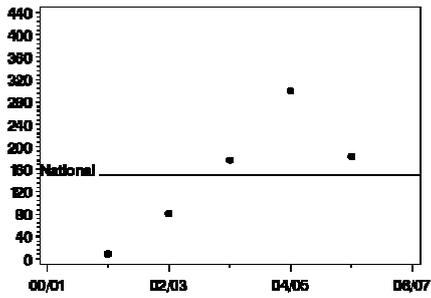
Little Grebe



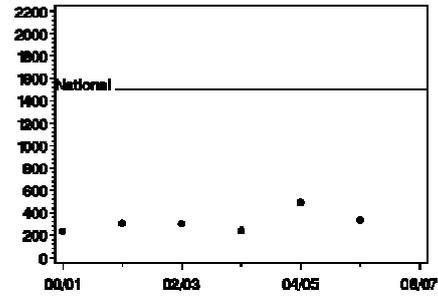
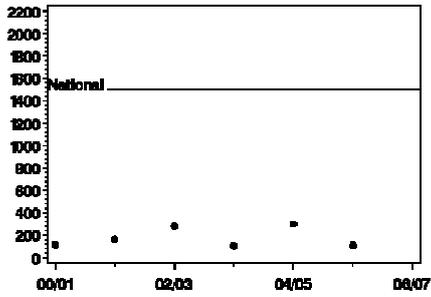
Dunlin



Black-tailed Godwit



Curlew



3.1.3 Trends in annual peak counts

Out of the 10 species considered in the preceding analysis, the winter peaks for five species, Wigeon, Gadwall, Shoveler, Little Grebe and Black-tailed Godwit, show a significant linear increase through time either when considering waterbird numbers on the newly created habitat inland of the sea wall or across the entire reserve (Table 3.1.3.i, Figure 3.1.3.i). For none of these five species, were differences between the trends for the two extents sufficient to affect the conclusions that may be drawn regarding their relationship to the 1% National Threshold. Consequently, statements for these species can be taken as pertinent to either the newly created habitat inland of the sea wall or the entire reserve. For Teal, a significant linear increase has occurred on the newly created habitat, and for Pintail, a significant decline was found across the entire reserve.

In the case of Shoveler and Black-tailed Godwit the trend in annual peak counts has already crossed the 1% National Threshold. In the case of Little Grebe, extrapolation of the current linear trend suggests that the 1% National Threshold could be reached in the next one or two years. The rate of increase for Wigeon, Gadwall and Teal is also quite high but nonetheless numbers of the species are unlikely to approach the 1% National Threshold in the immediate future but may do so in another six years. The annual peak counts of Pintail have remained relatively low in recent winters as compared with the early years, suggesting habitat in the early stages of development were more attractive to this species.

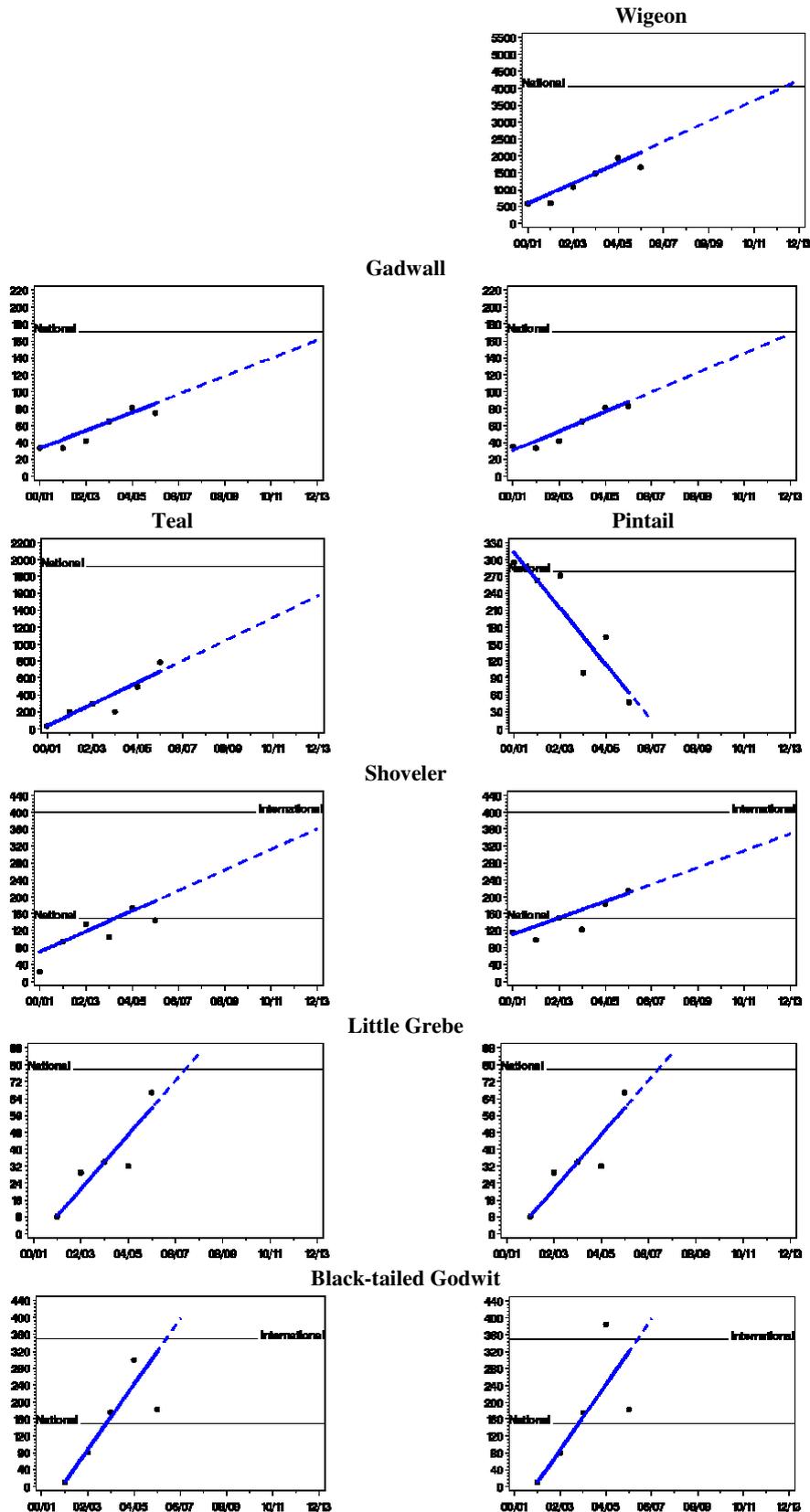
	Newly created habitat inland of the sea wall				Entire reserve			
	Z (test statistic)	significance	trend	n	Z (test statistic)	significance	trend	n
Shelduck	0.000	NS		6	0.376	NS		6
Wigeon	1.503	NS		6	2.254	P<0.01	+ve	6
Gadwall	2.067	P<0.01	+ve	6	2.254	P<0.01	+ve	6
Teal	2.254	P<0.01	+ve	6	0.000	NS		6
Pintail	0.000	NS		6	1.879	P<0.05	-ve	6
Shoveler	1.879	P<0.05	+ve	6	1.879	P<0.05	+ve	6
Little Grebe	1.715	P<0.05	+ve	5	1.715	P<0.05	+ve	5
Dunlin	0.735	NS		5	0.000	NS		6
Black-tailed Godwit	1.715	P<0.05	+ve	5	1.715	P<0.05	+ve	5
Curlew	0.000	NS		6	1.127	NS		6

Table 3.1.3.i: Trend analysis for annual peak counts of waterbirds for the Newport Wetlands Reserve. Analyses are presented for both the newly created habitat inland of the sea wall and for the entire reserve. Values given are for Mann-Kendall tests for significance of Thiel-Sen Robust Regression. Note the Mann-Kendall test assesses the significance of the absolute value of the Z statistic i.e. is a one-tailed test.

Figure 3.1.3.i: Linear trends in annual peak counts of waterbirds on the reserve inland of the sea-wall based on standard WeBS data with the 1% National (and if appropriate International) Threshold indicated. Only trends for those species showing an increase and for which this trend (Thiel-Sen Robust Regression) is significant (Mann-Kendall test) are given. Regressions are extrapolated for the foreseeable future (arbitrarily until the WeBS count year 2011/2012).

Newly created habitat inland of the sea wall

Entire reserve



4. DISCUSSION

Both of the targets set by the UK government for the newly established Newport Wetlands Reserve appear to have been met in the first five years since it was established.

4.1 Waterbird numbers after five years

In the short period since its creation, the Newport Wetlands Reserve has come to support a relatively impressive suite of waterbird species.

Firstly, the five-year peak mean count of two species, Shoveler and Black-tailed Godwit, across the entire reserve have exceeded the 1% National Threshold. Indeed, the annual peak count for the latter species exceeded the 1% International Threshold during 2004/05.

Secondly, the five-year peak mean count for Black-tailed Godwit has exceeded the 1% National Threshold for both winter and passage numbers when only newly created habitat, inland of the sea wall is considered. Together with recent annual peak counts for Shoveler and potentially Little Grebe in the immediate future, this would warrant the extension and re-notification of the existing Gwent Levels SSSI complex to include this new habitat. This process would underpin the inclusion of the Newport Wetlands Reserve as an extension to the existing Severn Estuary SPA.

It is perhaps surprising that the five-year peak means of two species have attained their 1% National Threshold in such a short period given that the reserve substantially comprises newly established habitat and that it is substantially within this new habitat that these species are recorded. It might have been expected that an extended period of time would be required before waterbird use of the reserve reach these levels. Indeed, annual peaks of five species show a significant linear increase since the reserve was first established with little evidence that numbers are beginning to stabilise. Consequently, the annual peaks of further species may attain the 1% National Threshold in the foreseeable future. If current trends are maintained, Little Grebe can be expected to reach this level in the immediate future and potentially Wigeon, Gadwall and Teal will do so early next decade. The evidence suggests than numbers of Pintail and Shelduck have been declining in numbers as the habitat has developed. (Although, in the latter species while the annual peak for the most recent winter was the highest recorded, this is against the general trend.)

4.2 Recommendations for site designation

Given their immediate proximity, it is reasonable to consider that, since it was established, the Newport Wetlands Reserve has become a functional component of the existing Severn Estuary SPA and, accordingly, it would be prudent to extend the latter to incorporate the newly created habitat.

Supporting this assumption, count data presented by Ward *et al.* (2003) do imply that, for Wigeon, Gadwall, Teal and Tufted Duck, birds counted on the Nash Foreshore (within existing SPA boundaries) between high-tide periods may be the same individuals as those recorded within the reserve over the high-tide period. That report did not aim to look at this question specifically and the locations referenced by Ward *et al.* (2003) are often imprecise but movements of these birds between the Nash Foreshore (and elsewhere) and the reserve can be inferred.

It is generally UK policy that areas classified as SPAs are first notified as SSSIs. The analyses relating to new habitat inland of the sea wall, indicate that, if not already then in the immediate future, waterbird numbers on this area would warrant extension and re-notification for waterbird interest, of the Gwent Levels SSSIs complex to achieve this aim.

4.3 Recommendations for continued monitoring

While the Newport Wetlands Reserve has met the targets set for by the UK government, it should still be considered to be a developing site. Although it already supports an impressive waterbird community it may not yet have reached its full potential. Consequently, the recommendations given above are based on a minimal perception of the site potential. Ultimately, the five-year peak mean can be expected to stabilise for

an increasing number of species as waterbird numbers reach equilibrium with the fully developed habitat. Periodic reassessment would therefore be prudent. This can easily be achieved through the standard WeBS data request system although that would not provide an interpretation of results.

It is also recommended that this assessment be repeated fully in a further five years time.

It is further recommended that observational data of waterbird movements between the reserve and the existing Severn Estuary SPA are collated into a database. These data would be greatly enhanced if samples of birds of key species were individually colour-marked (e.g. with colour-rings). This would greatly enhance the possibility for understanding how waterbirds are reacting behaviourally to the establishment of new habitat. This would have the potential to feed into site management here and elsewhere.

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