Blackwater Estuary Special Protection Area

(Site Code 4028)

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Conservation Objectives Supporting Document

VERSION 1

National Parks & Wildlife Service

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SUMMARY

This document presents conservation objectives for the Special Conservation Interests of Blackwater Estuary Special Protection Area, designated under Directive 2009/147/EC on the conservation of wild birds (Birds Directive).

Part One presents an introduction to the Special Protection Area designation process and to the site designated as Blackwater Estuary Special Protection Area, as well as introducing the concept of conservation objectives and their formulation.

Part Two provides site designation information for Blackwater Estuary Special Protection Area and Part Three presents the conservation objectives for this site.

Part Four reviews the conservation condition of the site Special Conservation Interest (SCI) species including analysis of wintering (non-breeding) population trends, assignment of site conservation condition, and examination of site trends in light of all-Ireland and international status and trends. Importantly, this section states the current conservation condition of each of the SCI species.

Part Five provides supporting information that will assist the interpretation of the site-specific conservation objectives. This section includes a review of the ecological characteristics of the SCI species and examines waterbird distribution recorded during the 2009/10 Waterbird Survey Programme, drawing also on data from NPWS monitoring programmes (e.g. benthic surveys) and the Irish Wetland Bird Survey (I-WeBS). Part Five concludes with information on activities and events that occur in and around the site which may interact with waterbirds during the non-breeding season and includes an assessment of those activities that were recorded to cause disturbance to non-breeding waterbirds at the site during the 2009/10 Waterbird Survey Programme.

PART ONE - INTRODUCTION

1.1 Introduction to the designation of Special Protection Areas

The over-arching framework for the conservation of wild birds within Ireland and across Europe is provided by Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) (Birds Directive). Together with the EU Habitats Directive (Council Directive 92/43/EEC), these legislative measures provide for wild bird protection via a network of protected sites across Europe known as Natura 2000 sites, of which the overriding conservation objective is the maintenance (or restoration) of 'favourable conservation status' of habitats and species.

Under Article 4 of Directive 2009/147/EC, Ireland, along with other Member States, is required to classify the most suitable territories in number and size as Special Protection Areas (SPAs) for the conservation of certain wild bird species, which are:

- species listed in Annex I of the directive
- regularly occurring migratory species

Also under Article 4, Member States are required to pay particular attention to the protection of wetlands, especially those of international importance.

The National Parks & Wildlife Service (NPWS) is responsible for the selection and designation of SPA sites in Ireland. NPWS have developed a set of criteria, incorporating information relating to the selection of wetland sites developed under the Ramsar Convention **(**Ramsar Convention Bureau 1971), which are used to select sites for SPA designation**.** Sites that meet any of the following criteria may be selected as SPAs:

- A site holding 20,000 waterbirds or 10,000 pairs of seabirds;
- A site holding 1% or more of the all-Ireland population of an Annex I species;
- A site holding 1% or more of the biogeographical population of a migratory species;
- A site that is one of the '*n*' most suitable sites in Ireland for a regularly occurring migratory species or Annex I listed species (where *n* is a variable which is related to the proportion of the total biogeographic population of a species held by Ireland).

The biogeographic population estimates and the recommended 1% thresholds for wildfowl and waders are taken from Wetlands International (Wetlands International, 2002); thresholds reflecting the baseline data period used. The all-Ireland populations for the majority of wintering waterbirds are taken from Crowe et al. (2008).

Site specific information relevant to the selection and designation of a SPA is collated from a range of sources including the Irish Wetland Bird Survey (I-WeBS), The Wetland Bird Survey (WeBS) in Northern Ireland, species specific reports and a wide range of scientific publications, reports and other surveys. When a site is selected for SPA designation, a list of Special Conservation Interests is compiled. The **Special Conservation Interests** of a site can be divided into two categories:

Selection species:

The species occurring at a site which identifies the site as qualifying for SPA status i.e. a species that met at least one of the following conditions:

- An Annex I species that occurs at the site in numbers that exceed the all-Ireland 1% population threshold;
- A migratory species that occurs at the site in numbers that exceed the biogeographic 1% population threshold; and/or

- A species for which the site is considered to be one of the *'n'* most suitable sites in Ireland for the conservation of that species (where *n* is a variable that is related to the proportion of the total biogeographic population held by Ireland) (NPWS, 2011a).

Additional Conservations Interests:

- Relevant Annex I or migratory species which exceed the all-Ireland 1% threshold during the baseline period but were not selection species for the site.

- Wetlands and waterbirds: the wetlands of northwest Europe are a vital resource for millions of northern and boreal nesting waterbird species that overwinter on these wetlands or visit them when migrating further south. To acknowledge the importance of Ireland's wetlands to wintering waterbirds the term Wetland & Waterbirds can be included as a Special Conservation Interest for a Special Protection Area that has been designated for wintering waterbirds, and is or contains a wetland site of significant importance to one or more of the species of Special Conservation Interest.

1.2 Introduction to Blackwater Estuary Special Protection Area

The Blackwater Estuary SPA is a moderately-sized, south-facing estuary that spans the border between counties Cork and Waterford. The site extends south as far as the Ferry Point peninsula on its eastern side, and east as far as Kinsalebeg. On the western side the Tourig Estuary is included as far as Kilmagner. The site also extends northwards along the River Blackwater as far as Ballynaclash Quay, a section that is tidal in all its parts. This aforementioned river section is sheltered by woodlands and other undeveloped habitats of the lower Blackwater valley. Below Youghal Bridge the site opens out into mudflats that flank either side of the river channel. These provide sheltered feeding grounds for a diversity of wintering waterbirds while areas of saltmarsh, particularly well developed around Kinsalebeg, provide roosting areas.

The site supports internationally important numbers of Black-tailed Godwit *Limosa limosa* during winter together with a further seven species in numbers of all-Ireland importance. A breeding colony of the Annex I species Little Egret *Egretta garzetta* occurs along the River Blackwater (e.g. Smiddy, 2002).

The Site Synopsis for Blackwater Estuary SPA and a map showing the SPA boundary are given in Appendix 1.

1.3 Introduction to Conservation Objectives

The overriding objective of the Habitats Directive is to ensure that the habitats and species covered achieve '*favourable conservation status'* and that their long-term survival is secured across their entire natural range within the EU (EU Commission, 2010). In its broadest sense, favourable conservation status means that an ecological feature is being maintained in a satisfactory condition, and that this status is likely to continue into the future. Definitions as per the EU Habitats Directive are given in Box 1.

Box 1

Favourable Conservation Status as defined by Articles 1 (e) and 1(i) of the Habitats Directive

The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- *its natural range and areas it covers within that range are stable or increasing; and*
- *the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and*
- *the conservation status of its typical species is favourable'.*

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- *the population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and*
- *the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and*
- *there is, and will probably continue to be, a sufficiently large habitat to maintain its populations*

Site-specific conservation objectives define the desired condition or range of conditions that a habitat or species should be in, in order for these selected features within the site to be judged as favourable. At site level, this state is termed 'favourable conservation condition.' Site conservation objectives also contribute to the achievement of the wider goal of biodiversity conservation at other geographic scales, and to the achievement of favourable conservation status at national level and across the Natura 2000 network[1].

For coastal SPA sites, conservation objectives are defined for attributes[2] relating to waterbird species populations, and for attributes related to the maintenance and protection of habitats that support them. These attributes are:

- Population trend;
- Population distribution;
- Habitat range and area (extent).

Further guidance is given in Section 3.1 (Conservation Objectives for the Special Conservation Interests of Blackwater Estuary Special Protection Area).

[1] Note that the terms 'conservation condition' and 'conservation status' are used to distinguish between site and the national level objectives respectively.

[2]Attribute can be defined as: 'a characteristic of a habitat, biotope, community or population of a species which most economically provides an indication of the condition of the interest feature to which it applies' (JNCC, 1998).

PART TWO – SITE DESIGNATION INFORMATION

2.1 Special Conservation Interests of Blackwater Estuary Special Protection Area

The **Selection Species** and **Additional Special Conservation Interests**[3] for Blackwater Estuary SPA are listed below and summarised in Table 2.1. This table also shows the importance of Blackwater Estuary SPA for SCI species, relative to the importance of other sites within Ireland, within the south-east region and within Counties Waterford and Cork[4].

The Selection Species listed for Blackwater Estuary SPA are as follows:-

1. During winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 620 individuals.

2. During winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 1,007 individuals.

Additional Special Conservation Interests for Blackwater Estuary SPA are as follows:

3. During winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 953 individuals.

4. During winter the site regularly supports 1% or more of the all-Ireland population of Golden Plover (*Pluvialis apricaria*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 2,628 individuals.

5. During winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,054 individuals.

6. During winter the site regularly supports 1% or more of the all-Ireland population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,807 individuals.

7. During winter the site regularly supports 1% or more of the all-Ireland population of Bar-tailed Godwit (*Limosa lapponica*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 161 individuals.

8. During winter the site regularly supports 1% or more of the all-Ireland population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 520 individuals.

9. The wetland habitats contained within Blackwater Estuary SPA are identified of conservation importance for non-breeding (wintering) migratory waterbirds. Therefore the wetland habitats are considered to be an additional Special Conservation Interest.

[3] Note that Special Conservation Interest species are listed in the order of Selection Species followed by additional Special Conservation Interest species. Within these two categories, species are listed in taxonomic order.

[4] Blackwater Estuary is a cross-border site of Counties Waterford and Cork.

Table 2.1 Designation Summary: species listed for Blackwater Estuary Special Protection Area, plus site importance at national, regional and county scale

	Special Conservation Interests	Annex I species	Baseline Population[a]	Population status at baseline	National Importance Rank[1]	Regional Importance Rank[2]	County Importance Rank[3]
Selection Species	Black-tailed Godwit		620	International Importance	4	1	1
	Curlew		1,007	All-Ireland Importance	7	2	3
Additional Special Conservation Interests	Wigeon		953	All-Ireland Importance	18	4	3
	Golden Plover	Yes	2,628	All-Ireland Importance	19	5	4
	Lapwing		3,054	All-Ireland Importance	14	4	3
	Dunlin		1,807	All-Ireland Importance	16	3	4
	Bar-tailed Godwit	yes	161	All-Ireland Importance	23	6	7
	Redshank		520	All-Ireland Importance	11	2	3
Other conservation designations associated with the site[b]		**SAC**	**RAMSAR SITE**	**IMPORTANT BIRD AREA (IBA)**	**WILDFOWL SANCTUARY**	**OTHER**	**OTHER**
		Yes	Yes	Yes	Yes		

[a] Baseline data is the 5-year mean peak count for the period 1995/96 – 1999/00 (I-WeBS).
[b] Note that other designations associated with Blackwater Estuary may relate to different areas and/or some of these areas may extend outside the SPA boundary.
[1]National importance rank – the number given relates to the importance of the site for the non-breeding population of a SCI species during the baseline period (1995/96 – 1999/00) relative to other sites in Ireland.
[2]Regional importance rank – the number given relates to the importance of the site for the non-breeding population of a SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within the South East region.
[3]County importance rank – the number given relates to the importance of the site for the non-breeding population of a SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within Counties Waterford and Cork (cross-border site).

PART THREE – CONSERVATION OBJECTIVES FOR BLACKWATER ESTUARY SPA

3.1 Conservation Objectives for the Special Conservation Interests of Blackwater Estuary SPA

The overarching Conservation Objective for Blackwater Estuary Special Protection Area is to ensure that waterbird populations and their wetland habitats are maintained at, or restored to, favourable conservation condition. This includes, as an integral part, the need to avoid deterioration of habitats and significant disturbance; thereby ensuring the persistence of site integrity.

The site should contribute to the maintenance and improvement where necessary, of the overall favourable status of the national resource of waterbird species, and continuation of their long-term survival across their natural range.

Conservation Objectives for Blackwater Estuary Special Protection Area, based on the principles of favourable conservation status, are described below and summarised in Table 3.1. Note that these objectives should be read and interpreted in the context of information and advice provided in additional sections of this report.

Objective 1: *To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Blackwater Estuary SPA.*

This objective is defined by the following attributes and targets:-

- To be favourable, the long term **population trend** for each waterbird Special Conservation Interest species should be stable or increasing.[5] Waterbird populations are deemed to be unfavourable when they have declined by 25% or more, as assessed by the most recent population trend analysis.[6]

- To be favourable, there should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest, other than that occurring from natural patterns of variation.[7]

Factors that can adversely effect the achievement of Objective 1 include:

- ❖ Habitat modification: activities that modify discreet areas or the overall habitat(s) within the SPA in terms of how one or more of the listed species use the site (e.g. as a feeding resource) could result in the displacement of these species from areas within the SPA and/or a reduction in their numbers (for further discussion on this topic please refer to Section 5.4).

- ❖ Disturbance: anthropogenic disturbance that occurs in or near the site and is either singular or cumulative in nature could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers (for further discussion on this topic please refer to Section 5.4).

[5] Note that 'population' refers to site population (numbers wintering at the site) rather than the species biogeographic population.

[6] Population trend analysis is presented in Section 4.

[7] Waterbird distribution from the 2009/2010 waterbird survey programme is examined in Section 5.

- ❖ Ex-situ factors: several of the listed waterbird species may at times use habitats situated within the immediate hinterland of the SPA or in areas ecologically connected to it. The reliance on these habitats will vary from species to species and from site to site. Significant habitat change or increased levels of disturbance within these areas could result in the displacement of one or more of the listed waterbird species from areas within the SPA, and/or a reduction in their numbers (for further information on this topic please refer to Section 5.2).

Objective 2: *To maintain the favourable conservation condition of the wetland habitat at Blackwater Estuary SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.*

This objective is defined by the following attributes and targets:-

- To be favourable, the permanent **area** occupied by the wetland habitat should be stable and not significantly less than the area of **871 ha**, other than that occurring from natural patterns of variation.

The boundary of Blackwater Estuary SPA was defined to include the primary wetland habitats of this site. Objective 2 seeks to maintain the permanent extent of these wetland habitats, which constitute an important resource for regularly-occurring migratory waterbirds. The wetland habitats can be categorised into three broad types: subtidal; intertidal; and supratidal. Over time and though natural variation these subcomponents of the overall wetland complex may vary due to factors such as changing rates of sedimentation, erosion etc. Waterbird species may use more than one of the habitat types for different reasons (behaviours) throughout the tidal cycle.

Subtidal areas refer to those areas contained within the SPA that lie below the mean low water mark and are predominantly covered by marine water. Tidal rivers, creeks and channels are included in this category. For Blackwater Estuary SPA this broad category is estimated to be **412 ha**. Subtidal areas are continuously available for benthic and surface feeding ducks (e.g. Wigeon) and piscivorous/other waterbirds. Various waterbirds roost in subtidal areas.

The intertidal area is defined, in this context, as the area contained between the mean high water mark and the mean low water mark. For Blackwater Estuary SPA this is estimated to be **318 ha**. When exposed or partially exposed by the tide, intertidal habitats provide important foraging areas for many species of waterbirds, especially wading birds, as well as providing roosting/loafing[8] areas. When the intertidal area is inundated by the tide it becomes available for benthic and surface feeding ducks and piscivorous/other waterbirds. During this tidal state this area can be used by various waterbirds as a loafing/roosting resource.

The supratidal category refers to areas that are not frequently inundated by the tide (i.e. occurring above the mean high watermark) but contain shoreline and coastal habitats and can be regarded as an integral part of the shoreline. For Blackwater Estuary SPA this is estimated to be **141 ha**. Supratidal areas are used by a range of waterbird species as a roosting resource as well as providing feeding opportunities for some species.

The maintenance of the 'quality' of wetland habitat lies outside the scope of Objective 2. However, for the species of Special Conservation Interest, the scope of Objective 1 covers the need to maintain, or improve where appropriate, the different properties of the wetland habitats contained within the SPA.

[8] Loafing can be described as any behaviour not connected with breeding or feeding, and includes preening and resting.

Table 3.1 Conservation Objectives for the waterbird Special Conservation Interests of Blackwater Estuary SPA.

Objective 1: *To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Blackwater Estuary SPA, which is defined by the following list of attributes and targets:*				
Parameter	**Attribute**	**Measure**	**Target**	**Notes**
Population	Population trend	Percentage change as per population trend assessment using waterbird count data collected through the Irish Wetland Bird Survey and other surveys.	The long term population trend should be stable or increasing	Waterbird population trends are presented in Part Four of this document.
Range	Distribution	Range, timing and intensity of use of areas used by waterbirds, as determined by regular low tide and other water bird surveys	There should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest other than that occurring from natural patterns of variation.	Waterbird distribution from the 2009/10 waterbird survey programme is reviewed in Part Five of this document.
Objective 2: *To maintain the favourable conservation condition of the wetland habitat at Blackwater Estuary SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attributes and targets:*				
Parameter	**Attribute**	**Measure**	**Target**	**Notes**
Area	Wetland habitat	Area (ha)	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 871 ha, other than that occurring from natural patterns of variation.	The wetland habitat area was estimated as 871 ha using OSI data and relevant orthophotographs.

PART FOUR – REVIEW OF THE CONSERVATION CONDITION OF WATERBIRD SPECIAL CONSERVATION INTERESTS

4.1 Population data for waterbird SCI species of Blackwater Estuary SPA

Wintering waterbirds have been counted regularly at Blackwater Estuary each winter as part of the Irish Wetland Bird Survey (I-WeBS) since the survey commenced in 1994 (Crowe, 2005).

Two I-WeBS count areas form constituent parts of the Blackwater Estuary SPA as follows:

- The count section known as the 'Blackwater Estuary' count area spans from Youghal Bridge southwards to the most southerly extent of the SPA. The area is divided into two count subsites: Tourig River and Kinsalebeg, which cover the western and eastern sides of the lower SPA site respectively.

- The stretch of the River Blackwater that extends northwards from Youghal Bridge as far as Ballynaclash Quay is part of an I-WeBS count area known as the 'Lower River Blackwater.'

Waterbird counts of the Blackwater Estuary and Lower Blackwater River are not coordinated so the resulting data cannot simply be added together to generate totals for the SPA. Data for the waterbird Special Conservation Interest (SCI) species of Blackwater Estuary SPA are therefore shown separately for the two constituent count areas. Table 4.1(a) presents population[9] data for the Blackwater Estuary while Table 4.1 (b) presents data for two subsites of the lower Blackwater River that are included within the SPA: 'Ballynatray' that extends north of Youghal Bridge as far as Glendine Bridge, and 'Newport' the area extending north towards Ballynaclash Quay. For each I-WeBS site, annual maxima were identified and used to calculate the five-year mean peak for each species. The baseline period was 1995/96 – 1999/00 and the most recent five-year average is for 2005/06 – 2009/10. Baseline data are not available for the subsite 'Newport' as this subsite was counted as part of a different, much larger subsite during this period.

When examining waterbird data, it is standard practice to use the mean of peak counts because they reflect more accurately the importance of a site for a particular species. The assessment of five-year periods helps to account for fluctuations in numbers or where there are inconsistencies in data gathering (e.g. incomplete coverage, bad weather). In general and taking into account all potential sources of error in counting wetland birds, resulting data are regarded to be underestimates of population size (Underhill & Prŷs-Jones, 1994).

Table 4.1(a) highlights where the numbers shown surpass thresholds of International or all-Ireland importance. Note that these thresholds are different for the baseline and recent time periods used. International thresholds are outlined in Wetlands International (2002) and Wetlands International (2006) for the baseline and recent site data respectively, while all-Ireland thresholds are given within Crowe et al. (2008).

[9] Note that 'population' refers to site population (numbers wintering at the site) rather than a species' biogeographic population.

Table 4.1(a) Population data for waterbird Special Conservation Interest Species of Blackwater Estuary SPA – data from the Blackwater Estuary I-WeBS count site

Site Special Conservation Interests (SCIs)	Baseline Period[1] (1995/96 – 1999/00)	Recent Site Data[2] (2005/06 – 2009/10)
Black-tailed Godwit *Limosa limosa**	620 (i)	750 (i)
Curlew *Numenius arquata**	1,007 (n)	622 (n)
Wigeon *Anas penelope*	953 (n)	404
Golden Plover *Pluvialis apricaria*	2,628 (n)	770
Lapwing *Vanellus vanellus*	3,054 (n)	1,519
Dunlin *Calidris alpina*	1,807 (n)	467
Bar-tailed Godwit *Limosa lapponica*	161 (n)	56
Redshank *Tringa totanus*	520 (n)	439 (n)

* denotes site selection species. [1]Baseline data is the 5-year mean peak count for the period 1995/96 – 1999/00; [2]recent site data is the four-year mean for the 5-year period 2005/06 – 2009/10 (I-WeBS) (no data for 2005/06).
(i) denotes numbers of international importance; (n) denotes numbers of all-Ireland importance.

Table 4.1(b) Population data for waterbird Special Conservation Interest Species of Blackwater Estuary SPA – data from the Lower Blackwater River I-WeBS count subsites 'Ballynatray' and 'Newport'

Site Special Conservation Interests (SCIs)	'Ballynatray'		'Newport'
	Baseline Period[1] (1995/96 – 1999/00)	Recent Site Data[2] (2005/06 – 2009/10)	Recent Site Data[2] (2005/06 – 2009/10)
Black-tailed Godwit *Limosa limosa**	83	20	64
Curlew *Numenius arquata**	38	25	34
Wigeon *Anas penelope*	62	43	85
Golden Plover *Pluvialis apricaria*	-	-	-
Lapwing *Vanellus vanellus*	4	6	108
Dunlin *Calidris alpina*	58	3	73
Bar-tailed Godwit *Limosa lapponica*	-	-	-
Redshank *Tringa totanus*	55	29	67

* denotes site selection species. [1]Baseline data is the 5-year mean peak count for the period 1995/96 – 1999/00; [2]recent site data is the four-year mean for the 5-year period 2005/06 – 2009/10 (I-WeBS) (no data for 2005/06); baseline data are not available for the subsite 'Newport.'

4.2 Waterbird population trends at Blackwater Estuary SPA

The calculation and assessment of waterbird population trends at Irish coastal SPA sites follows the UK Wetland Bird Survey 'Alerts System' which provides a standardised technique for monitoring changes in the numbers of non-breeding waterbirds over a range of spatial scales and time periods (Appendix 3).

As noted in Section 4.1, two I-WeBS count areas form constituent parts of the Blackwater Estuary SPA. Count data obtained are not additive nor is it correct to produce trends for the smaller count units of the Lower Blackwater River. Therefore population trends for non-wintering waterbirds were calculated using data for only the Blackwater Estuary I-WeBS count area, this area having been the most comprehensively covered in terms of counts across the years, and considered representative of waterbird populations across the wider area.

Annual population indices were calculated for waterbird SCI species for the data period 1994/95 to 2008/09. Trends are given for the 'long-term' 12-year period (1995/96–2007/08) and the recent ('short-term') five-year period (2002/03 - 2007/08) (Table 4.2). The values given represent the percentage change in index (population) values across the specified time period. Positive values equate to increases in population size while negative values reflect a decrease in population size.

Waterbirds are relatively long-lived birds and changes in population size can take several years to become evident. The short-term trend can be useful to assess whether species numbers at the site are remaining stable, showing increase or signs of recovery, or are

continuing to decline. For example, although a species' long-term trend may be negative, the short-term trend could be positive if numbers have increased during the recent five year period being assessed. Importantly, the short-term trend may detect more rapidly where a species population is beginning to decline.

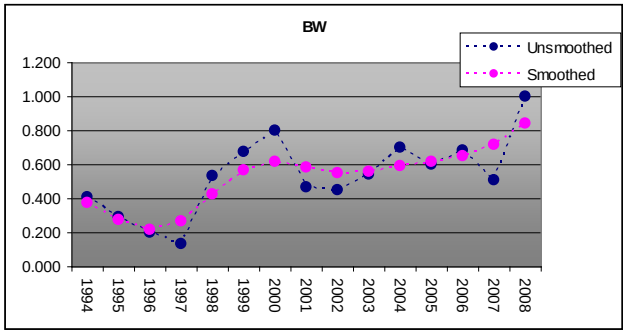
Table 4.2 Site Population Trends for waterbird Special Conservation Interest species of Blackwater Estuary SPA

Site Special Conservation Interests (SCIs)	Site Population Trend[1] 12 Yr	Site Population Trend[2] 5 Yr
Black-tailed Godwit *Limosa limosa**	+ 163.2	+ 30.5
Curlew *Numenius arquata**	- 28.3	- 14.3
Wigeon *Anas penelope*	- 51.4	- 32.5
Golden Plover *Pluvialis apricaria*	- 12.2	+ 27.6
Lapwing *Vanellus vanellus*	- 24.3	+ 16.1
Dunlin *Calidris alpina*	- 74.3	- 44.7
Bar-tailed Godwit *Limosa lapponica*	- 60.9	- 82.3
Redshank *Tringa totanus*	+ 16.6	+ 0.05

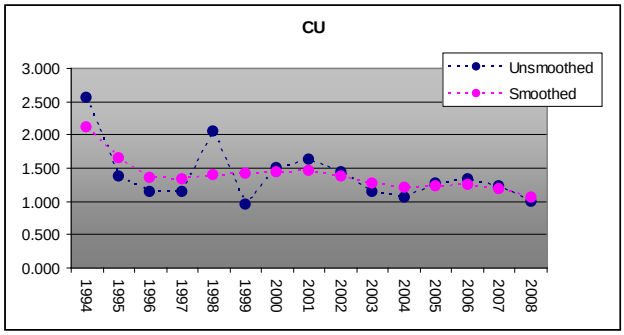
* denotes site selection species.
[1]Site population trend analysis: 12 yr = 1995/96 – 2007/08
[2]Site population trend analysis: 5 yr = 2002/03 – 2007/08.

For selected species, explanatory notes are given below to aid the interpretation of trends. Graph headings use waterbird species codes and a list of these is provided in Appendix 4.

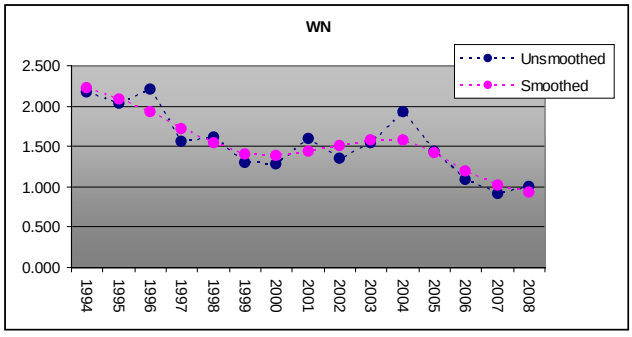
Black-tailed Godwit – numbers recorded in 1997/98 were at their lowest point in the entire 15-year dataset. Numbers then increased to a relative high in 2000/01 before almost halving in the following two years. Thereafter numbers have steadily increased. This trend for increase is in line with the national trend (Crowe et al. 2008) and that evident in Northern Ireland and Britain (Calbrade et al. 2010).



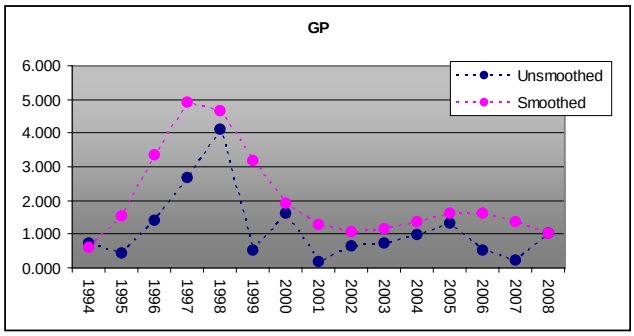
Curlew – numbers showed a steep trend for decline in the early part of the dataset and although punctuated by a relatively high number in the season 1998/99, thereafter showed a more stable yet sustained trend for decline which is consistent with the all-Ireland trend.



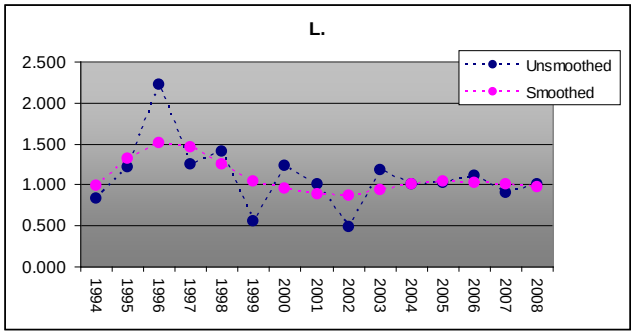
Wigeon – a period of decline from 1994/95 to 2000/01 was followed by a period of recovery to 2004/05. Thereafter numbers have declined again with numbers during 2007/08 at their lowest in the 15-year period.



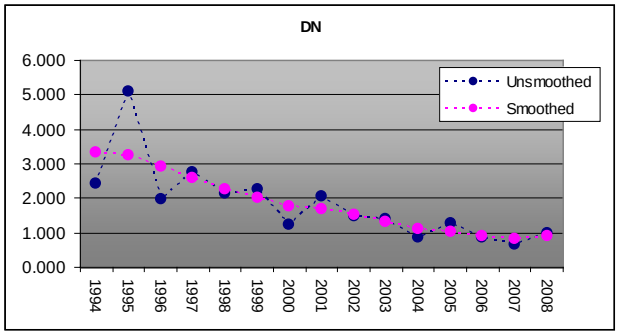
Golden Plover – numbers have fluctuated with a period of increasing numbers from 1994/95 to 1998/99. Numbers then declined to a dataset low in the season 2001/02. Since then numbers have shown more stability and increased during the early 2000's, hence the short-term trend for increase.



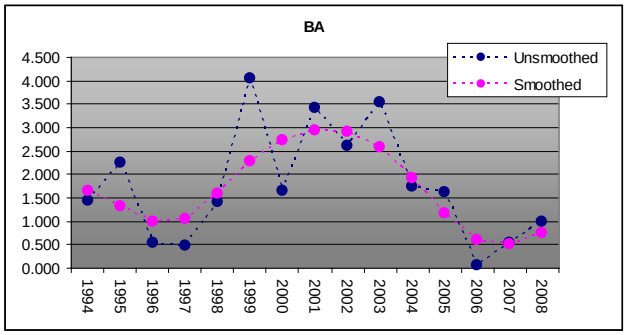
Lapwing – numbers increased early in the dataset to a relative high number recorded in 1996/97. Thereafter, despite fluctuating during the period 1998/99 to 2003/04, the underlying trend has been for more stable numbers and indeed a slight increase in the short-term.



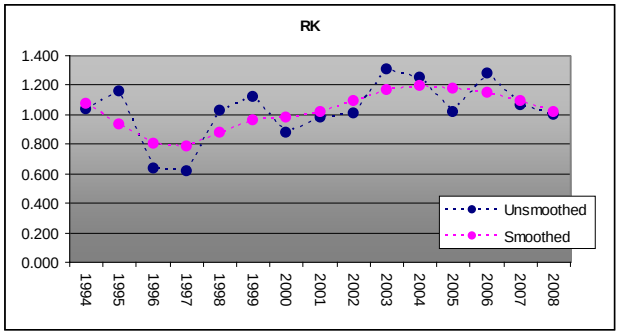
Dunlin – the season 1995/96 recorded the highest numbers of the 15-year dataset (peak count this season of 2,537 individuals). Thereafter numbers declined steadily although this has levelled off in recent years explaining the lower short-term trend for decline. The long-term trend for decline is in line with the national trend and that evident in Northern Ireland and Britain (Calbrade et al. 2010).



Bar-tailed Godwit – numbers have fluctuated widely but the smoothed trend illustrates a period of increase and subsequent decrease in numbers across a nearly ten-year period (1997/98 to 2006/07). Numbers were at their lowest in 2006/07 but have improved slightly since.



Redshank – this species has exhibited a consistent increase in numbers since the relative low numbers recorded in the seasons 1996/97 and 1997/98.



4.3 Blackwater Estuary SPA – site conservation condition of waterbird SCI species

Conservation condition of waterbird species is determined using the long-term site population trend and is assigned using the following criteria:

Favourable population = population is stable/increasing.

Intermediate (unfavourable) = Population decline in the range 1.0 – 24.9%.

Unfavourable population = populations that have declined between 25.0 – 49.9% from the baseline reference value.

Highly Unfavourable population = populations that have declined > 50.0% from the baseline reference value.

The threshold levels of >25.0% and >50.0% follows standard convention used for waterbirds (e.g. Lynas et al. 2007; Leech et al. 2002). The 'Intermediate' range (1.0% - 24.9% decline) allows for natural fluctuations and represents a range within which relatively small population declines have the potential to be reversible and less likely to influence conservation status in the long-term (Leech et al. 2002). Declines of more than 25.0% are deemed of greater ecological significance for the long-term.

With regards the eight waterbird species of Special Conservation Interest for Blackwater Estuary SPA, and based on the long-term population trend for the site, it has been determined that (Table 4.3):-

1. 3 species are currently considered as **Highly Unfavourable** (Wigeon, Dunlin and Bar-tailed Godwit);

2. 1 species is currently considered as **Unfavourable** (Curlew);

3. 2 species are currently considered as **Intermediate (Unfavourable)** (Golden Plover & Lapwing);

4. 2 species are currently considered as **Favourable** (Black-tailed Godwit & Redshank).

Site conservation condition and population trends were also reviewed in light of species' all-Ireland and international trends (Table 4.3). The calculation of all-Ireland trends (island of Ireland) for the long-term (12-year) data period was facilitated by the provision of indices from

the I-WeBS and the WeBS database[10]; International trends follow Wetlands International (2006).

Table 4.3 SCI species of Blackwater Estuary SPA – Current Site Conservation Condition

Special Conservation Interests	BoCCI Category[b]	Site Population Trend[a]	Site Conservation Condition	Current all-Ireland Trend[c]	Current International Trend[d]
Black-tailed Godwit*	Amber	+ 163.2	Favourable	+ 70.2	Increase
Curlew*	Red	- 28.3	Unfavourable	- 25.7	Decline
Wigeon	Amber	- 51.4	Highly Unfavourable	- 20.1	Stable
Golden Plover	Red	- 12.2	Intermediate (Unfavourable)	- 2.2	Decline
Lapwing	Red	- 24.3	Intermediate (Unfavourable)	- 40.12	Decline
Dunlin	Amber	- 74.3	Highly Unfavourable	- 46.5	Stable *(alpina*)
Bar-tailed Godwit	Amber	- 60.9	Highly Unfavourable	+ 1.5	Stable
Redshank	Red	+ 16.6	Favourable	+ 22.7	Stable/Decline

* denotes site selection species.
[a] Site population trend analysis; see Table 4.2; [b]After Lynas *et al.* (2007); [c]all-Ireland trend calculated for period 1994/95 to 2008/09; [d]international trend after Wetland International (2006).

Table 4.3 also shows the relationship between a species' long-term site trend and the current all-Ireland trend for the same time period (1994/95 to 2008/09). The colour coding used represents the following cases:-

- Green – species whose populations are stable or increasing at both site level and all-Ireland level.
- Beige – species whose populations are declining at both site level and all-Ireland level. Therefore there is a potential for factors at a larger spatial scale to be influencing the observed trend at site level.
- Orange - species whose populations are exhibiting a 1 – 24.9% decline at site level but are stable or increasing at all-Ireland level.
- Pink - species whose populations are exhibiting a 25.0 – 49.9% decline at site level but are stable or increasing at all-Ireland level.
- Red - species whose populations are exhibiting a decline of >50.0% at site level but are stable or increasing at all-Ireland level.

Pink and red categories highlight where populations are stable at all-Ireland level, but where significant declines are seen at site level. In these cases it would be reasonable to suggest that site-based management issues may be responsible for the observed declining site population trends (Leech et al. 2002).

[10] kindly provided by the I-WeBS Office and the British Trust for Ornithology.

PART FIVE – SUPPORTING INFORMATION

5.1 Introduction

Part Five of this report is based around the need to review, collate and disseminate site-specific information relating to the Special Conservation Interests of Blackwater Estuary SPA.

Section 5.2 provides selected ecological summary information for the non-breeding waterbirds of Blackwater Estuary SPA. Section 5.3 presents results from the 2009/10 Waterbird Survey Programme. Finally, Section 5.4 provides summary information for activities and events that occur at Blackwater Estuary SPA and environs, that may either act upon the habitats within the site, or may interact with waterbirds using the site.

The information provided is intended to:-

- provide information to assist the interpretation and understanding of the site-specific conservation objectives;
- facilitate the identification of conservation priorities and direct site management measures;
- inform the scope and nature of Appropriate Assessments in applying the provisions of Article 6 of the Habitats Directive.

Note however, that this information does not aim to provide a comprehensive assessment on which to assess plans and projects as required under the Habitats Directive, but rather should inform the scope of these assessments and help direct where further detailed examinations are required. The information presented in this report was compiled in November 2011.

5.2 Waterbird species – Ecological characteristics, requirements and specialities – summary information

Waterbirds, defined as *''birds that are ecologically dependent on wetlands''* (Ramsar Convention, 1971), are a diverse group that includes divers, grebes, swans, geese and ducks, gulls, terns and wading birds. During the data period 1994/95 – 2009/10 the I-WeBS database shows a total of 66 waterbird species that have been recorded either within the Blackwater Estuary count area or count subsites of the lower Blackwater River that relate to the area designated as Blackwater Estuary SPA.[11] These species represent eleven waterbird families: *Gaviidae* (divers), *Podicipedidae* (grebes), *Anatidae* (swans, geese and ducks), *Rallidae* (Water Rail, Moorhen & Coot), *Haematopodidae* (oystercatchers), *Charadriidae* (plovers and lapwings), *Scolopacidae* (sandpipers and allies) and *Laridae* (gulls and terns) plus *Phalacrocoracidae* (Cormorants), *Ciconiiformes* (Herons) and Alcedinidae (Kingfisher).

As described in Section 1.1, the wetland habitats contained within this SPA are considered to be a Special Conservation Interest in their own right. The wetland habitat is an important resource for listed SCI species and for other waterbird species included in the total waterbird assemblage. These species may include those that utilise the site during passage, those that are present in months of the year outside of the non-breeding season[12] or species that use the site at certain times only (e.g. as a cold weather refuge).

31 waterbird species occurred on a regular basis within the Blackwater Estuary I-WeBS count area during the period 1994/95 – 2009/10.[13] Eight of these species are listed as SCIs for the SPA, and the additional 23 non-SCI species are listed in Table 5.1a.

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[11] Refer to Section 4.1 for a description of I-WeBS count areas and how these relate to the SPA.

[12] Non-breeding season is defined as September – March inclusive

[13] Regular is defined as a species that has occurred in 12 out of the 15-year data period.

Table 5.1a Regularly-occurring non SCI waterbird species that occur at Blackwater Estuary SPA during the non-breeding season

Species	Baseline Data Period[1] (1995/96 – 1999/00)	Recent Site Average[2] (2005/06 – 2009/10)
Light-bellied Brent Geese (*Branta bernicla hrota*)	19	125
Shelduck (*Tadorna tadorna*)	123	118
Teal (*Anas crecca*)	407	306
Mallard (*Anas platyrhynchos*)	105	145
Red-breasted Merganser (*Mergus serrator*)	7	4
Cormorant (*Phalacrocorax carbo*)	43	85
Little Egret (*Egretta garzetta*)	12	46
Grey Heron (*Ardea cinerea*)	17	25
Oystercatcher (*Haematopus ostralegus*)	401	298
Ringed Plover (*Charadrius hiaticula*)	28	31
Grey Plover (*Pluvialis squatarola*)	49	7
Knot (*Calidris canutus*)	43	32
Snipe (*Gallinago gallinago*)	83	25
Spotted Redshank (*Tringa erythropus*)	4	1
Greenshank (*Tringa nebularia*)	25 (n)	27 (n)
Turnstone (*Arenaria interpres*)	52	47
Black-headed Gull (*Chroicocephalus ridibundus*)	345	5,476 (x)
Common Gull (*Larus canus*)	253	905 (x)
Lesser Black-backed Gull (*Larus fuscus*)	390	6,381 (x)
Herring Gull (*Larus argentatus*)	64	644 (x)
Great Black-backed Gull (*Larus marinus*)	227	478
Sandwich Tern (*Sterna sandvicensis*)	17	13
Kingfisher (*Alcedo atthis*)	1	1

[1] Baseline data is the 5-year mean peak count for the period 1995/96 – 1999/00 (I-WeBS);
[2] Recent site data is the four-year mean for 2005/06 – 2009/10 (I-WeBS).
(n) denotes numbers of all-Ireland importance (thresholds given in Crowe et al. 2008)
(x) denotes surpassing 'threshold of significance' as applied by Crowe (2005).

The I-WeBS count area 'Ballynatray' extends north of Youghal Bridge as far as Glendine Bridge. This subsite has recorded 14 waterbird species on a regular basis during the period 1994/95 – 2009/10[13] of which four (Black-tailed Godwit, Curlew, Wigeon and Redshank) are listed SCI species for the SPA. Recent data for the ten additional non-SCI species are shown in Table 5.1b. Further north along the Blackwater river, the I-WeBS count area 'Newport' has recorded 16 waterbird species on a regular basis during the period 1994/95 – 2009/10[13] of which six (Black-tailed Godwit, Lapwing, Curlew, Wigeon, Dunlin and Redshank) are SCI species. Recent data for the ten additional non-SCI species are also shown in Table 5.1b.

Table 5.1b Regularly-occurring non SCI waterbird species that have occurred within the I-WeBS subsites 'Ballynatray' and 'Newport' (2005/06 – 2009/10)

Species	Ballynatray Recent Site Average* (2005/06 – 2009/10)	Newport Recent Site Average* (2005/06 – 2009/10)
Shelduck (*Tadorna tadorna*)	1	9
Teal (*Anas crecca*)	63	15
Mallard (*Anas platyrhynchos*)	6	n/a
Cormorant (*Phalacrocorax carbo*)	27	34
Little Egret (*Egretta garzetta*)	6	4
Grey Heron (*Ardea cinerea*)	12	3
Oystercatcher (*Haematopus ostralegus*)	17	10
Greenshank (*Tringa nebularia*)	n/a	6
Black-headed Gull (*Chroicocephalus ridibundus*)	34	63
Lesser Black-backed Gull (*Larus fuscus*)	n/a	48
Great Black-backed Gull (*Larus marinus*)	14	19

*Recent site data is the four-year mean for 2005/06 – 2009/10 (I-WeBS).

Although waterbirds may be linked by their dependence on water, different species vary considerably in aspects of their ecology due to many evolutionary adaptations and specialisations to their wetland habitats. Different species or groups of species may therefore utilise wetland habitats in very different ways which relates to how species are distributed across a site as a whole.

Table 5.2[14] provides selected ecological information for waterbird SCI species of Blackwater Estuary SPA. Information is provided for the following categories:

- waterbird family (group);
- winter distribution – species distribution range during winter (based on the period 1996/97 – 2000/01 (after Crowe, 2005));
- trophic (foraging) guild (after Weller, 1999; see Appendix 5);
- food/prey requirements;
- principal supporting habitat within the site;
- ability to utilise other/alternative habitat in/around the site;
- site fidelity (species 'faithfulness' to wintering sites).

A single wetland site seldom meets all the ecological requirements of a diverse assemblage of waterbirds (Ma et al., 2010). Although some waterbird species will be faithful to specific habitats within the SPA, many will at times also use habitats situated within the immediate hinterland of the site or in areas ecologically connected to the SPA. These areas may be used as alternative high tide roosts, as a foraging resource or, be simply flown over, either on migration or on a more frequent basis throughout the non-breeding season as waterbirds move between different areas used (e.g. commuting corridors between feeding and roosting areas).

Reliance on alternative habitats will vary between species and from site to site. Use of alternative habitats is also likely to vary through time, from seasonally through to daily, and different habitats may be used by day and night (Shepherd et al. 2003). Different waterbirds may utilise wetland habitats in different ways. For example, while the majority of wading birds forage across exposed tidal flats, species such as Lapwing and Golden Plover are considered as 'terrestrial waders', typically foraging across grassland and using tidal flats primarily for roosting. When tidal flats are covered at high water, intertidally-foraging waterbirds are excluded and many will move to nearby fields to feed. Terrestrial foraging is also important when environmental factors (e.g. low temperature) reduce the profitability of intertidal foraging (e.g. Zwarts & Wanink, 1996b). Some waterbird species are simply generalists, and make use of a range of habitats, for example the Black-tailed Godwit that forages across intertidal

[14] Notes to aid the understanding of categories and codes used in Table 5.2 are provided in the table sub text.

mudflats and grassland habitats. Other waterbird species such as Greenland White-fronted Goose (*Anser albifrons flavirostris*) or Bewick's Swan (*Cygnus columbianus bewickii*) are herbivores and are therefore reliant on terrestrial areas, often outside of the SPA boundary, and use the wetland site primarily for roosting. Some species switch their habitat preference as food supplies become depleted; an example being Light-bellied Brent Geese that exploit grasslands increasingly when intertidal seagrass and algae become depleted.

The topic of alternative habitat use is also applicable to benthic-foraging seaducks and divers whose foraging distribution is highly influenced by water depth and tidal conditions. Many of these species however (e.g. Great Northern Diver, Common Scoter) exhibit a widespread coastal distribution during winter utilising shallow nearshore waters to a greater degree at certain times (e.g. storms, driving onshore winds).

Thus areas designated as Special Protection Areas represent a variable portion of the overall range of the listed species. To this end, field data, where available, are being compiled on waterbird alternative habitat use. Such a resource is warranted for the effective conservation management of mobile waterbird species. Indeed, the isolated protection of single sites may be inadequate to provide effective species protection thereby underlining the need for wider countryside conservation measures (Kushlan, 2006). Furthermore, it is recommended that assessments that are examining factors that have the potential to affect the achievement of the site's conservation objectives should also consider the use of these habitats, and their significance to the listed bird species.

Table 5.2 Waterbirds – Ecological characteristics, requirements & specialities

	Family (group)	Winter distribution[A]	Trophic Guild[B]	Food/Prey Requirements[C]	Principal supporting habitat within site[D]	Ability to utilise other/alternative habitats[E]	Site Fidelity[F]
SELECTION SPECIES							
Black-tailed Godwit *Limosa limosa*	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	High
Curlew *Numenius arquata*	Scolopacidae (wading birds)	Very widespread	4	Wide	Intertidal mud and sand flats	2	High
ADDITIONAL SPECIAL CONSERVATION INTERESTS							
Wigeon *Anas penelope*	Anatidae (dabbling ducks)	Very widespread	1, 5	Narrower	Intertidal mudflats, shallow subtidal, saltmarsh	1	Weak
Golden Plover *Pluvialis apricaria*	Charadriidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate
Lapwing *Vanellus vanellus*	Charadriidae (wading birds)	Very widespread	4	Wide	Intertidal mud and sand flats	2	Moderate
Dunlin *Calidris alpina*	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	3	High
Bar-tailed Godwit *Limosa lapponica*	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	Moderate
Redshank *Tringa totanus*	Scolopacidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	High

[A] Winter distribution: Very widespread (>300 sites); Widespread (200 – 300 sites); Intermediate (100 – 200 sites); Localised (50-100 sites); Highly restricted (<50 sites) (based on Crowe (2005).
[B] Waterbird foraging guilds. 1 = Surface swimmer, 2 = water column diver (shallow), 3 = water column diver (deeper), 4/5 = intertidal walker (out of water), 6 = intertidal walker (in water), 7 = terrestrial walker. Further details are given within Appendix 5.
[C] Food/prey requirements - species with a wide prey/food range; species with a narrower prey range (e.g. species that forage upon a few species/taxa only), and species with highly specialised foraging requirements (e.g. piscivores).
[D] Principal supporting habitat present within Blackwater Estuary SPA. Note that this is the main habitat used when foraging.
[E] Ability to utilise alternative habitats refers to the species ability to utilise other habitats adjacent to the site. 1 = wide-ranging species with requirement to utilise the site as and when required; 2 = reliant on site but highly likely to utilise alternative habitats at certain times (e.g. high tide); 3 = considered totally reliant on wetland habitats due to unsuitable surrounding habitats and/or species limited habitat requirements.
[F] Site fidelity on non-breeding grounds: Unknown; Weak; Moderate; or High (based on published literature).

5.3 The 2009/10 waterbird survey programme

5.3.1 Introduction

The 2009/10 waterbird survey programme was designed to investigate how waterbirds are distributed across coastal wetland sites during the low tide period. The surveys ran alongside and are complementary to the Irish Wetland Bird Survey (I-WeBS) which is a nationwide survey undertaken primarily on a rising tide or at high tide.

At Blackwater Estuary SPA, a standard survey programme of four low tide counts (October, November & December 2009 and February 2010) and a high tide count (January 2010) were completed across the site.[15]

Waterbirds were counted within a series of 11 count sections (subsites) (Appendix 6). Subsites used were based on I-WeBS subsites (see Crowe, 2005) and are not exactly coincident with the SPA boundary.

The behaviour of waterbirds during counts was attributed to one of two categories (foraging or roosting/other) while the position of birds was recorded in relation to one of four broad habitat types (intertidal, subtidal, supratidal and terrestrial). Note that these broad habitats (Table 5.3) were defined specifically for the survey programme and do not follow strict habitat-based definitions for these areas, nor follow definitions used in relation to conservation objectives outlined in Section 3.1. For a detailed survey methodology, please refer to NPWS (2010).

Table 5.3 Definition of broad habitat types used

Broad Habitat Type	Broad Habitat Description
Intertidal (area between mean high water and mean low water)	Refers to the area uncovered by the tide and most likely dominated by mudflats and sandflats. It may also include areas of rocky shoreline, areas of mixed sediment and grave/pebbles or shingle and gravel shores.
Subtidal (area that lies below mean low water)	Refers to areas that are covered by seawater during counts. During low-tide counts it will include offshore water, tidal channels and creeks as well as tidal rivers.
Supratidal	This category pertains to the shore area and habitats immediately marginal to and above the mean high-water mark. The supratidal section is an integral part of the shoreline. This broad habitat also includes areas of saltmarsh where the saltmarsh is contiguous with coastal habitats lying above. Note that patches of lower saltmarsh (e.g. *Spartina* sp.) surrounded by intertidal flats, were included in the intertidal category.
Terrestrial	Used where birds were recorded within habitats close to the shoreline but were above the intertidal and supratidal levels.

In addition to the main survey programme described above, a high tide roost survey was completed on 7th March 2010. During this survey, roost sites were located, species and numbers of waterbirds counted and the position of the roosts marked onto field maps.

5.3.2 Waterbird data, analyses and presentation

The aim of data analyses was to understand how waterbirds are distributed across the site of Blackwater Estuary SPA during the autumn and winter months. By assessing patterns of waterbird distribution at low and high tide, together with examination of data on sediment and invertebrate distribution and abundance, we aimed to identify areas (subsites) within the site that are the most important for foraging and roosting on a species by species basis.

[15] Low tide surveys: 16/10/09, 16/11/09, 18/12/09 & 31/01/10 plus a high tide survey on 24/01/10.

Data analyses were undertaken to determine the proportional use of subsites by each Special Conservation Interest (SCI) species, relative to the whole area surveyed on each survey occasion. Analyses were undertaken on datasets as follows:

- Total numbers (low tide surveys);
- Total numbers (high tide survey);
- Total numbers of foraging birds (low tide surveys);
- Total numbers of roosting birds (low tide and high tide surveys).
- Foraging densities (low tide surveys).

For each of the analyses listed above and for each survey date completed, subsites were ranked in succession from the highest to the lowest in terms of their relative contribution to each species' distribution across all subsites surveyed. Rank positions were then converted to categories (see below) with the exception of assessments relating to the single high tide survey or average foraging density that are presented simply as rank numbers. The highest rank position/category for each subsite across any of the low tide count dates is presented in a subsite by species matrix.

Subsite Rank Position - Categories

Very High (V)	Any section ranked as 1.
High (H)	Top third of ranking placings (where n = total number of count sections species was observed in)
Moderate (M)	Mid third of ranking placings (where n = total number of count sections species was observed in)
Low (L)	Lower third of ranking placings (where n = total number of count sections species was observed in).

Intertidal foraging density was calculated for selected species and for each low tide survey occasion, by dividing the number of the species within a subsite by the area of intertidal habitat within the same subsite. Subsites were then ranked based on the peak foraging density recorded. Whole site intertidal foraging density was calculated by summing the mean subsite counts for each species and dividing by the total area of intertidal habitat.

Waterbird count data for low tide surveys are also presented as species distribution maps ('dot density maps'). Dot-density maps show waterbird species distribution within intertidal or subtidal habitat[16] divided into 'foraging' birds and 'roosting/other' birds. These maps show the number of birds represented by dots; each dot representing one, or a pre-determined number of birds. As the dots are placed in the appropriate subsites and broad habitat types for the birds counted, the resulting map is equivalent to presenting numbers and densities and provides a relatively quick way of assessing species distribution. **Note however, that dot-density maps are not intended to show the actual position of each bird; the dots are placed randomly within subsites so no conclusions can be made at a scale finer than subsite.**

In contrast to dot-density maps, roost maps produced from roost survey data show the mapped locations of waterbird roosts, but note the limitations in relation to field mapping discussed below.

[16] Note that birds within supratidal or terrestrial habitat are not included within these maps.

Notes on data interpretation and methodological limitations

Subsite rankings and dot-density maps relate to the distribution of waterbirds at subsite level as recorded within the survey area during the 2009/10 waterbird survey programme. Care must be taken in the interpretation of these data, and subsite rankings in isolation should not be used to infer a higher level of conservation importance to one area over another without a detailed examination of data and understanding of each species' ecology. For instance, while some species are known to be highly site-faithful, both at site level and within-site level (e.g. Dunlin), other species may range more widely across a site(s). While some species by their nature may aggregate in high numbers, others such as Greenshank or Grey Heron may not. It is also important to consider that distribution maps and data refer to a single season of low tide surveys. Although important patterns of distribution will emerge, these distributions should not be considered absolute; waterbirds by their nature are highly mobile and various factors including tide (e.g. spring/neap), temperature, direction of prevailing winds, changing prey densities/availabilities and degree of human activity across the site, could lead to patterns that may change in different months and years.

The mapping of flock positions or roost locations over large distances in intertidal habitats (i.e. mapping by eye) is inherently difficult and prone to error. Flock or roost positions should therefore be viewed as indicative only.

5.3.3 Summary Results

A total of 43 waterbird species were recorded during the 2009/10 survey programme at Blackwater Estuary SPA. Cummins and Crowe (2010) provide a summary of waterbird data collected. Of note were the weather conditions recorded during the winter of 2009/10. December 2009 was the coldest for 28 years (Met Éireann (2009) and the cold spell persisted into the first half of January; January being the coldest on record for 25 years (Met Éireann, 2010). Such weather events are likely to affect waterbird distribution patterns across Ireland and Europe, and results of the Waterbird Survey Programme should be interpreted with this regard. This is further discussed in relation to waterbird patterns across wetland sites covered by the Irish Wetland Bird Survey (I-WeBS) in Crowe et al. (2011).

All SCI species were recorded within all counts undertaken with the exception of Golden Plover, which was not recorded on the final count day (31/01/10). Table 5.4 shows peak numbers (whole site) for SCI species recorded during the low tide (LT) and high tide (HT) surveys.

Average percentage occupancy, defined as the average proportion of subsites in which a species occurred during low tide counts was lowest for Golden Plover that occurred, on average, in less than 10% of subsites (Table 5.4). Curlew and Redshank were the most widespread species, occurring in over 90% of subsites during low tide surveys.

Average percentage area occupancy is defined as the average proportion of the whole site area that a species occurred in during low tide counts. Although this is a broad calculation across all habitat zones it presents some indication of the range of a species across the site as a whole. The lowest average percentage area occupancy was recorded for Golden Plover. Four of the SCI species occurred, on average, across over 50% of the area surveyed; Dunlin and Bar-tailed Godwit also revealing a relatively restricted distribution (34% of survey area).

Table 5.4 Blackwater Estuary SPA 2009/2010 waterbird surveys – summary data

Site Special Conservation Interests (SCIs)	Peak number - LT surveys[I]	Peak number - HT survey[II]	Average subsite % occupancy [III]	Average % area occupancy [III]
Black-tailed Godwit*	846 (i)	287 (n)	54.5 (23.5)	59.0 (29.5)
Curlew*	411	72	90.9 (7.4)	94.7 (3.5)
Wigeon	431	490	59.1 (11.7)	67.1 (7.7)
Golden Plover	86	22	9.1 (7.4)	8.5 (12.6)
Lapwing	1,079	1,322	45.5 (0)	47.9 (0.8)
Dunlin	734	743	29.5 (4.5)	34.3 (10.9)
Bar-tailed Godwit	95	48	20.5 (4.5)	34.1 (2.5)
Redshank	622 (n)	468 (n)	90.9 (0)	93 (0)

* site selection species; (i) denotes numbers of International importance; (n) denotes numbers of all-Ireland importance (1% thresholds; 1999/00 – 2003/04 Crowe et al. 2008).
[I] 4 low-tide counts undertaken on 16/10/09, 16/11/09, 18/12/09 & 31/01/10; [II] High-tide count undertaken on 24/01/10; [III] Mean (± s.d.) averaged across low tide surveys.

Species richness (total number of species) across the whole site was relatively consistent throughout the survey programme with a total of 32, 33, 34, and 30 species recorded during the four low tide counts respectively, with 30 species recorded during the high tide survey.

Species richness at subsite level ranged from an average four species (0L436) to 24 species (0M489) during low tide surveys (Table 5.5). 0M489 (Ferrypoint to Newtown) also supported the peak number (20 species) during the high tide survey, closely followed by 0M488 (Blackbog) (19 species).

Table 5.5 Subsite species richness

Subsite	Subsite Name	Mean (±S.D) LT Survey	HT Survey	Peak Overall
0L432	Outer Youghal Harbour	6 (±1)	5	7 (LT)
0L436	Tourig river (Rincrew Section)	4 (±2)	2	6 (LT)
0L437	Tourig river	14 (±1)	17	17 (HT)
0L438	Youghal mudlands	15 (±3)	8	17 (LT)
0L439	Foxhole to Youghal Bridge	14 (±1)	15	16 (LT)
0M382	Ballinaclash Quay	13 (±)	12	15 (LT)
0M383	Templemichael	11 (±1)	8	13 (LT)
0M395	Ballynatray	9 (±1)	11	11 (HT)
0M487	Pillpark	16 (±2)	8	20 (LT)
0M488	Blackbog	13 (±1)	19	19 (HT)
0M489	Ferrypoint to Newtown	24 (±10)	20	25 (LT)

5.3.4 Waterbird distribution

Data analyses determined the proportional use of subsites by each Special Conservation Interest (SCI) species, relative to the site as a whole during both low tide and high tide surveys. Selected results from these 'subsite assessments' are shown in Tables 5.6 (a–f). The relative importance of each subsite is based on the final rank positions (see 5.3.2 for methodology). Where a box is left blank, means simply that a species was not recorded in that subsite.

Ranked assessments relate to the broad habitat that birds were observed in. In some cases, data for different broad habitats have been combined such as intertidal and supratidal habitats (roosting birds) or intertidal/subtidal, the latter for some wading birds in order to include those individuals that had their feet in water and hence recorded as subtidal (see superscripts and their description for each table).

The fact that different subsites may be ranked as 'Very High' for the same species highlights the fact that several subsites may be equally important for the species being analysed. This approach, rather than averaging across all surveys, allows for equal weightings to be given for temporal differences – e.g. concentrations of foraging birds in different subsites at different

times reflecting the natural pattern of distribution across time as species move in response to changing prey densities or availabilities.

Tables 5.6 (a–f) are followed by species discussion notes which provide additional information on the distribution of each SCI species, drawing upon the full extent of the data collected and analysed for Blackwater Estuary SPA. Waterbird distribution dot-density maps are provided in Appendix 7; summary roost data are presented in Appendix 8.

Table 5.6 (a) Blackwater Estuary SPA Subsite assessment – total numbers during LT surveys (across all behaviours and habitats) (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods). (Note that Pintail were not recorded during any survey).

Subsites ► / Species ▼	BW	CU	WN	GP	L.	DN	BA	RK
OL432		L						
OL436		L	M		M			L
0L437	H	H	V		V	V		H
0L438	L	M	L		L			L
0L439	V	M	H		H			M
0M382	H	M	M		V	V	H	H
0M383	L	H	M				H	L
0M395	M	H	M				M	M
0M487	V	H	M		M		V	V
0M488	M	V	H	V	V	M		H
0M489	M	V	V	H	H	V	V	V

Table 5.6 (b) Blackwater Estuary SPA Subsite assessment – ranked total numbers HT Survey (across all habitats)

Subsites ► / Species ▼	BW	CU	WN	GP	L.	DN	BA	RK
OL432								
OL436								10
0L437	1	3	2		1	2		4
0L438			4		5			7
0L439	3	5			6			6
0M382	2	4	5		3	1	3	1
0M383		6						9
0M395	5	2						5
0M487								8
0M488	4	1	1		4	3	1	2
0M489		6	3	1	2	4	2	3

Table 5.6 (c) Blackwater Estuary SPA Subsite assessment – total numbers foraging intertidally[I], subtidally[II] and intertidal/subtidal combined[III] (LT surveys) Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods).

Subsites ► BW[III]	CU[III]	WN[I]	WN[II]	GP	L.[I]	DN[III]	BA[III]	RK[III]
Species ▼								
OL432	L			*not recorded*				
OL436	M				H			L
0L437	M	M		H	V	V		H
0L438	M	H		V				L
0L439	H	H			H			M
0M382	V	M		M	V	V	H	H
0M383	L	H	M	H			H	L
0M395	H	M					M	M
0M487	V	V	V	L	H		V	V
0M488	H	H	V		H	M		H
0M489	M	V	V	V		V	V	V

Table 5.6 (d) Blackwater Estuary SPA Subsite assessment – ranked peak intertidal foraging density for selected species - LT surveys

Subsites ► BW	CU	WN	L.	DN	BA	RK
Species ▼						
OL432	11					
OL436	1		4			5
0L437	5	10		1	1		3
0L438	9	9					10
0L439	4	7		2			8
0M382	1	8		3	2	5	2
0M383	7	4	4			2	9
0M395	3	5				3	6
0M487	2	2	2	6		1	1
0M488	6	6	1	5	4		4
0M489	8	3	3		3	4	7

Table 5.6 (e) Blackwater Estuary SPA Subsite assessment – total numbers (roosting/other behaviour) during LT surveys (Intertidal[I], Subtidal[II], Intertidal/Subtidal combined[III]); Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods).

Subsites ► / Species ▼	BW[I]	CU[III]	WN[I]	WN[II]	GP[I]	L.[I]	DN[III]	BA[III]	RK[III]
OL432									
OL436			H	M					
0L437	H	V	V	V		V	H		V
0L438			L						
0L439	V	M	H	H		H			H
0M382	H	L	L	H		V	V		M
0M383		H	L					V	M
0M395	H	V	H						H
0M487	H	H	L						
0M488		V			V	V	M		V
0M489		V	V	V	H	L		H	

Table 5.6 (f) Blackwater Estuary SPA Subsite assessment – ranked total numbers (roosting/other behaviour) during HT survey (Intertidal[I], Subtidal[II,] Intertidal/Subtidal combined[III] and Supratidal only[IV])

Subsites ► / Species ▼	BW[I]	CU[III]	WN[I]	WN[II]	GP	L.[I]	DN[III]	BA[III]	RK[III]	RK[IV]
OL432					*not recorded*					
OL436										
0L437	1	4		3		1	2		4	4
0L438				4						2
0L439	3	3				3				3
0M382		5	2	5		2			2	
0M383										5
0M395		2								
0M487									5	
0M488		1	1	2			1	1	1	6
0M489	2			1						1

Blackwater Estuary - Waterbird Survey Programme 2009/10

Waterbird distribution - discussion notes

Where mentioned, information on benthic communities or sediment is from the intertidal and subtidal sampling programme commissioned by the National Parks & Wildlife Service (NPWS) and Marine Institute and reported in ASU (2010) and NPWS (2012).

'I-WeBS' refers to count data recorded at Blackwater Estuary as part of the Irish Wetland Bird Survey.

Black-tailed Godwit *Limosa limosa* - Family (group): Scolopacidae (wading birds)

Black-tailed Godwits *Limosa limosa* have a widespread Palearctic breeding distribution. Four populations are recognised – three populations of the nominate *L. l. limosa* and one *L. l. islandica*, the latter of which breeds almost exclusively in Iceland and winters in Britain, Ireland, Spain, Portugal and Morocco (Delaney et al. 1999).

Numbers

Numbers of Black-tailed Godwits peaked in November when 846 were counted, representing numbers of international importance.
265 Black-tailed Godwits were recorded during the high tide survey (24/01/10). The site peak recorded during I-WeBS for the winter 2009/10 was 509 individuals. Total numbers were most likely affected by the cold weather event (December 2009/January 2010).

This species was recorded in nine subsites overall but only two subsites supported the species during all four low tide surveys: 0L439 and 0M382. Two subsites supported peak numbers; 0L439 (Foxhole to Youghal Bridge) on 16/11/09 and 31/01/10 and 0M487 (Pillpark) on 16/10/09 and 18/12/09. The subsite peak of 421 Black-tailed Godwits (numbers of all-Ireland importance) was recorded for 0L439 (Foxhole to Youghal Bridge) on 16/11/09.

Foraging Distribution

Black-tailed Godwits are relatively large long-billed wading birds that forage within intertidal flats for their preferred prey of bivalves such as *Macoma balthica*, *Scrobicularia plana* and *Mya arenaria*. At some sites, polychaete worms form a larger proportion of the diet and the species is relatively adaptable, utilising other habitats for foraging where available, such as terrestrial grassland, coastal marshes or freshwater callows.

0M487 (Pillpark) supported peak numbers of foraging individuals during three low tide surveys (16/10/09, 18/12/09 & 31/01/10), accounting for 40% - 60% of the birds foraging intertidally on the respective survey occasions. An additional (partial) low tide survey undertaken on 16/12/09 recorded 376 foraging within 0M487 (Pillpark); this was the single largest number recorded foraging within a subsite during the survey programme. 0M382 (Ballinaclash Quay) supported the only foraging individuals (15) on 16/11/09, but supported numbers ranked as second highest on a further two occasions, including 221 individuals on 18/12/09.

The benthic community of both 0M487 (Pillpark) and 0M382 (Ballinaclash Quay) are classified predominantly as 'intertidal estuarine sandy mud' (NPWS, 2012). Distinguishing species of this community include the bivalves *Macoma balthica* and *Scrobicularia plana*, both particularly favoured by Black-tailed Godwits, as well as several polychaete worms that may form part of Black-tailed Godwit diet (e.g. *Nephtys hombergi* and *Hediste diversicolor*). Within 0M487, the godwits tended to distribute across the wider part of 0M487, towards Pillpark, rather than northwards towards Youghal Bridge, where the sediment becomes sandier.

0L439 (Foxhole to Youghal Bridge) held foraging individuals on three low tide survey occasions with good numbers (91) during the final low tide count (31/01/10), accounting for 38% of individuals foraging on that date. This subsite is also classified as 'intertidal estuarine sandy mud' (NPWS, 2012).

Terrestrial foraging within agricultural grassland (outside of the SPA boundary) was recorded only once - adjacent to 0M382 (Ballinaclash Quay) during the January 2010 high tide survey. However, terrestrial foraging is likely to occur regularly within these and other suitable grassland areas that are outside the SPA boundary.

The overall peak intertidal foraging density was recorded for 0M382 (Ballinaclash Quay) which supported 8.7 Black-tailed Godwits ha^{-1} on 18/12/09. This was closely followed by 0M487 (Pillpark) which supported a peak density of 7.8 Black-tailed Godwits $ha.^{-1}$ The whole site average intertidal foraging density was 1.0 Black-tailed Godwit ha^{-1}.

Roosting Distribution

Black-tailed Godwits were often recorded roosting intertidally, rather than foraging, during low tide surveys, most notably on 16/11/09 when 831 individuals were located within 0L437 (Tourig river) and 0L439 (Foxhole to Youghal Bridge). This latter subsite supported roosting individuals during all low tide surveys. Irregular low tide roosting records were also obtained for 0M382, 0M395, 0M487 and 0M488.

During the high tide survey (24/01/10), 147 Black-tailed Godwits were recorded roosting, 123 of which were located within 0L437 (Tourig river), divided across three large mixed-species roosts positioned intertidally. At over an hour before high water, these birds would have moved as the tide came in further.

145 Black-tailed Godwits were recorded roosting during the roost survey (07/03/10) the majority (98%) located within 0M488 (Blackbog) within two separate mixed-species flocks that roosted intertidally backed by saltmarsh.

Curlew *Numenius arquata* - Family (group): Scolopacidae (wading birds)

The Curlew has a widespread breeding range across temperate latitudes of the Palearctic region, occurring across Europe and Asia from Ireland in the west to northern China in the east (Delaney et al. 2009). The nominate subspecies breeds across Europe and winters in Europe. Ireland supports a small and declining population of breeding Curlew. Irish breeding Curlew are thought to make only short migrations, many resident during winter. Wintering numbers are enhanced by birds moving in from breeding grounds in Fennoscandia, the Baltic and northwest Russia (Delaney et al. 2009).

Numbers

Numbers of Curlew peaked early during October 2009 when 504 were recorded. Thereafter numbers ranged from 140 to 342 during low tide surveys and 72 were counted during the high tide survey (24/01/10). No count surpassed the threshold of all-Ireland importance. The site peak recorded during I-WeBS for the winter 2009/10 was 435 Curlew. Lower numbers at the site than usual could possibly be attributed to the cold weather event; declines in the number of Curlew also recorded at other sites (Crowe et al. 2011) but of note is a low peak count during I-WeBS in the preceding year also (413). Indeed the peak I-WeBS counts of 2008/09 and 2009/10 were the lowest in the 15-year dataset.

Curlew occurred in all 11 subsites and was the most widespread SCI species. 0M489 (Ferrypoint to Newtown) supported peak numbers during three low tide surveys and recorded the subsite peak of 241 Curlew. 0M488 (Blackbog) held peak numbers on one low tide occasion, peak numbers during the high tide survey and good numbers during all other surveys. 0M487 (Pillpark) is notable for supporting second highest numbers on three survey occasions.

Foraging Distribution

Curlews are the largest intertidal wader to spend the non-breeding season within Ireland. Within intertidal areas they seek out larger prey items such as crabs, large worms and bivalves and their de-curved bill is ideally suited to extracting deep-living worms such as Lugworms (*Arenicola marina*). Curlews also feed amongst damp grasslands where they take terrestrial worms.

Overall, Curlews were recorded foraging within nine of the total 11 subsites during low tide surveys. However a subsite preference was evident with 0M489 (Ferrypoint to Newtown) supporting the highest numbers during all low tide surveys with an overall peak of 217 Curlew on 16/10/09. 0M487 (Pillpark) supported second highest numbers on three survey occasions and joint-peak numbers on 18/12/09 (27 individuals).

Subsites 0M487 and 0M489 are classified predominantly as 'intertidal estuarine sandy mud' (NPWS, 2012). Distinguishing species of this community include the Lugworm as well as other large polychaetes including the Catworm *Nephtys hombergi*. A central sandbank that extends in a north-south direction alongside the Blackwater River at low tide, effectively forming an island, and known as 'Red Bank' on Admiralty charts, was noted to support dense concentrations of birds at low tide including Curlews and Oystercatchers. Although the benthic community of the sandbank was not determined, this area may be a continuation of an extensive Mussel (*Mytilus edulis*) bed community complex that extends down the eastern side of the harbour. Mussel beds are known as important biogenic structures of the estuarine ecosystem, serving as both habitat and food resource for many species with a resulting higher biodiversity than surrounding mudflats (Tyler-Walters, 2008). Due to its larger size, this intertidal reef is considered important (ASU, 2010), and its presence likely explains the dense concentrations of waterbirds in this area, including Oystercatchers that would feed directly on the Mussels.

An additional (partial) low tide survey undertaken on 16/12/09 recorded Curlew foraging intertidally within 0M487, 0M488 and 0M489 with 23, 13 and 15 individuals respectively.

Terrestrial foraging within agricultural grassland (outside of the SPA boundary) was recorded for four subsites (0L437, 0L438, 0M488 and 0M489).

The overall peak intertidal foraging density was recorded for 0L436 (Tourig river (Rincrew Section)) which supported 3.9 Curlew ha^{-1} on 16/11/09. The second highest density recorded was 3.2 Curlew ha^{-1} (0M487 Pillpark). The whole site average intertidal foraging density was 0.68 Curlew ha^{-1}.

Roosting Distribution

Curlews were recorded in roosting/other behaviour across eight subsites during low tide surveys. This was recorded most frequently in 0M488 (Blackbog) (all five survey occasions). 0L437 (Tourig river) held good numbers roosting intertidally on 16/10/09 (77 individuals) with smaller numbers thereafter. 0M489 (Ferrypoint to Newtown) held good numbers roosting on two occasions.

During the January 2010 high tide survey, only 31 Curlews were recorded roosting and total numbers were also down on this day, most likely as a consequence of the cold weather event. 0M488 (Blackbog) supported the majority of individuals roosting on this day.

87 Curlew were counted during the roost survey (07/03/10), the majority (52) located within/adjacent 0M488 (Blackbog). A single roost of 30 individuals was recorded within 0L439 (Foxhole to Youghal Bridge) and smaller number were recorded within 0M395 and 0M489.

Wigeon *Anas penelope* - Family (group): Anatidae (ducks)

Wigeon have a widespread breeding distribution across northern Europe and Asia, from Iceland and northern Britain across Scandinavia, and northern Russia to the Russia to the Bering Sea coast (Wernham et al. 2002). The species is highly migratory. Five main wintering groups are known; birds breeding in northwest and northeast Europe and west Siberia spend winter in northwest Europe.

Numbers

Whole site numbers of Wigeon rose from 121 in October 2009 to a site peak of 490 during the January 2010 high tide survey. 431 were counted during the final low tide survey on 31/01/10. The site peak recorded during I-WeBS for the winter 2009/10 was 390 Wigeon. No count surpassed the threshold of all-Ireland importance.

Wigeon were recorded in ten subsites overall (not in 0L432). Subsite usage during low tide surveys ranged from five to eight (average 60% of subsites). 0M489 (Ferrypoint to Newtown) supported peak numbers during three low tide surveys and good numbers (ranked 3rd) during the high tide survey. 0L437 (Tourig river) supported the second highest numbers on three survey occasions and joint peak numbers (98 individuals) on 18/12/09. 0M488 (Blackbog) held peak numbers during the high tide survey (198 individuals).

Foraging Distribution

The Wigeon diet is almost entirely vegetarian and a major part of the diet comprises seagrass and algae species which are taken by grazing or dabbling in shallow water. Wigeon also forage within grasslands and agricultural crops for seeds, stems and rhizomes. A gregarious bird, they are rarely seen far from water.

Wigeon foraged across intertidal habitats of four subsites: 0M383, 0M487, 0M488 and 0M489. Records were irregular with the exception of 0M489 (Ferrypoint to Newtown) and 0M488 (Blackbog) which supported foraging individuals on three low tide survey occasions. Other subsites were used on one or two occasions only. Subtidal foraging was recorded most regularly within 0M489 (Ferrypoint to Newtown), peak number 155 individuals on 31/01/10. 83 Wigeon ere also recorded foraging subtidally during an additional (partial) count undertaken on 16/12/09. With the exception of 0M383, Wigeon foraging distribution therefore coincided mainly with the eastern section of the site within intertidal areas classified predominantly as 'intertidal estuarine sandy mud' (NPWS, 2012). They were not recorded foraging in the intertidal *Zostera noltii* bed within 0L439, but are likely to do so at other times/states of the tide.

0M382, 0M383 and 0M487 held subtidally foraging Wigeon on the single survey date of 18/12/09. 0M488 (Blackbog) supported 54 supratidally foraging Wigeon on 18/12/09. 128 were also recorded during the high tide survey (24/01/10); 103 also recorded foraging supratidally within 0L437 (Tourig river) on this date.

Roosting Distribution

Intertidally roosting Wigeon were recorded across ten subsites throughout the survey programme but most records were irregular; exceptions being 0L437 (Tourig river) (three separate occasions) and most notably 0M489 (Ferrypoint to Newtown) which supported roosting individuals on all low tide survey occasions (peak number 116 on 31/01/10).

Only 52 Wigeon roosted intertidally during the high tide survey (24/01/10), the majority within 0M488 (Blackbog). A further 191 roosted/other subtidally on this date, the majority (63%) within 0M489 (Ferrypoint to Newtown).

A single roost of 32 Wigeon was recorded during the roost survey within 0M488 (Blackbog); a further 45 Wigeon also foraged within this inner subsite within supratidal and subtidal habitats.

Golden Plover *Pluvialis apricaria* - Family (group): Charadridae (wading birds)
The Eurasian Golden Plover is a Palearctic species, occurring mainly at higher latitudes of Western Europe to north-central Siberia and wintering south in Europe, north Africa and parts of Asia. Two subspecies are currently described. *P. a. altifrons* is the 'northern' form and breeds at high latitudes in Western Eurasia from Iceland and the Faeroes across northern Scandinavia to 125^{0}E in the north Siberia lowlands south of Taymyr (Delaney et al. 2009). The nominate *P. a apricaria* breeds at more southerly latitudes including Ireland and Britain and migrates south for winter. Golden Plovers that winter in Ireland are thought to be mostly Icelandic-breeding birds *P. a. altifrons* (Wernham et al. 2002).
Numbers
Total numbers of Golden Plover varied greatly across the months which is not unusual given the species' tendency to move between coastal wetland sites and agricultural grassland foraging areas. The species absence during the January 2010 count was likely related to the cold weather event, which saw numbers across wetland sites in Ireland plummet (Crowe et al. 2011). The site peak number (86 on 16/11/09) contrasts greatly to the peak recorded during I-WeBS (281) for the same winter. Golden Plovers were recorded in two subsites only: 0M488 (Blackbog) and 0M489 (Ferrypoint to Newtown).
Foraging Distribution
During winter, Golden Plovers feed primarily within agricultural grassland and arable land. Tidal flats are used more as a roosting/resting habitat and the birds tend to favour large, open tidal flats. As a consequence, Golden Plovers tend to be in large aggregations when observed upon tidal flats. Intertidal feeding is observed to a greater degree during cold weather periods when grassland feeding areas are frozen over. Although Golden Plovers eat a wide range of invertebrate species, relatively little is known about their intertidal feeding patterns (Gillings et al. 2006). Golden Plovers were not recorded foraging intertidally during low tide surveys. A single record of 22 Golden Plover foraging terrestrially was made (adjacent to 0M489) although this is likely to be a more regular occurrence.
Roosting Distribution
0M488 (Blackbog) recorded individuals roosting intertidally with most frequency (three occasions) with a peak number of 48 on 16/11/09. 0M489 (Ferrypoint to Newtown) supported 38 roosting individuals on 16/11/09. Golden Plover were not recorded during the roost survey on 07/03/10.

Lapwing *Vanellus vanellus* - Family (group): Charadriidae (wading birds)

The Lapwing is a monotypic species and has a wide Palearctic breeding distribution from Britain and Ireland in the west to Eastern and southern Siberia in the east with a southern limit extending into Spain (Delaney et al. 2009). Birds breeding in Britain and Ireland are partial migrants with some residing over winter and some migrating south. The wintering population is enhanced by Lapwings moving in from continental Europe and northern and western Britain (Wernham et al. 2002). Cold weather movements can see a greater flux of birds to Ireland's estuaries.

Numbers

Whole site numbers of Lapwing peaked during the January 2010 high tide survey (1,300 individuals) and 1,079 were counted on the final low tide survey day. Numbers in the earlier survey programme were much lower and highly variable. No count surpassed the threshold of all-Ireland importance. The site peak recorded during I-WeBS for the winter 2009/10 was 793 Lapwing. Nationally, I-WeBS recorded lower numbers of Lapwing during January 2010 attributed to the cold weather event (Crowe et al. 2011); this pattern therefore not evident at Blackwater Estuary.

Across the survey programme, Lapwings were recorded within eight of the 11 subsites. Two subsites recorded the species in all surveys undertaken: 0L487 and 0M382.

0L437 (Tourig river) supported peak numbers on 16/11/09 and 31/01/10 and the subsite peak number (805) during the high tide survey. 0M382 (Ballinaclash Quay) held peak numbers on one occasion and good numbers in all other surveys. 0M488 (Blackbog) supported peak numbers on 16/10/09 and good numbers on two other low tide survey occasions.

Foraging Distribution

Lapwings are traditionally 'inland' waders. During winter they can be observed across a wide variety of habitats, principally using lowland farmland and freshwater wetlands (e.g. turloughs and callows) but also coastal wetlands where they feed on a variety of soil and surface-living invertebrates. They are opportunistic and mobile birds and will readily exploit temporary food sources such as newly-ploughed fields. Estuaries are typically used as roosting areas where large flocks may be observed roosting upon the tidal flats but coastal areas will also be used to a greater degree during cold weather events when farmland and freshwater habitats freeze over. There is evidence in the UK that utilisation of coastal habitats has increased, coupled with an increase in intertidal feeding (Gillings et al. 2006).

At Blackwater Estuary, Lapwings foraged irregularly across intertidal habitats, generally within one or two subsites on count days. The exception is 31/01/10 when 700 foraged across four subsites (0L437, 0L439, 0M382 and 0M488); 86% of these within 0L437 (Tourig river). 0M382 (Ballinaclash Quay) was notable in recording foraging individuals on four separate survey occasions (peak number 25 on 24/01/10). 0L437, 0M382, 0M488 and to a lesser extent 0L439, are all characterised by being upper estuarine subsites, highly influenced by freshwater, and relatively sheltered. In terms of benthic community, all are classified predominantly as 'intertidal estuarine sandy mud' (NPWS, 2012).

Terrestrial foraging (outside of SPA boundary) was recorded adjacent/within subsites 0L438, 0M488 and 0M489; the peak number recorded was 239 individuals adjacent to 0M489 during the high tide survey (24/01/10).

Roosting Distribution

Intertidal roosting was recorded regularly within 0L437, 0L439, 0M382 and 0M488. The peak number recorded was 506 within 0L437 (Tourig river) during the high tide survey. These birds were distributed among five different mixed-species roosts, positioned both intertidally and supratidally (saltmarsh). A further 115 roosted intertidally within 0M382 (Ballinaclash Quay) as three separate flocks (15+ 52 + 48) positioned on both sides of the river. Lapwings were not recorded during the roost survey on 07/03/10.

Dunlin *Calidris alpina* - Family (group): Scolopacidae (wading birds)
The Dunlin is a Holarctic and highly migratory wader, breeding widely in Arctic zones across Europe, Asia and North America. The nominate form *alpina* breeds from northern Scandinavia eastwards across European Russia and western Siberia to 85^0 E (Delaney et al. 2009). This race migrates southwest to winter along the coasts of Western Europe, south to Iberia, western Mediterranean and beyond. *C. a. alpina* originating from the western part of their breeding range moult mainly in the Wadden Sea and begin to arrive in Ireland during October (Crowe, 2005). Ireland has a small and declining breeding population of *Calidris alpina schinzii* which are believed to winter mainly in west Africa (Delaney et al. 2009).
Numbers
Low tide numbers rose from 23 individuals on 16/10/09 to a peak of 734 Dunlin on 18/12/09. 743 Dunlin were recorded during the high tide survey (24/01/10). No count surpassed the threshold of all-Ireland importance. The peak I-WeBS count for 2009/10 was 247 individuals. Overall, Dunlins were recorded within five subsites (0O437, 0M382, 0M487, 0M488 and 0M489) but most regularly within three subsites: 0L437 (Tourig river), 0M382 (Ballinaclash Quay) and 0M489 (Ferrypoint to Newtown), all three of which supported peak numbers on at least one survey occasion. The subsite peak of 689 Dunlin was recorded for 0M489 (Ferrypoint to Newtown) on 18/12/09.
Foraging Distribution
Dunlins are small wading birds that forage across intertidal mudflats. They forage upon a range of invertebrates including bivalves such as *Macoma balthica* and *Scrobicularia plana* (small size-classes[17]), polychaete worms such as *Hediste diversicolor* (Dierschke et al. 1990; Santos et al. 2005) and smaller polychaetes such as *Spionidae* and *Phyllodocidae* (Dit Durrel & Kelly, 1990) (see review in Santos et al. 2005). In the Blackwater estuary, intertidally foraging Dunlin were recorded within 0L437 (Tourig river) and 0M382 (Ballinaclash Quay) on every survey occasion and both subsites supported peak numbers at least once during the survey programme. Although 0M489 (Ferrypoint to Newtown) recorded foraging Dunlin on only two occasions (16/11/09 & 18/12/09) these were peak subsite counts on the respective days (156 and 689 individuals). 0L437 (Tourig river) and 0M382 (Ballinaclash Quay) are upper estuarine subsites, characterised by a relatively high degree of freshwater influence, muddier sediments and relative shelter in comparison to subsites in the lower estuary. Dunlins preference for muddier substrates is consistent with previous reports (e.g. Hill et al. 1993; Summers et al. 2002; Santos et al. 2005). In terms of benthic community, 0L437 and 0M382 are classified predominantly as 'intertidal estuarine sandy mud' (NPWS, 2012) which supports a range of invertebrate species that could form part of the Dunlin diet including the Mud Snail *Hydrobia ulvae* that occurs in moderate to high abundances (NPWS, 2012), the bivalve Scrobicularia plana plus a diverse range of polychaete worms. NPWS (2012) note that the Ragworm *Hediste diversicolor*, documented to be favoured by Dunlin at some sites, is particularly abundant in the upper estuarine, muddy areas of the site and although subsites 0L437 and 0M382 were not surveyed in detail, it would be considered usual for *Hediste diversicolor*-dominated biotopes to dominate in such upper estuarine areas. The overall peak intertidal foraging density was recorded for 0L437 (Tourig river) which supported 16.1 Dunlin ha^{-1} on 31/01/10. The second highest density recorded was 14.9 Dunlin ha^{-1} (0M382 Ballinaclash Quay). The whole site average intertidal foraging density was 1.2 Dunlin ha^{-1}.
Roosting Distribution
Almost no intertidal roosting/other behaviour was recorded during low tide surveys, the exception being 234 Dunlin roosting within 0M382 (Ballinaclash Quay) on 31/01/10. During the high tide survey, 193 Dunlin roosted intertidally, the majority (85%) within 0M488 (Blackbog). During the roost tide survey (07/03/10), a single roost of 34 Dunlin was recorded within 0M488 (Blackbog).

[17] Size classes – e.g. Santos et al. (2005) recorded ingested *Scrobicularia plana* in the range 2 – 12mm; average 7mm.

Bar-tailed Godwit *Limosa lapponica* - Family (group): Scolopacidae (wading birds)
The Bar-tailed Godwit has a widespread breeding distribution across the sub-arctic and low Arctic zones of the Palearctic and extending into western Alaska (Delaney et al. 2009). The taxonomy of the species is complex but five subspecies are generally recognised. The nominate subspecies *L. l. lapponica* breeds across the higher latitudes of Northern Europe, Russia and Siberia and west and winters mainly in Western Europe. The Wadden Sea is used by *L. l. lapponica* and other populations as a staging and moulting area in autumn and spring.
Numbers
Whole-site numbers rose from just five in October 2009 to a site peak of 95 on 18/12/09. 11 individuals were recorded during the January 2010 high tide survey. The site peak recorded during I-WeBS for 2009/10 was 73 Bar-tailed Godwits. No count surpassed the threshold of all-Ireland importance. Across the entire survey period, Bar-tailed Godwits were recorded in six subsites (0M382, 0M383, 0M395, 0M487, 0M488 and 0M489). However most subsites recorded few individuals on one or two occasions only. 0M489 (Ferrypoint to Newtown) was notable in that it supported the species during all surveys (numbers<10). Pillpark (0M487) held higher numbers (max 93) on two survey occasions only.
Foraging Distribution
Bar-tailed Godwits generally forage within sandier sediments (e.g. Hill et al. 1993) and the birds forage by probing within the sediment for invertebrate species, of which polychaete worms such as Lugworm *Arenicola marina* are the most favoured. Bar-tailed Godwits foraged most regularly within 0M489 (Ferrypoint to Newtown), numbers ranging from two to eight individuals. Pillpark (0M487) held high numbers (93 and 40) on 18/12/09 and 31/01/10 respectively. In terms of benthic community, 0M489 and 0M487 are classified predominantly as 'intertidal estuarine sandy mud' (NPWS, 2012). Characterising species of this community include the large polychaetes *Hediste diversicolor*, *Arenicola marina* and *Nephtys hombergi,* all of which could be taken as prey by Bar-tailed Godwits. Both subsites also contain a variant of the aforementioned community that occurs either side of the Blackwater River at Youghal Mudlands. Here, sand constitutes the major portion of the sediment fractions and the fauna is dominated by polychaetes with *Capitella capitata, Nephtys hombergii*, *Spio martinensis*, *Pygospio elegans* and *Arenicola marina* all occurring in moderate abundances (NPWS, 2012). The overall peak intertidal foraging density was recorded for 0M487(Pillpark) which supported 3.2 Bar-tailed Godwits ha^{-1} on 18/12/09. The second highest peak subsite intertidal foraging density was 0.2 Bar-tailed Godwits $ha.^{-1}$ 0M383 (Templemichael). The whole site average intertidal foraging density was 0.13 Bar-tailed Godwits ha^{-1}.
Roosting Distribution
Relatively little roosting behaviour was recorded during surveys, one-off records for the following subsites obtained: 0M383, 0M488 and 0M489 (numbers < 10). A single roost of seven individuals was recorded within 0M488 (Blackbog) during the roost survey (seven individuals).

Redshank *Tringa totanus* - Family (group): Scolopacidae (wading birds)

Tringa totanus breeds widely across the Palearctic in a band that extends both into the low arctic and Mediterranean zones, from Iceland through continental Europe and Russia to eastern Siberia, China and Mongolia. The taxonomy of the species has proved complex but five populations are currently recognised including *T. t. britannica,* a small and declining population that breeds in Britain and Ireland, and *T. t. robusta* that breeds in Iceland and the Faeroes and winters in Britain, Ireland and the North Sea area (Delaney et al. 2009).

Numbers

Total numbers of Redshank peaked early in November 2009 (622 individuals) which surpasses the threshold of all-Ireland importance. Numbers recorded during all surveys were of all-Ireland importance. The site peak recorded during I-WeBS for the winter 2009/10 was 431 Redshank.

Redshanks were widespread across the site and recorded in ten of the 11 subsites overall (not in 0L432). 0M489 supported peak numbers on three survey occasions (16/11/09, 18/12/09 & 34/01/10). 0M382 (Ballinaclash Quay) held peak numbers during the high tide survey (24/01/10). Pillpark (0M487) supported peak numbers on 16/10/09. The peak subsite count of 234 Redshanks was recorded within 0M489 on 16/11/09. Redshank was the most widespread SCI species during the high tide survey.

Foraging Distribution

Redshanks forage mainly by pecking at the surface or probing within intertidal mudflats; generally favouring the muddier sections of sites where they prey upon species such as the Ragworm *Hediste diversicolor* and Mud Snail *Hydrobia ulvae.* A particularly favoured prey is the burrowing amphipod *Corophium volutator.*

Redshanks were recorded foraging within ten subsites overall. Pillpark (0M487) held peak numbers (183) on 16/10/09; thereafter 0M489 (Ferrypoint to Newtown) supported peak proportions during all low tide surveys, with proportions ranging from 26% to 41% of the total numbers foraging on survey days. 0L437 (Tourig river) was notable in supporting numbers ranked as high during three low tide surveys. 0M382 (Ballinaclash Quay) also supported good numbers (peak 133) during all surveys. Of these subsites, 0L437 (Tourig river) and 0M382 (Ballinaclash Quay) are upper estuarine subsites, characterised by a relatively high degree of freshwater influence, muddier sediments and relative shelter in comparison to subsites in the lower estuary. NPWS (2012) note that the Ragworm *Hediste diversicolor* is particularly abundant in the upper estuarine, muddy areas of the site and although subsites 0L437 and 0M382 were not surveyed in detail, it would be considered usual for *Hediste diversicolor*-dominated biotopes to dominate in such upper estuarine areas.

Subsites 0M487 and 0M489 are classified as 'intertidal estuarine sandy mud' (NPWS, 2012), which supports a range of invertebrate species that may form part of the Redshank diet including the Mud Snail *Hydrobia ulvae* that occurs in moderate to high abundances (NPWS, 2012), and a diverse range of polychaete worms. 0M489 also contains an intertidal Mussel (*Mytilus edulis*) community. Mussel beds are known as important biogenic structures of the estuarine ecosystem, serving as both habitat and food resource for many species with a resulting higher biodiversity than surrounding mudflats (Tyler-Walters, 2008).

A single record was made of Redshanks foraging terrestrially (and outside the SPA boundary): ten individuals in 0L438 (Youghal mudlands) on 16/11/2009.

The overall peak intertidal foraging density was recorded for 0M487(Pillpark) which supported 6.3 Redshank ha^{-1} on 16/11/09. The second highest peak subsite intertidal foraging density was 5.1 Redshank $ha.^{-1}$ 0M382 (Ballinaclash Quay). The whole site average intertidal foraging density was 1.6 Redshank ha^{-1}.

Roosting Distribution

0L437 (Tourig river) supported 23 and 36 roosting Redshanks on the first two low tide surveys dates, thereafter records of intertidal roosting/other behaviour during low tide surveys are irregular with low numbers across six subsites overall. During the high tide survey, 96 Redshank roosted intertidally across five subsites, the majority (52%) within 0M488 (Blackbog).

71 Redshank roosted supratidally across six subsites during the high tide survey, 24 individuals within 0M489 and 16 and 13 respectively within 0L438 and 0L439.

During the roost survey (07/03/10), 171 Redshank were recorded roosting. 123 Redshank roosted at three different locations within 0M488 (Blackbog). A single roost of 45 Redshank was located within 0M382 (Ballinaclash Quay) and three individuals roosted within 0L439 (Foxhole to Youghal Bridge).

5.4 Blackwater Estuary - Activities and Events

5.4.1 Introduction

The overriding objective of the Habitats Directive is to ensure that the habitats and species covered achieve '*favourable conservation status'* and that their long-term survival is secured across their entire natural range within the EU (EU Commission, 2010). In its broadest sense, favourable conservation status means that an ecological feature is in a satisfactory condition, and that this status is likely to continue into the future.

At site level, the concept of 'favourable status' is referred to as 'conservation condition.' This relates to not only species numbers, but importantly, to factors that influence a species abundance and distribution at a site. The identification of activities and events that occur at a designated site is therefore important, as is an assessment of how these might impact upon the waterbird species and their habitats, and thus influence the achievement of favourable condition. Site-based management and the control of factors that impact upon species or habitats of conservation importance are fundamental to the achievement of site conservation objectives.

Section 5 of the Conservation Advice Notes provides information on activities and events that occur in and around Blackwater Estuary SPA that may either act upon the habitats within the site, or may interact with the Special Conservation Interest species and other waterbirds using the site.

5.4.2 Assessment Methods

Information on 'activities' and 'events' across the site was collected during a desk-top review which included NPWS site reporting files, Youghal Town Council Development Plan (Youghal Town Council, 2009a) and related documents, South Western River Basin District documents (e.g. SWRBD, 2010) and other available documents relevant to the ecology of the site.

In addition, information was collected during the 2009/10 waterbird survey programme (NPWS, 2010) as field workers recorded activities or events that occurred at the site during their survey work. This information, together with results from a 'site activity questionnaire' provides valuable information gained from 30+ hours of coordinated surveyor effort across the SPA site. All data collected were entered into a database but as the dataset will be subject to change over time, the assessment should be viewed as a working and evolving process.

The 'activities' and 'events' were categorised using the standard EU list of pressures and threats as used in Article 17 reporting under the EU Habitats Directive. Only factors likely to directly or indirectly affect waterbirds were included but the resulting list is broad and includes built elements (e.g. man-made structures such as roads and bridges that are adjacent to the site), factors associated with pollution (e.g. discharges from waste water treatment plants), various recreational and non-recreational activities as well as biological factors such as the growth of the invasive plant species *Spartina anglica*.

Data are presented in three ways:-

1. Activities and events identified to occur in and around Blackwater Estuary SPA (through either the desk-top review or field survey programme) are listed in relation to the subsite within which they were observed or are known to occur. The activities/events are classified as follows:

   O observed or known to occur within Blackwater Estuary SPA
   U known to occur but unknown spatial area hence all potential subsites are included (e.g. fisheries activities).
   H historic, known to have occurred in the past.

P potential to occur in the future.

2. Of the activities and events identified to occur in and around Blackwater Estuary SPA, those that have the potential to cause disturbance to waterbird species are highlighted.

3. Data from the 2009/10 waterbird survey programme were used to inform an assessment which examined the level of disturbance caused by activities recorded during field surveys. The methodology was adapted from that used for monitoring Important Bird Areas (IBAs) (Birdlife International, 2006) and involved assigning scores which ranged between 0 and 3, to three selected attributes of each disturbance event (1) frequency/duration; (2) intensity and (3) likely response of waterbirds (after Hill et al. 1997) (Table 5.7). The rationale for scoring is provided in Appendix 10.

Table 5.7 Scoring system for disturbance assessment

Frequency/Duration	(A) Timing Score	Intensity	(B) Scope Score	Response	(C) Severity Score	TOTAL SCORE A + B + C
Continuous	3	Active, high-level	3	Most birds disturbed all of the time	3	9
Frequent	2	Medium level	2	Most birds displaced for short periods	2	6
Infrequent	1	Low-level	1	Most species tolerate disturbance	1	3
Rare	0	Very low-level	0	Most birds successfully habituate to the disturbance	0	0

The scores assigned to the three attributes were then added together to give an overall 'disturbance score' which is used to define the extent of the impact as follows:-

Scores 0 – 3 = Low
Scores 4 – 6 = Moderate
Scores 7 – 9 = High

The attributes (1) frequency/duration and (3) response were scored based on field survey observations. Attribute (2) intensity was scored based on a combination of field survey observations and best expert opinion.

5.4.3 Overview of activities at Blackwater Estuary

Activities and events identified to occur across Blackwater Estuary are shown in Appendix 9. Activities highlighted in grey have the potential to cause disturbance to waterbirds (see Section 5.4.4).

Youghal Town is the main settlement adjacent to the SPA, which together with its docklands occur just beyond the south-western boundary of the SPA. Landuse surrounding the site is predominantly agricultural with livestock grazing and tillage dominating.
Various historical land claim (reclamation) has occurred at the site. To the north of Youghal Town, an extensive area of mudflat was claimed in the 19th century to form an area known as 'Youghal mudlands.' This low-lying land is dissected by a series of drainage ditches which carries water out into the harbour via a sluice gate. An active landfill is located in the north of this area and adjacent to subsites 0L438 and 0L439. Further north 'Foxhole' was claimed in

the 19th century and used for summer grazing (Smiddy, 2001). In more recent times the bank has breached which allows some tidal inundation into an area which has gradually changed into saltmarsh habitat and is an important habitat for waterbirds. An adjacent area has been developed for light industry (Foxhole Industrial Estate). The southern bank of the Tourig estuary was subject to historical land claim and important historically for brick making. Some areas have since reverted to natural habitat (Smiddy, 2001). The Youghal by-pass (N25) road scheme involved the crossing of the Tourig River just above Ringcrew Bridge which creates a rather short and modified riverine section and dissects some wetland habitat. The N25 crosses the Blackwater via the New Youghal bridge which was built in 1963 and replaced the original bridge linking Cork and Waterford which was built in 1832 (www.youghal.ie).

The water quality of the Blackwater Estuary is classified as good (outer) to moderate (inner) according to the South Western River Basin District Transitional and Coastal Waters Action Plan (SWRBD, 2010a); the non-compliant factors listed as Dissolved Oxygen (DO), Biological Oxygen demand (BOD), phytoplankton biomass and opportunistic macroalgae. Land-based pressures are identified as waste water treatment plants (WWTP) and combined sewer overflows. The Blackwater Estuary Water Management Unit Action Plan covers a catchment area of 470km^2 and includes 23 waterbodies. Six WWTPs discharge to estuarine waters of the Blackwater River of which three (Cappoquin, Piltown & Tooraneeena) are considered at risk (SWRBD, 2010b).

The River Blackwater is renowned for its Salmon (*salmo salar*) fishing. Fishing rights on the estuarine stretch of the River Blackwater and for Youghal Harbour are owned by the Duke of Devonshire, the rights dating back to 1753. The estuary provides good shore fishing for species such as Flounder (*Platichthys flesus*), Bass (*Dicentrarchus labrax*) and Codling (*Gadus morhua*); shore angling marks include the mouth of the Tourig River, Ferry Point and the remains of the old bridge while charter boats are available from Youghal harbour (www.fishinginireland.info).

Various inshore fishing activities occur within and adjacent to the site (detail of spatial scale unknown). Static fishing gear activity in the area includes hook and line fishing and the use of pots. Mobile fishing (Otter trawls) occurs to the south, beyond the SPA boundary (Fahy et al. 2008).

Hand-gathering of edible molluscs (e.g. Periwinkles *Littorina littorea*) occurs and was recorded within subsites 0L432, 0M487, 0M488 and 0M489. Bait-digging also occurs and was recorded within four subsites (0L438, 0M487, 0M488 and 0M489).

McCorry & Ryle (2009) report on the saltmarsh habitat that occurs in the Kinsalebeg area (subsite 0M488) in the east of the site. The main impact upon this habitat is through grazing and the related poaching. The invasive species *Spartina anglica* was noted but as yet does not form a significant part of the saltmarsh vegetation (McCorry & Ryle, 2009). *Spartina anglica* is also known from the Tourig estuary. Historic 6'' OS maps (www.osi.ie) also show a quarry adjacent to subsite 0M488.

Youghal was once one of Ireland's major seaside resorts but this trend has slowed somewhat in recent decades due to the widely-recognised changes in tourism patterns and partly due to the closing of the railway line in the 1970's. There are plans however to reverse this trend. The leisure sailing industry for example, is viewed as a business of great benefit to the local economy and as such there is scope for its development in the future including a potential marina development (Youghal Town Council, 2009b). Water-based recreational activities within the site include sea angling and sailing; powered watercraft being recorded from eight of the eleven subsites surveyed in 2009/10 and Jet skiing from five subsites. The Blackwater River is navigable as far as Cappoquin and some boating and cruising activities occur as well as canoeing and rowing.

The main beaches at Youghal occur outside (south) of the SPA boundary but walking is a popular pastime with a walkway extending north from Youghal Town along the shoreline as

far as the landfill (along subsite 0L438). Walking was recorded within six subsites during the 2009/10 survey period (Appendix 9).

Wildfowling was recorded irregularly at the site during the 2009/10 Waterbird Survey Programme although shooting was a regular activity within grounds of Ballynatray Estate which lies adjacent to the River Blackwater (subsite 0M395). January 2010 was the coldest January for 25 years (Met Éireann (2010)) and in response to the freezing conditions, the Department of the Environment, Heritage and Local Government extended a temporary closure of the hunting season for wild birds (6th January 2010 to 20th January 2010).

5.4.4 Disturbance Assessment

A relatively low number of activities were recorded to cause disturbance to waterbirds during the 2009/10 Waterbird Survey Programme. Four activities were observed to cause disturbance (walking (incl. dogs), shooting, non-powered watercraft and powered watercraft), while two activities (aircraft flying over and hand-gathering[18]) reported no determinable responses from waterbirds.

A summary is shown in Table 5.8 and full results of the disturbance assessment are shown in Appendix 10. Individual activities/events are scored separately and there has been no attempt to produce cumulative scores for different activities occurring at the same time, although cumulative effects are likely.

As a final review, Table 5.9 shows the peak disturbance scores overlaid on the subsite assessment table (total waterbird numbers, LT surveys).

[18] For this site 'hand-gathering' includes the gathering of Shore Crabs *Carcinus maenas* which are used as bait. This activity is classified as gathering as opposed to bait-digging because the latter implies that the species are collected by digging whereas the crabs are searched for visually.

Table 5.8 Disturbance Assessment – Summary Table
Number of activities recorded during field surveys (2009/10 waterbird survey programme) that had the potential to cause disturbance, or were observed to cause disturbance to waterbirds. The calculated peak disturbance score is shown (see text for explanation).
Scores 0 – 3 = Low Scores 4 – 6 = Moderate Scores 7 – 9 = High. Grey shading = no activity recorded to cause disturbance during field surveys

Subsite Code	Subsite Name	Number Activities	Peak Disturbance Score	Activity Responsible
0L432	Outer Youghal Harbour	1	2	• Hand gathering - molluscs
0L436	Tourig River (Rincrew Section)	0	-	
0L437	Tourig River	0	-	• Bait digging
0L438	Youghal Mudlands	2	5	• Walking (incl. dogs)
0L439	Foxhole to Youghal Bridge	0	-	
0M382	Ballinaclash Quay	3	6	• Powered watercraft
0M383	Templemichael	0	-	•
0M395	Ballynatray	1	6	• Wildfowling/shooting
0M487	Pillpark	1	2	• Hand gathering
0M488	Blackbog	1	2	• Hand gathering
0M489	Ferrypoint to Newtown	2	4	• Walking (incl. dogs)

Table 5.9 Blackwater Estuary - subsite rankings based on total numbers of waterbirds (LT surveys) by peak disturbance score

	BW	CU	WN	GP	L.	DN	BA	RK
OL432		L						
OL436		L	M		M			L
0L437	H	H	V		V	V		H
0L438	L	M	L		L			L
0L439	V	M	H		H			M
0M382	H	M	M		V	V	H	H
0M383	L	H	M				H	L
0M395	M	H	M				M	M
0M487	V	H	M		M		V	V
0M488	M	V	H	V	V	M		H
0M489	M	V	V	H	H	V	V	V

5.4.5 Discussion

This review has highlighted that many 'activities and events' occur across the site, while the disturbance assessment represents a 'snap-shot' record of the level of disturbance-causing activities that can occur during the non-breeding season.

Many of the 'activities' identified may act so as to modify wetland habitats of the site. While physical loss might be considered more historic in nature (e.g. land claim, the construction of piers, slipways etc.), on-going modifications to intertidal habitats may occur due to changes in natural processes (e.g. sedimentation or erosion rates) as a result of former physical events. Physical damage may occur from trampling or compaction (e.g. horse-riding, humans walking). The grazing and poaching of saltmarsh habitat can modify and disturb waterbird roosting areas. Bait-digging and the hand-gathering of molluscs/crabs may cause some physical damage while at the same time removing waterbird prey resources. Fisheries interact with waterbirds in a variety of ways including the direct removal of waterbird prey (e.g. fish species, bivalves).
Activities that cause disturbance can lead to the displacement of waterbirds. The significance of the impact that results from even a short-term displacement should not be underestimated. In terms of foraging habitat, displacement from feeding opportunities not only reduces a bird's

energy intake but also leads to an increase in energy expenditure as a result of the energetic costs of flying to an alternative foraging area. Displacement also has knock-on ecological effects such as increased competition within and/or between different species for a common food source. In areas subject to heavy or on-going disturbance, waterbirds may be disturbed so frequently that their displacement is equivalent to habitat loss. When disturbance effects reduce species fitness[19] (reduced survival or reproductive success) consequences at population level may result.

Whilst the nature and the frequency of disturbance-causing activities are key factors when assessing likely impacts, many aspects of waterbird behaviour and ecology will influence a species response. Waterbird responses are likely to vary with each individual event and to be species-specific. The significance of a disturbance event upon waterbirds will vary according to a range of factors including:-

- Frequency/duration of disturbance event;
- Intensity of activity;
- Response of waterbirds.
-

and be influenced by:-

- Temporal availability – whether waterbirds have the opportunity to exploit the food resources in a disturbed area at times when the disturbance does not occur;
- Availability of compensatory habitat - whether there is suitable alternative habitat to move to during disturbance events;
- Behavioural changes as a result of a disturbance - e.g. degree of habituation;
- Time available for acclimatisation - whether there is time available for habituation to the disturbance. (NB there may be a lack of time for waterbirds during the staging period);
- Age - for example when feeding, immature (1st winter birds) may be marginalised by older more dominant flocks so that their access to the optimal prey resources is limited. These individuals may already therefore be under pressure to gain their required daily energy intake before the effects of any disturbance event are taken into account;
- Timing/seasonality - birds may be more vulnerable at certain times e.g. pre- and post-migration, at the end of the winter when food resources are lower;
- Weather - birds are more vulnerable during periods of severe cold weather or strong winds;
- Site fidelity – some species are highly site faithful at site or within-site level and will therefore be affected to a greater degree than species that range more widely;
- Predation and competition – a knock-on effect of disturbance is that waterbirds may move into areas where they are subject to increased competition for prey resources, or increased predation – i.e. the disturbance results in an indirect impact which is an increased predation risk.

Knowledge of site activities and events is important when examining waterbird distribution and understanding the many factors that might influence a species' distribution across a site. The above points also highlight the complex nature of waterbird behaviour and species specificity, as well as the need for careful consideration of the impacts of disturbance upon waterbird species when undertaking Appropriate Assessments or other environmental assessments. This review could therefore form the starting point for any future study aiming to quantify the effects of activities/disturbance events across the site, as well as to help identify the extent to which existing use and management of the site are consistent with the achievement of the conservation objectives described in Part Three of this document.

[19] defined as a measure of the relative contribution of an individual to the gene pool of the next generation.

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APPENDIX 1

SITE NAME: BLACKWATER ESTUARY SPA

SITE CODE: 004028

The Blackwater Estuary SPA is a moderately-sized, sheltered south-facing estuary, which extends from Youghal New Bridge to the Ferry Point peninsula, close to where the river enters the sea. It comprises a section of the main channel of the River Blackwater to Ballynaclash Quay. At low tide, intertidal flats are exposed on both sides of the channel. On the eastern side the intertidal channel as far as Kinsalebeg and Moord Cross Roads is included, while on the west side the site includes part of the estuary of the Tourig River as far as Kilmagner.

The intertidal sediments are mostly muds or sandy muds, reflecting the sheltered conditions of the estuary. Green algae (*Enteromorpha* spp. and *Ulva lactuca*) are frequent on the mudflats during summer, and Bladder Wrack (*Fucus vesiculosus*) occurs on the upper more stony shorelines. The sediments have a macrofauna typical of muddy sands, with polychaete worms such as Lugworm (*Arenicola marina*), Ragworm (*Hediste diversicolor*) and the marine bristle worm *Nephtys hombergii* being common. Salt marshes fringe the estuarine channels, especially in the sheltered creeks.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Wigeon, Golden Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew and Redshank. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The Blackwater Estuary is of high ornithological importance for wintering waterfowl, providing good quality feeding areas for an excellent diversity of waterfowl species. At high tide, the birds roost along the shoreline and salt marsh fringe, especially in the Kinsalebeg area. The site supports an internationally important population of Black-tailed Godwit (620) and has a further seven species with nationally important populations: Wigeon (953), Golden Plover (2,628), Lapwing (3,054), Dunlin (1,807), Bar-tailed Godwit (161), Curlew (1,007) and Redshank (520) - all figures are mean peaks for the five winters 1995/96 to 1999/2000.

Other species which occur include Light-bellied Brent Goose (19), Shelduck (123), Teal (407), Mallard (105), Shoveler (21), Red-breasted Merganser (7), Cormorant (43), Little Egret (12), Grey Heron (17), Oystercatcher (401), Ringed Plover (28), Grey Plover (49), Knot (43), Greenshank (25) and Turnstone (52). The site is also notable for the large concentrations of gulls that occur in autumn and winter, including Lesser Black-backed Gull (390), Black-headed Gull (345), Common Gull (253), Great Black-backed Gull (227) and Herring Gull (64).

The Blackwater Estuary SPA is an internationally important wetland site on account of the population of Black-tailed Godwit it supports. It is also of high importance in a national context, with seven species having populations which exceed the thresholds for national importance. The occurrence of Little Egret, Golden Plover and Bar-tailed Godwit is of particular note as these species are listed on Annex I of the E.U. Birds Directive.

22.4.2010


CO. WATERFORD
Dungarvan
CO. CORK
Youghal
SPA 004028
Cork
Middleton
Legend
SPA 004028
BLACKWATER ESTUARY
SPA 004028
SITE CODE: SPA 004028
CO. CORK; version 1.04,
CO. WATERFORD; version 1.06
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Date: March 2012
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht

APPENDIX 2

Waterbird data sources

Irish Wetland Bird Survey (I-WeBS)
I-WeBS began in the Republic of Ireland in 1994/95 and aims to monitor wintering (non-breeding) waterbird populations at the wetland sites upon which they rely. Counts are carried out by volunteers and professional staff of the partner organisations across the months September to March of each year. I-WeBS counts take place on a rising tide or close to high tide. For further information please refer to Crowe (2005).

The I-WeBS Programme monitors the larger coastal wetland sites together with inland lakes, turloughs, rivers and callows. However the resulting dataset is incomplete for some waterbird species that utilise other habitats such as non-wetland habitat (e.g. grassland used by many species and particularly foraging geese, and swans), non-estuarine coastline, small and ephemeral wetlands and the open sea; the latter of which is obviously difficult to monitor from land-based surveys (Crowe, 2005).

A number of additional and special surveys are therefore conducted on an annual or regular basis and data collected are, where appropriate, integrated into the I-WeBS database. These surveys include those undertaken for swan and geese species that forage typically during daylight hours across terrestrial habitats (e.g. grassland, arable fields) using coastal wetlands sites at night when they congregate to roost. Some of the additional surveys are carried out at certain times, aimed at providing a better estimate of numbers (e.g. Greylag Geese) and for some species an assessment of breeding success during the previous summer (e.g. Light-bellied Brent Geese). These surveys are introduced briefly below and more information is provided in Crowe (2005).

- Swan Surveys

Coordinated international censuses are carried out of the wintering populations of Whooper Swan (*Cygnus cygnus*) and Bewick's Swan (*Cygnus columbianus bewickii*) at four or five-yearly intervals. The surveys are organised by I-WeBS, the Irish Whooper Swan Study group (IWSSG) and WWT.

- Greenland White-fronted Goose

Greenland White-fronted Geese are concentrated at relatively few sites during winter, many of which are non-wetland habitats. The species is therefore not covered adequately by the I-WeBS programme. The Greenland White-fronted Goose census was initiated in the late 1970's and is carried out by NPWS in Ireland and by JNCC and Scottish Natural Heritage (SNH) in Scotland.

- Greylag Geese

Data for the Icelandic breeding population of Greylag Goose that winters in Ireland are taken from special surveys organised through I-WeBS and undertaken during November each year. The surveys aim to assess the distribution and status of the migratory flocks wintering in Ireland and focus on known feeding areas (grassland & agricultural land). When calculating population estimates of the Icelandic birds, data collected are adjusted to account for feral flocks that also occur within Ireland.

- Barnacle Goose (*Branta leucopsis*)

A wintering population from the northeast Greenland breeding population winters mainly on offshore islands along the west coast of Ireland. An aerial survey is conducted of the principal wintering areas every four to five years.

- Light-bellied Brent Geese

Special autumn surveys of this species have been conducted since 1996 and organised in the Republic of Ireland by the Irish Brent Goose Research Group (IBGRG). The survey is currently conducted on a bi-annual basis during the month of October which coincides with the autumn arrival of the species. Data collected are integrated into the I-WeBS database.

APPENDIX 3

Analysing population trends: a synopsis

Monitoring of non-breeding waterbirds has been undertaken by the Irish Wetland Bird Survey (I-WeBS) and its partner, WeBS in Northern Ireland, since the mid 1990's. For such long-term count data, there is clearly a need to assess long-term trends in a consistent and objective manner (Atkinson et al. 2006).

The first stage in the analytical process involves the use of the Underhill Program (Underhill & Prŷs-Jones, 1994) which models the raw monthly counts using a Generalised Linear Model (GLM). As part of this process, it accounts for changes in numbers at the site and the timing of the count (month, year) while also taking into account completed counts and trends at other sites. When counts at a site are flagged as poor quality (e.g. due to poor visibility) or where there are missing values in a given month, then the modelled values are used. This imputation process is used widely to replace missing data points (e.g. Houlahan et al. 2000; Atkinson et al. 2006; Leech et al. 2002; Gregory et al. 2005; Crowe et al. 2008). The resulting dataset is therefore complete for all months and seasons and comprises a combination of actual count data and imputed count data.

This complete dataset is then modelled using a Generalised Additive Models (GAM) which fits a smoothed curve to the counts. GAMs are non-parametric and flexible extensions of the generalised linear model where the linear predictor of the GLM is replaced by a general additive predictor which allows mean abundance to vary as a smooth function of time. Count data are assumed to follow independent Poisson distribution with 0.3T degrees of freedom (e.g. after Atkinson et al. 2006). The application of GAMs to analyse population trends was applied to UK farmland birds by Fewster et al. (2000) and has since been adopted for modelling waterbird trends elsewhere, for example, the UK WeBS Alert system (Leech et al. 2002).

Smoothed count data for a site are then indexed to assess population trends over time. An index number can be defined as a measure of population size in one year expressed in relation to the size of the population in another selected year (Leech et al. 2002). Changes in the index numbers can therefore explain the pattern of population change over time (Underhill & Prŷs-Jones, 1994).

Annual indices are calculated separately for each species at a site. For each year included in an analysis, a total is obtained by summing the number of birds present in a predetermined number of months. The final year in the series of totals is then scaled to equal 100 (please see example in table). Index values in any given year therefore represent the number of individuals relative to those present in the final year. As this process is the same across all species and all sites analysed it allows for some useful comparisons.

Count Data	Index
264.41	128.11
262.21	127.04
234.0	113.37
126.0	61.05
197.23	95.56
206.4	100.00

Un-smoothed indices are also calculated and provide a means of examining ('eye-balling') the variation across time and can also be used to provide a measure of the mean annual change over the entire period. However, the GAM extension to the methodology and resultant smoothed indices allows for the calculation of proportional change in population size between one season and another. This latter calculation is used in Section 4.2 whereby trends are calculated for the 'long-term' 12-year period (1995–2007) and the recent five-year period (2002-2007). The values given represent the percentage change in index (population) values across the specified time period, calculated by subtracting the smoothed index value at the start of the time-frame (1995) from the smoothed index value in the reference year (2007):-

$$\text{Change} = ((I_y - I_x) / I_x) \times 100$$

where I_y is the index from the current year and I_x is the index value at the start of the selected time period (see example below)

The reference year is the penultimate year in the time series because, when smoothing, the GAM takes into account values from both the preceding and following year. The last value in the smoothed dataset (2008) is therefore likely to be the least robust because it has no following year.

The final result is therefore % change in population size across a specified time period. Larger values indicate larger proportional changes in population size; positive values indicating relative increases while negative values indicate relative decreases over the specified time period.

Worked example

Year	Unsmoothed Index	Smoothed Index
1994	0.715	0.753
1995	0.604	0.804
1996	0.739	0.835
1997	0.594	0.826
1998	0.711	0.782
1999	0.745	0.727
2000	0.618	0.691
2001	0.694	0.692
2002	0.300	0.739
2003	0.530	0.827
2004	1.348	0.936
2005	0.836	1.028
2006	0.773	1.069
2007	0.734	1.051
2008	1	1.000

Term	Change
5YR	**+ 42.80**
10YR	**+ 27.24**
ALL YR	**+ 30.72**

Further information on population indexing and trend analysis can be found in various references; for particular reference to waterbirds see Leech et al (2002) and Atkinson et al. (2006). For information on the UK WeBS Alerts system, please see Thaxter et al. (2010).

Limitations

The months chosen for the calculation of population indices aim to reflect the months when the populations at a site are the most stable, excluding months when there may be fluctuations due to passage populations. Despite this, some datasets still present a high degree of variability or fluctuation both within and between years. Because of this, we assess each species separately and take into account where a species shows a history of wide fluctuations between years (within national dataset), or where a species naturally exhibits within-season fluctuations (e.g. species considered to have weak site faithfulness). Where necessary the results of the trend analysis are assigned necessary caution.

A high proportion of imputed counts can limit the effectiveness of the analysis to aid in the interpretation of the dataset. Species for which 50% or more of the monthly count values are imputed are excluded from analysis. But sometimes the calculation of population change may involve a comparison between winters where, at least one has a value based on a high proportion of imputed data. Where data for adjacent winters are relatively complete this is not a serious concern because of the smoothing technique used. However, where data for a number of consecutive winters rely heavily on imputed data then the resulting result is considered less reliable (Thaxter et al. 2010). Where necessary the results of the trend analysis are assigned necessary caution.

Despite the smoothing effects of the GAM analysis, interpretation of population trends may sometimes still be difficult. Therefore we calculate proportional change in the population across differing time periods (e.g. 12-year, 10-year and 5-year periods) to assess more effectively how the population has fared over time.

APPENDIX 4

Waterbird species codes

AE	Arctic Tern	*Sterna paradisaea*
BY	Barnacle Goose	*Branta leucopsis*
BA	Bar-tailed Godwit	*Limosa lapponica*
BE	Bean Goose	*Anser fabalis*
BS	Bewick's Swan	*Cygnus columbianus*
AS	Black Swan	*Cygnus atratus*
BH	Black-headed Gull	*Chroicocephalus ridibundus*
BN	Black-necked Grebe	*Podiceps nigricollis*
BW	Black-tailed Godwit	*Limosa limosa*
BV	Black-throated Diver	*Gavia arctica*
BG	Brent Goose	*Branta bernicla*
CG	Canada Goose	*Branta canadensis*
CM	Common Gull	*Larus canus*
CS	Common Sandpiper	*Actitis hypoleucos*
CX	Common Scoter	*Melanitta nigra*
CN	Common Tern	*Sterna hirundo*
CO	Coot	*Fulica atra*
CA	Cormorant	*Phalacrocorax carbo*
CU	Curlew	*Numenius arquata*
CV	Curlew Sandpiper	*Calidris ferruginea*
DN	Dunlin	*Calidris alpina*
GA	Gadwall	*Anas strepera*
GP	Golden Plover	*Pluvialis apricaria*
GN	Goldeneye	*Bucephala clangula*
GD	Goosander	*Mergus merganser*
GB	Great Black-backed Gull	*Larus marinus*
GG	Great Crested Grebe	*Podiceps cristatus*
ND	Great Northern Diver	*Gavia immer*
NW	Greenland White-fronted Goose	*Anser albifrons flavirostris*
GK	Greenshank	*Tringa nebularia*
H.	Grey Heron	*Ardea cinerea*
GV	Grey Plover	*Pluvialis squatarola*
GJ	Greylag Goose	*Anser anser*
HG	Herring Gull	*Larus argentatus*
JS	Jack Snipe	*Lymnocryptes minimus*
KF	Kingfisher	*Alcedo atthis*
KN	Knot	*Calidris canutus*
L.	Lapwing	*Vanellus vanellus*
LB	Lesser Black-backed Gull	*Larus fuscus*
PB	Light-bellied Brent Goose	*Branta bernicla hrotra*
ET	Little Egret	*Egretta garzetta*

LG	Little Grebe	*Tachybaptus ruficollis*
AF	Little Tern	*Sterna albifrons*
MA	Mallard	*Anas platyrhynchos*
MU	Mediterranean Gull	*Larus melanocephalus*
MH	Moorhen	*Gallinula chloropus*
MS	Mute Swan	*Cygnus olor*
OC	Oystercatcher	*Haematopus ostralegus*
PG	Pink-footed Goose	*Anser brachyrhynchus*
PT	Pintail	*Anas acuta*
PO	Pochard	*Aythya ferina*
PS	Purple Sandpiper	*Calidris maritima*
RM	Red-breasted Merganser	*Mergus serrator*
RH	Red-throated Diver	*Gavia stellata*
RK	Redshank	*Tringa totanus*
RP	Ringed Plover	*Charadrius hiaticula*
RU	Ruff	*Philomachus pugnax*
SS	Sanderling	*Calidris alba*
TE	Sandwich Tern	*Sterna sandvicensis*
SP	Scaup	*Aythya marila*
SU	Shelduck	*Tadorna tadorna*
SV	Shoveler	*Anas clypeata*
SY	Smew	*Mergus albellus*
SN	Snipe	*Gallinago gallinago*
NB	Spoonbill	*Platalea leucorodia*
DR	Spotted Redshank	*Tringa erythropus*
T.	Teal	*Anas crecca*
TU	Tufted Duck	*Aythya fuligula*
TT	Turnstone	*Arenaria interpres*
WA	Water Rail	*Rallus aquaticus*
WM	Whimbrel	*Numenius phaeopus*
WG	White-fronted Goose	*Anser albifrons*
WS	Whooper Swan	*Cygnus Cygnus*
WN	Wigeon	*Anas penelope*
WK	Woodcock	*Scolopax rusticola*

APPENDIX 5

Waterbird foraging guilds (after Weller, 1999)

Guild	Foods	Tactics	Examples…
(1) Surface swimmer	Invertebrates, vegetation & seeds	Strain/sieve/sweep/dabble/grab/up-ending	'Dabbling ducks'; e.g. Shoveler, Teal, Mallard, Pintail, Wigeon, Gadwall
(2) Water column diver – shallow[a]	Fish & Invertebrates;	Search/grab	'Diving ducks' e.g. Pochard, Tufted Duck, Scaup, Eider,
(3) Water column diver – greater depths	Fish & Invertebrates	Search/grab	Common Scoter, divers, grebes, Cormorant
(4) Intertidal walker, out of water	Invertebrates	Search (probe)/grab	Sandpipers, plovers
(5) Intertidal walker, out of water	Invertebrates, vegetation	Sieve/grab/graze	Shelduck, Avocet, Spoonbill, Wigeon, Light-Bellied Brent Goose,
(6) Intertidal walker, in water	Fish	Search/strike	Grey Heron
	Fish, Invertebrates	Probe, scythe, sweep/grab	Spoonbill, Greenshank
	Fish	Stalk	Little Egret
	Invertebrates	Probe	Several sandpiper species
(7) Terrestrial, walker (e.g. grassland/marsh)	Vegetation (inc. roots, tubers & seeds)	Graze, peck, probe	Many geese species

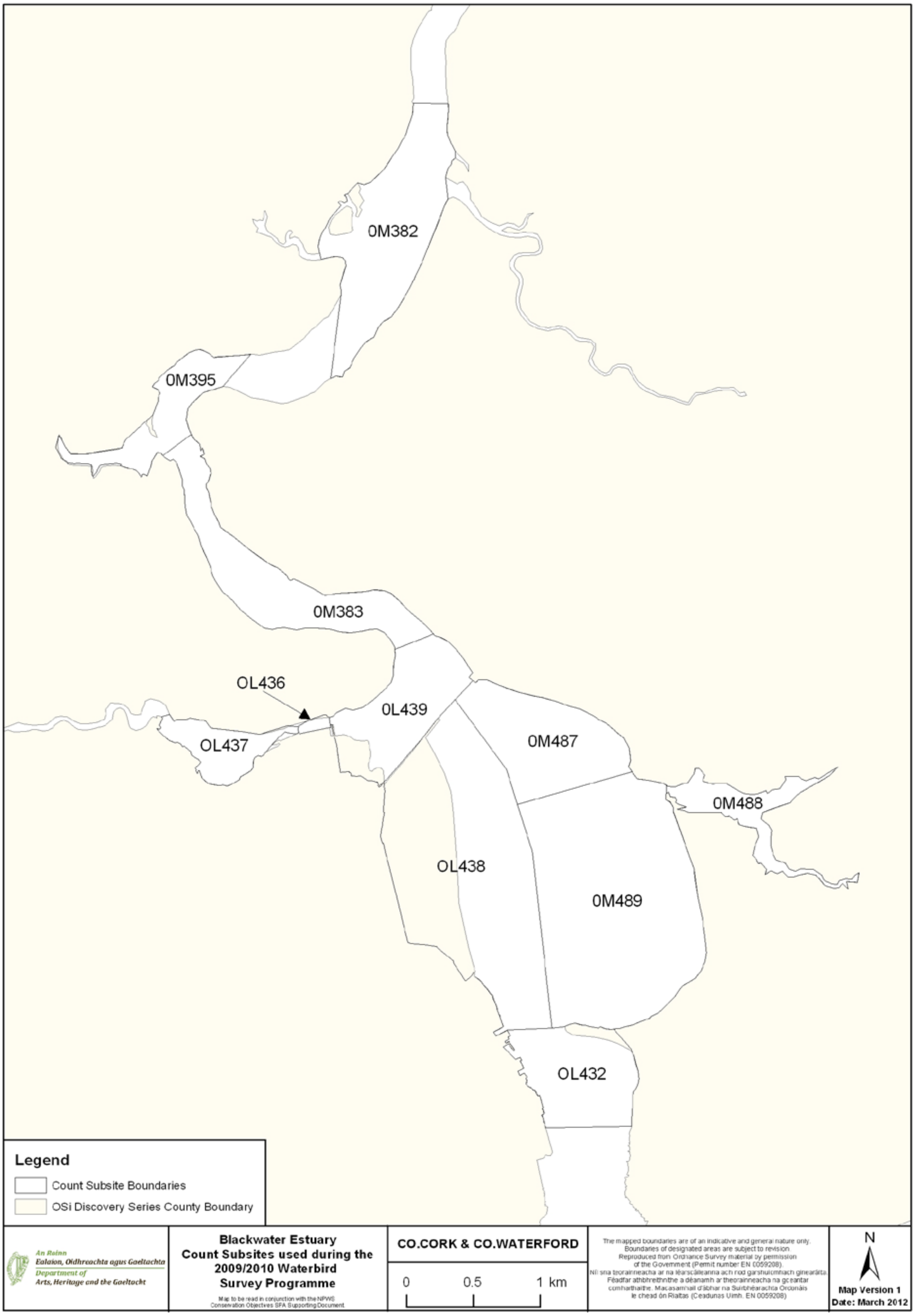
[a] dives <3m.

Please note that this table refers to generalised foraging strategies and is meant as a guide only. There is a great deal of variation between sites, seasons, tidal states and indeed, individual birds themselves. For example, some waterbird species may deploy several of the methods, e.g. Shelduck may forage by sieving intertidal mud (5) or by up-ending (1) and Pintail, although generally known as a 'dabbling' duck, does occasionally dive for food.

APPENDIX 6

Blackwater Estuary – Waterbird Survey Programme 2009/10 – Count Subsites

Subsite	Subsite Name	Subsite Area (ha)
0L432	Outer Youghal Harbour	58.93
0L436	Tourig river (Rincrew Section)	2.05
0L437	Tourig river	25.19
0L438	Youghal mudlands	191.66
0L439	Foxhole to Youghal Bridge	60.02
0M382	Ballinaclash Quay	99.64
0M383	Templemichael	73.10
0M395	Ballynatray	37.66
0M487	Pillpark	69.17
0M488	Blackbog	28.16
0M489	Ferrypoint to Newtown	202.09



0M382
0M395
0M383
OL436
0L439
OL437
0M487
0M488
OL438
0M489
OL432
Legend
Count Subsite Boundaries
OSi Discovery Series County Boundary
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
Blackwater Estuary
Count Subsites used during the
2009/2010 Waterbird
Survey Programme
Map to be read in conjunction with the NPWS
Conservation Objectives SFA Supporting Document.
CO.CORK & CO.WATERFORD
0
0.5
1 km
The mapped boundaries are of an indicative and general nature only.
Boundaries of designated areas are subject to revision.
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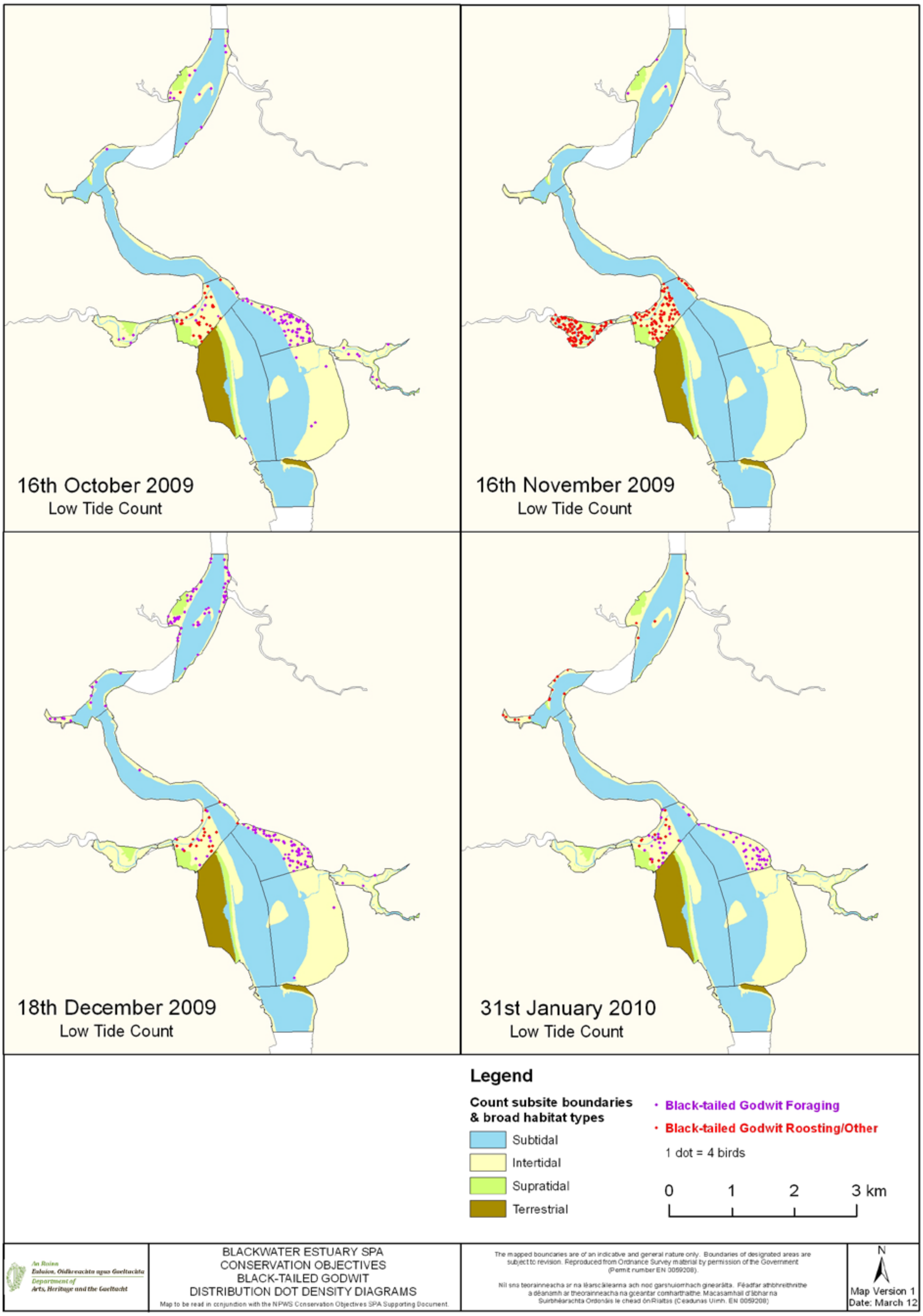
of the Government (Permit number EN 0059208).
Níl sna teorainneacha ar na léarscáileanna ach rod garshuíomhach ginearálta.
Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar
comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis
le chead ón Rialtas (Ceadunas Uimh. EN 0059208)
N
Map Version 1
Date: March 2012

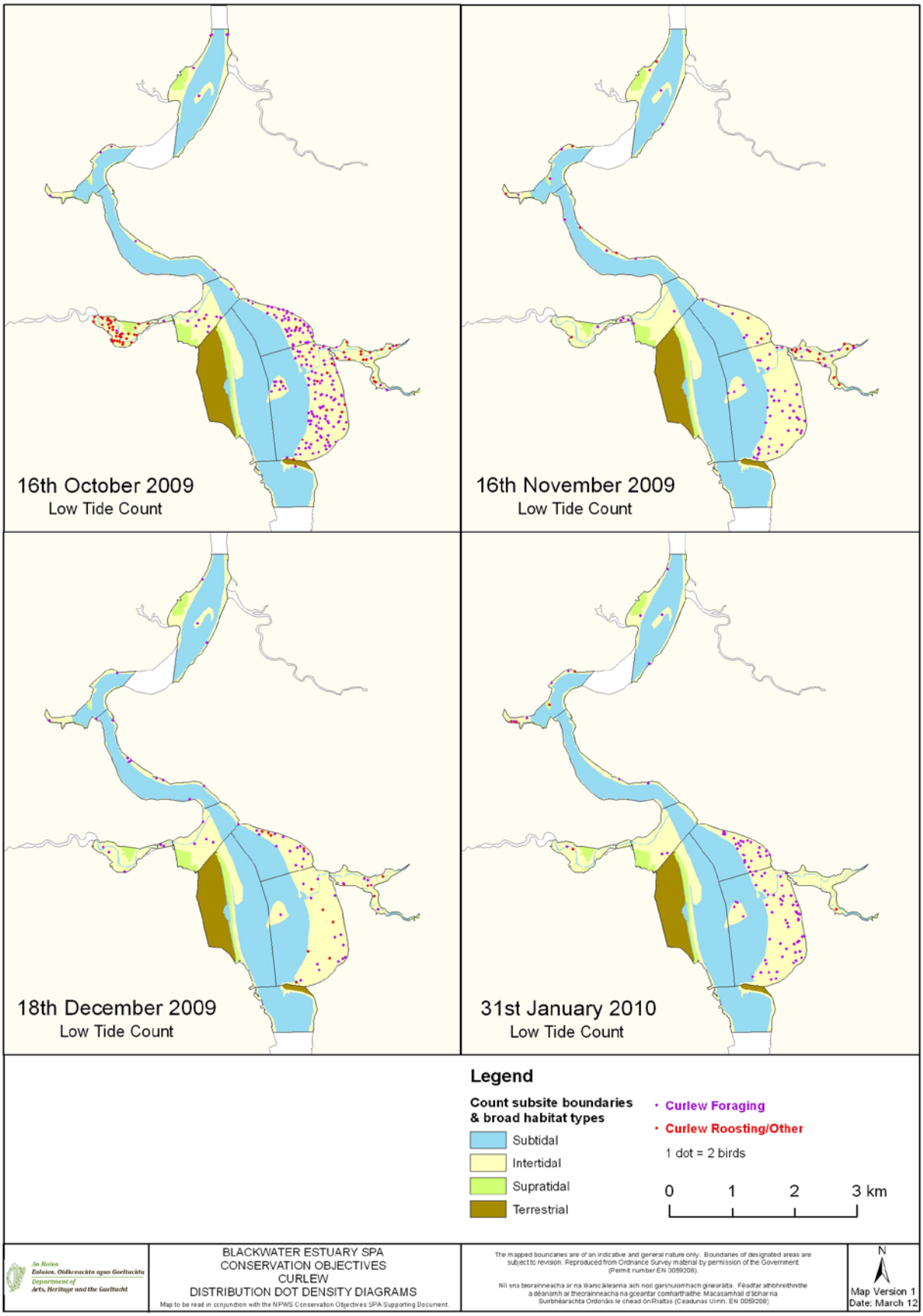
APPENDIX 7

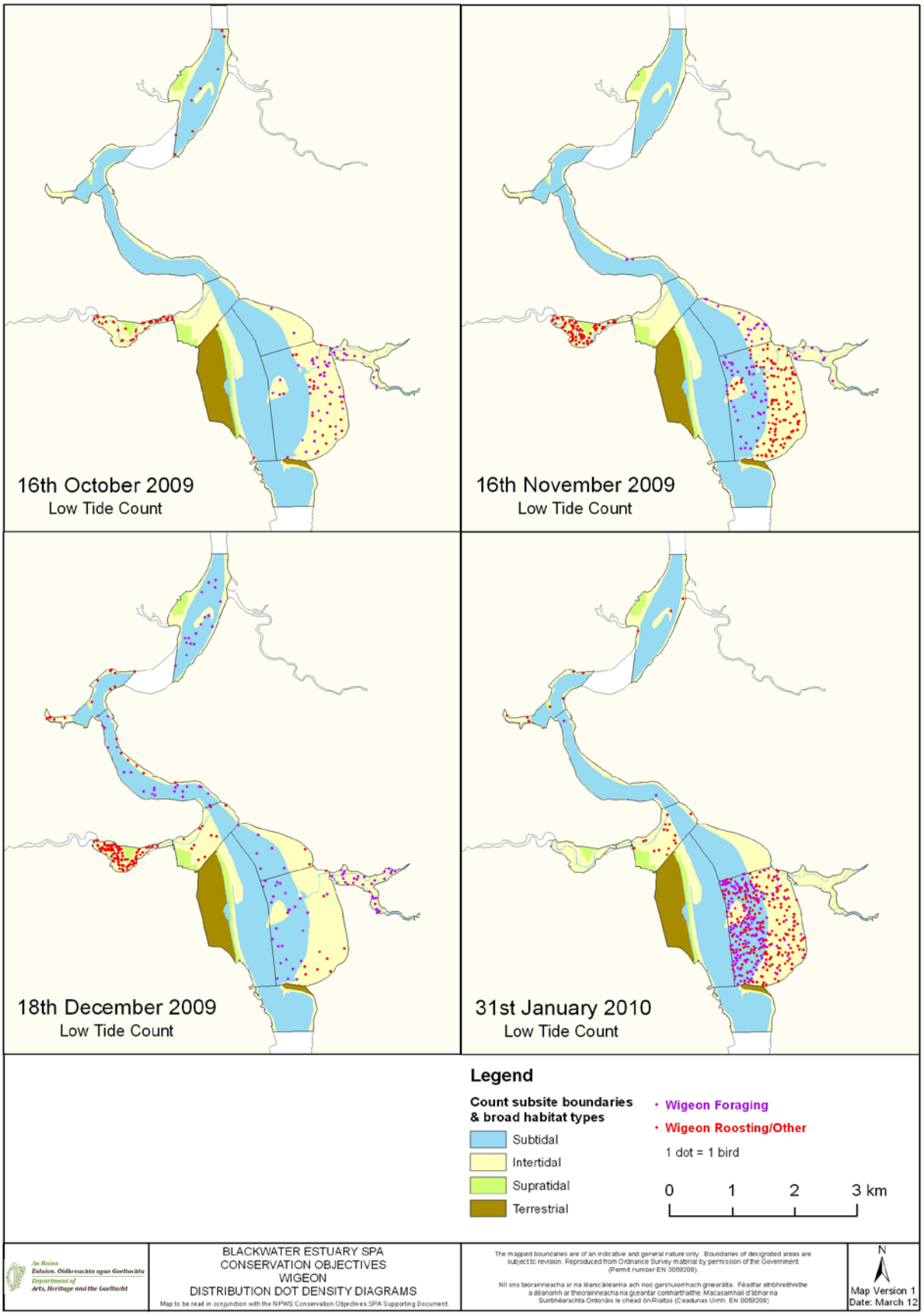
Blackwater Estuary

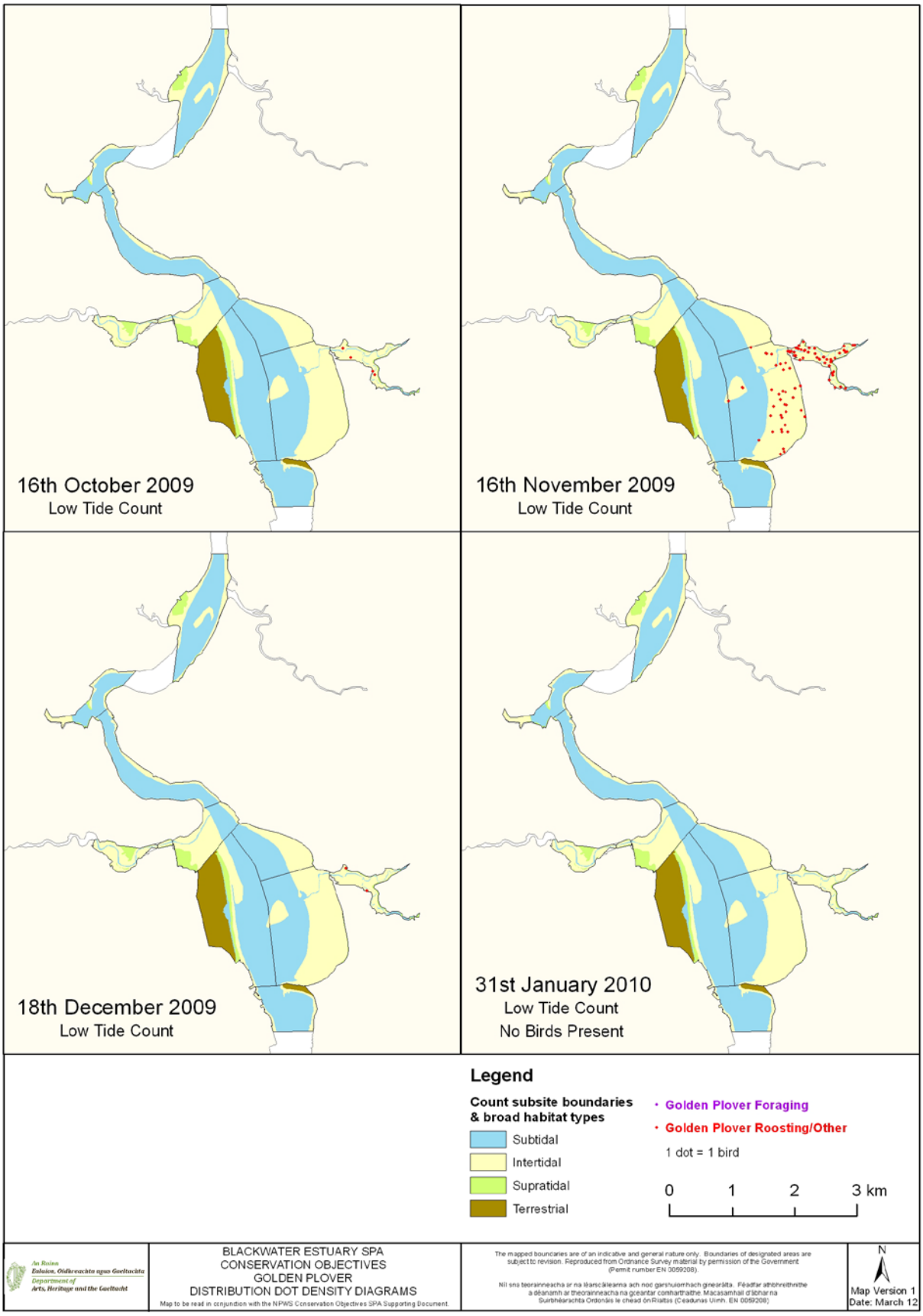
Waterbird distribution (dot-density diagrams) recorded during low tide surveys (October 2009 – February 2010)

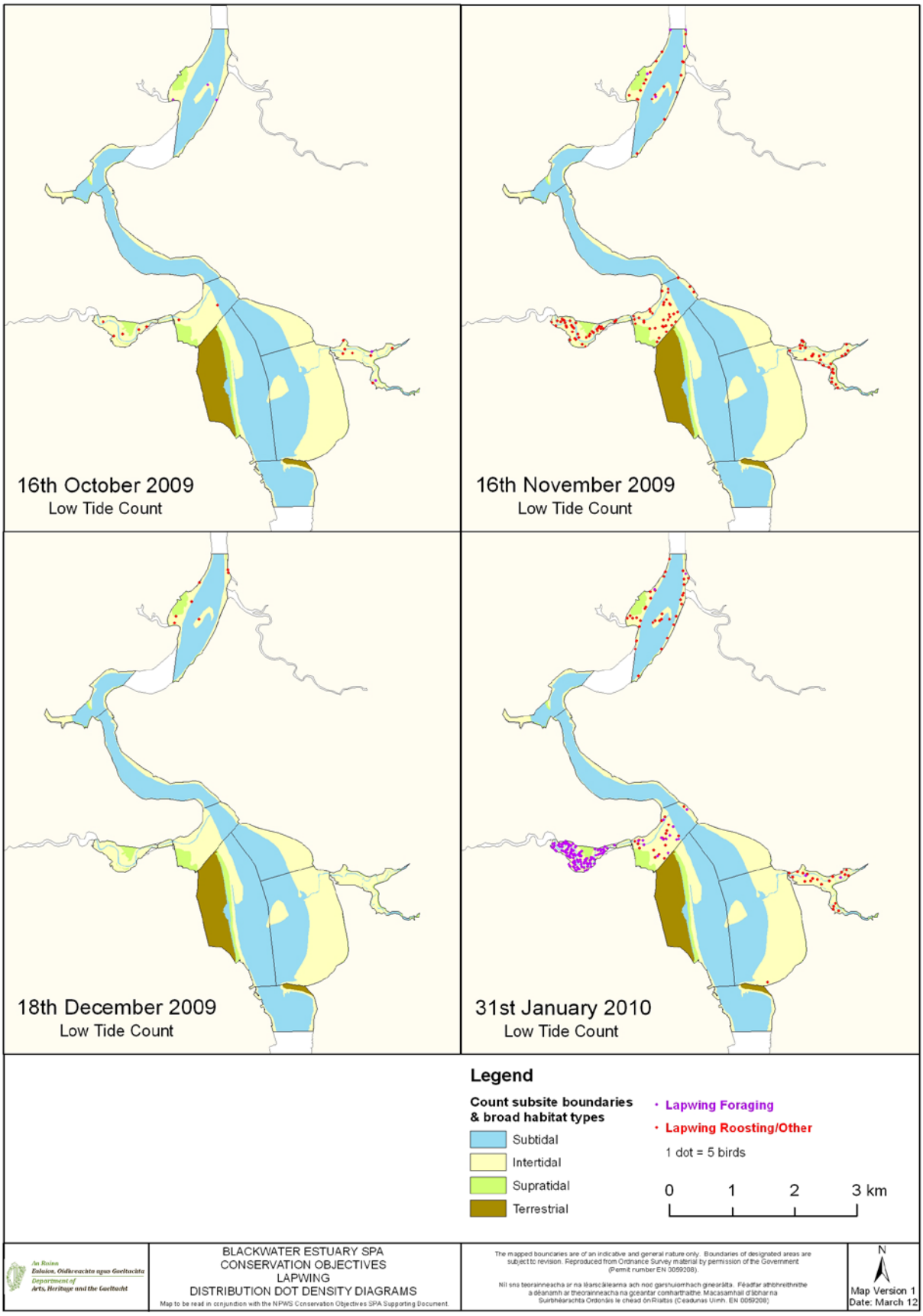
(data are presented for birds located in intertidal and subtidal habitats only)

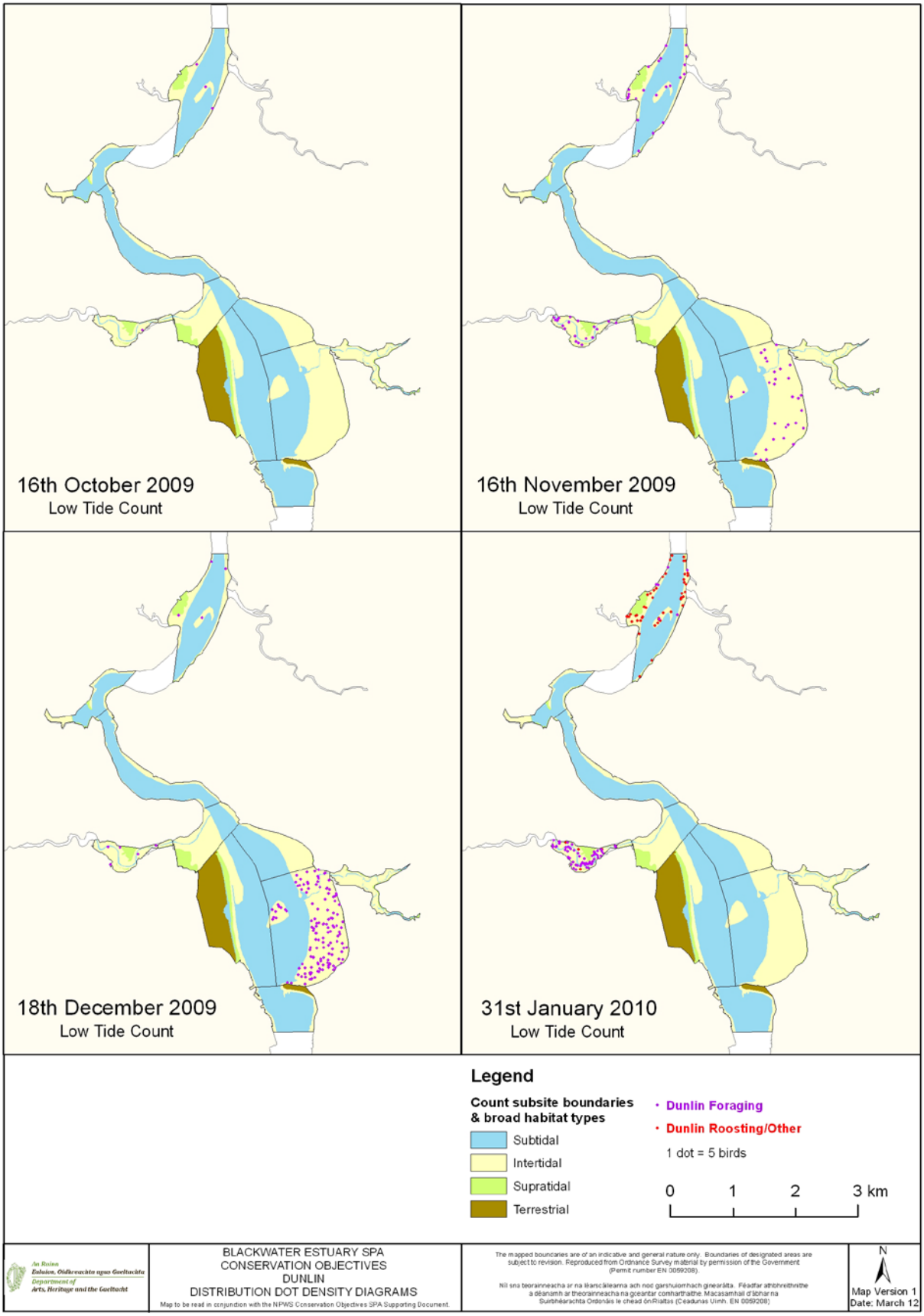

16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Black-tailed Godwit Foraging
Black-tailed Godwit Roosting/Other
1 dot = 4 birds
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
BLACK-TAILED GODWIT
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a dhéanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)
N
Map Version 1
Date: March 12

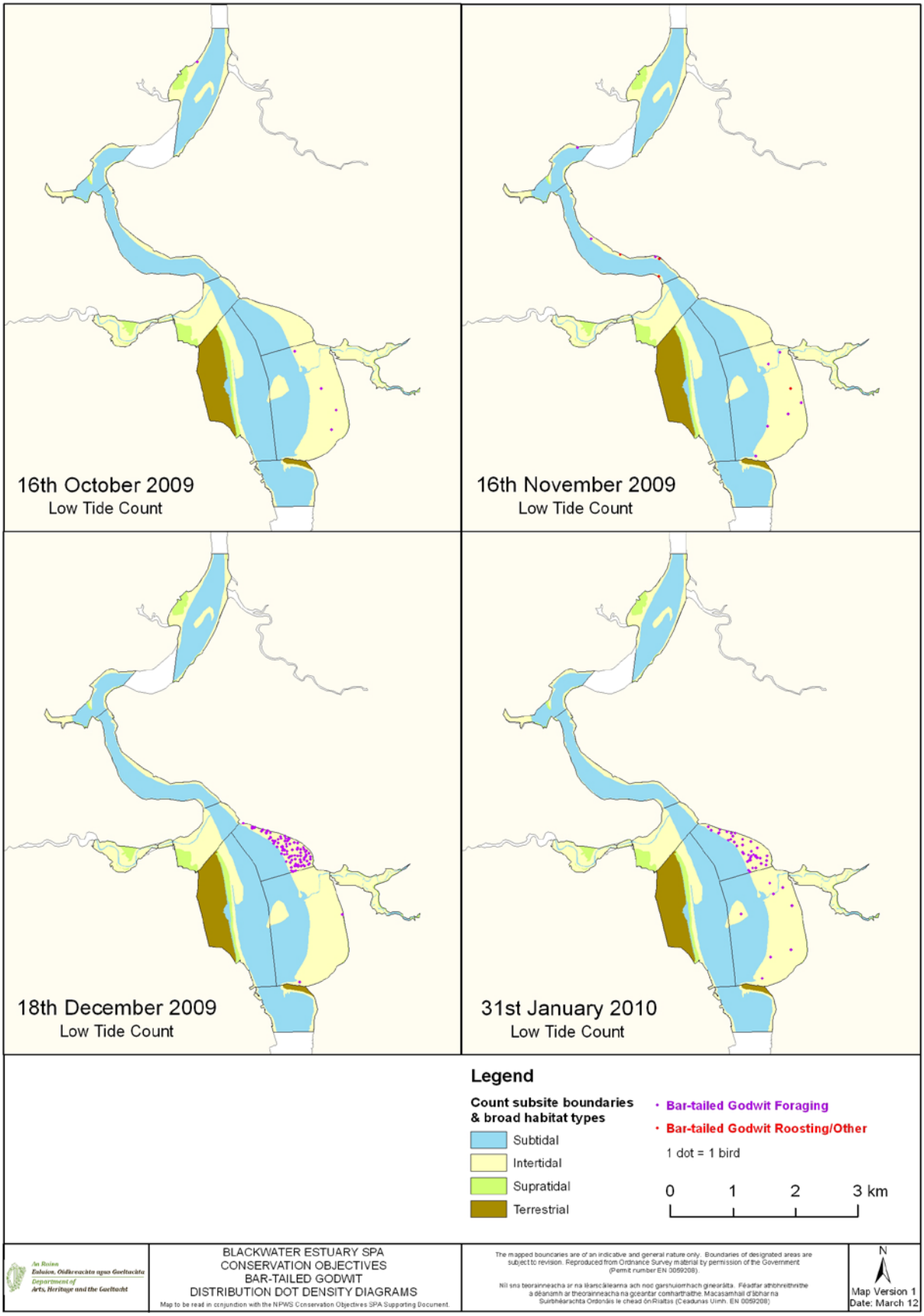

16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Curlew Foraging
Curlew Roosting/Other
1 dot = 2 birds
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
CURLEW
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a dhéanamh ar theorainneacha na gceantar comhartha the Macasamhail d'Ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: March 12

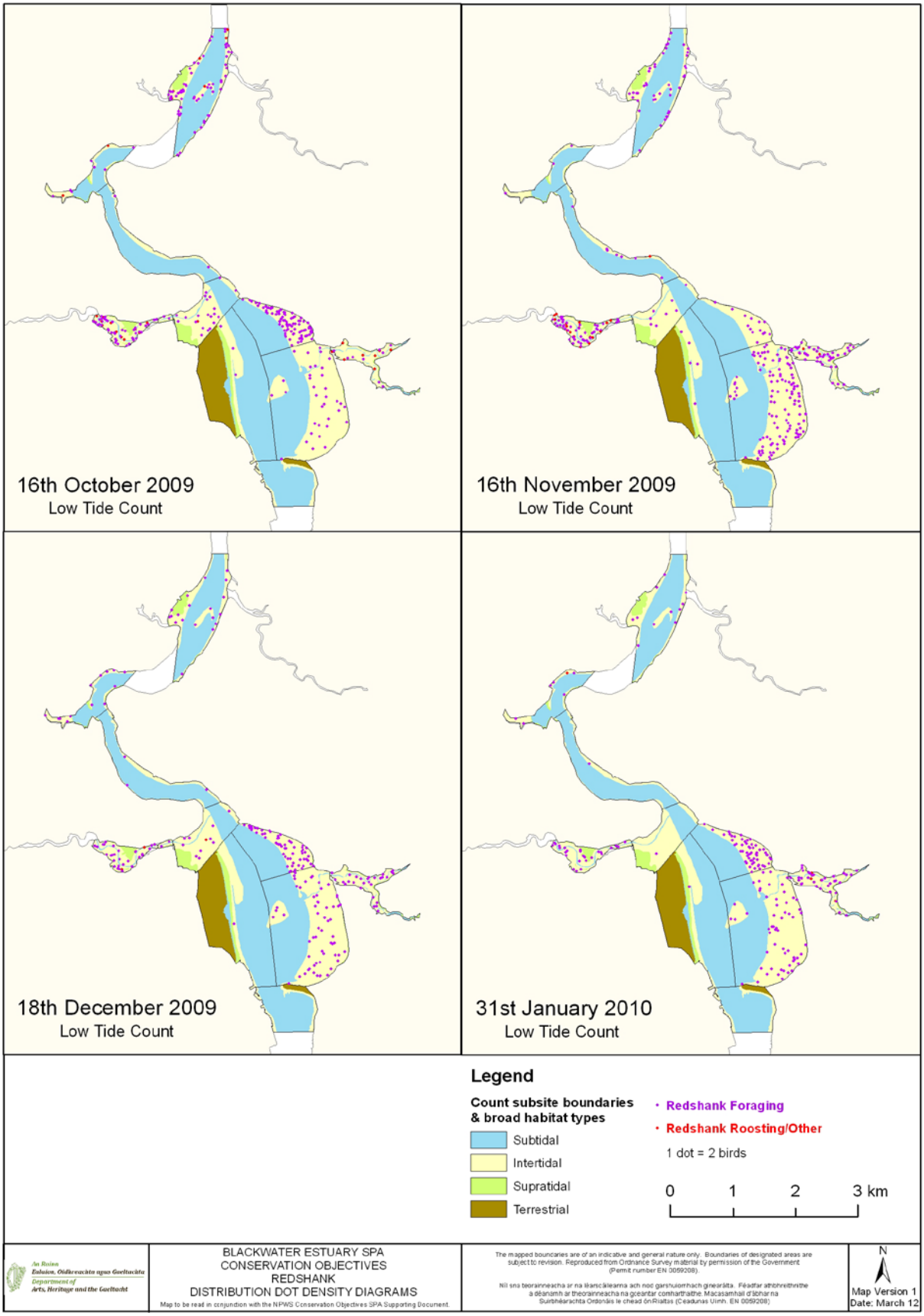

16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Wigeon Foraging
Wigeon Roosting/Other
1 dot = 1 bird
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
WIGEON
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped bouncaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéireachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: March 12


16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
No Birds Present
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Golden Plover Foraging
Golden Plover Roosting/Other
1 dot = 1 bird
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
GOLDEN PLOVER
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a dhéanamh ar theorainneacha na gceantar comhartha dhe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: March 12


16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Lapwing Foraging
Lapwing Roosting/Other
1 dot = 5 birds
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
LAPWING
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a dhéanamh ar theorainneacha na gceantar comhartha. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208).
N
Map Version 1
Date: March 12


16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Dunlin Foraging
Dunlin Roosting/Other
1 dot = 5 birds
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
DUNLIN
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comhaltaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadunas Uimh. EN 0059208)
N
Map Version 1
Date: March 12


16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Bar-tailed Godwit Foraging
Bar-tailed Godwit Roosting/Other
1 dot = 1 bird
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
BAR-TAILED GODWIT
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comhaltaithe. Macasamhail d'Ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: March 12


16th October 2009
Low Tide Count
16th November 2009
Low Tide Count
18th December 2009
Low Tide Count
31st January 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Subtidal
Intertidal
Supratidal
Terrestrial
Redshank Foraging
Redshank Roosting/Other
1 dot = 2 birds
0 1 2 3 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
BLACKWATER ESTUARY SPA
CONSERVATION OBJECTIVES
REDSHANK
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped bouncaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).
Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comhartha thé Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: March 12

APPENDIX 8

Blackwater Estuary

Summary data and roost location maps from the roost survey (07/03/10)

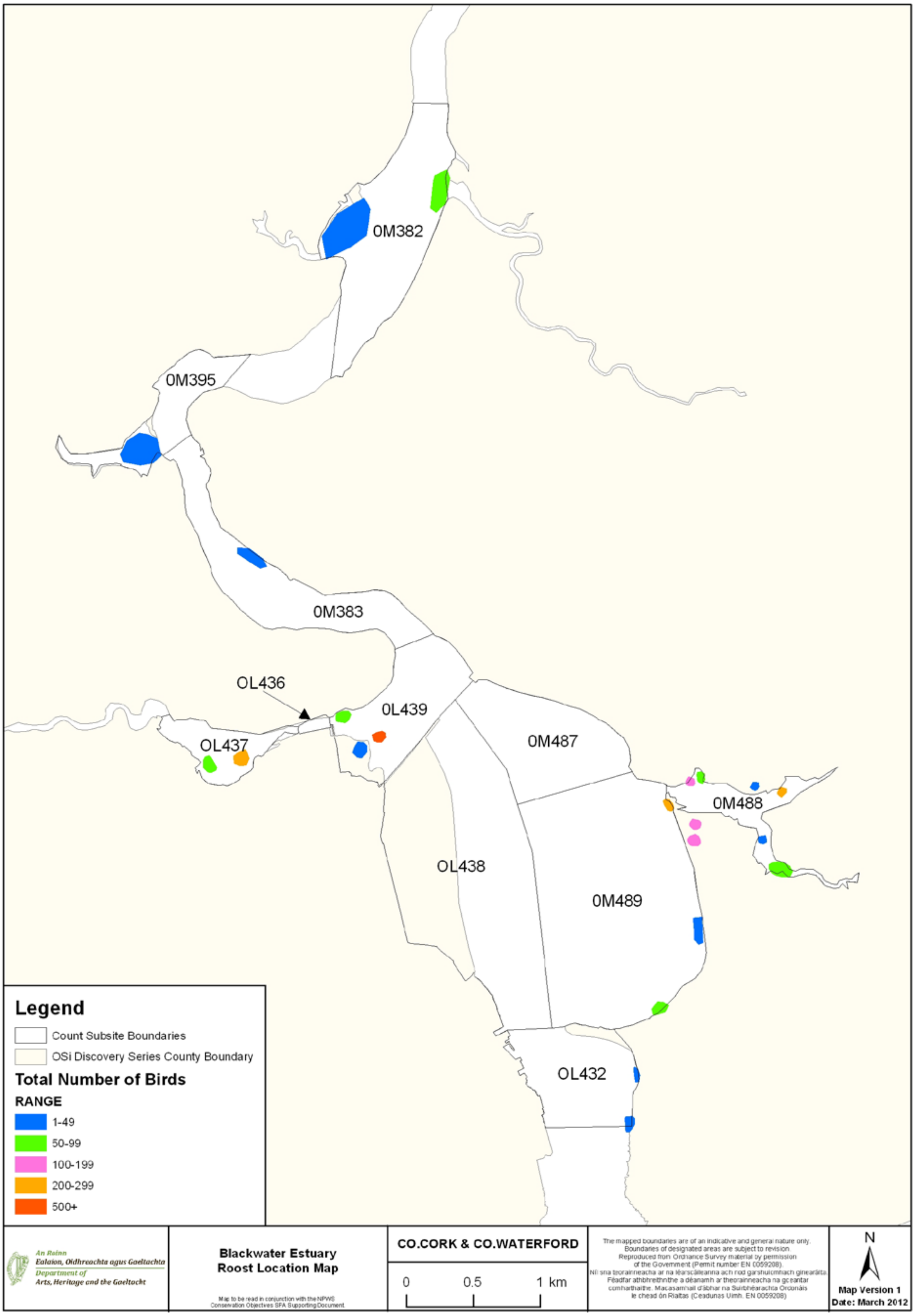
This table summarises the data collected from the coordinated roost survey undertaken on 7th March 2010. (Please see Sections 5.3.1 and 5.3.2 for further details on methods/limitations)

Blackwater Estuary - Roost Summary Table

Subsite Code	Subsite Name	Number individual roost locations	No. Species	Total No. birds	Species (alphabetical order)
0L432	Outer Youghal Harbour	2	4	48	BH, CA, HG, OC
0L436	Tourig river (Rincrew Section)	0	-	-	
0L437	Tourig river	2	4	389	BH, GB, HG, LB
0L438	Youghal mudlands	0	-	-	
0L439	Foxhole to Youghal Bridge	3	15	765	BA, BH, BW, CA, CM, CU, GB, GK, HG, LB, MA, OC, RK, SU, T.
0M382	Ballinaclash Quay	2	4	65	BH, CA, HG, RK
0M383	Templemichael	1	3	7	CA, CM, HG
0M395	Ballynatray	1	7	16	CA, CU, GB, MA, SN, SU, T.
0M487	Pillpark	0	-	-	
0M488	Blackbog	6	17	648	BH, BW, CM, CU, DN, GK, GV, HG, LB, ET, MA, OC, PT, RK, SU, T., WN
0M489	Ferrypoint to Newtown	5	11	545	CA, CU, GB, GK, HG, LB, MA, OC, RK, SU, T.

Blackwater Estuary SPA (4028) SCI species and recorded roosts 07/03/10 – shows number of roosting individuals and in brackets, the number of roost locations within the subsite.
Subsites not shown recorded no roosting SCI species during this survey.

SCI SPECIES	0L439	0M382	0M395	0M488	0M489
BW	3 (1)			142 (2)	
CU	30 (1)		3 (1)	52 (3)	2 (1)
WN				32 (1)	
GP					
L.					
DN				34 (1)	
BA	7 (1)				
RK	3 (1)	45 (1)		123 (3)	



0M382
0M395
0M383
OL436
0L439
OL437
0M487
0M488
OL438
0M489
OL432
Legend
Count Subsite Boundaries
OSi Discovery Series County Boundary
Total Number of Birds
RANGE
1-49
50-99
100-199
200-299
500+
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
Blackwater Estuary
Roost Location Map
Map to be read in conjunction with the NPWS Conservation Objectives SFA Supporting Document.
CO.CORK & CO.WATERFORD
0
0.5
1 km
The mapped boundaries are of an indicative and general nature only.
Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta.
Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordanáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)
N
Map Version 1
Date: March 2012

APPENDIX 9

Blackwater Estuary - Activities & Events

Please note that this list is based on the current review process and is not exhaustive.

Legend:	
O	observed or known to occur in or around Blackwater Estuary SPA.
U	known to occur but unknown area (subsites)/spatial extent; hence all potential subsites are included (e.g. fisheries activities).
H	historic, known to have occurred in the past.
P	potential to occur in the future.
	Grey highlighting refers to activities that have the potential to cause disturbance to waterbirds.

	0M382	0M383	0M395	0L432	0L436	0L437	0L438	0M439	0M487	0M488	0M489
1. Coastal protection, sea defences & stabilisation											
1.1 Linear defences				O	O		O	O	O		O
1.2 Training walls							O	O			
1.3 Groynes					O		O	O			
1.4 *Spartina* planting/growing			O			O				O	
2. Barrage schemes/drainage											
2.1 Weirs and barrages for river management			H								
2.2 Altered drainage/river channel					O		H				
2.3 Other channel modifications		H									
4. Industrial, port & related development											
4.1 Industrial port							O				
4.3 Slipway	O	H	O	O			O	O		H	O
4.4 Pier		O		O					O		H
4.5 Manufacturing industries						H	H				
6. Pollution											
6.1 Domestic & urban waste water							O	O			
6.2 Industrial							O				
6.3 Landfill							O	O			
6.4 Agricultural & forestry effluents						H					
6.7 Solid waste incl. fly-tipping				O					O		O
7. Sediment extraction (marine & terrestrial)											
7.2 Quarrying										H	
7.6 Removal of estuarine sediment		O									
8. Transport & communications											
8.3 Bridges & aqueducts			O		O	O	O/H		H		
8.5 Road schemes					O	O		O			
8.6 Car parks		O	O								
8.7 Shipping channel, shipping lanes				O				H			
9. Urbanisation											
9.1 Urbanised areas, housing				O			O				
9.2 Commercial & industrial areas							O	O			
9.3 Hotel & leisure complex				O							
12. Tourism & recreation											
12.2 Non-marina moorings				O			O	O	O	O	O
12.6 Power boating & water-skiing	O	O	O	O			O	O	O		O
12.7 Jet-skiing				O			O	O	O		O
12.8 Sailing		O		O			O				
12.9 Sailboarding & wind-surfing				O							O

	0M382	0M383	0M395	0L432	0L436	0L437	0L438	0M439	0M487	0M488	0M489
12.13 Rowing	O	H	H								
12.14 Tourist boat trips			P	O			O	O	O		O
12.15 Angling				O	O		O	O	O		O
12.17 Bathing & general beach recreation				O							
12.18 Walking, incl. dog walking	O	O	O	O			O				O
12.19 Birdwatching	O	O	O	O			O	O	O	O	O
12.21 4WD, trial & quad bikes				O							
12.22 Motorised vehicles				O							
12.23 Horse-riding				O							
13. Wildfowl & hunting											
13.1 Wildfowling		H	O			O				O	O
13.2 Other hunting-related activities	O	O	O								
14. Bait-collecting											
14.1 Digging for lugworms/ragworms							O		O	O	O
15. Fisheries & Aquaculture											
15.1 Professional passive fishing				U			U		U		U
15.2 Professional active fishing				U			U		U		U
15.4 Fish traps & other fixed devices & nets				U			U		U		U
15.5 Leisure fishing				O			O		O		O
15.6 Molluscs - hand-gathering				O					O	O	O
16. Agriculture & forestry											
16.1 Saltmarsh grazing/harvesting		H								O	O
16.2 Grazing: intensive (terrestrial)	O	H	O			O					
16.3 Grazing: non-intensive (terrestrial)										O	O
16.4 Sand dune grazing		H									
16.6 Crop production: intensive	O	O	O								
16.9 Removal of hedges, scrub	H	H	H								
16.10 Mowing/grassland cutting	O	O	O								
16.13 Agricultural land-claim					H	H	H	H			
16.14 In-filling of ditches, ponds, pools, marshes and pits							H			O	
16.15 Removal of stone walls/embankments							H				
16.20 Others									O	H	
19. Natural events											
19.1 Storms, floods and storm surges				O	O	O	O	O	O	O	O
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O	O	O
19.3 Eutrophication			O								
19.4 Other natural catastrophes			O								

APPENDIX 10

Disturbance Assessment

Scoring system - definitions & rationale

Frequency/Duration	Score	Rationale
Continuous	3	Continuous motion or noise; not necessarily 24-hours per day but zones of fairly continuous activity such as a port or marina.
Frequent	2	Frequently observed during the survey programme, can be up to several times per 6 hour tidal cycle; and/or known to occur on a frequent basis.
Infrequent	1	Observed only once or twice during the survey programme and known/considered likely to be infrequent.
Rare	0	Known to occur but not observed during the survey programme and considered likely to be rare in occurrence.
Intensity	**Score**	**Rationale**
Active, high-level	3	Would indicate an active event that is likely to displace waterbirds during its presence e.g. active shipping channel, speed boats, quad bikes, loose dogs.
Medium-level	2	Lower intensity events such as non-powered watercraft, vehicles, people walking along a shoreline (without dogs) – that are likely to result in waterbirds moving but birds will be less 'alarmed' than (1) and response will be species-specific.
Low-level	1	Although activity may be of a nature to displace waterbirds, birds move only slightly, resume normal behaviour quickly or show no determinable response at all; e.g. solitary walkers close to site but not impacting on waterbirds' immediate location; cars passing on an adjacent road…
Very low-level	0	Any activities considered to impart little effect upon waterbirds.
Response	**Score**	**Rationale**
Most birds disturbed all of the time	3	Birds do not return - therefore equivalent to habitat loss.
Most birds displaced for short periods	2	Birds return once disturbance has ceased.
Most species tolerate disturbance	1	Weak response, birds may move slightly away from disturbance source.
Most birds successfully habituate to the disturbance	0	Little determinable effects.

The scores assigned to the three attributes were then added together to give an overall 'disturbance score' which is used to define the extent of the impact as follows:-

Scores 0 – 3 = Low
Scores 4 – 6 = Moderate
Scores 7 – 9 = High

Scoring system – worked example

Disturbance event – humans walking along a beach; the beach is a popular recreational area and this activity was recorded frequently during surveys.

Attribute	Score	Rationale
Frequency/Duration	2	Recorded frequently during the survey period; known area of beach recreation.
Intensity	2	Medium level - considered likely to result in waterbirds moving away from the source of disturbance although response will be species-specific and some species may even habituate to the activity.
Response	2	Most birds are displaced for short periods and therefore will resume their previous behaviour in the area when the activity ceases.
TOTAL SCORE	**6**	**MODERATE**

Results - based on records from the 2009/10 Waterbird Survey Programme

	0M382	0M383	0M395	0L432	0L436	0L437	0L438	0M439	0M487	0M488	0M489
8. Transport & communications											
8.2 Flight path/aircraft flying over											3
12. Tourism & recreation											
12.6 Power boating (powered watercraft)	6										
12.8 Sailing (non powered watercraft)							4				
12.18 Walking, incl. dog walking	5						5				4
13. Wildfowl & hunting											
13.1 Wildfowling/shooting	6		6								
15. Fisheries & Aquaculture											
15.6 Hand-gathering – molluscs/crabs				2					2	2	2