Wexford Harbour and Slobs Special Protection Area (Site Code 4076)

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The Raven Special Protection Area (Site Code 4019)

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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 waterbird Special Conservation Interests of Wexford Harbour and Slobs Special Protection Area and The Raven 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 sites designated as Wexford Harbour and Slobs Special Protection Area and The Raven Special Protection Area, as well as introducing the concept of conservation objectives and their formulation.

Part Two provides site designation information for Wexford Harbour and Slobs Special Protection Area and The Raven Special Protection Area. Part Three presents the conservation objectives for these designated sites.

Part Four reviews the conservation condition of the Special Conservation Interest (SCI) species of both designated areas, including analysis of wintering (non-breeding) waterbird population trends, assignment of conservation condition, and examination of site trends in light of all-Ireland and international trends.

Part Five (Conservation Advice Notes) provides supporting information that is intended to assist the interpretation of the conservation objectives. This section includes a review of ecological characteristics of the SCI species of both designated sites and examines waterbird distribution recorded during the 2009/10 waterbird survey programme, drawing also on data from NPWS monitoring programmes (including benthic surveys), and the Irish Wetland Bird Survey (I-WeBS). This section concludes with information on activities and events that occur at the site which may interact, either directly, or indirectly, with waterbirds during the non-breeding season.

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 Wexford Harbour & Slobs Special Protection Area and The Raven Special Protection Area

Wexford Harbour and Slobs SPA (SPA Site Code 4076) and The Raven SPA (SPA Site Code 4019) are two Special Protection Areas situated in close proximity to Wexford Town.

Wexford Harbour is a shallow harbour with extensive mud and sand flats. The main freshwater input is the River Slaney which flows out through Wexford Town. The designated site is complex and encompasses the natural estuarine habitats of Wexford Harbour, the polderland known as the North and South 'Slobs', and the tidal section of the River Slaney as far north as Enniscorthy. The seaward boundary of the designated is a line that extends between a point on Rosslare Peninsula to a point just west of Raven Point (see map Appendix 1).

At low tide, extensive areas of intertidal flats are exposed which are fringed with saltmarsh in places, especially in sheltered areas such as Ferrycarrig, Castlebridge and Hopeland. At Castlebridge, saltmarsh grades into brackish marsh which is quite extensive and diverse (McCorry & Ryle, 2009a). Other wetland habitats include lagoons, dune slacks and reedswamp. Sandbanks occur across the mouth of the harbour of which Dogger Bank is the largest, but sediments in the harbour are very dynamic and sandbanks fluctuate in size and position often. The harbour was once a successful commercial fishing port but its success was hampered by its inaccessibility in terms of tides, currents and mobile sands and the need for frequent dredging of channels to keep them open.

The Slobs are two flat areas of farmland, mainly arable and pasture grassland, empoldered behind 19th century sea-walls. They are drained by a network of channels which flow into two central channels, in parts several hundred metres in width. Water from the channels is pumped into the sea with electric pumps. The channels often support swamp vegetation. Part of the North Slob (*c*500 acres) is a Nature Reserve (Wexford Wildfowl Reserve) owned by NPWS/BWI, and these lands are rented to farmers to farm the land in such a way that is sympathetic to the foraging requirements of wintering geese. Monitoring of the wintering birds of the Slobs extends back to the 1960s and there are ongoing monitoring and research programmes.

The river section of the SPA is extensive, extending to Enniscorthy, a distance of almost 20 km from Wexford town. In places the river is several hundreds metres wide. The river is noticeably tidal as far as Edermine Bridge but the tidal influence does extend as far as Enniscorthy.

The site is of international importance for several species of waterbirds but also because it regularly supports in excess of 20,000 waterbirds during winter. Wexford Harbour and Slobs is one of the top three sites in the country for numbers and diversity of wintering birds. The combination of estuarine habitats, including shallow waters for grebes, diving duck and seaduck, and the farmland of the polders, which include freshwater drainage channels, provides optimum feeding and roost areas for a wide range of species.

The Raven SPA extends from north of Rosslare Point to Blackwater Harbour on the coast of Co. Wexford. The seaward boundary of the site extends a maximum distance of approximately 4.5 km from the shoreline to encompass important areas of shallow water utilised by some of the species of special conservation interest. The Raven is an important bird site, being part of the Wexford Slobs and Harbour complex and is of critical significance is that it forms the principal night roost for the internationally important Wexford Harbour population of Greenland White-fronted Goose *Anser albifrons flavirostris*.

The Site Synopses for Wexford Harbour and Slobs SPA and The Raven SPA plus a map showing these SPA boundaries 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 on a long-term basis.*

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 non-breeding waterbird Special Conservation Interests of Wexford Harbour and Slobs and The Raven Special Protection Areas).

[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 Wexford Harbour and Slobs Protection Area

Wexford Harbour and Slobs SPA is selected as a Special Protection Area because it regularly supports over 20,000 waterbirds during the non-breeding season making this a site of international importance.

The **Selection Species** and **Additional Special Conservation Interests**[3] for Wexford Harbour and Slobs SPA are listed below and summarised in Table 2.1. This table also shows the importance of Wexford Harbour and Slobs SPA for these species relative to the importance of other sites within Ireland, within the south-eastern region, and within Co. Wexford.

The Selection Species listed for Wexford Harbour and Slobs SPA are as follows:-

1. The site regularly supports 1% or more of the all-Ireland population of the Annex I species Bewick's Swan (*Cygnus columbianus*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 191 individuals.

2. The site regularly supports 1% or more of the all-Ireland population of the Annex I species Whooper Swan (*Cygnus cygnus*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 100 individuals.

3. The site regularly supports 1% or more of the biogeographic population of the Annex I species Greenland White-fronted Goose (*Anser albifrons flavirostris*). The mean peak number within the SPA during the baseline period (1994/95 – 1998/99) was 9,111 individuals.

4. The site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta bernicla hrota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,469 individuals.

5. The site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 753 individuals.

6. The site regularly supports 1% or more of the all-Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,538 individuals.

7. The site regularly supports 1% or more of the all-Ireland population of Scaup (*Aythya marila*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 339 individuals.

8. The site regularly supports 1% or more of the all-Ireland population of Red-breasted Merganser (*Mergus serrator*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 209 individuals.

[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.

9. The site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 495 individuals.

10. The site regularly supports 1% or more of the all-Ireland population of Oystercatcher (*Haematopus ostralegus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,493 individuals

11. The site regularly supports 1% or more of the all-Ireland population of the Annex I species Golden Plover (*Pluvialis apricaria*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 5,013 individuals.

12. The site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,279 individuals.

13. The site regularly supports 1% or more of the all-Ireland population of species Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 11,826 individuals.

14. The site regularly supports 1% or more of the all-Ireland population of Sanderling (*Calidris alba*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 210 individuals.

15. 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 790 individuals.

16. The site regularly supports 1% or more of the biogeographical population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,696 individuals.

17. The site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,771 individuals.

18. The site regularly supports 1% or more of the all-Ireland population of Black-headed Gull (*Chroicocephalus ridibundus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 5,977 individuals.

19. The site is selected for Little Tern (*Sterna albifrons*). In 2000, 30 pairs were breeding at this site. This exceeds the all-Ireland 1% threshold for this Annex I species.

The following species are identified as additional Special Conservation Interests (SCIs) for Wexford Harbour and Slobs SPA as they were recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00) (Table 2.1):

Wigeon (*Anas penelope*),
Mallard (*Anas platyrynchos*),
Pintail (*Anas acuta*),
Goldeneye (*Bucephala clangula*),
Little Grebe (*Tachybaptus ruficollis*),
Great Crested Grebe (*Podiceps cristatus*),
Grey Heron (*Ardea cinerea*),
Coot (*Fulica atra*),
Knot (*Calidris canutus*),
Dunlin (*Calidris alpina*),
Redshank (*Tringa totanus*),
Lesser Black-backed Gull (*Larus fuscus*).

In addition to the aforementioned waterbird species of additional Special Conservation Interest, the Annex I species Hen Harrier (*Circus cyaneus*) is listed as an additional Special Conservation Interests (SCI). The site contains a winter roost for this species with up to eight individuals recorded, while the slobs provide good foraging habitats.

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

Table 2.1 Designation Summary: Species listed for Wexford Harbour and Slobs Special Protection Area

	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]
Site Selection Species	Bewick's Swan	Y	191	All-Ireland Importance	2	2	2
	Whooper Swan	Y	100	All-Ireland Importance	18	2	2
	Greenland White-fronted Goose	Y	9,111	International Importance	1	1	1
	Light-bellied Brent Goose		1,469	International Importance	2	1	1
	Shelduck		753	All-Ireland Importance	4	1	1
	Teal		1,538	All-Ireland Importance	3	1	1
	Scaup		339	All-Ireland Importance	3	1	1
	Red-breasted Merganser		209	All-Ireland Importance	2	1	1
	Cormorant		495	All-Ireland Importance	2	1	1
	Oystercatcher		1,493	All-Ireland Importance	4	1	1
	Golden Plover	Y	5,013	All-Ireland Importance	10	1	1
	Grey Plover		1,279	All-Ireland Importance	1	1	1
	Lapwing		11,826	All-Ireland Importance	2	1	1
	Sanderling		210	All-Ireland Importance	7	1	1
	Black-tailed Godwit		790	International Importance	7	2	1
	Bar-tailed Godwit	Y	1,696	International Importance	2	1	1
	Curlew		1,771	All-Ireland Importance	2	1	1
	Black-headed Gull		5,977	All-Ireland Importance	n/c	n/c	n/c
	Little Tern	Y	30 pairs	All-Ireland Importance	n/c	n/c	n/c
Additional Special Conservation Interests	Wigeon		2,752	All-Ireland Importance	9	2	2
	Mallard		3,290	All-Ireland Importance	2	1	1
	Pintail		66	All-Ireland Importance	6	2	2
	Goldeneye		182	All-Ireland Importance	5	1	1
	Little Grebe		82	All-Ireland Importance	3	1	1
	Great Crested Grebe		117	All-Ireland Importance	6	1	1
	Grey Heron		52	All-Ireland Importance	4	1	1
	Hen Harrier	Y	8 individuals	All-Ireland Importance	n/c	n/c	n/c
	Coot		351	All-Ireland Importance	8	2	2
	Knot		453	All-Ireland Importance	12	3	2
	Dunlin		2,485	All-Ireland Importance	13	3	2
	Redshank		555	All-Ireland Importance	14	3	1
	Lesser Black-backed Gull		1,086	All-Ireland Importance	n/c	n/c	n/c
Other conservation designations associated with the site[b]		**SAC**	**RAMSAR SITE**	**IMPORTANT BIRD AREA (IBA)**	**WILDFOWL SANCTUARY**	**OTHER**	
		Yes	**Yes**	**Yes**	**Yes**	**Yes**	

[a] Baseline data from I-WeBS with the exception of Bewick's Swan (Robinson et al. 2004a), Greenland White-fronted Goose (NPWS data), Light-bellied Brent Goose (Robinson et al. 2004b), breeding Little Terns (Mitchell et al. 2004) and Hen Harrier (NPWS data).
[b] Note that other designations associated with Wexford Harbour & Slobs may relate to different areas and/or some of these areas may extend outside the SPA boundary. These include Slaney River Valley SAC (781) and Raven Point Nature Reserve.
[1]National importance - the number given relates to the rank 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 - the number given relates to the rank 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 - the number given relates to the rank 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 Co Wexford.

2.2 Special Conservation Interests of The Raven Special Protection Area

The **Selection Species** and **Additional Special Conservation Interests**[4] for The Raven SPA are listed below and summarised in Table 2.2. This table also shows the importance of The Raven SPA for these species relative to the importance of other sites within Ireland, within the south-eastern region, and within Co. Wexford.

The Selection Species listed for The Raven SPA are as follows:-

1. In winter The Raven SPA is utilised by the internationally-important Wexford Harbour flock of Greenland White-fronted Goose (*Anser albifrons flavirostris*). The mean peak number within the SPA during the baseline period (1994/95 – 1998/99) was 9,111 individuals. This exceeds the biogeographic 1% threshold making the site of international importance for this Annex I species.

2. The site regularly supports 1% or more of the all-Ireland population of Common Scoter (*Melanitta nigra*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 3,234 individuals.

3. The site regularly supports 1% or more of the all-Ireland population of the Annex I species Red-throated Diver (*Gavia stellata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 77 individuals.

4. The site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1998/99) was 250 individuals.

5. The site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1998/99) was 553 individuals.

The following species is identified as an additional Special Conservation Interest (SCIs) for The Raven SPA as it was recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00) (Table 2.2):

Sanderling (*Calidris alba).*

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

[4] 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.

Table 2.2 Designation Summary: species listed for The Raven Special Protection Area

	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]
Site Selection Species	Greenland White-fronted Goose	Y	9,111	International Importance	1	1	1
	Common Scoter		3,234	All-Ireland Importance	1	1	1
	Red-throated Diver	Y	77	All-Ireland Importance	1	1	1
	Cormorant		250	All-Ireland Importance	5	2	2
	Grey Plover		553	All-Ireland Importance	2	2	2
Additional Special Conservation Interest	Sanderling		101	All-Ireland Importance	12	2	2
Other conservation designations associated with the site[b]		**SAC**	**RAMSAR SITE**	**IMPORTANT BIRD AREA (IBA)**	**WILDFOWL SANCTUARY**	**OTHER**	
		Yes	**Yes**	**Yes**		**Yes**	

[a] Baseline data from I-WeBS with the exception of Greenland White-fronted Goose (NPWS data).
[b] Note that other designations associated with The Raven may relate to different areas and/or some of these areas may extend outside the SPA boundary.
[1]National importance- the number given relates to the rank 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 - the number given relates to the rank 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 - the number given relates to the rank 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 Co Wexford.

PART THREE - CONSERVATION OBJECTIVES

3.1 Conservation Objectives for the non-breeding Special Conservation Interests of Wexford Harbour and Slobs SPA and The Raven SPA

The overarching Conservation Objective for Wexford Harbour and Slobs and The Raven Special Protection Areas 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 sites should contribute to the maintenance and improvement where necessary, of the overall favourable status of the national resource of waterbird species, and the continuation of their long-term survival across their natural range.

Conservation Objectives for Wexford Harbour and Slobs SPA and The Raven SPA, based on the principles of favourable conservation condition, are described below and summarised in Table 3.1. Note that 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* ***Wexford Harbour and Slobs SPA*** *and* ***The Raven 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 numbers or **range (distribution)** of areas used 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:

- ❖ 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 5.4.4).

- ❖ 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 5.4.4).

[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] Distribution from the 2009/2010 waterbird survey programme is introduced in Section 5.

Objective 2: *To maintain the favourable conservation condition of the wetland habitat at Wexford Harbour and Slobs SPA and The Raven 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 10,203 ha, other than that occurring from natural patterns of variation.

This objective seeks to maintain the permanent extent of the wetland habitats that are contained within the boundary of these two SPAs, and which constitute an important resource for regularly-occurring migratory waterbirds (note that the total designated area also contains some non-wetland habitat; primarily terrestrial habitats of the North and South Slobs).

The wetland habitats of Wexford Harbour and Slobs SPA and The Raven SPA can be categorised into four broad types: subtidal; intertidal; supratidal; and aquatic (terrestrial). 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. Many waterbird species will use more than one of the habitat types for different reasons throughout the tidal cycle.

Subtidal areas refer to those areas contained with 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 Wexford Harbour and Slobs SPA and The Raven SPA this broad category is estimated to be 6,585 ha. Subtidal areas are continuously available for benthic feeding ducks (e.g. Scaup and Common Scoter) and piscivorous/other waterbirds (e.g. divers and grebes). 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 watermark. For Wexford Harbour and Slobs SPA and The Raven SPA this is estimated to be 1, 206 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 feeding ducks (e.g. Scaup and Common Scoter) and piscivorous/other waterbirds (e.g. divers and grebes). 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 Wexford Harbour and Slobs SPA and the Raven SPA this is estimated to be 523 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 category known as 'Aquatic (terrestrial)' in this context refers to channels draining the polderlands inside of seawalls. Inland freshwater/brackish ponds are also included within this category. For Wexford Harbour and Slobs SPA and The Raven SPA this habitat category is estimated to be 135 ha. These areas form both feeding and roosting/refuge habitats for several species of waterbird including Teal and Whooper Swan.

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 non-breeding waterbird Special Conservation Interests of Wexford Harbour and Slobs SPA and The Raven SPA.

Objective 1: *To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Wexford Harbour and Slobs SPA and The Raven 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 4 of this document.
Range	Distribution	Number and range of areas used by waterbirds as determined by regular low tide and other waterbird surveys	There should be no significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation.	Waterbird distribution from the 2009/10 waterbird survey programme is reviewed in Part 5 of this document.
Objective 2: *To maintain the favourable conservation condition of the wetland habitat at* Wexford Harbour and Slobs SPA and The Raven 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 10,203 ha, other than that occurring from natural patterns of variation.	The wetland habitat area was estimated as 10,203 ha using OSI data and relevant orthophotographs. For details on known permanent wetland habitat loss see section 5.4.3

PART FOUR – REVIEW OF THE CONSERVATION CONDITION OF WATERBIRD SPECIAL CONSERVATION INTEREST SPECIES

4.1 Population data for non-breeding waterbird SCI species of Wexford Harbour & Slobs and The Raven SPAs

The sites designated as Wexford Harbour and Slobs and The Raven Special Protection Areas are inextricably interlinked because many of the listed waterbird species use habitats extending across both designated sites. An example is Greenland White-fronted Geese that feed almost exclusively on the North and South Slobs (part of Wexford Harbour and Slobs SPA), but roost at night primarily upon sandbanks located within The Raven SPA.

Non-breeding waterbirds have been counted regularly at these sites as part of the Irish Wetland Bird Survey (I-WeBS) since the survey commenced in 1994. Several I-WeBS count areas form constituent parts of the SPA sites as follows:

1. Wexford Harbour & Slobs – the area situated around the town of Wexford including the lower estuary of the River Slaney (Wexford Bridge to Ferrycarrig Bridge);
2. Raven Point – which is counted as a constituent subsite of (1) above;
3. River Slaney – the lower section of the River Slaney from Ferrycarrig Bridge in the south to Enniscorthy in the north, is counted as a separate count area for I-WeBS;
4. Wexford Bay - the coastal strip running north from Raven Point to Blackwater Head (and included within The Raven SPA) is counted as a separate count area for I-WeBS.

Counts at River Slaney and Wexford Bay are not coordinated with those at Wexford Harbour & Slobs, so the resulting datasets cannot be added together to form one site complex.

Baseline population[9] data for the non-breeding waterbird Special Conservation Interest (SCI) species of Wexford Harbour and Slobs and The Raven Special Protection Areas are shown in Table 4.1. The table subtext provides details on the data periods and count subsites/sites used to calculate this baseline data. Table 4.1 also shows recent site population data for the four constituent count areas that make up the two designated sites. The table subtext provides details on the data periods used.

For the majority of species, data in Table 4.1 are taken from the I-WeBS database. However, some of the waterbird species present at this site during the non-breeding season distribute across habitats that are outside the wetland habitats routinely counted during I-WeBS core counts. Therefore in addition to I-WeBS, several species-specific surveys are conducted on an annual or regular basis (Appendix 2) and these data are, where appropriate, integrated into the I-WeBS database. This is particularly relevant for Greenland White-fronted Geese. Data in Table 4.1 for this species have originated from specific counts undertaken by National Parks & Wildlife Service staff on pre-determined dates at intervals of approximately three weeks, between November and March each winter. These counts form part of the Greenland White-fronted Goose Census which is a collaborative effort to census all known wintering sites in Britain and Ireland each year (see Appendix 2).

Data in Table 4.1 are based on four or five-year mean peaks. Annual peak counts are used because they reflect more accurately the importance of a site for a particular species. The mean

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

of five-year periods (four-year period being used only where data were missing or incomplete) is generated to account for fluctuations in numbers or where there are inconsistencies in data gathering (e.g. incomplete coverage, bad weather). In general however, 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 also 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).

Gull species are not assigned 1% thresholds in Table 4.1. The wintering distributions of gull species are widespread and not monitored routinely during I-WeBS therefore standard methods of population estimation and threshold setting are difficult. SCI selection in relation to gull species therefore relates to the known most important sites for the gull species in question and a 'threshold of significance' is applied (Crowe, 2005).[10]

[10] Current threshold of significance is 1,000 for Black-headed Gull and 500 for Lesser Black-backed Gull.

Table 4.1 Baseline population data for waterbird Special Conservation Interest Species of Wexford Harbour and Slobs SPA and The Raven SPA, together with recent count data for their constituent count areas within I-WeBS

Site Special Conservation Interests (SCIs)	Baseline Data[aa] Wexford Harbour & Slobs SPA	Baseline Data[ab] The Raven SPA	Recent Site Data Wexford Harbour & Slobs[b]	Recent Site Data River Slaney[c]	Recent Site Data The Raven[d]	Recent Site Data Wexford Bay[e]
Bewick's Swan	191 (n)		47 (n)			
Whooper Swan	100 (n)		450 (i)			
Greenland White-fronted Goose	9,111 (i)	9,111 (i)	8,703 (i)			
Light-bellied Brent Goose	1,469 (i)		2,555 (i)			
Shelduck	753 (n)		489 (n)			
Teal	1,538 (n)		1,153 (n)	727		
Scaup	339 (n)		37			
Common Scoter	-	3,234 (n)	-			2,506 (n)
Red-breasted Merganser	209 (n)		95 (n)			
Red-throated Diver	-	77 (n)	-			65 (n)
Cormorant	495 (n)	250 (n)	320 (n)	61	251 (n)	
Oystercatcher	1,493 (n)		487			
Golden Plover	5,013 (n)		10,915 (i)			
Grey Plover	1,279 (n)	553 (n)	106 (n)		116 (n)	
Lapwing	11,826 (n)		6,684 (n)	800		
Sanderling	210 (n)	101 (n)	16		10	
Black-tailed Godwit	790 (i)		1,379 (i)	25		
Bar-tailed Godwit	1,696 (i)		967 (n)			
Curlew	1,771 (n)		800 (n)	66		
Black-headed Gull	5,977 (n)		524	1,872		
Wigeon	2,752 (n)		4,067 (n)	30		
Mallard	3,290 (n)		1,255 (n)	203		
Pintail	66 (n)		113 (n)			
Goldeneye	182 (n)		69			
Little Grebe	82 (n)		43 (n)	8		
Great Crested Grebe	117 (n)		63 (n)			
Grey Heron	52 (n)		13	11		
Coot	351 (n)		40			
Knot	453 (n)		21			
Dunlin	2,485 (n)		709			
Redshank	555 (n)		298	35		
Lesser Black-backed Gull	1,086 (n)		13	37		

n/c = not calculated; (i) denotes numbers of International importance; (n) denotes numbers of all-Ireland importance.
Note that International thresholds used for the baseline period are given in Wetlands International (2002). Recent site data uses thresholds as per Wetlands International (2006). All-Ireland thresholds are shown within Crowe et al. (2008).
[aa]Baseline data period is 1995/96 – 1999/00 (five-year means) and comprises the combined data for the Wexford Harbour & Slobs and Slaney River I-WeBS count units. The only exception is for Greenland White-fronted Goose which is based on the data period 1994/95 - 1998/99 with data from species-specific surveys undertaken by NPWS (see main text).
[ab]Baseline data period is 1995/96 – 1999/00 (five-year means) for Common Scoter and Red-throated Diver (data for Wexford Bay); 1994/95 – 1998/99 (four-year means) for Cormorant, Grey Plover and Sanderling (data for Raven Point) and 1994/95 - 1998/99 (five-year mean) for Greenland White-fronted Goose.
[b]Recent data are the four-year means for the period 2004/05 to 2008/09; with the exception of Greenland White-fronted Goose which is based on the period 2005/06 to 2009/10.
[c]Recent data are the peak count for the count season 2007/08.
[d]Recent data are the five-year means for the period 2001/02 to 2005/06.
[e]Recent data are the five-year means for the period 2003/04 to 2007/08.

4.2 Waterbird population trends - Wexford Harbour & Slobs SPA and The Raven SPA

The calculation and assessment of waterbird population trends 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, several I-WeBS count areas form constituent parts of Wexford Harbour & Slobs SPA and The Raven SPA. Count data obtained are not additive nor is it correct to produce trends for the smaller constituent count units. Therefore population trends for non-wintering waterbirds were calculated using data for only the Wexford Harbour & Slobs I-WeBS count area, this area being the most comprehensively covered in terms of counts across the years, and considered representative of waterbird populations across the wider area. Note that The Raven SPA is an inclusive part of this count area.

For most species, trend analyses were undertaken using data from the Irish Wetland Bird Survey (I-WeBS). Trends are presented for the 'long-term' 12-year period (1995/96–2007/08) and the recent five-year period (2002/03 - 2007/08) (Table 4.2). Data for the Greenland White-fronted Goose is from the species-specific surveys undertaken by NPWS and trends are presented for the 15-year period 1992/93 – 2007/08 and recent five-year period (2002/03 - 2007/08) (Appendix 3). The values shown in Table 4.2 represent the percentage change in index (population) values across these specified time periods. Positive values equate to increases in population size while negative values reflect a decrease in population size across the specified time period.

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.

Common Scoter and Red-throated Diver (SCI species for The Raven SPA) occur mainly in the I-WeBS count area Wexford Bay. The dataset spanning the period 1995/96 to 2007/08 allows for the calculation of a measure of population change using the generic threshold method (Table 4.3). Obtaining consistent and accurate data for both species however is inherently difficult because they are essentially marine species during winter and can only be detected when located sufficiently close to land-based vantage points and/or during suitable weather conditions. These trends must therefore be treated with necessary caution.

Trend analyses were not carried out for Black-headed Gull or Lesser Black-backed Gull because these species have not been counted routinely during I-WeBS counts at this site in recent years.

Table 4.2 Site Population Trends for waterbird Special Conservation Interest species of Wexford Harbour & Slobs SPA and The Raven SPA

	Special Conservation Interests	Site Population Trend[1] 12 Yr	Site Population Trend[2] 15 Yr	Site Population Trend[3] 5 Yr
Site Selection Species	Bewick's Swan	- 79.7		- 76.3
	Whooper Swan	+ 193		+ 16.2
	Greenland White-fronted Goose	-	- 7.0	+ 7.5
	Light-bellied Brent Goose	+ 50		+ 24.2
	Shelduck	- 15.6		+ 26.7
	Teal	+ 69.8		+ 6.5
	Scaup	+ 14.8		+ 195
	Red-breasted Merganser	- 15		+ 9
	Cormorant	+ 45		+ 5
	Oystercatcher	+ 5		+ 10.5
	Golden Plover	+ 39.7		- 14.6
	Grey Plover	- 45.5		- 6
	Lapwing	- 31		- 5
	Sanderling	- 2		+ 37
	Black-tailed Godwit	+ 72.1		+ 13.7
	Bar-tailed Godwit	- 6		- 1
	Curlew	- 30		- 9
	Black-headed Gull	n/c		n/c
Additional Special Conservation Interests	Wigeon	- 7.8		- 15.5
	Mallard	- 16.6		+ 0.3
	Pintail	+ 53		+ 57.4
	Goldeneye	- 42.3		- 30.1
	Little Grebe	- 13.1		+ 5.8
	Great Crested Grebe	- 8.8		- 13
	Grey Heron	+ 45.4		- 3.4
	Coot	- 48		- 14.5
	Knot	- 39.9		+ 47.3
	Dunlin	- 61.7		- 18.7
	Redshank	+ 18.4		- 7.4
	Lesser Black-backed Gull	n/c		n/c

[1]Site population trend analysis: 12 yr = 1995/96–2007/08
[2]Site population trend analysis: 15 yr = 1992/93–2007/08.
[3]Site population trend analysis: 5 yr = 2002/03-2007/08.
n/c = not calculated.

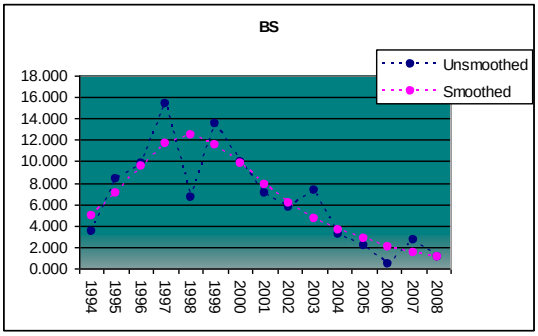
Table 4.3 Site Population change for Common Scoter and Red-throated Diver at Wexford Bay (The Raven SPA) (1995/96 – 199/00 to 2003/04 – 2007/08)

Special Conservation Interests	Population Change
Common Scoter	- 23
Red-throated Diver	- 16

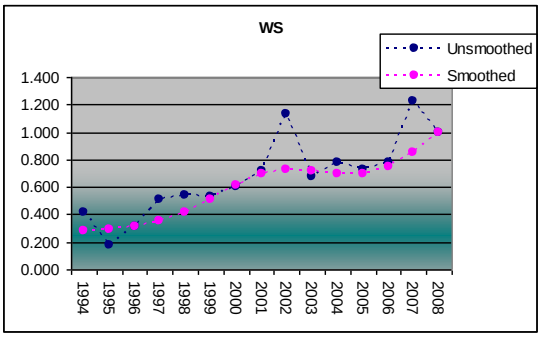
To aid the interpretation of trends, explanatory notes are given below for selected species. Graph headings in this section use waterbird species codes; a list of these is provided in Appendix 4.

Bewick's Swan – site numbers climbed to a peak in 1997/98 and were highly variable from 1997/98 to 2000/01. Thereafter numbers have steadily declined and this decline parallels a large-scale decline in numbers that has been taking place in Ireland since the 1990's (Worden et al. 2006), an all-time low number recorded in 2006/07.

In Ireland, the majority of Bewick Swans occur at sites in Co Wexford.

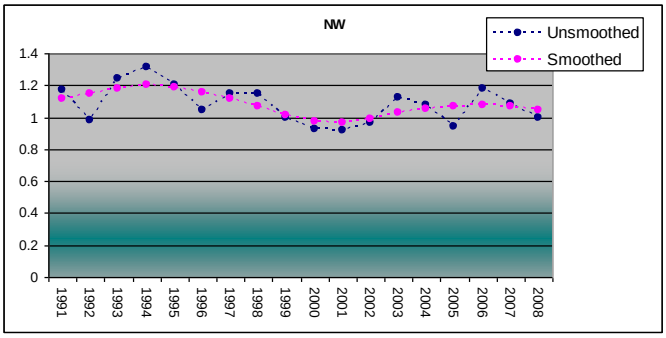


Whooper Swan – Whooper Swans have increased steadily in numbers at the site since 1995/96.



Greenland White-fronted Geese -

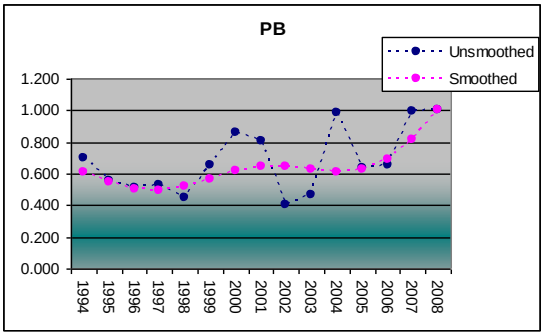
Wexford slobs have held 25-40% of the world wintering population of Greenland White-fronted Geese since the 1950's, and together with the island of Islay off southwest Scotland, supports the majority of the population.



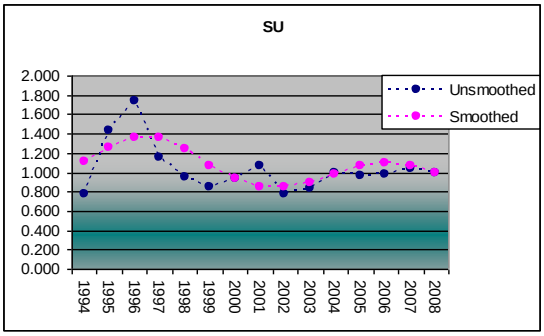
Nationally and globally, the Greenland White-fronted Goose has been in decline and of high conservation concern for several decades. Declines at Wexford are less marked than observed at other Irish wintering sites.

A ban of hunting of this species in Ireland and Scotland from 1983 onwards resulted in an increase in the Irish wintering population until the late 1990's; thereafter the population has declined to current levels despite a cessation of hunting in Iceland, the species' staging area. The more recent population decline has been attributed largely to low productivity (Fox et al. 2009).

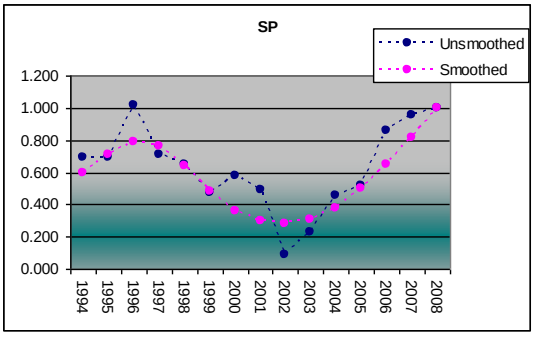
Light-bellied Brent Geese – numbers showed high inter-annual variation but overall site numbers have been increasing since 1998/99, in line with their flyway population.



Shelduck – a period of increasing numbers in the 1990's was followed by a decline to former levels by 2002/03. Numbers have since been relatively stable albeit at a level lower than in the 1990's.

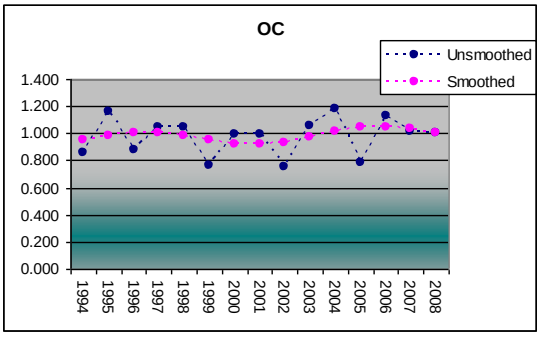


Scaup – apart from the all-time high number in the 1996/97 season, numbers steadily declined during the first half of the time period reaching an all-time low number in 2002/03. Since then site numbers have increased annually which explains the large short-term trend for increase.



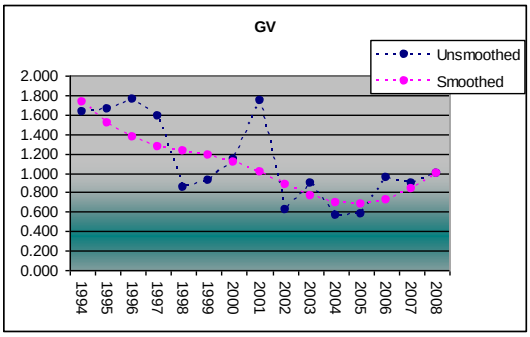
Oystercatcher – exhibited wide inter-annual variation but a reasonably stable trend is evident from the smoothed annual indices.

Examination of raw I-WeBS data for Oystercatcher shows a marked difference in the baseline five-year mean (1,493) and recent five-year mean (487). This is due to some very high September counts during the baseline period which have not been recorded in recent years. These high counts, likely due to the post-breeding congregation of adults and juveniles prior

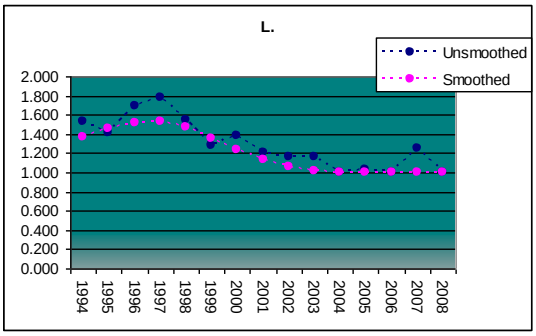


dispersion to other sites, does not affect the trend analysis because data for September is not included in the analysis for this species (please refer to methods in Appendix 3).

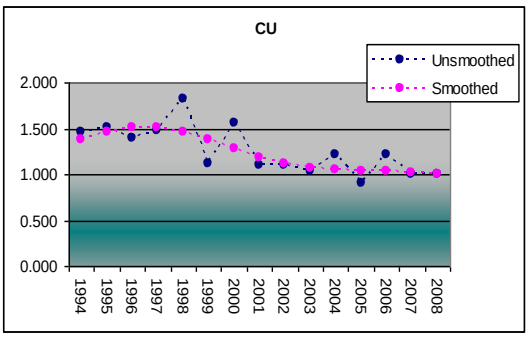
Grey Plover – numbers at the site have fluctuated widely between years but the smoothing process highlights the observed decline in numbers up to 2004/05. Since then numbers have increased which leads to the moderated short-term trend for decline.



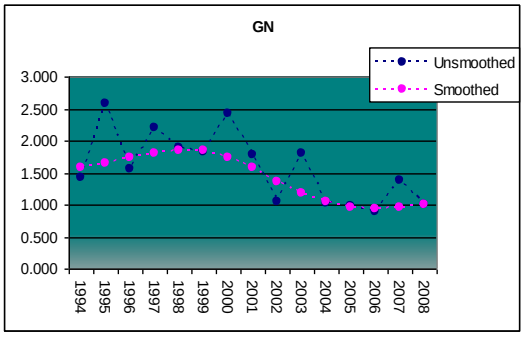
Lapwing – numbers have gradually declined since 1997/98. This is in line with the all-Ireland trend.



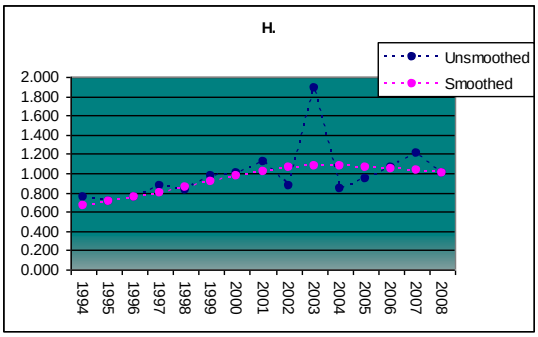
Curlew – the steady decline observed is in line with the all-Ireland trend for this species. This decline is less marked in recent years.



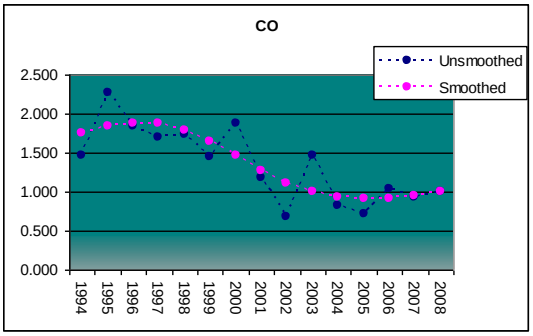
Goldeneye – numbers have fluctuated widely between years but the smoothing process highlights the observed decline in numbers since 2000/01. Numbers have been more stable since 2004/05 albeit much lower than those present in the 1990's.



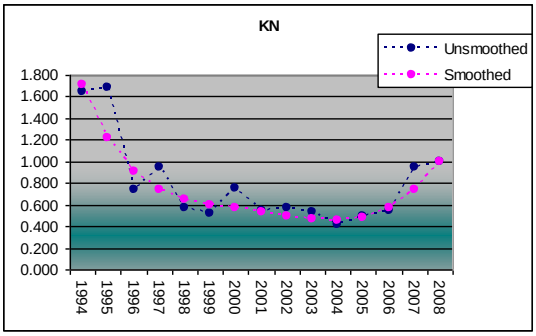
Grey Heron – exhibited steadily increasing numbers with the exception of great variation in the period 2002/03 to 2004/05.



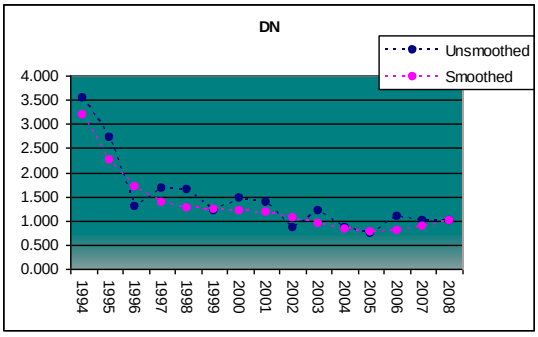
Coot – were present in much greater numbers in the period 1994/95 to 2000/1. Numbers subsequently declined to an all-time low in 2002/03. Numbers have been more stable in recent years which has led to the moderated short-term trend for decline.



Knot – declined in numbers from the high levels recorded in 1994/95. The period 1996/97 to 2004/05 showed a more gradual decline and since 2005/06 numbers have increased gradually year by year.



Dunlin – the decline in numbers from the higher levels recorded in 1994/95 is similar to Knot. Since 1996/97 the trend is for a more gradual decline although an improvement is evident in more recent years. The trend for decline follows the all-Ireland trend and that observed in Northern Ireland and Britain (Calbrade et al. 2010).



4.3 Wexford Harbour & Slobs SPA and The Raven SPA – site conservation condition of non-breeding waterbirds

Conservation condition of waterbird species was determined using the long-term site population trend (Table 4.4).[11] For Common Scoter and Red-throated Diver, conservation condition has been assigned using % population change (See Section 4.2) but this is tentative given factors (described above) in relation to their count coverage during the non-breeding season.

Conservation condition 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 32 non-breeding waterbird species of Special Conservation Interest for Wexford Harbour & Slobs SPA and The Raven SPA, and based on the long-term population trend for these species, it has been determined that:-

1. 2 species are currently considered as **Highly unfavourable** (Bewick's Swan and Dunlin);
2. 6 species are currently considered as **Unfavourable** (Grey Plover, Lapwing, Curlew, Goldeneye, Coot and Knot);
3. 11 species are currently considered as **Intermediate (unfavourable)** (Greenland White-fronted Goose, Shelduck, Common Scoter, Red-breasted Merganser, Red-throated Diver, Sanderling, Bar-tailed Godwit, Wigeon, Mallard, Little Grebe and Great Crested Grebe);
4. 11 species are currently considered as **Favourable** (Whooper Swan, Light-bellied Brent Goose, Teal, Scaup, Cormorant, Oystercatcher, Golden Plover, Black-tailed Godwit, Pintail, Grey Heron and Redshank).
5. 2 species are currently **un-assessed** (Black-headed Gull and Lesser Black-backed Gull).

[11] Results in Table 4.4 are presented for the waterbird SCI species of both SPA sites combined.

Table 4.4 Non-breeding SCI species of Wexford Harbour & Slobs SPA and The Raven SPA – Current Site Conservation Condition

	Special Conservation Interests	Site Population Trend[1]	Site Conservation Condition
Site Selection Species	Bewick's Swan	- 79.7	Highly Unfavourable
	Whooper Swan	+ 193	Favourable
	Greenland White-fronted Goose	- 7	Intermediate (Unfavourable)
	Light-bellied Brent Goose	+ 50	Favourable
	Shelduck	- 15.6	Intermediate (Unfavourable)
	Teal	+ 69.8	Favourable
	Scaup	+ 14.8	Favourable
	Common Scoter[2]	- 23	Intermediate (Unfavourable)
	Red-breasted Merganser	- 15	Intermediate (Unfavourable)
	Red-throated Diver[2]	- 16	Intermediate (Unfavourable)
	Cormorant	+ 45	Favourable
	Oystercatcher	+ 5	Favourable
	Golden Plover	+ 39.7	Favourable
	Grey Plover	- 45.5	Unfavourable
	Lapwing	- 31	Unfavourable
	Sanderling	- 2	Intermediate (Unfavourable)
	Black-tailed Godwit	+ 72.1	Favourable
	Bar-tailed Godwit	- 6	Intermediate (Unfavourable)
	Curlew	- 30	Unfavourable
	Black-headed Gull	n/c	-
Additional Special Conservation Interests	Wigeon	- 7.8	Intermediate (Unfavourable)
	Mallard	- 16.6	Intermediate (Unfavourable)
	Pintail	+ 53	Favourable
	Goldeneye	- 42.3	Unfavourable
	Little Grebe	- 13.1	Intermediate (Unfavourable)
	Great Crested Grebe	- 8.8	Intermediate (Unfavourable)
	Grey Heron	+ 45.4	Favourable
	Coot	- 48	Unfavourable
	Knot	- 39.9	Unfavourable
	Dunlin	- 61.7	Highly Unfavourable
	Redshank	+ 18.4	Favourable
	Lesser Black-backed Gull	n/c	-

[1]Site population trend analysis: 12 yr = 1995/96–2007/08 with the exception of Greenland White-fronted Goose which is the 15-yr trend (1992/93–2007/08) and those marked[2] which are calculated using the generic threshold method (see Section 4.2 for details)
n/c = not calculated.

4.4 Conservation condition in light of national, all-Ireland and international trends

Site conservation condition and population trends for waterbird species of Special Conservation Interest at Wexford Harbour & Slobs SPA and The Raven SPA were reviewed in light of species' all-Ireland and international trends (Table 4.5). The calculation of all-Ireland trends (island of Ireland) for the long-term data period was facilitated by the provision of indices from the I-WeBS and the WeBS database (kindly provided by the I-WeBS office and the British Trust for Ornithology). International trends follow Wetlands International (2006).

Table 4.5 also examines the relationship between a species' site trend and the current all-Ireland trend for the same time period (1994/95 to 2008/09)[12]. Colour coding is used to represent the following cases, as follows:-

[12] This is not strictly the same time period as used to calculate the trend for Greenland White-fronted Goose, but the assessment is nevertheless applicable.

- Grey – species for which analysis was not undertaken.
- Green – species whose populations are stable or increasing at both site level and all-Ireland level.
- Yellow - species whose populations are stable or increasing at site level but decreasing at 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 1.0 – 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 >50.0% decline at site level but are stable or increasing at all-Ireland level.

Pink and red categories, which are not used in the current assessment, 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). Results shown in Table 4.5 suggest that species site trends are largely in line with the trends observed at all-Ireland level.

Table 4.5 Non-breeding waterbird SCI populations of Wexford Harbour & Slobs SPA and The Raven SPA – additional population review, status and trends

	Special Conservation Interests	BoCCI Category[a]	Site Conservation Condition	Current Site Trend[b]	Current all-Ireland trend[d]	Current international trend[e]
Site Selection Species	Bewick's Swan	Red	Highly Unfavourable	- 79.7	-94.1	Decline
	Whooper Swan	Amber	Favourable	+ 193	+ 43.9	Increase
	Greenland White-fronted Goose	Amber	Intermediate (Unfavourable)	- 7	Decline	Decline
	Light-bellied Brent Goose	Amber	Favourable	+ 50	+ 58	Increase
	Shelduck	Amber	Intermediate (Unfavourable)	- 15.6	+ 4.46	Stable
	Teal	Amber	Favourable	+ 69.8	+ 11.28	Increase
	Scaup		Favourable	+ 14.8	+ 88.7	Stable
	Common Scoter[c]	Red	Intermediate (Unfavourable)	- 23	n/c	Stable
	Red-breasted Merganser	Green	Intermediate (Unfavourable)	- 15	- 11	n/c
	Red-throated Diver[c]	Amber	Intermediate (Unfavourable)	- 16	n/c	Stable
	Cormorant	Amber	Favourable	+ 45	+ 31.5	Increase
	Oystercatcher	Amber	Favourable	+ 5	+ 23.5	Decline
	Golden Plover	Red	Favourable	+ 39.7	- 2.2	Decline
	Grey Plover	Amber	Unfavourable	- 45.5	- 33.1	Decline
	Lapwing	Red	Unfavourable	- 31	- 40.12	Decline
	Sanderling	Green	Intermediate (Unfavourable)	- 2	+ 109.3	Stable/Increase
	Black-tailed Godwit	Amber	Favourable	+ 72.1	+ 70.2	Increase
	Bar-tailed Godwit	Amber	Intermediate (Unfavourable)	- 6	+ 1.5	Stable
	Curlew	Red	Unfavourable	- 30	- 25.7	Decline
	Black-headed Gull	Red	-	n/c	n/c	n/c
Additional Special Conservation Interests	Wigeon	Amber	Intermediate (Unfavourable)	- 7.8	- 20.1	Stable
	Mallard	Green	Intermediate (Unfavourable)	- 16.6	- 16	Decline/Stable
	Pintail	Red	Favourable	+ 53	+ 26.8	Stable
	Goldeneye	Amber	Unfavourable	- 42.3	- 50.7	Stable
	Little Grebe	Amber	Intermediate (Unfavourable)	- 13.1	- 5.5	Stable
	Great Crested Grebe	Amber	Intermediate (Unfavourable)	- 8.8	- 18	Decline
	Grey Heron	Green	Favourable	+ 45.4	+ 29.2	Increase
	Coot	Amber	Unfavourable	- 48	- 34	Stable
	Knot	Red	Unfavourable	- 39.9	- 2.91	Decline
	Dunlin	Amber	Highly Unfavourable	- 61.7	- 46.5	Stable (*alpina*)
	Redshank	Red	Favourable	+ 18.4	+ 22.7	Stable/Decline
	Lesser Black-backed Gull	Amber	-	n/c	n/c	Increase

[a]See Lynas *et al.* (2007); [b]Site population trend analysis: 12 yr = 1995/96 to 2007/08, with the exception of Greenland White-fronted Goose which is the 15-year trend 1992/93 to 2007/08; [c]based on two five-year averages (see Section 4.2); [d]all-Ireland trend calculated for the period 1994/95 to 2008/09; [e]International trend after Wetland International (2006); n/c = not calculated.

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 Wexford Harbour & Slobs SPA and The Raven SPA.

The information provided in Part Five is intended to:-

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

Section 5.2 provides selected ecological summary information for the non-breeding waterbirds of Wexford Harbour & Slobs SPA and The Raven SPA. This is intended to aid the interpretation of species distribution data provided within Section 5.3 of this report and related appendices. Finally, Section 5.4 provides summary information for activities and events that occur at Wexford Harbour & Slobs SPA and The Raven SPA that may either act upon the habitats within the site, or may interact with waterbirds using the site.

Note that the information provided in this document does not provide a comprehensive assessment on which to assess plans and projects as required under the Habitats Directive, but rather should inform the scope of the assessments and help direct where further detailed examinations are required. The information provided is based on best-available information at time of report production (August 2011).

Background information on coastal/marine habitats relevant to Wexford Harbour & Slobs SPA and The Raven SPA can be found in documents pertaining to Slaney River Valley SAC (Site Code 0781) (NPWS, 2011b) and Raven Point Nature Reserve SAC (Site Code 0710) (NPWS, 2011c).

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. The I-WeBS database shows 91 waterbird species that have been recorded at Wexford Harbour & Slobs[13] during the period 1994/95 – 2008/09. 45 waterbird species are present in the I-WeBS dataset for the Lower River Slaney. Ten waterbird families are represented: *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) and *Ciconiiformes* (Herons).

[13] Refers to the I-WeBS count area rather than the designated area.

As described in Section 1.1, the wetland habitats contained within the SPA sites are considered to be a Special Conservation Interest in their own right. The wetland habitat is an important resource for listed 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[14] or species that use the site at certain times only (e.g. as a cold weather refuge).

In the period 1994/95 to 2008/09, Wexford Harbour & Slobs supported 56 waterbird species on a regular basis[15] during the non-breeding season. Of these, 32 species are listed as Special Conservation Interest species for Wexford Harbour & Slobs SPA and The Raven SPA and a further 24 are non-SCI species. These species are listed in Table 5.1a together with relevant population data taken from the I-WeBS database. Note that the international and all-Ireland 1% thresholds used to compare with the baseline and recent site averages are different. These thresholds (periods 1994/95 – 1998/99 and 1999/00 – 2003/04) are outlined in Crowe et al. (2008).

Table 5.1(a) Selected (non SCI) waterbird species that occur at Wexford Harbour & Slobs* during the non-breeding season

Species	Baseline Data Period (1995/96 – 1999/00)	Recent Site Average (2004/05 – 2008/09)
Mute Swan (*Cygnus olor*)	243 (n)	164 (n)
Pink-footed Goose (*Anser brachyrhynchus*)	11	7
Greylag Goose (*Anser anser*)	7	2
Barnacle Goose (*Branta leucopsis*)	2	3
Gadwall (*Anas strepera*)	37 (n)	16
Shoveler (*Anas clypeata*)	21	8
Pochard (*Aythya ferina*)	187	61
Tufted Duck (*Aythya fuligula*)	111	98
Long-tailed Duck (*Clangula hyemalis*)	4	1
Great Northern Diver (*Gavia immer*)	15	4
Slavonian Grebe (*Podiceps auritus*)	4	2
Little Egret (*Egretta garzetta*)	2	22
Water Rail (*Rallus aquaticus*)	4	5
Moorhen (*Gallinula chloropus*)	30	15
Ringed Plover (*Charadrius hiaticula*)	100	19
Ruff (*Philomachus pugnax*)	3	7
Snipe (*Gallinago gallinago*)	17	35
Spotted Redshank (*Tringa erythropus*)	12	3
Greenshank (*Tringa nebularia*)	19	9
Turnstone (*Arenaria interpres*)	58	50
Common Gull (*Larus canus*)	107	135
Herring Gull (*Larus argentatus*)	105	41
Great Black-backed Gull (*Larus marinus*)	133	49
Kingfisher (*Alcedo atthis*)	1	1

* refers to I-WeBS count area rather than the area designated as Wexford Harbour & Slobs and The Raven SPAs;
(n) denotes numbers of all-Ireland importance.

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

[15] Regular occurrence was determined as those species that occurred in eleven out of the 14-years (1994/95 – 2008/09; one year data missing)

In the period 1994/95 to 2008/09, the Lower River Slaney supported 21 waterbird species on a regular basis[16] during the non-breeding season. Of these, 16 species are listed as Special Conservation Interest species for Wexford Harbour & Slobs SPA and The Raven SPA; data for the remaining five species are given in Table 5.1b.

Table 5.1(b) Selected (non SCI) waterbird species that occur within the Lower River Slaney during the non-breeding season

Species	Baseline Data Period (5-Yr Average 1995/96 – 1999/00)	Recent Site Average (Peak count 2007/08)
Mute Swan (*Cygnus olor*)	300 (n)	93
Tufted Duck (*Aythya fuligula*)	160	-
Moorhen (*Gallinula chloropus*)	8	1
Greenshank (*Tringa nebularia*)	5	2
Common Gull (*Larus canus*)	92	153
Herring Gull (*Larus argentatus*)	224	10
Great Black-backed Gull (*Larus marinus*)	107	19

Although waterbirds are 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 provides selected ecological information for waterbird SCI species of Wexford Harbour & Slobs SPA and The Raven SPA. Information is given for Selection species (Table 5.2a) and for additional Conservation Interests (Table 5.2b) for both SPA sites (two site lists combined) and shown for the following categories:

- waterbird family (group);
- winter distribution – species distribution range during winter; this is 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).

Further information to aid understanding of categories and codes is provided in the table sub text.

[16] Regular occurrence was determined as those species that occurred in six out of the 8-year dataset (1994/95 – 2007/08).

Table 5.2a Waterbirds – Ecological characteristics, requirements & specialities – Special Conservation Interests: selection species

	Family (group)	Winter distribution[A]	Trophic Guild[B]	Food/Prey Requirements[C]	Principal supporting habitat within site[D]	Ability to utilise alternative habitats[E]	Site Fidelity[F]
Bewick's Swan *Cygnus columbianus*	Anatidae (swans & geese)	Highly restricted	1, 7	Wide	Polderland of the North Slobs	2	High
Whooper Swan *Cygnus cygnus*	Anatidae (swans & geese)	Widespread	1, 7	Wide	Polderland of the North and South Slobs	2	Moderate/ High
Greenland White-fronted Goose *Anser albifrons flavirostris*	Anatidae (swans & geese)	Highly restricted	7	Narrower	Polderland of the North and South Slobs	2	High
Light-bellied Brent Goose* *Branta bernicla hrota*	Anatidae (geese)	Highly restricted	1, 5	Highly specialised	Intertidal mudflats and North Slobs	2	High
Shelduck *Tadorna tadorna*	Anatidae (shelducks)	Intermediate	1, 5	Wide	Intertidal mudflats and North Slobs	3	High
Teal *Anas crecca*	Anatidae (dabbling ducks)	Very widespread	1	Wide	Main channel – North Slobs	3	Weak
Scaup *Aythya marila*	Anatidae (diving ducks)	Localised	2	Wide	Main channel – North Slobs	1	Unknown
Common Scoter *Melanitta nigra*	Anatidae (sea ducks)	Localised	3	Highly specialised	Shallow subtidal over sand flats	1	Unknown
Red-breasted Merganser *Mergus serrator*	Anatidae (sea ducks)	Intermediate	2	Highly specialised	Sheltered & shallow subtidal	1	Unknown
Red-throated Diver *Gavia stellata*	Gaviidae (divers)	Intermediate	3	Highly specialised	Sheltered & shallow subtidal	1	Unknown
Cormorant *Phalacrocorax carbo*	Phalacrocoracidae (cormorants)	Very widespread	3	Highly specialised	Sheltered & shallow subtidal over sand and mud flats	1	Moderate
Oystercatcher *Haematopus ostralegus*	Haematopodidae (wading birds)	Intermediate	4	Narrower	Intertidal mud and sand flats	2	High
Golden Plover *Pluvialis apricaria*	Charadriidae (wading birds)	Intermediate	4	Wide	North and South Slobs plus intertidal mudflats	2	Moderate
Grey Plover *Pluvialis squatarola*	Charadriidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	High
Lapwing *Vanellus vanellus*	Charadriidae (wading birds)	Very widespread	4	Wide	North and South Slobs	2	Moderate
Sanderling *Calidris alba*	Scolopacidae (wading birds)	Localised	4, 6	Wide	Intertidal sand flats	3	High
Black-tailed Godwit *Limosa limosa*	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	High
Bar-tailed Godwit *Limosa lapponica*	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	Moderate
Curlew *Numenius arquata*	Scolopacidae (wading birds)	Very widespread	4	Wide	Intertidal mud and sand flats, North and South Slobs	2	High
Black-headed Gull *Chroicocephalus ridibundus*	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal flats & sheltered & shallow subtidal	2	Moderate

[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 – (1) species with a wide prey/food range; (2) species with a narrower prey range (e.g. species that forage upon a few species/taxa only), and (3) species with highly specialised foraging requirements (e.g. piscivores).
[D] Principal supporting habitat present within the site. 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. Note, a score of 1 for sea ducks and divers relates to propensity for within-season movements although the site is an important part of the species' wintering range.
[F] Site fidelity on non-breeding grounds: Unknown; Weak; Moderate; or High (based on published information).

Table 5.2b Waterbirds – Ecological characteristics, requirements & specialities – species of Additional Conservation Interest

	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]
Wigeon *Anas penelope*	Anatidae (dabbling ducks)	Very widespread	1, 5	Narrower	Main channel North Slobs	1	Weak
Mallard *Anas platyrynchos*	Anatidae (dabbling ducks)	Very widespread	1	Wide	Main channel North Slobs	1	Moderate
Pintail *Anas acuta*	Anatidae (dabbling ducks)	Localised	1	Wide	Main channel North Slobs	1	Weak
Goldeneye *Bucephala clangula*	Anatidae (diving ducks)	Widespread	2	Wide	Main channel North Slobs	3	Unknown
Little Grebe *Tachybaptus rufficollis*	Podicipedidae (grebes)	Widespread	1,2	Wide	Main channel North Slobs	3	Unknown
Great Crested Grebe *Podiceps cristatus*	Podicipedidae (grebes)	Widespread	2/3	Narrower	Sheltered & shallow subtidal over sand flats	2	High
Grey Heron *Ardea cinerea*	Ardeidae (herons)	Very widespread	6	Narrower	Widespread, intertidal and channels of North & South slobs	1	Unknown
Coot *Fulica atra*	Rallidae (rails)	Widespread	1/2/7	Wide	Main channel North Slobs	3	Unknown
Knot *Calidris canutus*	Scolopacidae (wading birds)	Localised	4	Narrower	Intertidal mud and sand flats	3	Moderate
Dunlin *Calidris alpina*	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	3	Moderate
Redshank *Tringa totanus*	Scolopacidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	Moderate
Lesser Black-backed Gull *Larus fuscus*	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal flats & sheltered & shallow subtidal	1	Unknown

[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 – (1) species with a wide prey/food range; (2) species with a narrower prey range (e.g. species that forage upon a few species/taxa only), and (3) species with highly specialised foraging requirements (e.g. piscivores).
[D] Principal supporting habitat present within the site. 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 information).

5.3 The 2009/10 waterbird survey programme

5.3.1 Introduction & methods

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 Wexford Harbour & Slobs SPA and The Raven SPA, a survey programme of four low tide counts (October 15th, November 20th & December 15th 2009 and February 15th 2010) and a high tide count (January 21st 2010) were completed across the site. Greenland White-fronted Geese were not included within this main survey programme but were instead counted during their own species-specific surveys that were undertaken across the North and South Slobs in the months November 2009 to March 2010. These surveys, undertaken each year and known as 'NPWS Research counts' aim to obtain the most accurate counts possible of this species and the results form part of the International Greenland White-fronted Goose Census (Appendix 2). In 2009/10 these surveys took place a day or two prior to the main survey programme, the exception to this was the February 2010 survey where the census was undertaken in the morning before the low tide count.

Waterbird species were counted within a series of nine count sections (subsites) (Appendix 6), the subsites corresponding to those used during I-WeBS surveys. Within six subsites, the behaviour of waterbirds during counts was attributed to one of two categories (foraging or roosting/other); behaviour was not assigned to waterbirds counted within three subsites (0O499 North Slobs, 0O486 South Slobs and 0O490 (Raven Point – Ferrybank).

In addition to behaviour, the position of waterbirds was recorded in relation to one of five broad habitat types (intertidal, subtidal, supratidal, terrestrial and terrestrial (aquatic)), the latter two used in relation to South Slobs (0O486) and North Slobs (0O499). Note that the definitions of broad habitats (Table 5.3) were defined specifically for the survey programme and do not follow strict scientific definitions for these areas.

Table 5.3 Definition of broad habitat types used

Broad Habitat Type	Broad Habitat Description
Intertidal (areas 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 (areas that lie 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/Coastal	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*) surrounded by intertidal flats, were included in the intertidal category. Part of the system of sandbanks that occur at the mouth of Wexford Harbour (south of Raven Point) were classified as supratidal during surveys although they are mapped separately as 'sandbank' within maps. Note that the mapped position of sandbanks is indicative only.
Terrestrial	Used where birds were recorded within habitats close to the shoreline but were above the intertidal and supratidal levels.
Aquatic (Terrestrial)	Used for waterbirds recorded within channels and wet pools that are present across the North and South slobs.

In addition to the surveys outlined above, information on high tide roosts was collected from a variety of sources including the high tide survey (21/01/10), a roost survey undertaken on 8th March 2010 (partial site only), I-WeBS records, and data records from NPWS Regional staff.

5.3.2 Waterbird distribution data and analyses

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 day. Analyses were undertaken for (1) total numbers (low tide surveys) and (2) total numbers (high tide survey). For each low tide survey, subsites were ranked in succession from the highest to the lowest in terms of their relative contribution to each species' distribution across all subsites. Rank positions were then converted to categories (see Box 2). The highest rank position for each subsite across any of the low tide count dates was then presented for each SCI species in a subsite by species matrix. Rank numbers only are shown for the high tide survey.

Box 2

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).

Waterbird count data for low and high tide surveys are also presented as species distribution maps ('dot density maps'). 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 broad habitat types within subsites, 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 the broad habitat types of each subsite so no conclusions can be made at a scale finer than habitat within subsite.**

Note
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 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 is inherently difficult and prone to error. Flock/roost positions should therefore be viewed as indicative only.

5.3.3 Summary Results

Note that hereafter the site 'Wexford Harbour & Slobs' refers to the count area used during the 2009/10 waterbird survey programme, and that there are differences between the extent of this count area and the area designated as Wexford Harbour & Slobs SPA and The Raven SPA.[17]

For the purpose of reporting, the SCI species listed for the two SPA sites are presented together in tables, in the order of Selection Species followed by additional Special Conservation Interest species. Within these two categories, species are listed in taxonomic order. Standard waterbird codes are often used in figures, tables and data files; these codes are listed in Appendix 4.

Cummins and Crowe (2010) provide a summary of waterbird data collected and useful information on site coverage, count conditions etc. However some aspects of the dataset have been updated since their report was produced (e.g. species site totals).

A total of 58 waterbird species were recorded during the 2009/10 survey programme at Wexford Harbour & Slobs. Table 5.4 shows peak numbers (whole site) for SCI species[18] recorded during the low tide (LT) and high tide (HT) surveys (data for Greenland White-fronted Geese not included).

Average subsite occupancy, defined as the average proportion of subsites in which a species occurred during low tide counts, varied greatly amongst the species. Two species were restricted to a single subsite: Bewick's Swan and Scaup (0O499 North Slob), while several others occurred in a maximum two subsites (Common Scoter, Red-throated Diver, Sanderling, Pintail, Little Grebe, Coot and Knot). Only Black-headed Gulls were recorded in all nine subsites with an average subsite use during low tide surveys of 94%. Thirteen of the 32 SCI species for the two SPA sites in question occurred within 50-75% of all subsites surveyed.

Monthly count data from the Greenland White-fronted Geese survey are shown in Table 5.5.

[17] The relationship between the count area and the designated sites are explained in Section 4.1

[18] For both SPA sites (Wexford Harbour & Slobs SPA and The Raven SPA)

Table 5.4 Wexford Harbour & Slobs * 2009/2010 waterbird surveys – summary data

Site Special Conservation Interests (SCIs)	Peak number recorded - LT surveys[I]	Peak number recorded - HT survey[II]	Average LT subsite % occupancy [III]	Peak number subsites utilised [IV]
Bewick's Swan	9	65 (n)	11	1
Whooper Swan	512 (i)	411 (i)	28	3
Light-bellied Brent Goose	2,571 (i)	2,648 (i)	61	6
Shelduck	765 (n)	768 (n)	47	6
Teal	552 (n)	527 (n)	19	3
Scaup	4	0	11	1
Common Scoter	8,264 (n)	273 (n)	14	2
Red-breasted Merganser	314 (n)	62 (n)	58	7
Red-throated Diver	39 (n)	2	17	2
Cormorant	626 (n)	25	81	8
Oystercatcher	1,171 (n)	352	75	8
Golden Plover	12,466 (i)	420	25	4
Grey Plover	246 (n)	1,021 (n)	56	6
Lapwing	4,113 (n)	4,098 (n)	42	5
Sanderling	130 (n)	16	11	2
Black-tailed Godwit	1,849 (i)	780 (i)	44	6
Bar-tailed Godwit	984 (n)	964 (n)	67	7
Curlew	1,062 (n)	1,593 (n)	86	8
Black-headed Gull	4,086	198	94	9
Wigeon	6,421 (n)	3,050 (n)	31	3
Mallard	1,957 (n)	279	31	3
Pintail	258 (n)	30 (n)	14	2
Goldeneye	50	29	28	5
Little Grebe	45 (n)	15	14	2
Great Crested Grebe	137 (n)	26	64	7
Grey Heron	57 (n)	4	67	8
Coot	20	18	14	2
Knot	25	0	11	2
Dunlin	2,607 (n)	1,387 (n)	53	7
Redshank	1,016 (n)	176	83	8
Lesser Black-backed Gull*	325	15	58	7

* refers to I-WeBS count area rather than the site designated as Wexford Harbour & Slobs and The Raven SPAs.
(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 (15/10/09, 20/11/09, 15/12/09 & 15/02/10).
[II] 1high-tide count undertaken on (21/01/10).
[III]Mean (± s.d.) calculated across low tide counts.
[IV]Peak number of subsites utilised by the species in any one low tide survey.

Table 5.5 Wexford Harbour & Slobs * – data from the Greenland White-fronted Geese census 2009/10

Subsite	Subsite Name	16/11/09	14/12/09	18/01/10	15/02/10	14/03/10
0O485/0O486	South Slobs & adj harbour	2	0	24	434	764
0O499	North Slobs	7,491	7,445	7,974	7,515	7,470

Species richness (total number of species) across the whole site differed between October and November 2009 but then remained relatively consistent across the remainder of the survey programme; a total 47, 44, 50 and 50 species recorded during the four low tide counts respectively, with 49 species recorded during the high tide count in January 2010.[19]

[19] Greenland White-fronted Geese are included in these calculations as although not counted on the main survey dates, were present in every month.

Species richness at subsite level varied considerably (Table 5.6) with the North Slobs (0O499) consistently supporting the greatest species diversity. With the exception of 0O901 (Blackwater Head to Raven Point) other subsites supported an average diversity in the range 16-21 species. In general, low tide surveys recorded a greater number of species than high tide surveys.

Table 5.6 Subsite species richness

Subsite	Subsite Name	Mean (±S.D) (Low Tide Surveys)	Peak LT Survey	Peak HT Survey
0O407	Ferrybank (Wexford Bridge) - Castlebridge	18 (3)	22	6
0O485	Inner South Harbour	16 (7)	21	7
0O486	South Slobs	19 (5)	26	22
0O490	Raven Pt. - Ferrybank (Wexford Bridge)	21 (6)	30	16
0O493	Raven Point	16 (1)	17	15
0O495	Rosslare Backstrand	21 (2)	23	16
0O498	Hopeland Wexford Harbour	20 (4)	24	18
0O499	North Slob	31 (4)	35	32
0O901	Blackwater Head - Raven Point	9 (2)	11	11

5.3.4 Waterbird distribution

Results from the 'subsite assessments' are shown in Tables 5.7a (total numbers low tide surveys) and Table 5.7b (total numbers high tide survey) which shows the proportional use of subsites by each Special Conservation Interest (SCI) species, relative to the site as a whole.

The categories L, M, H, V used in Table 5.7a relates to the final rank positions (see 5.3.2 for methodology). The fact that different subsites may be categorised as 'Very High' for the same species highlights that several subsites may have supported peak numbers during the survey programme. This approach, rather than using an average obtained 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.

Waterbird distribution maps ('dot-density maps') are provided in Appendix 7 and summary roost data are presented in Appendix 8. To aid the interpretation of maps and tables, discussion notes on the distribution of each SCI species are provided in the following pages. This information draws upon the full extent of the data collected and analysed for the site.

Table 5.7 (a) Wexford Harbour & Slobs Subsite assessment – rank total numbers during Low Tide surveys (across all behaviours and habitats) (L Low, M Moderate; H High V Very high; see Section 5.3.2 for methods and descriptions of categories)

Subsite ► / Species ▼	0O407	0O485	0O486	0O490	0O493	0O495	0O498	0O499	0O901
BS								V	
WS		M	V			H		V	
NW			H					V	
PB		H	M	M	M	V	V	V	
SU	M	H	M	H	M	H	V	V	
T.	M		H				H	V	
SP								V	
CX						H			V
RM	M	M	H	V	H	H	M	L	H
RH		H				H			V
CA	M	H	H	V	V	H	L	L	H
OC	H	V	M	H	M	V	V	H	L
GP			H	L		V	M	V	
GV	M	M	M	H	H	V	V		
L.	M		V	L			M	V	
SS				V		V	H		
BW	V	L	M	H			V	V	
BA	L	L	L	H	V	V	V	M	
CU	H	M	H	H	M	V	H	V	
BH	H	V	H	H	H	V	V	V	L
WN			H	H		H		V	
MA			H	M	H			V	M
PT				H				V	
GN	V	M	L	H				V	H
LG			V	H				V	
GG	V	V	M	V	M	M	H		M
H.	H	V	H	V	M	M	V	H	
CO			H					V	
KN					V	V			
DN	L		M	L	H	V	V	M	
RK	V	M	M	H	M	H	V	M	
LB	H	H	M	V	V	H	M		H

Table 5.7 (b) Wexford Harbour & Slobs Subsite assessment – rank total numbers during High Tide surveys (across all behaviours and habitats) (see Section 5.3.2 for methods)

Subsite ► / Species ▼	0O407	0O485	0O486	0O490	0O493	0O495	0O498	0O499	0O901
BS								1	
WS			1					2	
NW			2					1	
PB			5	6	3	4	2	1	
SU			5		3	4	1	2	
T.	3		2					1	
SP	*Not observed during HT survey*								
CX									1
RM		5		4	3	1	2		5
RH									1
CA	4	5			1	2			2
OC				3		1	2	5	4
GP			2					1	
GV			2			1			
L.			1	4			3	2	
SS						1			
BW			2				1		
BA					2	1		3	
CU			3		1	2	4	5	
BH	8	1		4	5	3	6	7	2
WN			2					1	
MA	2		3					1	
PT								1	
GN							2	1	
LG			3	2				1	
GG				3		1	2		4
H.			1				2		
CO								1	
KN	*Not observed during HT survey*								
DN			2		3	1		4	
RK	5	5	1	7	3		2	4	
LB			1	4	2	2			

Wexford Harbour & Slobs SPA (4076) and The Raven (4019)

Waterbird Survey Programme 2009/10

Waterbird distribution - discussion notes

Where mentioned, information on benthic communities and sediment is from the intertidal and subtidal sampling programme commissioned by the Marine Institute and National Parks & Wildlife Service (e.g. ASU, 2009) and reported in NPWS (2011b and 2011c). I-WeBS refers to count data collected through the Irish Wetland Bird Survey (I-WeBS count areas are described in Section 4.1).

Bewick's Swan *Cygnus columbianus bewickii* - Family (group): Anatidae (geese)
Cygnus columbianus, known as the Bewick's or Tundra swan, has a widespread breeding distribution extending across Alaska, northern Canada and Arctic Russia. Three populations of the *Cygnus* c. *bewickii* sub-species are known. One of these three, which breeds in northern Russia, spends winter in Northwest Europe including Britain and Ireland (Worden et al. 2006). The total size of the Northwest European population of Bewick's Swan *Cygnus columbianus bewickii* is monitored at 5-year intervals by a coordinated midwinter census throughout the swans' wintering range. Numbers are known to be in decline, a coordinated international census in January 2005 recorded a total of c. 21,500 birds, a 27% decrease on the peak count of 29,277 in January 1995 (Rees & Beekman, 2010). In Ireland, wintering Bewick's swans are limited to relatively few sites and winter numbers are in decline (Crowe et al. 2005; 2008) with just 80 individuals recorded in January 2010. Bewick's Swans occur at relatively few sites in Ireland and are highly site faithful. The most recent census recorded the species at only five locations in the Irish Republic, three in Co Wexford (North Slob (Wexford Harbour), Ballyteige Burrow (also known as Cull and Killag) and Tacumshin Lake) and two locations in Co Roscommon (Boland et al. 2010).
Numbers
At Wexford Harbour & Slobs, relatively few Bewick's Swans were recorded on low tide survey days (maximum 9 individuals on 15/02/10), but 65 individuals representing numbers of national importance, were recorded during the high tide survey (21/01/10). This swan species was recorded exclusively within 0O499 (North Slob). The I-WeBS site peak for the Wexford Harbour and Slobs count area was 25 individuals for the recent season (2008/09).
Foraging Distribution
Bewick's Swans are primarily herbivorous, feeding on aquatic plants, grasses and agricultural plants such as grain and vegetables. They typically feed by day and roost by night and are gregarious, often occurring in large flocks intermixed with the more numerous Whooper Swans. Use of agricultural habitats has increased over the years, largest proportions now found on winter cereals and sugar beet (Worden et al. 2006) with beet the main habitat used at Wexford Harbour and Slobs and Ballyteige Burrow (Crowe et al. 2005); indeed as part of management practices, fodder beet is grown specifically across the slobs for the wintering geese and swan populations to provide them with additional feeding during the leanest part of the winter. A single flock of 65 foraging Bewick's Swans in 0O499 on 21st January 2010 were located within a stubble field.
Roosting Distribution
Bewick's Swans forage diurnally and roost at night. Roosting takes places primarily alongside the main channel of the North Slob (0O499).

Whooper Swan *Cygnus cygnus* - Family (group): Anatidae (geese)

The Whooper Swan is a migratory species and has a widespread breeding distribution across the northern Palearctic, ranging from Iceland and northern Scandinavia in the west, to Russia in the east. Five breeding populations have been identified in the Western Palearctic and Asia and those wintering in Britain and Ireland come almost exclusively from the Icelandic breeding population (Worden et al. 2009).

Historically the species was known to winter in areas with freshwater wetland habitats or brackish lagoons and coastal bays. A change to feeding on terrestrial habitats has been observed since the mid 1990's (Crowe, 2005) with grassland and increasingly, arable habitats used by foraging individuals.

Numbers

Internationally-important numbers of Whooper Swans were recorded in all but the first (October) low tide survey. Numbers peaked during the November low tide survey (512 individuals) and 411 individuals were recorded during the high tide survey (21/01/10).
The site peak for the Wexford Harbour and Slobs I-WeBS count area was 650 individuals for the recent season (2008/09).

During the 2009/10 Waterbird Survey programme, Whooper Swans were recorded from four subsites (0O485, 0O486, 0O495 and 0O499) but numbers were consistently higher within two of these (0O486 (South Slob) and 0O499 (North Slob)). Numbers were higher within 0O499 during the first three surveys and higher within 0O486 during the final two surveys. The subsite peak of 331 individuals was recorded within 0O486 (South Slob) on 15/02/10.

Foraging Distribution

Whooper Swans are primarily herbivorous, feeding on aquatic plants, grasses and agricultural plants such as grain and vegetables. During the most recent international swan census, just over half of habitat usage records for Whooper Swans were for dry improved pasture (Boland et al. 2010).

At Wexford Harbour and Slobs, Whooper Swans were recorded foraging exclusively within 0O486 (South Slob) and 0O499 (North Slob).
On 15/10/09, the majority of individuals were located in the main water channel of the North Slob (0O499), positioned at the south-west corner where the channel is at its widest and deepest. On 20/11/09, the same area of water channel was again favoured by the majority of individuals (208) with 94 individuals located in the channel further to the northeast. In addition, 95 individuals foraged within grass of the South Slobs (0O486). On 15/12/09, 66 individuals were located in the channel (NE corner) of 0O499 (North Slobs) and 51 foraged in the east of the subsite within stubble. Two flocks (40 and 24 individuals) foraged within grass and stubble respectively of 0O486 (South Slobs).

During the high tide count, the South Slobs supported the majority of individuals. 56 foraged within winter cereals to the east of the main channel with 83 individuals in nearby fields within grass. A further 103 individuals foraged within winter cereals in the SE of the subsite. 0O499 (North Slob) supported 59 individuals foraging within beet and a further 110 individuals at three locations of the main channel.

The final low tide survey recorded the majority of Whooper Swans within 0O486 (South Slobs) when 331 individuals foraged terrestrially. 208 were recorded in winter cereals in the SE corner and 123 foraged within winter cereals to the east of the main, these were the same fields as used in January 2010.

Roosting Distribution

Whooper Swans forage diurnally and roost at night. Roosting is undertaken primarily within 0O486 (South Slob) and 0O499 (North Slob). The species has been known to use Tern Island (within 0O495) when shoots are being carried out on the slobs.

On 15/10/09, 13 individuals were recorded in roosting/other behaviour subtidally within 0O485 (inner South Harbour) and small numbers of individuals loafed subtidally within 0O495 (Rosslare Backstrand). On 20/11/09, 75 individuals loafed within the channel of 0O486 (South Slobs) and a further 40 individuals rested terrestrially. On 15/12/09, 35 individuals were positioned at the northern end of the main channel of 0O486 (South Slobs).

Greenland White-fronted Goose *Anser albifrons flavirostris* - Family (group): Anatidae (geese)

The Greater White-fronted Goose (*Anser albifrons*) has five subspecies and a circumpolar breeding distribution. The subspecies Greenland White-fronted Geese (*A. a. flavirostris*) is the most morphologically distinct, and breeds solely in western Greenland, stages during spring and autumn migration in southern and western Iceland, and winters almost entirely in Ireland and north and west Scotland (Fox, 2003). Historically these geese wintered on bogland, callowland and rough grassland (Norriss & Wilson, 1993) but in recent decades have changed to feeding in agricultural landscapes of varying degrees of farming intensity (Stroud & Fox, 2009).

In the early 1980's the species began to be afforded protection in some parts of its wintering range and research programmes were initiated, aimed primarily at providing accurate estimates of population size and improving knowledge of the species' distribution (Wilson et al. 1991).

Greenland White-fronted Geese are the subject of an annual census, coordinated in Britain by the Greenland White-fronted Goose Study and in Northern Ireland and Ireland by NPWS. The global population of Greenland White-fronted Geese is estimated at 22,844 (Fox et al. 2010); down by 1.4% from the previous world population estimate of 23,162 in spring 2009 (Fox et al. 2009). However, the population remains of high conservation concern because it has declined by more than 30% over the past ten years, attributed to the continuing decline in annual recruitment, while perhaps climate-related changes and increased competition for nest sites with the expanding population of breeding Canada Geese (*Branta canadensis*) throughout the 'white-fronts' breeding range, are also factors (e.g. Boyd & Fox, 2008).

Wexford Harbour & Slobs has held 25-40% of the world wintering population of Greenland White-fronted Geese since the 1950's, and is one of the most important sites for this species in the world (D. Berridge in Fox et al. 2010). The other key wintering site is Islay, an island off southwest Scotland. Counts undertaken at Wexford in March 2010 (8,381 individuals) together with a total of 2,622 for the rest of the country, provide an all-Ireland population estimate of 11,003 geese.

Since research programmes were initiated, a great deal of information has been built up from the use of leg rings and neck collars to individually mark birds. From such monitoring, it is known that Greenland White-fronted Geese are highly site faithful to their wintering sites both between and within years (e.g. Wilson et al. 1991). More recently GPS satellite transmitters have been deployed which give fascinating insights into migration routes and timing (see http://www.lrwc.net/greenland.html).

Numbers

A separate species-specific census of Greenland White-fronted Geese was undertaken across the North and South Slobs in the months November 2009 to March 2010. These surveys, known as 'NPWS Research counts' have been undertaken in this way since the early 1980's and aim to obtain the most accurate count of this species as possible; the results forming part of the International Greenland White-fronted Goose Census (Appendix 2). The 2009/10 survey dates were as follows: 16/11/09, 14/12/09, 18/01/10, 15/02/10 and 14/03/10. The Wexford geese are counted at four locations: North slobs, South Slobs, Tacumshin and Cahore, and are considered one discrete flock. The resulting count data are shown in Table 5.5 (Page 39).

Internationally-important numbers of Greenland White-fronted Geese were counted during all surveys undertaken. The peak count of the Wexford flock was recorded in March 2010 when 8,381 individuals were counted at the four locations, the majority (89%) at the North Slobs (0O499) while the South Slobs supported just under 10% of the total. The North Slobs was the single most important subsite for this species throughout the survey period, the subsite peak of 7,974 individuals recorded in January 2010.

Foraging Distribution

Greenland White-fronted Geese (hereafter called 'geese') are herbivores and feed by grazing and probing. They are traditionally linked to bogland habitats where they feed by up-rooting cyperacean species, and in particular the common cotton grass *Eriophorum angustifolium*, to consume the nutritious lower stem storage organs (Fox, 2003). Exploitation of this highly specific food in a localised habitat is considered influential in having shaped the species' highly philopatric nature as well as their relatively unusual and extended parent-offspring relationship (Fox, 2003) which allows juveniles to learn about the best foraging patches and alternatives to them. The latter half of the 20th century saw an increase in the use of grassland habitats by the geese where they grub and probe for stolons and underground plant parts such as bulbils, rhizomes and other nutritious storage parts, and the species has shown good flexibility in adapting to new food sources including agricultural stubbles and fodder beet, the latter for example, grown specifically for the geese on the North and South Slobs to allow extra feeding during the leanest part of the winter.

At Wexford, the North Slobs is the single most important subsite for this species. The North Slob comprises some 2,500 acres of flat farmland that was created when the area was separated from the sea by a wall in 1847. About 500 acres form the Wexford Wildfowl Reserve, owned by NPWS/BWI, and these lands are rented to farmers to farm the land in such a way that is sympathetic to the foraging requirements of the geese. During NPWS research counts, the geese are counted and assigned to fields; each field across the North and South Slobs being numbered. During the winter period the crop types within fields are also recorded. Analysis of the proportion of geese using different crop types (data period November 2009 to January 2010) shows that grass was more favoured by the geese than any other crop type (see Page 47). In terms of areas used within this subsite, the data suggests that mid and northern parts of the subsite are most favoured, and that the southeast corner (towards the Raven) is the least favoured section. However, the data collected during counts represents a snap-shot of the species distribution. The geese are typically opportunistic, moving to exploit nutritious new growth of grass following grazing but then moving to new areas once the new shoots are depleted or the grass quality declines. However, there is evidence of site-fidelity at within-subsite level (i.e. within the North Slobs), both in terms of the areas used and the specific family groupings and sub-groups that use them (Wilson et al. 1991; A. Walsh pers. comm.).

Far fewer Greenland White-fronted Geese were recorded on the South Slobs (0O486) (Table 5.5) with numbers increasing at the end of the season possibly due to some individuals as feeding opportunities across the North Slobs become depleted. On 15/02/10 the majority of geese (377 i.e. 87% of the total recorded across 0O486) were located within a stubble field in the southeast of the subsite. On 14th March 2010, 764 geese were more widespread, distributed across nine fields comprising winter cereals, stubble and rough grass.

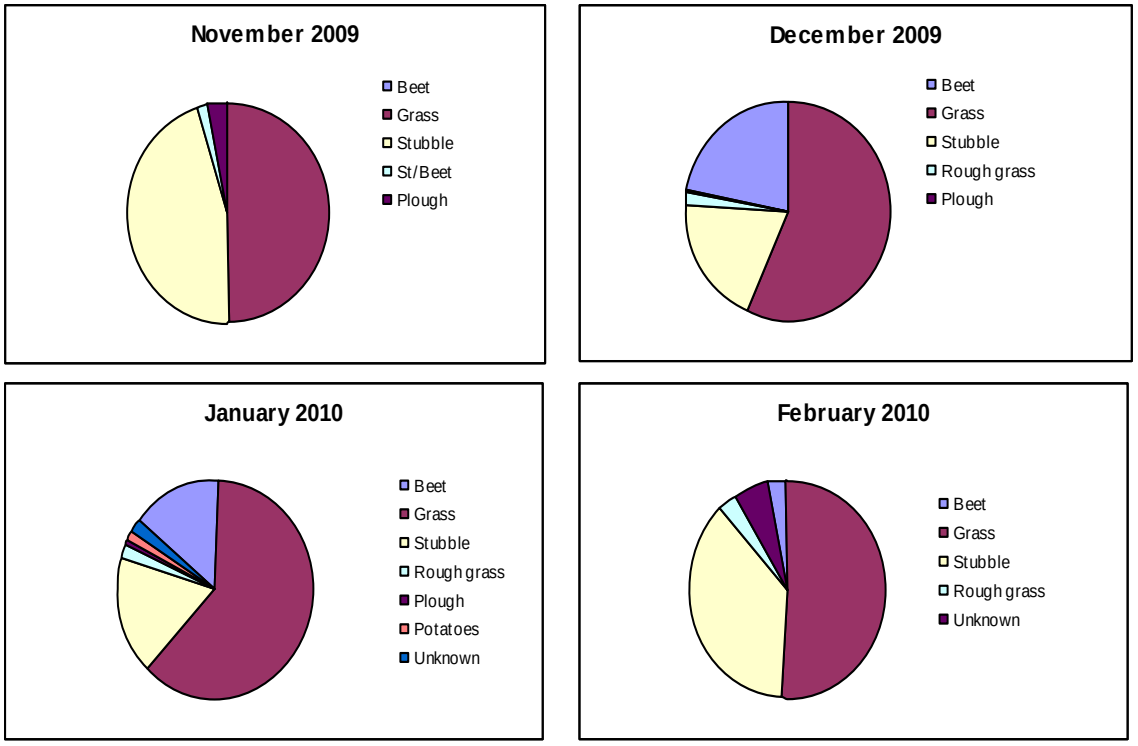


Figure - Proportional use of different crop types by Greenland White-fronted Geese across the North Slobs (0O499) November 2009 – January 2010

Roosting Distribution

Greenland White-fronted Geese roost primarily on tidal sandbanks located within The Raven SPA. Small numbers occasionally roost (e.g. during bad weather) alongside the channel of the North Slob (0O499).

Light-bellied Brent Goose *Branta bernicla hrota* - Family (group): Anatidae (geese)

Migratory Light-bellied Brent Geese (hereafter called 'Brent Geese') that spend winter within Ireland belong to the East Canadian High Arctic population. Almost all of this population spends winter within Ireland.

Brent Geese begin to arrive in Ireland in late August when almost three-quarters of the biogeographic population congregate at Strangford Lough in Northern Ireland before dispersing to other sites (Robinson et al. 2004).

Numbers

Internationally-important numbers of Brent Geese were recorded in all survey months at Wexford Harbour & Slobs, rising from 295 individuals in October 2009 to a site peak of 2,648 during the high tide survey (21/01/10). The site peak for the Wexford Harbour and Slobs I-WeBS count area was 2,020 individuals for the recent season (2008/09).

Brent Geese were recorded in a total seven subsites throughout the entire 2009/10 Waterbird Survey Programme. Three subsites supported peak numbers; 0O495 (Rosslare Backstrand) supported peak numbers in October 2009. 0O498 (Hopeland Wexford Harbour) recorded peak numbers in November 2009 and February 2010 and 0O499 (North Slob) held peak numbers during December 2009 and during the January 2010 high tide survey.

The overall peak subsite count of 2,100 individuals was recorded within 0O499 (North Slob) (15/12/09).

Foraging Distribution

Brent Geese are grazers and are known for their preference for foraging in intertidal areas with the Eelgrass *Zostera* sp (Robinson et al. 2004). Where this food source is absent the birds feed upon algae species, saltmarsh plants and may move to terrestrial grazing (grass), especially as the winter season progresses.

Brent Geese were recorded foraging intertidally within three subsites: 0O493 (Raven Point), 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour), the latter on only one occasion. 0O493 (Raven Point) and 0O495 (Rosslare Backstrand) both supported good numbers foraging intertidally on three separate survey occasions, 552 individuals recorded within 0O493 on 20/11/09.

0O498 (Hopeland Wexford Harbour) supported good numbers foraging supratidally on one occasion (358 individuals on 15/12/09). This subsite also supported the peak number of foraging individuals on 20/11/09 when 140 foraged intertidally and 520 foraged terrestrially. The peak number also foraged there during the final low tide survey when 1,300 foraged terrestrially.

0O499 (North Slob) held peak numbers during December 2009 and during the January 2010 high tide survey and although the behaviour of these birds was not recorded it is likely that a substantial proportion were foraging. In November and December 2009, flocks of 650 and 1,000 respectively were positioned within rough grass in the south of the subsite (close to the Wildfowl Reserve HQ). In December 2009, a further 1,100 were positioned within grass fields to the north of the reserve HQ. In January 2010, these latter two fields again supported 650 Brent and a further 250 individuals were located just east of the Reserve HQ and 230 individuals foraged within beet in the north of the subsite. During the final low tide survey (February 2010), 600 Brent foraged in grass close to the Reserve HQ.

Subtidal foraging was recorded within five subsites: 0O485 (Inner South harbour), 0O490 (Raven Pt – Ferrybank (Wexford Bridge)), 0O493 (Raven Point), 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour).

Roosting Distribution

Brent Geese are known to roost on tidal sandbanks located off Raven Point (Appendix 8).

Subtidal roosting/other behaviour was recorded within 0O485 (Inner South harbour), 0O490 (Raven Pt – Ferrybank (Wexford Bridge) and 0O498 (Hopeland Wexford Harbour), the latter supporting 842 individuals during the high tide survey (21/01/10). 0O495 (Rosslare Backstrand) supported 215 Brent roosting supratidally during the high tide survey (21/01/10).

Shelduck *Tadorna tadorna* - Family (group): Anatidae (ducks)
Tadorna tadorna has five known populations which breed across temperate Eurasia. The northwest Europe population breeds and winters along coasts of Britain, Ireland, Scandinavia, the Baltic and continental Europe. Although a breeding species in Ireland, Shelducks undertake a moult migration each autumn to the Helgoland Bight area of the Wadden Sea (Prater, 1981). Following the moult, the ducks then migrate to wintering areas.
Numbers
Across the study area, low tide numbers of Shelduck peaked on 15/12/09 when 465 individuals were counted. 768 individuals were counted during the high tide survey (21/01/10). Both of these counts, together with the low tide count on 15/02/10 (439 individuals) represent numbers of all-Ireland importance. Shelduck were recorded within eight of the nine subsites (not in 0O901 Blackwater Head – Raven Point) and with regularity (three surveys or more) within five subsites (0O486, 0O493, 0O495, 0K498 & 0O499). 0O498 (Hopeland Wexford Harbour) supported peak numbers in all except the November low tide survey and recorded the peak subsite count of 663 individuals during the high tide survey (21/01/10). This relatively small subsite supported numbers of all-Ireland importance on three survey occasions (December, January and February surveys). The I-WeBS site peak for the Wexford Harbour and Slobs count area was 173 individuals for the recent season (2008/09).
Foraging Distribution
Shelducks can forage in a variety of ways from scything their bill through wet mud on exposed tidal flats, to dabbling and scything in shallow water and up-ending in deeper waters. They can therefore forage throughout the tidal cycle. At Wexford Harbour & Slobs, Shelduck were recorded foraging within intertidal, subtidal and terrestrial habitat. 0O498 (Hopeland Wexford Harbour) supported the greatest number of foraging Shelduck during two low tide surveys (15/12/09 & 15/02/10) and during the high tide survey (21/01/10) (foraging both intertidally and subtidally). 0O498 is notably one of the 'muddier' subsites within the site, described as the benthic community '*Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud' (ASU, 2009). On 20/11/09 the peak number of foraging Shelduck were recorded in 0O499 (North Slob) in association with the main channel.
Roosting Distribution
Shelduck were recorded in roosting/other behaviour within intertidal, supratidal, subtidal and terrestrial habitats. Relatively few individuals were recorded roosting during low tide surveys, notable exceptions being 40 roosting intertidally along with ten subtidally within 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) on 15/12/09. On the same date, 48 individuals roosted intertidally within 0O495 (Rosslare Backstrand). 59 individuals roosted within 0O498 (Hopeland Wexford Harbour) on 15/02/10, the majority of which were loafing subtidally. During the high tide survey (21/01/10) 483 Shelduck roosted supratidally within 0O498 (Hopeland Wexford Harbour) which represented 63% of all Shelduck recorded on that date. Shelduck are also known to roost by the main channel of the North Slobs (0O499).

Teal *Anas crecca* - Family (group): Anatidae (ducks)
Anas crecca has five breeding subspecies that occur across north and northwest Europe, Siberia and into Asia (Wetlands International, 2006). Teal are largely migratory, moving south of their breeding range during winter. Being highly responsive to cold spells they can show rapid and extensive movement during these periods. Teal breeding in Britain and Ireland are supplemented during winter by birds from a range extending from Iceland, through Scandinavia to northwest Siberia (Wernham et al. 2002).
Numbers
Whole site numbers of Teal peaked early in the season, the site peak number of 552 recorded on 15/10/09. 527 Teal were recorded during the high tide survey but numbers dropped significantly to the relatively low number of 88 recorded during the final low tide survey (15/02/10). Numbers of Teal were above the threshold of all-Ireland importance during three surveys (15/10/09, 20/11/09 & 21/01/10). Teal were recorded within four subsites overall (0O407, 0O486, 0O498 and 0O499) but across the survey period the majority of these ducks were recorded within 0O499 (North Slob). The I-WeBS site peak for the Wexford Harbour and Slobs count area was 1,050 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 727 Teal, the majority of which occurred in the section from Ferrycarrig Bridge to Killurin (Deep's) Bridge.
Foraging Distribution
Teal are omnivores and have a variety of foraging methods (e.g. dabbling and up-ending) within differing habitats and water depths. During the survey programme, the majority of Teal were recorded within 0O499 (North Slob) and although the behaviour of these birds was not recorded it is likely that a substantial proportion were foraging. On 15/10/09, the majority of Teal (87%) were located in the NE corner of the subsite, 380 within stubble fields and 100 individuals within the water channel. On 20/11/09, 350 Teal were recorded in three flocks within the main water channel (western section) and a further 180 were located in the NE corner within stubble. The same stubble area was again favoured on 15/12/09 (100 individuals) and a further 276 were positioned along the western section of the main channel. During the high tide survey the majority of Teal were located in the SW corner (most southerly point) of the main channel (372 individuals) along with Mallard (120) and Wigeon (1,500) amongst other species. Far fewer Teal were recorded during the final low tide survey (15/02/10) but the largest group (50 individuals) was again located in the SW corner of the main channel. Regular shoots occur across the North Slobs during winter and Teal are a quarry species. Along the main channel there are several feeding areas where wildfowlers actively feed grain to the birds in order to attract them to locations close to shooting hides. In addition, 'Teal ponds' have been created in recent years, these excavated areas along the main channel being attractive to the birds. Therefore distribution of Teal across the North Slobs is at least in part, related to the activities of wildfowlers.
Roosting Distribution
Most roosting behaviour is undertaken within 0O499 (North Slob).

Scaup *Aythya marila* - Family (group): Anatidae (diving ducks)
Two subspecies (*marila, mariloides*) of Scaup have four populations which have a circumpolar breeding distribution (eastern and western Siberia, northern Europe, Alaska and Arctic Canada). The nominate form that breeds in northern Europe and western Siberia spends winter in western Europe, including Ireland. The wintering population is around 4,400 birds (Crowe et al. 2008).
Numbers
Very low numbers of Scaup were recorded during the 2009/10 Waterbird Survey Programme, with 2, 3, 4, 0 and 1 individuals recorded on the five respective survey dates. All individuals were recorded within 0O499 (North Slob). The I-WeBS site peak for the Wexford Harbour and Slobs count area was 53 individuals for the recent season (2008/09).
Foraging Distribution
During the non-breeding season, Scaup are generally considered a marine duck species with a distribution concentrated along open coasts and within partially enclosed estuaries and shallow bays, although there may be some association with brackish lagoons. A diving species, Scaup take a variety of food items including crustaceans, insects and plant material although molluscs are thought to dominate the diet in many areas (BWPi, 2004). Diving depth is within the range 0.5 – 3.5 m, maximum dives up to 6m (BWPi, 2004). Scaup recorded within 0O499 (North Slob) were associated with the main channel that drains the polderland. The birds were positioned in the SW corner (most southerly point) of the main channel.
Roosting Distribution
No specific roost information is available.

Common Scoter *Melanitta nigra* - Family (group): Anatidae (sea ducks)
The Common Scoter is polytypic and the nominate race breeds throughout the low arctic across northern Russia to central Siberia with smaller outlying populations in Iceland, Scotland and Ireland (BWPi, 2004). There is a relatively small Irish breeding population (estimated at 100 pairs) that breed at inland lakes (Underhill et al. 1998). During winter, these birds occur off the coast joined by other wintering individuals from Iceland and Scandinavia (Wernham et al. 2002).
Numbers
Common Scoter were recorded in all surveys and whole site numbers peaked in October 2009 (8,264 individuals). Thereafter smaller numbers were recorded ranging from 1,976 (20/11/09) to 160 (15/02/10). All counts, with the exception of this latter count of 160, were above the threshold of all-Ireland importance which is set at 230 individuals. With the exception of three Common Scoters recorded in 0O495 (Rosslare Backstrand) on 15/10/09, all individuals were recorded within 0O901 (Blackwater Head - Raven Point). The I-WeBS site peak for the Wexford Bay count area was 2,145 Common Scoter for the recent season (2007/08).
Foraging Distribution
During winter and when feeding, Common Scoters are generally distributed in shallow coastal waters with a depth of no more than 20m (BWPi, 2004). They are most often found in areas where there is a sandy substratum, linked to the distribution of their favoured prey of bivalve molluscs. Previous research varies somewhat in the range of dive depths undertaken by scoters; examples include a range 2.2 – 3.7m (BWPi, 2004) and a mean of 6.85m and 11.42m (Kaiser et al. 2006). Water depth is an important parameter, as deeper dives are more costly in terms of the energy expenditure required. It therefore follows that scoters are likely to maximise their energy intake by foraging where prey items are abundant and where the energy required obtaining the prey is minimised. All observations of Common Scoters were of subtidally foraging individuals. Within 0O901 (Blackwater Head - Raven Point) the following numbers foraged subtidally during the five surveys: 8,261, 1,976, 1,605, 273 and 161. These results are consistent with a previous study of the Blackwater Bank*, which found that the greatest concentrations of Common Scoters occurred between the bank and the shoreline, in the Wexford Bay area (CWC, 2005) and generally <10m depth. The benthic community of this area is classified predominantly as 'fine sand with *a Spiophanes bombyx* community complex' (NPWS, 2011d) and occurs at depths of between 8m to 16 m. The substrate is largely fine sand with varying amounts of medium sand (ranging from 3.8% to 62.8%) with low mud and gravel fractions (< 2.5%) (NPWS, 2011d). Two bivalve species are notable: *Abra alba* was the dominant bivalve at the mouth of Wexford Harbour and is also present further north in Wexford Bay; a *Fabulina fabula* (*Tellina fabula*) community was identified in Wexford North Bay and off Blackwater Head (Aquafact International, 2010). Both of these bivalve species may be taken by Common Scoters when feeding. *The Blackwater Bank is one of a series of north-south orientated sandbanks that occurs off the east coast of Ireland (for more information see Roche et al. 2007).
Roosting Distribution
Common Scoters were not recorded undertaking roosting/other behaviour during the 2009/10 waterbird surveys.

Red-breasted Merganser *Mergus serrator* - Family (group): Anatidae (sea ducks)

Red-breasted Mergansers have a wide breeding range which spans northern Europe, Russia, Siberia and North America. The Irish breeding population is thought to be sedentary. Large flocks of moulting birds congregate at several sites in Ireland and numbers remain relatively stable throughout the wintering season apart from some peaks possibly reflecting passage populations or cold weather movements (Crowe, 2005).
The wintering population is thought to be increased to some extent by the addition of birds from central Europe, eastern Greenland (Robinson, 1999) and Iceland (Scott & Rose, 1996).

Numbers

The whole-site peak number of Red-breasted Mergansers occurred in October 2009 (314 individuals), likely reflecting the occurrence of passage individuals. In November and December numbers were relatively stable (135 and 118 respectively) before declining to a low 62 individuals during the high tide survey on 21/01/10. Numbers in all surveys however surpassed the threshold of all-Ireland importance.

Red-breasted Mergansers were recorded in all nine subsites but with regularity (three surveys or more) within five subsites: 0O485 (Inner South Harbour), 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)), 0O493 (Raven Point), 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour).

0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) supported peak numbers in all surveys and held 212 individuals, numbers of all-Ireland importance, on 15/10/09.

The I-WeBS site peak for the Wexford Harbour and Slobs count area was 76 individuals for the recent season (2008/09); the most recent data (2007/08) available for the Wexford Bay count area shows a peak of 35 Red-breasted Mergansers.

Foraging Distribution

Red-breasted Mergansers are sea ducks that feed on fish, obtained by frequent dives from the surface. They prefer shallow waters (range 3 – 6m) (BWPi, 2004).

On 15/10/09, 101 Red-breasted Mergansers foraged subtidally within 0O493 (Raven Point). A further 212 were recorded within 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) but their behaviour was not recorded. On 20/11/09, 0O490 supported the greatest number of individuals (56) and good numbers foraged within 0O495 (Rosslare Backstrand) and 0O485 (Inner South Harbour) (34 and 28 individuals respectively). 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) also supported the greatest number of foraging individuals on 15/12/09 (36) and the greatest number on 15/02/10 (33). 0O495 (Rosslare Backstrand) supported peak numbers during the high tide survey (21/01/10).

Roosting Distribution

Few individuals were recorded roosting/other during the survey programme and no specific roost information is available for this species.

Red-throated Diver *Gavia stellata* - Family (group): Gaviidae (divers)

The Red-throated Diver is an arctic breeding species across northern Eurasia and north America. In Europe, it breeds in Iceland, northern Scotland, north-western Ireland, Scandinavia and northern Russia, and winters along the coast as far south as Spain. The Irish breeding population is very small and restricted to County Donegal; six pairs in 2009 (Hillis, 2010).

Numbers

The all-Ireland wintering population of Red-throated Divers is estimated at 1,025 individuals (Crowe et al. 2008); reflected by the relatively small all-Ireland 1% threshold of 20 individuals.

At Wexford Harbour & Slobs, numbers of Red-throated Divers peaked early within the October 2009 survey (35 individuals) and thereafter were variable; with between 10 and 21 individuals present during low tide surveys but just two individuals recorded during the high tide survey. Such variation is to be expected however as this species is inherently difficult to count from land based vantage points and accuracy depends largely on weather and sea conditions. Furthermore, this species may simply feed further offshore at times and thus be undetected.

With the exception of two solitary individuals recorded within 0O485 and 0O495, all other Red-throated Divers were recorded within 0O901 (Blackwater Head - Raven Point).

The site peak for the Wexford Harbour and Slobs I-WeBS count area was 5 individuals for the recent season (2008/09); the most recent data (2007/08) available for the Wexford Bay count area shows a peak of 44 Red-throated Divers.

Foraging Distribution

Red-throated Divers feed primarily on fish, obtained by frequent dives from the surface. They prefer shallow waters (range 2 – 9m) (BWPi, 2004). All records of Red-throated Divers within 0O901 (Blackwater Head - Raven Point) were of birds foraging subtidally.

Roosting Distribution

No individuals were recorded roosting/other during the survey programme and no specific roost information is available for this species.

Cormorant *Phalacrocorax carbo* - Family (group): Phalacrocoracidae (cormorants)

The nominate race of *Phalacrocorax carbo* breeds along the coasts of the North Atlantic from eastern Canada and the Norwegian coast in the north, to northwest France in the south. The species is only partially migratory or dispersive (Wernham et al. 2002). Most Cormorants in Ireland are of the nominate race and breed primarily on rocky cliffs and offshore islands. Although wintering historically along the coast, since the 1960s there has been a gradual shift towards the use of inland freshwater sites (Mitchell et al. 2004).

Numbers

The whole-site peak number of Cormorants occurred in October 2009 (626 individuals), following the observed pattern that Cormorants peak in autumn and decline as the season progresses, likely due to some individuals moving inland (Crowe, 2005). Between November 2009 and February 2010 their numbers varied from 196 to 272 during low tide surveys and a relatively low 25 individuals were counted during the high tide survey (21/01/10). All low tide surveys recorded total numbers of all-Ireland importance.

Cormorants were recorded in all nine subsites and seven of these supported the species during three or more surveys (0O407, 0O485, 0O490. 0O493, 0O495, 0O499 and 0O901). 0O493 (Raven Point) supported peak numbers in all except one survey; 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) recording peak numbers on 15/12/09.

The subsite peak of 358 individuals was recorded for 0O493 (Raven Point) (15/10/09) and represents numbers of all-Ireland importance.

The I-WeBS site peak for the Wexford Harbour and Slobs count area was 150 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 61 Cormorant.

Foraging Distribution

Cormorants are piscivorous (fish-eating) seabirds.

Foraging Cormorants were observed across seven subsites: 0O407, 0O485, 0O490, 0O493, 0O495, 0O498 and 0O901. On 15/10/09, 0O493 (Raven Point) held the greatest number of foraging individuals (27). Thereafter, but with the exception of the high tide survey (21/01/10), 0O901 (Blackwater Head - Raven Point) supported the greatest number of foraging individuals, with a subsite peak of 76 on 15/02/10.

Roosting Distribution

During the 2009/10 survey programme, significant numbers of Cormorants were recorded roosting within 0O493 (Raven Point), for example 331 birds on 15/10/09 and 109 birds on 20/11/09. These birds roosted on sandbanks *c*500m off Raven Point. Previous roost data for the site (I-WeBS unpublished data and NPWS (2000b)) also notes Raven Point as a regular roost used by this species. A large number (115) of Cormorants roosted/other subtidally off Raven Point on 15/02/10.

Good numbers of Cormorant were recorded regularly roosting along the breakwater (classed as intertidal) within 0O485 (Inner South Harbour), for example 90, 24 and 19 individuals for the first three low tide surveys respectively. Similarly, the breakwater in 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) also regularly supports roosting individuals. 0O495 (Rosslare Backstrand) supported good numbers roosting supratidally, 77 individuals on 15/10/09 and 42 individuals on 20/11/09. Thereafter, smaller numbers occurred irregularly within other subsites throughout the survey period.

Cormorants also use Tern Island (within 0O495) as a roost site (NPWS data).

Oystercatcher *Haematopus ostralegus* - Family (group): Haematopodidae (wading birds)
Haematopus ostralegus is polytypic; four subspecies are recognised of which only two occur within western Europe and Africa (Delaney et al. 2009). The nominate race breeds in western and northern Europe as far as Iceland, Norway and Finland and includes those birds that breed within Ireland. Irish-breeding birds are partial migrants, some moving south during winter while others remain on the Irish coast. Wintering birds are supplemented by breeding birds from Iceland and the Faeroe Islands (Wernham et al. 2002).
Numbers
Whole site numbers peaked in October 2009 when 1,171 Oystercatchers, representing numbers of all-Ireland importance, were more than three times greater than numbers counted in other surveys during the programme. 352 individuals were recorded during the high tide survey (21/01/10). Oystercatchers were recorded in all nine subsites and seven subsites supported the species in three or more surveys: 0O407, 0O485, 0O490, 0O493, 0O495, 0O498 and 0O901. 0O495 (Rosslare Backstrand) supported peak numbers in three surveys and held the subsite peak 738 individuals on 15/10/09.
Foraging Distribution
Oystercatchers are large wading birds that forage primarily on tidal flats although the species can be found foraging along non-estuarine coastline or terrestrially for earthworms. On tidal flats their food consists of Cockles (*Cerastoderma edule*), Blue Mussels (*Mytilus edulis*) and to a lesser degree other bivalve molluscs such as *Macoma balthica*, *Scrobicularia plana* and *Mya arenaria* as well as larger polychaetes such as *Arenicola marina* and *Hediste diversicolor.* Cockles and Mussels are favoured prey items and '*universally important during winter*' (Zwarts et al. 1996) because these bivalves live in the upper sediment and are nearly always accessible, although it is now known that individual birds may be specialised by way of morphology with regards choosing one or the other of these prey items and their methods of handling them. Oystercatchers were recorded foraging within all nine subsites and across intertidal, supratidal and terrestrial habitats. 0O495 (Rosslare Backstrand) held good numbers in all low tide surveys (range 54 – 738 individuals), the peak number (738) foraging intertidally on 15/10/09. 0O485 (Inner South Harbour) recorded good numbers during the first three low tide surveys with a peak 295 individuals foraging on 15/10/09, almost equally divided between intertidal and supratidal habitats. Both Rosslare Backstrand and Inner South Harbour are classified in terms of benthic community as 'estuarine muds dominated by polychaetes and crustaceans' with sediment ranging from sandy mud to slightly gravely sandy mud (NPWS, 2011b). Mussel beds (*Mytilus edulis*) are exposed within Rosslare Backstrand during low tide (NPWS, 2000; D Daly *pers. comm.* 2011) and the breakwater wall in 0O485 (Inner South Harbour) when exposed at low tide, reveals a rocky structure likely to provide attachment for Mussels. These features may collectively explain the preference of Rosslare Backstrand and Inner South Harbour by Oystercatchers. Raven Point (0O493) supported foraging individuals in all low tide surveys (peak number 35 on 15/10/09). This subsite is sandy in nature and classified as 'sand dominated by polychaetes (NPWS, 2011b). The Common Cockle (*Cerastoderma edule*) was recorded within most of the intertidal sampling sites of this subsite (ASU, 2009). 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) and 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) also supported good numbers of foraging Oystercatchers in all low tide surveys. The Mussel *Mytilus edulis* is a distinguishing species of the 'mixed sediment community' that characterises much of this subsite and the Common Cockle (*Cerastoderma edule*) was also recorded within sampling sites (ASU, 2009). 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) is classified as 'estuarine muds dominated by polychaetes and crustaceans.' The sediment of this community complex may be classified as sandy mud to slightly gravely sandy mud and distinguishing invertebrate species include the Ragworm *Hediste diversicolor* and Mud Shrimp *Corophium volutator.* Just upstream of Wexford Bridge, Oystercatchers were most likely foraging for Cockles (*Cerastoderma edule*) which were recorded within this narrow band of gravely muddy sand (ASU, 2009).
Roosting Distribution
Relatively low numbers of Oystercatchers were recorded during the high tide survey (293) and of these, 280 individuals were roosting. The majority (70%) were located within 0O495 (Rosslare Backstrand) on the sand bank island known as 'Tern Island.' This is a known and important roost site for this species along with other waders such as Knot, Dunlin, Sanderling, Grey and Golden Plover (NPWS data) (refer to Appendix 8). During the roost survey (08/03/10) 290 Oystercatchers roosted along the western shore of 0O498 (Hopeland Wexford Harbour) along with Curlew, Bar-tailed Godwits and Black-headed Gulls. 80 Oystercatchers roosted on Tern Island (within 0O495). Smaller numbers roosted along the eastern shore of 0O407 (Ferrybank (Wexford Bridge) - Castlebridge). The fish-tail groyne in 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) is known as a regularly-used diurnal roost site; 113 Oystercatchers roosted there on 19/10/2011 as part of a mixed-species roost (S. McAvoy *pers. comm.).* and previous roost recording for the site (I-WeBS, unpublished data) indicates that 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) regularly supports roosting Oystercatchers (*c*300 birds).

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 125^0E 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

Golden Plovers were recorded in numbers of international importance on 20/11/09 when 12,466 individuals were counted. Other low tide counts ranged from 1,000 (15/02/10) to 5,688 (15/12/09) and 420 were recorded during the January 2010 high tide survey.

Golden Plovers were recorded in five subsites overall (0O486, 0O490, 0O495, 0O498 and 0O499). 0O495 (Rosslare Backstrand) held peak numbers in October and November 2009 while 0O499 (North Slob) held peak numbers in all other surveys.

The I-WeBS site peak for the Wexford Harbour and Slobs count area was 9,500 individuals for the recent season (2008/09).

Foraging Distribution

During winter, Golden Plovers feed primarily within agricultural grassland and arable land. Tidal flats are used but more so 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 intertidal feeding patterns (Gillings et al. 2006).

At Wexford Harbour & Slobs, almost no records were made of Golden Plovers foraging intertidally. Rather the birds foraged terrestrially within 0O499 (North Slobs) and 0O486 (South Slobs) although as behaviour was not recorded within these subsites, it is reasonable to expect that some of these birds were also roosting/resting.

On 20/11/09, 4,600 Golden Plovers were recorded in 0O499 (North Slobs) in grassland just north of the Wildfowl Reserve HQ. On 15/12/09, 3,050 Golden Plovers were recorded just to the east of the Wildfowl Reserve HQ. 350 and 1,000 were positioned similarly during the January high tide and February low tide count respectively.

The large count of 2,510 Golden Plovers recorded on the South Slobs (0O486) on 15/12/09 was made up of eight smaller flocks the majority of which were clustered around fields in the southeast, comprising grass, winter cereals and stubble; Golden Plover often co-occurring with Lapwings.

Roosting Distribution

Significant numbers of intertidally-roosting Golden Plovers were recorded within 0O495 (Rosslare Backstrand) on 15/10/09 and 20/11/09. 0O498 (Hopeland Wexford Harbour) supported 120 roosting individuals (intertidal) on 15/12/09. As noted above, the large number of Golden Plovers recorded within 0O499 (North Slobs) and 0O486 (South Slobs) are also likely to have included some roosting/resting individuals.

Previous roost records for the site (unpublished I-WeBS data) indicates that 0O493 (Raven Point) is a significant and regular roost site for Golden Plovers (*c* 1,000 individuals) where the birds roost on the intertidal sandbanks. Tern Island (within 0O495: Rosslare Backstrand) is also a regularly-used roosting site; 400 Golden Plover recorded roosting here during the roost count on 08/03/10.

Grey Plover *Pluvialis squatarola* - Family (group): Charadriidae (wading birds)
The Grey Plover is generally considered a monotypic species and has a holarctic breeding distribution across the tundra of Eurasia and North America (Delaney et al. 2009). The species migrates from breeding areas to a very wide wintering range extending to the coastlines of Africa, south and east Asia, Australasia and South America (BWPi, 2004). In Ireland, Grey Plovers occur as both passage and wintering birds and are thought to originate from Russian breeding populations (Wernham et al. 2002).
Numbers
Whole site numbers of Grey Plovers rose from 45 individuals during October 2009 to a peak of 1,021 individuals during the high tide survey (21/01/10). Apart from the first survey, all whole site counts passed the threshold of all-Ireland importance (65). The pattern of a gradual rise in numbers to a January peak was recorded at other sites in the winter 2009/10 (e.g. Dundalk Bay) and is consistent with that shown by I-WeBS data in general (Crowe, 2005). Grey Plovers were recorded in a total seven subsites throughout the entire survey programme but subsite use during individual surveys ranged from two subsites (21/01/10) to six subsites on 15/12/09. Four subsites were used by Grey Plovers with the most regularity (three surveys or more): 0O490, 0O493, 0O495 and 0O498. 0O495 (Rosslare Backstrand) supported peak numbers in all bar one survey; 0O498 (Hopeland Wexford Harbour) recording peak numbers on 15/12/09.
Foraging Distribution
During winter Grey Plovers mainly forage intertidally and have a characteristic mode of foraging whereby they stand motionless watching the mudflat surface before snatching a prey item (often a worm) from the sediment surface. Grey Plovers take a wide range of prey species including Lugworms (*Arenicola marina*), Ragworms (*Hediste diversicolor*), amphipod crustaceans and small bivalves (e.g. *Macoma balthica and Scrobicularia plana*) (Dit Durrell & Kelly, 1990). 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour) supported the highest numbers of foraging Grey Plovers across the survey programme; 182 foraging intertidally within 0O495 on 15/02/10. Rosslare Backstrand is classified, in terms of benthic community, as 'estuarine muds dominated by polychaetes and crustaceans' with sediment ranging from sandy mud to slightly gravely sandy mud (NPWS, 2011b). Characterising invertebrate species that may also be prey items for Grey Plovers include *Hediste diversicolor*, the crustacean amphipod *Gammarus locusta*, the polychaete worm *Pygospio elegans* and Mud Shrimp *Corophium volutator.* Soft muddy sand and an invertebrate community dominated by *Hediste diversicolor* and *Corophium volutator* also describes 0O498 (Hopeland Wexford Harbour) (ASU, 2009). Other notable records of Grey Plovers was 34 individuals within 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) on 15/02/10 (probably foraging although behaviour not assigned) and 7-26 individuals foraging within 0O493 (Raven Point) on three survey occasions.
Roosting Distribution
During low tide surveys, relatively few Grey Plovers were recorded in roosting/other behaviour. During the high tide survey (21/01/10), 1,020 Grey Plovers were recorded roosting intertidally within 0O495 (Rosslare Backstrand). These birds formed part of a large mixed species flock on the sand bank island known as 'Tern Island.' During the roost survey (08/03/10), 800 Grey Plovers also roosted on Tern Island along with 400 Golden Plover, 550 Common Gulls and 200 Dunlin amongst other species. Previous roost records for the site (unpublished I-WeBS data) also indicates that 0O493 (Raven Point) is a regularly-used roosting area (*c* 100 individuals).

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 rose steadily to a peak in January 2010 (4,113). Numbers of all-Ireland importance were recorded in all except the first low tide survey on 15/10/09.

Across the survey programme, Lapwings were recorded within six subsites. Subsite use during individual surveys varied from two (20/11/09) to five subsites (15/02/10). Only two subsites supported the species in all surveys: 0O499 (North Slob) and 0O486 (South Slobs). The subsite peak count of 2,750 individuals was recorded for 0O486 (South Slobs) during the high tide survey (21/01/10).

The I-WeBS site peak for the Wexford Harbour and Slobs count area was 8,500 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 800 Lapwing.

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 Wexford Harbour & Slobs, relatively little intertidal feeding was observed; the greatest number was 14 individuals in 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) on 15/12/09. Rather the terrestrial habitats of 0O499 (North Slob) and 0O486 (South Slobs) were favoured for feeding with 0O499 (North Slob) holding peak numbers in October and November 2009 while 0O486 (South Slobs) supported peak numbers in the latter three surveys. Note that because behaviour was not recorded within these subsites, it is reasonable to expect that some of these birds were also diurnally roosting/resting.

On 15/10/09, 164 Lapwings occurred in two flock positions just north and just east of the Wildfowl Reserve HQ. In November 2009, the North Slobs supported 2,730 individuals at eight different locations and within stubble and grass habitats. On 15/12/09 the largest single flock (900) were located just east of the Wildfowl Reserve HQ, while grass fields to the north of the HQ supported the largest flocks in January and February 2010 (430 and 500 respectively).

The count of 1,420 Lapwings recorded on the South Slobs (0O486) on 15/12/09 was made up of many smaller flocks. 16 different flocks were recorded within individual fields; 990 Lapwings clustered around fields in the southeast, comprising grass, winter cereals and stubble. Lapwings and Golden Plovers often occurred in the same fields. During the high tide survey (21/01/10), the South Slobs supported 2,750 Lapwings. The largest single flock (1,300) occurred in a field of winter cereals in the NE of the subsite while three fields of stubble, grass and winter cereals in the SE of the subsite (as in December 2009) were also favoured. Some of these SE fields also supported Lapwings during the final survey (15/02/10) although the largest single flock occurred in a grass field in the NE of the subsite.

Roosting Distribution

It is reasonable to expect that Lapwings undertook some roosting/resting behaviour within the North and South Slobs as the majority of birds were recorded there. In terms of intertidal roosting, 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) supported good numbers on two survey occasions; 544 and 684 on 15/12/09 and 15/02/10 respectively. 0O498 (Hopeland Wexford Harbour) held 314 roosting intertidally on 15/12/09 and 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) held small flocks roosting supratidally on two occasions.

Previous roost records for the site (unpublished I-WeBS data) indicates that 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) is a regularly-used roost site for Lapwings (*c* 1,000 individuals) where they are observed to roost diurnally upon the fish-tail groyne.

Sanderling *Calidris alba* - Family (group): Scolopacidae (wading birds)
Sanderling are one of the most northerly of all Arctic-breeding waders with a circumpolar breeding range that includes Alaska, Northern Canada, Greenland and Svalbard. The species is a long-distance migrant with a wide wintering distribution that includes coastlines of much of the tropics and the Southern Hemisphere as well as northwest Europe. There is evidence for two subspecies, with the nominate form *C. a. alba* occurring on passage and during winter in Western Eurasia and Africa. It was thought that most Sanderlings wintering in Ireland and Britain were of Siberian origin, but there is now thought to be considerable overlap in the wintering range of Siberian and Greenland-breeding populations (Delaney et al. 2009).
Numbers
Numbers of Sanderling peaked early in October 2009 when 130 individuals surpassed the threshold for all-Ireland importance. No Sanderlings were recorded in November 2009, with relatively few individuals recorded during the remaining surveys (maximum 16 during the high tide survey (21/01/10)). Sanderlings were recorded within three subsites only: 0O490 (Raven Pt. - Ferrybank (Wexford Bridge), 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour). 0O495 (Rosslare Backstrand) was the only subsite to recorded the species on more than one occasion and this subsite recorded the subsite peak number of 120 individuals on 15/10/09.
Foraging Distribution
Often foraging along the tide line where they rush in and out with the waves searching for small prey such as sandhoppers, Sanderlings are shorebirds characteristic of sandy shorelines, indeed significant proportions are found along non-estuarine coastlines (Crowe, 2005) or outer parts of estuaries (Musgrove et al. 2003). The species has a flexible foraging strategy however, with the diet very much related to the local conditions at a site (Reneerkens et al. 2009). At Wexford Harbour & Slobs, Sanderlings were recorded foraging intertidally within three subsites: 0O490 (Raven Pt. - Ferrybank (Wexford Bridge), 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour). 0O495 (Rosslare Backstrand) was the only subsite to recorded the species foraging on more than one occasion with 120 individuals foraging on 15/10/09, 15 individuals on 15/02/10, and 16 individuals foraging during the high tide survey on 21/01/10. Seven and ten individuals were recorded within 0O490 and 0O498 respectively on 15/12/09 and 15/10/09. Rosslare Backstrand is classified, in terms of benthic community, as 'estuarine muds dominated by polychaetes and crustaceans' with sediment ranging from sandy mud to slightly gravely sandy mud (NPWS, 2011b). Characterising invertebrate species that may form prey items for Sanderling include the crustacean amphipod *Gammarus locusta*.
Roosting Distribution
Sanderling were not recorded roosting during the 2009/10 Waterbird Survey Programme. Previous roost records for the site (unpublished NPWS data) indicate that sandbanks off Raven Point (0O493) together with Tern Island (within 0O495 Rosslare Backstrand) are regularly-used roosting areas.

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). Recoveries and sightings confirm that Black-tailed Godwits wintering in Ireland are of the *islandica* race, whereas further south (e.g. Spain and Portugal) some mixing of *limosa and islandica* occurs in the non-breeding season (Wernham et al. 2002).

Numbers

Numbers of Black-tailed Godwits peaked early with 1,739 and 1,849 individuals respectively in the October and November surveys, but thereafter dropped to a relatively low 324 and 240 individuals for the remaining two low tide surveys with 780 Black-tailed Godwits counted during the high tide survey. Numbers were of all-Ireland importance in all months and of international importance in the October, November and January surveys.

Black-tailed Godwits were recorded in six subsites overall (0O407, 0O485, 0O486, 0O490, 0O498 & 0O499). The subsite peak of 1,800 individuals was recorded within 0O499 (North Slob) on 20/11/09.

The I-WeBS site peak for the Wexford Harbour and Slobs count area was 1,069 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 25 Black-tailed Godwit.

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 may 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.

At Wexford Harbour & Slobs, Black-tailed Godwits foraged intertidally within four subsites: 0O407 (Ferrybank (Wexford Bridge) - Castlebridge), 0O485 (Inner South Harbour), 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) and 0O498 (Hopeland Wexford Harbour). Large numbers also occurred terrestrially across 0O499 (North Slob) and 0O486 (South Slobs) on occasion, and it is reasonable to expect that some, if not all, of these birds were foraging e.g. 1,800 within 0O499 (North Slob) on 20/11/09; 640 on 15/10/09 and 244 individuals in 0O486 (South Slobs) on 21/01/10.

In terms of total numbers recorded foraging intertidally during the survey programme, 0O407 (Ferrybank (Wexford Bridge) – Castlebridge) appeared to be the favoured subsite of this species. This subsite is classified as 'estuarine muds dominated by polychaetes and crustaceans.' The sediment is classified as sandy mud to slightly gravely sandy mud and distinguishing invertebrate species include the Ragworm *Hediste diversicolor*. As Ragworms were recorded in abundance (up to 23 within one sample) it is reasonable to suggest that this polychaete may form part of the diet of the Black-tailed Godwit at this site. Other potential prey items recorded within this subsite include the bivalve *Scrobicularia plana* and smaller size classes of the Common Cockle *Cerastoderma edule*.

Roosting Distribution

During low tide surveys, intertidal roosting was observed within 0O407 (Ferrybank (Wexford Bridge) - Castlebridge), 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) and 0O498 (Hopeland Wexford Harbour). Roosting/resting behaviour is also likely to occur within 0O499 (North Slob) and 0O486 (South Slobs). During the high tide survey (21/01/10) the majority of Black-tailed Godwits recorded were roosting at the tide edge in 0O498 (Hopeland Wexford Harbour); this subsite is known from previous NPWS records to be an important roosting area for this species.

Previous roost data for the site (I-WeBS, unpublished data) indicates that 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) is a regularly-used roosting site. Eleven individuals were recorded roosting in the NE section of this subsite during the roost survey (08/03/10). The species is also known to utilise 0O493 (Raven Point).

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, including Ireland. The Wadden Sea is used by *L. l. lapponica* and other populations as a staging and moulting area in autumn and spring.

Numbers

Numbers of all-Ireland importance were recorded in all surveys peaking at 984 individuals on 15/02/10. 964 Bar-tailed Godwits were recorded during the high tide survey (21/01/10).

Across the entire survey period, Bar-tailed Godwits were recorded in eight of the nine count subsites, subsite occurrence during individual low tide surveys ranging from three to seven subsites. The species was recorded during all four low tide surveys within four subsites: 0O490, 0O493, 0O495 and 0O498 and the latter three of these all recorded subsite peaks during the survey programme.

The overall subsite peak number (776) was recorded within 0O495 (Rosslare Backstrand) on 15/10/09.

Foraging Distribution

Bar-tailed Godwits are a wader species considered characteristic of coastal wetland sites dominated by sand (e.g. Hill et al. 1993). The birds forage by probing within intertidal sediment for invertebrate species, of which polychaete worms such as Lugworm *Arenicola marina* are the most favoured.

Bar-tailed Godwits at Wexford Harbour & Slobs foraged primarily within intertidal habitat but small numbers were also recorded foraging terrestrially on occasion across 0O499 (North Slob) and 0O486 (South Slobs). Peak numbers foraging (intertidal/subtidal combined) during low tide surveys were recorded for 0O495, 0O493, 0O493 and 0O498 for the four low tide surveys respectively.

00493 (Raven Point) supported good numbers of foraging individuals during all low tide surveys, with numbers of all-Ireland importance on 15/02/10 (309) and 15/12/09 (287). This subsite is recognised as important for Bar-tailed Godwits in NPWS (2000b). This subsite is characterised by sand with an invertebrate community dominated by polychaetes (NPWS, 2011c). Although not recorded frequently in core samples, observations of casts[20] of the Lugworm *Arenicola marina* suggest this polychaete is abundant within this subsite (ASU, 2009). Large flocks were observed foraging upon sand banks off Raven Point including 309 foraging subtidally (feet in water) on 15/02/10. It is not unreasonable to suggest that these birds may have been foraging upon the polychaete worm *Lanice conchilega*, which are abundant on the lower shore in this subsite; previous research suggests that such prey items, although not regularly forming a large part of the diet, may become important at certain times (e.g. Scheiffarth, 2001).

Good numbers of Bar-tailed Godwits also foraged in 00490 (Raven Pt. - Ferrybank (Wexford Bridge)) and 0O495 (Rosslare Backstrand) during all low tide surveys. Within 00490 (Raven Pt. - Ferrybank (Wexford Bridge)), the godwits tended to be more numerous along the eastern sandier section of the shore, most likely foraging upon Lugworms which also attracted Lugworm diggers (bait-diggers) during most low tide surveys. Both 0O490 and 0O495 are reported as areas of high use by Bar-tailed Godwits by NPWS (2000).

Roosting Distribution

During the survey programme, roosting was only recorded within three subsites: 0O490, 0O493 and 0O495 and only during the high tide survey (21/01/10). Only one solitary individual was recorded within 0O490 but significant numbers were observed roosting within 0O493 (Raven Point) and 0O495 (Rosslare Backstrand) (292 and 630 birds respectively).

0O493 (Raven Point) is a known and important roost site for this species where they roost upon the tidal sandbanks together with other waders (299 individuals recorded during the roost survey on 08/03/10). In addition, Tern Island (within 0O495: Rosslare Backstrand) is also an important and regularly-used roost site. During the roost survey (08/03/10) a flock of 622 Bar-tailed Godwits were recorded roosting along the western shore of 0O498 (Hopeland Wexford Harbour), these birds part of a larger mixed flock.

[20] Lugworm casts are roughly circular shapes left on the sediment surface that are actually excreted sediment, ejected by the worm from within its burrow.

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 of all-Ireland importance were recorded in all but one of the surveys completed. Numbers were relatively high early during October 2009 (1,062 Curlew), but then dropped back in the next two surveys before peaking during the high tide survey on 21/01/10 (1,593 individuals).

Curlew had a widespread distribution across the site, occurring in 8 subsites across all surveys with an average % occupancy (no. subsites) of 86%. Eight subsites supported Curlew in all four low tide surveys.

0O499 (North Slob) held the greatest number of Curlews during the first three low tide surveys with 0O495 (Rosslare Backstrand) supporting peak numbers on the final survey date (15/02/10). The peak subsite count of 692 recorded for 0O499 (North Slob) on 15/10/09 represents numbers of all-Ireland importance.

The I-WeBS site peak for the Wexford Harbour and Slobs count area was 580 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 66 Curlew.

Foraging Distribution

Curlews are the largest 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.

0O499 (North Slob) recorded the greatest number of Curlews during the first three low tide surveys and it is reasonable to expect that the majority of these birds were foraging. On 15/10/09 492 Curlews occurred in four flocks of 172, 200, 100 and 10 and mostly within stubble fields. On 20/11/09, 440 Curlews occurred as one flock in the NE of the subsite (stubble) and on 15/12/09, 250 Curlews were recorded in this same stubble field. Although fewer numbers were recorded across the North Slobs during the final two surveys, good numbers were again recorded in the stubble fields in the NE of the subsite.

During the high tide survey 287 Curlews were recorded in 0O486 (South Slobs), the majority of which were in the NW of the subsite within fields of winter cereals.

Intertidal foraging was recorded within six subsites: 0O407, 0O485, 0O490, 0O493, 0O495 and 0O498. 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) recorded good numbers within intertidal habitat during the first two low tide surveys (130 and 131 for 15/10/09 & 20/11/09 respectively) and although their behaviour was not recorded it is likely that these birds were foraging. Relatively few Curlews were recorded here for the remainder of the survey programme however. There was little pattern in terms of foraging numbers within other subsites but 0O407 (Ferrybank (Wexford Bridge) - Castlebridge), 0O493 (Raven Point), 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour) recorded foraging individuals in all low tide surveys and all supported good numbers at times, for example 283 foraged within Rosslare Backstrand (0O495) on 15/02/10.

Roosting Distribution

During the high tide survey (21/01/10) the North and South Slobs recorded a total 447 Curlews but a larger number (1,146) were recorded roosting within three subsites. 0O493 (Raven Point) supported 517, 0O495 (Rosslare Backstrand) supported 460, and 0O498 (Hopeland Wexford Harbour) recorded 198 roosting Curlew.

During the roost survey (08/03/10), a flock of 283 Curlew roosted as part of a larger mixed-species flock along the western shore of 0O498 (Hopeland Wexford Harbour). A further 160 Curlews roosted upon Tern Island (within 0O495: Rosslare Backstrand) and 31 Curlews roosted at the tide edge in 0O493 (Raven Point).

Black-headed Gull *Chroicocephalus ridibundus* - Family (group): Laridae (gulls)
Black-headed Gulls breed widely throughout the middle latitudes of the Palearctic and in north-eastern North America (Mitchell et al. 2004). It is the most widespread breeding seabird within Ireland, breeding both inland and on the coast. Winter numbers are boosted by birds arriving from northern and eastern Europe (Wernham et al. 2004). There is some evidence that gulls from Iceland also move into Ireland for the winter (BWPi, 2004).
Numbers
Numbers of Black-headed Gulls peaked early, 4,086 recorded on 15/10/09. Thereafter numbers were variable ranging from 198 counted during the high tide survey (21/01/10) to 1,816 recorded on 20/11/09. Black-headed Gulls were recorded within all nine subsites and their distribution was widespread in all surveys. The subsite peak of 1,272 individuals was recorded for 0O485 (Inner South Harbour) on 15/10/09 and accounted for 31% of all Black-headed Gulls recorded on that date. The I-WeBS site peak for the Wexford Harbour and Slobs count area was 840 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 1,872 Black-headed Gulls, the majority of which were recorded in the stretch from Ferrycarrig Bridge to Killurin (Deep's) Bridge.
Foraging Distribution
Black-headed Gulls were recorded foraging within all except one subsite (0O493 Raven Point), this subsite used for roosting only. 0O499 (North Slob) held Black-headed Gulls in all five surveys and it is reasonable to assume that some of these birds were foraging (behaviour not recorded). 0O486 (South Slobs) supported a relatively large number of foraging individuals (373) on 20/11/09. On 15/10/09, the largest number foraging intertidally (769) were within 0O498 (Hopeland Wexford Harbour), this subsite also supporting relatively high numbers foraging intertidally on 15/12/09 (256). 0O495 (Rosslare Backstrand) also supported good numbers of foraging individuals in all surveys. 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) recorded large numbers foraging on 15/10/09 (653 intertidal + 439 subtidal) but relatively few individuals were recorded foraging here during the remaining survey programme. Intertidal and subtidal foraging was also recorded in 0O485 (Inner South Harbour) and 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)). Only subtidal foraging was recorded (on one occasion) in 0O901 (Blackwater Head - Raven Point).
Roosting Distribution
Behaviour was not recorded for 0O499 (North Slobs), 0O486 (South Slobs) or 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) but as Black-headed Gulls were recorded within this subsite, some roosting/resting behaviour is likely to occur. 0O493 (Raven Point) recorded roosting individuals in all surveys with good numbers roosting intertidally (e.g. 251 on 15/10/09) and subtidally (e.g. 152 on 15/02/10). 0O485 (Inner South Harbour) supported a large number 1,200 roosting intertidally on 15/10/09 but relatively few during the rest of the survey programme. Thereafter, three subsites supported roosting individuals (0O407, 0O495 and 0O901) but not in all surveys and numbers were highly variable. 0O493 (Raven Point) supported 109 roosting individuals during the roost survey (08/03/10) and 26 roosted within 0O498 (Hopeland Wexford Harbour). A further 59 roosted at Ferrybank (within 0O407: Ferrybank (Wexford Bridge) – Castlebridge)) and 39 roosted at two locations within 0O485 (Inner South Harbour).

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, including Ireland.
Numbers
Whole site numbers of Wigeon were variable but the counts for November and December 2009 and 21st January 2010 were above the threshold of all-Ireland importance. The peak count of 6,421 individuals was recorded on 20/11/09. Wigeon occurred in four subsites: 0O486 (South Slobs), 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)), 0O495 (Rosslare Backstrand) and 0O499 (North Slob). 0O499 (North Slob) supported peak numbers in all five surveys with numbers that represented 70 – 98% of all Wigeon counted during surveys. The peak number recorded was 6,300 on 20/11/09. The I-WeBS site peak for the Wexford Harbour and Slobs count area was 3,350 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 30 Wigeon.
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. 0O499 (North Slob) supported peak numbers in all five surveys and although behaviour was not recorded, it is reasonable to expect that some, if not most, of these birds were foraging. Apart from the final survey on 15/02/10, a greater proportion of Wigeon recorded within the North Slobs were recorded within water. Most were located along the main channel although smaller numbers were often located at damp flushes. On 20/11/09, 5,050 Wigeon were counted within aquatic habitats across the North Slobs. Of these, 2,300 were located at the most south-westerly point of the main channel. On this date, a further 1,250 were also distributed across terrestrial habitats, the majority within the NW of the site within stubble and grass fields but never far from water. The south-westerly point of the main channel supported Wigeon during all surveys including a large count of 1,500 on 21/01/10. Wigeon, like Teal, are a quarry species. Regular shoots take place across the North Slobs during winter. Along the main channel there are several feeding areas where wildfowlers actively feed grain to the birds in order to attract them to locations close to shooting hides. In addition, 'Teal ponds' have been created in recent years, these excavated areas along the main channel being attractive to wildfowl. Therefore the distribution of Wigeon across the North Slobs is at least in part, related to the activities of wildfowlers. 0O486 (South Slobs) supported Wigeon in all five surveys and it is reasonable to expect that some, if not most, of these birds were foraging. The peak number was 450 during the high tide survey (21/01/10). 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) supported 1,065 foraging Wigeon on 15/12/09; 711 foraged subtidally and 353 foraged intertidally (plus one supratidally). The only other record of foraging individuals was five within 0O495 (Rosslare Backstrand) on 15/02/10.
Roosting Distribution
Relatively few records of roosting Wigeon were collected during the 2009/10 waterbird survey programme. As most individuals occurred within the North Slobs (0O499), including at high tide, it is reasonable to expect that most roosting/resting behaviour is undertaken there, and most likely within or in close proximity to the main channel that drains this area. Indeed previous records (refer to Appendix 8) suggest this is the case.

Mallard *Anas platyrynchos* - Family (group): Anatidae (ducks)
Mallard ducks are the most common and widespread of northern hemisphere dabbling ducks (Delaney et al. 1999) with a wide breeding range across northern Eurasia and north America with the band extending from Arctic tundra to the subtropical zone (Wernham et al. 2002). Mallards breeding in northwest Europe, including Ireland, are largely sedentary or dispersive with short movements made during cold spells. The winter population in Ireland is increased by migratory individuals from various locations including Iceland, Northwest Russia, Poland and Germany (Wernham et al. 2002).
Numbers
Across the whole site, numbers of Mallard peaked early in October 2009 (1,957) and thereafter declined to a low of 279 counted during the high tide survey (21/01/10). The early peak in numbers is consistent with the pattern described in Crowe (2005) in that Mallard congregate early at some of the larger sites, with a subsequent reduction in numbers attributable to both the start of the hunting season and the re-distribution of some ducks to other suitable smaller wetland sites. Mallard were recorded in six subsites overall but only with regularity within two: 0O486 (South Slobs) and 0O499 (North Slobs). 0O499 (North Slob) supported peak numbers in all five surveys and held up to 99% of all Mallards counted across the entire site. The subsite peak count was 1,918 on 15/10/09 (all-Ireland importance). The I-WeBS site peak for the Wexford Harbour and Slobs count area was 1,128 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 203 Mallard.
Foraging Distribution
Mallards are omnivores and feed upon a wide variety of food items including seeds, plants and animal material (e.g. crustaceans, molluscs). They also have a variety of foraging methods including dabbling and up-ending, across differing habitats and water depths although the species is essentially a shallow-water duck, water depth usually less than 1m when foraging (Wernham et al. 2002). Across the North Slobs (0O499) Mallard ducks were recorded in both aquatic and terrestrial habitats although the majority were in water during all surveys. They were most often located along the wider stretch of the main channel that extends in a south-westwards direction, although on one occasion (15/10/09) 800 Mallards were counted along the smaller eastern arm of this channel. Mallards were most often counted together with Wigeon, Teal or other waterfowl species. Mallards, like Wigeon and Teal, are a quarry species. Regular shoots take place across the North Slobs during winter. Along the main channel there are several feeding areas where wildfowlers actively feed grain to the birds in order to attract them to locations close to shooting hides. In addition, 'Teal ponds' have been created in recent years, these excavated areas along the main channel being attractive to wildfowl. Therefore the distribution of Mallard across the North Slobs is at least in part, related to the activities of wildfowlers. Mallards were occasionally recorded within 0O486 (South Slobs) and foraging individuals were recorded on a once-off basis within 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) and 0O493 (Raven Point).
Roosting Distribution
Relatively few records of roosting Mallard were collected during the 2009/10 waterbird survey programme. As most individuals occurred within the North Slobs (0O499), including at high tide, it is reasonable to expect that most roosting/resting behaviour is undertaken there, and most likely within or in close proximity to the main channel that drains this area. Indeed previous records (refer to Appendix 8) suggest this is the case. Mallards were occasionally recorded roosting/loafing within 0O486 (South Slobs) and roosting individuals were recorded on a once-off basis within 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) and 0O901 (Blackwater Head - Raven Point).

Pintail *Anas acuta* - Family (group): Anatidae (ducks)
The Pintail has a Holarctic distribution breeding widely over northern temperate and arctic zones. Although there is a small population breeding within Ireland, the main numbers that winter in Ireland come from breeding grounds from Iceland eastwards through Fennoscandia to western Russia (Wernham et al. 2002). Although breeding within terrestrial wetlands, wintering takes places primarily within estuaries or coastal brackish lagoons.
Numbers
Numbers of Pintail peaked during November 2009 (258 individuals) then declined steadily to just ten individuals recorded on 15/02/10. Pintail were recorded in only two subsites: 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) and 0O499 (North Slobs), the latter supporting all recorded Pintail in all four low tide surveys and most (85%) individuals during the high tide survey. The I-WeBS site peak for the Wexford Harbour and Slobs count area was 152 individuals for the recent season (2008/09).
Foraging Distribution
0O499 (North Slob) supported peak numbers in all five surveys and although behaviour was not recorded, it is reasonable to expect that some, if not most, of these birds were foraging. During the October, November and December low tide surveys, all Pintail were recorded within the main water channel draining the North Slobs. They occurred along the wider stretch of the main channel that extends in a south-westwards direction. During the January and February 2010 surveys, small numbers of Pintail (30 and 10 respectively) were located adjacent to the water channel in the north of the subsite. Pintail, like Mallards, Wigeon and Teal, are a quarry species. Regular shoots occur take place the North Slobs during winter. Along the main channel there are several feeding areas where wildfowlers actively feed grain to the birds in order to attract them to locations close to shooting hides. In addition, 'Teal ponds' have been created in recent years, these excavated areas along the main channel being attractive to wildfowl. Therefore the distribution of Pintail across the North Slobs is at least in part, related to the activities of wildfowlers.
Roosting Distribution
As most individuals occurred within the North Slobs (0O499), including at high tide, it is reasonable to expect that most roosting/resting behaviour is undertaken there, and most likely within or in close proximity to the main channel that drains this area. 12 Pintail were recorded loafing subtidally within 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) on 15/12/09.

Goldeneye *Bucephala clangula* - Family (group): Anatidae (diving ducks)
Six populations are described for this migratory species. The population that breeds within north and northwest Europe winters in northwest and central Europe (Wetlands International, 2006). The wintering population in Ireland is about 9,600 individuals (Crowe et al. 2008).
Numbers
Numbers of Goldeneye increased from seven (15/10/09) to a peak of 50 on 20/11/09. Goldeneye were recorded within six subsites overall: 0O407, 0O485, 0O490, 0O498, 0O499 and 0O901. 0O499 (North Slob) consistently supported the greatest number with the exception of the final low tide survey (15/02/10) when 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) supported 90% of all Goldeneye counted. The subsite peak of 49 was recorded for 0O499 (North Slob) on 20/11/09. The I-WeBS site peak for the Wexford Harbour and Slobs count area was 57 individuals for the recent season (2008/09).
Foraging Distribution
0O499 (North Slob) supported peak numbers in most surveys and although behaviour was not recorded, it is reasonable to expect that some, if not most, of these birds were foraging. Goldeneye make shallow-water dives for their prey which may comprise molluscs, crustaceans and insect larvae, although the species has a wide and varied diet. On 15/10/09, seven Goldeneye were recorded within the main water channel at the SW corner of the subsite. On 20/11/09, the majority of Goldeneye (48) were located a little further north, but still within the most southerly, widest and deepest part of the water channel. On 15/12/09 and 21/01/10, the same stretch of water channel supported 25 Goldeneye (20+3+2) and 20 Goldeneye (14+4+2) respectively 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) supported foraging individuals on two occasions; eight on 15/12/09 and 18 on 15/02/10 (foraging subtidally). 0O485 (Inner South Harbour) and 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) recorded five and eight foraging individuals respectively on 15/12/09. Nine Goldeneye foraged intertidally within 0O498 (Hopeland Wexford Harbour) on 21/01/10 and two Goldeneye foraged intertidally within 0O901 (Blackwater Head - Raven Point) on 15/02/10.
Roosting Distribution
As most individuals occurred within the North Slobs (0O499), including at high tide, it is reasonable to expect that most roosting/resting behaviour is undertaken there, and most likely within or in close proximity to the main channel that drains this area. A single Goldeneye was recorded loafing subtidally within 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) on 20/11/09.

Little Grebe *Tachybaptus ruficollis* - Family (group): Podicipedidae (grebes)
Little Grebes are a widespread breeding species. The nominate race breeds throughout temperate Europe, northwest Africa, Turkey and Israel. Breeding on shallow freshwaters, the nominate race is thought to move to wintering areas in a westwards or southwest direction. In Ireland some individuals move to coastal estuaries and bays during winter although many stay on inland waterbodies. Movements to coastal sites increase during period of cold (freezing) weather. The true nature of movements and migrations are still relatively unknown for this species (Wernham et al. 2002).
Numbers
The peak number (whole site) of Little Grebes was recorded during the October low tide survey (45 individuals), this number surpassing the threshold of all-Ireland importance. Only four were recorded the following month. 14 and 15 individuals were counted in December 2009 and January 2010 respectively, with three Little Grebes on 15/02/10. Little Grebes were recorded in three subsites overall: 0O486 (South Slobs), 0O499 (North Slobs) and 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)). 0O499 (North Slobs) held the greatest number in three surveys (15/10/09, 15/12/09, 21/01/10) and 0O486 (South Slobs) supported peak numbers on 15/02/10. The peak subsite count was 45 individuals within 0O499 (North Slob) on 15/10/09. The I-WeBS site peak for the Wexford Harbour and Slobs count area was 36 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of eight Little Grebe.
Foraging Distribution
0O499 (North Slob) and 0O486 (South Slobs) supported peak numbers in surveys and although behaviour was not recorded, it is reasonable to expect that some, if not most, of these birds were foraging. Little Grebes were always recorded within water and across the North Slobs were always associated with the main water channel.
Roosting Distribution
As most individuals occurred within the North Slobs (0O499), including at high tide, it is reasonable to expect that most roosting/resting behaviour is undertaken there, and most likely within or in close proximity to the main channel that drains this area.

Great Crested Grebe *Podiceps cristatus* - Family (group): Podicipedidae (grebes)
Great Crested Grebes are a widespread breeding species; one population of the nominate subspecies breeds and winters in north and west Europe (Wetlands International, 2006). It is thought likely that the majority that breed within Ireland are resident, with individuals breeding at inland wetlands (lakes) moving to coastal sites for the winter period. Some immigration of individuals due to cold weather movements is likely (Crowe, 2005) but the true nature of this species' movements is poorly known (Wernham et al. 2002).
Numbers
The peak number (whole site) of Great Crested Grebes was recorded during the November low tide survey (137 individuals); this count and the number recorded during the final low tide survey (63) surpassing the threshold of all-Ireland importance. Great Crested Grebes were recorded within eight subsites overall. Between four and seven subsites were used during any one survey. The low tide peak subsite count was 84 individuals within 0O485 (Inner South Harbour) on 20/11/09. Peak numbers during low tide surveys were recorded within 0O485, 0O490 and 0O407. Relatively few Great Crested Grebes were present during the high tide survey (26 in total), the peak number recorded within 0O495 (18 individuals). The I-WeBS site peak for the Wexford Harbour and Slobs count area was 39 individuals for the recent season (2008/09).
Foraging Distribution
Great Crested Grebes are largely piscivorous and make short dives for their prey in the depth range of 2-4m. On 15/10/09, the highest number of Great Crested Grebes foraged within 0O485 (Inner South Harbour) (17 individuals). A further 18 individuals foraged within five different subsites (0O407, 0O486, 0O490, 0O495 and 0O498). On 20/11/09, 0O485 (Inner South Harbour) again held peak numbers (84); 0O498 (Hopeland Wexford Harbour) recorded 26 and thereafter four subsites held <4 individuals each. 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) recorded peak numbers on 15/12/09 (27) while 0O485 (Inner South Harbour) supported 19 foraging individuals. 0O495 (Rosslare Backstrand) recorded peak numbers of foraging individuals during the high tide survey (21/01/10) (18 individuals) which accounted for 69% of all Great Crested Grebes counted during that survey. 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) held the highest number of foraging individuals on 15/02/10 (28).
Roosting Distribution
Relatively few Great Crested Grebes were recorded in roosting/other behaviour. A notable exception was 20 individuals within 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) on 20/11/09.

Grey Heron *Ardea cinerea* - Family (group): Ardeidae (herons)
Grey Herons occur throughout much of the Palearctic, Africa and south Asia. Although migratory, the species is largely resident in Ireland. Some immigration is thought to occur.
Numbers
Numbers of Grey Heron were variable across the months and peaked with 57 individuals during the October low tide survey. Total numbers present during the first two low tide survey surpassed the threshold of all-Ireland importance. Only four individuals were recorded during the high tide count (15/02/10). Grey Herons were widespread across the site, occurring in a maximum eight subsites. As the species is generally solitary when feeding, a widespread distribution is perhaps to be expected; aggregations of birds are unlikely, especially as many individuals hold territories when feeding. The peak subsite count was 22 individuals within 0O485 (Inner South Harbour) on 15/10/09. Two subsites recorded Grey Herons in all five surveys: 0O486 (South Slobs and 0O498 Hopeland Wexford Harbour). The I-WeBS site peak for the Wexford Harbour and Slobs count area was 6 individuals for the recent season (2008/09); the most recent data available for the River Slaney count area (2007/08) shows a site peak of 11 Grey Heron.
Foraging Distribution
Grey Herons foraged regularly (three surveys or more) within six subsites: 0O407 (Ferrybank (Wexford Bridge) – Castlebridge), 0O485 (Inner South Harbour), 0O495 (Rosslare Backstrand), 0O498 (Hopeland Wexford Harbour), 0O486 (South Slob) and 0O499 (North Slob).
Roosting Distribution
Roosting/other behaviour was recorded within 0O485 (Inner South Harbour) and 0O498 (Hopeland Wexford Harbour). A small Grey Heron/Little Egret colony occurs in woodland of The Raven Nature Reserve (refer to Appendix 8).

Coot *Fulica atra* - Family (group): Rallidae (rails)
Coot *Fulica atra* are a widespread breeding species distributed across Europe, parts of Africa, the Middle East, Asia and Australasia (Wetlands International, 2006). One population of the nominate subspecies breeds and winters within northwest Europe, including Ireland. The Irish breeding population is thought to be largely sedentary but there is a distinct increase of birds during winter due to an influx of migratory birds (Wernham et al. 2002).
Numbers
Coot were recorded in four out of the five surveys (not on 20/11/09). The maximum whole-site count was 20 individuals, recorded on 15/02/10. The species was recorded in two subsites: 0O486 (South Slob) and 0O499 (North Slob), the latter recording the highest numbers in all four surveys. The I-WeBS site peak for the Wexford Harbour and Slobs count area was 40 individuals for the recent season (2008/09).
Foraging Distribution
Coot typically occur in large, still or slow moving waterbodies with shallow water. They are largely aquatic when foraging, feeding upon vegetation but also invertebrates, small fish and even frogs (BWPi, 2004). 0O499 (North Slob) supported peak numbers in all surveys when the species was recorded, and although behaviour was not recorded, it is reasonable to expect that some, if not most, of these birds were foraging. They were always recorded within the main water channel, and most often within the south-western section. Although primarily an aquatic forager, Coots may also forage on land (e.g. grassland). One observation (15/10/09) was made of a single Coot foraging terrestrially within 0O486 (South Slobs).
Roosting Distribution
Coots were not recorded in roosting/other behaviour. As most individuals occurred within the North Slobs (0O499), including at high tide, it is reasonable to expect that most roosting/resting behaviour is undertaken there, and most likely within or in close proximity to the main channel that drains this area.

Knot *Calidris canutus* - Family (group): Scolopacidae (wading birds)
Knot are a high Arctic breeding species. Two populations are recognised in Western Eurasia and Africa - *C. c canutus* and *C. c. islandica*. The latter breeds in north and east Greenland and northern Canada and winters in north-west Europe. The Knot that winter in Ireland are almost entirely from the *islandica* population. The Wadden Sea is an important staging ground for the species after a non-stop flight from the breeding grounds (van der Kam, 2004).
Numbers
Whole-site numbers of Knot were low. Low tide surveys recorded 5, 0, 25 and 4 individuals respectively. The species was not recorded during the high tide survey. Knot were recorded within two subsites: 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour). The I-WeBS site peak for the Wexford Harbour and Slobs count area was one individual only for the recent season (2008/09).
Foraging Distribution
Knots are mud and sandflat foragers; pecking visible items off the surface or probing to the depth that their bill (3.5cm) allows. The preferred prey items are bivalve molluscs including *Scrobicularia plana, Macoma balthica* and *Mytilus edulis* of smaller size-classes that are able to be swallowed (shell length in the range 6 – 16mm depending on bivalve species and shape of shell) (Dekinga & Pierma, 1993). *Hydrobia ulvae* may also be an important prey at some sites (Moreira, 1994). All Knot recorded were foraging. 5, 25 and 2 individuals foraged within 0O498 (Hopeland Wexford Harbour) on 15/10/09, 15/12/09 and 15/02/10 respectively. Two Knot foraged within 0O495 (Rosslare Backstrand) on 15/02/10.
Roosting Distribution
Knot were not recorded roosting during any of the surveys of the 2009/10 waterbird survey programme. However, they are known to roost upon the sand bank island 'Tern Island' within 0O495 (Rosslare Backstrand) and are likely to utilise mixed-species wader roosts upon the mobile sand banks off 0O493 (Raven Point).

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. The majority of Dunlin wintering in Ireland are *C. a. alpina* that originate from the western part of their breeding range and moult mainly in the Wadden Sea before starting 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
Dunlins were recorded in numbers of all-Ireland importance in all months except the October low tide survey. The site peak of 2,607 individuals was recorded on 15/02/10 and 1,387 were recorded during the high tide survey. Overall, Dunlins were recorded within seven subsites, but subsite usage between surveys varied from two subsites (15/10/09) to seven subsites (15/02/10), with on average, 53% of subsites used by Dunlin during low tide surveys. Only two subsites held Dunlins in all four low tide surveys: 0O495 (Rosslare Backstrand) and 0O498 (Hopeland Wexford Harbour). The subsite peak of 2,070 Dunlins were recorded within 0O498 (Hopeland Wexford Harbour) on 15/12/09, and represented numbers of all-Ireland importance. The I-WeBS site peak for the Wexford Harbour and Slobs count area was 600 Dunlin for the recent season (2008/09).
Foraging Distribution
The majority of Dunlins were recorded foraging. 0O498 (Hopeland Wexford Harbour) supported peak numbers of foraging individuals on 15/10/09, 15/12/09 and 15/02/10, the maximum number being 2,070 foraging intertidally on 15/12/09. 0O495 (Rosslare Backstrand) recorded peak numbers on 20/11/09 (420 individuals) and a further 306 foraged intertidally at 0O493 (Raven Point). 0O498 (Hopeland Wexford Harbour) is characterised by soft muddy sand and an invertebrate community dominated by *Hediste diversicolor* and *Corophium volutator* (ASU, 2009). Rosslare Backstrand is classified (in terms of benthic community) as 'estuarine muds dominated by polychaetes and crustaceans' with sediment ranging from sandy mud to slightly gravely sandy mud (NPWS, 2011b). Characterising invertebrate species that may form prey items of Dunlin include polychaetes *Hediste diversicolor* and *Pygospio elegans* and the amphipods *Corophium volutator* and *Gammarus locusta*. Results of benthic sampling reveal that lower shore areas of Raven Point and associated sandbanks can be dominated by the polychaete worm *Lanice conchilega*. The abundance of this potential prey item, only revealed in its true light during spring tides, may explain the high numbers (553) of Dunlin foraging on the lower shore (feet in water) on 15/02/10. 0O499 (North Slobs) and 0O486 (South Slobs) recorded Dunlins during the latter three surveys. Behaviour of waterbirds was not recorded but it is thought most likely that these birds were foraging terrestrially.
Roosting Distribution
Roosting was recorded during the high tide survey (21/01/10). 202 Dunlins roosted intertidally at 0O493 (Raven Point) and 750 Dunlins roosted supratidally within 0O495 (Rosslare Backstrand). A further 435 Dunlins were recorded across the 0O499 (North Slobs) and 0O486 (South Slobs) but their behaviour is unknown. During the roost survey (08/03/10), 200 Dunlin roosted upon the sand bank island 'Tern Island' within 0O495 (Rosslare Backstrand); this is a known roost site for this wader species. Dunlin are also known to roost regularly upon the sand banks within/off 0O493 (Raven Point) (Appendix 8).

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 recognised currently including *T. t. britannica,* a small and declining population that breeds in Britain and Ireland, and *T. t. robusta* which breeds in Iceland and the Faeroes and winters in Britain, Ireland and the North Sea area (Delaney et al. 2009).

Numbers

Total numbers of Redshanks were variable across the survey months. Numbers peaked at 1,016 on 15/10/09, which surpasses the threshold of all-Ireland importance. This early peak likely indicates the occurrence of some passage birds, Wexford Harbour therefore an important stopover site. Thereafter numbers during low tide survey ranged from 432 to 569, with 176 Redshanks recorded during the high tide survey (21/01/10).

Redshanks were widespread and recorded within eight subsites overall (not in 0O901 Blackwater Head - Raven Point). Six subsites recorded redshanks during all four low tide surveys as follows: 0O407 (Ferrybank (Wexford Bridge) - Castlebridge), 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)), 0O493 (Raven Point), 0O495 (Rosslare Backstrand), 0O498 (Hopeland Wexford Harbour) and 0O499 (North Slobs).

The peak subsite count of 653 Redshanks was recorded within 0O498 (Hopeland Wexford Harbour) on 15/10/09.

The I-WeBS site peak for the Wexford Harbour and Slobs count area was 272 Redshank for the recent season (2008/09).

Foraging Distribution

Redshanks forage mainly by pecking at the surface or probing within intertidal mudflats; favouring the muddier sections of sites (e.g. Rehfisch et al. 2000) where they prey upon species such as the Ragworm *Hediste diversicolor* or Mud Snail *Hydrobia ulvae.* A particularly favoured prey is the burrowing amphipod *Corophium volutator.*

0O498 (Hopeland Wexford Harbour) recorded the highest number of foraging Redshanks (intertidally) during all four low tide surveys with a peak number (653) recorded on 15/10/09. This subsite is characterised by soft muddy sand and an invertebrate community dominated by *Hediste diversicolor* and *Corophium volutator* (ASU, 2009). Furthermore, raw core sample data reveals that this subsite recorded the greatest number of *Corophium volutator*, supporting the conclusion that Redshanks distributed according to where this prey item was most abundant.

0O407 (Ferrybank (Wexford Bridge) - Castlebridge) recorded the second highest number foraging intertidally on three survey occasions. This subsite is also characterised by muddy sediment, classified by NPWS (2011b) as 'estuarine mud dominated by polychaetes and crustaceans.'

0O495 (Rosslare Backstrand) held good numbers in all low tide surveys and the second highest number of foraging individuals on 15/12/09. 0O493 (Raven Point) supported foraging individuals during all surveys (maximum 30 on 15/12/09).

Redshanks were recorded within 0O499 (North Slobs) in all surveys but their behaviour is unknown (maximum 80 Redshanks on 20/11/09). Similarly Redshanks were recorded within 0O486 (South Slobs) in all bar one survey but their behaviour is unknown (maximum 96 Redshanks on 21/01/10). 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) supported good numbers of Redshanks during the first two low tide surveys (15 and 90 individuals respectively) and although behaviour is unknown it is reasonable to expect that some if not most of these birds were foraging.

Roosting Distribution

Roosting individuals were recorded within 0O407 (Ferrybank (Wexford Bridge) - Castlebridge), 0O485 (Inner South Harbour), and 0O498 (Hopeland Wexford Harbour), the latter supporting 65 roosting Redshanks during the high tide survey (21/01/10).

Previous records indicate that the sheltered inner section of 0O498 (Hopeland Wexford Harbour) is a regularly-used roosting site, as is Tern Island (within 0O95: Rosslare Backstrand). Redshanks also utilise the sand banks off The Raven (0O493) for roosting along with other wader species such as Dunlin, Grey Plover and Oystercatchers.

Lesser Black-backed Gull *Larus fuscus* - Family (group): Laridae (gulls)
Lesser Black-backed Gulls that occur as breeding and wintering birds in Britain and Ireland belong to the race *graellsii,* which also breeds across western Europe, Iceland, the Faeroes and Greenland. Smaller numbers of the race *intermedius* also occur at times and numbers during winter are increased by gulls from the Netherlands and Germany, thought to be an intergrade between *graellsii* and *intermedius* (Wernham et al. 2002).
Numbers
Total numbers of Lesser Black-backed Gulls were variable across the survey months. Numbers peaked at 325 on 15/10/09. Thereafter numbers during low tide survey ranged from 21 to 93, with only 15 recorded during the high tide survey (21/01/10). Lesser Black-backed Gulls were widespread and recorded within eight subsites overall (not in 0O499 North Slobs) but only three subsites recorded the species in all five surveys; 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)), 0O493 (Raven Point) and 0O495 (Rosslare Backstrand). Raven Point recorded the subsite peak of 250 on 15/10/09.
Foraging Distribution
0O485 (Inner South Harbour) held the highest number of foraging Lesser Black-backed Gulls on 15/10/09 (10 gulls). Thereafter, three subsites supported few individuals (<3). On 20/11/09 0O495 (Rosslare Backstrand) supported peak numbers foraging (11 gulls), 0O498 (Hopeland Wexford Harbour) recorded eight and 0O485 (Inner South Harbour) a further two. Relatively few foraging individuals were observed for the remainder of the survey programme although note that 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)) supported good numbers on 15/02/10 but behaviour was not recorded.
Roosting Distribution
Most Lesser Black-backed Gulls were recorded in roosting/other behaviour. 0O493 (Raven Point) supported good number during the first three low tide surveys, a maximum 250 roosting intertidally on 15/10/09. 0O901 (Blackwater Head - Raven Point) recorded 28 and five individuals respectively on 15/10/09 and 20/11/09 (resting subtidally). Thereafter records are mostly 'one-off' records of roosting/resting individuals e.g. 23 within 0O407 (Ferrybank (Wexford Bridge) - Castlebridge) on 20/11/09 and 24 within 0O485 (Inner South Harbour) on 15/10/09. 15 Lesser Black-backed Gulls were recorded during the high tide survey, five within both 0O486 (South Slobs), 4 within 0O493 (Raven Point) and 0O495 (Rosslare Backstrand) and two within 0O490 (Raven Pt. - Ferrybank (Wexford Bridge)). Sand banks off 0O493 (Raven Point) are a known roosting area for lesser Black-backed, and other gull species. Small numbers were recorded on Tern Island (within 0O495: Rosslare Backstrand) during the roost survey on 08/03/10.

5.4 Wexford Harbour & Slobs - 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 at Wexford Harbour and Slobs SPA and The Raven 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 Information collection and presentation

Information on 'activities' and 'events' across the site was collected during a desk-top review which included NPWS site reporting files, Wexford County Development Plan (Wexford County Council, 2007), related documents (Wexford Borough Council and Wexford County Council. (2009), and other available documents relevant to the ecology of the site.

In addition, information was collected during the 2009/10 waterbird survey programme as field workers recorded activities or events that occurred at the site during their survey work[21]. 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. 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 information collected was categorised based on the standard EU list of pressures and threats as used in Article 17 reporting under the EU Habitats Directive. Only factors likely to affect waterbirds (directly or indirectly) were included but the resulting list is broad and includes built elements (e.g. man-made structures such as roads and bridges), factors associated with pollution (e.g. industrial discharges and waste water treatment plants), various recreational and non-recreational activities as well as biological factors such as saltmarsh erosion and siltation.

Data are presented in two ways:-

1. Appendix 9 shows activities and events identified to occur at Wexford Harbour and Slobs SPA and The Raven SPA that are listed in relation to the subsite within which they were observed or are known to occur. The activities/events are classified as follows:

[21] Note incomplete dataset.

O observed or known to occur
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. Appendix 10 shows activities that occur at Wexford Harbour and Slobs SPA and The Raven SPA that have the potential to cause disturbance to waterbird species. This includes features of the site (e.g. pier) whose associated activities have the potential to cause disturbance to waterbirds.

5.4.3 Overview of activities at Wexford Harbour & Slobs & The Raven

Historically, the North and South Slobs have undergone much change. They are two empoldered areas of farmland, mainly arable and pasture grassland that were created by the building of dykes (sea walls) in the mid 1800's. Both areas are drained by a network of channels which flow into one main central. When water in the channels reaches a certain height, it is pumped into the harbour, the North Slobs Pump House is located on the sea wall at the south-western end of the channel, and the South Slobs pump is located at the far north-western corner.

Activities across the slobs are mostly agricultural in nature. Buildings are relatively few, those present mostly farm sheds. There is a pig farm in the north of the South Slobs. 194 ha of the North Slob is a Nature Reserve 'Wexford Wildfowl Reserve' and the habitats are managed for the benefit of wintering geese. Monitoring of the wintering birds of the Slobs extends back to the 1960s and there is ongoing monitoring and research including recent studies of the movements of Greenland White-fronted Geese using satellite transmitters (e.g. Fox et al. 2010). The reserve, which is jointly owned by National Parks & Wildlife Service and BirdWatch Ireland, has a Visitor Centre which provides an observation tower for viewing birds. A second Nature Reserve occurs at The Raven, which encompasses 589 ha of state-owned land.

Wexford Town is the main populated area close to the site, with a population of *c*18,000 including the town and its environs (Wexford County and Wexford Borough Councils, 2009). The main populated area is adjacent to count subsites 0O490 and 0O485 (part only). The surrounding landscape is low lying and productive agricultural land. The harbour and environs has a rich and diverse natural heritage and offers a great deal in terms of coastal and marine leisure and tourism. The main beach in the area is at Curracloe (within 0O901) known locally as Ballinsker. This is a Blue Flag beach. Rosslare beach (adjacent to 0O495) is also a Blue Flag beach. Smaller beaches are present at Raven Point and Ardcavan. General beach activities occur including walking, horse riding and kite-surfing, although beach bye-laws (Wexford County Council 2005) govern Curracloe and Rosslare Strand and prohibit activities such as horse riding, jet-skiing and quad bikes (www.wexford.ie). While beaches are popular and easily accessible, they are rarely crowded.

Leisure fishing is undertaken within Wexford Harbour and Wexford Bay. Shore fishing may be undertaken at Ardcavan strand (within 0O490), Ferrybank (within 0O407), Kaats Strand (within 0O407), Ferrycarig (within 0O407), the Burrow (within 0O495), and the marina (within 0O407) for species such as flounder (*Platicthys flesus*), eel (*Anguilla anguilla*), Tope (*Galeorhinus galeus*), Ling (*Molva molva*), Wrasse (*Lubrus*) and bass (*Dicentrarchus labrax*). The Wexford Bay coastline is accessed in the south via Curracloe or Blackwater village for the northern stretch. Blackwater has a small harbour. The River Slaney also provides fishing opportunities. The river is known for stocks of wild Brown Trout (*Salmo trutta*) with reasonable runs of spring Salmon

(*Salmo salar*) and Sea Trout (*Salmo trutta*), the latter in late summer/autumn (www.fishinginireland.info).

Pleasure boating occurs within the harbour and a range of small boats and cruisers may be moored along the harbour area, located south of Wexford Bridge. An operator offers cruises from the quays around Wexford Harbour, but this operates mainly in summer months. A small fishing fleet is also based there. Development or expansion of a port in Wexford harbour has been hampered across the years by its the inaccessibility in terms of tides, currents and mobile sands and consequently major marine traffic travels to the nearby Rosslare Europort.

Professional static fishing gear activity in the area includes widespread line fishing (lines set on the seabed with bated hooks at intervals) and the use of pots (bated traps set on the seabed targeting crustaceans) (DoEHLG, 2009b). Mobile fishing gear activity includes the use of mussel dredges. Boats that dredge for Mussels close to the sea wall of the North Slobs have been observed to cause disturbance to foraging Greenland White-fronted Geese by the fact that the masts, which rise high above the sea wall, and are clearly visible to the birds, cause them to be displaced from feeding areas. NPWS are involved in discussions with fishermen to try to mitigate and resolve this issue.

In 2009 Wexford Harbour was designated as a Shellfish Water under the EU Shellfish Waters Directive.[22] Two Shellfish Areas are described No 34 (inner harbour) and 33 (outer harbour) (DoEHLG, 2009a, b). The predominant species cultivated is Blue Mussles *Mytilus edulis* and Wexford Harbour is one of the nine main areas used for the culture of bottom mussels in the Republic of Ireland, and the most important area in the south of the country (BIM, 2006). Mussel spat is relayed into the harbour for on-growing from natural seed stocks; the principal source being beds off Wicklow Head (BIM, 2006).

The Sea Fisheries Protection Authority is responsible for classifying shellfish production areas. The latest classification for Wexford Harbour is Class B (outer) and Class C (inner) as per 15th July 2011.[23] The DoEHLG published Pollution Reduction Programmes for Wexford Harbour in 2009 to ensure compliance with the standards and objectives established by the regulations. These documents identify the key pressures upon water quality to be urban wastewater treatment systems (WWTPs), on-site WWTPs and agricultural inputs.

The South Eastern River Basin District Transitional and Coastal Waters Action Plan classify the waters of Wexford Harbour as of moderate quality (South Eastern RBD, 2010). Nutrient inputs (from agriculture) were identified as a risk to water quality.

The mobile nature of the sediments and silting means that there is a regular requirement for dredging of the channels for them to remain navigable. Coastal erosion is also an issue at this site. There has been erosion along the eastern side of the Raven. Sediment transport along the Raven is in a southerly direction and the sand dune system on the south-western end of the Raven is accreting. Some of the sediment rounds Raven Point and enters the Harbour system, while some of the sediment by-passes the mouth of the harbour and has in the past contributed to the nourishment of the Rosslare spit (NPWS, 2000). Sediment transport along the Rosslare Spit is in a northerly direction and erosion here has been attributed to human interference with the

[22] European Communities (Quality of Shellfish Waters) (Amendment) Regulation 2009, (SI 55 of 2009).

[23] Criteria for the classification of bivalve mollusc harvesting areas under Regulation (EC) No 854/2004, Regulation (EC) 853/2004 and Regulation (EC) 2073/2005.

natural sediment movements, namely the slob reclamation works and harbour construction works at Rosslare (www.eurosion.org/shoreline/21rosslare.html).

In the mid 1990's an intertidal area of *c* 6 ha at Ferrybank was subject to infilling (dredged spoil). By way of mitigation, a "fish-tail" groyne was built at the east of the reclamation site, which aimed to facilitate natural mudflat creation while also retaining imported mud, to result ultimately in the creation of compensatory habitat. To date these attempts have been unsuccessful.

Part of Hopeland (subsite 0O498) was reclaimed prior to the reclamation of the South Slobs by the building of an embankment but this was breached in the 20th century and the former harbour then reverted to intertidal and coastal habitats. The only signs of this former reclamation are the remains of the old embankment and several old posts in the intertidal area (McCorry & Ryle, 2009b).

Winkle picking and bait digging occurs at the site. Winkle picking was recorded in one subsite only during the 2009/10 waterbird survey programme (0O493) while bait digging (e.g. for Lugworms *Arenicola marina*) was a regular activity at low tide and recorded within five subsites.

Walking is a popular activity and concentrated in certain areas such as along Rosslare backstrand (adjacent 0O495) and at the Raven (adjacent 0O493). One policy of the Wexford County Development Plan to '*seek to develop a new walking route along the River Slaney between Wexford and Enniscorthy…*' (Wexford County Council, 2007).

Hunting in the form of wildfowling has been a long tradition at the site. Both the North and South Slobs are renowned as prime wildfowling sites within Ireland and support organised and managed shoots (Wexford Regional Game Council) each year for quarry waterbird species (e.g. Wigeon, Teal, Mallard) and for pheasant and partridge (both grey and red-legged, which are released). There are a number of active punt-gunning licenses operating in this area. The use of lead shot is prohibited within part of the site.

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 Discussion

This review has highlighted that many 'activities and events' occur across the site.

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. 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 such as the development of coastal defences, bridge building etc. The fish-tail groyne in subsite 0O490 is an example here.

Physical damage may occur from trampling or compaction (e.g. horse-riding, humans walking, motor vehicles). The grazing of salt marsh areas can modify waterbird roosting areas. Bait-digging and the hand gathering of molluscs may cause physical damage while at the same time removing waterbird prey items. Fisheries and aquaculture interact with waterbirds in a variety of ways including the direct removal of waterbird prey items (e.g. fish species, bivalves), habitat loss/modification (e.g. due to the physical presence of oyster trestles within intertidal habitat),

habitat damage (e.g. from machinery, vehicles) and indirect effects upon invertebrate distribution and abundance.

Pollution and impacts upon water quality may arise from domestic and urban wastewater discharges, agricultural run-off and marine-based pollution (i.e. that arising from shipping, harbours etc) and may affect a wider area than those subsites identified in Appendix 9. These may translate into direct effects upon waterbirds (direct toxicity) or indirect effects due to changes to invertebrate community composition, spatial distribution and/or abundance.

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[24] (reduced survival or reproductive success) consequences at population level may result.

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.

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

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.

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APPENDIX 1

SITE SYNOPSIS

SITE NAME: WEXFORD HARBOUR AND SLOBS SPA

SITE CODE: 004076

Wexford Harbour is the lowermost part of the estuary of the River Slaney, a major river that drains much of the south-east region. The site is divided between the natural estuarine habitats of Wexford Harbour, the reclaimed polders known as the North and South 'Slobs', and the tidal section of the River Slaney. The seaward boundary extends from the Rosslare peninsula in the south to the area just west of The Raven Point in the north. Shallow marine water is a principal habitat, but at low tide extensive areas of intertidal flats are exposed. These vary from rippled sands in exposed areas to sandy-muds in the more sheltered areas, especially at Hopeland and the inner estuary to the west of Wexford Bridge. The flats support a rich macro-invertebrate fauna, including the bivalves Cockle (*Cerastoderma edule*), Baltic Tellin (*Macoma balthica*) and Peppery Furrow-shell (*Scrobicularia plana*), the polychaetes Lugworm (*Arenicola marina*), Catworm (*Nepthys hombergi*) and Ragworm (*Hediste diversicolor*) and the crustacean *Corophium volutator*. Beds of mussels (*Mytilus edulis*) also occur. Salt marshes fringe the intertidal flats, especially in the sheltered areas such as Hopeland and towards Castlebridge. The Slobs are two flat areas of farmland, mainly arable and pasture grassland, empoldered behind 19th century sea-walls. The lands are drained by a network of channels which flow into two central channels, in parts several hundred metres in width. Water from the channels is pumped into the sea with electric pumps. The channels often support swamp vegetation. The river section of the site is extensive, extending to Enniscorthy, a distance of almost 20 km from Wexford town. It is noticeably tidal as far as Edermine Bridge but with tidal influence right up to Enniscorthy. In places, such as the Macmine marshes, it is several hundreds metres wide and here reedswamp is well developed.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Bewick's Swan, Whooper Swan, Greenland White-fronted Goose, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Mallard, Pintail, Scaup, Goldeneye, Red-breasted Merganser, Hen Harrier, Coot, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Knot, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Lesser Black-backed Gull and Little Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. 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 site is of international importance for several species of waterbirds but also because it regularly supports well in excess of 20,000 waterbirds (average peak of 49,030 for the 5 winters 1996/97-2000/01). Wexford Harbour and Slobs is one of the top three sites in the country for numbers and diversity of wintering birds. The combination of estuarine habitats, including shallow waters for grebes, diving duck and seaduck, and the farmland of the polders, which include freshwater drainage channels, provides optimum feeding and roost areas for a wide range of species. Of particular importance is that it is one of the two most important sites in the world for Greenland White-fronted Goose (9,353) (all given figures for species are average peaks for the 5 winters 1995/96-1999/00). The geese feed almost entirely within the Slobs and roost at The Raven (a separate SPA). The site also has internationally important populations of Mute Swan (543), Light-bellied Brent Goose (1,469), Bar-tailed Godwit (1,696) and Black-tailed Godwit (790).

There are at least a further 26 species of wintering waterbirds which occur in numbers of national importance, i.e. Great Crested Grebe (117), Little Grebe (82), Cormorant (495), Grey Heron (52), Whooper Swan (100), Bewick's Swan (192), Shelduck (753), Wigeon (2,752), Teal (1,538), Mallard (3,290), Pintail (66), Scaup (339), Goldeneye (182), Red-breasted Merganser (209), Coot (351), Oystercatcher (1,493), Golden Plover (5,013), Grey Plover (1,279), Lapwing (11,826), Knot (453), Sanderling (210), Dunlin (2,485), Curlew (1,771), Redshank (555), Black-headed Gull (5,977) and Lesser Black-backed Gull (1,086). Other species that use the site include Ringed Plover (69), Turnstone (41), Greenshank (12), Shoveler (24), Tufted Duck (114), Pochard (218), Common Gull (100+) and Little Egret. Several of the above populations represent substantial proportions of the national totals, especially Shelduck (5.2%), Scaup (5.3%), Red-breasted Merganser (5.7%) and Grey Plover (19.8% and the top site in the country). The Slobs is the most important and indeed one of the few sites in the country which supports a regular flock of Bewick's Swan. Numbers of wintering birds are often swelled by hard-weather movements from Britain and Europe, notably Golden Plover and Lapwing.

The site is a regular location for scarce passage waders such as Ruff, Spotted Redshank and Green Sandpiper, as well as Curlew Sandpiper in varying numbers. The rare Wood Sandpiper is seen each year, mainly in autumn.

Short-eared Owl and Hen Harrier are regular visitors in small numbers to the Slobs during winter. Of particular note is the presence of the Hen Harrier communal roost site.

A nesting colony of Little Egret has recently become established within the site (12+ pairs in 2003) and birds are present in the area throughout the year. The sheltered estuarine habitat to the west of Wexford Bridge is the favoured location.

The site is important for Little Tern as it has can hold a nationally important breeding colony (30 pairs were recorded in 2000). The Slobs support a nesting colony of Tree Sparrow, a very localised species in Ireland that is listed in the Irish Red Data Book. Another very localised breeding species, Reed Warbler, is well established within the swamp vegetation along the River Slaney and on the South Slob (estimated as at least 10 pairs).

A range of duck species breed, including Teal, Tufted Duck and, probably in most years, Shoveler.

The site supports populations of Borrer's Saltmarsh-grass (*Puccinellia fasciculata*) and Short-leaved Water-starwort (*Callitriche truncata*), both protected, Red Data Book species. The Slobs are well known for their population of Irish Hare.

Part of the North Slob is a Nature Reserve and much of this slob is managed for the benefit of the wintering geese. Monitoring of the wintering birds of the Slobs extends back to the 1960s and nowadays there is an ongoing monitoring and research programme. The North Slob has a wildfowl collection and an interpretative centre.

There are no imminent significant threats to the wintering bird populations. In the long-term, however, projected increases in sea level could cause problems in maintaining the Slobs as farmland. In recent times, the South Slob has become less suitable due to changes in landuse, including forestry operations, and a sustained programme of scaring. An increase in the amount of new housing in the vicinity of the North Slob has led to increased levels of disturbance in recent times. Localised reclamation has occurred in Wexford Harbour and any further reclamation of estuarine habitat is undesirable. Aquaculture occurs in Wexford Harbour though it is not known what effects, if any, this has on the bird populations.

Wexford Harbour and Slobs SPA is one of the most important ornithological sites in the country. It is of world importance for Greenland White-fronted Goose, and supports internationally important populations of a further four species (Mute Swan, Light-bellied Brent Goose, Black-tailed Godwit and Bar-tailed Godwit). In addition, it has 26 species of wintering waterbirds with populations of national importance. Also of significance is that several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Little Egret, Whooper Swan, Bewick's Swan, Greenland White-fronted Goose, Hen Harrier, Golden Plover, Bar-tailed Godwit, Ruff, Wood Sandpiper, Little Tern and Short-eared Owl. The site is an important centre for research, education and tourism.

26.1.2009

SITE SYNOPSIS

SITE NAME: THE RAVEN SPA

SITE CODE: 004019

The Raven SPA extends from north of Rosslare Point to Blackwater Harbour on the coast of Co. Wexford. The seaward boundary of the site extends a maximum distance of approximately 4.5 km from the shoreline to encompass important areas of shallow water utilised by some of the species of special conservation interest.

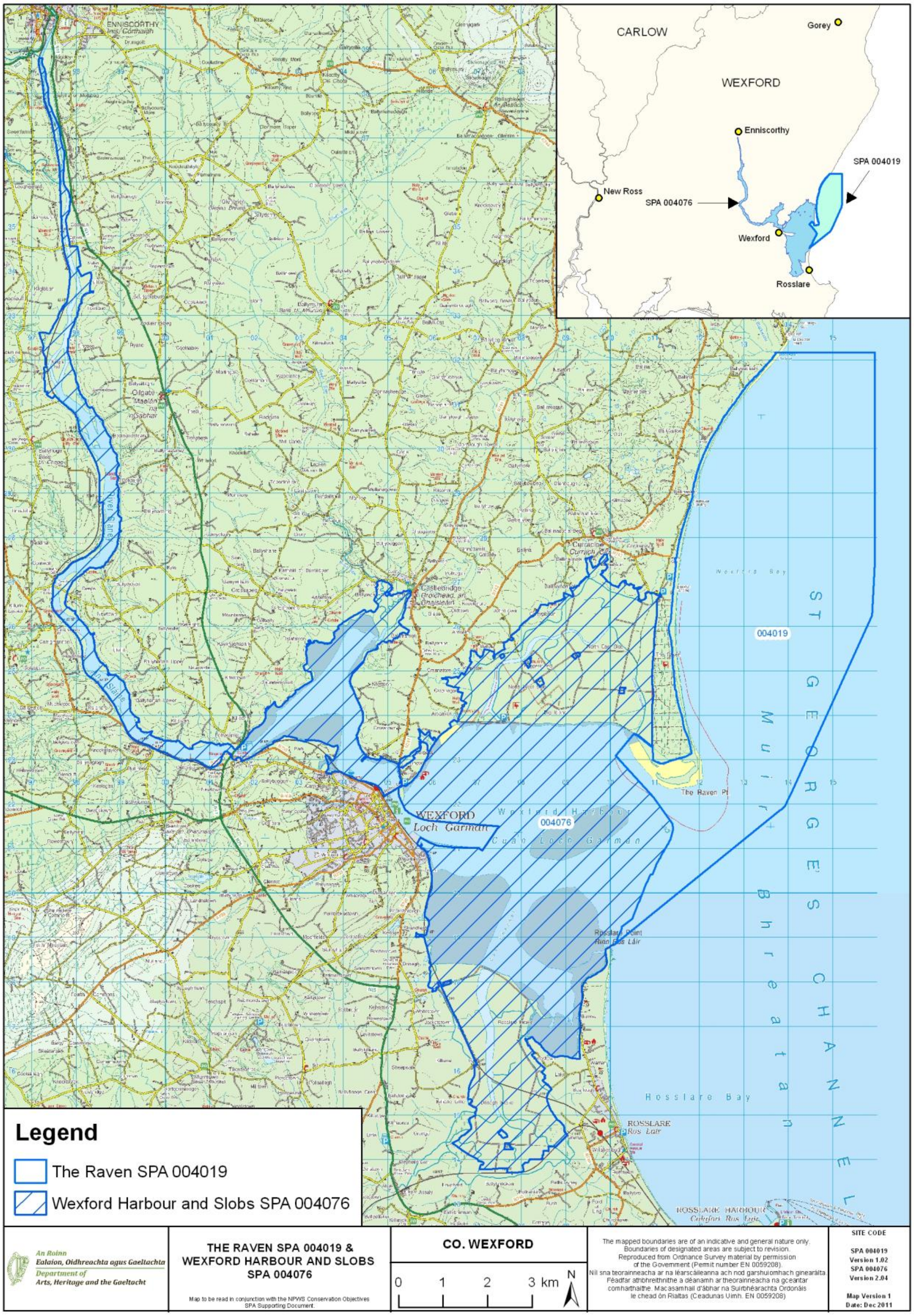
The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Red-throated Diver, Cormorant, Greenland White-fronted Goose, Common Scoter, Grey Plover and Sanderling. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The Raven is an important bird site, being part of the Wexford Slobs and Harbour complex. Of critical significance is that it forms the principal night roost for the internationally important Wexford Harbour population of Greenland White-fronted Goose (9,111 – five year mean peak for the period 1994/95 to 1998/99). Various other waterfowl species are also attracted to the site during winter, both for feeding and roosting. The shallow waters within the site are particularly suitable for divers, grebes and sea duck, and nationally important populations of Red-throated Diver (77) and Common Scoter (3,234) occur – figures are five year mean peaks for the period 1995/96 to 1999/2000. The Common Scoter population represents over 17% of the all-Ireland total. Nationally important populations of Cormorant (250), Grey Plover (553) and Sanderling (101) also occur – figures are four year mean peaks for the period 1995/96 to 1998/99. Other species which occur include Oystercatcher (105), Golden Plover (711), Dunlin (673), Bar-tailed Godwit (136) and Curlew (111).

The Raven SPA is a breeding site for Little Tern, with up to 30 pairs occurring in some years. The birds nest on the shingle and sandy beaches or on offshore sandbanks. Numbers vary a lot between years – this partly related to the suitability of potential nesting habitat after winter storms, which create or destroy sandbars and shingle ridges. A number of pairs of Ringed Plover also breed on the sandy beaches.

The Raven SPA is of international ornithological importance as it provides important roosting habitat for the Wexford Harbour Greenland White-fronted Goose flock. The site also supports a range of other species, including five which have populations of national importance. It is of note that five of the wintering species that regularly occur are listed on Annex I of the E.U. Birds Directive, i.e. Red-throated Diver, Great Northern Diver, Greenland White-fronted Goose, Golden Plover and Bar-tailed Godwit. Little Tern, a species breeding within the site, is also listed on Annex I of this directive. Raven Point is a statutory Nature Reserve and a Ramsar Convention site.

06.09.2010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Muir Bhreatan
The Raven Pt
WEXFORD
Loch Garman
Wexford Harbour
Cuan Loch Garman
Rosslare Point
Rosslare Bay
ROSSLARE
Ros Láir
ROSSLARE HARBOUR
Legend
The Raven SPA 004019
Wexford Harbour and Slobs SPA 004076
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
THE RAVEN SPA 004019 &
WEXFORD HARBOUR AND SLOBS
SPA 004076
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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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).
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Version 1.02
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Version 2.04
Map Version 1
Date: Dec 2011

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 ygnus*) 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 coordinated in Britain by the Greenland White-fronted Goose Study and in Northern and the Republic of Ireland by NPWS (Fox et al. 2010).

- 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. The months used to calculate index values varies according to the species concerned, the months chosen being representative of when the population is most stable, minimising for example, the inclusion of passage birds.

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.

Note that the above % change calculation is the same as the 'generic threshold method' used for e.g. gull species (see Section 4.2).

Greenland-White-fronted Goose

Trend assessment for this species uses data from the Irish Greenland White-fronted Goose census carried out by NPWS. The data period is therefore different (1991/92 to 2008/09 rather than 1994/95 to 2008/09 as used for other species) but population indexing, smoothing and calculation of % change across time follows the methodology given above (and shown in example below) although the dataset was not subject to the Underhill Indexing method as there were no missing counts.

Example

Year	Unsmoothed	Smoothed
1991	1.172492219	1.119099629
1992	0.981924826	1.145619925
1993	1.239645679	1.182427878
1994	1.312066076	1.20231643
1995	1.204093847	1.188261017
1996	1.047522145	1.153804725
1997	1.149748623	1.116250962
1998	1.145199904	1.069602655
1999	0.997127125	1.014932544
2000	0.925664352	0.974458798
2001	0.917285133	0.966843903
2002	0.967919559	0.991485405
2003	1.123773043	1.027816069
2004	1.07517357	1.051463129
2005	0.944697151	1.064718323
2006	1.177400048	1.074949854
2007	1.083672492	1.065637156
2008	1	1.040725123

Term	Change
5YR	**7.48**
10YR	**-4.53**
ALL YR	**-6.98**

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

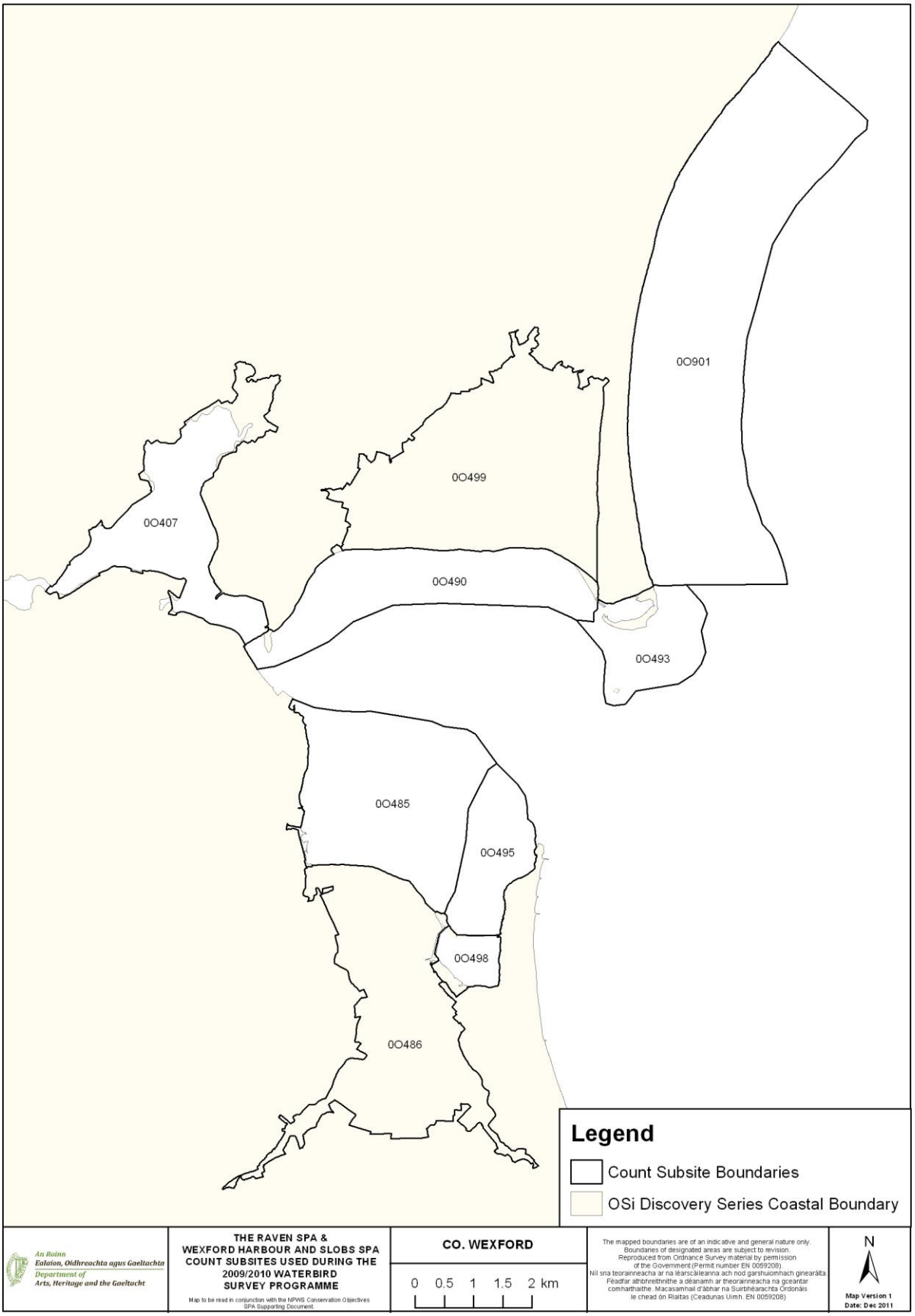
[a] dives <3m.

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

Wexford Harbour & Slobs SPA (4076) and The Raven SPA (4019) – Waterbird survey programme 2009/10 – Count Subsites

Subsite	Name
0O407	Ferrybank (Wexford Bridge) – Castlebridge
0O485	Inner South Harbour
0O486	South Slobs
0O490	Raven Pt. – Ferrybank (Wexford Bridge)
0O493	Raven Point
0O495	Rosslare Backstrand
0O498	Hopeland Wexford Harbour
0O499	North Slob
0O901	Blackwater Head – Raven Point


0O901
0O499
0O407
0O490
0O493
0O485
0O495
0O498
0O486
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
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THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA COUNT SUBSITES USED DURING THE 2009/2010 WATERBIRD SURVEY PROGRAMME
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0 0.5 1 1.5 2 km
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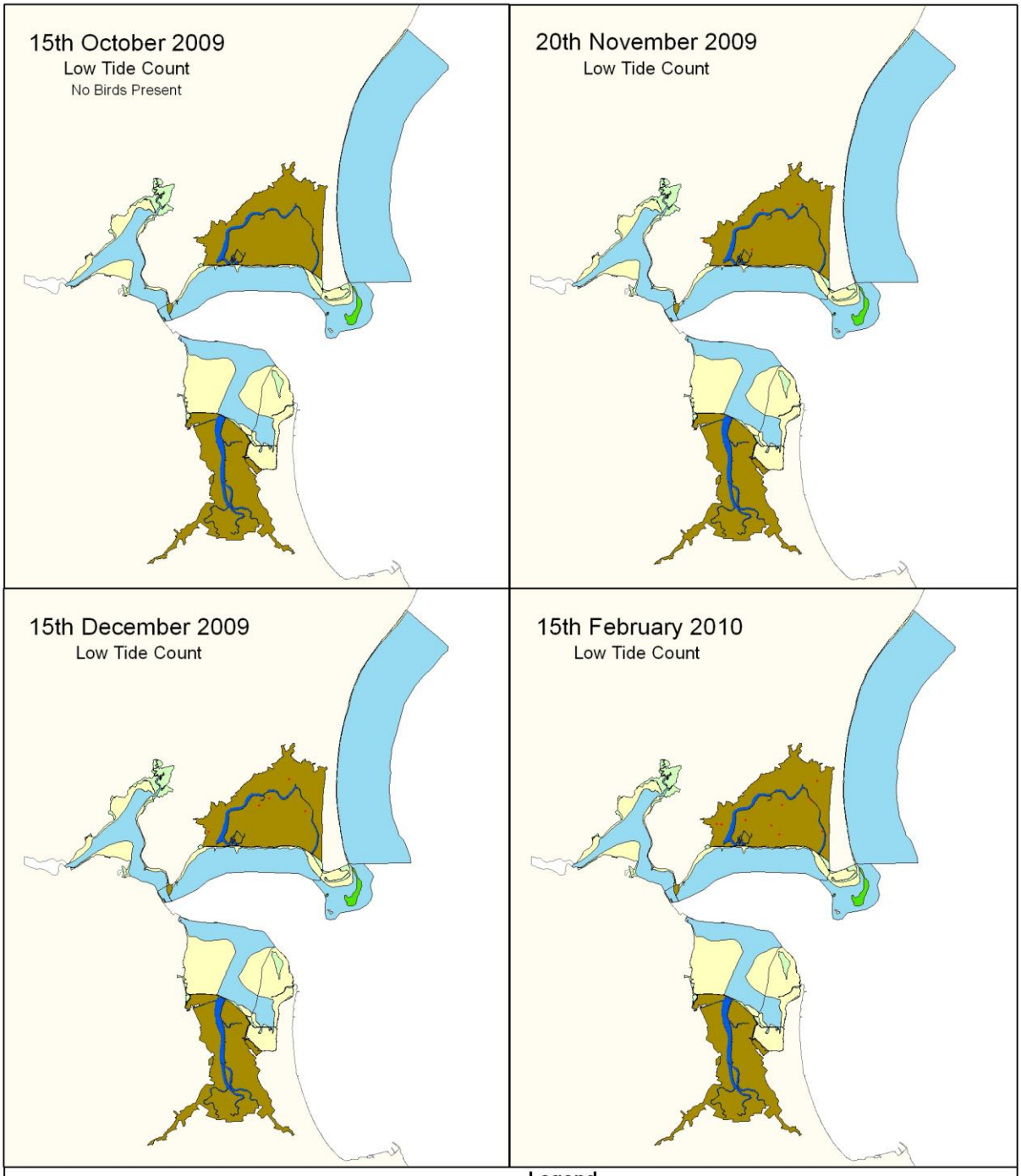
N
Map Version 1
Date: Dec 2011

APPENDIX 7

Wexford Harbour & Slobs (4076) and The Raven SPA (4019)

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



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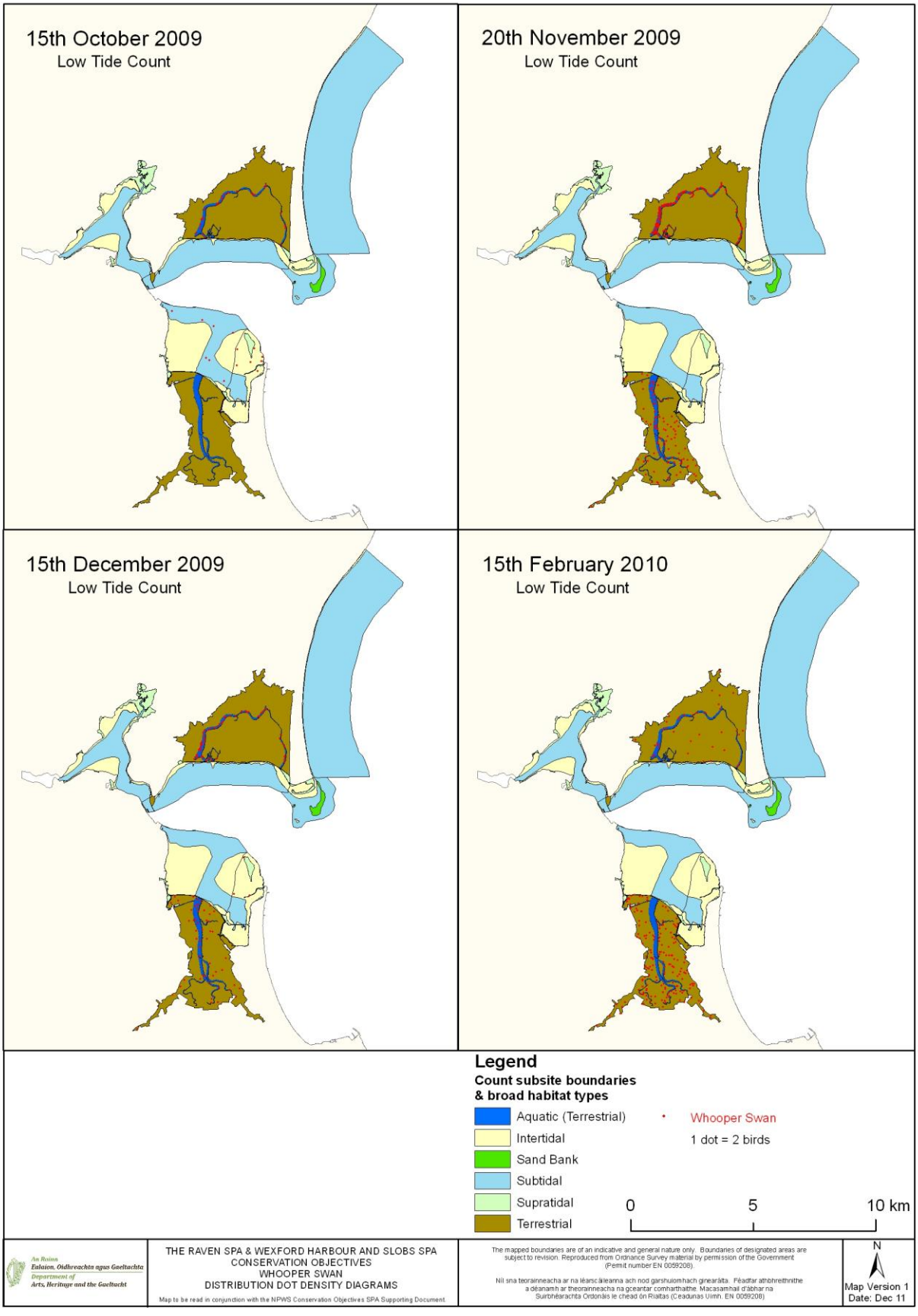
Department of Arts, Heritage and the Gaeltacht

THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
BEWICK SWAN
DISTRIBUTION DOT DENSITY DIAGRAMS

Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.

N

Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Whooper Swan
1 dot = 2 birds
0
5
10 km
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Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
WHOOPER SWAN
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document
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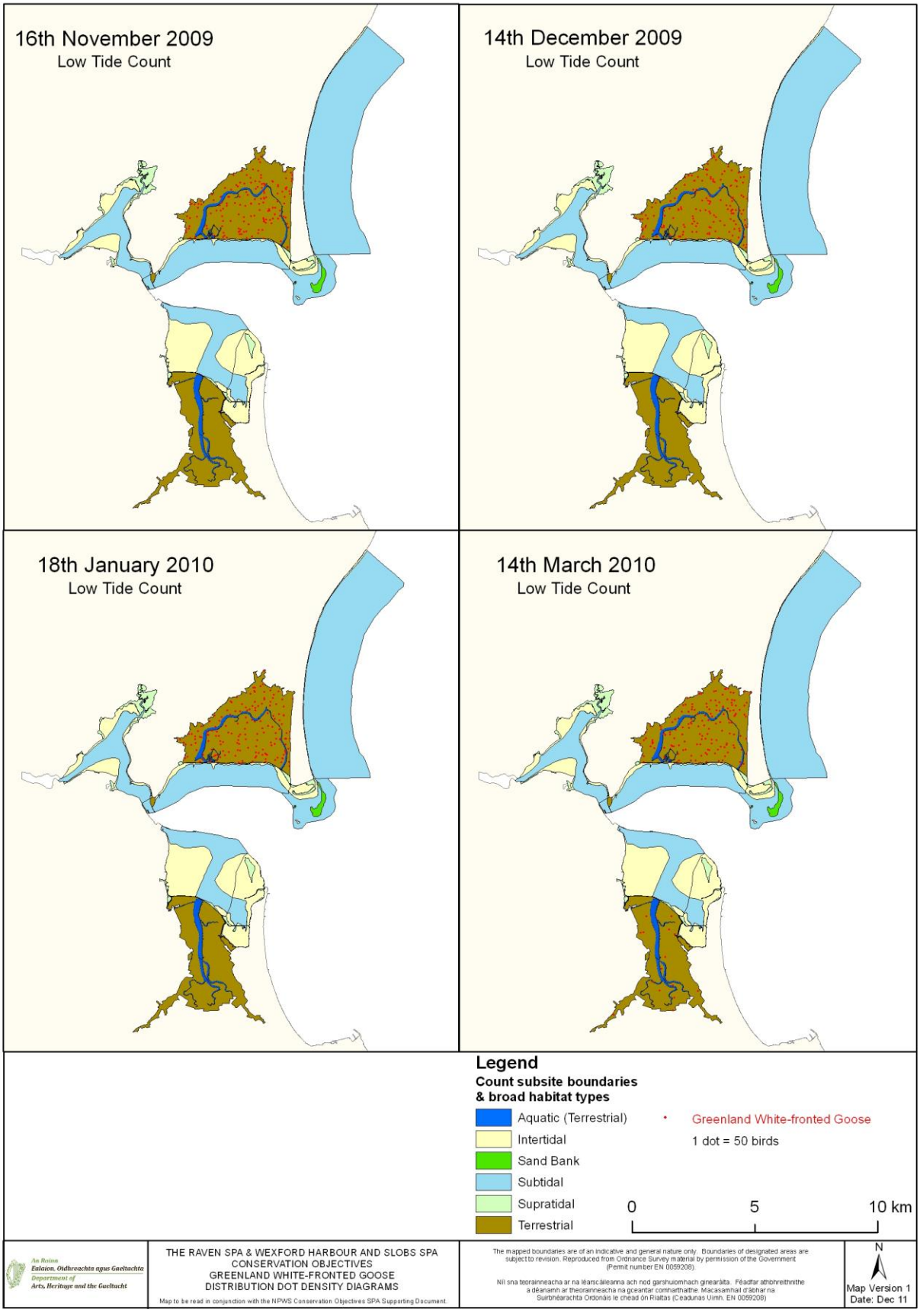
Map Version 1
Date: Dec 11


16th November 2009
Low Tide Count
14th December 2009
Low Tide Count
18th January 2010
Low Tide Count
14th March 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Greenland White-fronted Goose
1 dot = 50 birds
0
5
10 km
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THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
GREENLAND WHITE-FRONTED GOOSE
DISTRIBUTION DOT DENSITY DIAGRAMS
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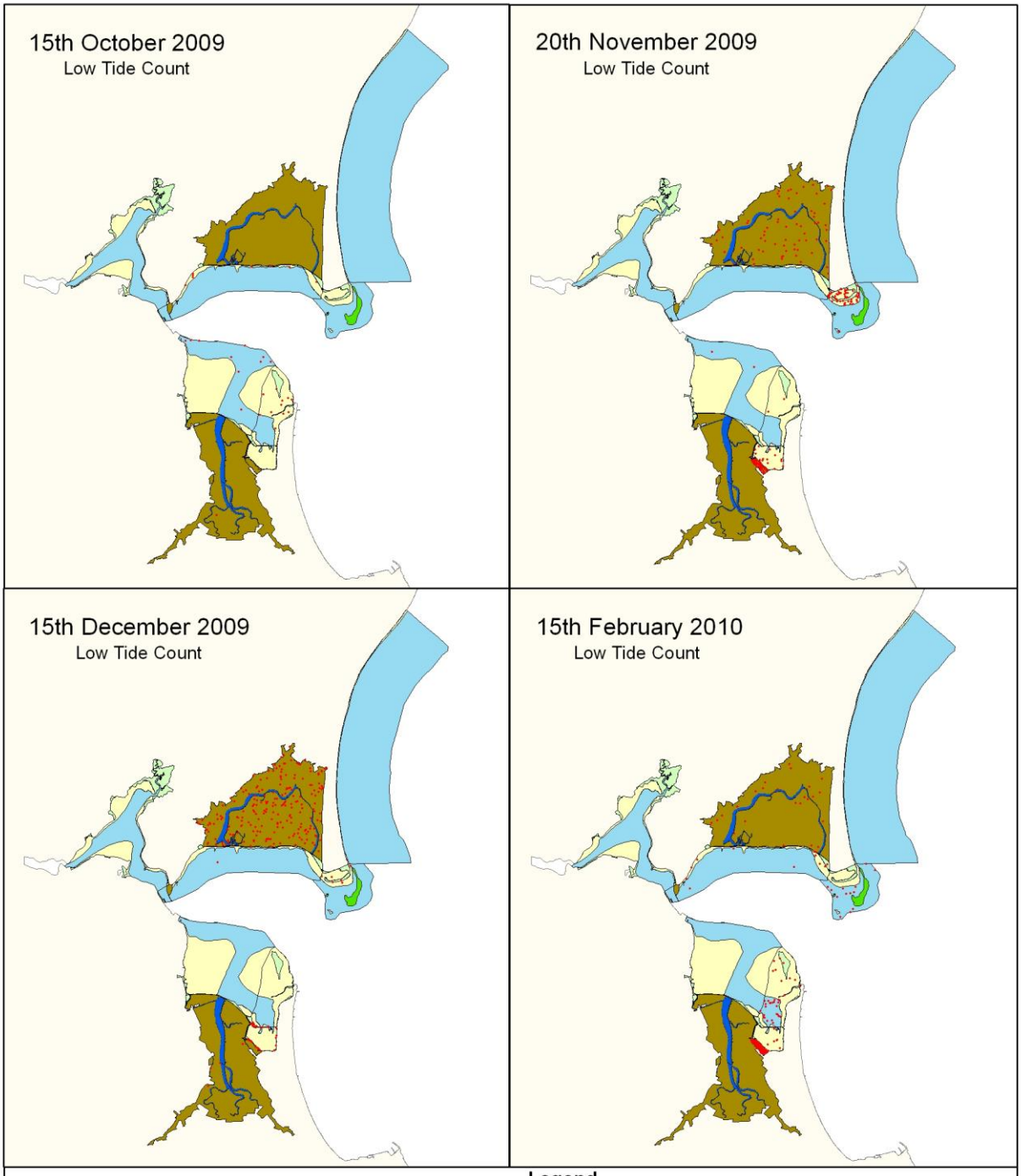
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Light-bellied Brent Goose
1 dot = 10 birds
0
5
10 km
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THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
LIGHT-BELLIED BRENT GOOSE
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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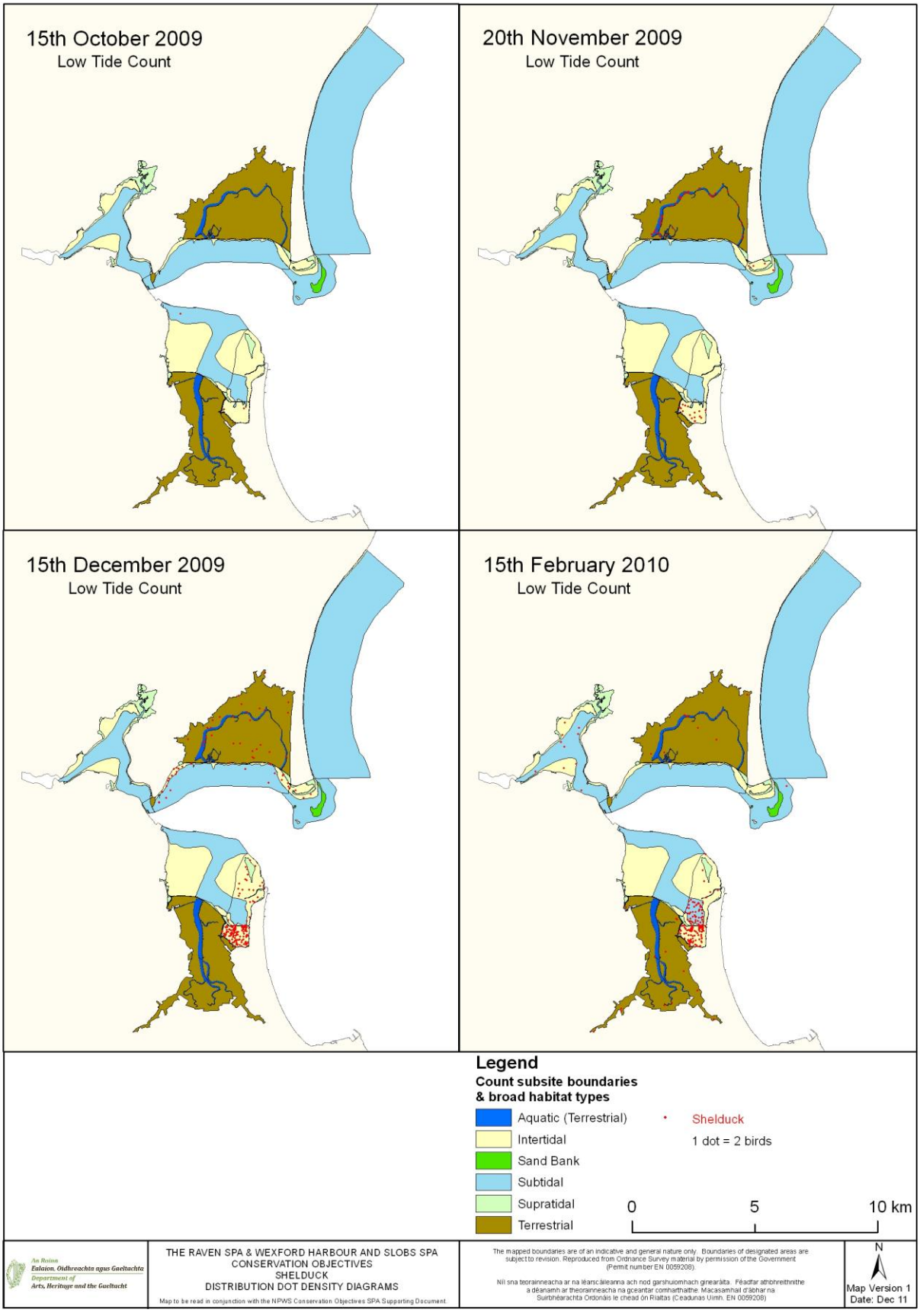
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Shelduck
1 dot = 2 birds
0
5
10 km
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CONSERVATION OBJECTIVES
SHELDUCK
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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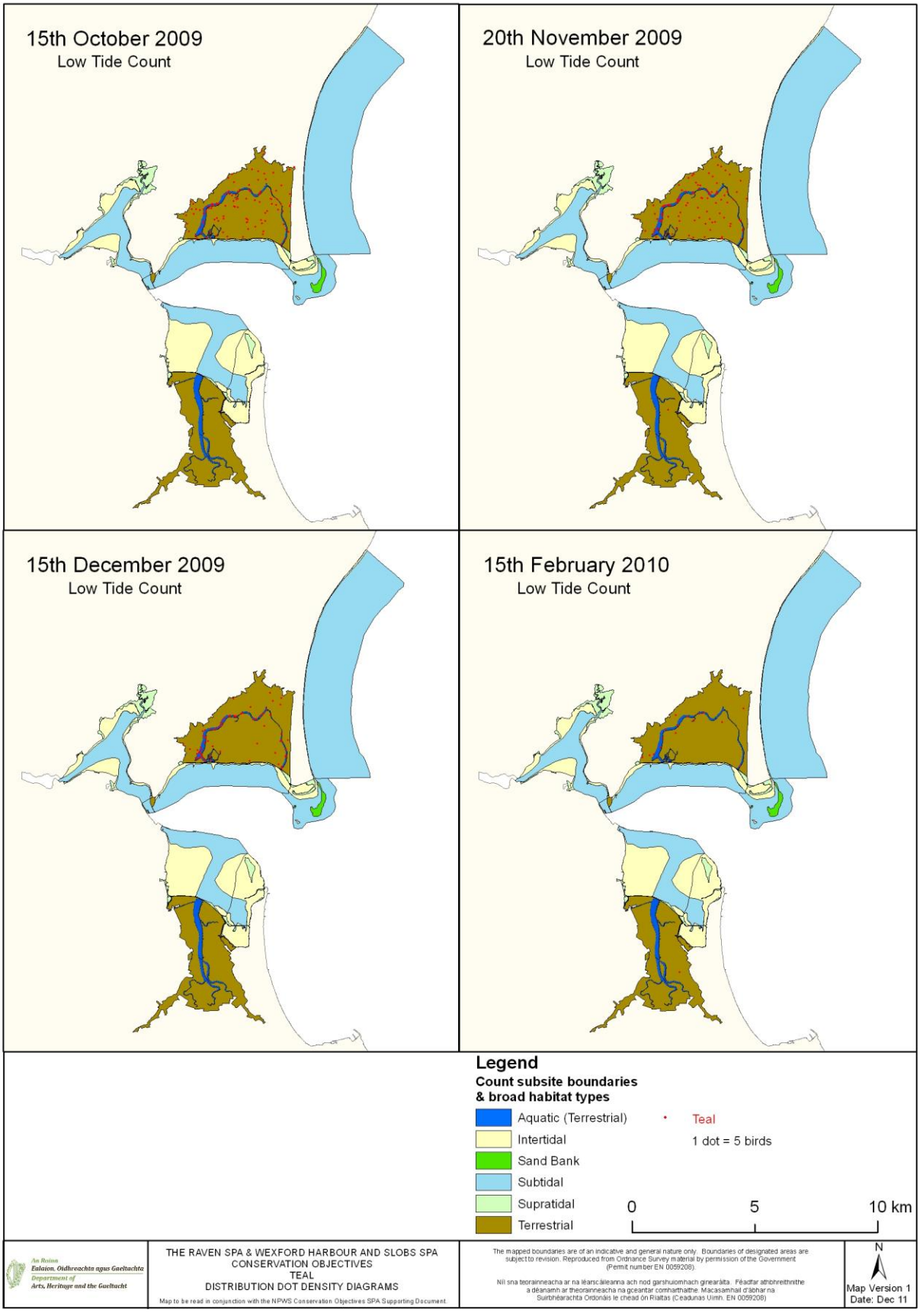
15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Teal
1 dot = 5 birds
0
5
10 km
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CONSERVATION OBJECTIVES
TEAL
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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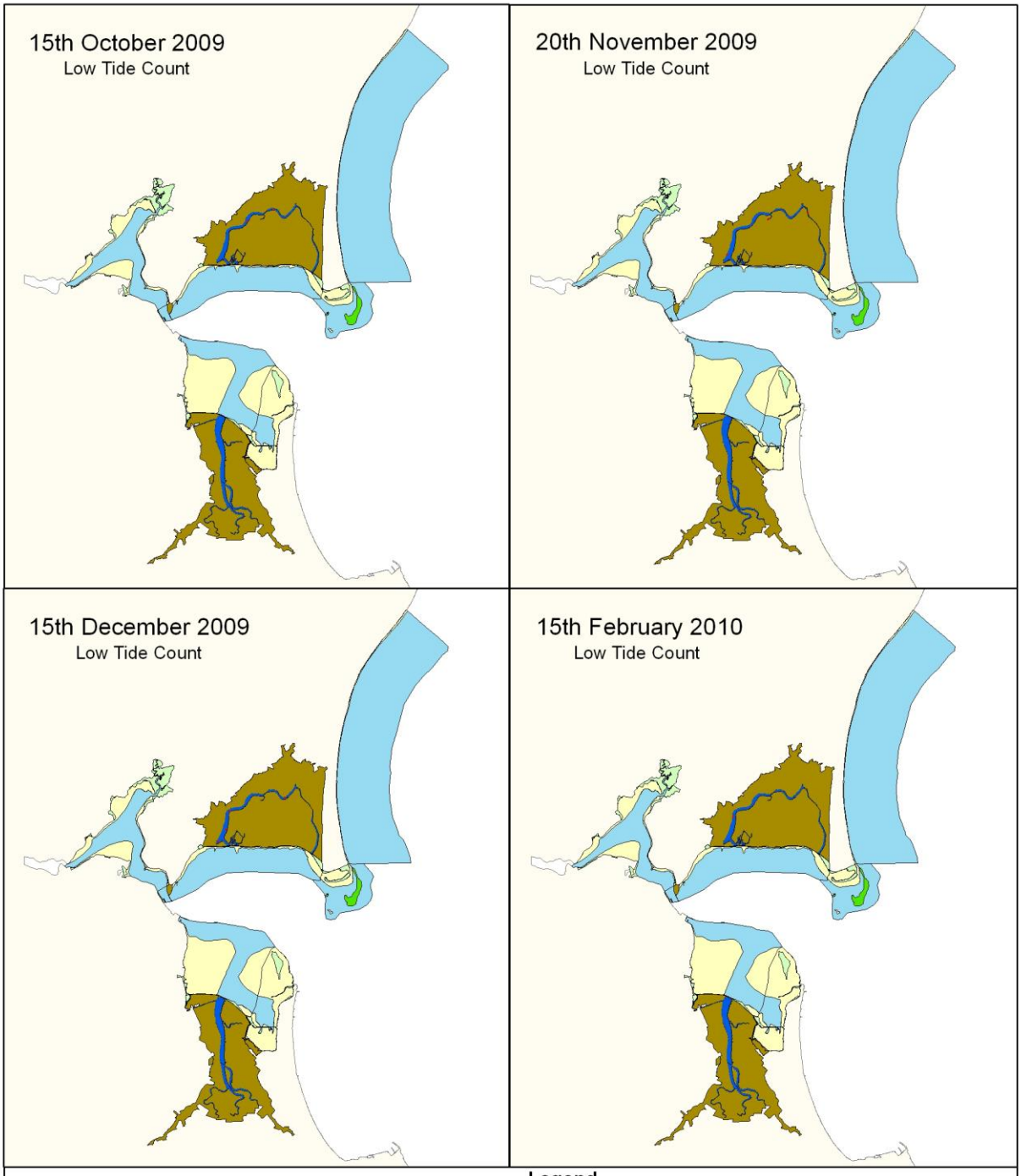
Date: Dec 11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Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Scaup
1 dot = 1 bird
0
5
10 km
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CONSERVATION OBJECTIVES
SCAUP
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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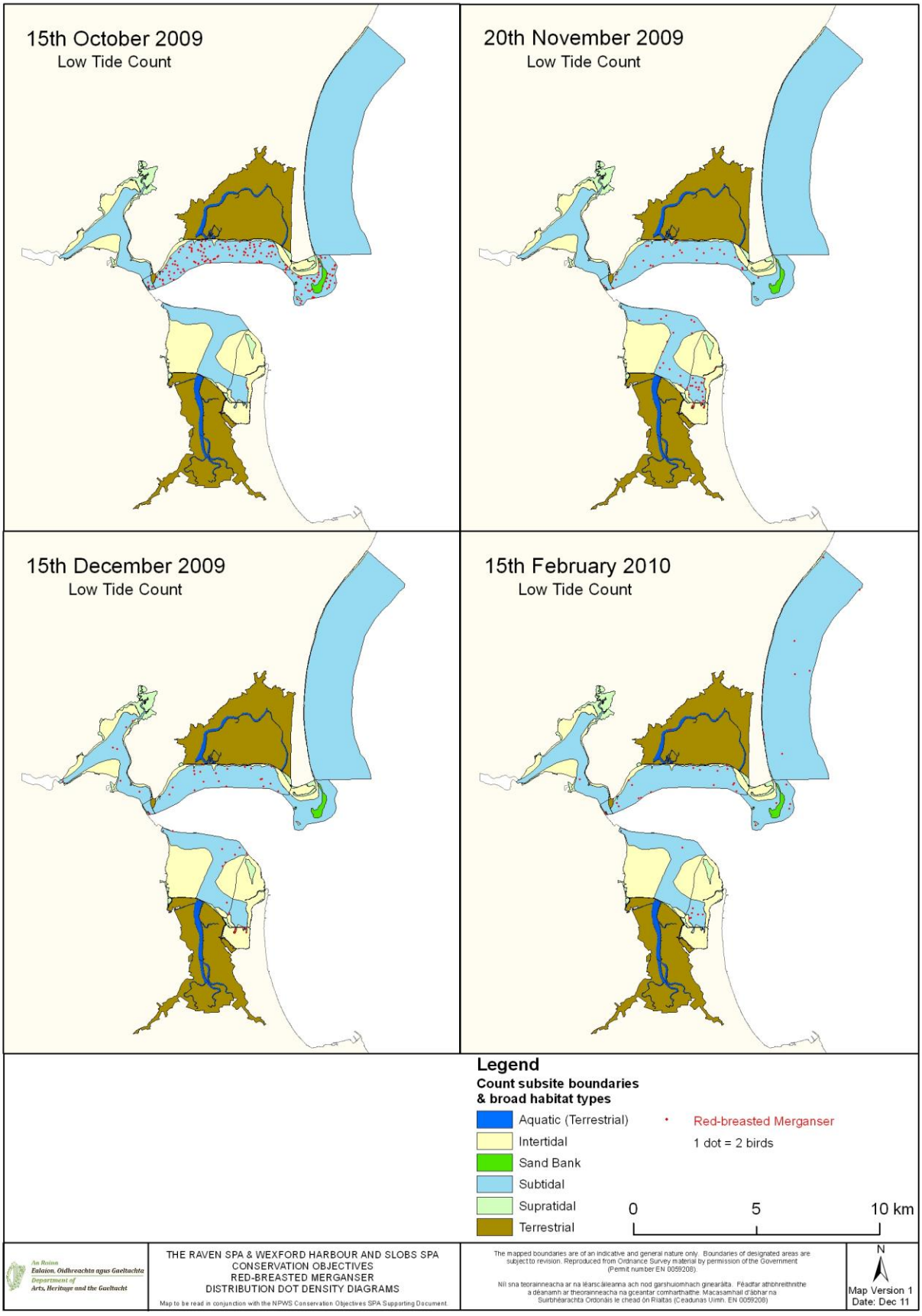
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Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Red-breasted Merganser
1 dot = 2 birds
0
5
10 km
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Department of
Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
RED-BREASTED MERGANSER
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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Map Version 1
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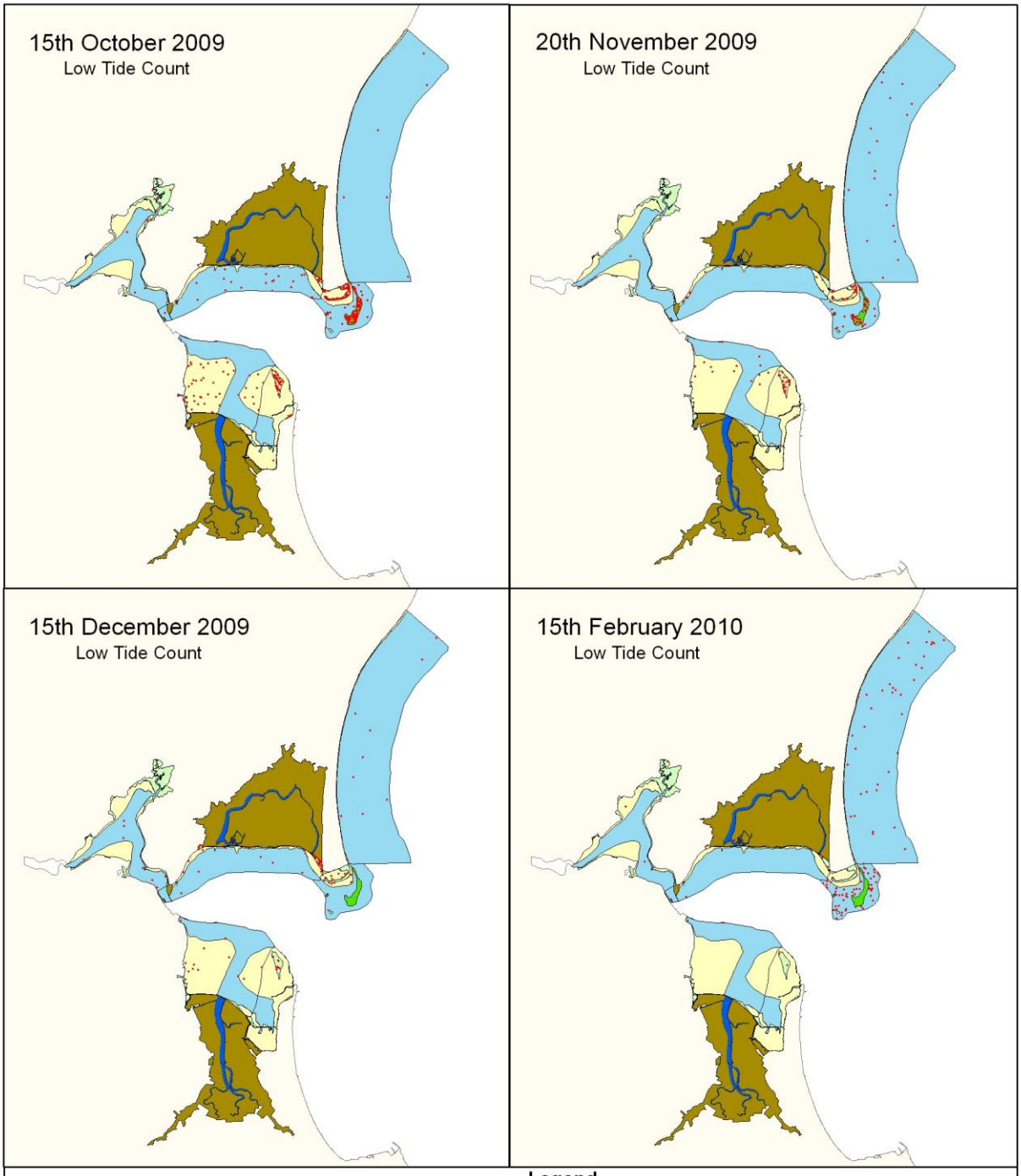
15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Cormorant
1 dot = 2 birds
0
5
10 km
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Department of
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CONSERVATION OBJECTIVES
CORMORANT
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document
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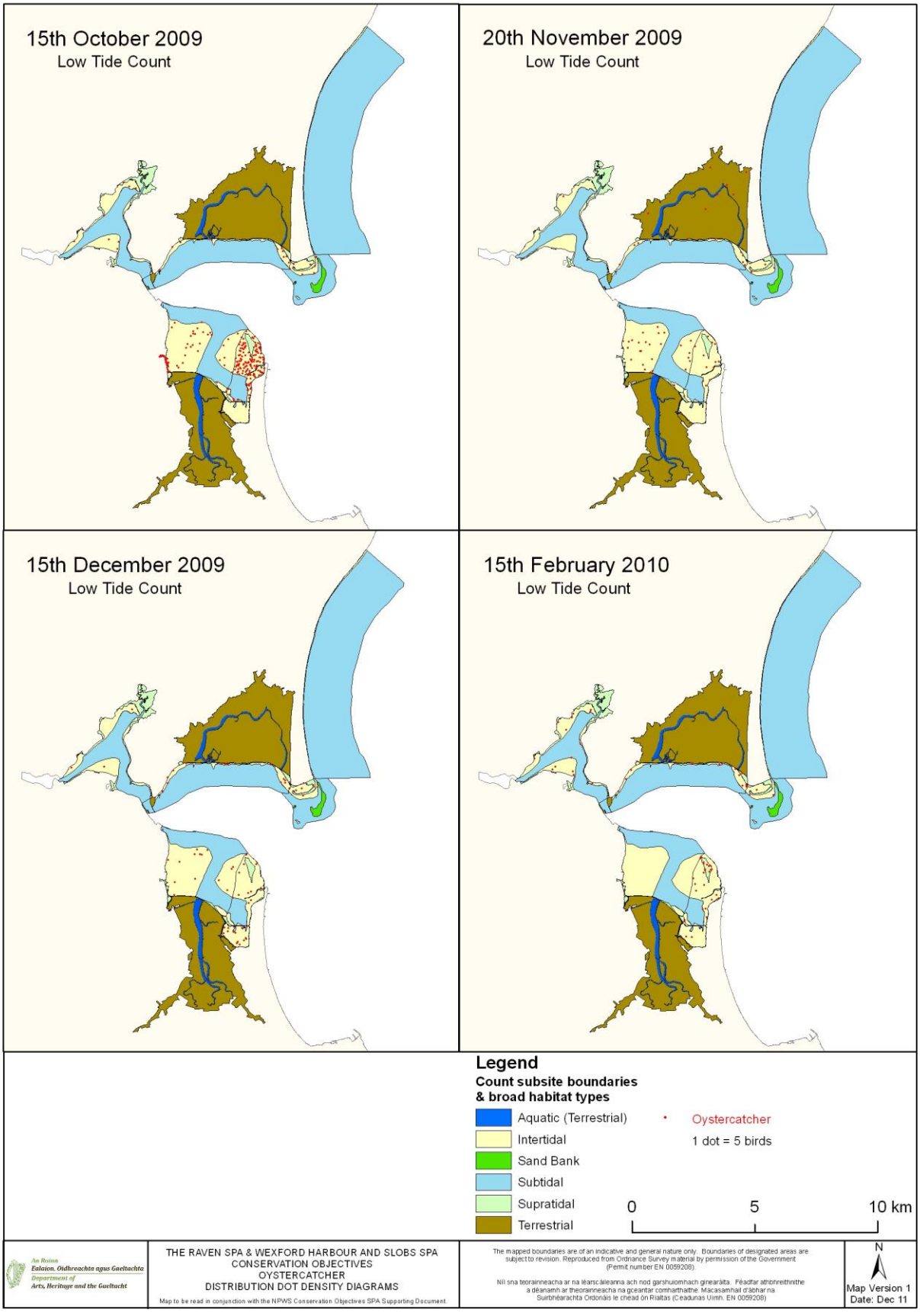
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Oystercatcher
1 dot = 5 birds
0
5
10 km
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CONSERVATION OBJECTIVES
OYSTERCATCHER
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document
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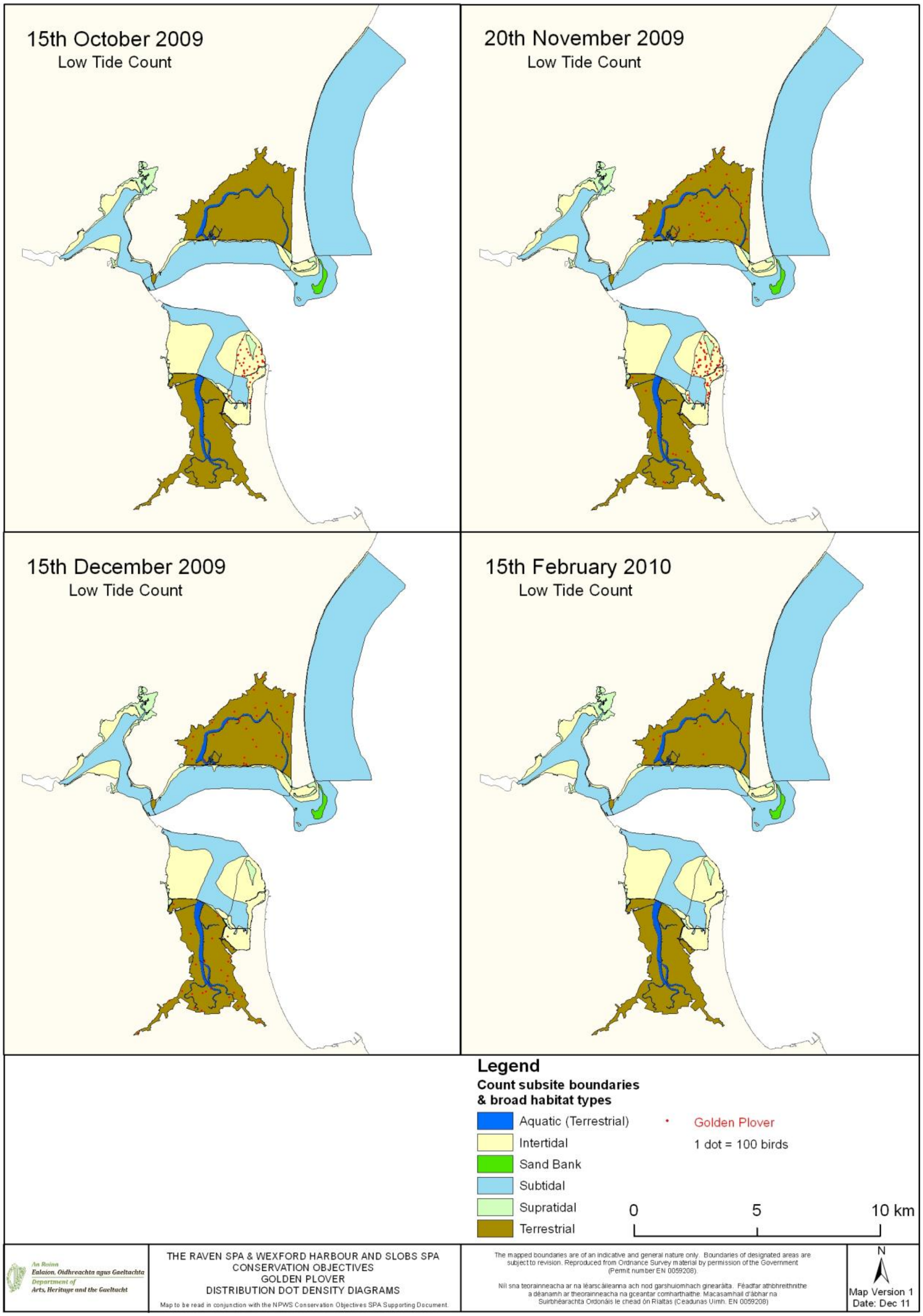
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Golden Plover
1 dot = 100 birds
0
5
10 km
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Department of
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THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
GOLDEN PLOVER
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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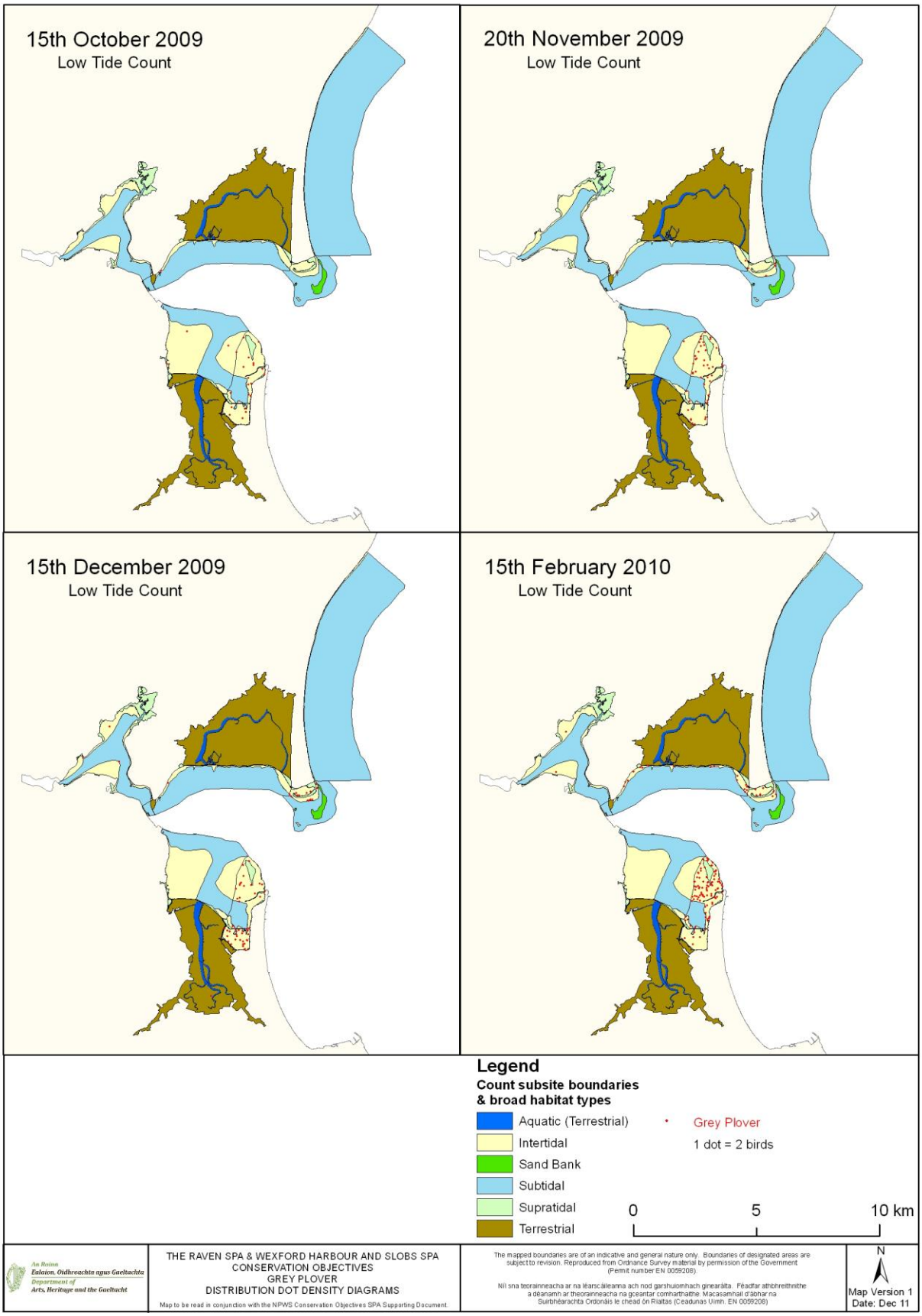
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Grey Plover
1 dot = 2 birds
0
5
10 km
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Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
GREY PLOVER
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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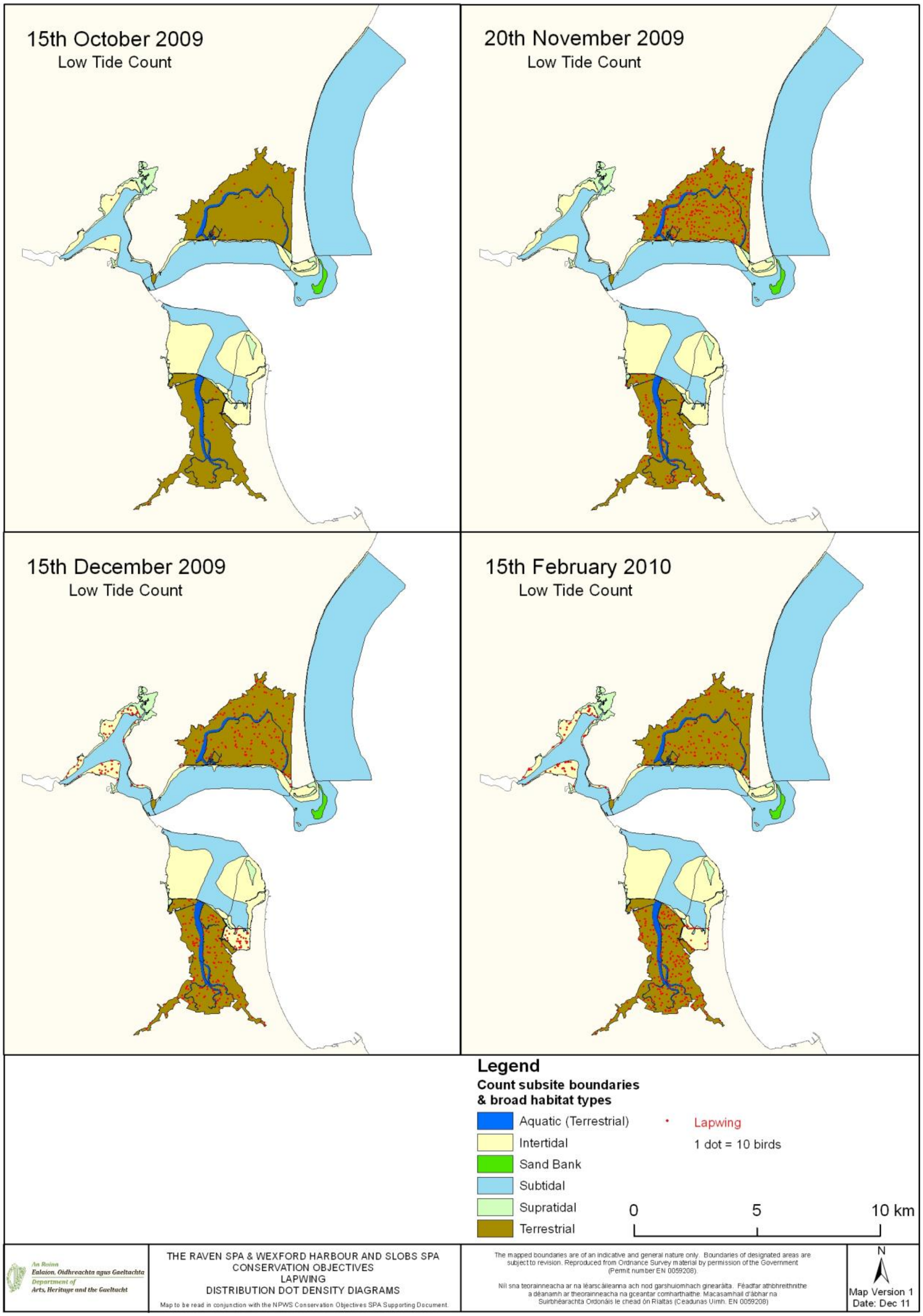
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Lapwing
1 dot = 10 birds
0
5
10 km
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
LAPWING
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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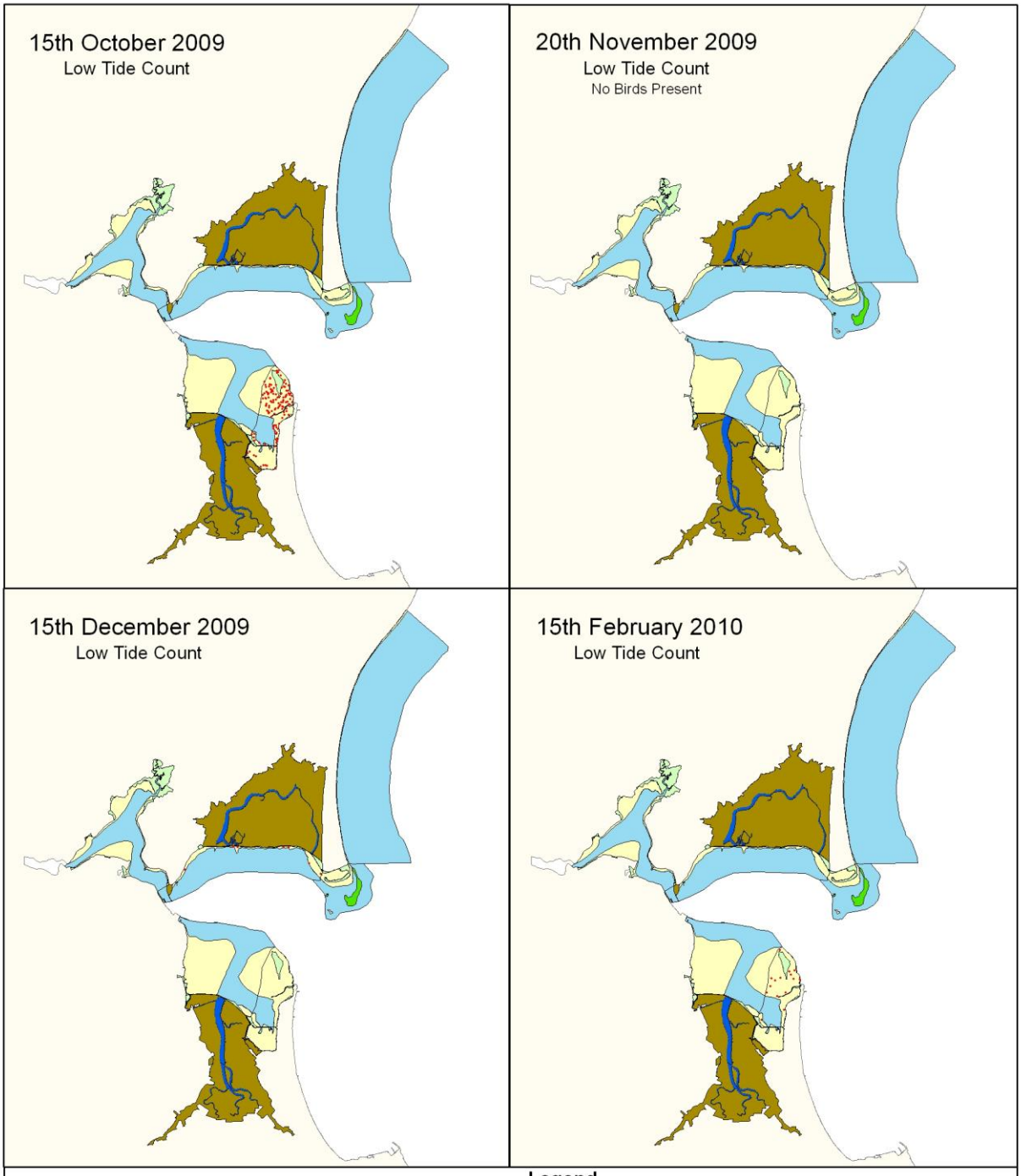
Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadunas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
No Birds Present
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Sanderling
1 dot = 1 bird
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
SANDERLING
DISTRIBUTION DOT DENSITY DIAGRAMS
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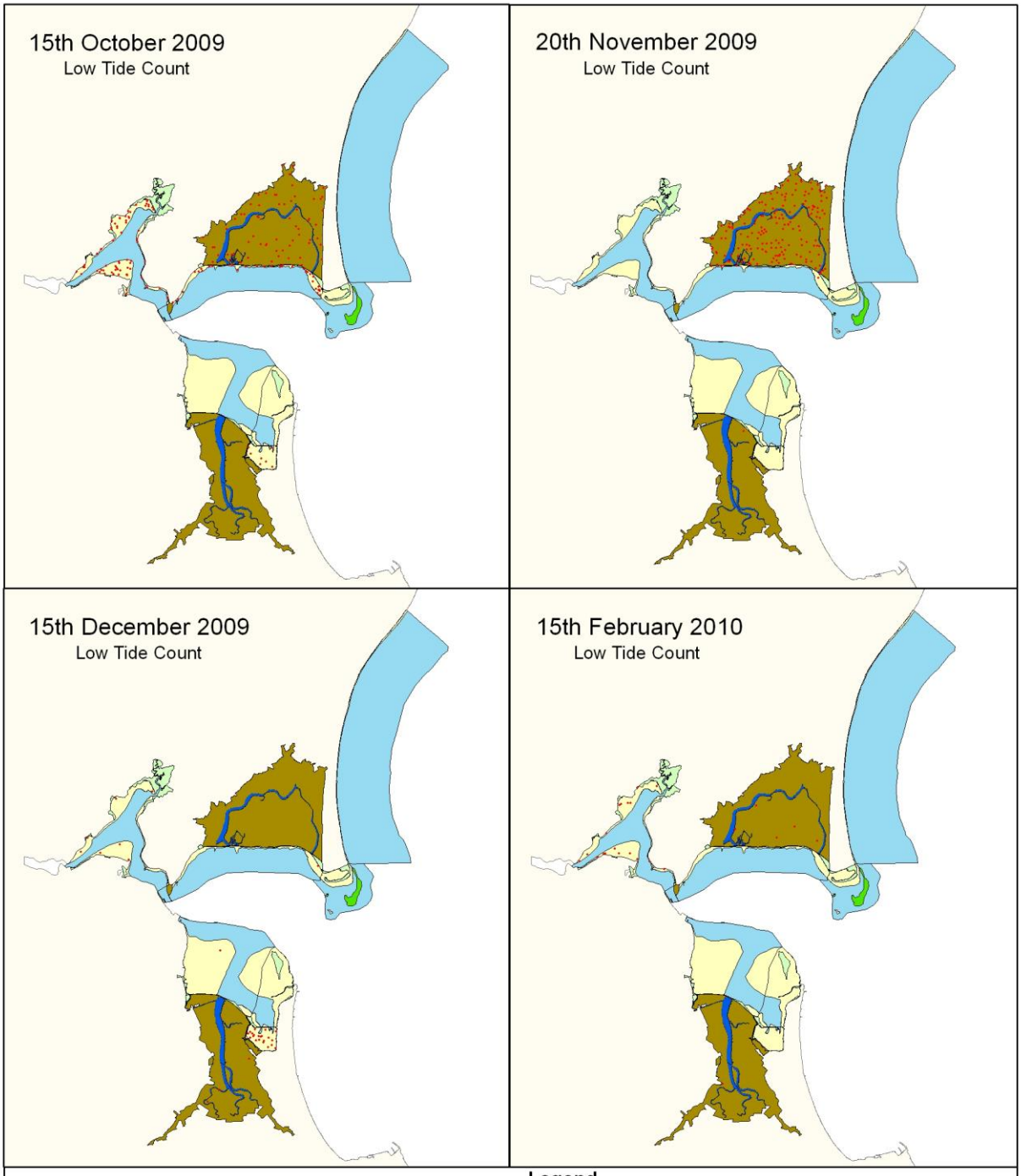
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Black-tailed Godwit
1 dot = 10 birds
0
5
10 km
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
BLACK-TAILED GODWIT
DISTRIBUTION DOT DENSITY DIAGRAMS
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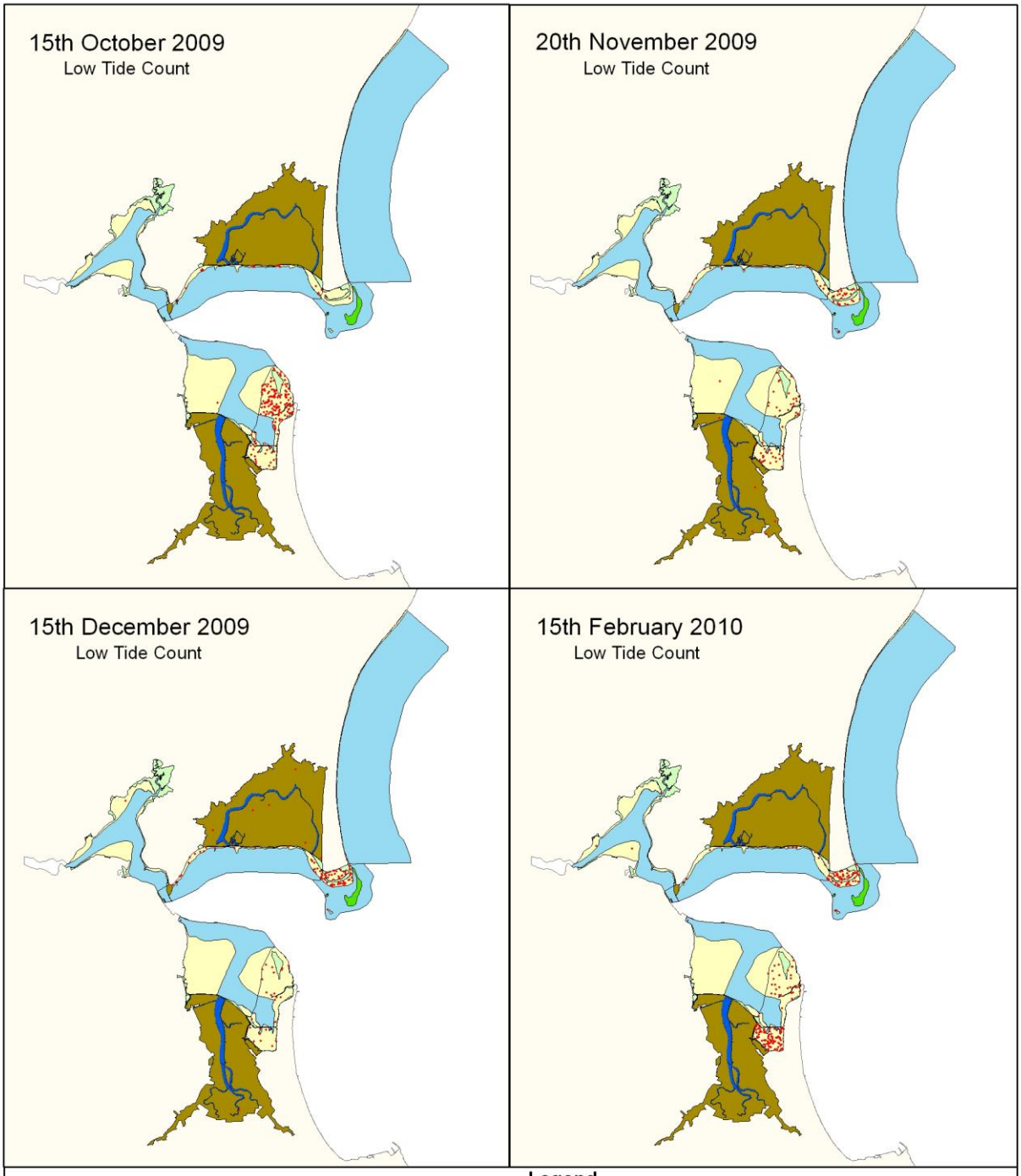
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Bar-tailed Godwit
1 dot = 5 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
BAR-TAILED GODWIT
DISTRIBUTION DOT DENSITY DIAGRAMS
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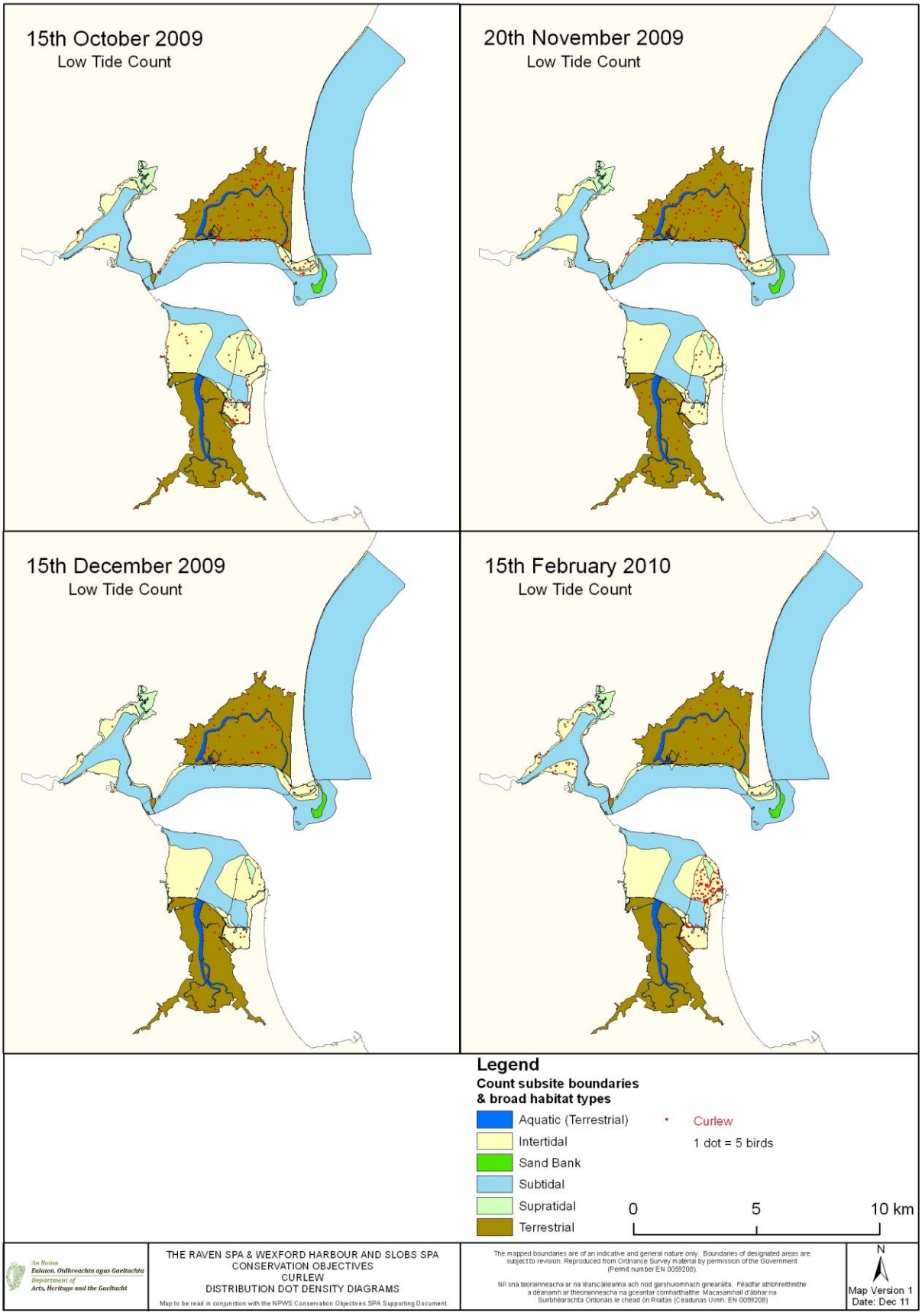
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Curlew
1 dot = 5 birds
0
5
10 km
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
CURLEW
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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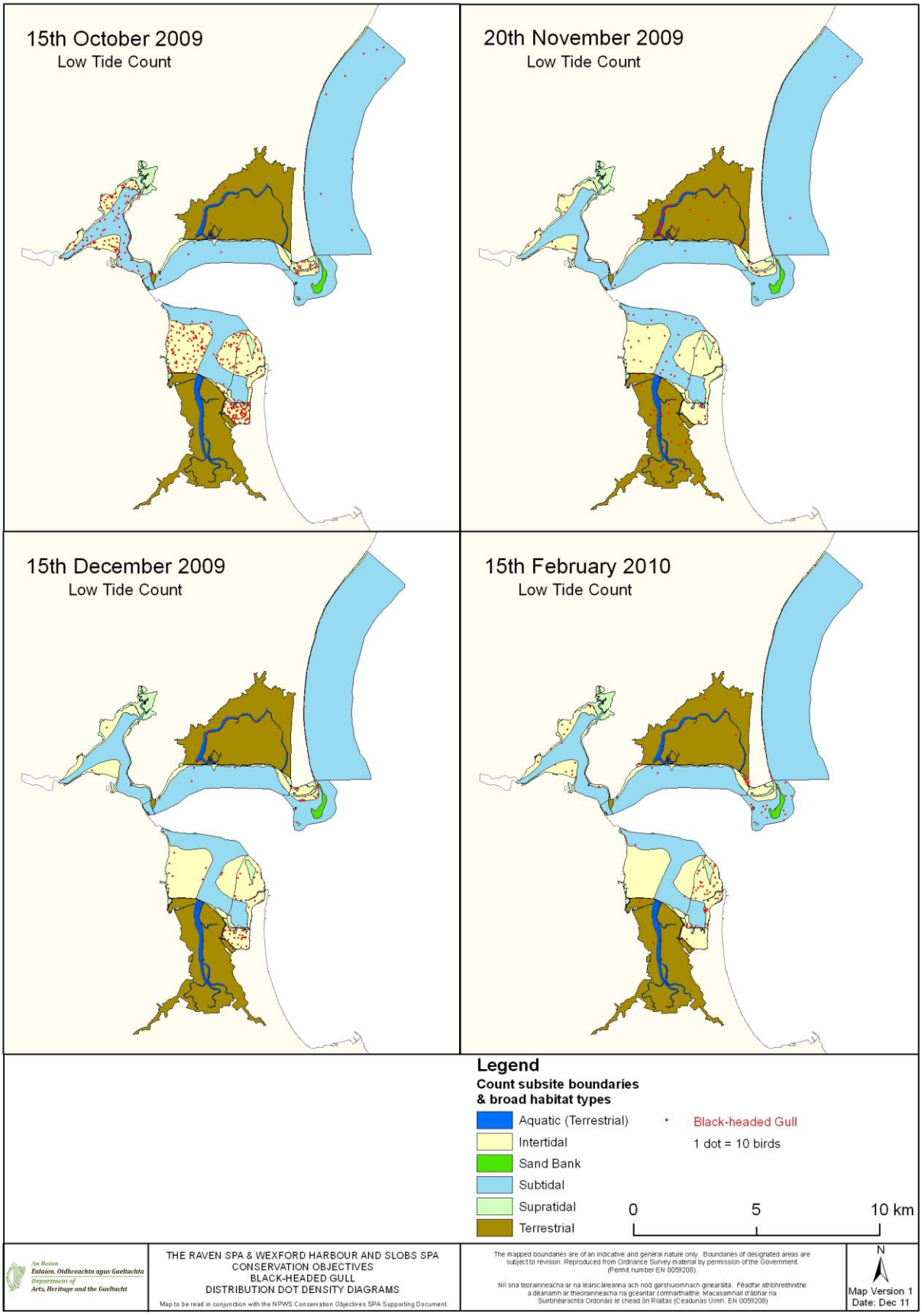
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Black-headed Gull
1 dot = 10 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
BLACK-HEADED GULL
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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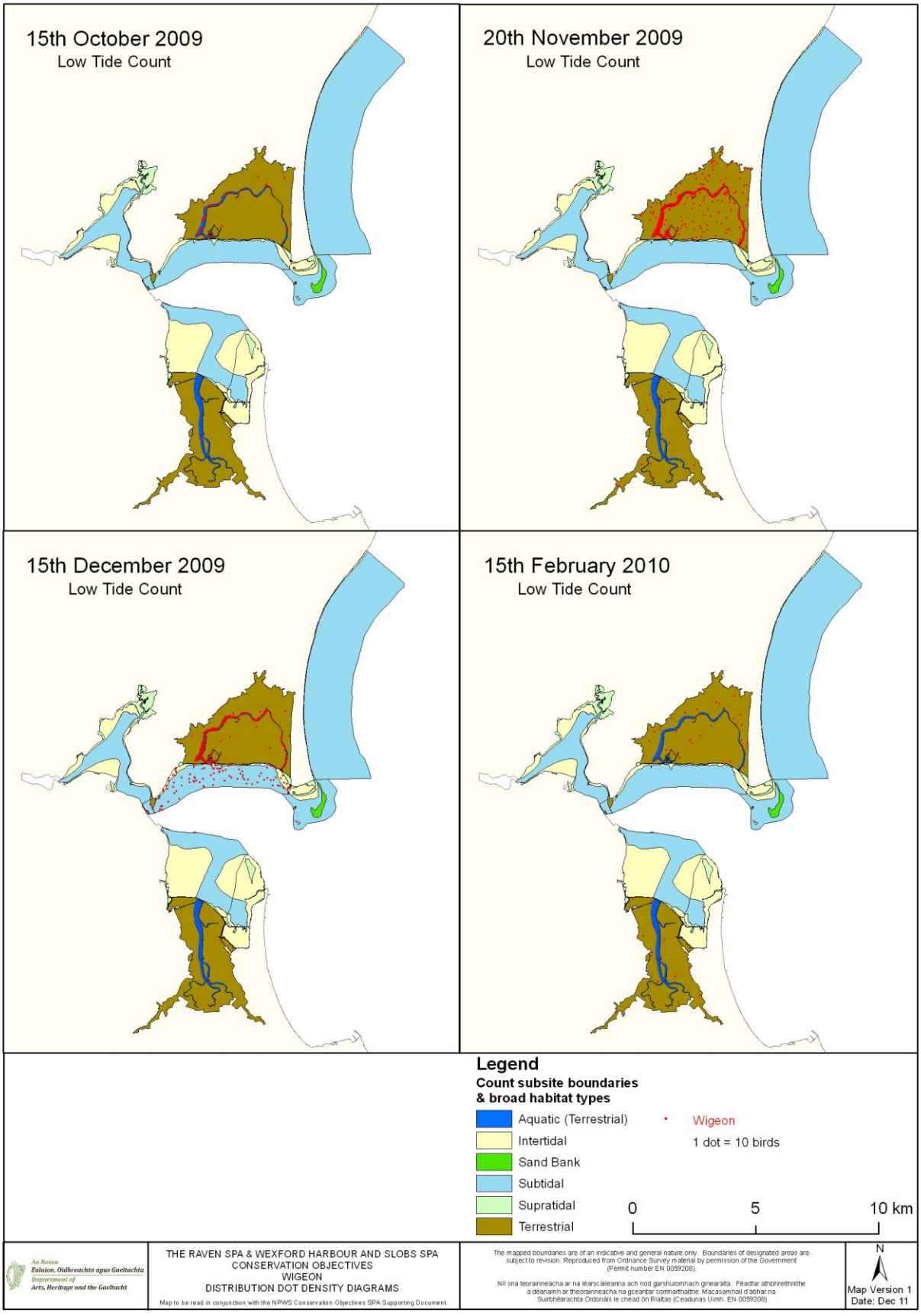
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Wigeon
1 dot = 10 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
WIGEON
DISTRIBUTION DOT DENSITY DIAGRAMS
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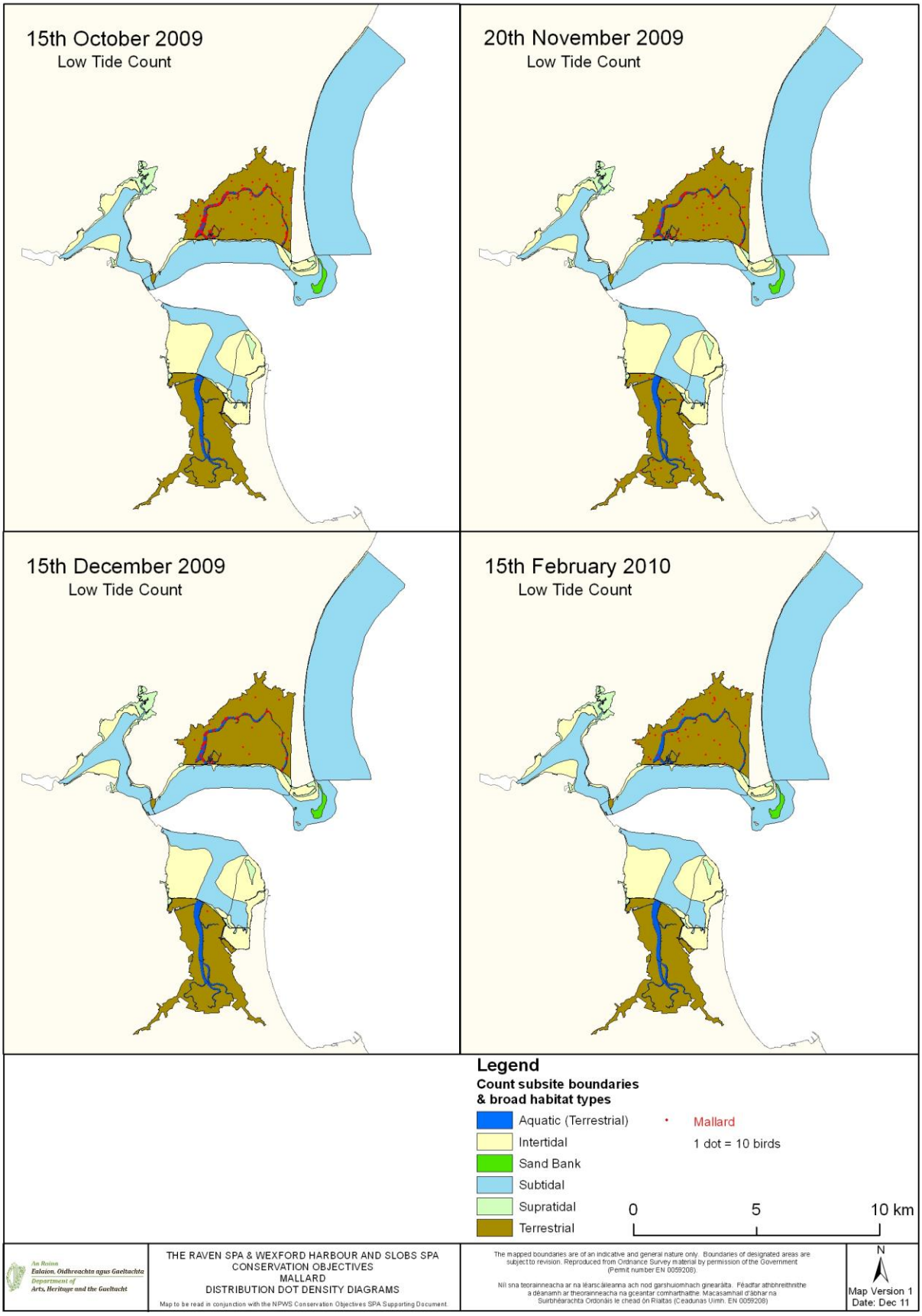
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Mallard
1 dot = 10 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
MALLARD
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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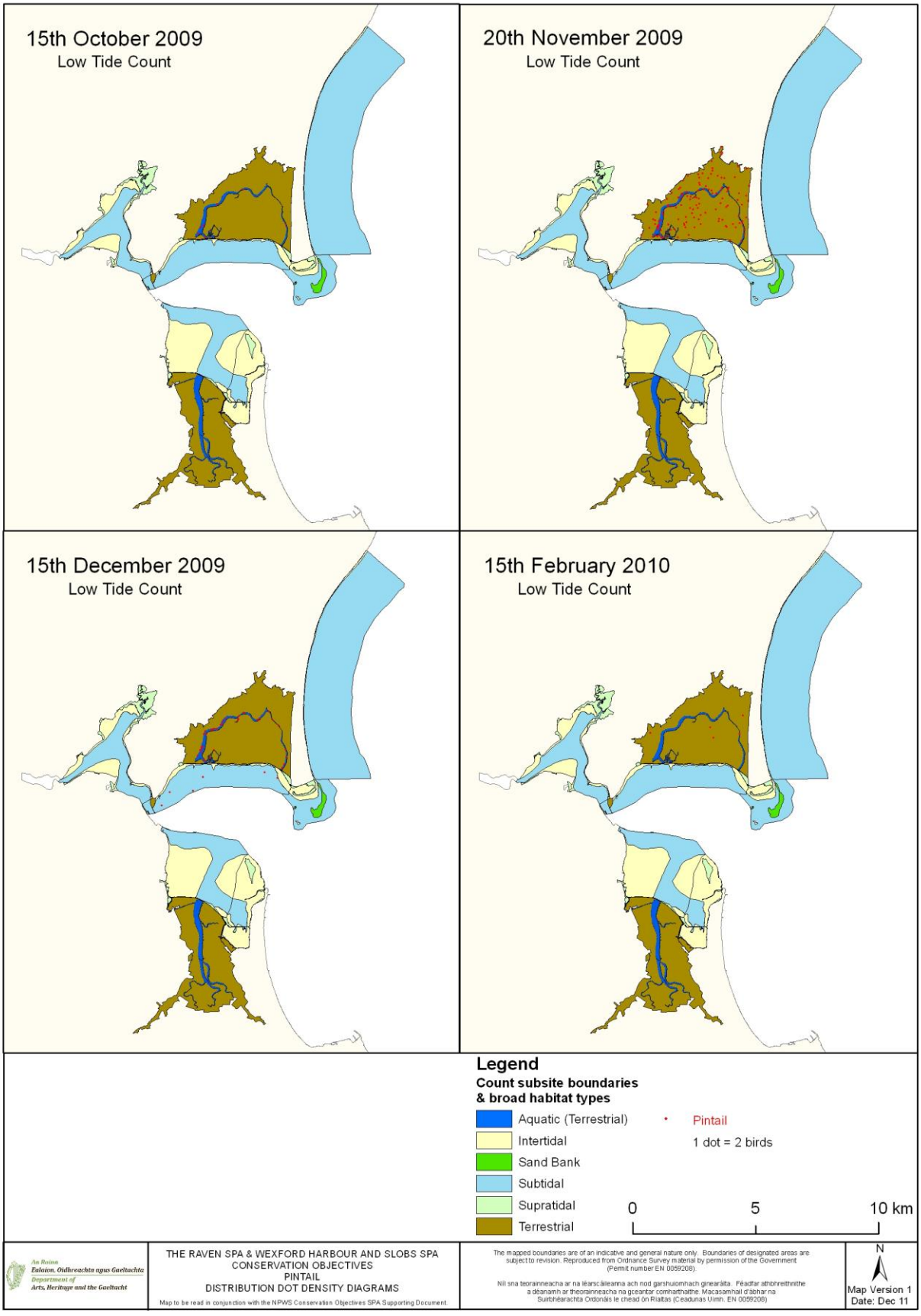
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Pintail
1 dot = 2 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
PINTAIL
DISTRIBUTION DOT DENSITY DIAGRAMS
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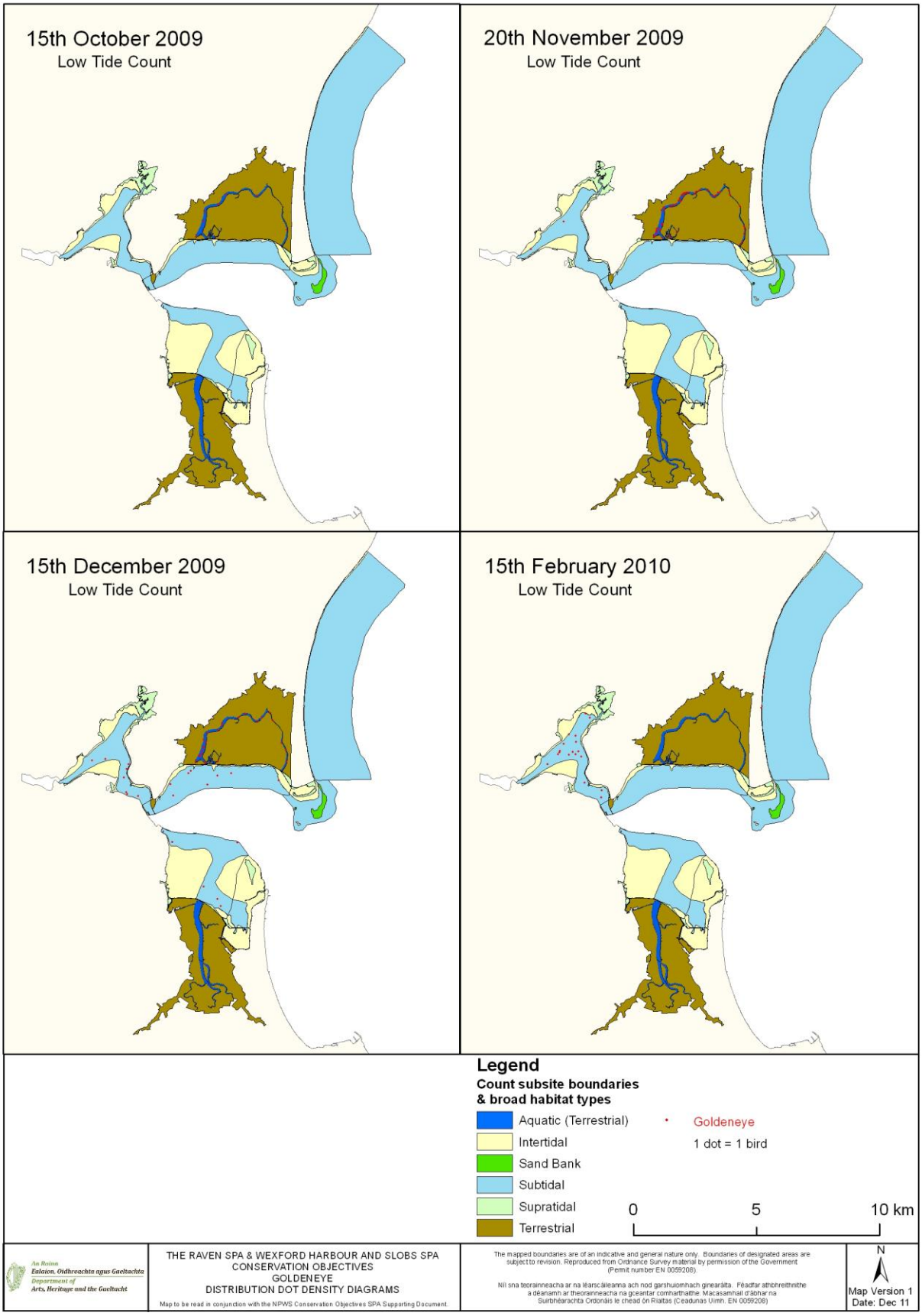
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Goldeneye
1 dot = 1 bird
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
GOLDENEYE
DISTRIBUTION DOT DENSITY DIAGRAMS
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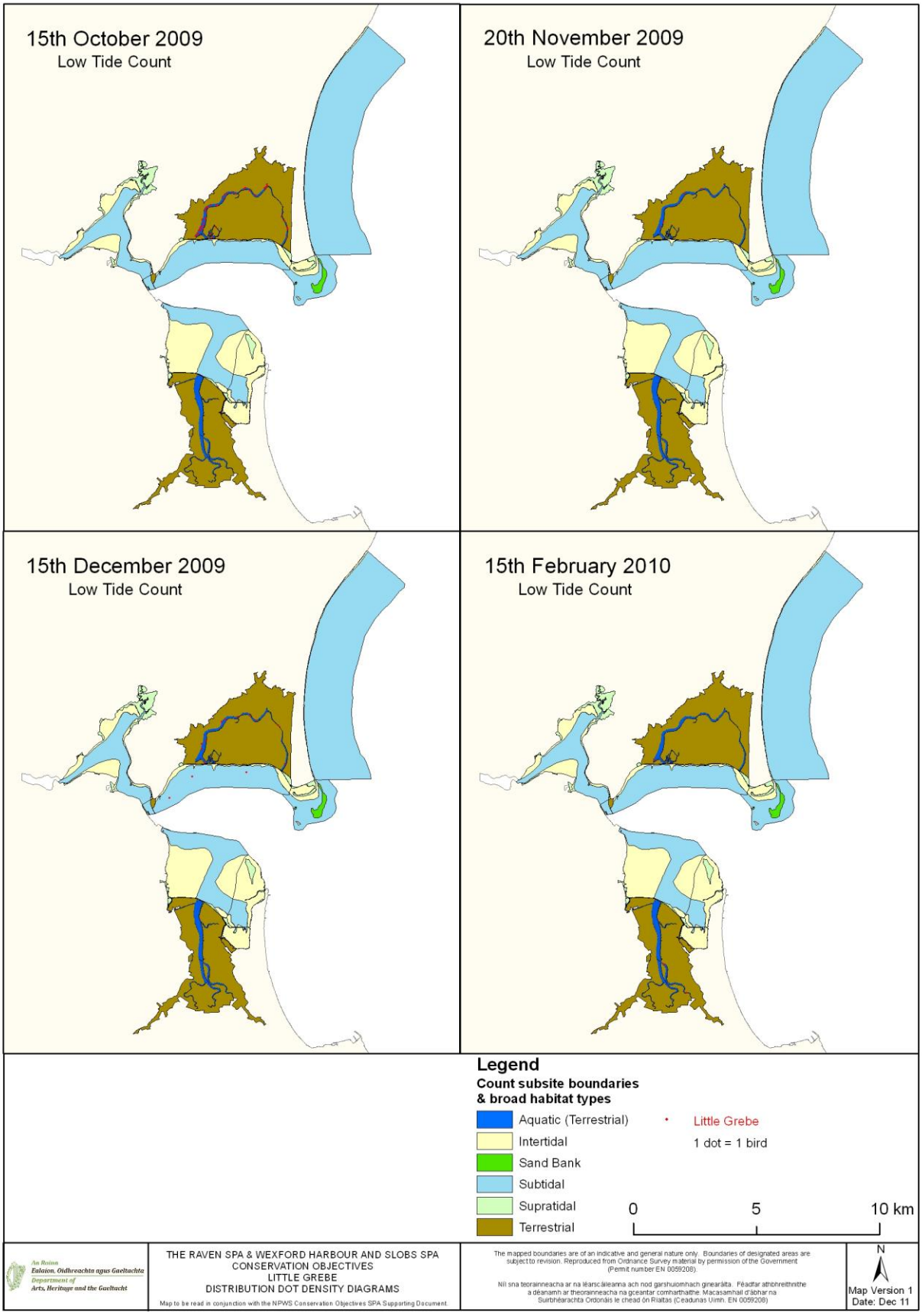
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Little Grebe
1 dot = 1 bird
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
LITTLE GREBE
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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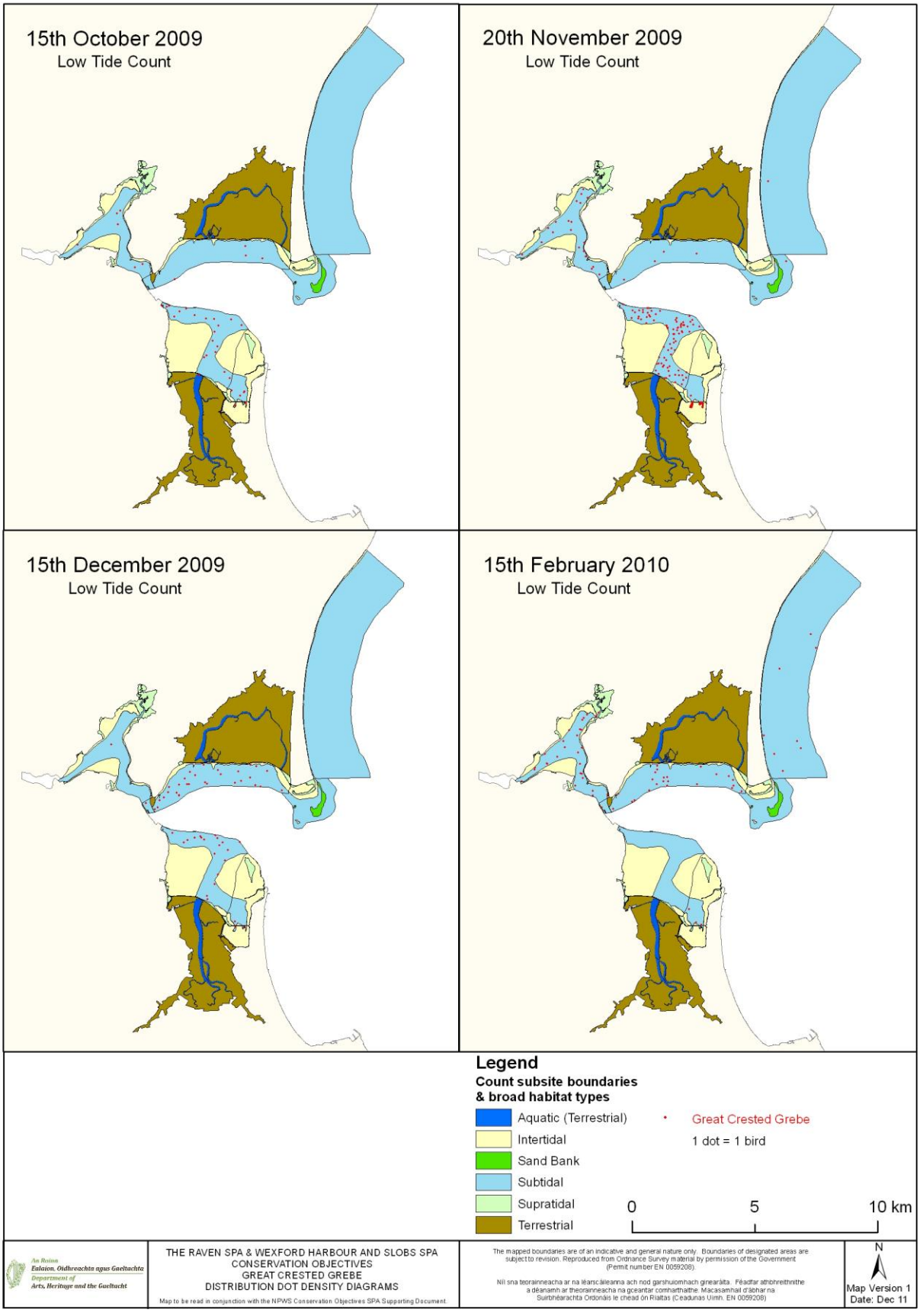
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Great Crested Grebe
1 dot = 1 bird
0
5
10 km
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
GREAT CRESTED GREBE
DISTRIBUTION DOT DENSITY DIAGRAMS
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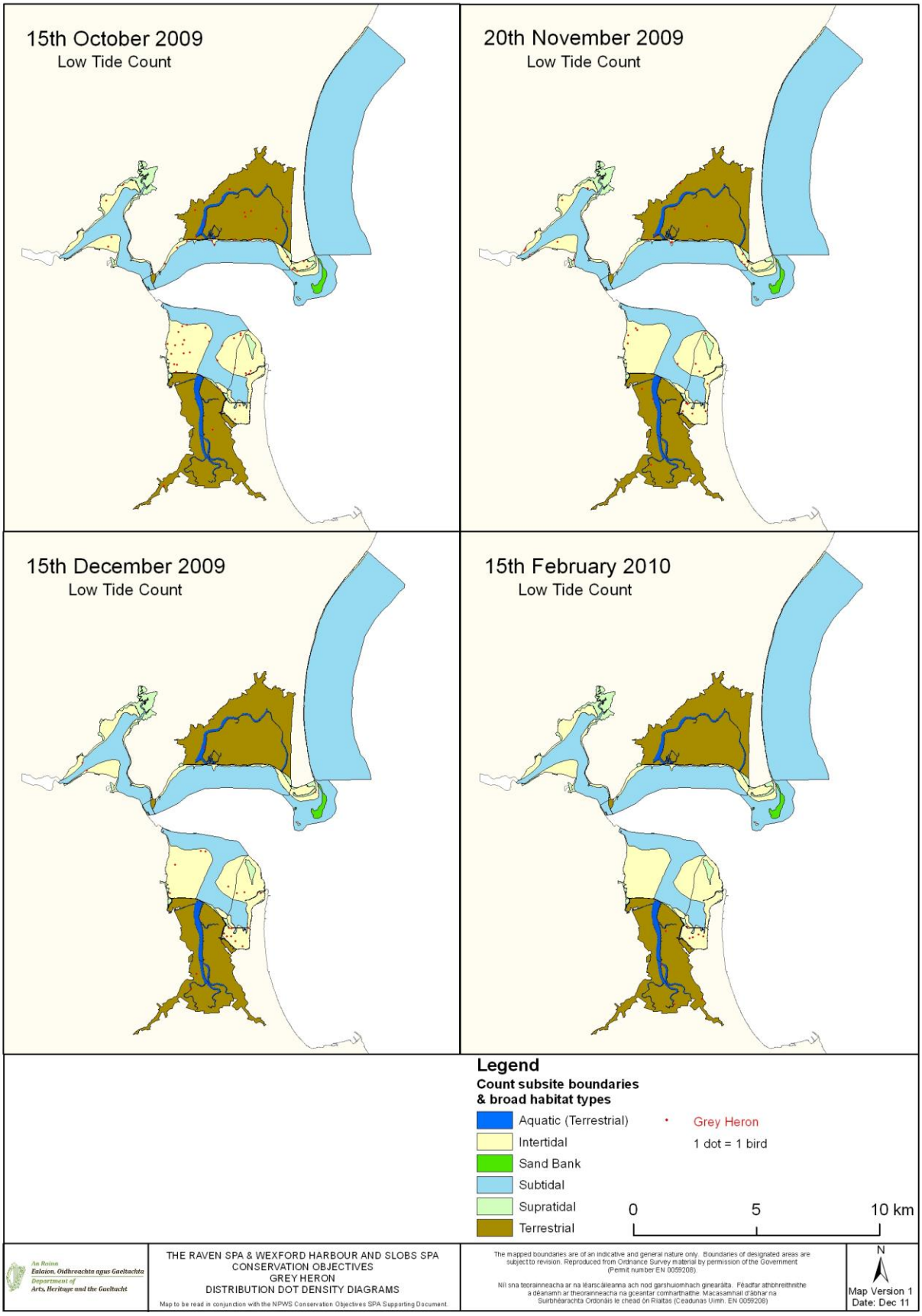
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Grey Heron
1 dot = 1 bird
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
GREY HERON
DISTRIBUTION DOT DENSITY DIAGRAMS
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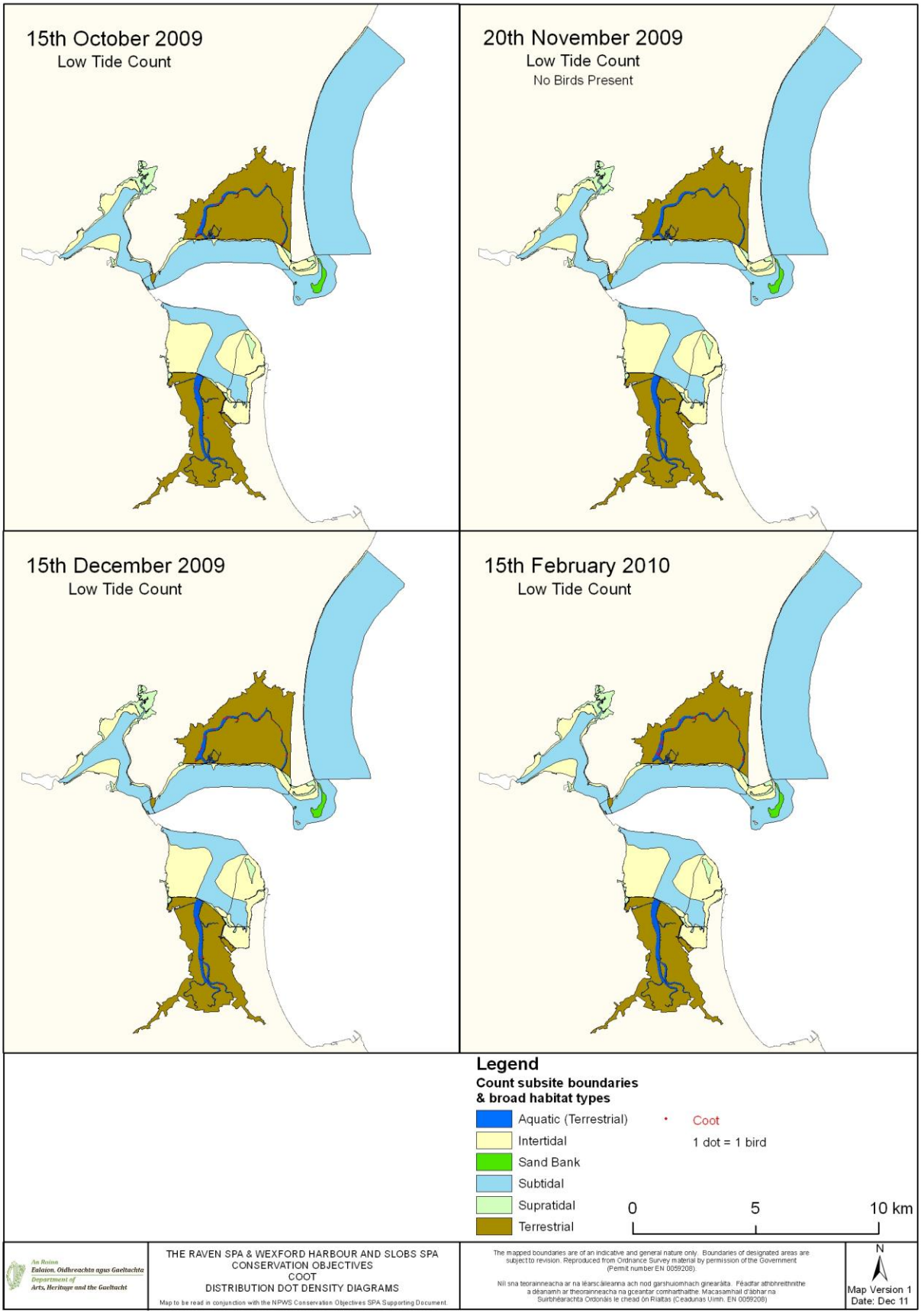
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
No Birds Present
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Coot
1 dot = 1 bird
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
COOT
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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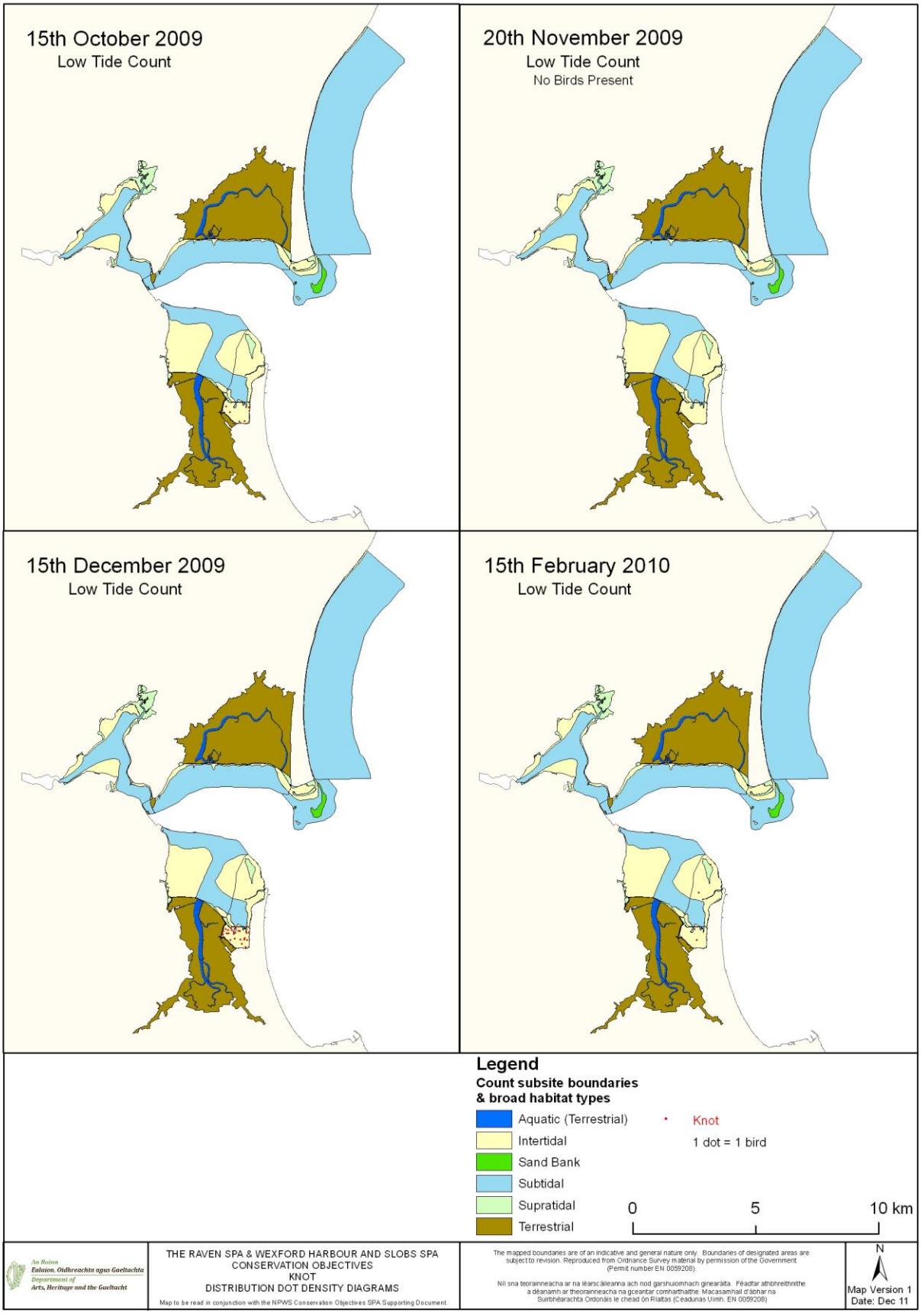
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
No Birds Present
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Knot
1 dot = 1 bird
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
KNOT
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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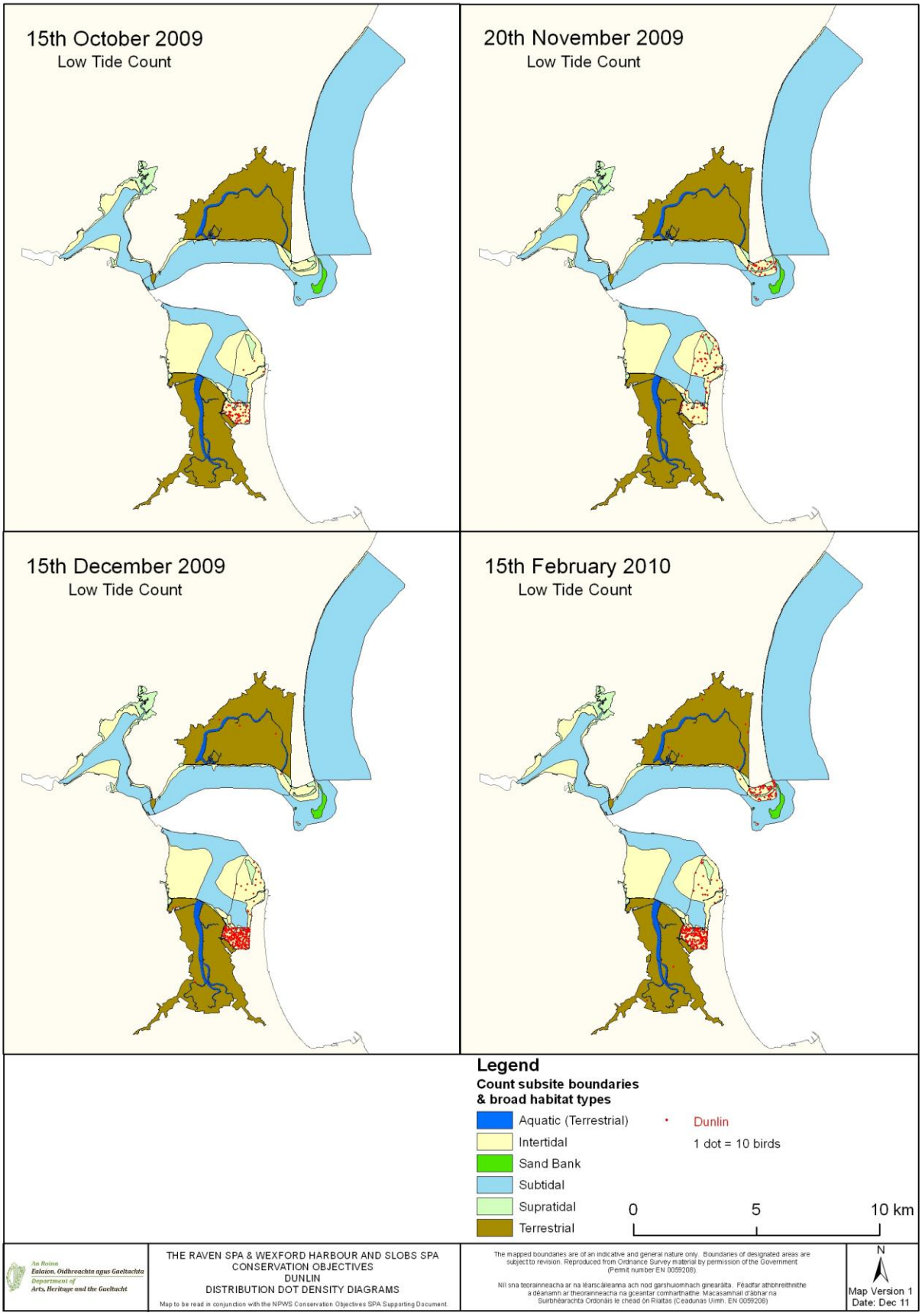
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Dunlin
1 dot = 10 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
DUNLIN
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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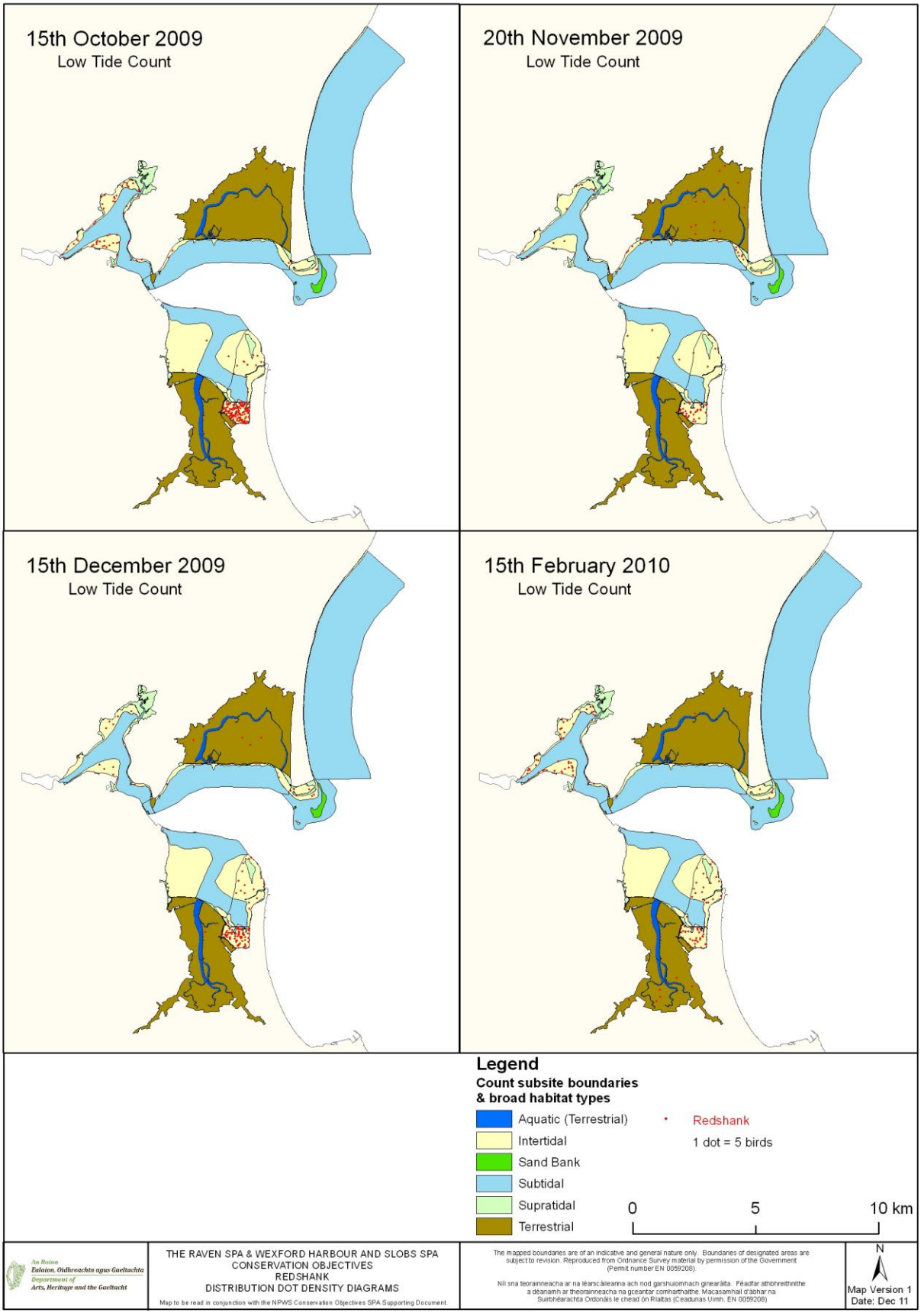
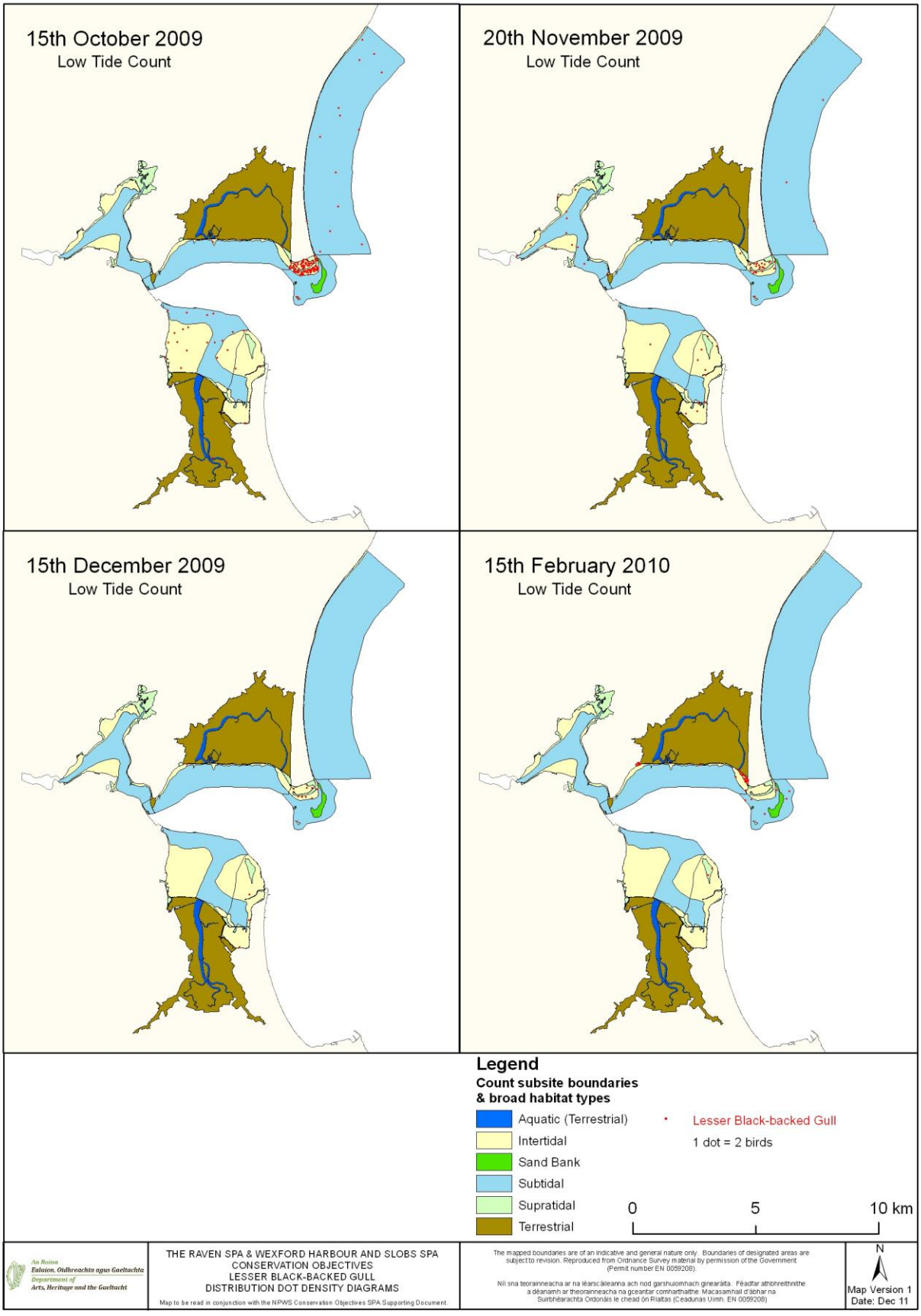
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Redshank
1 dot = 5 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
REDSHANK
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 garshuiomhach ginearálta. Féadfar athbhreithnithe a dhéanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 11


15th October 2009
Low Tide Count
20th November 2009
Low Tide Count
15th December 2009
Low Tide Count
15th February 2010
Low Tide Count
Legend
Count subsite boundaries
& broad habitat types
Aquatic (Terrestrial)
Intertidal
Sand Bank
Subtidal
Supratidal
Terrestrial
Lesser Black-backed Gull
1 dot = 2 birds
0
5
10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN SPA & WEXFORD HARBOUR AND SLOBS SPA
CONSERVATION OBJECTIVES
LESSER BLACK-BACKED GULL
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 comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 11

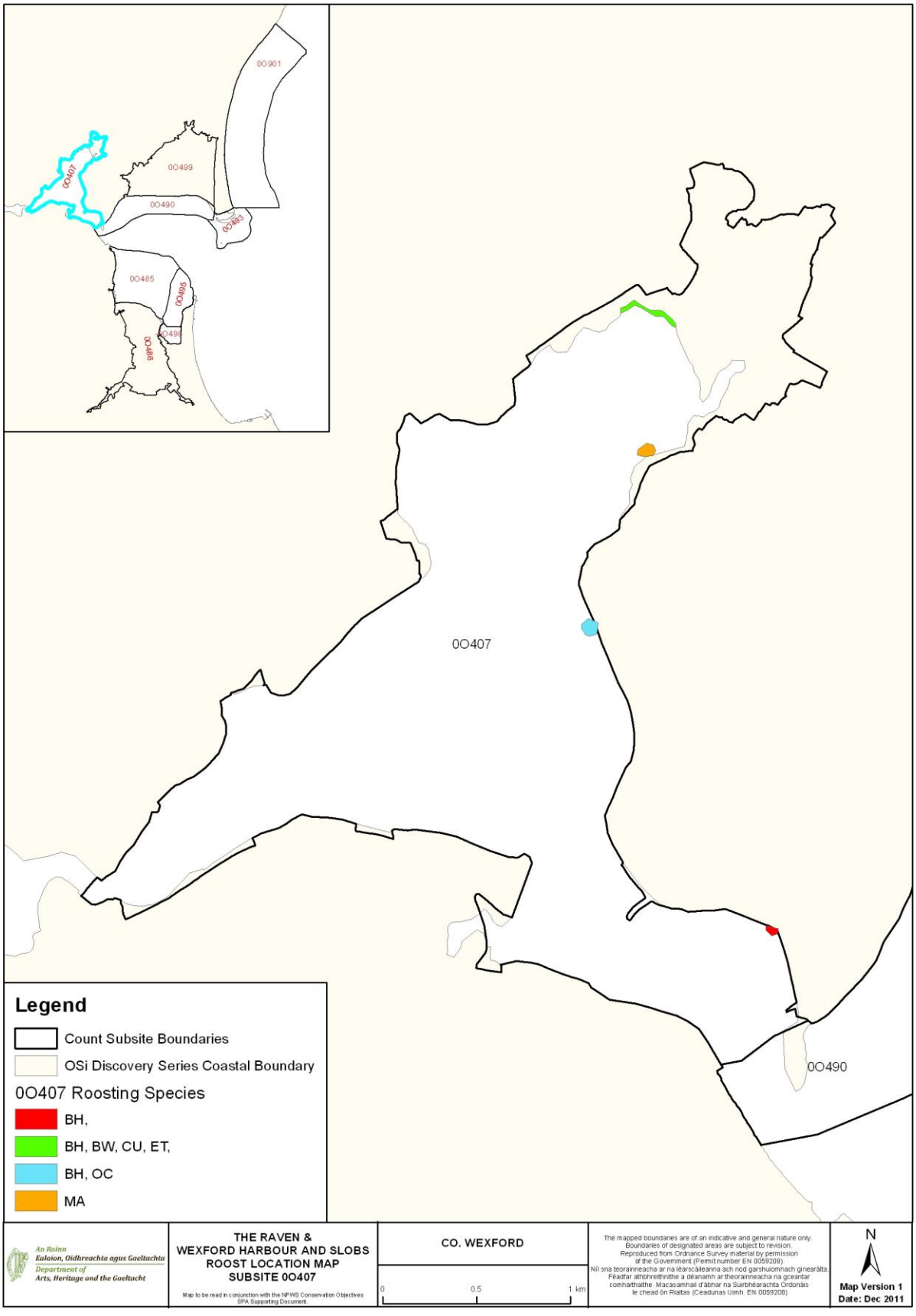
APPENDIX 8

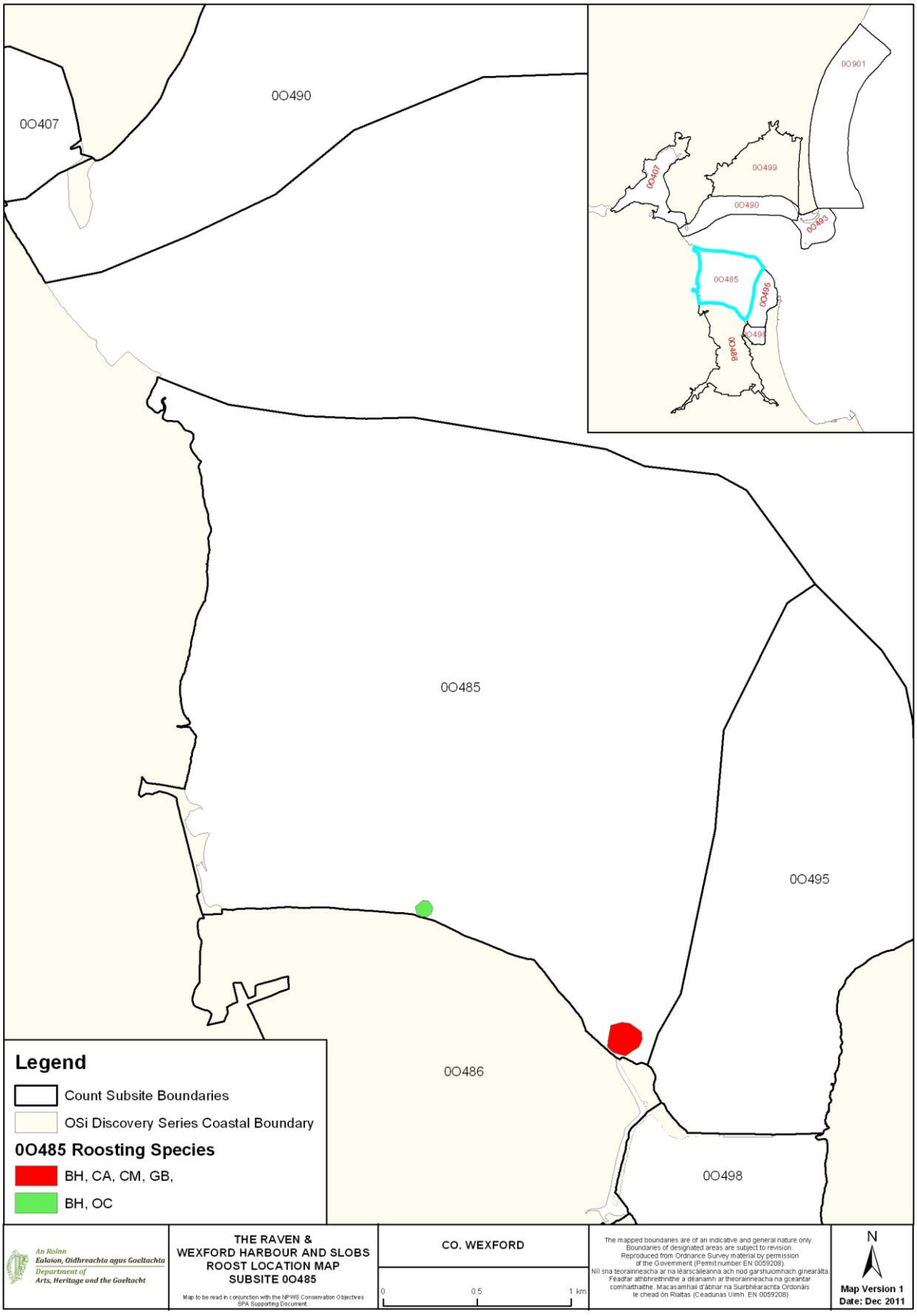
Wexford Harbour & Slobs (4076) and The Raven SPA (4019)

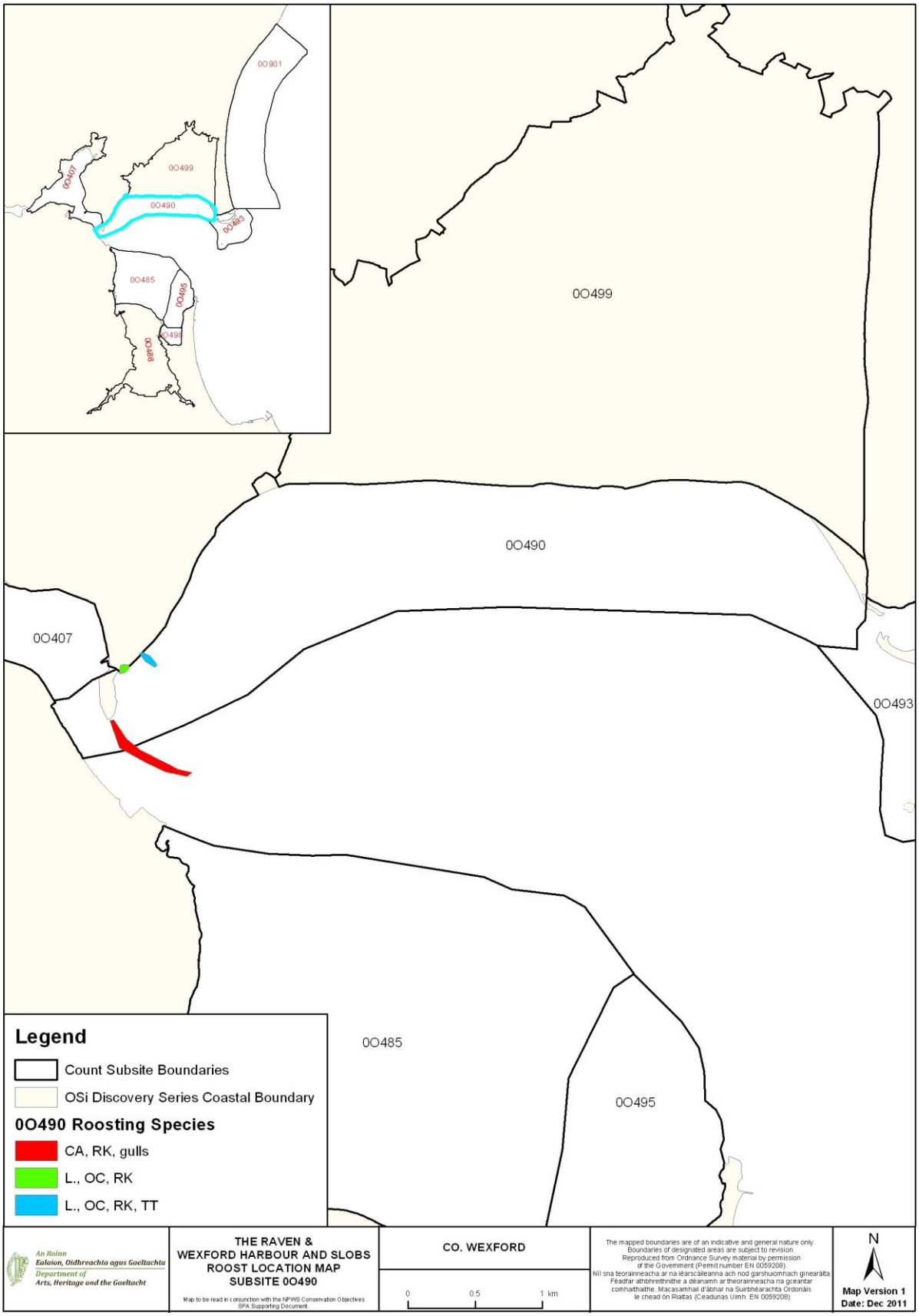
Waterbird Roosts

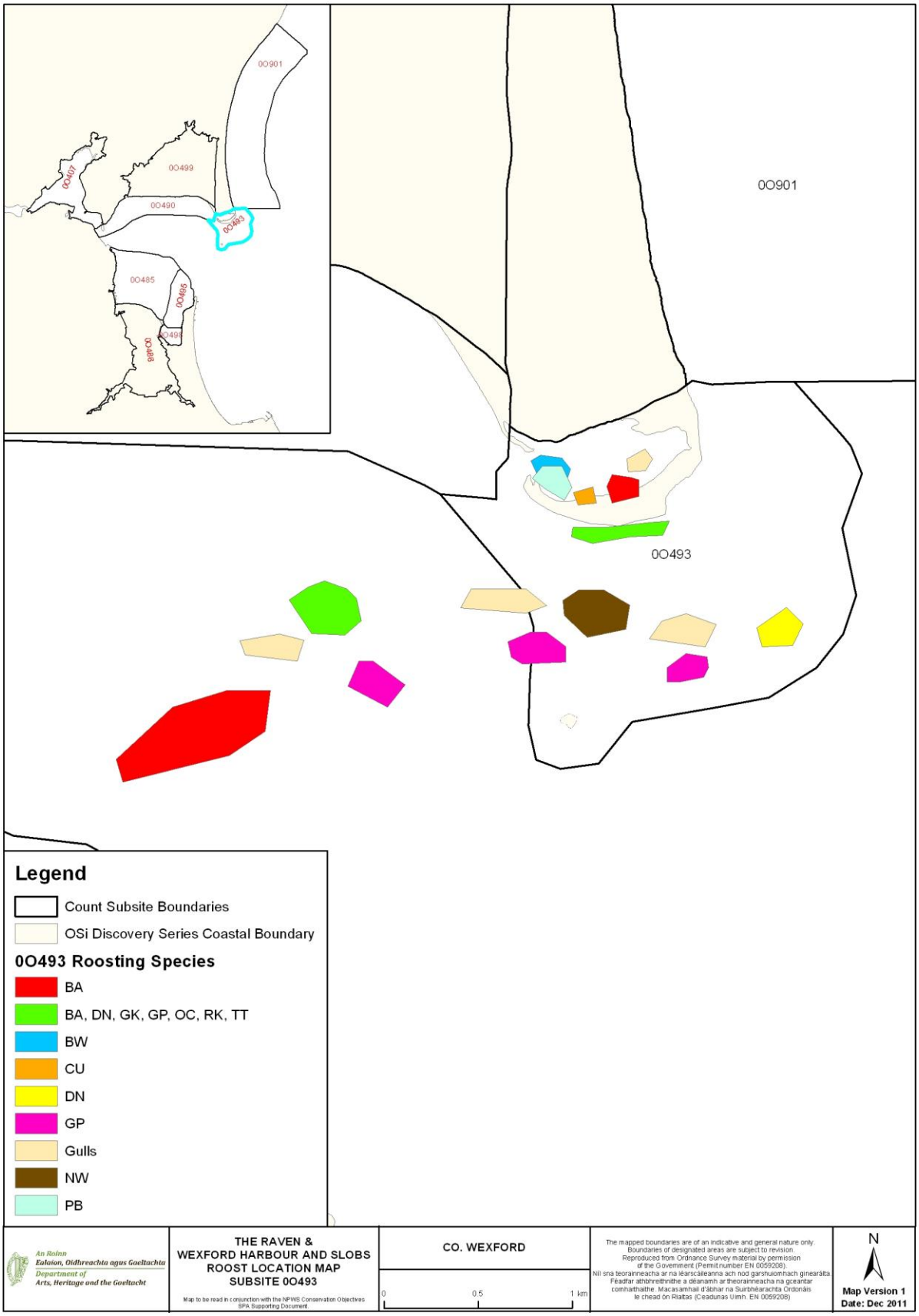
Information on high tide roosts was collected from a variety of sources including the high tide survey (21/01/10), a roost survey undertaken on 8th March 2010 (partial site only), I-WeBS records, and data from NPWS Regional staff.

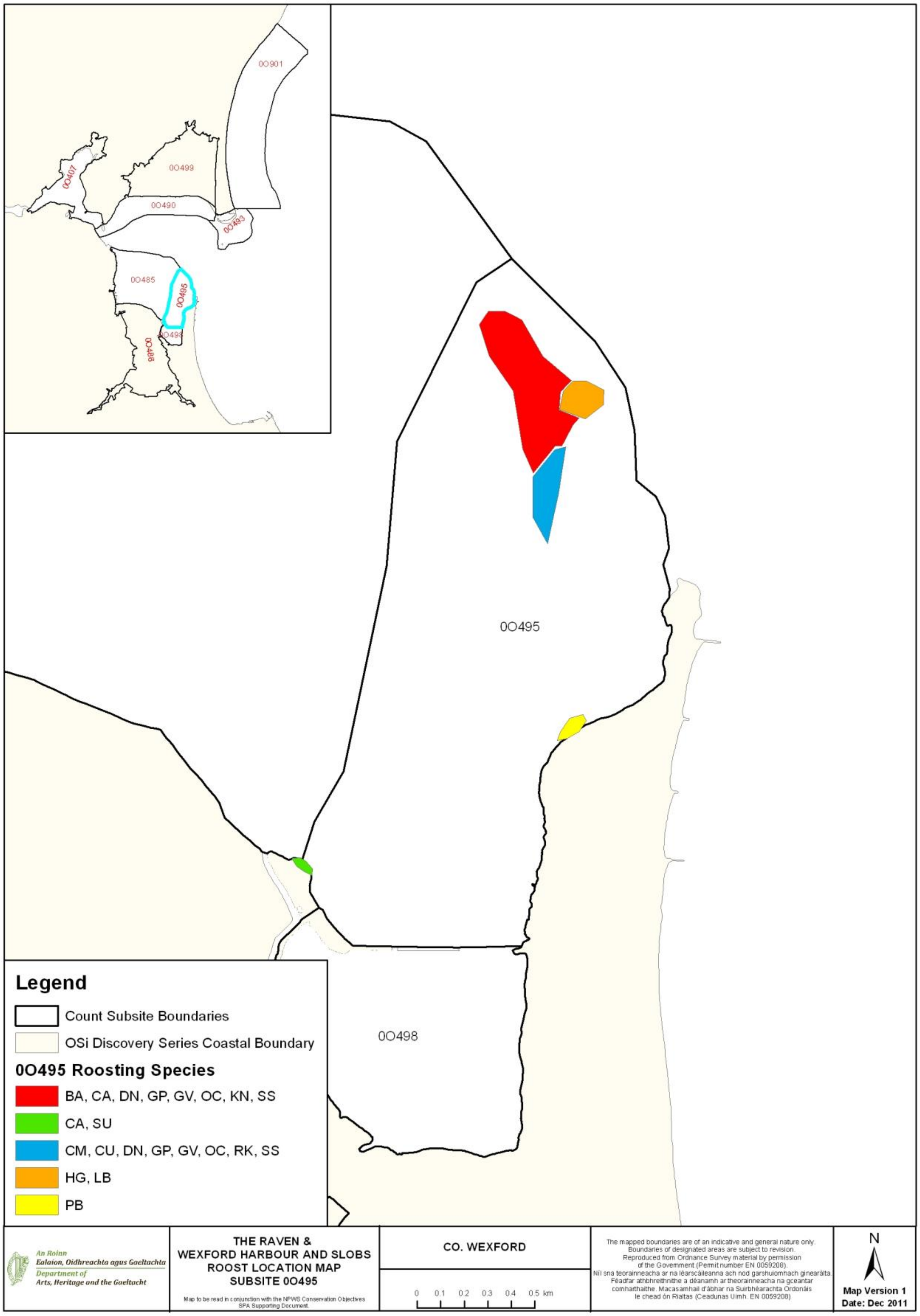
The following maps show roost records for the site, shown simply as position of roost and species recorded there. Roost positions should be treated as indicative rather than accurate because the mapping of positions over large distances is inherently difficult and prone to error. Note also that the series of sandbanks at the mouth of Wexford Harbour, used extensively by roosting waterbirds, are subject to natural shifts in their position. Please refer to the species distribution text (Section 5) which provides further information, where available, on roosting birds.


00901
00499
00490
00493
00485
00495
00498
00496
0O407
0O407
0O490
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
0O407 Roosting Species
BH,
BH, BW, CU, ET,
BH, OC
MA
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN & WEXFORD HARBOUR AND SLOBS ROOST LOCATION MAP SUBSITE 0O407
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0
0.5
1 km
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 garshuiomach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 2011

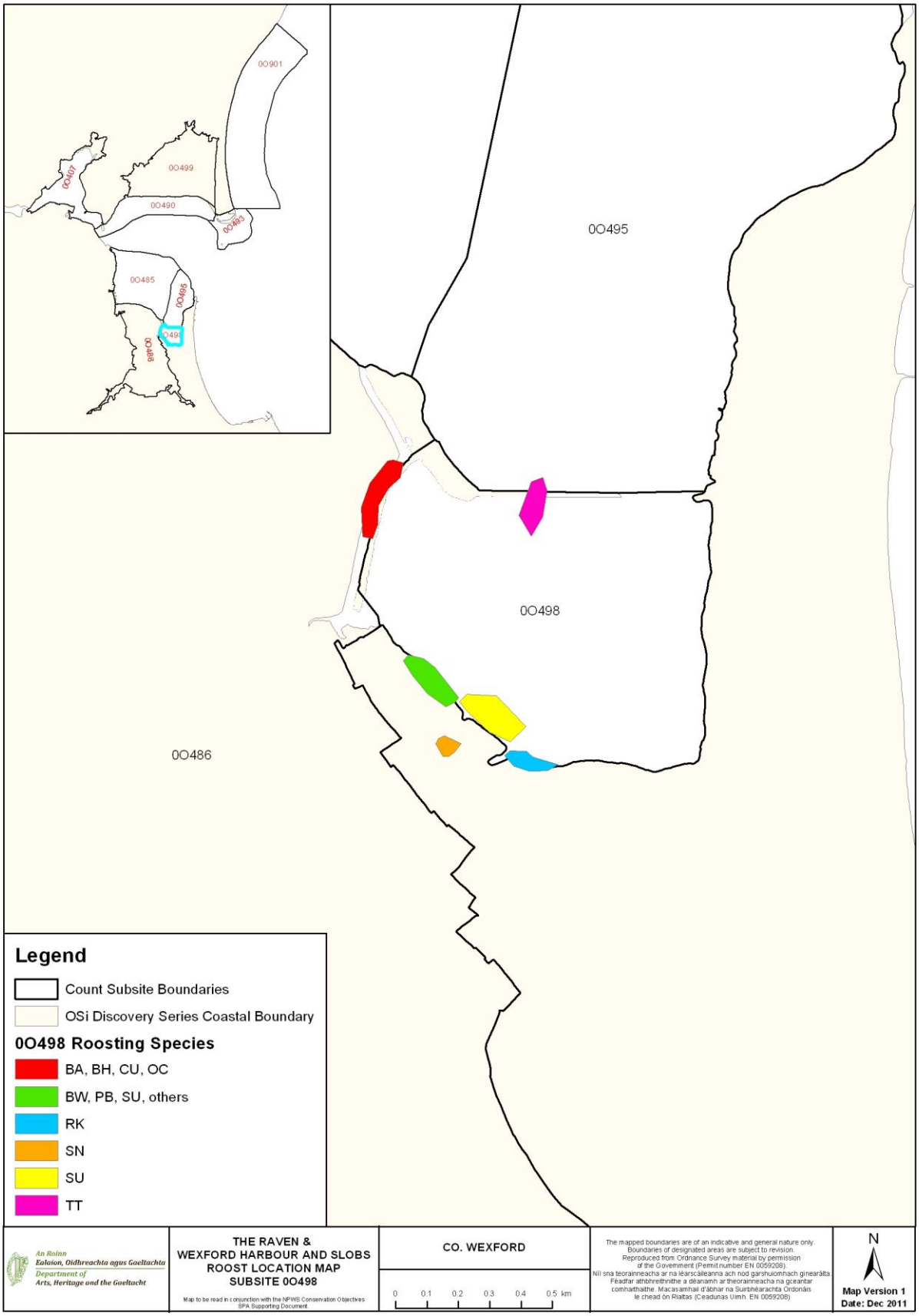

0O490
0O407
0O485
0O495
0O486
0O498
0O901
0O499
0O483
0O496
0O492
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
0O485 Roosting Species
BH, CA, CM, GB,
BH, OC
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN & WEXFORD HARBOUR AND SLOBS ROOST LOCATION MAP SUBSITE 0O485
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0
0.5
1 km
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 garshuiomhach ginearálta. Féadfar athbhreithnithe a dhéanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 2011

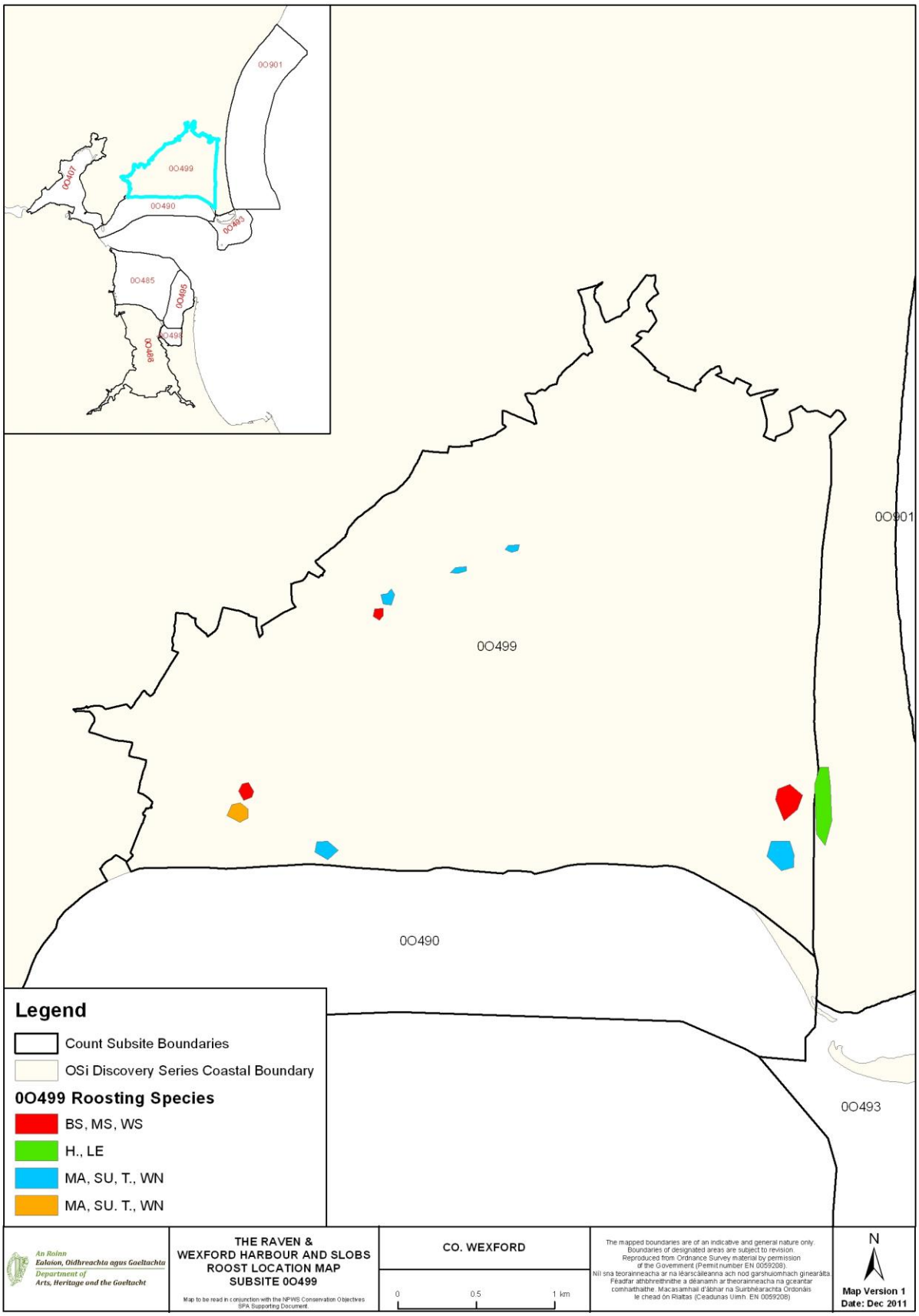

0O901
0O499
0O407
0O490
0O493
0O485
0O495
0O489
0O499
0O490
0O407
0O493
0O485
0O495
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
0O490 Roosting Species
CA, RK, gulls
L., OC, RK
L., OC, RK, TT
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN & WEXFORD HARBOUR AND SLOBS ROOST LOCATION MAP SUBSITE 0O490
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0
0.5
1 km
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 gineárálta Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comhaithaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadunas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 2011


0O901
0O499
0O490
0O493
0O485
0O496
0O498
0O497
0O486
0O901
0O493
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
0O493 Roosting Species
BA
BA, DN, GK, GP, OC, RK, TT
BW
CU
DN
GP
Gulls
NW
PB
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN & WEXFORD HARBOUR AND SLOBS ROOST LOCATION MAP SUBSITE 0O493
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0
0.5
1 km
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'abhar na Suirbhéireachta Ordonáis le cead ón Rialtas (Ceadunas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 2011



0O901
0O499
0O407
0O490
0O493
0O485
0O495
0O498
0O488
0O495
0O498
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
0O495 Roosting Species
BA, CA, DN, GP, GV, OC, KN, SS
CA, SU
CM, CU, DN, GP, GV, OC, RK, SS
HG, LB
PB
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
THE RAVEN &
WEXFORD HARBOUR AND SLOBS
ROOST LOCATION MAP
SUBSITE 0O495
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0 0.1 0.2 0.3 0.4 0.5 km
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 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: Dec 2011


0O901
0O499
0O490
0O493
0O407
0O485
0O495
0O488
0O495
0O498
0O486
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
0O498 Roosting Species
BA, BH, CU, OC
BW, PB, SU, others
RK
SN
SU
TT
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN & WEXFORD HARBOUR AND SLOBS ROOST LOCATION MAP SUBSITE 0O498
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0 0.1 0.2 0.3 0.4 0.5 km
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 comhartha the. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 2011


0O901
0O499
0O490
0O493
Legend
Count Subsite Boundaries
OSi Discovery Series Coastal Boundary
0O499 Roosting Species
BS, MS, WS
H., LE
MA, SU, T., WN
MA, SU. T., WN
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
THE RAVEN & WEXFORD HARBOUR AND SLOBS ROOST LOCATION MAP SUBSITE 0O499
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
CO. WEXFORD
0 0.5 1 km
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 garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comhaithaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le cead ón Rialtas (Ceadúnas Uimh. EN 0059208)
N
Map Version 1
Date: Dec 2011

APPENDIX 9

Wexford Harbour & Slobs (4076) and The Raven SPA (4019)
Activities & Events

Activities and events are listed as per standard EU Natura pressure and threat categories. Please note that this list is based on the current review process and is not exhaustive.

Activity & Events Legend:	
O	observed or known to occur within Wexford Harbour & Slobs and The Raven SPAs.
U	known to occur but unknown area (subsites)/spatial extent; 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.

	OO407	OO485	OO486	OO490	OO493	OO495	OO498	OO499	OO901
1. Coastal protection, sea defences & stabilisation									
1.1 Linear defences	O	O	O	O		O	O	O	
1.2 Training walls			O	O				O	
1.3 Groynes				O		O			O
1.4 *Spartina* planting/growing	O						O		
1.5 Marram grass planting						O			O
1.6 Other modifications	O					H			
2. Barrage schemes/drainage									
2.2 Altered drainage/river channel	O		O					O	
2.3 Other channel modifications			O					O	
2.4 Tidal barrages							H		
3. Power generation									
3.1 Power stations								O	
3.3 Wind-power generation									P
4. Industrial, port & related development									
4.2 Fishing harbour				O					O
4.3 Slipway	O			O		O			
4.4 Pier				O					
4.7 Ship & boat building/repair						O			
5. Military activities									
5.2 Firing range								H	
6. Pollution									
6.1 Domestic & urban waste water	O	O		O		O	O		
6.3 Landfill	O					O			
6.4 Agricultural & forestry effluents	O		H	O				H	
6.7 Solid waste incl. fly-tipping						O	O		
7. Sediment extraction (marine & terrestrial)									
7.1 Channel dredging (maintenance & navigation)			O					O	
8. Transport & communications									
8.3 Bridges & aqueducts	O			O					
8.5 Road schemes						O			
8.6 Car parks				O				O	O
8.8 Rail lines				O					
9. Urbanisation									
9.1 Urbanised areas, housing		O		O				O	
9.2 Commercial & industrial areas		O		O					
9.3 Hotel & leisure complex	O			O					O

	OO407	OO485	OO486	OO490	OO493	OO495	OO498	OO499	OO901
11. Education & scientific research									
11.1 Scientific sampling, specimen collection								O	
11.2 Nature trails					O				O
11.3 Interpretative centre				O		O		O	
12. Tourism & recreation									
12.1 Marinas				O					
12.2 Non-marina moorings	O			O					
12.4 Caravan parks & chalets				O					O
12.5 Leisure centres, sports ground				O					O
12.6 Power boating & water-skiing	O	O		O	O				
12.7 Jet-skiing				O	O				
12.8 Sailing	O			O	O				
12.9 Sailboarding & wind-surfing				O	O				
12.10 SCUBA & snorkelling					O				
12.11 Canoeing				O					
12.14 Tourist boat trips				O	O				
12.15 Angling	O			O	O	O			O
12.17 Bathing & general beach recreation				O		O			O
12.18 Walking, incl. dog walking	O	O		O	O	O			O
12.19 Birdwatching		O	O	O	O	O	O	O	O
12.21 4WD, trial & quad bikes					O	O			O
12.22 Motorised vehicles			O			O		O	
12.23 Horse-riding					O	O			O
12.25 Golf courses						O			
13. Wildfowl & hunting									
13.1 Wildfowling			O	O		O		O	
13.2 Other hunting-related activities	O		O			O		O	
14. Bait-collecting									
14.1 Digging for lugworms/ragworms				O	O	O	O	O	
15. Fisheries & Aquaculture									
15.1 Professional passive fishing (static gear)	U	U		U		U			U
15.2 Professional active fishing		U		U		U			U
15.3 Bottom (benthic) dredging	U	U		U		U			U
15.4 Fish traps & other fixed devices & nets						O		O	
15.5 Leisure fishing				O		O			
15.6 Molluscs - hand-gathering					O				
15.7 Hand raking					O	O			
15.10 Suspended cultivation (subtidal)									U
15.11 Bottom culture	U	U		U					U

	OO407	OO485	OO486	OO490	OO493	OO495	OO498	OO499	OO901
16. Agriculture & forestry									
16.1 Saltmarsh grazing/harvesting	O						O		
16.2 Grazing: intensive (terrestrial)			O	O				O	
16.5 Stock feeding			O				O		
16.6 Crop production: intensive			O	O				O	
16.7 Crop production: non-intensive			O						
16.9 Removal of hedges, scrub			H	H				O	
16.10 Mowing/grassland cutting			O	O				O	
16.12 Polderisation			H					H	
16.13 Agricultural land-claim			H				H	H	
16.14 In-filling of ditches, ponds, pools, marshes & pits			H					H	
16.17 Forest planting on open ground								H	
16.18 Forest and plantation management & use			O						
18. Wildlife habitat management									
18.4 Habitat management			O			O			
19. Natural events									
19.1 Storms, floods and storm surges					O			O	
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O

APPENDIX 10

Wexford Harbour & Slobs (4076) and The Raven SPA (4019)

Activities, or activities associated with features at the site, that are considered to have the potential to cause disturbance to waterbird species

Code	Legend
	Activities considered likely to cause disturbance to waterbirds

	0O407	0O485	0O486	0O490	0O493	0O495	0O498	0O499	0O901
4. Industrial, port & related development									
4.2 Fishing harbour				■					■
4.3 Slipway	■			■		■			
4.4 Pier				■					
7. Sediment extraction (marine & terrestial)									
7.1 Channel dredging (maintenance & navigation)			■					■	
8. Transport & communications									
8.3 Bridges & aqueducts	■			■					
8.5 Road schemes						■			
9. Urbanisation									
9.1 Urbanised areas, housing		■		■				■	
9.2 Commercial & industrial areas		■		■					
9.3 Hotel & leisure complex	■			■					■
12. Tourism & recreation									
12.1 Marinas				■					
12.2 Non-marina moorings				■					
12.4 Caravan parks & chalets				■					■
12.5 Leisure centres, sports ground				■					■
12.6 Power boating & water-skiing	■	■		■	■				
12.7 Jet-skiing				■	■				
12.8 Sailing	■			■	■				
12.9 Sailboarding & wind-surfing				■	■				
12.10 SCUBA & snorkeling					■				
12.11 Canoeing				■					
12.14 Tourist boat trips				■	■				
12.15 Angling	■			■	■	■			■
12.17 Bathing & general beach recreation				■		■			■
12.18 Walking, incl. dog walking	■	■		■	■	■			■
12.19 Birdwatching		■	■	■	■	■	■	■	■
12.21 4WD, trial & quad bikes					■	■			■
12.22 Motorised vehicles			■			■		■	
12.23 Horse-riding					■	■			■
13. Wildfowl & hunting									
13.1 Wildfowling			■	■		■		■	
13.2 Other hunting-related activities	■		■			■		■	
14. Bait-collecting									
14.1 Digging for lugworms/ragworms				■	■	■	■	■	
15. Fisheries & Aquaculture									
15.2 Professional active fishing		■		■		■			■
15.3 Bottom (benthic) dredging	■	■		■		■			■

15.5 Leisure fishing									
15.6 Molluscs - hand-gathering									
15.7 Hand raking									
15.10 Suspended cultivation (subtidal)									
15.11 Bottom culture									