

**Cork Harbour**  
**Special Protection Area**

**(Site Code 4030)**



**Conservation Objectives**  
**Supporting Document**

**VERSION 1**

National Parks & Wildlife Service

November 2014

## TABLE OF CONTENTS

SUMMARY	
PART ONE - INTRODUCTION	1
1.1 Introduction to the designation of Special Protection Areas	1
1.2 Introduction to Cork Harbour Special Protection Area	2
1.3 Introduction to Conservation Objectives	2
PART TWO – SITE DESIGNATION INFORMATION	4
2.1 Special Conservation Interests of Cork Harbour Special Protection Area	4
PART THREE – CONSERVATION OBJECTIVES FOR CORK HARBOUR SPA	9
3.1 Conservation Objectives for the non-breeding Special Conservation Interests of Cork Harbour SPA	9
PART FOUR – REVIEW OF THE CONSERVATION CONDITION OF WATERBIRD SPECIAL CONSERVATION INTERESTS	13
4.1 Population data for waterbird SCI species of Cork Harbour SPA	13
4.2 Waterbird population trends for Cork Harbour SPA	14
4.3 Cork Harbour SPA – site conservation condition of waterbird SCI species	19
PART FIVE – SUPPORTING INFORMATION	23
5.1 Introduction	23
5.2 Waterbird species – Ecological characteristics, requirements and specialities – summary information	23
5.3 The 2010/11 waterbird survey programme	28
5.3.1 Introduction	28
5.3.2 Waterbird data, analyses and presentation	29
5.3.3 Summary Results	30
5.3.4 Waterbird distribution	33
5.4 Cork Harbour - Activities and Events	73
5.4.1 Introduction	73
5.4.2 Assessment Methods	73
5.4.3 Overview of activities at Cork Harbour	74
5.4.4 Disturbance Assessment	79
5.4.5 Discussion	81
REFERENCES	83
APPENDIX 1	87
APPENDIX 2	89
APPENDIX 3	90
APPENDIX 4	92
APPENDIX 5	94
APPENDIX 6	95
APPENDIX 7	99
APPENDIX 8	101
APPENDIX 9	125
APPENDIX 10	139
APPENDIX 11	155

## SUMMARY

This document presents conservation objectives for the non-breeding Special Conservation Interests of Cork Harbour 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 (SPA) designation process and to the site designated as Cork Harbour Special Protection Area, as well as introducing the concept of conservation objectives and their formulation.

Part Two provides site designation information for Cork Harbour SPA and Part Three presents the conservation objectives for this site.

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

Part Five provides supporting information that will assist the interpretation of the site-specific conservation objectives. This section includes a review of the ecological characteristics of the SCI species and examines waterbird distribution recorded during the 2010/11 Waterbird Survey Programme, drawing also on data from NPWS monitoring programmes (e.g. benthic surveys) and the Irish Wetland Bird Survey (I-WeBS). Part Five concludes with information on activities and events that occur in and around the site which may interact with waterbirds during the non-breeding season and includes an assessment of those activities that were recorded to cause disturbance to non-breeding waterbirds during the 2010/11 Waterbird Survey Programme.

## PART ONE - INTRODUCTION

### 1.1 Introduction to the designation of Special Protection Areas

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

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

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

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

The National Parks & Wildlife Service (NPWS), part of the Department of the Arts, Heritage and the Gaeltacht, is responsible for the selection and designation of SPAs in Ireland. NPWS has developed a set of criteria, incorporating information relating to the selection of wetland sites developed under the Ramsar Convention, which are used to identify and designate SPAs. Sites that meet any of the following criteria may be selected as SPAs:

- A site regularly supporting 20,000 waterbirds or 10,000 pairs of seabirds;
- A site regularly supporting 1% or more of the all-Ireland population of an Annex I species;
- A site regularly supporting 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 an Annex I species or a migratory 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. If, following collation of all the available scientific data, a site meets the relevant criteria for designation and is selected as an SPA, a list of species for which the site is nationally and internationally important is compiled. These species are known as **Special Conservation Interests** and may be one of the following:

- 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 ('internationally important');
- A migratory species that occurs at the site in numbers that exceed the all-Ireland 1% threshold ('all-Ireland importance');

- 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).

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 Cork Harbour Special Protection Area

Cork Harbour is a large, sheltered bay system, which stretches from the two main estuaries of the River Lee, near Cork City in the northwest, and the Owenacurra River, near Midleton, in the northeast, southwards as far as Roches Point. It is a complex site and encompasses many other estuaries and inlets including the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay and the Rostellan and Poul nabibe inlets.

Owing to the sheltered conditions, the intertidal flats are often muddy in character but described principally as 'mixed sediment to sandy mud with polychaetes and oligochaetes' (NPWS, 2014a). These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Peringia (Hydrobia) ulvae*, *Nephtys hombergi*, *Nereis diversicolor* and *Corophium volutator*.

Green algae are a common occurrence on the mudflats while Common Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, and is particularly prevalent at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for waterbirds. Harpers Island and Brown Island in the north of the site are included within the SPA as important roost areas. Lough Beg, in the southwest of the site is a small shallow inlet although the southern section is divided from the main intertidal flats by a causeway and is now a brackish lagoon of significant importance for birds.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl, for which it is amongst the top ten sites in the country. Of particular note is that the site supports internationally important populations of Black-tailed Godwit and Redshank, while a further 20 non-breeding waterbird species occur in numbers of national importance. The Annex I species Common Tern has a breeding population at the site.

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

## 1.3 Introduction to Conservation Objectives

The overriding objective of the Habitats Directive is to ensure that the habitats and species covered achieve 'favourable conservation status' and that their long-term survival is secured across their entire natural range within the EU (EU Commission, 2012). In its broadest sense, favourable conservation status means that an ecological feature is being maintained in a satisfactory condition, and that this status is likely to continue into the future. Definitions as per the EU Habitats Directive are given in Box 1.

### Box 1

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

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

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

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

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

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

Where relevant, conservation objectives are defined for attributes<sup>2</sup> relating to non-breeding<sup>3</sup> waterbird species populations, and for attributes related to the maintenance and protection of habitats that support them. These attributes are:

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

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

---

<sup>1</sup> Note that the terms 'conservation condition' and 'conservation status' are used to distinguish between site and the national level objectives respectively.

<sup>2</sup>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).

<sup>3</sup> Conservation objectives for the breeding species Common Tern are not presented in this document.

## PART TWO – SITE DESIGNATION INFORMATION

### 2.1 Special Conservation Interests of Cork Harbour Special Protection Area

Cork Harbour 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 **Special Conservation Interest species**<sup>4</sup> for Cork Harbour SPA are listed below and summarised in Table 2.1. This table also shows the importance of Cork Harbour SPA for these SCI species, relative to the importance of other sites within Ireland, within the South West region<sup>5</sup> and within County Cork.

The Special Conservation Interests listed for Cork Harbour SPA are as follows:-

1. During winter 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 2,009 individuals.
2. During winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,791 individuals.
3. During winter 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 1,065 individuals.
4. During winter the site regularly supports 1% or more of the all-Ireland population of Pintail (*Anas acuta*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 57 individuals.
5. During winter the site regularly supports 1% or more of the all-Ireland population of Shoveler (*Anas clypeata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 103 individuals.
6. During winter 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 121 individuals.
7. During winter the site regularly supports 1% or more of the all-Ireland population of Little Grebe (*Tachybaptus ruficollis*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 57 individuals.
8. During winter the site regularly supports 1% or more of the all-Ireland population of Great Crested Grebe (*Podiceps cristatus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 253 individuals.
9. During winter 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 521 individuals.

---

<sup>4</sup> Special Conservation Interest species are listed in taxonomic order.

<sup>5</sup> 'Region' refers to regions as defined by Irish Regions Office and in the case of the South West region takes into account cross-border sites Blackwater Estuary and Blackwater Callows.

10. During winter the site regularly supports 1% or more of the all-Ireland population of Grey Heron (*Ardea cinerea*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 80 individuals.
11. During winter 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 1,809 individuals.
12. During winter the site regularly supports 1% or more of the biogeographic 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 3,342 individuals.
13. During winter 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 95 individuals.
14. During winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 7,569 individuals.
15. During winter the site regularly supports 1% or more of the all-Ireland population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 9,621 individuals.
16. During winter the site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,896 individuals.
17. During winter the site regularly supports 1% or more of the all-Ireland population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 233 individuals.
18. During winter 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 2,237 individuals.
19. During winter the site regularly supports 1% or more of the biogeographical population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,149 individuals.
20. During winter 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 3,640 individuals.
21. During winter the site regularly supports 1% or more of the all-Ireland population of Common Gull (*Larus canus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,562 individuals.
22. During winter the site regularly supports 1% or more of the all-Ireland population of Lesser Black-backed Gull (*Larus fuscus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 783 individuals.
23. The site is selected for the breeding Annex I species Common Tern (*Sterna hirundo*). In 1995, 102 pairs were breeding at this site. This exceeds the All-Ireland 1% threshold for this species.

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

**Table 2.1 Site Designation Summary: species listed for Cork Harbour Special Protection Area, plus site importance at national, regional and county scale**

Special Conservation Interests	Annex I species	Baseline Population <sup>a/b</sup>	Population status at baseline	National Importance Rank <sup>1</sup>	Regional Importance Rank <sup>2</sup>	County Importance Rank <sup>3</sup>
		2,009	All-Ireland Importance	1	1	1
		1,791	All-Ireland Importance	13	3	2
		1,065	All-Ireland Importance	8	1	1
		57	All-Ireland Importance	7	2	1
		103	All-Ireland Importance	15	2	2
		121	All-Ireland Importance	6	1	1
		57	All-Ireland Importance	5	1	1
		253	All-Ireland Importance	3	1	1
		521	All-Ireland Importance	1	1	1
		80	All-Ireland Importance	2	1	1
		1,809	All-Ireland Importance	5	1	1
	Yes	3,342	All-Ireland Importance	14	4	3
		95	All-Ireland Importance	19	4	3
		7,569	All-Ireland Importance	5	1	1
		9,621	All-Ireland Importance	3	1	1
		1,896	International Importance	5	2	2
	Yes	233	All-Ireland Importance	13	3	2
		2,237	All-Ireland Importance	5	2	2

Redshank ( <i>Tringa totanus</i> )		2,149	International Importance	2	1	1
Black-headed Gull ( <i>Chroicocephalus ridibundus</i> )		3,640	All-Ireland Importance	3	1	1
Common Gull ( <i>Larus canus</i> )		1,562	All-Ireland Importance	3	2	2
Lesser Black-backed Gull ( <i>Larus fuscus</i> )		783	All-Ireland Importance	2	2	2
Common Tern ( <i>Sterna hirundo</i> )	Yes	102 breeding pairs	All-Ireland Importance	3	1	1
Other conservation designations associated with the site <sup>c</sup>	<b>SAC</b>	<b>RAMSAR SITE</b>	<b>IMPORTANT BIRD AREA (IBA)</b>	<b>WILDFOWL SANCTUARY</b>	<b>OTHER</b>	<b>OTHER</b>
	SAC 1058	Yes	Yes	Yes	pNHA	

<sup>a</sup> Baseline data are the 5-year mean peak counts for the period 1995/96 – 1999/00 (I-WeBS), with the exception of Common tern (1995 All-Ireland Tern Survey, Hannon et al. 1997).

<sup>b</sup> Note that 1% all-Ireland and International thresholds used were those in place during the baseline period; current day 1% thresholds may be different.

<sup>c</sup> Note that other designations associated with Cork Harbour may relate to different areas and/or some of these areas may extend outside the SPA boundary.

<sup>1</sup> National importance rank – the number given relates to the importance of the site for the non-breeding populations of the SCI species during the baseline period (1995/96 – 1999/00) relative to other sites in Ireland.

<sup>2</sup> Regional importance rank - the number given relates to the importance of the site for the non-breeding populations of the SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within the South West Region; includes the cross-region sites Blackwater Estuary and Blackwater Callows.

<sup>3</sup> County importance rank - the number given relates to the importance of the site for the non-breeding populations of the SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within Co Cork; includes the cross-county sites Blackwater Estuary and Blackwater Callows.

## PART THREE – CONSERVATION OBJECTIVES FOR CORK HARBOUR SPA

### 3.1 Conservation Objectives for the non-breeding Special Conservation Interests of Cork Harbour SPA

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

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

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

**Objective 1:** *To maintain the favourable conservation condition of the non-breeding waterbird Special Conservation Interest species listed for Cork Harbour 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.<sup>6</sup> Waterbird populations are deemed to be unfavourable when they have declined by 25% or more, as assessed by the most recent population trend analysis.<sup>7</sup>
- To be favourable, there should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest, other than that occurring from natural patterns of variation.<sup>8</sup>

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

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

---

<sup>6</sup> Note that 'population' refers to site population (numbers wintering at the site) rather than the species biogeographic population.

<sup>7</sup> Population trend analysis is presented in Section 4.

<sup>8</sup> Waterbird distribution from the 2010/2011 waterbird survey programme is examined in Section 5.

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

**Objective 2:** *To maintain the favourable conservation condition of the wetland habitat at Cork Harbour 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 **2,587 ha**, other than that occurring from natural patterns of variation.

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

Subtidal areas refer to those areas contained within the SPA that lie below the mean low water mark and are predominantly covered by marine water. Tidal rivers, creeks and channels are included in this category. For Cork Harbour SPA this broad category is estimated to be **826 ha**. Subtidal areas are continuously available for benthic and surface feeding waterfowl (e.g. Wigeon) and piscivorous/other waterbirds. Various waterbirds roost in subtidal areas (e.g. Brent Goose).

The intertidal area is defined, in this context, as the area contained between the mean high water mark and the mean low water mark. For Cork Harbour SPA this is estimated to be **1,461 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<sup>9</sup> areas. When the intertidal area is inundated by the tide it becomes available for benthic and surface feeding ducks and piscivorous/other waterbirds. During this tidal state this area can be used by various waterbirds as a loafing/roosting resource.

The supratidal and associated habitats 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 Cork Harbour SPA this is estimated to be **243 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 lagoon and associated habitats category refers to lagoons and brackish lakes and their associated wetland habitats. For Cork Harbour SPA this broad habitat category is estimated to be **57 ha**.

---

<sup>9</sup> Loafing can be described as any behaviour not connected with breeding or feeding, and includes preening and resting.

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.

**Table 3.1 Conservation Objectives for the waterbird Special Conservation Interests of Cork Harbour SPA.**

<b>Objective 1:</b>				
<i>To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Cork Harbour SPA, which is defined by the following list of attributes and targets:</i>				
Parameter	Attribute	Measure	Target	Notes
Population	Population trend	Percentage change as per population trend assessment using waterbird count data collected through the Irish Wetland Bird Survey and other surveys.	The long term population trend should be stable or increasing	Waterbird population trends are presented in Part Four of this document.
Range	Distribution	Range, timing or intensity of use of areas used by waterbirds, as determined by regular low tide and other waterbird surveys.	There should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest other than that occurring from natural patterns of variation.	Waterbird distribution from the 2010/11 waterbird survey programme is reviewed in Part Five of this document.
<b>Objective 2:</b>				
<i>To maintain the favourable conservation condition of the wetland habitat at Cork Harbour SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attributes and targets:</i>				
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 2,587 ha, other than that occurring from natural patterns of variation.	The wetland habitat area was estimated as 2,587 ha using OSI data and relevant orthophotographs.

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

### **4.1 Population data for waterbird SCI species of Cork Harbour SPA**

Non-breeding waterbirds are counted at Cork Harbour each winter as part of the Irish Wetland Bird Survey (I-WeBS). The dataset spans the period 1994/95 to 2012/13 and a total of 21 count subsites, covering some 2,961 ha have been monitored regularly (Crowe, 2005). Given the extensive nature of the site however, and the large number of counters required to complete full coordinated counts, count coverage has been variable across the years with certain key areas not covered in some years (e.g. Douglas Estuary 1997/98 – 1999/00) and overall relative lower coverage in some seasons (e.g. 2008/09 and 2009/10).

I-WeBS counts are undertaken during what is termed the ‘core survey period’ which covers the main wintering period when many species occur in their largest concentrations, but also the autumn and spring passage periods when total waterbird numbers may be enhanced by staging/stopover birds<sup>10</sup>. Note that although the SPA area and the I-WeBS count area are similar, they are not coincident. Information on I-WeBS and other waterbird surveys is given in Appendix 2.

Table 4.1 presents population<sup>11</sup> data for the non-breeding waterbird SCI species of Cork Harbour. Annual maxima were identified and used to calculate the five-year mean peak for each species. The baseline period was 1995/96 – 1999/00 while the recent average relates to the five-year period 2008/09 – 2012/13<sup>12</sup>. When examining waterbird data, it is standard practice to use the mean of peak counts generated for each species because it reflects more accurately the importance of a site for a particular species by helping to account for inconsistencies in data gathering (i.e. differing coverage) or extraordinary fluctuations in numbers. However it is important to note that waterbird counts represent a ‘snapshot’ of bird numbers during a count session, so in general and taking into account all potential sources of error, resulting data are regarded to be underestimates of population size (Underhill & Prŷs-Jones, 1994).

Table 4.1 highlights where the numbers shown surpass thresholds of International or all-Ireland importance. These thresholds are different for the baseline and recent time periods used; international thresholds are outlined in Wetlands International (2002) and Wetlands International (2012), while all-Ireland thresholds are presented within Crowe et al. (2008) and Crowe & Holt (2013) for the baseline and recent site data respectively.

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).<sup>13</sup>

---

<sup>10</sup> The terms ‘stopover’ and ‘staging’ are often used interchangeably. A stopover site can be defined as any place where a bird takes a break during migration. Staging areas can be defined as stopover sites that attract large numbers of individuals and play an important part in re-fuelling the birds before their onward migration (e.g. Warnock, 2010).

<sup>11</sup> Note that ‘population’ refers to site population (numbers wintering at the site) rather than a species’ biogeographic population.

<sup>12</sup> Note that the recent 5-year mean peak is likely to have been affected by a relative low coverage in 2008/09 and 2009/10 (Crowe et al. 2011).

<sup>13</sup> Current threshold of significance is 1,000 for Black-headed Gull and 500 for Common Gull and Lesser Black-backed Gull (Crowe, 2005).

**Table 4.1 Population data for non-breeding waterbird Special Conservation Interest Species of Cork Harbour SPA**

Site Special Conservation Interests (SCIs)	Baseline Period <sup>1</sup> (1995/96 – 1999/00)	Recent Site Data <sup>2</sup> (2008/09 – 2012/13)
Shelduck	2,009 (n)	1,219 (n)
Wigeon	1,791 (n)	1,303 (n)
Teal	1,065 (n)	1,052 (n)
Pintail	57 (n)	20 (n)
Shoveler	103 (n)	26
Red-breasted Merganser	121 (n)	60 (n)
Little Grebe	57 (n)	66 (n)
Great Crested Grebe	253 (n)	137 (n)
Cormorant	521 (n)	260 (n)
Grey Heron	80 (n)	68 (n)
Oystercatcher	1,809 (n)	1,445 (n)
Golden Plover	3,342 (n)	4,043 (n)
Grey Plover	95 (n)	31 (n)
Lapwing	7,569 (n)	2,412 (n)
Dunlin	9,621 (n)	4,943 (n)
Black-tailed Godwit	1,896 (i)	2,194 (i)
Bar-tailed Godwit	233 (n)	328 (n)
Curlew	2,237 (n)	1,252 (n)
Redshank	2,149 (i)	1,520 (n)
Black-headed Gull	3,640 (n)	1,693 (n)
Common Gull	1,562 (n)	178
Lesser Black-backed Gull	783 (n)	132

<sup>1</sup>Baseline data is the 5-year mean peak for the period 1995/96 – 1999/00;

<sup>2</sup>recent site data is the mean peak for the 5-year period 2008/09 – 2012/13 (I-WeBS).

(i) denotes numbers of international importance; (n) denotes numbers of all-Ireland importance.

note that thresholds differ for the baseline and recent time periods used; international thresholds are outlined in Wetlands International (2002) and Wetlands International (2012), while all-Ireland thresholds are presented within Crowe et al. (2008) and Crowe & Holt (2013) for the baseline and recent site data respectively.

#### 4.2 Waterbird population trends for Cork Harbour SPA

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

For Cork Harbour, the variable level of annual count coverage during I-WeBS precludes the use of this analysis. Therefore an estimation of population change over time was calculated using the 'generic threshold method' (after JNCC, 2004). This compares population size for two different five-year time periods, the change being expressed as a proportion of the initial population, as follows:

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

where:  $I_y$  = recent population and  $I_x$  = baseline population.

This calculation was undertaken comparing the baseline population with the series of rolling peak means shown in Table 4.2. The results (% change) are shown in Table 4.3. Waterbird species codes are given in Appendix 4.

For selected species, explanatory notes are given below to aid the interpretation of trends and give caution where necessary. Site trends are compared with national trends (Boland & Crowe, 2012<sup>14</sup>); all-Ireland trends (Crowe & Holt, 2013), and British trends (Holt et al. 2012).

<sup>14</sup> National trends presented in Boland & Crowe (2012) update those previously shown in Crowe (2005).

**Table 4.2 Site population data for waterbird Special Conservation Interest species of Cork Harbour SPA: rolling five-year means\***

SCI Species ▼	1995/96- 1999/00	1999/00 - 2003/04	2000/01 - 2004/05	2001/02 - 2005/06	2002/03 - 2006/07	2003/04 - 2007/08	2004/05 - 2008/09	2005/06 - 2009/10	2006/07 - 2010/11	2007/08 - 2011/12	2008/09 - 2012/13
SU	2,009 (n)	1,510 (n)	1,414 (n)	1,540 (n)	1,525 (n)	1,335 (n)	1,207 (n)	1,119 (n)	1,132 (n)	1,153 (n)	1,219 (n)
WN	1,791 (n)	1,810 (n)	1,938 (n)	2,150 (n)	2,157 (n)	2,067 (n)	1,755 (n)	1,594 (n)	1,405 (n)	1,388 (n)	1,303 (n)
T.	1,065 (n)	1,307 (n)	1,298 (n)	1,331 (n)	1,264 (n)	1,115 (n)	1,008 (n)	925 (n)	914 (n)	951 (n)	1,052 (n)
PT	57 (n)	47 (n)	43 (n)	45 (n)	31 (n)	16	12	13	13	18	20 (n)
SV	103 (n)	81 (n)	56 (n)	51 (n)	53 (n)	43 (n)	44 (n)	44 (n)	38 (n)	33 (n)	26
RM	121 (n)	90 (n)	82 (n)	85 (n)	83 (n)	79 (n)	72 (n)	67 (n)	63 (n)	64 (n)	60 (n)
LG	57 (n)	63 (n)	69 (n)	71 (n)	73 (n)	74 (n)	68	63	63	67	66 (n)
GG	253 (n)	210 (n)	187 (n)	180 (n)	135 (n)	109 (n)	99 (n)	114 (n)	115 (n)	135 (n)	137 (n)
CA	521 (n)	375 (n)	338 (n)	351 (n)	316 (n)	314 (n)	277 (n)	237 (n)	232 (n)	251 (n)	260 (n)
H.	80 (n)	79 (n)	94 (n)	87 (n)	102 (n)	101 (n)	105 (n)	90 (n)	90 (n)	77 (n)	68 (n)
OC	1,809 (n)	1,554 (n)	1,641 (n)	1,717 (n)	1,746 (n)	1,779 (n)	1,623 (n)	1,489 (n)	1,386 (n)	1,533 (n)	1,445 (n)
GP	3,342 (n)	4,739 (n)	5,292 (n)	5,091 (n)	4,366 (n)	4,560 (n)	3,590 (n)	3,250 (n)	3,321 (n)	3,710 (n)	4,043 (n)
GV	95 (n)	40 (n)	32 (n)	36 (n)	37 (n)	25	22	23	29	34 (n)	31 (n)
L.	7,569 (n)	4,648 (n)	4,651 (n)	4,017 (n)	4,122 (n)	3,951 (n)	3,622 (n)	3,191 (n)	2,914 (n)	2,689 (n)	2,412 (n)
DN	9,621 (n)	5,758 (n)	4,975 (n)	4,424 (n)	4,291 (n)	4,211 (n)	4,292 (n)	3,953 (n)	4,186 (n)	4,301 (n)	4,943 (n)
BW	1,896 (i)	2,023 (i)	2,272 (i)	2,616 (i)	2,564 (i)	2,519 (i)	2,513 (i)	2,193 (i)	2,009 (i)	2,227 (i)	2,194 (i)
BA	233 (n)	341 (n)	390 (n)	363 (n)	358 (n)	314 (n)	290 (n)	309 (n)	326 (n)	309 (n)	328 (n)
CU	2,237 (n)	1,550 (n)	1,569 (n)	1,671 (n)	1,694 (n)	1,674 (n)	1,646 (n)	1,381 (n)	1,299 (n)	1,343 (n)	1,252 (n)
RK	2,149 (i)	1,635 (n)	1,640 (n)	1,747 (n)	1,861 (n)	1,776 (n)	1,752 (n)	1,566 (n)	1,592 (n)	1,522 (n)	1,520 (n)
BH	3,640 (n)	1,968 (n)	2,081 (n)	2,148 (n)	2,314 (n)	2,431 (n)	2,003 (n)	1,662 (n)	1,477 (n)	1,758 (n)	1,693 (n)
CM	1,562 (n)	805 (n)	788 (n)	572 (n)	292	245	223	204	221	183	178
LB	783 (n)	144	219	190	295	297	284	197	225	113	132

\*all 5-year means (I-WeBS);

(i) denotes numbers of international importance; (n) denotes numbers of all-Ireland importance.

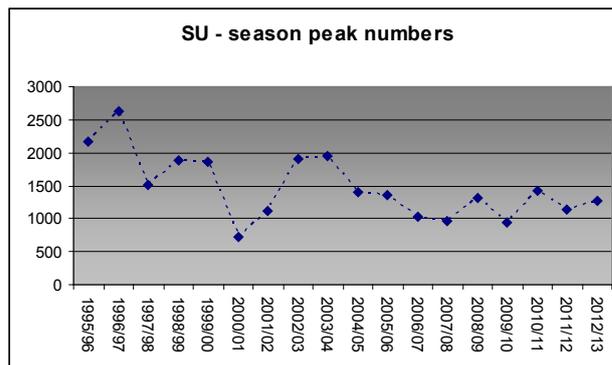
note that thresholds differ for the baseline and recent time periods used; international thresholds are outlined in Wetlands International (2002) and Wetlands International (2012), while all-Ireland thresholds are presented within Crowe et al. (2008) and Crowe & Holt (2013) for the baseline and recent site data respectively.

**Table 4.3 Site Population trends (percentage change)**

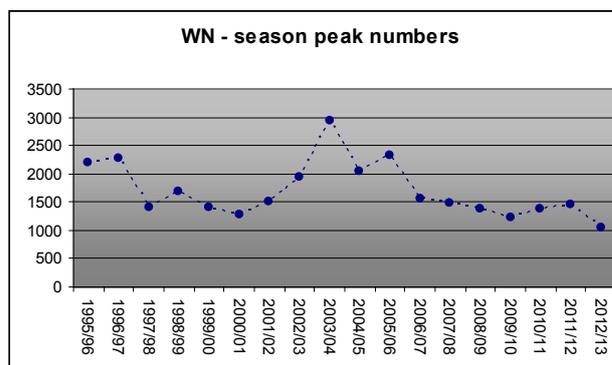
Data period	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP	GV	L.
Baseline vs 1999/00 – 2003/04	-25	+1	+23	-17	-21	-25	+11	-17	-28	-1	-14	+42	-58	-39
Baseline vs 2000/01-2004/05	-30	+8	+22	-25	-45	-32	+21	-26	-35	+18	-9	+58	-66	-39
Baseline vs 2001/02-2005/06	-23	+20	+25	-20	-51	-30	+25	-29	-33	+8	-5	+52	-62	-47
Baseline vs 2002/03-2006/07	-24	+20	+19	-46	-48	-31	+28	-46	-39	+27	-4	+31	-61	-46
Baseline vs 2003/04-2007/08	-34	+15	+5	-71	-58	-35	+29	-57	-40	+27	-2	+36	-73	-48
Baseline vs 2004/05-2008/09	-40	-2	-5	-80	-57	-41	+20	-61	-47	+32	-10	+7	-77	-52
Baseline vs 2005/06-2009/10	-44	-11	-13	-77	-57	-44	+11	-55	-55	+13	-18	-3	-76	-58
Baseline vs 2006/07-2010/11	-44	-22	-14	-78	-63	-48	+10	-55	-56	+12	-23	-1	-69	-61
Baseline vs 2007/08-2011/12	-43	-23	-11	-68	-68	-47	+17	-47	-52	-3	-15	+11	-65	-64
Baseline vs 2008/09-2012/13	-39	-27	-1	-65	-75	-51	+16	-46	-50	-15	-20	+21	-68	-68

Data period	DN	BW	BA	CU	RK	BH	CM	LB
Baseline vs 1999/00 – 2003/04	-40	+7	+46	-31	-24	-46	-48	-82
Baseline vs 2000/01-2004/05	-48	+20	+67	-30	-24	-43	-50	-72
Baseline vs 2001/02-2005/06	-54	+38	+56	-25	-19	-41	-63	-76
Baseline vs 2002/03-2006/07	-55	+35	+54	-24	-13	-36	-81	-62
Baseline vs 2003/04-2007/08	-56	+33	+35	-25	-17	-33	-84	-62
Baseline vs 2004/05-2008/09	-55	+33	+24	-26	-18	-45	-86	-64
Baseline vs 2005/06-2009/10	-59	+16	+33	-38	-27	-54	-87	-75
Baseline vs 2006/07-2010/11	-56	+6	+40	-42	-26	-59	-86	-71
Baseline vs 2007/08-2011/12	-55	+17	+33	-40	-29	-52	-88	-86
Baseline vs 2008/09-2012/13	-49	+16	+41	-44	-29	-53	-89	-83

**Shelduck** – although having declined across the long-term (Table 4.3), numbers of Shelduck have been largely stable at the site since 2004/05. The Owenboy Estuary, that can hold good numbers of Shelduck, received poor or no count coverage in the seasons 2006/07, 2008/09 and 2009/10, while Lough Beg was not counted in 2009/10; this will have affected recent site peaks so some caution is required. Nationally, numbers have shown a slight but steady decline since the mid 1990's; the all-Ireland trend is stable (1999/00-2010/11).



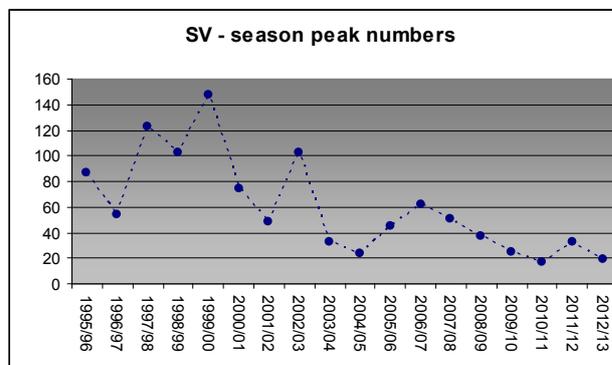
**Wigeon** – season peak counts and the rolling five-year means indicate that following a period of increasing numbers in the late 1990's and early 2000's, numbers have since declined. Nationally, numbers have been in decline since the mid 1990's while the all-Ireland trend is also for decline.



The trend highlighted above is also seen at the level of individual I-WeBS count subsite. For example the subsite 'Ballintubbrid' (North Channel) which has received good count coverage throughout and is favoured by Wigeon, supported peak numbers during the early 2000's at nearly twice the level as recorded in recent seasons. Season peaks were particularly low in the final two seasons (2011/12, 2012/13) despite a full count coverage September to March. Counts in 2009/10 were likely affected by the cold weather spell (Crowe et al. 2011); January 2010 being the coldest January for 25 years (Met Éireann, 2010a).

**Pintail** – numbers of Pintail have been highly variable with season peak counts often doubling or halving between successive seasons. The 'North Channel – Ballintubbrid' count subsite has consistently held greater numbers and it is therefore of note that this subsite received variable count coverage between the period 2001/02 to 2008/09 with no count being undertaken during the 2000/01 season. Rostellan Lake and Whitegate Bay, relatively well covered subsites during I-WeBS, have seen a notable decline in numbers in recent seasons. Overall interpretation of a long-term site trend is difficult and some caution is necessary.

**Shoveler** – numbers of Shoveler have declined across the long-term with season peaks counts substantially lower during the last decade compared with the mid to late 1990's. Numbers have dropped sharply in favoured subsites Whitegate Bay and Rostellan Lake, both of which have received good count coverage across the years.

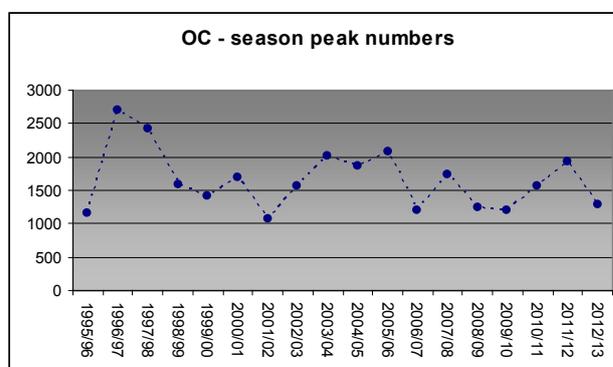


**Red-breasted Merganser** – numbers have declined over the long-term with no season site maxima reaching 100 individuals since the baseline period (1995/96 – 1999/00). Numbers across the recent five-year period however appear relatively stable (Table 4.2).

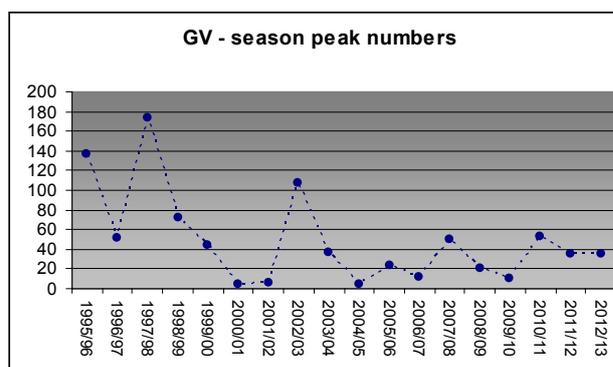
**Great Crested Grebe** – numbers appear to have declined substantially over the long-term with counts exceeding 200 individuals not recorded since the 2002/03 season. Key count subsites such as Ballintubbrid, Whitegate Bay and Aghada have received relatively good count coverage across the years.

**Cormorant** – some caution is necessary because peak numbers recorded in the recent five-year period were likely affected by the cold weather spells of 2009/10 and 2010/11. During cold weather, numbers might be expected to rise at coastal sites because the birds move away from frozen inland waterbodies, however numbers at Cork Harbour were relatively low in these seasons compared to most recent annual peaks. Cork Harbour is also known to support significant Cormorant night-time roosts; which are not monitored by the diurnal I-WeBS methodology.

**Oystercatcher** – some caution is necessary as key subsites (generally supporting peaks of 100+ individuals) and namely Lough Beg, Owenboy Estuary and Monkstown Creek were not counted in 2009/10 which will affect the recent five-year mean and its comparison with baseline data. Nationally numbers have shown an overall increase since I-WeBS began.



**Grey Plover** – the long-term trend for decline reflects relatively high annual peak counts during the baseline period, but numbers overall have been highly variable between seasons so interpretation of the long-term trend is difficult. Numbers have stabilised/increased across the recent five-year period. This site trend mirrors the national trend where there has been an overall long-term decline although numbers have stabilised in recent seasons. In Britain, numbers now appear relatively stable after exhibiting a decline during the mid 1990's to mid 2000's.



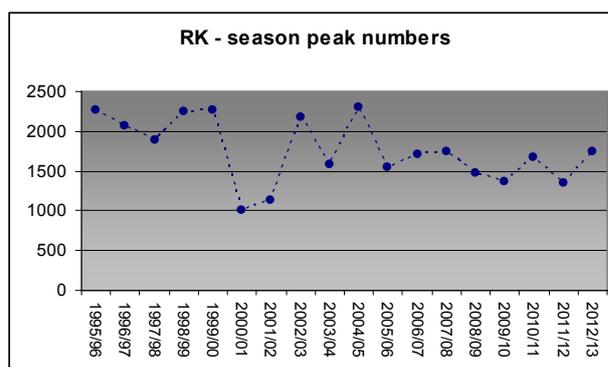
**Lapwing** – the substantial long-term trend for decline is consistent with the national and all-Ireland long-term trends for decline. Counts in 2009/10 were likely affected by the cold weather spell (Crowe et al. 2011); January 2010 being the coldest January for 25 years (Met Éireann, 2010a) and the site annual maxima for 2009/10 was the lowest on record for this species.

**Dunlin** - the long-term site trend for decline is consistent with the national trend, numbers having declined throughout I-WeBS. Numbers are relatively stable in recent seasons

however (Table 4.2) with the last three seasons recording a season maxima of over 5,000 individuals.

**Curlew** – the long-term trend for decline is consistent with the national trend where numbers have declined throughout I-WeBS by an average c.3% per year. The all-Ireland trend is also for decline. In Britain, numbers of Curlew increased from the 1970's until the start of the 2000's but have steadily declined since then.

**Redshank** – a long-term trend for decline is evident with numbers not exceeding 2,000 individuals since the 2004/05 season. Numbers have stabilised in recent seasons (Table 4.2). Nationally, numbers of Redshank have increased over the long-term while the all-Ireland trend is stable.



#### 4.3 Cork Harbour SPA – site conservation condition of waterbird SCI species

Conservation condition of SCI species was determined using a species site trend based on the comparison of the baseline peak mean with the most recent peak mean, and therefore relates to Conservation Objective 1 (population trend) only<sup>15</sup>. 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 22 non-breeding waterbird species of Special Conservation Interest listed for Cork Harbour SPA, it has been determined that (Table 4.4):-

<sup>15</sup> Conservation condition in relation to Objective 1 (range, timing or intensity of use of areas by SCI species) has yet to be assigned.

1. 9 species are currently considered as **Highly Unfavourable** (Pintail, Shoveler, Red-breasted Merganser, Cormorant, Grey Plover, Lapwing, Black-headed Gull, Common Gull and Lesser Black-backed Gull);
2. 6 species are currently considered as **Unfavourable** (Shelduck, Wigeon, Great Crested Grebe, Dunlin, Curlew and Redshank);
3. 3 species are currently considered as (Intermediate) **Unfavourable** (Teal, Grey Heron and Oystercatcher).
4. 4 species are currently considered as **Favourable** (Little Grebe, Golden Plover, Black-tailed Godwit and Bar-tailed Godwit).

Site conservation condition and population trends were also reviewed in light of species' all-Ireland and international trends (Table 4.4). All-Ireland trends follow Crowe & Holt (2013) while International trends follow Wetlands International (2012).

**Table 4.4 SCI species of Cork Harbour SPA – Current Site Conservation Condition**

Special Conservation Interests	BoCCI Category <sup>a</sup>	Site Population Trend <sup>b</sup>	Site Conservation Condition	Current all-Ireland Trend <sup>c</sup>	Current International Trend <sup>d</sup>
Shelduck	Amber	- 39	Unfavourable	Stable	Increasing
Wigeon	Red	- 27	Unfavourable	Declining	Stable
Teal	Amber	- 1	(Intermediate) Unfavourable	Stable	Increasing
Pintail	Red	- 65	Highly Unfavourable	Increasing	Increasing
Shoveler	Red	- 75	Highly Unfavourable	Increasing	Increasing
Red-breasted Merganser	Green	- 51	Highly Unfavourable	Stable	n/c
Little Grebe	Amber	+ 16	Favourable	Stable	Increasing
Great Crested Grebe	Amber	- 46	Unfavourable	Declining	Declining?
Cormorant	Amber	- 50	Highly Unfavourable	Stable	Increasing
Grey Heron	Green	- 15	(Intermediate) Unfavourable	Stable	Increasing
Oystercatcher	Amber	- 20	(Intermediate) Unfavourable	Stable	Declining
Golden Plover	Red	+ 21	Favourable	Declining	Declining
Grey Plover	Amber	- 68	Highly Unfavourable	Declining	Declining?
Lapwing	Red	- 68	Highly Unfavourable	Declining	Stable
Dunlin	Red	- 49	Unfavourable	Declining	Stable
Black-tailed Godwit	Amber	+ 16	Favourable	Increasing	Increasing
Bar-tailed Godwit	Amber	+ 41	Favourable	Stable	Increasing
Curlew	Red	-44	Unfavourable	Declining	Declining
Redshank	Red	-29	Unfavourable	Stable	Stable/Increasing?
Black-headed Gull	Red	- 53	Highly Unfavourable	n/c	n/c
Common Gull	Amber	- 89	Highly Unfavourable	n/c	n/c
Lesser Black-backed Gull	Amber	- 83	Highly Unfavourable	n/c	n/c

<sup>a</sup>After Colhoun & Cummins, 2013; <sup>b</sup> Site population trend analysis; see Table 4.3; <sup>c</sup>all-Ireland trend - where a species is deemed to be increasing or declining if the annual rate of change is equal to or greater than 1.2% (after Crowe & Holt, 2013); <sup>d</sup> current international trend after Wetlands International (2012).

Table 4.4 also shows the relationship between a species' long-term site trend and the current all-Ireland trend for the period 1999/00 to 2010/11. The colour coding used represents the following cases:-

- Grey – un-assessed.
- Green – species whose populations are stable or increasing at both site level and all-Ireland level.
- Beige – species whose populations are declining at both site level and all-Ireland level. Therefore there is a potential for factors at a larger spatial scale to be influencing the observed trend at site level.
- Orange - species whose populations are exhibiting a 1.0 – 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 decline of >50.0% at site level but are stable or increasing at all-Ireland level.

The pink and red categories listed above highlight where populations are stable or increasing 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).

## 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 Cork Harbour SPA.

Section 5.2 provides selected ecological summary information for non-breeding waterbirds of Cork Harbour. Section 5.3 presents results from the 2010/11 Waterbird Survey Programme. Finally, Section 5.4 provides summary information on activities and events that occur in and around Cork Harbour that may either act upon the habitats within the site, or may interact with waterbirds using the site.

The information provided is intended to:-

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

Note however, that the information does not aim to provide a comprehensive assessment on which to assess plans and projects as required under the Habitats Directive, but rather should inform the scope of these assessments and help direct where further detailed examinations are required. The information presented in this report was compiled in November 2013 and updated in July 2014.

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

Waterbirds, defined as “birds that are ecologically dependent on wetlands” (Ramsar Convention, 1971), are a diverse group that includes divers, grebes, swans, geese and ducks, gulls, terns and wading birds. During the data period 1994/95 – 2012/13, the I-WeBS database shows a total of 95 waterbird species that have been recorded at Cork Harbour. These species represent eleven waterbird families: *Gaviidae* (divers), *Podicipedidae* (grebes), *Anatidae* (swans, geese and ducks), *Rallidae* (Water Rail, Moorhen and Coot), *Haematopodidae* (oystercatchers), *Charadriidae* (plovers and lapwings), *Scolopacidae* (sandpipers and allies) and *Laridae* (gulls and terns) plus *Phalacrocoracidae* (Cormorants), *Ardeidae* (Herons) and *Alcedinidae* (Kingfisher).

As described in Section 1.1, the wetland habitats contained within this SPA are considered to be a Special Conservation Interest in their own right. The wetland habitat is an important resource for listed SCI species and for other waterbird species included in the total waterbird assemblage. These species may include those that utilise the site during passage, those that are present in months of the year outside of the non-breeding season<sup>16</sup> or species that use the site at certain times only (e.g. as a cold weather refuge).

During the I-WeBS period 1994/95 – 2012/13, 45 waterbird species occurred on a regular basis<sup>17</sup> at Cork Harbour. Excluding SCI species results in 22 additional regularly-occurring species and these are listed in Table 5.1.

---

<sup>16</sup> Non-breeding season is defined as September – March inclusive.

<sup>17</sup> Regular is defined as a species that has occurred in 15 out of the 19-year data period.

**Table 5.1 Regularly-occurring non SCI waterbird species of Cork Harbour during the non-breeding season**

Species	Baseline Data Period <sup>1</sup> (1995/96 – 1999/00)	Recent Site Average <sup>2</sup> (2008/09 – 2012/13)
Mute Swan ( <i>Cygnus olor</i> )	42	50
Canada Goose ( <i>Branta canadensis</i> )	10	11
Gadwall ( <i>Anas strepera</i> )	5	12
Mallard ( <i>Anas platyrhynchos</i> )	581 (n)	355 (n)
Pochard ( <i>Aythya ferina</i> )	72 (n)	2
Tufted Duck ( <i>Aythya fuligula</i> )	64	30
Goldeneye ( <i>Bucephala clangula</i> )	22	16
Great Northern Diver ( <i>Gavia immer</i> )	3	5
Little Egret ( <i>Egretta garzetta</i> )	14	115 (n)
Water Rail ( <i>Rallus aquaticus</i> )	3	1
Moorhen ( <i>Gallinula chloropus</i> )	44	25
Coot ( <i>Fulica atra</i> )	53	8
Ringed Plover ( <i>Charadrius hiaticula</i> )	73	30
Knot ( <i>Calidris canutus</i> )	26	167
Snipe ( <i>Gallinago gallinago</i> )	73	50
Spotted Redshank ( <i>Tringa erythropus</i> )	1	3
Greenshank ( <i>Tringa nebularia</i> )	46 (n)	84 (n)
Turnstone ( <i>Arenaria interpres</i> )	127 (n)	162 (n)
Mediterranean Gull ( <i>Larus melanocephalus</i> )	3	28
Herring Gull ( <i>Larus argentatus</i> )	130	65
Great Black-backed Gull ( <i>Larus marinus</i> )	147	77
Kingfisher ( <i>Alcedo atthis</i> )	1	2

Grey shading denotes an Annex I species; <sup>1</sup> Baseline data is the 5-year mean peak for the period 1995/96 – 1999/00 (I-WeBS); <sup>2</sup> recent data is the 5-year mean peak for the period 2008/09 – 2012/13 (I-WeBS).  
(n) = numbers of all-Ireland importance (after Crowe and Holt, 2013).

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

Table 5.2 provides selected ecological information for waterbird SCI species of Cork Harbour SPA. Information is provided for the following categories<sup>18</sup>:-

- waterbird family (group);
- winter distribution – species distribution range during winter (based on the period 2001/02 – 2008/09 (after Boland & Crowe, 2012);
- 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).

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

<sup>18</sup> Notes to aid the understanding of categories and codes used in Table 5.2 are provided in the table sub text.

Reliance on alternative habitats will vary between species and from site to site. Use of alternative habitats is also likely to vary through time, from seasonally through to daily, and different habitats may be used by day and night (Shepherd et al. 2003). Different waterbirds may utilise wetland habitats in different ways. For example, while the majority of wading birds forage across exposed tidal flats, species such as Lapwing and Golden Plover are considered to be 'terrestrial waders,' typically foraging across grassland and using tidal flats primarily for roosting. When tidal flats are covered at high water, intertidally-foraging waterbirds are excluded and many will move to nearby fields to feed. Terrestrial foraging is also important when environmental factors (e.g. low temperature) reduce the profitability of intertidal foraging (e.g. Zwarts & Wanink, 1993). Some waterbird species are simply generalists, and make use of a range of habitats, for example the Black-tailed Godwit that forages across intertidal mudflats and grassland habitats. Other waterbird species such as Greenland White-fronted Goose or Bewick's Swan are herbivores and are therefore reliant on terrestrial areas, often outside of the SPA boundary, and use the wetland site primarily for roosting. Some species switch their habitat preference as food supplies become depleted; an example being Light-bellied Brent Geese that exploit grasslands increasingly when intertidal seagrass and algae become depleted.

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

Thus the area designated as a SPA can represent a variable portion of the overall range of the listed waterbird species. To this end, data on waterbird use of areas adjacent to or ecologically connected to the SPA are often collected. Indeed for some species a mix of site-related and wider countryside measures are needed to ensure their effective conservation management (Kushlan, 2006). Furthermore, it is recommended that assessments that are examining factors that have the potential to affect the achievement of the site's conservation objectives should also consider the use of these '*ex-situ*' habitats, and their significance to the listed bird species.

**Table 5.2** Non-breeding waterbird SCIs – Ecological characteristics, requirements & specialities

Special Conservation Interests	Family (group)	Winter distribution <sup>A</sup>	Trophic Guild <sup>B</sup>	Food/Prey Requirements <sup>C</sup>	Principal supporting habitat within site <sup>D</sup>	Ability to utilise other/alternative habitats <sup>E</sup>	Site Fidelity <sup>F</sup>
Shelduck <i>Tadorna tadorna</i>	Anatidae (shelducks)	Localised	1, 5	Wide	Intertidal mud and sand flats, shallow subtidal	3	High
Wigeon <i>Anas penelope</i>	Anatidae (dabbling ducks)	Widespread	1, 5	Narrower	Intertidal mud and sand flats Sheltered & shallow subtidal and lagoons	1	Weak
Teal <i>Anas crecca</i>	Anatidae (dabbling ducks)	Very widespread	1	Wide	Intertidal mud and sand flats Sheltered & shallow subtidal and lagoons	3	Weak
Pintail <i>Anas acuta</i>	Anatidae (dabbling ducks)	Localised	1	Wide	Intertidal mud and sand flats Sheltered & shallow subtidal and lagoons	1	Weak
Shoveler <i>Anas clypeata</i>	Anatidae (diving ducks)	Intermediate	1	Wide	Sheltered & shallow subtidal and lagoons	3	Moderate
Red-breasted Merganser <i>Mergus serrator</i>	Anatidae (sea ducks)	Localised	2	Highly specialised	Sheltered & shallow subtidal	1	Unknown
Little Grebe <i>Tachybaptus ruficollis</i>	Podicipedidae (grebes)	Widespread	1,2	Wide	Sheltered & shallow subtidal	3	Unknown
Great Crested Grebe <i>Podiceps cristatus</i>	Podicipedidae (grebes)	Widespread	2/3	Narrower	Sheltered & shallow subtidal over sand flats	2	High
Cormorant <i>Phalacrocorax carbo</i>	Phalacrocoracidae (cormorants)	Widespread	3	Highly specialised	Sheltered & shallow subtidal	1	Moderate
Grey Heron <i>Ardea cinerea</i>	Ardeidae (herons)	Widespread	6	Narrower	Sheltered & shallow subtidal; coastal lagoons	1	Unknown
Oystercatcher <i>Haematopus ostralegus</i>	Haematopodidae (wading birds)	Intermediate	4	Narrower	Intertidal mud and sand flats	2	High
Golden Plover <i>Pluvialis apricaria</i>	Charadriidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate
Grey Plover <i>Pluvialis squatarola</i>	Charadriidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	High
Lapwing <i>Vanellus vanellus</i>	Charadriidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	Moderate
Dunlin <i>Calidris alpina</i>	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	3	High
Black-tailed Godwit <i>Limosa limosa</i>	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	High

Special Conservation Interests	Family (group)	Winter distribution <sup>A</sup>	Trophic Guild <sup>B</sup>	Food/Prey Requirements <sup>C</sup>	Principal supporting habitat within site <sup>D</sup>	Ability to utilise other/alternative habitats <sup>E</sup>	Site Fidelity <sup>F</sup>
Bar-tailed Godwit <i>Limosa lapponica</i>	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	Moderate
Curlew <i>Numenius arquata</i>	Scolopacidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	High
Redshank <i>Tringa totanus</i>	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate
Black-headed Gull <i>Chroicocephalus ridibundus</i>	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal flats & sheltered & shallow subtidal	2	Moderate
Common Gull <i>Larus canus</i>	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal mud and sand flats & sheltered & shallow subtidal	2	Moderate
Lesser Black-backed Gull <i>Larus fuscus</i>	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal flats & sheltered & shallow subtidal	1	Unknown

<sup>A</sup> Winter distribution: Very widespread (>300 sites); Widespread (200 – 300 sites); Intermediate (100 – 200 sites); Localised (50-100 sites); Highly restricted (<50 sites) (based on Boland & Crowe, 2012).

<sup>B</sup> 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.

<sup>C</sup> Food/prey requirements - species with a wide prey/food range; species with a narrower prey range (e.g. species that forage upon a few species/taxa only), and species with highly specialised foraging requirements (e.g. piscivores).

<sup>D</sup> Principal supporting habitat present within Cork Harbour. Note that this is the main habitat used when foraging with the exception of Golden Plover and Lapwing (roosting).

<sup>E</sup> 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.

<sup>F</sup> Site fidelity on non-breeding grounds: Unknown; Weak; Moderate; or High (based on published literature).

## 5.3 The 2010/11 waterbird survey programme

### 5.3.1 Introduction

The 2010/11 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.

Cork Harbour is a large diverse wetland site and includes areas of open water, sandy shore, mudflats, rocky shore and saltmarsh. Because of its large size, the site was surveyed over a two-day period each survey month. A survey programme of four low tide counts (October, November and December 2010 and February 2011) and one high tide count (January 2011) were undertaken as follows:

Survey	Day 1	Day 2
Low Tide 1	07.10.10	08.10.10
Low Tide 2	08.11.10	09.11.10
Low Tide 3	06.12.10	07.12.10
Low Tide 4	03.02.11	04.02.11
High Tide	13.01.11	14.01.11

Waterbirds were counted within a series of 73 count subsites (refer to Appendix 6), many of these extending beyond the SPA boundary, so it should be noted that count boundaries and SPA boundaries are not coincident.

The behaviour of waterbirds during counts was attributed to one of two categories (foraging or roosting/other) while the position of birds was recorded in relation to one of four broad habitat types (Table 5.3). Note that these broad habitats were defined specifically for the survey programme and do not follow strict habitat-based definitions for these areas, nor follow definitions used in relation to conservation objectives outlined in Section 3.1. For a detailed survey methodology, please refer to NPWS (2011).

**Table 5.3 Definition of broad habitat types used**

Broad Habitat Type	Broad Habitat Description
Intertidal (area between mean high water and mean low water)	Refers to the area uncovered by the tide and most likely dominated by mudflats and sandflats. It may also include areas of rocky shoreline, areas of mixed sediment and gravel/pebbles or shingle and gravel shores.
Subtidal (area that lies below mean low water)	Refers to areas that are covered by seawater during counts. During low-tide counts it will include offshore water, tidal channels and creeks as well as tidal rivers.
Supratidal	This category pertains to the shore area and habitats immediately marginal to and above the mean high-water mark. The supratidal section is an integral part of the shoreline. This broad habitat also includes areas of saltmarsh where the saltmarsh is contiguous with coastal habitats lying above. Note that patches of lower saltmarsh (e.g. <i>Spartina</i> sp.) surrounded by intertidal flats, were included in the intertidal category.
Terrestrial	Used where birds were recorded within habitats close to the shoreline but were above the intertidal and supratidal levels. Also includes aquatic areas that are not marine subtidal, such as lagoons and lakes.

In addition to the main survey programme described above, a high tide roost survey was undertaken on the 29<sup>th</sup> and 30<sup>th</sup> November 2010. During this survey, waterbird roost sites were located, species and numbers of waterbirds counted and the position of roosts marked onto field maps.

### 5.3.2 Waterbird data, analyses and presentation

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

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

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

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

#### **Subsite Rank Position - Categories**

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

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

Waterbird count data for low tide surveys are also presented as species distribution maps ('dot density maps'). Dot-density maps show waterbird species distribution within intertidal or subtidal habitat<sup>19</sup> divided into 'foraging' birds and 'roosting/other' birds. These maps show the number of birds represented by dots; each dot representing one, or a pre-determined number of birds. As the dots are placed in the appropriate subsites and broad habitat types for the birds counted, the resulting map is equivalent to presenting numbers and densities and provides a relatively quick way of assessing species distribution.

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

---

<sup>19</sup> Note that birds within supratidal or terrestrial habitat are not included within these maps.

## Notes on data interpretation and methodological limitations

Cummins and Crowe (2011) provide a summary of waterbird data collected. In particular, the following survey constraints were noted.

Given the large size of Cork Harbour, full count coverage was not possible. In particular this relates to areas of open marine water in the outer harbour where counting beyond about 1.5 km offshore was not feasible. In some of the more industrialised areas (Ringaskiddy and Little Island), access to the shoreline along some stretches was not possible. However, in most cases, counters were able to access suitable vantage points to allow them to cover these subsites. Coverage of offshore islands (e.g. Spike Island) only included sections of the shore visible to the observer on the mainland (Cummins & Crowe, 2011).

Weather conditions during the winter of 2010/11 proved extremely challenging for fieldworkers, December 2010 being the coldest on record (Met Éireann, 2010b). For example the count on 6<sup>th</sup> December started with a temperature of -5 °C. It should be borne in mind that the cold weather is likely to have affected the numbers and distribution of waterbirds at the site, as well as nationally, as was the case in the previous cold winter of 2009/10 (Crowe et al. 2011).

Subsite rankings and dot-density maps relate to the distribution of waterbirds at subsite level as recorded within the survey area during the 2010/11 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, other species such as Greenshank or Grey Heron may not. It is also important to consider that distribution maps and data refer to a single season of low tide surveys. Although important patterns of distribution will emerge, these distributions should not be considered absolute; waterbirds by their nature are highly mobile and various factors including tide (e.g. spring/neap), temperature, direction of prevailing winds, changing prey densities/availabilities and degree of human activity across the site, could lead to patterns that may change in different months and years.

Dot-density maps are not intended to show the actual position of each bird; the dots are placed randomly within subsites so no conclusions can be made at a scale finer than subsite. Dots are placed in the appropriate subsites and broad habitat types for the birds counted but given that the broad habitats are based on OS mapping, there are various cases where the mapping does not accurately portray where a bird was e.g. in the case of birds associated with freshwater flows, or small creeks that are not shown on OS maps. These associations are discussed as necessary in the individual species text tables.

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

### 5.3.3 Summary Results

A total of 58 waterbird species were recorded during the 2010/11 survey programme at Cork Harbour. Cummins and Crowe (2011) provide a summary of waterbird data collected. Note that the total count area and SPA area are not exactly coincident. Maps showing count subsites and how these relate to the SPA boundary are provided in Appendix 6.

Table 5.4 shows peak numbers (whole site<sup>20</sup>) for SCI species recorded during the low tide (LT) and high tide (HT) surveys.

Average subsite occupancy, the average proportion of subsites in which a species occurred during low tide counts, ranged from 3% (Golden Plover) to 77% (Black-headed Gull). Only six SCI species occurred in more than half of the count subsites (Cormorant, Oystercatcher, Black-tailed Godwit, Curlew, Redshank and Black-headed Gull). Pintail was counted in one subsite (OL545) and on one low tide survey occasion only.

Average percentage area occupancy is defined as the average proportion of the whole site area that a species occurred in during low tide counts. Although this is a broad calculation across all habitat zones it presents some indication of the range of a species across the site as a whole. Average percentage area occupancy ranged from 4% (Golden Plover) to 88% (Black-headed Gull). Eight SCI species distributed, on average, across more than half of the count area (Table 5.4).

---

<sup>20</sup> Totals from the two days combined.

**Table 5.4 Cork Harbour 2010/2011 waterbird surveys – summary data for SCI species**

Site Special Conservation Interests (SCIs)	Peak number - LT surveys <sup>1</sup>	Peak number - HT survey <sup>1</sup>	Average subsite % occupancy <sup>11</sup>	Average % area occupancy <sup>11</sup>
Shelduck ( <i>Tadorna tadorna</i> )	1,476 (n)	1,250 (n)	32 (16)	35 (21)
Wigeon ( <i>Anas penelope</i> )	1,646 (n)	1,629 (n)	28 (12)	30 (16)
Teal ( <i>Anas crecca</i> )	1,662 (n)	1,360 (n)	38 (11)	33 (12)
Pintail ( <i>Anas acuta</i> )	11	12	-	-
Shoveler ( <i>Anas clypeata</i> )	28	35 (n)	6 (4)	7 (4)
Red-breasted Merganser ( <i>Mergus serrator</i> )	82 (n)	79 (n)	8 (6)	11 (10)
Little Grebe ( <i>Tachybaptus ruficollis</i> )	159 (n)	72 (n)	21 (6)	15 (5)
Great Crested Grebe ( <i>Podiceps cristatus</i> )	150 (n)	128 (n)	18 (9)	32 (14)
Cormorant ( <i>Phalacrocorax carbo</i> )	273 (n)	279 (n)	53 (5)	73 (5)
Grey Heron ( <i>Ardea cinerea</i> )	91 (n)	61 (n)	46 (16)	56 (24)
Oystercatcher ( <i>Haematopus ostralegus</i> )	1,753 (n)	1,245 (n)	76 (2)	76 (34)
Golden Plover ( <i>Pluvialis apricaria</i> )	2,932 (n)	12	3 (1)	4 (2)
Grey Plover ( <i>Pluvialis squatarola</i> )	69 (n)	45 (n)	11 (8)	16 (10)
Lapwing ( <i>Vanellus vanellus</i> )	1,831 (n)	3,961 (n)	18 (9)	16 (9)
Dunlin ( <i>Calidris alpina</i> )	8,020 (n)	5,786 (n)	27 (9)	31 (8)
Black-tailed Godwit ( <i>Limosa limosa</i> )	3,348 (i)	1,675 (i)	58 (5)	53 (5)
Bar-tailed Godwit ( <i>Limosa lapponica</i> )	222 (n)	255 (n)	7 (2)	9 (6)
Curlew ( <i>Numenius arquata</i> )	1,698 (n)	948 (n)	74 (4)	80 (6)
Redshank ( <i>Tringa totanus</i> )	2,275 (n)	1,302 (n)	71 (5)	71 (6)
Black-headed Gull ( <i>Chroicocephalus ridibundus</i> )	5,279 (a)	3,254 (a)	77 (3)	88 (4)
Common Gull ( <i>Larus canus</i> )	896 (a)	793 (a)	37 (10)	51 (13)
Lesser Black-backed Gull ( <i>Larus fuscus</i> )	299	110	34 (6)	45 (9)

(i) denotes numbers of international importance (after Wetlands International, 2012); (n) denotes numbers of all-Ireland importance (1% thresholds; 2006/07 – 2010/11 Crowe & Holt, 2013); (a) denotes surpassing the threshold of significance as applied by Crowe (2005) which is 1,000 for Black-headed Gull, and 500 for Common Gull and Lesser Black-backed Gull (Crowe, 2005).

<sup>1</sup> Survey dates are given in Section 5.3.1. <sup>11</sup> Mean (± s.d.) averaged across the four low tide surveys with the exception of two species (Shoveler and Grey Plover) that were not present on all dates, in which case they were averaged over two or more survey dates and Pintail, that was present on one count only.

Whole site species richness (total number of species) ranged between 40 species and 48 species during low tide surveys and 47 species were recorded during the high tide survey.

During low tide surveys, 42 subsites (58%) supported, on average ten or more species (full results in Appendix 7). 13 subsites supported 15 or more species. Lough Beg (0L453) recorded the greatest number of species on average (24) and diversity during low tide

surveys was very consistent with 22, 24, 25 and 24 species recorded for the four low tide surveys respectively. The majority of subsites (62) recorded a greater number of species during low tide surveys, as opposed to the high tide survey.

#### 5.3.4 Waterbird distribution

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

Ranked assessments relate to the broad habitat that birds were observed in. In some cases, data for different broad habitats have been combined, for example, in the case of wading birds and intertidal/subtidal habitat which were combined in order to include those individuals that had their feet in water and were recorded as subtidal.

The fact that different subsites may be ranked as 'Very High' for the same species highlights the fact that several subsites may be equally important for the species being analysed. This approach, rather than averaging across all surveys, allows for equal weightings to be given for temporal differences – e.g. concentrations of foraging birds in different subsites at different times reflecting the natural pattern of distribution across time as species move in response to changing prey densities or availabilities.

Tables 5.5 (a–f) are followed by species discussion notes which provide additional information on the distribution of each SCI species, drawing upon the full extent of the data collected and analysed for Cork Harbour. Waterbird distribution dot-density maps are provided in Appendix 8; summary roost data are presented in Appendix 9.

**Table 5.5 (a) Cork Harbour Subsite assessment – total numbers during LT surveys (across all behaviours and habitats)** (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods).

Species ► Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB
0L041			M		M					M				L		M		L	L	L		
0L099			M				V		M	H						L				M	M	
0L453	H	H	H		V		M		H	H	H		V	M	H	M	V	H	V	V	V	H
0L469											H			M	M	H			H	M		
0L479	M	V	H		V	H	M	H	H	H	M		H	M	M	H		H	H	M	M	
0L483	V	H	V			H	V	H	V	H	H		H		H	H	M	H	H	H	H	H
0L486	M	M	L				L		H	H	H			M	H	H	V	H	M	V	L	V
0L487	M	M	M			M	M	H		H	H	M	M		L	H		H	H	M	H	M
0L491	V	H	L		V	V		V	H	V	H				M	H		H	H	V	H	M
0L496	H	L	M						V	V	H				M	M		M	M	H		M
0L510	H	M	M			L		M	M	V	H	M	H		V	M	V	H	M	H	M	M
0L511	L	M				M	H	H	H	H	H		V		H	L		M	M	M	M	M
0L512	H		L			V	M	V	M	H	H		M			H	M	M	M	M	V	L
0L513														V		H		M	L			
0L514														H		H		M				
0L517	M		H						M	H	M		M	L	M	H		V	H	M		M
0L518									H		M							L		H	M	
0L519								L	H	H	H			L				L	L	M	M	H
0L520	H	H	V						M	V	L			H	H	V		H	H	H	H	V
0L521									L	H	M							L	L	M	H	M
0L522	L		M						M	H	M					M		M	M	L	L	M
0L523									M	V	M							L	L	L	M	
0L524	L	L	L				L		M	H	M				L	H		H	M	H		M
0L525	H		H						H	M	M			L	H	H	M	H	H	H	M	H
0L526									H	H	L			M	L	H		L	H	V	H	H
0L527		L							H	M	M		M		L			L	L	L	L	
0L528	L								H	H	H							L	M	M		H
0L529								M	H	H	H		H					M	M	H	M	H
0L530	M		H				H		L	H	M				H	M		M	M	H		M
0L532									H	M	M							L	H	H		V
0L533	M	H	H					L	L	H	H	V	M	V	V	H	H	M	H	H	M	H
0L534	H	V	M				M		H	H	H	V	M	V		H	V	H	H	M		M
0L535	H	L	L				M		H	H	H			H	L	H	M	V	H	H	H	M

Species ▶ Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB
0L536	M	H				L		H	H		V	H			V	H	L	V	H	M	L	H
0L537	H	L	H					H	M		H				H	H		H	H	H	L	H
0L538								H	H	M	L					M		L	H	L	L	
0L539		L						H	M	M	L					M		M	L	M	L	M
0L540	L	L	M					L	L		M		L	L	H	M		M	H	H	L	M
0L541	H	M	L					L	H	M	H		H		H	M		H	H	H	H	L
0L542	L		H			V			L	H	H			M	M	H	M	H	M	H	L	M
0L543			M				H			M	M				M	H	M	M	M	M		M
0L544			L													L			L			
0L545	H	H	M	V						M	L					M		H	H	L		
0L546	V	H	H							M	H	V	H	H	H	H		H	H	M		M
0L547	M								M		M		H			H		H	H	H	H	
0L548	H										H			H	H	H		H	V	M		
0L551	M		L				L	M	M		M		M		L	M	L	M	M	M		
0L552	L	L				L		M	H	M	M					H		L	L	L	M	M
0L557			M		L		L		M	H	H			M	M	H		M	H	H	H	H
0L558							M		M	V	M							M	L	L	M	M
0L559	L		L			M		H	L	H	M							L	L	H	H	H
0L560		M					H		M	H	L	H						M		H	H	H
0L561								V	H	H	M							L		H	H	H
0L562		H						M	H	H	H							M	L	M	H	
0L563	L	H	M		M	M		H	H	V	H			H	M	L		H	H	H	V	L
0L564	L	M	L		H		H		M	H	H			M	M			H	H	H	V	
0L565	M	M	H							H	M			L		H		H	H	L		
0L566									V											L		
0L567						M		H	H	M	L							L	L	L	M	M
0L568			L							M						M		H		L		
0L582	L	L	L					M	H	V	H					M		M	M	H	H	
0L583								M	M		L									L		
0L585	L		M																	L		
0L586			M							M						L		L	L	L		
0L587	L	V	H				V		M	M				H		L		M	L			
0L589	V	L	M				H		H	M	H					H		H	H	M	M	M

Species ▶ Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB
0L590	V	H	H				L		M	H	M			H	M	H		H	H	H	L	
0L591	H	H	V				M			M	M			H		M		H	H	M	H	
0L592	H	H	H				V		H	H	H			V	H	V	H	H	H	H	H	H
0L593	L	M	L			V	H	M	M	H	V					L		M	M	H	L	H
0L595	L	V	M		H		L		M	M	H			H		M		V		M	M	
0L601																						
0L602																		M				

**Table 5.5 (b) Cork Harbour Subsite assessment – highest rank obtained during the high tide survey (across all behaviours and habitats)**

Species ► Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB	
OL041		31	21												8								
OL099							1		24	8	38			20		17				15	8		
OL453	13	26			1			8			7			15			2	22	3	1			9
OL469	3	14	16				6		18		5				10			17	4	36			
OL479	10	1	8		1	4		12	18		8	1	3	6	6	3		10	12				
OL483	8	17	4			6		11	5		25							31	20	39	3	3	
OL486		22				12	15	16	14		3			9	7			3	28	3	12	1	
OL487	20	28	20			7	9				16		5					31	15	41			
OL491	4	20	29			7		1	18		1								13	10	4		
OL496	11		23						4	1	24				12			27	22	36			6
OL510			30								36									19	16		
OL511								10	10	8										21			
OL512						3	6	3	11		6							19	29	48			
OL513																							
OL514																							
OL517		16	9					12			8							27	29	33			
OL518									7														
OL519									1		2							16	41	43	23		
OL520	16	17	31						24	8	28			5		12		19	31	34	18		
OL521											38							24	36	45	24		
OL522	18								11	8									20	46	5		
OL523										3											18		
OL524	14		28							8	33								4	26	14	6	
OL525	19		12											8	2				7	26	21	9	
OL526																8		31	34	9	10	2	
OL527									30		33		2		5				41				
OL528									18	8	22									30			
OL529									8	4	10								24	35		6	
OL530	7		13				2			4	14								23	26		9	
OL532									18	8	27									12	13	5	
OL533	20	24	27										5	2	1			14	9	11			
OL534	1	4	15										7	3		11	1	1	17	6			
OL535	25	21	11								36					6	3	26	2	8		4	

Species ▶ Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB	
OL536								3															
OL537											19		1			18				32		9	
OL538							15													48			
OL539						5	3	6	2														
OL540		30	22				15	16	24									23	13				
OL541		14						8	24		4		4	17	8				41	1830	18		
OL542	5		17			10	11			2	13			16	11	9		15	6	16			
OL543	23		34															34	36	14			
OL544			34															34					
OL545	9	29	25													13		7	31	25			
OL546	2	3	6	1						8	17			18				11	11	39			
OL547									11										41				
OL548											28								18	42			
OL551	23						15	16	8		28					21		34	36				
OL552						2		5	5										36				
OL557			6						30		21			4	4			30	24	74	7		
OL558						10	11		30	8	28							27	41	24			
OL559								12	30		22								41	38	24		
OL560		27					11													17	15		
OL561									14	4										19			
OL562		12	20			7		12	14		11				3				41	48			
OL563		10	31		6	1		7	14	4				1						12	1		
OL564		12			4		4		24		20							34	41	2126	21		
OL565	17	9	2		3				30		26					7		5	1	17			
OL566									3														
OL567								2	18											36	43		
OL568		6			5					8						16		8	26				
OL582									24		38									612	6		
OL583								16	30														
OL585	22		25							8				7		5		17	34	48			
OL586			19													20		19	41				
OL587	25	25	18		6		6							13		18		4	26	2423	24		
OL589	11	7	5								14					10		13	19				

Species ▶ Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB
OL590	15	5	1								28			10		2		12	10	7	2	
OL591		23	10				9				18			19		15		6	8	23	16	
OL592	6	19	3				11				12			14		14		9	16	5	10	9
OL593		2	23								33							2	31			
OL595	25	10	14				5							11		1		25		22	9	
OL601																						
OL602		8														4						

**Table 5.5 (c) Cork Harbour Subsite assessment – total numbers foraging intertidally<sup>1</sup> and subtidally<sup>11</sup>** (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods). *Note that Pintail and Golden Plover were not recorded foraging.*

Species Subsites	SU <sup>1</sup>	WN <sup>11</sup>	T. <sup>1</sup>	SV <sup>11</sup>	RM <sup>11</sup>	LG <sup>11</sup>	GG <sup>11</sup>	CA <sup>11</sup>	H. <sup>11</sup>	OC <sup>1</sup>	GV <sup>1</sup>	L. <sup>1</sup>	DN <sup>1</sup>	BW <sup>1</sup>	BA <sup>1</sup>	CU <sup>1</sup>	RK <sup>1</sup>	BH <sup>1</sup>	CM <sup>1</sup>	LB <sup>1</sup>	
OL041														L		L	L				
OL099																					
OL453	H	V	M			H		M	V	H	V	H	H	H	V	H	V	V	V	V	
OL469										H			L				H				
OL479	M	L	H		V	L	H	H	H	M	H		M	M		H	H	M			
OL483	V	M	V		H	V	M			H	H		H	H	M	H	H	V		H	
OL486	M	M	L			L		M	M	M			H	H	V	M	M	M		M	
OL487	M		M			M	H		H	H	M		L	H		M	H	L			
OL491	H	V	L	V				V	M	H	H		M	H		H	H	H			
OL496	H	L							H	H			M	M		H	M	M			
OL510	M	L	M		M		H		H	H	H		V	M	V	H	M	H	M	H	
OL511	L	M			V	L	H	H		H	V		H	L		M	M	M		M	
OL512	H		M		V	M	H	H	H	H	M			H	M	M	M	L	L		
OL513																					
OL514																					
OL517	M		V							H	M		M	H		V	M	H			
OL518								M		M						L					
OL519							L	V	H	M						L	L				
OL520	H	L	H						H	L		L	M	H		H	H	L			
OL521								M		M						L	L	M	H		
OL522	L		M					L	M	L				M		M	M	L			
OL523								M	H	M						L	L				
OL524	L		L			M		M	M	M			L	H		H	M			M	
OL525	H		H					H	H	M		M	H	H	L	H	H	H		H	
OL526									V	L			L	H		L	H	M			
OL527										M	M		L			L	L	L	M		
OL528	L							H		H						M	M	M			
OL529							M	H		H	H					M	M				
OL530	M		H						H	M			H	M		M	M	H			
OL532								H	M	M							L				
OL533			L				L			H	M		V	H	H	M	H	H			
OL534	H		V			M		M		H	M			H	V	H	H	H			
OL535		L				H		M		H		H	L	H	M	V	H	H	M		

Species Subsites ▼	SU'	WN''	T.'	SV''	RM''	LG''	GG''	CA''	H.''	OC'	GV'	L.'	DN'	BW'	BA'	CU'	RK'	BH'	CM'	LB'
0L536		M			M		V	L		V			V	H	H	V	H	L	M	V
0L537	M	L	L				M	M		H			H	H		H	H	V		V
0L538									M	L				M		L		M		
0L539		M						H	M	L				M		M	L	L		
0L540								L		M			H	M		H	H	M	L	L
0L541	H		L					L	M	H	H	H	H	M		H	H	H	H	M
0L542	L								H	H		M	M	H	L	H	H	M	M	
0L543			L			H				M			M	H	M	M	M	M		M
0L544															L					
0L545	M		M							L				M		M	H			
0L546	V		V						M	H	H		H	H		H	H			
0L547	H							H		H	M			H		H	H	M		
0L548	V									H			H	M		H	V			
0L551	M		M			M	M			M	M		L	M	L	M	M	L		
0L552	L				L		M	M		M				M		L	L	L	H	
0L557			M			L		M	M	L			M	H		M	H	H		
0L558						M		H	M	M						M	L			
0L559					M		V	M	H	M						L	L	M	M	
0L560		M				H			H											
0L561							V	V	H	M						L		M		H
0L562		H					M	H	H	H						M	L	M	M	
0L563	L	H	L	H			M	M	V	H		V	M	L		H	H	H	H	
0L564		H	L	H		H		M	M	H		V	M			H	H	H	H	
0L565	M	M	V						V	H				H		H	H	L		
0L566																				
0L567					M		H	H	H	L						L	L			
0L568																				
0L582			L					H	H	H	H			M		L	M	M	M	
0L583								M	H	L										
0L585																				
0L586																				
0L587						M		M									L	L		
0L589	V		M			H		H		H				H		M	M	M	M	M

Species ▶ Subsites ▼	SU'	WN''	T.'	SV''	RM''	LG''	GG''	CA''	H.''	OC'	GV'	L.'	DN'	BW'	BA'	CU'	RK'	BH'	CM'	LB'
0L590	V		M			L		H	H	M		L	M	V		H	H	H		
0L591	H	M	H			H			M	M		V		M		H	H	H		
0L592	H	H	H			V		M	H	V		H	H	V	M	H	H	V	H	
0L593	L				V	H	L	H	M	V				L		M	M	M		V
0L595																				
0L601																				
0L602																				

**Table 5.5 (d) Cork Harbour Subsite assessment – ranked top ten peak low tide intertidal foraging densities - LT surveys**

Species ▶ Subsites ▼	SU	OC	GV	DN	BW	BA	CU	RK
OL453			3			7	6	9
OL469		5						3
OL479			6					
OL486				9		2		
OL487			9					4
OL491	10							
OL496	7							
OL510				2		4	10	
OL511			1	3				
OL512	8							
OL518		8						
OL523		10					7	
OL524					9			
OL525					8	10		
OL526					3			
OL527			4					
OL528	4	1					4	5
OL529		4	2					7
OL533			5	6	10	3		
OL534					6	1		8
OL535						8	3	
OL536		3		1	5	6	1	2
OL537				5				
OL538		7			1		5	
OL528	4							
OL540				4				
OL541			7	7				
OL543					7	5		10
OL545	1							6
OL546	9			10				
OL547	3		8		4		8	
OL548	2							1
OL551	6					9		
OL562		6						
OL564		9					9	
OL590					2			
OL591							2	
OL592	5			8				
OL593		2						

**Table 5.5 (e) Cork Harbour Subsite assessment – total numbers (roosting/other behaviour) during LT surveys, intertidal<sup>I</sup> and subtidal<sup>II</sup>** Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods; *with the exception of Grey Heron (H) where the presence of roosting individuals (mostly single individuals) is marked by an X).*

Species ▶ Subsites ▼	SU <sup>I</sup>	WN <sup>I</sup>	T. <sup>I</sup>	PT <sup>I</sup>	SV <sup>II</sup>	RM <sup>II</sup>	LG <sup>II</sup>	GG <sup>II</sup>	CA <sup>I</sup>	H. <sup>I</sup>	OC <sup>I</sup>	GP <sup>I</sup>	GV <sup>I</sup>	L. <sup>I</sup>	DN <sup>I</sup>	BW <sup>I</sup>	BA <sup>I</sup>	CU <sup>I</sup>	RK <sup>I</sup>	BH <sup>I</sup>	CM <sup>I</sup>	LB <sup>I</sup>	
0L041			L		H									L									
0L099																							
0L453	V	M	M		V						H			L		L		M	H	H	H		
0L469														M	V	H					L		
0L479		L	L		V				H	X						L			H	L	M		
0L483		M	H						V	X	V							M	V	M	H	H	
0L486									H	X	V			L		H		H	M	V	M	V	
0L487		H				V					H	M				M		H		M	V	M	
0L491	V				V	V		V	H	X	V				V	M		V	H	V	V	M	
0L496																				H			M
0L510		L	L						L	X	M		V					L		H	M	L	
0L511						L	V		M	X	M							M		M	M	L	
0L512	H					H	V	H		X	M					M		H	L	M			
0L513																							
0L514																							
0L517									M					L		M				L		H	
0L518									M											L			
0L519								H	M	X	H									L	M	H	
0L520	L	L	V						M	X	L			M		H		M	M	H	V	V	
0L521										X										L	M	M	
0L522	M		L						L	X						L		L	L	L	L		
0L523										X	M									L			
0L524									M		L					M		H		M		M	
0L525	M								M									H		M	M	H	
0L526									H					M						H	H	H	
0L527									H														
0L528																				M		H	
0L529									L											H	H	H	
0L530									L	X										H			
0L532																				H	H	V	
0L533	H	V	H						L		H	V		V	V	L		M		V	M	H	
0L534		V							H			V		V			V					M	
0L535											L			H		H			H	H	H	M	

Species ▶ Subsites ▼	SU <sup>I</sup>	WN <sup>I</sup>	T. <sup>I</sup>	PT <sup>I</sup>	SV <sup>II</sup>	RM <sup>II</sup>	LG <sup>II</sup>	GG <sup>II</sup>	CA <sup>I</sup>	H. <sup>I</sup>	OC <sup>I</sup>	GP <sup>I</sup>	GV <sup>I</sup>	L. <sup>I</sup>	DN <sup>I</sup>	BW <sup>I</sup>	BA <sup>I</sup>	CU <sup>I</sup>	RK <sup>I</sup>	BH <sup>I</sup>	CM <sup>I</sup>	LB <sup>I</sup>	
0L536									V			H				L	V			L			
0L537	L										M					L		L	M	M	M	M	
0L538									M	X	L							L		M	L		
0L539								H	M	X	M									L	M	M	
0L540									L		L		H	L				L		M	L	M	
0L541	V	L							H		L		V							H	M		
0L542	M		M			V			L	X	H			L		M	V	M	M	H	M	L	
0L543			M				V			X	H					L	H	L	V	L		M	
0L544			L																				
0L545	H	H	H	V						X						M		V		L			
0L546	V	H										V		V		H				M		M	
0L547											H		V			M		L	M	H	H		
0L548														H		V		H		M			
0L551	M		L						L		L					L		M		L			
0L552	L	L						H	H	X	L					L		L		L			
0L557			M						H	X	V			M		M		L	H	H	M	H	
0L558									M									M		L			
0L559											M									H	H	H	
0L560																							
0L561									L		M									H	H	H	
0L562								M	V	X	M									L	M		
0L563	L					M		V	H	X				H				M		H	H		
0L564		L					H		M	X	M							M	L	L	H		
0L565		M	H							X						H		H	V	L			
0L566																							
0L567									M		L												M
0L568																							
0L582	L									X								M		H	M		
0L583																							
0L585																							
0L586																							
0L587			L																				
0L589	M								H		M					H		H	V	M	L		

Species ▶ Subsites ▼	SU'	WN'	T.'	PT'	SV''	RM''	LG''	GG''	CA'	H.'	OC'	GP'	GV'	L.'	DN'	BW'	BA'	CU'	RK'	BH'	CM'	LB'
0L590	M	M	V						H	X	M			H		H		H	H	M	L	
0L591		V	V								M			M		L		H	H	M	H	
0L592	H	H	H						H		H			V	V	V	V	V	H	H	M	M
0L593									L	X	H							M		L		L
0L595																						
0L601																						
0L602																						

**Table 5.5 (f) Cork Harbour Subsite assessment – highest rank obtained (roosting/other behaviour) during the HT survey (Intertidal<sup>I</sup>, Subtidal<sup>II</sup>)**  
(Pintail, Grey Heron, Golden Plover, and Bar-tailed Godwit were not recorded)

Species Subsites	SU <sup>II</sup>	WN <sup>II</sup>	T. <sup>II</sup>	SV <sup>II</sup>	RM <sup>II</sup>	LG <sup>II</sup>	GG <sup>II</sup>	CA <sup>I</sup>	OC <sup>I</sup>	GV <sup>I</sup>	L. <sup>I</sup>	DN <sup>I</sup>	BW <sup>I</sup>	CU <sup>I</sup>	RK <sup>I</sup>	BH <sup>I</sup>	CM <sup>II</sup>	LB <sup>II</sup>
OL041		18	13															
OL099																		
OL453	8	14												13				
OL469																		
OL479								8		2		3			9			
OL483		7	4												7			2
OL486									3		8			6		1	13	1
OL487					1	1												
OL491		9	11				4		1						3		3	
OL496																		
OL510			12															
OL511							2											
OL512							2	5	2					9	14	8		
OL513																		
OL514																		
OL517														10	10			
OL518								2										
OL519								1	13					15			13	
OL520	9	7	16						11		6			14	11		10	
OL521																		
OL522	11							6									7	
OL523																		
OL524	6																7	
OL525	7		7												14		11	3
OL526													2			2		
OL527									13									
OL528																		
OL529																		
OL530																		
OL532																	9	
OL533											1	1						
OL534										3	2			1				
OL535	11		6											15	1			

Species ▶ Subsites ▼	SU <sup>II</sup>	WN <sup>II</sup>	T. <sup>II</sup>	SV <sup>II</sup>	RM <sup>II</sup>	LG <sup>II</sup>	GG <sup>II</sup>	CA <sup>I</sup>	OC <sup>I</sup>	GV <sup>I</sup>	L. <sup>I</sup>	DN <sup>I</sup>	BW <sup>I</sup>	CU <sup>I</sup>	RK	BH <sup>I</sup>	CM <sup>II</sup>	LB <sup>II</sup>
OL536																		
OL537										1						7		3
OL538																		
OL539																		
OL540		17	8			4	5							10				
OL541		11					1											
OL542	1				2	2					7							
OL543	9																	
OL544																		
OL545	3	16	13										5	4	11			
OL546		2																
OL547																		
OL548																		
OL551								3	11				8		13			
OL552																		
OL557																	4	
OL558									15					10				
OL559									8							5		
OL560																		
OL561																		
OL562		15							6			2			14			
OL563		4	13	2				6			3						1	
OL564		6							7						14		11	
OL565		12	2	1					10				4	2	2	4		
OL566								4										
OL567																		
OL568																		
OL582																	6	
OL583																		
OL585																		
OL586																		
OL587																		
OL589	4	5	5						5				3	6	6			

Species ▶ Subsites ▼	SU <sup>II</sup>	WN <sup>II</sup>	T. <sup>II</sup>	SV <sup>II</sup>	RM <sup>II</sup>	LG <sup>II</sup>	GG <sup>II</sup>	CA <sup>I</sup>	OC <sup>I</sup>	GV <sup>I</sup>	L. <sup>I</sup>	DN <sup>I</sup>	BW <sup>I</sup>	CU <sup>I</sup>	RK <sup>I</sup>	BH <sup>I</sup>	CM <sup>II</sup>	LB <sup>II</sup>
OL590	5	3	3								4		1	8	8	6	2	
OL591		13	10						8		9		7	3	5	3		
OL592	2	10	1			2			4		5		6	5	4		5	
OL593		1	9															
OL595																		
OL601																		
OL602																		

## **Cork Harbour - Waterbird Survey Programme 2010/11**

### **Waterbird distribution - discussion notes**

Where mentioned, information on benthic communities or sediment is from the intertidal and subtidal sampling programme commissioned by the National Parks & Wildlife Service (NPWS) and Marine Institute and reported in NPWS (2014a, 2014b) and MERC (2012).

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

### 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. Large moult gatherings occur along traditionally used areas of the north German coast of the Wadden Sea although several sites in Britain have also become recognised as important moulting areas such as Bridgewater Bay (Severn Estuary), the Humber Estuary, the Wash, and the Firth of Forth. Following the moult, the ducks then migrate to wintering areas.

#### Numbers

Whole-site numbers of Shelduck increased throughout the count programme with just 43 recorded in October 2010 and 193 the following month. The December count (07/12/10 and 08/12/10) recorded a total combined count of 1,022 Shelduck but this was exceeded by the low tide count in February 2011 (1,476). A total 1,250 Shelduck were counted during the high tide survey (09/01/12). All site counts, except the first in October 2010, surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 850 individuals recorded in February 2011, this count surpassing the threshold of all-Ireland importance.

Shelduck were recorded in 46 subsites overall (44 during low tide surveys). 15 subsites supported the species with most regularity (0L453, 0L483, 0L491, 0L496, 0L512, 0L530, 0L537, 0L541, 0L545, 0L546, 0L548, 0L563, 0L589, 0L590 and 0L592).

0L589 (Brown Island West) and 0L590 (Brown Island East) held joint peak numbers in October 2010 (eight individuals). 0L546 (Fota Is to Weir Is.) held peak numbers in the subsequent two low tide surveys; 0L483 (Rathcoursey) sharing the peak in November 2010. 0L491 (Whitegate Bay) recorded peak numbers and the subsite peak count overall (228 Shelduck) in February 2011.

0L534 (Bloomfield) supported the peak number of Shelduck during the high tide survey (156).

#### 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.

Between 81% and 100% of Shelduck were foraging intertidally during low tide surveys (as opposed to foraging subtidally). Shelducks were recorded foraging intertidally in 34 subsites overall.

Peak numbers were held by 0L589 (Brown Island West) and 0L590 (Brown Island East) jointly in October 2010 (eight individuals). 0L546 (Fota Is to Weir Is.) and 0L483 (Rathcoursey) shared peak numbers in November 2010 (24 individuals) and 0L546 (Fota Is to Weir Is.) again held peak numbers in December 2010 (135 individuals). 0L548 (Rossmore Bay) recorded peak numbers in February 2011 (187 individuals). 0L483, 0L546 and 0L548 were notable for supporting peak numbers in one low tide survey and numbers ranked as 'high' in all other low tide surveys. Of further note was 0L496 (Monkstown Creek) and 0L592 (Harper's Island North) that held numbers ranked as 'high' on at least three low tide survey occasions.

Subtidal foraging was recorded less frequently and in 14 subsites during low tide surveys, four subsites during the high tide survey. Of note were 108 individuals within 0L491 (Whitegate Bay) in February 2011.

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*. *P. ulvae* is recorded in very high abundances in the south of the site at Owenboy Estuary, at Lough Beg, at Corkbeg Island and Monkstown Creek.

The peak intertidal foraging density was recorded for 0L545 (Rossleague) that recorded a density of (5 Shelduck ha<sup>-1</sup> in February 2011). 0L496, 0L512, 0L528, 0L547, 0L548, 0L551, and 0L592 recorded densities of over 2 Shelduck ha<sup>-1</sup>. The average whole site foraging density was 0.3 individuals ha<sup>-1</sup>.

#### Roosting Distribution

Intertidal roosting/other behaviour was recorded across 19 subsites during low tide surveys. 0L545 (Rossleague) was the only subsite to recorded individuals in all four low tide surveys; and held the peak number of 27 individuals in December 2010. 0L491 (Whitegate Bay) held good numbers in three low tide surveys and the peak number in two of these (November and December 2010) as well as recording the peak number (106 individuals) representing over half of all counted in this behaviour, during the high tide survey. 0L453 (Lough Beg) held good numbers on two occasions with a peak of 44 Shelduck in February 2011. 0L592 (Harper's Island North) also recorded good numbers in the latter part of the survey programme with a peak number of 43 Shelduck in February 2011.

Subtidal roosting/other behaviour was recorded less frequently and across nine subsites overall during low tide surveys. 259 Shelduck roosted subtidally during the high tide survey in January 2011. Peak numbers were in 0L542 (Belvelly Br. West) (73 Shelduck). A further 61 individuals were in 0L592 (Harper's Island North). A further ten subsites held 30 or fewer individuals.

Terrestrial roosting was also recorded during the high tide survey in 0L534 (Bloomfield) when a flock of 156 Shelduck roosted in grassland that is within the SPA boundary.

Intertidal, subtidal and supratidal roosting flocks were recorded during the November roost survey across a total of 15 subsites. The largest roosting/other flock of 125 individuals was positioned subtidally in 0L546 (Fota Is to Weir Is.), a second flock comprised 72 individuals. The largest intertidal roost was a flock of 72 individuals in 0L491 (Whitegate Bay); these birds part of a larger mixed-species roost positioned on the eastern side of the causeway to Corkbeg Island. 0L453 (Lough Beg) supported the most flocks (four) of subtidally and supratidally roosting individuals. 91 Shelduck roosted supratidally along the southern shore of 0L530 (Raffeen Creek). 0L545 (Rossleague) held a subtidal roosting/other flock of 88 individuals. Lower numbers were recorded in 0L453, 0L469, 0L483, 0L520, 0L535, 0L542, 0L552, 0L557, 0L563, 0L565 and 0L590.

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

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

#### Numbers

Whole site numbers of Wigeon peaked in December 2010 when 2,129 Wigeon were counted across the site. 1,629 individuals were recorded during the high tide count in January 2011. All site counts, except the first in October 2010, surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 870 individuals recorded in February 2011, this count surpassing the threshold of all-Ireland importance.

Wigeon was a widespread species, occurring in 41 subsites overall (37 during low tide surveys).

0L534 (Bloomfield) held peak numbers in October 2010 and numbers ranked as 'high' in all other low tide surveys. 0L587 (Harpers Island (only)) recorded peak numbers in November 2010 while 0L595 (Slatty's Pool) recorded peak numbers in December 2010. In February 2011, 0L479 (Brown Island) recorded 488 individuals which is the overall subsite peak count. 0L479 also held peak numbers (406) during the high tide survey (January 2011).

#### Foraging Distribution

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

Wigeon were recorded foraging in intertidal, subtidal, supratidal and terrestrial habitats. In all surveys a greater majority of individuals foraged subtidally.

Intertidal foraging was recorded across 12 subsites during low tide surveys (0L453, 0L479, 0L483, 0L491, 0L520, 0L524, 0L527, 0L533, 0L536, 0L562, 0L564 and 0L589). 0L483 (Rathcoursey) recorded individuals on a greater number of occasions (three times), numbers peaking at 18 individuals and ranked as 'high' on two occasions. 0L520 (Ringabella Inner Creek) recorded peak counts on two occasions (December 2010 and February 2011). 0L536 (Ringmahon Pt) recorded a peak number of 84 individuals in November 2010 but Wigeon were not recorded foraging intertidally there again during the survey programme.

Subtidal foraging was recorded in 20 subsites during low tide surveys. 0L491 (Whitegate Bay) recorded peak numbers in November, December and February low tide surveys while 0L453 held peak numbers in October 2010. 0L563 (Agahda Lower) was notable for recording numbers ranked as 'high' in all low tide surveys although no foraging individuals were recorded there during the high tide survey.

The permanent brackish water pool at Brown Island (0L479) held good numbers of Wigeon in all five surveys. Numbers peaked during low tide surveys at 488 individuals (February 2011); this was also the subsite peak count (see above) while 274 Wigeon were present during the high tide survey. The lagoon at Slatty's Pool (0L595) recorded foraging Wigeon on a regular basis at (maximum number of 387 in December 2010). 0L560 (Cuskinny Marsh) held relatively low numbers (maximum 25). 0L568 (Ballyannan pool) recorded 76 Wigeon during the January 2011 high tide survey.

Terrestrial foraging occurred at Harper's Island (0L587) where a maximum count of 156 Wigeon was recorded in November 2010 (inside SPA boundary). Terrestrial foraging was also recorded on a single occasion in 0L534 (Bloomfield) where 280 Wigeon foraged in grassland east of Bloomfield House along with 34 Curlew (outside SPA boundary) (February 2011). During the high tide survey 56 Wigeon foraged in grassland of 0L602 (Kilbeg Fields), south of Ringabella Creek (outside SPA boundary).

#### Roosting Distribution

Good numbers of Wigeon were recorded in roosting/other behaviour in all surveys.

During low tide surveys Wigeon roosted intertidally across a total of 17 subsites (see Table 5.5e). 0L535 (Bloomfield) held peak numbers during the first two low tide surveys and 0L533 (Inner Douglas Estuary (Goat Is)) held peak numbers in December 2010. 0L591 (Brown Island North) was the only subsite to support roosting/other individuals in all four low tide surveys and held peak numbers in February 2011.

Lower numbers of Wigeon were recorded roosting subtidally during surveys with the exception of the February 2011 low tide survey and the high tide survey. During low tide surveys, subtidal roosting/other occurred with most regularity (two or more low tide surveys) in 0L486 (Dunkettle), 0L520 (Ringabella Inner Creek), 0L541 (Martello west to Carrigrenan) and 0L591 (Brown Island North).

During the high tide survey (January 2011) a total of 752 Wigeon were recorded in roosting/other behaviour. 611 of these roosted subtidally; and a quarter of these were positioned within 0L593 (Harper's Island South). The only other subsite to record over 100 individuals was 0L546 (Fota Is to Weir Is.). A further 52 Wigeon roosted/other in intertidal habitat across four subsites: 0L517, 0L562, 0L589 and 0L592. 0L589 (Brown Island West) supported the largest number with 26 (50%) of the total number.

Three subsites supported roosting individuals in supratidal habitat (0L469, 0L486 and 0L533). A further 18 Wigeon roosted in the lagoon at Slatty's Pool (0L595).

The November 2010 roost survey recorded roosting flocks across a total of 13 subsites: 0L483, 0L487, 0L491, 0L512, 0L520, 0L533, 0L534, 0L542, 0L545, 0L546, 0L565, 0L589 and 0L592. The largest roost was a flock of 300 Wigeon that roosted as part of a larger mixed-species roost within grassland (terrestrial) in 0L534 (Bloomfield) (within the SPA boundary). 0L546 (Fota Is to Weir Is.) recorded a flock of 116 Wigeon roosting/other subtidally as well as two additional flocks of 64 and 10 individuals. 0L545 (Rosslague) recorded six different roosts; the largest comprising 71 individuals roosted subtidally.

### 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

Across the whole site, numbers of Teal rose from 702 in October 2010 to a low tide peak of 1,662 in December 2010. 1,360 Teal were counted during the high tide survey. Whole site numbers were above the threshold of all-Ireland importance during all surveys.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 775 individuals recorded in February 2011, this count surpassing the threshold of all-Ireland importance.

Teal was a widespread species, occurring in 47 subsites overall, and in 45 during low tide surveys. 14 subsites recorded the species in all five surveys: 0L479, 0L483, 0L496, 0L520, 0L530, 0L533, 0L534, 0L542, 0L546, 0L565, 0L590, 0L591, 0L592 and 0L595.

0L591 (Brown Island North) recorded peak numbers in October 2010, and the subsite peak count overall (172 Teal) and numbers ranked as 'high' in all other low tide surveys. 0L520 (Ringabella Inner Creek) held peak numbers in November 2010 and 0L483 (Rathcoursey) held peak numbers during the final two low tide surveys. 0L565 (Saleen East) was notable for supporting numbers ranked as 'high' in all low tide surveys. Peak numbers (182) during the high tide survey were held by 0L590 (Brown Island East).

#### Foraging Distribution

Non-breeding Teal are widely distributed throughout Ireland, favouring areas of shallow water on estuarine coastal lagoons, coastal and inland marshes, and flooded pastures and ponds. Teal are omnivores and have a variety of foraging methods (e.g. dabbling and up-ending) within differing habitats and water depths.

More Teal foraged intertidally than subtidally during all low tide surveys except October 2010 and intertidal foraging occurred across a total of 31 subsites.

Peak numbers were held by 0L534 (Bloomfield), 0L565 (Saleen East), 0L517 (Loughatalia) and 0L546 (Fota Is to Weir Is.) jointly; and 0L483 (Rathcoursey) for the four low tide survey dates. 0L520 (Ringabella Inner Creek) was notable for recording numbers ranked as 'high' in three low tide surveys.

Subtidal foraging was recorded in 19 subsites overall and most regularly (all four low tide surveys) in 0L496 (Monkstown Creek) and 0L565 (Saleen East). 0L537 (Hop Island to Passage West) was notable for recording peak numbers during two low tide surveys.

The permanent brackish water pool at Brown Island (0L479) held Teal during two surveys with a maximum number of 25. 0L099 (Rostellan Lake) supported 17 Teal during the November low tide survey.

Terrestrial foraging was recorded in association with three subsites: 0L565, 0L586 (outside the SPA boundary) and 0L587 (inside SPA boundary).

#### Roosting Distribution

Good numbers of Teal were recorded in roosting/other behaviour in intertidal habitat in all low tide surveys with a maximum site count of 545 during the November low tide survey. Peak subsite numbers were held by 0L591, 0L520, 0L590 and 0L591 for the four respective low tide survey dates.

Subtidal roosting/other was recorded across 14 subsites overall during low tide surveys but most records were of a single nature and involved relatively low numbers of Teal. 0L565 (Saleen East) however, recorded individuals in three low tide surveys as did 0L591 (Brown Island North).

During the high tide survey a total of 444 Teal roosted subtidally, peak numbers (104) in 0L592 (Harper's Island North). A further 97 Teal were in 0L565 (Saleen East) and 84 Teal in 0L590 (Brown Island East). A further 13 subsites supported 36 or less Teal. 264 Teal roosted intertidally during the high tide survey, the peak number (58) located in 0L590 (Brown Island East) with 0L589 (Brown Island West) closely following with 55 Teal.

The permanent brackish water pool at Brown Island (0L479) held good numbers of roosting/other Teal in most surveys with a peak number of 90 individuals during low tide surveys and 51 during the high tide survey.

The lagoon at Slatty's Pool (0L595) recorded roosting/other Teal on a regular basis (maximum number of 48 during low tide surveys and 28 during the high tide survey). 0L099 (Rostellan Lake) supported roosting Teal on two low tide survey occasions.

The November 2010 roost survey recorded roosting flocks across a total of 21 subsites: 0L041, 0L099, 0L453, 0L479, 0L483, 0L511, 0L517, 0L520, 0L525, 0L530, 0L533, 0L535, 0L542, 0L543, 0L545, 0L546, 0L557, 0L565, 0L587, 0L589 and 0L590. The largest single flock comprised 84 Teal roosting/other subtidally in 0L546 (Fota Is to Weir Is.) along with 64 Wigeon. The largest intertidal roost comprised 47 Teal that roosted along the northern shore of 0L483 (Rathcoursey). Further west in 0L479 (Brown Island), 36 Teal roosted along with Mallard on the tip of the island. A further 34 roosted intertidally in 0L565 (Saleen East); this subsite also supporting the most flocks (six). The largest supratidal roost (36 individuals) was in 0L557 (Bailich) where the Teal roosted along with Shelduck and Redshank.

**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**

Pintail were recorded in one low tide survey (December 2010) and the high tide survey (January 2011) only, with 11 and 12 individuals respectively. No count exceeded the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 12 individuals recorded in November 2010.

Pintail were recorded in only two subsites: 0L545 (Rosslague) during the December 2010 low tide survey, and 0L546 (Fota Is to Weir Is.) during the high tide survey.

Rostellan Lake (0L099) held good numbers of Pintail in the mid to late 1990's with peak numbers of 61 individuals (1995/96: I-WeBS). This subsite now supports very few Pintail (maximum number in last decade was four individuals) and has recorded no Pintail in the last three seasons of I-WeBS. Pintail were also not recorded there during the 2010/11 Waterbird Survey Programme.

**Foraging Distribution**

12 Pintail were recorded foraging subtidally in 0L546 (Fota Is to Weir Is.) during the high tide survey.

**Roosting Distribution**

11 Pintail were recorded roosting intertidally in 0L545 (Rosslague) during the December 2010 low tide survey.

The November 2010 roost survey recorded roosting Pintail in 0L099 (one individual) and 0L546 (21 individuals). Pintail in 0L546 roosted subtidally in the south of the subsite where a dense bed of *Spartina* occurs and can partially obscure the view, so the count may be an underestimate.

### Shoveler *Anas clypeata* - Family (group): Anatidae (dabbling ducks)

The Shoveler has a widespread breeding distribution across north America, Canada, north and eastern Europe, Siberia to central Asia (Wetlands International, 2006). The small numbers of Shoveler breeding in Ireland are largely sedentary or dispersive and are supplemented during winter by migratory birds from northwest and central Europe. The wintering population is relatively small (c.2,770 individuals) (Crowe & Holt, 2013).

#### Numbers

Shovelers were recorded in the November, December and February low tide surveys with a whole-site peak count of 28 recorded in November 2010. 35 individuals were counted during the high tide survey and this was the only count to surpass the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 6 individuals recorded in November 2010.

The species was recorded in 11 subsites overall (0L041, 0L453, 0L479, 0L491, 0L557, 0L563, 0L564, 0L565, 0L568, 0L587, 0L595), and in eight during low tide surveys.

The permanent brackish water pool at Brown Island (0L479) held peak numbers during two low tide surveys and during the high tide survey. 0L491 (Whitegate Bay) held the peak number (16) in December 2010; this being the subsite peak count overall. 0L453 (Lough Beg) held joint peak numbers in February 2011.

Rostellan Lake (0L099) once held good numbers of Shoveler and often the I-WeBS season peak counts (e.g. 78 in 1995/96). This subsite now supports very few Shoveler and irregularly, and none were recorded during the 2010/11 Waterbird Survey Programme.

#### Foraging Distribution

Shovelers are omnivorous, taking a range of items from planktonic crustaceans and small molluscs, to insects, larvae, plant material and seeds. A true dabbling duck, Shovelers feed by surface-feeding, swimming with head and neck immersed, up-ending, and less often, by shallow dives (BWPI, 2004).

Four subsites supported foraging individuals overall: 0L453 (Lough Beg), 0L491 (Whitegate Bay), 0L563 (Agahda Lower) and 0L564 (Saleen west). All foraging was undertaken subtidally.

0L453 (Lough Beg) recorded ten foraging individuals during the high tide survey. 0L491 (Whitegate Bay) recorded three and nine individuals for the December and February low tide counts respectively. 0L563 (Agahda Lower) and 0L564 (Saleen west) recorded two and one individuals respectively during the December low tide survey.

#### Roosting Distribution

During low tide surveys, intertidal roosting/other behaviour was recorded in three subsites (0L479 Brown Island, 0L563 Agahda Lower, and 0L564 Saleen west) and involved low numbers (four or less individuals). Subtidal roosting was recorded in four subsites (0L041 Carrigrenan Pools, 0L453 Lough Beg, 0L479 Brown Island and 0L491 Whitegate Bay). The peak number was seven individuals in 0L491 (Whitegate Bay) during the December low tide survey. The lagoon at Slatty's Pool (0L595) recorded three roosting individuals during the December low tide survey.

During the high tide survey, a total of 18 Shoveler were recorded in roosting/other behaviour. 0L565 (Saleen East) supported two individuals roosting intertidally and four roosting subtidally. Eight Shoveler roosted supratidally in 0L479 (Brown Island) along with two that were in the brackish pool. Single individuals were recorded in 0L563 and 0L587.

The November 2010 roost survey recorded roosting Shoveler in four subsites: 0L479, 0L525, 0L546 and 0L565. The largest number (15) were in 0L546 (Fota Is to Weir Is.) and located on the western side of Weir Island. Ten individuals roosted in 0L479 (Brown island). Single individuals were recorded in 0L525 and 0L565.

### 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 peak number of Red-breasted Mergansers occurred in December 2010 when 82 individuals were counted across the whole site. 79 individuals were counted during the high tide survey in January 2011. All counts with the exception of October 2010 surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 42 individuals recorded in February 2011, this count surpassing the threshold of all-Ireland importance.

Red-breasted Mergansers were recorded in 18 subsites overall, and in 14 during low tide surveys.

Peak counts were recorded for 0L593 (Harper's Island South), 0L542 (Belvelly Br. West), 0L491 (Whitegate Bay) and 0L512 (Currabally - Ballyellane) for the four low tide survey dates. The subsite peak count was 22 Red-breasted Mergansers recorded in 0L542 in November 2010.

0L512 (Currabally - Ballyellane) recorded the species with most regularity (four surveys overall).

#### 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).

During low tide surveys, Red-breasted Mergansers foraged subtidally within ten subsites overall (0L479, 0L483, 0L510, 0L511, 0L512, 0L536, 0L552, 0L559, 0L567 and 0L593).

Peak counts for the four low tide survey dates were recorded for 0L593 (Harper's Island South) and 0L511 (Marino Pt to Carrigrenan Pt) which is the channel that runs between Little Island and Fota Island; and 0L479 (Brown Island) and 0L512 (Currabally - Ballyellane) which are both in the North Channel (also called Great Island Channel). 0L512 (Currabally - Ballyellane) was notable for supporting peak numbers on one occasion and numbers ranked as 'high' on another two low tide survey dates, while 0L479 (Brown island) supported peak numbers on one occasion and numbers ranked as high during both another low tide and the high tide survey.

A greater number of Red-breasted Mergansers foraged subtidally during the high tide survey (73) as opposed to the peak low tide number of 47 individuals. During this survey, 0L563 (Agahda Lower) supported peak numbers (none recorded here during low tide surveys) while 0L552 (Ballyellane to Brown Is.) supported numbers ranked as second highest while again supporting only a single individual during low tide surveys; highlighting the differences in foraging distribution between these two tidal states. 0L512 (Currabally - Ballyellane) and 0L479 (Brown Island) however supported good numbers during the high tide survey in addition to their noted preference during low tide surveys.

#### Roosting Distribution

Subtidal roosting/other behaviour was recorded on an irregular basis for six subsites (0L487, 0L491, 0L511, 0L512, 0L542 and 0L563). 0L542 (Belvelly Br. West) supported the maximum number (22) in November 2010. Of note was 0L487 (Brick Island) that supported roosting/other individuals on three survey occasions (peak number of nine individuals) and the highest number (four individuals) during the high tide survey.

The November roost survey recorded roosting/other groups of Red-breasted Mergansers in three subsites: 0L491, 0L551 and 0L593. In 0L491 (Whitegate Bay) six individuals roosted/other subtidally. 0L551 (Ballydaniel) recorded the largest number (32 individuals) that were positioned subtidally along the south of this subsite. 0L593 (Harper's Island South) supported six individuals.

### 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 December low tide survey (159 individuals). Numbers dropped back during the January 2011 high tide survey to 72 individuals with 94 recorded during the February low tide survey. Counts in all months surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 52 individuals recorded in September 2010; this count surpassing the threshold of all-Ireland importance.

Little Grebes were recorded in 30 subsites overall and in 25 during low tide surveys.

Peak counts were recorded for 0L587 (Harper's Island only), 0L099 (Rostellan Lake), 0L592 (Harper's Island North) and 0L483 (Rathcoursey) for the four low tide survey dates.

0L592 (Harper's Island North) recorded the subsite peak count (22 individuals) and was the only subsite to support numbers ranked as highest or second highest in all four low tide surveys. 0L099 (Rostellan Lake) is also notable for supporting peak numbers on one occasion and numbers ranked as 'high' on two other survey occasions.

#### Foraging Distribution

During low tide surveys, Little Grebes foraged subtidally within 22 subsites overall.

0L592 (Harper's Island North) recorded the peak counts during the first three low tide surveys and numbers ranked as second highest in February 2011. 0L593 (Harper's Island South) recorded numbers ranked in the top three during three low tide surveys and together with 0L592, was the only subsite to record this species during all four low tide surveys. 0L483 (Rathcoursey) recorded peak numbers of foraging individuals in February 2011.

Relatively low numbers (30) were recorded foraging during the high tide survey and peak numbers (8) were recorded in 0L539 (Wallingstown) with a further seven within 0L564 (Saleen west). A further six subsites held four or less individuals.

#### Roosting Distribution

Irregular and often once-off records were made of subtidally roosting/other individuals during low tide surveys. The peak number recorded was 17 in 0L511 (Marino Pt to Carrigrenan Pt) during the December 2010 survey.

Eight individuals roosted subtidally during the high tide survey across four subsites (0L487, 0L540, 0L542 and 0L592); the largest subsite count of three individuals recorded for 0L487 (Brick Island).

The November roost survey recorded two flocks of roosting/other Little Grebes. 0L564 (Saleen west) supported six individuals while 0L565 (Saleen East) supported four individuals.

### 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

Whole site numbers of Great Crested Grebes rose to a peak during December 2010 (150 individuals), over double the number recorded in the previous month. 128 Great Crested Grebes were counted during the high tide survey. All except the first low tide count in October 2010 surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 55 individuals recorded in February 2011, this count surpassing the threshold of all-Ireland importance.

Great Crested Grebes were recorded within 28 subsites overall and 25 during low tide surveys. Peak numbers during low tide surveys were recorded within 0L491 (Whitegate Bay), 0L512 (Currabally – Ballyellane), 0L561 (Cobh) and 0L491 (Whitegate Bay) for the four respective low tide survey dates. 0L491 (Whitegate Bay) also supported peak numbers during the high tide survey.

The subsite peak count was 33 individuals recorded in 0L561 (Cobh) in December 2010.

#### Foraging Distribution

Great Crested Grebes are largely piscivorous and make short dives for their prey in the depth range of 2-4m.

Across the low tide survey programme Great Crested Grebes foraged subtidally within 25 subsites. Peak numbers during low tide surveys were recorded within 0L491 (Whitegate Bay), 0L559 (Cuskinny Bay), 0L561 (Cobh) and 0L563 (Ringmahon Pt). Both 0L561 (Cobh) and 0L491 (Whitegate Bay) also held numbers ranked as 'high' on another survey occasion; while the latter also held peak numbers during the high tide survey. 0L567 (Marloag Point) was also notable for supporting numbers ranked as 'high' on three low tide survey occasions and the second highest numbers during the high tide survey.

#### Roosting Distribution

Relatively irregular records were made of Great Crested Grebes in roosting/other behaviour however good numbers were recorded in 0L491 (Whitegate Bay) e.g. 28 during the February low tide survey; and in 0L563 (Agahda Lower) where up to 12 individuals were recorded.

16 Great Crested Grebes were recorded in roosting/other behaviour during the high tide survey. The largest numbers (five individuals) were positioned in 0L541 (Martello west to Carrigrenan) with lower numbers also in 0L491, 0L511 and 0L512 and 0L540.

The November 2010 roost survey recorded no roosting/other individuals.

### **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**

Whole-site numbers of Cormorants were relatively stable during the first three low tide surveys (range 242-273) and the January 2011 high tide survey (279) but then dropped back to 134 during the final low tide survey in February 2011. All counts recorded total numbers of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 199 individuals recorded in September 2010, this count surpassing the threshold of all-Ireland importance.

Cormorants were widespread and occurred in 58 subsites overall (56 during low tide surveys).

0L566 (Aghada Pools) held peak numbers during the first two low tide surveys. 0L483 (Rathcoursey) recorded peak numbers in December 2010 (36) and numbers ranked as 'high' in all other low tide surveys. 0L496 (Monkstown Creek) recorded peak numbers in February 2011. 0L486 (Dunkettle), 0L519 (White Bay to Graball Bay) and 0L541 (Martello west to Carrigrenan) were noted for recording numbers ranked as 'high' in all four low tide surveys.

#### **Foraging Distribution**

Cormorants are piscivorous (fish-eating) seabirds.

Cormorants were recorded foraging subtidally within 39 subsites during low tide surveys. As a relatively solitary-feeding species, numbers recorded within subsites were generally low (maximum number 14) so regularity of subsite use is a good way to examine species distribution and subsite preference. Six subsites recorded the species in all four low tide surveys; 0L512, 0L519, 0L528, 0L532, 0L561 and 0L562.

Peak numbers during the first three low tide surveys were recorded in 0L519 (White Bay to Graball Bay), a maximum number of 14 birds recorded in December 2010. 0L561 (Cobh) held peak numbers in February 2011 and numbers ranked as high on two other survey occasions. 0L528 (Ringaskiddy Port), 0L529 (Haulbowline to Spike Is) and 0L532 (Glenbrook) were notable for supporting numbers ranked as high on three survey occasions.

A total of 42 Cormorants foraged subtidally during the high tide survey and the peak number (12) was recorded in 0L552 (Ballyelane to Brown Is.). 15 other subsites held three or less individuals.

#### **Roosting Distribution**

Cormorants were recorded in roosting/other behaviour across intertidal habitat of 40 subsites (38 during low tide surveys). Peak numbers were recorded by 0L562 (Aghada), 0L483 (Rathcoursey), 0L536 (Ringmahon Pt) and 0L483, for the four respective low tide survey dates. The peak number recorded in a subsite was 23 individuals.

Cormorants were recorded in roosting/other behaviour during all four low tide surveys in three subsites: 0L486 (Dunkettle), 0L541 (Martello west to Carrigrenan) and 0L563 (Aghada Lower).

Fewer individuals overall were recorded in roosting/other behaviour when in subtidal habitat and this was recorded in 15 subsites overall: 0L453, 0L486, 0L511, 0L519, 0L520, 0L523, 0L535, 0L537, 0L538, 0L541, 0L547, 0L561, 0L562, 0L565 and 0L582. 0L519 (White Bay to Graball Bay) was the only subsite to record the species during all four low tide surveys and also held peak numbers in three of these as well as the peak number (39) during the high tide survey.

The November 2010 roost survey recorded roosting/other flocks in terrestrial, supratidal, intertidal and subtidal habitat across a total of 21 subsites: 0L099, 0L479, 0L483, 0L496, 0L519, 0L520, 0L524, 0L525, 0L527, 0L529, 0L532, 0L534, 0L551, 0L552, 0L561, 0L562, 0L563, 0L566, 0L589, 0L590 and 0L591. The largest intertidal roost was in 0L519 (White Bay to Graball Bay), the birds positioned along the eastern (rocky) shore of this subsite. 11 individuals roosted in 0L551 (Ballydaniel); lower numbers roosted intertidally across a further nine subsites (0L590, 0L589, 0L591, 0L552, 0L534, 0L520, 0L524, 0L519 and 0L563). 0L483 (Rathcoursey) held the largest supratidal roost of 37 individuals; these birds positioned along the northern shore of the subsite while 0L479 (Brown Island) held nine individuals. The largest numbers overall however, roosted terrestrially, with the breakwater in 0L496 (Monkstown Creek) holding the peak number of 33 Cormorants. This is a known roost site for Cormorants (see below). 25 individuals roosted terrestrially in 0L529 (Haulbowline to Spike Is) and 20 Cormorants roosted on the south side of Spike Island just outside subsite 0L527 (Lough More (Cork Harbour)). 27 roosted terrestrially in 0L566 (Aghada Pools) and smaller numbers roosted terrestrially inside or adjacent to a further eight subsites: 0L589, 0L483, 0L532, 0L561, 0L560, 0L558, 0L099 and 0L562.

Cork Harbour supports a number of night-time Cormorant roosts. Trees lining the southern shore of Monkstown Creek (0L496) support the largest known roost in the harbour while the stone breakwater in the outer creek supports a day-time roost. A proportion of the cormorants roosting in the trees spend time on the breakwater preening and drying plumage prior to flying to the trees. A recent night-time survey recorded a peak number of 259 Cormorants in October 2011 (RPS, 2012).

In December 2013 a coordinated survey of roosts was undertaken by volunteers and night-time roosts were identified and counted at Drake's Pool (Owenboy Estuary) (19), Monkstown Creek (151), Glanmire Wood (Glashaboy estuary) (109), Fota Island south (42), Fota Island north (34), Bagwell's Hill east (east ferry channel) (49), Saleen Creek (51) and Rostellan (7), giving a total of 462 Cormorants (unpublished data collated by T. Gittings). These data are also presented in Appendix 9.

Survey work undertaken at Monkstown Creek (RPS, 2012) would however suggest that counts usually peak in October / November and decline thereafter; so the total Cormorant numbers may therefore be higher (O'Donoghue & Gittings, 2014). Another roost at Bagwell's

Hill, Great Island has also since been located (Paul O'Donoghue *pers. comm.*) which may further increase numbers.

### 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

Low tide numbers of Grey Heron ranged from 51 (February 2011) to 91 (December 2010) and 61 individuals were counted across the site during the high tide count. All whole-site totals surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 57 individuals recorded in September 2010, this count surpassing the threshold of all-Ireland importance.

Grey Herons were widespread across the site, occurring in a total 58 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 23 individuals, recorded for 0L496 (Monkstown Creek) during December 2010 but generally subsites held five or fewer individuals.

Six subsites recorded Grey Herons in all four low tide surveys: 0L453, 0L496, 0L522, 0L523, 0L530 and 0L563. Subsites that consistently held the greatest number of individuals with peak or numbers ranked as 'high' on a regular basis were: 0L453 (Lough beg), 0L491 (Whitegate Bay), 0L496 (Monkstown Creek), 0L510 (Carrigrenan Pt), 0L520 (Ringabella Inner Creek), 0L522 (Currabinny to Crosshaven), 0L523 (Coolmore Woods), 0L526 (Carrigaline Owenboy), 0L530 (Raffeen Creek), 0L534 (Bloomfield), 0L563 (Agahda Lower), 0L564 (Saleen west) and 0L583 (Carrabinny Wood). 0L558 (Great Island east channel) held peak numbers (8) on one occasion but this species was not recorded there on any other survey occasion.

#### Foraging Distribution

Grey Herons feed predominantly upon fish. The species is typically a solitary feeder but at abundant temporary food sources, or where available feeding areas are restricted, congregations can occur (Kushlan and Hancock 2005).

During the 2009/10 survey programme, a greater proportion of Grey Herons foraged subtidally (i.e. wading in water) as opposed to walking in intertidal habitat and taking fish from adjacent channels or pools of water.

Subtidal foraging was recorded in 36 subsites. 0L563 (Agahda Lower) supported peak numbers on three survey occasions (maximum number four individuals). This was also the only subsite to recorded foraging individuals during all four low tide surveys. Peak numbers were recorded by 0L453 (Lough Beg) and 0L526 (Carrigaline Owenboy) during February 2011 (two individuals). 0L565 (Saleen east) held peak numbers jointly (three individuals) in October 2010.

In terms of Grey Herons foraging intertidally, 20 subsites were used overall and 0L534 (Bloomfield) supported peak numbers on two low tide survey occasions and numbers ranked as 'high' on another. Other subsites to support peak numbers were: 0L517, 0L557 and 0L558. The maximum subsite count was five individuals. 0L529 (Haulbowline to Spike Is) was notable for supporting numbers ranked as 'high' on three survey occasions.

#### Roosting Distribution

As with foraging, Grey Herons generally undertake diurnal roosting/other behaviour on a solitary basis, so while roosting behaviour was widely recorded across the site, subsite numbers were low (maximum three birds).

Grey Herons roosted intertidally across a total of 27 subsites. Only one of these, 0L523 (Coolmore Woods) recorded individuals in all four low tide surveys and the peak numbers on two survey occasions. The peak number recorded in a subsite was five individuals, recorded in 0L582 (Carrabinny Wood) in December 2010.

Roosting/other behaviour was also recorded within supratidal habitat with 18 subsites overall. 0L496 (Monkstown Creek) supported relatively large numbers during February 2011 (23) and during the high tide survey (31). 0L522 (Currabinny to Crosshaven) and 0L523 (Coolmore Woods) recorded good numbers on three survey occasions.

Terrestrial roosting other was recorded in or adjacent 14 subsites (0L099, 0L491, 0L510, 0L520, 0L522, 0L530, 0L560, 0L561, 0L563, 0L568, 0L585, 0L586, 0L587 and 0L595).

During the high tide survey a total of 59 Grey Herons were recorded roosting across 59 subsites in intertidal, subtidal, supratidal and terrestrial habitat. 0L496 (Monkstown Creek) supported the largest numbers (31) in supratidal habitat (as above); 0L542 (Belvelly Br. West) supported six individuals, and 0L523 (Coolmore Woods) five individuals, also in supratidal habitat. A further 14 subsites supported two or less individuals.

The November 2010 roost survey recorded roosting Grey Herons in 15 subsites: 0L453, 0L483, 0L491, 0L511, 0L519, 0L522, 0L524, 0L541, 0L545, 0L563, 0L565, 0L582, 0L587, 0L590 and 0L591. The peak number of birds at a single roost was four individuals recorded for 0L582 (Carrabinny Wood); 12 of the 15 roosts being just individual birds.

### 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 of Oystercatcher peaked in October 2010 when 1,753 Oystercatchers were counted. Numbers were relatively stable for the next two low tide surveys (1,577 and 1,538 respectively), before dropping back in the January high tide and February low tide surveys, the latter of which recorded the lowest count of 1,245 individuals. All whole site counts exceeded the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 782 individuals recorded in September 2010, this count surpassing the threshold of all-Ireland importance.

Oystercatchers were widely distributed and recorded in 62 subsites overall (61 during low tide surveys). 35 subsites recorded the species in all four low tide surveys and the high tide survey (0L453, 0L469, 0L483, 0L486, 0L487, 0L491, 0L496, 0L510, 0L512, 0L517, 0L519, 0L520, 0L521, 0L527, 0L528, 0L529, 0L530, 0L532, 0L535, 0L537, 0L541, 0L542, 0L546, 0L548, 0L551, 0L558, 0L559, 0L562, 0L564, 0L565, 0L582, 0L589, 0L590, 0L592 and 0L593). Despite this widespread distribution, one subsite held peak numbers during the November, December and February low tide surveys: 0L593 (Harper's Island South), with numbers representing up to 10% of the total site numbers. The subsite peak count however (190) was held by 0L536 (Ringmahon Pt) in October 2010. Eight subsites supported numbers ranked as 'high' in all four low tide surveys: 0L453, 0L491, 0L496, 0L510, 0L542, 0L548, 0L563 and 0L592.

0L491 (Whitegate Bay) held peak numbers (111) during the high tide survey. 0L486 (Dunkettle) and 0L519 (White Bay to Graball Bay) also supported over 100 individuals.

#### 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 intertidally within 59 subsites overall. 0L536 (Ringmahon Pt) held peak numbers in October 2010 (190) with 0L592 (Harper's Island North) supporting peak numbers (119) the following month. The final two low tide surveys recorded peak numbers in 0L593 (Harper's Island South) (123 and 119 individuals respectively). Of further note was eight subsites that supported numbers ranked as 'high' in all four low tide surveys: 0L453 (Lough beg), 0L491 (Whitegate Bay), 0L496 (Monkstown Creek), 0L510 (Carrigrenan Pt), 0L542 (Belvelly Br. West), 0L548 (Rossmore Bay), 0L563 (Agahda Lower) and 0L564 (Saleen west).

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*.

Terrestrial foraging was recorded widely and in association with 17 subsites: 0L099, 0L479, 0L486, 0L517, 0L519, 0L522, 0L530, 0L533, 0L537, 0L539, 0L551, 0L552, 0L558, 0L560, 0L562, 0L593 and 0L595. During the high tide survey the largest number of terrestrially foraging Oystercatchers (72) were recorded in grassland along with 14 Curlew to the east of 0L419 (White Bay to Graball Bay). 64 Oystercatchers foraged in grassland adjacent to 0L479 (Brown Island) (inside SPA boundary) with the same number of birds foraging in grassland adjacent to 0L517 (Loughatalia) (outside SPA boundary). 47 Oystercatchers foraged terrestrially outside the SPA boundary near 0L486 (Dunkettle). Terrestrial foraging was further recorded in association with six subsites: 0L099, 0L530, 0L537, 0L558, 0L562 and 0L593.

The peak intertidal foraging density was recorded for 0L528 (Ringaskiddy Port) that recorded a density of 18 Oystercatchers ha<sup>-1</sup> in a very small area of intertidal habitat in February 2011. 0L469, 0L529, 0L536, 0L538, and 0L562 recorded densities of over 4 Oystercatchers ha<sup>-1</sup>. The average whole site foraging density was 0.8 individuals ha<sup>-1</sup>.

#### Roosting Distribution

Foraging was the primary activity of Oystercatchers during low tide surveys but intertidal roosting/other behaviour was widespread and recorded in 35 subsites overall. The peak number roosting/other intertidally was recorded in October 2010 (229 individuals) representing 13% of all Oystercatchers counted on the two count days. Peak numbers were recorded for 0L483 (Rathcoursey), 0L486 (Dunkettle), 0L491 (Whitegate Bay) and 0L557 (Bailich) for the four survey dates respectively. 0L519 (White Bay to Graball Bay) and 0L547 (Rosslague east) recorded numbers ranked as 'high' on three survey occasions.

0L595 (Slatty's Pool) supported terrestrially roosting Oystercatchers during all four low tide surveys, with a peak number of 21 individuals.

402 Oystercatchers roosted intertidally during the high tide survey; peak numbers (111) in 0L491 (Whitegate Bay). 0L512 (Currabally – Ballyellane) held the second highest numbers (66). A further 13 subsites supported 44 or fewer individuals.

452 Oystercatchers roosted supratidally during the high tide survey; the largest number (91) on shingle/gravel in 0L541 (Martello west to Carrigrenan). 0L469 (Weir Island) supported 87 individuals while 0L453 (Lough Beg) supported 67 individuals. A further 11 subsites supported 39 or fewer individuals.

18 Oystercatchers roosted terrestrially adjacent to 0L557 (Bailich) during the high tide survey. Terrestrial roosting was also recorded in

association with 0L486 and 0L510.

The November 2010 roost survey recorded roosting Oystercatchers in 27 subsites overall. The largest single roost was in 0L541 (Martello west to Carrigrenan) where the birds roosted in the north of the subsite in the same position as the flock recorded during the high tide survey. The second largest roost (106 individuals) was positioned intertidally just east of the causeway in 0L491 (Whitegate bay). 0L453 (Lough Beg) and 0L512 (Currabally – Ballyellane) held the greatest number of roosting flocks (five each).

#### Golden Plover *Pluvialis apricaria* - Family (group): Charadriidae (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°E in the north Siberia lowlands south of Taymyr (Delaney et al. 2009). The nominate *P. a. apricaria* breeds at more southerly latitudes including Ireland and Britain and migrates south for winter. Golden Plovers that winter in Ireland are thought to be mostly Icelandic-breeding birds *P. a. altifrons* (Wernham et al. 2002).

#### Numbers

Numbers of Golden Plover peaked during November 2010 when 2,932 were counted across the whole site. The following month numbers dropped down to just 323, likely as a result of the cold weather spell, with December 2010 reported as the coldest since 1963 (Met Éireann, 2010a). Numbers were very low during the January 2011 high tide survey (12) then rose again for the final (February 2011) low tide survey when a site count of 1,308 was recorded.

Whole-site counts in October and November 2010, and February 2011 surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 704 individuals recorded in November 2010.

Golden Plovers were recorded in eight subsites overall: 0L479, 0L487, 0L510, 0L533, 0L534, 0L536, 0L546 and 0L560. 0L533 (Inner Douglas Estuary (Goat Is)) held peak numbers in October and November 2010 but did not record the species again during the survey programme. 0L546 (Fota Is to Weir Is.) held peak numbers (320) in December 2010 with second highest numbers the month previous. 0L534 (Bloomfield) held peak numbers during February 2011.

The subsite peak count was 2,400 Golden Plovers recorded for 0L533 (Inner Douglas Estuary (Goat Is)) in November 2010.

#### Foraging Distribution

During winter, Golden Plovers feed primarily within agricultural grassland and arable land. Tidal flats are used more as a roosting/resting habitat and the birds tend to favour large, open tidal flats. As a consequence, Golden Plovers tend to be in large aggregations when observed upon tidal flats. Intertidal feeding is observed to a greater degree during cold weather periods when grassland feeding areas are frozen over. Although Golden Plovers eat a wide range of invertebrate species, relatively little is known about their intertidal feeding patterns (Gillings et al. 2006).

A single intertidally foraging individual was recorded in 0L510 (Carrigrenan Pt) in November 2010. Two individuals foraged terrestrially in 0L560 (Cuskenny Marsh) during the same survey. 12 individuals were recorded foraging terrestrially in 0L479 (Brown Island) during the high tide survey.

#### Roosting Distribution

As to be expected, the majority of records made were of roosting Golden Plovers. Intertidal roosting was recorded within 0L487, 0L533, 0L534, 0L536 and 0L546.

0L533 (Inner Douglas Estuary (Goat Is)) held peak numbers in October and November 2010. 0L546 (Fota Is to Weir Is.) held peak numbers (320) in December 2010 and 0L534 (Bloomfield) held peak numbers (1,200) during February 2011.

Golden Plovers were not recorded roosting during the high tide survey.

The November roost survey recorded roosting individuals in two subsites. 23 individuals were recorded to the east of 0L517 (Loughatalia) (terrestrial grassland outside of SPA boundary) while 0L587 (Harpers Island (only)) recorded a flock of 21 individuals roosting terrestrially (inside SPA boundary).

### 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

Grey Plover were not recorded during the October 2010 low tide survey. Just nine individuals were recorded the following month then the peak count was recorded in December 2010 (69 individuals). 45 Grey Plover were counted during the high tide survey. The aforementioned counts of 45 and 69 surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 14 individuals recorded in February 2011.

Grey Plovers were recorded in 17 subsites overall. 0L453 (Lough Beg) held peak numbers on two low tide survey occasions and 0L511 (Marino Pt to Carrigrenan Pt) held peak numbers and the subsite peak count (30) in December 2010.

0L537 (Hop Island to Passage West) held peak numbers during the high tide survey (17).

#### 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).

Grey Plovers foraged in 16 subsites throughout the entire survey programme: 0L453, 0L479, 0L483, 0L487, 0L510, 0L511, 0L512, 0L517, 0L527, 0L529, 0L533, 0L534, 0L541, 0L546, 0L547 and 0L551.

0L453 (Lough Beg) held peak numbers during November 2010 and February 2011 (six and 13 individuals respectively) and numbers ranked as second highest during the December 2010 survey. 0L511 (Marino Pt to Carrigrenan Pt) held peak numbers (30) in December 2010.

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*.

The peak intertidal foraging density was 1.5 Grey Plover ha<sup>-1</sup> recorded for 0L511 (Marino Pt -Carrigrenan Pt.) in December 2010. This was the only subsite to record a density of over 1 Grey Plover ha<sup>-1</sup>. The whole site average intertidal foraging density was 0.02 Grey Plover ha<sup>-1</sup>.

#### Roosting Distribution

During low tide surveys, very few Grey Plovers were recorded in roosting/other behaviour. Low numbers (two or less) were recorded on irregular occasions in 0L510, 0L540, 0L541 and 0L547.

During the high tide survey 25 Grey Plovers roosted intertidally in total, with 68% of these located within 0L537 (Hop Island to Passage West). Seven individuals were within 0L479 (Brown Island) and a single individual was recorded in 0L534 (Bloomfield). A further 13 and two individuals roosted supratidally in 0L527 (Lough More (Cork Harbour)) and 0L487 (Brick Island) respectively.

The November roost survey recorded roosting individuals in three subsites (0L479, 0L527 and 0L533). At 0L479 (Brown Island), four Grey Plovers formed part of a larger mixed-species roost comprising 266 individuals in total. 0L533 (Inner Douglas Estuary (Goat Is)) supported two separate roosts (eight and one individual respectively), both positioned intertidally. 0L527 (Lough More (Cork Harbour)) recorded two Grey Plover roosting together with 150 Dunlin on a gravel shore.

### 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 result in a greater flux of birds to Ireland's estuaries.

#### Numbers

Whole site numbers of Lapwing rose from just 29 in October 2010 to a low tide peak of 1,831 the following month. Numbers then dropped down to 172 in December, likely related to the cold weather spell, with December 2010 reported as the coldest since 1963 (Met Éireann, 2010). Numbers then rose to a site peak count in the January 2011 high tide count (3,961 individuals) with 1,420 recorded during the final February low tide count. Three counts (November, January and February) surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 1,733 individuals recorded in January 2011.

Across the survey programme, Lapwings were recorded within 31 subsites (28 during low tide surveys). Nine subsites supported the species with most regularity (three low tide surveys): 0L479, 0L533, 0L534, 0L542, 0L546, 0L548, 0L563, 0L587 and 0L595.

Peak numbers in October 2010 were held by 0L534 (Bloomfield) (21 Lapwing) and this subsite supported numbers ranked as 'high' on another two low tide survey occasions. 0L592 (Harper's Island North) held peak numbers in November 2010 (504) but did not record the species during any other low tide survey. 0L513 (Gortigrennane west) and 0L533 (Inner Douglas Estuary (Goat Is)) held peak numbers during the final two low tide surveys; the latter also supporting numbers ranked as 'high' on another two low tide survey occasions. 0L563 (Agahda Lower) recorded the peak count of 640 Lapwing during the high tide survey.

#### 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).

Lapwings were recorded foraging intertidally across ten subsites (0L453, 0L520, 0L525, 0L535, 0L542, 0L563, 0L564, 0L590, 0L591 and 0L592). Numbers were low in all cases (<4 individuals) with the exception of 132 individuals that foraged within 0L591 (Brown Island North) in November 2010, 66 that foraged in 0L592 (Harper's Island North) during the same survey, and 16 that foraged in 0L563 (Agahda Lower) in December 2010.

Terrestrial foraging was recorded in association with six subsites during December 2010 (0L041, 0L513, 0L514, 0L519, 0L533 and 0L563). 0L513 (Gortigrennane west) recorded the largest number (76) which is grassland to the north of Ringabella Creek (outside of the SPA boundary); grassland just to the east (0L513 Gortigrennane east) recorded ten foraging individuals.

70 Lapwing foraged terrestrially along with 160 that were roosting in grassland of 0L479 (Brown Island) during the high tide survey (inside SPA boundary).

#### Roosting Distribution

The majority of Lapwings recorded during low tide surveys were roosting. Lapwings were recorded roosting intertidally within 19 subsites overall: 0L041, 0L453, 0L469, 0L486, 0L517, 0L520, 0L526, 0L533, 0L534, 0L535, 0L540, 0L542, 0L546, 0L548, 0L557, 0L563, 0L590, 0L591 and 0L592. Peak numbers in October 2010 were held by 0L534 (Bloomfield) (21 Lapwing) representing 100% of Lapwings counted during that survey. 0L592 (Harper's Island North) held peak numbers in November 2010 (438) and 0L546 (Fota Is to Weir Is.) held peak numbers in December 2010. The final low tide survey recorded peak numbers in 0L533 (Inner Douglas Estuary (Goat Is)).

Terrestrial roosting was recorded in association with four subsites during low tide surveys: 0L479, 0L585, 0L587 and 0L595. Both 0L587 (Harpers Island (only)) and 0L595 (Slatty's Pool) recorded this on three survey occasions with peak numbers of 117 and 170 respectively.

During the high tide survey a total of 1,682 Lapwings roosted intertidally with peak numbers in 0L533 (Inner Douglas Estuary (Goat Is)) (515 Lapwing). 0L534 (Bloomfield) held 415 individuals and 0L563 (Agahda Lower) supported 405 individuals. A further 347 Lapwing were distributed across six subsites.

509 Lapwings roosted supratidally during the high tide survey across five subsites: 0L453, 0L486, 0L525, 0L534 and 0L546. The largest number (207) was located within 0L525 (Carrigaline Castle to Rabbit pt).

1,639 Lapwings roosted terrestrially during the high tide survey. The largest number was a flock of 420 in 0L557 (Bailich) (inside the SPA boundary). A flock of 235 roosted terrestrially (near the quay) adjacent 0L563 (Agahda Lower) (outside the SPA boundary). A further 220 Lapwing roosted within Courtstown Lagoon (0L585) (inside SPA boundary). Flocks of 201 and 60 Lapwing were recorded flying over Ringabella Creek (0L520) and both flocks landed in fields to the north of this estuary. Lower numbers were recorded in association with 0L479, 0L496, 0L541, 0L587 and 0L595.

The November roost survey recorded roosting individuals across ten subsites: 0L520, 0L525, 0L533, 0L534, 0L545, 0L585, 0L587, 0L590, 0L591 and 0L595. 0L585 (Courtstown Lagoon) held the largest flock of 220 Lapwings roosting terrestrially. The second largest roost was a flock of 95 Lapwing that roosted as part of a larger mixed-species roost within grassland (terrestrial) in 0L534 (Bloomfield) (within the SPA boundary). The largest intertidal roost was in 0L533 (Inner Douglas Estuary (Goat Is)).

### 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° 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

Low tide numbers of Dunlin peaked in February 2011 when a total site count of 8,020 was recorded. 5,786 Dunlin were counted during the high tide survey. All whole-site counts exceeded the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 2,326 individuals recorded in November 2010.

Dunlin were recorded within 35 subsites overall during the survey programme (33 during low tide surveys). Six subsites supported this wader during all four low tide surveys: 0L453, 0L479, 0L525, 0L533, 0L541 and 0L548.

Peak numbers during the October low tide survey was recorded for 0L533 (Inner Douglas Estuary (Goat Is)) (350 individuals). 0L510 (Carrigrenan Pt) held peak numbers the following month when 2,089 represented 46% of all Dunlin counted during that survey. 0L536 (Ringmahon Pt) held peak numbers during the final two low tide surveys; the latter count of 4,700 birds accounting for nearly 60% of all Dunlin counted during that survey. With the exception of October 2010, all monthly peak counts exceeded the threshold of all-Ireland importance.

#### Foraging Distribution

The Dunlin diet is relatively wide and although this versatile species often shows a preference for muddier areas within sites (e.g. Hill et al. 1993; Santos et al. 2005), their distribution can often be widespread with no clear patterns.

The majority of Dunlin were recorded foraging during low tide surveys; almost 100% in all four surveys.

Dunlin foraged intertidally in 33 subsites overall. Six subsites recorded the species in all four low tide surveys: 0L453, 0L479, 0L525, 0L533, 0L541 and 0L548.

Peak numbers during the October low tide survey was recorded for 0L533 (Inner Douglas Estuary (Goat Is)) (350 individuals). 0L510 (Carrigrenan Pt) held peak numbers the following month and 0L536 (Ringmahon Pt) held peak numbers during the final two low tide surveys. 0L453 (Lough beg), 0L525 (Carrigaline Castle to Rabbit pt), 0L541 (Martello west to Carrigrenan) and 0L546 (Fota Is to Weir Is.) were notable for supporting numbers ranked as 'high' on at least two survey occasions.

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*.

The peak intertidal foraging density was 232 Dunlin ha<sup>-1</sup> recorded for 0L536 (Ringmahon Pt) and relating to the very large count of 4,700 Dunlin recorded there in February 2011. 0L510, 0L511, 0L537, and 0L540 all held densities of over 20 232 Dunlin ha<sup>-1</sup> on occasion. The whole site average intertidal foraging density was 3 Dunlin ha<sup>-1</sup>.

#### Roosting Distribution

Relatively few Dunlin were recorded in roosting/other behaviour during low tide surveys. Two observations of single roosting birds were made in October 2010 (0L491 and 0L592). 22 individuals roosted intertidally in 0L469 (Weir Island) in November 2010 and 44 roosted intertidally in 0L533 (Inner Douglas Estuary (Goat Is)) in February 2011.

During the high tide survey a total of 2,765 Dunlin were recorded roosting intertidally. 2,410 (86%) were in 0L533 (Inner Douglas Estuary (Goat Is)). A further 225 were in 0L562 (Agahda) and 130 were in 0L479 (Brown Island).

704 Dunlin roosted supratidally during the high tide survey across six subsites: 0L041, 0L486, 0L525, 0L527, 0L541 and 0L542. The largest proportion (44%) was in 0L525 (Carrigaline Castle to Rabbit pt). A further 212 Dunlin roosted terrestrially within 0L557 (Bailich).

The November 2010 roost survey recorded roosting Dunlin in nine subsites: 0L469, 0L479, 0L520, 0L525, 0L527, 0L533, 0L541, 0L545 and 0L587. The largest roost of 1,000 individuals roosted intertidally in 0L533 (Inner Douglas Estuary (Goat Is)). 0L525 (Carrigaline Castle to Rabbit pt) held the second largest roost (250 Dunlin) that was positioned supratidally along the northern shore of the subsite. 0L469 (Weir island) held a flock of 210 supratidally roosting Dunlin.

An additional record (counted outside of the allotted time for the roost survey) was of 1,850 Dunlin that roosted in the north of 0L541 (Martello west to Carrigrenan) on shingle/gravel.

### 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 during the non-breeding season (Wernham et al. 2002).

#### Numbers

Numbers of Black-tailed Godwits peaked in October 2010 when a site total count of 3,348 was recorded. Numbers then dropped to their lowest during December 2010, likely as a result of the cold weather spell (December 2010 reported as the coldest since 1963 (Met Éireann, 2010)) which saw many birds move south in Europe to warmer climes. All counts of the survey programme exceeded the threshold for international importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 1,694 individuals recorded in September 2010.

Black-tailed Godwits were recorded in 55 subsites overall (53 during low tide surveys). 27 subsites recorded the species in all four low tide surveys: 0L453, 0L486, 0L491, 0L496, 0L510, 0L512, 0L520, 0L524, 0L525, 0L530, 0L533, 0L534, 0L535, 0L537, 0L538, 0L542, 0L543, 0L546, 0L548, 0L551, 0L557, 0L565, 0L589, 0L590, 0L591, 0L592 and 0L595.

0L592 (Harper's Island North) held peak numbers during the October, December and February low tide surveys and recorded a peak subsite count of 505 individuals in October 2010. 0L520 (Ringabella Inner Creek) recorded peak numbers in November 2010 (359 individuals).

Peak numbers during the high tide survey were recorded at 0L 595 (Slatty's Pool).

#### Foraging Distribution

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

Black-tailed Godwits were recorded foraging intertidally in 45 subsites overall. 24 subsites supported foraging individuals during all four low tide surveys: 0L453, 0L486, 0L491, 0L496, 0L510, 0L512, 0L520, 0L524, 0L525, 0L530, 0L533, 0L534, 0L535, 0L537, 0L538, 0L542, 0L543, 0L551, 0L557, 0L565, 0L589, 0L590, 0L591 and 0L592.

0L590 (Brown Island East) held peak numbers of foraging individuals in October 2010; thereafter 0L592 (Harper's Island North) recorded peak numbers in all low tide surveys.

0L525 (Carrigaline Castle to Rabbit pt) and 0L535 (Harty's Quay) were notable for supporting numbers ranked as 'high' in all four low tide surveys, while 0L486, 0L520, 0L536, and 0L589 all supported numbers ranked as 'high' in three low tide surveys.

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*.

Terrestrial foraging was recorded in association with 12 subsites: 0L041, 0L099, 0L479, 0L513, 0L514, 0L520, 0L522, 0L537, 0L552, 0L568, 0L587 and 0L595. Some of the largest flocks were seen in grassland north of Ringabella Creek (0L520) including a flock of 179 that foraged in November 2010 (outside SPA boundary).

During the high tide survey a total of 660 Black-tailed Godwits were recorded foraging terrestrially. The largest number (242) was at 0L479 (Brown Island). Grasslands at 0L595 (Slatty's Pool) were used regularly throughout the survey programme (some of the grassland inside the SPA boundary, and 144 Black-tailed Godwits foraged there during the high tide survey. 118 Black-tailed Godwits foraged in grassland of the terrestrial subsite (Kilbeg Fields 0L602) (outside SPA boundary) and 91 foraged at 0L585 (Courtstown Lagoon) (inside SPA boundary). Five other terrestrially foraging flocks were recorded in association with 0L099, 0L520, 0L535, 0L537, 0L568 and 0L586.

The peak intertidal foraging density was 57 Black-tailed Godwits ha<sup>-1</sup> recorded for 0L538 (Glashaboy) in October 2010. The second highest recorded density was 12 Black-tailed Godwits ha<sup>-1</sup> recorded for 0L590 (Brown Island east). The whole site average intertidal foraging density was 1 Black-tailed Godwit ha<sup>-1</sup>.

#### Roosting Distribution

Good numbers of Black-tailed Godwits were recorded roosting intertidally during low tide surveys; the largest number in any one survey being 770, recorded in November 2010. This activity was recorded in 30 subsites overall (29 during low tide surveys).

0L548 (Rossmore Bay) held peak numbers during November and December 2010 while 0L592 (Harper's Island North) held peak numbers in October 2010 and February 2011. 0L469 (Weir Island), 0L520 (Ringabella Inner Creek) and 0L590 (Brown Island East) were notable for supporting numbers ranked as 'high' in two low tide surveys.

The high tide survey recorded relatively low numbers of Black-tailed Godwits roosting intertidally (324 birds). 0L590 (Brown Island East) held peak numbers (145) accounting for 45% of all individuals recorded in that activity. A total of 56 individuals roosted supratidally, 51 of these in 0L542 (Belvelly Br. West).

364 Black-tailed Godwits roosted terrestrially at 0L595 (Slatty's Pool) and 25 individuals were at 0L479 (Brown Island).

The November 2010 roost survey recorded roosting Black-tailed Godwits in 13 subsites: 0L469, 0L479, 0L483, 0L520, 0L525, 0L530, 0L533, 0L534, 0L545, 0L564, 0L565, 0L587 and 0L590. 0L520 (Ringabella Inner Creek) held the largest flock of 144 individuals that roosted intertidally and 0L545 (Rosslague) supported 140 that roosted supratidally (saltmarsh). 0L533 (Inner Douglas Estuary (Goat Is)) recorded 105 individuals roosting intertidally; all other roosts comprised 46 or less individuals.

#### 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 in northern Fennoscandia and Northern European Russia, east to the Kanin Peninsula, 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

Whole site numbers of Bar-tailed Godwits peaked in October 2010 when 222 were counted across the site. Numbers then dropped back to 66 during December 2010, likely as a result of the cold weather spell (December 2010 reported as the coldest since 1963 (Met Éireann, 2010)) which saw many birds move south in Europe to warmer climes. 255 Bar-tailed Godwits were counted during the January 2011 high tide survey but numbers dropped back to 23 individuals for the final (February) low tide survey. Only the October 2010 and January high tide count recorded numbers that exceeded the threshold for international importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 301 individuals recorded in November 2010.

Bar-tailed Godwits were recorded in 14 subsites overall: 0L453, 0L483, 0L486, 0L510, 0L512, 0L525, 0L533, 0L534, 0L535, 0L536, 0L542, 0L543, 0L551 and 0L592. Only one subsite recorded the species in all four low tide surveys (0L453: Lough Beg), and this subsite also recorded peak numbers in February 2011.

Peak numbers in October 2010 were held by 0L534 (Bloomfield) in the Douglas Estuary, with 178 birds representing the subsite peak count and numbers of all-Ireland importance. This subsite also supported peak numbers and numbers of all-Ireland importance during the high tide survey. 0L486 (Dunkettle) held peak numbers in November 2010 and 0L510 (Carrigrenan Pt) held peak numbers in December 2010.

#### Foraging Distribution

Bar-tailed Godwits are a wader species considered characteristic of coastal wetland sites dominated by sand. The birds forage by probing within intertidal sediment for invertebrate species, predominantly large polychaete worms such as *Arenicola marina* and *Nephtys* sp. The species is characteristic of sites with sandy substrates (e.g. Hill et al. 1993) and the birds often feed on the tide edge.

Bar-tailed Godwits were recorded foraging within 14 subsites overall (as above) and foraging was the main activity recorded by this species during low tide surveys.

0L534 (Bloomfield) recorded peak numbers in October 2010 and during the high tide survey. 0L486 (Dunkettle) held peak numbers (80) in November 2010 and 0L510 (Carrigrenan Pt) held peak numbers (37) in December 2010. 0L453 (Lough beg) held peak numbers (8) in February 2011.

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*.

The peak intertidal foraging density was recorded for 0L534 (Bloomfield) that held 5 Bar-tailed Godwits ha<sup>-1</sup> in October 2010. 0L486 (Dunkettle) recorded a density of 3 Bar-tailed Godwits ha<sup>-1</sup> in November 2010. The whole site mean feeding density (intertidal habitat) was 0.1 Bar-tailed Godwit ha<sup>-1</sup>.

#### Roosting Distribution

Relatively few Bar-tailed Godwits were recorded roosting intertidally during low tide surveys with the exception of 35 that roosted intertidally in 0L534 (Bloomfield) during October 2010. 0L536, 0L542, 0L543 and 0L592 all supported on occasion three or less roosting individuals.

No Bar-tailed Godwits were recorded roosting intertidally during the high tide survey. 31 roosted supratidally at Lough beg (0L453).

The November 2010 roost survey recorded roosting Bar-tailed Godwits in two subsites. 0L534 (Bloomfield) recorded the largest flock (42 birds) that roosted as part of a larger mixed-species roost within grassland (terrestrial) (inside the SPA boundary). 0L533 (Inner Douglas Estuary (Goat Is)) recorded two small flocks of 15 and 30 individuals roosting intertidally.

### ***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 and be mainly 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) and Britain (Wernham et al. 2002).

#### **Numbers**

Whole-site numbers of Curlew peaked in February 2011 when a site total count of 1,698 was recorded. 1,583 and 1,339 Curlew were counted during the October and November surveys but numbers fell noticeably during December 2010, likely as a result of the cold weather spell that saw this month recording the coldest weather since 1963 (Met Éireann, 2010).

948 Curlew were recorded during the high tide survey. All counts recorded exceeded the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 809 individuals, recorded in September 2010.

Curlews were widespread and occurred in 68 subsites overall. 42 subsites supported the species in all four low tide surveys.

Peak numbers were recorded by 0L535 (Harty's Quay), 0L536 (Ringmahon Pt), 0L517 (Loughatalia) and 0L595 (Slatty's Pool) for the four respective low tide survey dates. 0L534 (Bloomfield) held peak numbers (180) during the high tide survey. Five subsites (0L453, 0L483, 0L546 and 0L590 and 0L592) supported numbers ranked as 'high' in all four low tide surveys.

#### **Foraging Distribution**

Curlews are the largest intertidal wader to spend the non-breeding season within Ireland. Within intertidal areas they seek out larger prey items such as crabs, large worms and bivalves. Their de-curved bill is ideally suited to extracting deep-living worms such as Lugworms (*Arenicola marina*). Curlews rely on large prey that takes more time to handle (long handling time) in contrast to many other wader species that swallow prey relatively quickly upon finding it (short handling time). As a consequence, Curlews are territorial foragers and tend to occur widely spaced from each other to avoid competitive conflicts.

Curlew were recorded foraging in 57 subsites overall. 37 subsites recorded the species during all four low tide surveys. 0L535 (Harty's Quay) recorded peak numbers in October 2010 (196), while 0L536 (Ringmahon Pt) recorded peak numbers in both November 2010 and February 2011. 0L517 (Loughatalia) held peak numbers in December 2010 (64). Six subsites were notable for supporting numbers ranked as 'high' in all four low tide surveys: 0L453, 0L483, 0L491, 0L537, 0L541 and 0L592.

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*.

Terrestrial foraging was recorded widely and in association with 20 subsites: 0L479, 0L486, 0L513, 0L514, 0L519, 0L520, 0L521, 0L526, 0L534, 0L537, 0L540, 0L545, 0L560, 0L568, 0L585, 0L586, 0L587, 0L593, 0L595 and 0L602 with many of the flocks positioned outside of the SPA boundary. 0L479 (Brown Island) recorded terrestrial foraging on four survey occasions, including the high tide survey, as did 0L568 (Ballyannan pool), the latter of which is outside of the SPA boundary.

279 Curlews were recorded foraging terrestrially during the high tide survey in association with 12 subsites. The largest number (105) was at 0L534 (Bloomfield) in the outer Douglas Estuary where the Curlews foraged in grassland to the east of Bloomfield House and just outside of the SPA boundary. A further 67 foraged, along with 74 that roosted in grassland to the west of 0L593 (Harper's Island South) (outside SPA boundary). Smaller numbers roosted in association with the following subsites: 0L479, 0L486, 0L519, 0L520, 0L521, 0L526, 0L540, 0L568, 0L585 and 0L586.

The peak intertidal foraging density was recorded for 0L536 (Ringmahon Pt) (9 Curlew ha<sup>-1</sup>). The second highest density recorded was 4 Curlew ha<sup>-1</sup>, recorded for 0L591. The whole site mean feeding density (intertidal habitat) was 0.6 Curlew ha<sup>-1</sup>.

#### **Roosting Distribution**

Intertidal roosting/other behaviour was recorded widely across the site. A peak number of 282 Curlew roosted intertidally across 20 subsites during the October low tide survey.

Peak numbers during the four low tide surveys were held by 0L491 (Whitegate Bay), 0L545 (Rosslague), 0L592 (Harper's Island North) and 0L592, for the four respective dates. 0L589 (Brown Island West) and 0L590 (Brown Island East) held numbers ranked as 'high' in all four low tide surveys.

During the high tide survey a total of 335 Curlew roosted intertidally across 16 subsites. Peak numbers (75) were recorded for 0L534 (Bloomfield); no roosting Curlew had been recorded there during low tide surveys. The second highest numbers (60) were recorded in 0L565 (Saleen East). A total of 153 Curlew roosted supratidally across nine subsites, the largest number (55) located in 0L486 (Dunkettle). A further 138 Curlew were recorded roosting terrestrially in association with seven subsites. 0L593 (Harper's Island South) recorded the largest number (74) (see above) while 0L587 (Harper's Island (only)) supported a further 28 individuals (inside SPA boundary). Roosts were also recorded in association with 0L469, 0L557, 0L585, 0L586 and 0L595 many of which were outside of the SPA boundary.

The November 2010 roost survey recorded roosting Curlew across 27 subsites. 0L534 (Bloomfield) recorded the largest flock (165 birds) that roosted as part of a larger mixed-species roost within grassland (terrestrial) (inside the SPA boundary). The second largest roost of 88 Curlew was positioned intertidally in 0L591 (Brown Island North). 0L545 (Rosslague) held the largest number of roosting flocks (six); all positioned supratidally in saltmarsh (*Spartina*).

### 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

Whole site numbers of Redshank ranged from 1,331 (February 2011) to a low tide peak count of 2,275 in November 2010. The high tide recorded 1,302 Redshank. All whole site counts surpassed the threshold of all-Ireland importance.

The peak site count recorded for Cork Harbour during I-WeBS surveys (2010/11) was 1,153 individuals, recorded in November 2010.

Redshanks were widespread and recorded within 62 subsites overall (60 during low tide surveys). 46 subsites recorded this wader in all four low tide surveys.

0L453 (Lough Beg) recorded peak numbers in October 2010 (269) and thereafter 0L548 (Rossmore Bay) recorded peak subsite numbers during all low tide surveys.

Eight subsites were notable for supporting numbers ranked as 'high' in all four low tide surveys: 0L483, 0L487, 0L520, 0L525, 0L534, 0L565, 0L590 and 0L592.

Both 0L453 (Lough Beg) and 0L548 (Rossmore Bay) recorded subsite peak counts of 269 Redshank.

#### Foraging Distribution

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

Redshanks foraged intertidally across 58 subsites during the entire survey programme. Subsite use during individual low tide surveys ranged from 45 – 53 subsites; and 25 subsites recorded intertidal foraging during the high tide survey. 42 subsites recorded intertidal foraging during all four low tide surveys.

0L453 (Lough Beg) recorded peak numbers in October 2010 (269) and numbers ranked as 'high' in all other low tide surveys. 0L548 (Rossmore Bay) recorded peak subsite numbers during all remaining low tide surveys (subsite peak count of 269 individuals in November 2010). Nine subsites were notable for supporting numbers ranked as 'high' in all four low tide surveys: 0L483, 0L487, 0L491, 0L520, 0L525, 0L534, 0L565, 0L590 and 0L592.

The intertidal benthic community across the SPA has been classified as the broad habitat 'mixed sediment to sandy mud with polychaetes and oligochaetes'. The distinguishing species of this community complex are the polychaetes *Hediste diversicolor* and *Nephtys hombergii* and the oligochaetes *Tubificoides benedii*; these species are not uniformly recorded throughout the site. Other species recorded include the gastropod *Peringia ulvae* and the bivalve *Scrobicularia plana*.

Terrestrial foraging was recorded irregularly and in association with three subsites: 0L514, 0L520 and 0L586 with low numbers (<3 birds). During the high tide survey, 41 Redshanks foraged terrestrially in 0L479 (Brown Island) and a further 18 individuals in 0L530 (Raffeen Creek) (both inside SPA boundary). Single individuals were recorded in association with 0L565, 0L585 and 0L586.

The peak intertidal foraging density was 6 Redshanks ha<sup>-1</sup> recorded for 0L548 in November 2010. 15 subsites recorded densities of over 3 Redshanks ha<sup>-1</sup> (0L453, 0L469, 0L487, 0L520, 0L528, 0L529, 0L534, 0L536, 0L543, 0L544, 0L545, 0L547, 0L548, 0L564, 0L565). The whole site average intertidal foraging density was 1 Redshank ha<sup>-1</sup>.

#### Roosting Distribution

Redshanks were widely recorded in roosting/other behaviour during low tide surveys with a total of 20 subsites used (0L453, 0L479, 0L483, 0L486, 0L491, 0L512, 0L517, 0L520, 0L522, 0L535, 0L537, 0L542, 0L543, 0L547, 0L557, 0L565, 0L589, 0L590, 0L591 and 0L592). Only one subsite recorded individuals in all four low tide surveys (0L543 (Belvelly Br. East)), with a maximum count of 26 in December 2010.

288 Redshanks roosted intertidally across 17 subsites during the high tide survey. The largest number was located within 0L535 (Harty's Quay) (48), while 46 roosted within 0L565 (Saleen East). No roosting individuals were recorded in 0L548 (Rossmore Bay) where peak numbers were recorded to forage. 0L491 (Whitegate Bay), 0L591 (Brown Island North) and 0L592 (Harper's Island North) all held 30+ individuals.

512 Redshanks roosted supratidally during the high tide survey in association with 14 subsites: 0L453, 0L486, 0L487, 0L521, 0L522, 0L524, 0L525, 0L529, 0L535, 0L540, 0L542, 0L543, 0L546 and 0L587. The largest number was recorded in 0L453 (Lough Beg) (86) and 74 were recorded in 0L524 (Coolmore to Kellehers Woods). 0L525 (Carrigaline Castle to Rabbit pt) and 0L542 (Belvelly Br. West) both supported 64 roosting individuals. 0L546 (Fota Is to Weir Is.) supported 51 individuals. All other subsites held 43 or fewer individuals.

57 Redshanks roosted terrestrially during the high tide survey in association with six subsites: 0L496, 0L557, 0L568, 0L585, 0L587 and 0L593. The largest number was in 0L496 (Monkstown Creek) (21).

The November 2010 roost survey recorded Redshank roosting across a total of 34 subsites. The largest single roost comprised 72 Redshanks that roosted intertidally in 0L491 (Whitegate bay). 0L524 (Coolmore to Kellehers Woods) recorded an intertidal roost of 70 individuals, while 0L525 (Carrigaline Castle to Rabbit pt) has a supratidal roost of 66 Redshank with smaller numbers at three other

positions. 0L453, 0L520, and 0L533 each supported roosting individuals at five separate positions.

### **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**

Whole site numbers of Black-headed Gulls peaked in February 2011 when 5,279 gulls were counted. 3,254 Black-headed Gulls were counted during the high tide survey.

Black-headed Gulls were widely distributed and recorded in 67 subsites overall. 41 subsites recorded this species during all four low tide surveys.

Peak numbers were recorded by 0L453 (Lough Beg), 0L486 (Dunkettle), 0L526 (Carrigaline Owenboy) and 0L491 (Whitegate Bay) for the four respective low tide survey dates. The peak subsite count was 790 Black-headed Gulls recorded by 0L491 (Whitegate Bay) in February 2011.

#### **Foraging Distribution**

Black-headed Gulls were recorded foraging intertidally in 48 subsites overall (47 during low tide surveys). Whole site counts of 1,378, 626, 167 and 741 were recorded for the four respective low tide survey dates. Peak numbers were recorded by 0L453 (Lough Beg), 0L537 (Hop Island to Passage West), 0L483 (Rathcoursey) and 0L592 (Harper's Island North) for the four respective low tide survey dates. 0L537 (Hop Island to Passage West) was the only subsite to support peak numbers in one survey plus numbers ranked as 'high' in all other low tide surveys. 0L563 (Agahda Lower) was notable for supporting numbers ranked as 'high' in all four low tide surveys.

118 Black-headed Gulls foraged intertidally during the high tide survey with the largest number and 85% of the total located in 0L533 (inner Douglas Estuary (Goat Is)).

Black-headed Gulls were recorded foraging subtidally in 36 subsites overall (35 during low tide surveys). Whole site counts of 290, 690, 338 and 748 were recorded for the four respective low tide survey dates. Peak numbers were recorded by 0L451 (Martello west to Carrigrenan), 0L592 (Harper's Island North), 0L537 (Hop Island to Passage West) and 593 (Harper's Island South) for the four respective low tide survey dates. Both 0L563 (Agahda Lower) and 0L564 (Saleen west) were notable for supporting numbers ranked as 'high' in three low tide surveys.

235 Black-headed Gulls foraged subtidally during the high tide survey with the largest number located in 0L534 (Bloomfield) where 530 gulls accounted for 98% of all those recorded foraging subtidally.

Terrestrial foraging was recorded in association with ten subsites: 0L099, 0L479, 0L517, 0L520, 0L560, 0L564, 0L565, 0L585, 0L587 and 0L595.

#### **Roosting Distribution**

Greater numbers of Black-headed Gulls were recorded in roosting/other behaviour in intertidal habitat in most surveys; in comparison to those foraging or those roosting/other subtidally. The four low tide surveys recorded site totals of 1,121, 1,544, 1,439 and 3,244 for the four respective dates. Intertidal roosting/other was recorded for 55 subsites overall. Peak numbers were recorded by 0L491 (Whitegate Bay) in both October and February low tide surveys. 0L486 (Dunkettle) held peak numbers in November 2010 and 0L533 (Inner Douglas Estuary (Goat Is)) held peak numbers in December 2010.

316 roosted intertidally during the high tide survey and the largest number (130) were located in 0L486 (Dunkettle) accounting for 415 of the total number counted across the site.

Subtidal roosting/other behaviour was recorded in a total 43 subsites. Lower numbers were recorded in comparison during low tide surveys with the four low tide surveys recording site totals of 112, 351, 446 and 260 for the four respective dates. Peak numbers were recorded by 0L486 (Dunkettle) in November 2010 but all other low tide surveys recorded peak numbers in 0L526 (Carrigaline Owenboy).

1,833 Black-headed Gulls roosted subtidally during the high tide survey and the largest number (450) were located in 0L563 (Agahda Lower). 0L592 (Harper's Island North) recorded the second highest number with 242 gulls.

Terrestrial roosting/other was recorded in association with 16 subsites: 0L099, 0L486, 0L510, 0L522, 0L526, 0L532, 0L542, 0L557, 0L560, 0L561, 0L563, 0L566, 0L568, 0L582, 0L585, 0L587 and 0L595.

The November 2010 roost survey recorded Black-headed Gulls roosting across a total of 28 subsites. The largest intertidal roost comprised 160 individuals roosting intertidally in 0L491 (Whitegate bay). Intertidally roosting individuals were recorded across a further 13 subsites: 0L591, 0L510, 0L542, 0L533, 0L486, 0L524, 0L522, 0L582, 0L559, 0L564, 0L563, 0L563 and 0L519.

Terrestrial roosting/other was recorded in association with eight subsites: 0L595, 0L582, 0L532, 0L526, 0L561, 0L560, 0L560 and 0L099. The largest subtidal flock of roosting/other individuals was recorded in 26 (Carrigaline Owenboy).

### Common Gull *Larus canus* - Family (group): Laridae (gulls)

The Common Gull breeds widely across the Palearctic and in North America (Mitchell et al. 2004). In Ireland, the species is most widely seen during winter when wintering birds arrive from Scotland and continental Europe (Wernham et al. 2004).

#### Numbers

Numbers of Common Gull ranged from 137 individuals in October 2010 to a peak of 896 individuals in February 2011. 793 Common Gulls were recorded during the high tide survey.

Common Gulls were widespread across the site and recorded in 50 subsites overall. They occurred with most regularity (all four low tide surveys) within five subsites: 0L453, 0L491, 0L520, 0L521 and 0L563.

0L453 (Lough Beg) held peak numbers in October and November 2010; 0L512 (Currabally – Ballyellane) held peak numbers in December 2010 and 0L564 (Saleen west) held peak numbers, and the largest subsite count recorded of 185 gulls in February 2011.

#### Foraging Distribution

Common Gulls were recorded foraging intertidally in 18 subsites overall. Whole site counts of 79, 71, 39 and 156 were recorded for the four respective low tide survey dates. 0L453 (Lough Beg) held peak numbers during all four low tide surveys and recorded a peak count of 79 gulls in February 2011. 0L521 (Ringabella Outer creek), 0L563 (Agahda Lower) and 0L564 (Saleen west) were the only subsites to record numbers ranked as 'high' in two low tide surveys.

No Common Gulls were recorded foraging intertidally during the high tide survey.

Common Gulls were recorded foraging subtidally in 15 subsites overall (14 during low tide surveys). Whole site counts of 7, 38, 16 and 176 were recorded for the four respective low tide survey dates. Peak numbers were recorded by 0L563 (Agahda Lower) during October 2010 and December 2010, 0L562 (Agahda) held peak numbers in November 2010 while 0L564 (Saleen west) held peak numbers in February 2011.

Two Common Gulls foraged subtidally during the high tide survey in 0L591 (Brown Island North).

#### Roosting Distribution

Greater numbers of Common Gulls were recorded in roosting/other behaviour in intertidal habitat most surveys; in comparison to those roosting/other subtidally. The four low tide surveys recorded site totals of 39, 106, 122 and 548 for the four respective dates. Intertidal roosting/other was recorded for 36 subsites overall. Peak numbers were recorded by 0L520 (Ringabella Inner Creek) during October and November, 0L487 (Brick Island) in December 2010 and 0L491 (Whitegate Bay) in February 2011.

93 Common Gulls roosted intertidally during the high tide survey and the largest number (42) were located in 0L483 (Rathcoursey) accounting for 45% of the total number counted across the site.

Subtidal roosting/other behaviour was recorded in a total 23 subsites. Lower total numbers were recorded in comparison with intertidal roosting/other during low tide surveys with the four low tide surveys recording site totals of 4, 41, 76 and 15 for the four respective dates. Numbers in subsites were generally low (<10 individuals) two exceptions being 51 gulls in 0L512 (Currabally – Ballyellane) in December 2010 and 31 in 0L482 (Carrabinny Wood) in November 2010.

565 Common Gulls roosted subtidally during the high tide survey and the largest number (350) were located in 0L563 (Agahda Lower) and accounted for 62% of the total number recorded roosting subtidally across the site.

Terrestrial roosting/other was recorded in association with nine subsites during the high tide survey: 0L099, 0L486, 0L510, 0L522, 0L532, 0L560, 0L582, 0L587 and 0L595.

The November 2010 roost survey recorded Common Gulls roosting across a total of 13 subsites: 0L099, 0L486, 0L491, 0L512, 0L526, 0L527, 0L560, 0L563, 0L564, 0L582, 0L587, 0L591 and 0L592. The largest roost comprised 24 individuals that roosted intertidally in 0L491 (Whitegate Bay), a further 17 also roosted subtidally; this also being the largest number recorded in subtidal habitat across the site. Terrestrial roosting/other was recorded in association with 0L099, 0L560 and 0L582.

### 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 and peaked in February 2011 (299). Numbers dropped significantly during December 2010, likely as a result of the cold weather spell that saw this month recording the coldest weather since 1963 (Met Éireann, 2010). 110 Lesser Black-backed Gulls were counted during the high tide survey.

Lesser Black-backed Gulls were widespread and recorded within 43 subsites overall.

0L520 (Ringabella Inner Creek) held peak numbers in October and November 2010, 0L532 (Glenbrook) recorded peak albeit low numbers (7) in December 2010 and 0L486 (Dunkettle) held peak numbers in February 2011 and during the high tide survey.

#### Foraging Distribution

Lesser Black-backed Gulls were recorded foraging intertidally in 15 subsites overall. Whole site counts of 16, 13, 9 and 41 were recorded for the four respective low tide survey dates. Peak numbers were recorded by 0L537 (Hop Island to Passage West), 0L593 (Harper's Island South), 0L536 (Ringmahon Pt) and 0L453 (Lough Beg) for the four respective low tide survey dates.

Just two Lesser Black-backed Gulls foraged intertidally during the high tide survey (0L524).

Lesser Black-backed Gulls were recorded foraging subtidally in 12 subsites overall (11 during low tide surveys). Whole site counts of 11, 18, two and four individuals were recorded for the four respective low tide survey dates. 0L453 (Lough Beg) was notable for supporting peak numbers in two low tide surveys and was the only subsite to support foraging individuals in three or more surveys.

A total of eight Lesser Black-backed Gulls foraged subtidally during the high tide survey; seven in 0L535 and one in 0L453.

#### Roosting Distribution

Greater numbers of Lesser Black-backed Gulls were recorded in roosting/other behaviour in intertidal habitat in most surveys; in comparison to those foraging or those roosting/other subtidally. The four low tide surveys recorded site totals of 181, 137, 44 and 240 for the four respective dates. Intertidal roosting/other was recorded for 32 subsites overall. 0L520 (Ringabella Inner Creek) held peak numbers in October and November 2010, 0L532 (Glenbrook) recorded peak albeit low numbers (7) in December 2010 and 0L486 (Dunkettle) held peak numbers in February 2011.

28 Lesser Black-backed Gulls roosted intertidally during the high tide survey and the largest number (15) were located in 0L526 (Carrigaline Owenboy) accounting for 54% of the total number counted across the site.

Subtidal roosting/other behaviour was recorded in a total 12 subsites (10 during low tide surveys). Very low numbers were recorded in comparison with intertidal roosting/other during low tide surveys, with the four surveys recording site totals of 26, 4, 3 and one gulls for the four respective dates. Peak numbers were recorded by 0L486 (Dunkettle) in November 2010 but all other low tide surveys recorded peak numbers in 0L526 (Carrigaline Owenboy).

39 Lesser Black-backed Gulls roosted subtidally during the high tide survey and the largest number (33 - 85% of the total subtidally roosting individuals) was located in 0L486 (Dunkettle).

Terrestrial roosting/other was recorded in association with three subsites during the high tide survey: 0L486, 0L530 and 0L532 and involved low numbers (<4 gulls).

The November 2010 roost survey recorded Lesser Black-backed Gulls roosting across a total of 11 subsites. Each held a single flock. 0L486 (Dunkettle) held the largest number; 15 that roosted intertidally. 0L559 (Cuskinny Bay) and 0L560 (Cuskinny Marsh) each held flocks of 11 individuals. All other subsites held ten or fewer individuals.

## 5.4 Cork Harbour - 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, 2012). 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 can relate not only to 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 5.4 provides information on activities and events that occur in and around Cork Harbour that may either act upon the habitats within the site, or may interact with the Special Conservation Interest species and other waterbirds using the site.

### 5.4.2 Assessment Methods

Information on 'activities' and 'events' across the site was collected during a desk-top review which included NPWS site reporting files, County Development and other plans (e.g. Cork County Council, 2013), South Western River Basin District documents (e.g. SWRBD, 2010a) and other available documents relevant to the ecology of the site.

In addition, information was collected during the 2010/11 waterbird survey programme (NPWS, 2011) as field workers recorded activities or events that occurred at the site during their survey work. This information, together with results from a 'site activity questionnaire' provides valuable information gained from 200+ hours of surveyor effort across the site. All data collected were entered into a database but as the dataset will be subject to change over time, the assessment should be viewed as a working and evolving process.

The 'activities' and 'events' were categorised using the standard EU list of pressures and threats as used in Article 12 reporting under the EU Bird's Directive. Only factors likely to directly or indirectly affect waterbirds were included but the resulting list is broad and includes built elements (e.g. man-made structures such as roads and bridges that are adjacent to the site), factors associated with pollution (e.g. discharges from waste water treatment plants), various recreational and non-recreational activities as well as biological factors such as the growth of the invasive plant species *Spartina anglica*.

Data are presented in three ways:-

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

- O** observed or known to occur within Cork Harbour;
- U** unknown spatial area hence all potential subsites are included (e.g. fisheries activities);
- H** historic, known to have occurred in the past.
- P** potential to occur in the future.

2. Of the activities and events identified to occur in and around Cork Harbour, those that have the potential to cause disturbance to waterbird species are highlighted.
3. Data from the 2010/11 waterbird survey programme were used to inform an assessment which examined the level of disturbance caused by activities recorded during field surveys. The methodology was adapted from that used for monitoring Important Bird Areas (IBAs) (Birdlife International, 2006) and involved assigning scores which ranged between 0 and 3, to three selected attributes of each disturbance event (1) frequency/duration; (2) intensity and (3) likely response of waterbirds (after Hill et al. 1997) (Table 5.7). The rationale for scoring is provided in Appendix 10.

**Table 5.7 Scoring system for disturbance assessment**

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

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

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

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

#### 5.4.3 Overview of activities at Cork Harbour

Activities and events identified to occur in and around Cork Harbour are shown in Appendix 10, listed in terms of the subsites surveyed during the 2010/11 Waterbird Survey Programme. Activities highlighted in grey are those that have the potential to cause disturbance to waterbirds (see Section 5.4.4).

The following pages outline the range of activities and events that occur across the site using the following headings: (1) habitat loss, modification and adjacent landuse; (2) water quality; (3) fisheries and aquaculture; (4) recreational activities; and (5) others.

#### Habitat loss, modification and adjacent landuse

Cork Harbour is a large, sheltered bay system covering an area of 430km<sup>2</sup> (Halcrow Group 2010) which stretches from the two main estuaries of the River Lee, near Cork City in the northwest, and the Owenacurra River, near Midleton, in the northeast, southwards as far as

the narrow inlet between Roches Point and Crosshaven. The two large areas of open water, Lough Mahon and the Lower Harbour, are separated by Great Island.

Cork Harbour is renowned for being one of the finest natural harbours in the world, and being situated adjacent to the second largest city in the country, it is an important seaport and industrial area. The topography of the landscape is gently undulating, with a diverse coastal environment comprising of built areas, shallow cliffs, intertidal mudflats, reed beds, shingle and rocky shores (Cummins & O'Donnell, 2005). Sections of the site have adjacent urban or residential areas while the chemical and pharmaceutical industries also feature prominently. The results of a shoreline inventory of Cork Harbour carried out in 2003 showed that over two thirds of the shoreline is dominated by man made structures such as sea walls and rock reinforcements (O'Donnell & Cummins, 2004). However parts of the coast remain natural and characterised by rural agricultural land-use with much less influence from human activities.

Cork City is located upstream of the site on the River Lee in the northwest corner of Cork Harbour. Several of the city's suburbs, including Blackrock, Mahon, Douglas, and Rochestown lie on Lough Mahon or the Douglas Estuary, in the upper part of Cork Harbour. The village of Ballinacurra is located in the northeast of the harbour, and is effectively a suburb of Midleton. Great Island, which forms the northern shore of the lower harbour, supports the town of Cobh, an important centre for fishing, tourism and recreational water sports. The Lower Harbour has many towns around its shores including Passage West, Carrigaline, Monkstown, Ringaskiddy and the smaller village of Raffeen. Crosshaven lies in the southwest. The eastern shore is less densely populated but has two villages Whitegate and Aghada, hosting an oil refinery and power plant respectively. Whitegate is the only oil refinery in Ireland.

The Port of Cork, the second most important port in the Republic of Ireland and the key seaport in the south of Ireland, provides a significant economic contribution to the southern half of the country (Corepoint, 2008). Port facilities are located at the City Quays, Tivoli industrial and dock estate, Ringaskiddy deepwater and ferry terminal and Cobh cruise terminal (Port of Cork, 2004). Deepwater shipping channels are maintained at 11m by maintenance dredging. The Port of Cork has lodged a planning application with An Bord Pleanála for the re-development of the Ringaskiddy site (<http://www.ringaskiddyportredevelopment.ie/>).

The expansion of towns and villages has led to an expanding road network over the past several decades with many roads being built on the edges or across intertidal mudflats (Smiddy et al. 1995) with resulting habitat loss. Coastal towns on the north side of the harbour are linked by the N25 while the Lower Harbour towns and villages are linked by the N28. Roads line many areas of the harbour including the Glashaboy River Estuary (0L538), Douglas Estuary (e.g. 0L537) and the southern shoreline of the North (Great Island Channel) (e.g. subsites 0L545, 0L512). The N25 crosses both Harpers Island and Brown Island in the inner harbour. Rail lines also cross or run adjacent to the site in the upper harbour, examples including 0L592, 0L593, 0L541, a line that runs from Cork via Fota Island to Cobh.

One area where habitat loss has been most noticeable is in association with the Dunkettle Roundabout (0L486, 0L539). The Jack Lynch Tunnel, opened in 1999, is a tunnel running underneath subsites 0L536, 0L486 and takes the South Ring Road underneath the Lee Estuary to the Dunkettle Roundabout. The Jack Lynch Tunnel Intertidal Polder (0L486) occurs along the Dunkettle shore immediately southwest of the roundabout and is flanked by a rail line to the north, the active Tivoli container terminal to the west, the Jack Lynch Tunnel to the east, and a seawall/open shoreline to the south. This area was originally open coast before a sea wall was built when Cork County Council planned to reclaim the area for the industrial expansion of the Dunkettle area. When the wall was built, the feature became a lagoon, which was permanently wet, with tidal influence but the subsequent installation of culverts in the sea wall allow the area to drain fully at low tide to reduce the risk of flooding of the adjacent train line (Scott Cawley, 2012).

Lands at Marino Point (0L511, 0L541), have undergone major changes over the past 30+ years with the area of the peninsula almost doubling in size due to reclamation of intertidal habitat that started in 1975 (Köpke, 2005). The peninsula was formerly the home of the Irish Fertiliser Industry (IFI). The IFI plant was built in the mid 1970's to manufacture ammonia and urea and commenced operation in 1979 as the state owned Nitrogen Eireann Teoranta (N.E.T.) which became Irish Fertilizer Industries in 1987. Operations ceased in 2002 and the resulting brownfield site has not been in use since.

Land claim is also evident at Rushbrooke in Cobh, at Brown Island (0L479), Long Point, Aghada (adjacent 0L491), and at Ringaskiddy, amongst others. The construction of a sluice at the Slatty Bridge (0L595) (19<sup>th</sup> century) cut off part of the intertidal zone including some saltmarsh habitat (McCorry & Ryle, 2009).

Cork Harbour is an important site for the pharmaceutical and chemical industries, particularly the areas of Ringaskiddy and Little Island in the west and north-west of the area. Lough Beg is the lower harbour is overlooked by Currabinny Wood but is also the location of GlaxoSmithKline, a pharmaceutical plant. The lower area of brackish marsh is separated from the intertidal mudflats by a causeway to the plant, and this marsh is owned by the GSK plant that maintain it as a bird sanctuary complete with viewing hide. The industrial nature of the harbour has changed over time however with ship building and heavy industry having declined, for example the closure of the Irish Fertiliser Industry (IFI) at Marino Point, as above, Irish Steel on Haulbowline Island, and Mitsui Denman (a manganese processing plant) at Wallingstown on Lough Mahon, which closed in 2003.

The Cork Lower Harbour Energy Group, a group of healthcare manufacturing companies (DePuy Synthes, GSK, Janssen biologics and Novartis) have recently installed wind turbines in the Ringaskiddy area; built to reduce each site's energy costs. Three turbines are due to be installed and operational by May 2014 with one (Novartis) currently on hold (<http://www.clheg.com/project-information.html>).

East Cork Landfill (now closed) is situated on the Rossmore Peninsula on the northern shore of the North (Great Island) Channel (adjacent subsite 0L548, 0L551, 0L487). Quarries are located at Rossmore (0L548) and Weir Island (0L469, 0L546).

Cork Harbour is steeped in maritime heritage. Military fortifications include the impressive forts which mark the entrance to the Harbour; Camden Fort (renamed Fort Meagher, 1938) and Carlisle Fort (renamed Fort Davis, 1938). Other fortifications include installations on Spike Island, Rocky Island and Fort Templebreedy. There are also five Martello Towers, dating to the Napoleonic era located in the Harbour (Corepoint, 2008). Haulbowline Island is the base of the Irish Naval Service; the island connected to the mainland via a roadbridge. The Irish Steel plant formerly located on the east of this island closed in 2002 leading to issues of contaminated land and its remediation.

The River Lee catchment has been the focus of a flood risk assessment and management study in recent years undertaken by the OPW in partnership with Cork City and County Councils (Halcrow Group, 2010). The River Lee rises in the Shehy mountains in the south west of Ireland and flows to Cork Harbour in the northeast. The river and its main tributaries, the rivers Sullane, Laney, Dripsey, Bride and Shournagh drain an area of more than 1,100km<sup>2</sup> upstream of Cork city. The river is partly controlled by the Carrigadrohid and Inniscarra hydroelectric dams owned by the ESB. The catchment also includes a number of smaller rivers and their estuaries that drain into Cork Harbour including the Glashaboy, Owennacurra and Owenboy Rivers.

There is a high level of flood risk in the Lee Catchment from the River Lee, its tributaries and Cork Harbour and a number of significant events have occurred in the past, including both river flooding events (e.g. August 1986) and tidal flooding events (e.g. March 1962) (Halcrow Group, 2008). High tides impact on the level of flooding but flood risk can also be increased by local conditions, for example: where bridges restrict high flows; where the build up of

debris causes blockages; and as a result of environmental and land use changes (Halcrow Group, 2010). Flood risk is likely to increase in the future in line with climate change and sea level rise. Flood risk management options are detailed in the Lee CFRAMS study (see [http://www.leecframs.ie/downloads/documents/REP006\\_HDA.pdf](http://www.leecframs.ie/downloads/documents/REP006_HDA.pdf)); together with an assessment of potential impacts upon the Cork Harbour SPA (Carrigaline APSR, Middleton APSR and Little Island APSR) which relate to temporary damage to intertidal habitats and disturbance to bird populations during construction, while in the long term there is a potential for habitat loss as a result of coastal squeeze.

### Water quality

Cork Harbour has a history of problems associated with water pollution and eutrophication (e.g. ERU, 1989). Up to the 1960's most of the urban and industrial developments took place in Cork City and its immediate environs, and sewage and other waste were discharged directly into the River Lee. In the late 1980's, sewers were installed to convey waste water to two outfalls on the quays. While this improved water quality status upstream, the Lee Estuary and Lough Mahon regularly suffered from problems of increased concentrations of organic matter (BOD), nutrient enrichment, faecal coliform bacteria and a decrease in dissolved oxygen levels. In addition to the Lee Estuary and Lough Mahon, the Owennacurra estuary below Middleton has also suffered with serious pollution in the past; again linked to sewage outfalls (ERU, 1989).

Water quality in the Upper Harbour was improved by the engineering works conducted under the Cork Main Drainage Scheme, which included the building of Carrigrennan WWTP (Wastewater Treatment Plant) at Little Island, Co. Cork. The plant treats wastewater from Cork City and surrounding areas in the County including the City Environs, Glanmire and the proposed new town at Monard (Cork County Council, 2013b). The plant was commissioned in 2004 with a design organic load capacity of 413,000 population equivalent and provides primary and secondary treatment. Treated wastewater from the plant is discharged through a 500m long outfall pipe to Cork Harbour at Lough Mahon. However, the design of the existing plant did not include for nutrient removal or disinfection and since the plant was commissioned the upper harbour has been designated as a sensitive area under the Urban Wastewater Treatment (Amendment) Regulations 2004 (SI 440/2004). Current discharges from the plant do not comply with these regulations and the plant therefore needs to be upgraded (Cork County Council, 2013b).

Several locations around the harbour currently have no treatment facilities at all (Cobh, Passage West/ Monkstown, Carrigaline, Crosshaven and Whitegate/Agahda). Others have only preliminary/primary treatment (e.g. Ringaskiddy). Plans are currently underway to improve sewage facilities in the lower part of the Harbour (Cork County Council, 2013b).

The South Western River Basin District (SWRBD) River Basin Management Plan 2011 – 2015 covers the implementation of the Water Framework Directive (WFD) (2000/60/EEC) for the south-west coast of Ireland and covers Cork Harbour and its inflowing rivers and streams (SWRBD, 2010a).

The current water quality status of Cork Harbour is 'moderate' according to the South Western River Basin Transitional and Coastal Waters Action Programme (SWRBD, 2010b) and therefore fails to meet the required standards as set by the Water Framework Directive. The contributing factors were below standard levels of dissolved inorganic nitrogen (DIN) and dissolved oxygen (DO) with waste water treatment plants (WWTP), combined sewer overflows and treatment plant overflows being the listed pressures.

The Environmental Protection Agency (EPA) monitors the status of estuarine and coastal water bodies using their Trophic Status Assessment Scheme (TSAS), a requirement under the Urban Waste Water Treatment Directive (UWWT) (91/271/EEC)<sup>21</sup> and Nitrates Directive

---

<sup>21</sup> Transposed by the Urban Waste Water Treatment Regulations S. I. No 254 of 2001, as amended by S.I. No 48 of

(91/676/EEC). Following assessment, waterbodies are classified as eutrophic, potentially eutrophic, intermediate or unpolluted (O'Boyle et al. 2010). Recent results for the period 2007-2009, reveal that the North Channel is 'potentially eutrophic' while all other harbour sampling stations are classified as 'intermediate' (O'Boyle et al. 2010). In particular levels of dissolved inorganic nitrogen (DIN) were found to be high in the Glashaboy (Glanmire) estuary and both inner and outer Cork Harbour failed to comply with the Environmental Quality Standard (EQS) for DIN. Phosphorus, measured as molybdate reactive phosphorus (MRP), was found to be high in Lough Mahon and failed to meet the required EQS for this parameter, while deoxygenation (low levels of dissolved oxygen) was still a problem in the Lee Estuary.

### Fisheries & aquaculture

The River Lee from its source to the city waterworks is a designated Salmonid Waters as prescribed under the European Communities (Quality of Salmonid Waters) Regulations, 1988.

Various commercial inshore fishing activities are likely to occur in and adjacent to the site (detail and spatial scale unknown). Line fishing and other static methods (e.g. potting for shrimp, crab and lobster) are widespread within the bay (DoEHLG, 2009). Small boat trawling for flounder, plaice and codling occurs to a lesser extent and a short season for pelagic trawling for sprat is carried out in winter. The harbour waters supply important spawning and nursery areas for sea fish species (Corepoint, 2008).

An area of 3.4 km<sup>2</sup> of Cork Harbour is designated as the Cork Great Island North Channel Shellfish Area under the EU Shellfish Waters Directive<sup>22</sup> (No. 37) (DoEHLG, 2009). The designated area extends from Weir Island to the furthest reach of Brown Island in the North Channel. There are three designated shellfish areas in the adjacent tidal waters at Rostellan. Oyster (*Crassostrea gigas*) cultivation predominates.

The Sea Fisheries Protection Authority (SFPA) is responsible for classifying shellfish production areas and the current classification of the Cork Great Island North Channel Shellfish Area Bivalve Mollusc Production Area is Class B 2012 ([www.sfpa.ie](http://www.sfpa.ie)).

The North Channel, Cork Harbour, had been a long established public oyster bed until it went into decline at the beginning of the twentieth century (Browne, 1904 in Culloty & Mulcahy, 2007). Brick Island formerly supported Oyster production; Atlantic Shellfish Ltd. producing *Ostrea edulis* spat in static sea water ponds on the island which is linked to the mainland by a causeway (Culloty & Mulcahy, 2007). The company was involved in selective breeding programmes for resistance to the oyster parasite *Bonamia ostreae*. This company closed in the early 2000's but the pools are still present to this day on Brick Island.

Bait-digging and the collection of molluscs by hand-gathering is known at the site.

### Recreational activities

The bathymetry of the site reflects the morphology of the coastline with gentle slopes increasing to a water depth of around 28m at the harbour mouth. Both the sheltered environment and deepwater channels make the harbour ideal for both shipping and boating with cruise liners becoming a regular feature in recent years which berth at Cobh. Recreational boating includes sailing and power boating. Marinas are located at the Port of Cork City Marina, the Royal Cork Yacht Club Marina at Crosshaven, Monkstown and East Ferry, with moorings at Aghada, Whitepoint (Cobh) and Glenbrook amongst others.

---

2010.

<sup>22</sup> European Communities (Quality of Shellfish Waters) (Amendment) Regulation 2009 (SI 55 of 2009).

The coastal scenery and relative ease of accessibility provides scope for many recreational activities around the site. Walking is popular and coastal walk paths occur in many places facilitating walking, running and cycling and include those along the Douglas Estuary, and Owenboy Estuary, while roads immediately adjacent to the shoreline facilitate coastal walking in many areas including the southern shore of the North Channel. For descriptions and maps of coastal walks around Cork Harbour refer to O'Donoghue & Gittings (2014).

Recreational shore angling is a popular pursuit at a number of locations around Cork Harbour with salmon, trout and coarse fish pursued. The main salmon and trout bearing rivers are the Owenacurra, the Glashboy, the Lee and the Owenabue (<http://corkharbourbirds.ucc.ie/information/cork%20harb.htm>).

Deep sea angling vessels operate mainly from Crosshaven and Passage West targeting fishing grounds within and adjacent to the harbour (Corepoint, 2008).

#### Other

Wildfowling was not recorded at the site during the 2010/11 Waterbird Survey Programme but is known to occur at various places around the harbour.

In response to the freezing conditions experienced in the winter of 2010, the Department of the Environment, Heritage and Local Government extended a temporary closure of the hunting season for wild birds (8<sup>th</sup> – 30<sup>th</sup> December 2010 inclusive).

Douglas Estuary is a Wildfowl Sanctuary.

#### 5.4.4 Disturbance Assessment

During 2010/11 survey work, seven categories of activity/event were recorded that caused disturbance to waterbirds. These were aircraft, power boating, activities associated with aquaculture, bait-diggers, hand-gathering of molluscs, vehicles, and walking (including with dogs). These activities were recorded from 30 subsites (Table 5.8).

Walking (including with dogs) was the most widespread activity and caused an observed disturbance response in 21 subsites. Thereafter, bait digging was the most frequent (four subsites). Aquaculture activities were frequent but confined to one subsite only (0L547).

A summary of the disturbance assessment is shown in Table 5.8 and full results are shown in Appendix 11.

**Table 5.8 Disturbance Assessment Summary Table**

Number of activities recorded during field surveys (2010/11 waterbird survey programme) observed to cause disturbance to waterbirds. The calculated peak disturbance score is shown (see text for explanation).

Scores 0 – 3 = **Low** Scores 4 – 6 = **Moderate** Scores 7 – 9 = **High**. Grey shading = no activity recorded.

Subsite Code	Number of Activities	Peak Disturbance Score	Activity Responsible
0L453	2	5	Walking (incl. with dogs)
0L469	1	4	Walking (incl. with dogs)
0L479	1	4	Walking (incl. with dogs)
0L486	1	4	Walking (incl. with dogs)
0L487	1	4	Walking (incl. with dogs)
0L491	1	4	Other
0L512	1	4	Walking (incl. with dogs)
0L517	1	4	Walking (incl. with dogs)
0L520	2	5	Walking (incl. with dogs)
0L521	1	5	Walking (incl. with dogs)
0L525	1	4	Aircraft
0L527	1	4	Bait digging
0L529	1	4	Bait digging
0L533	1	5	Walking (incl. with dogs)
0L535	1	4	Walking (incl. with dogs)
0L536	1	5	Power boating
0L537	2	4	Walking (incl. with dogs), Vehicles
0L538	1	4	Walking (incl. with dogs)
0L542	2	4	Walking (incl. with dogs), Vehicles
0L543	1	4	Walking (incl. with dogs)
0L546	1	4	Walking (incl. with dogs)
0L547	1	6	Activities associated with intertidal aquaculture
0L548	1	4	Walking (incl. with dogs)
0L557	1	4	Walking (incl. with dogs)
0L558	1	4	Walking (incl. with dogs)
0L559	2	4	Bait digging Hand gathering of molluscs
0L560	1	4	Walking (incl. with dogs)
0L562	1	4	Hand gathering of molluscs
0L567	1	4	Walking (incl. with dogs)

#### 5.4.5 Discussion

It is clear that historical events at Cork Harbour such as the building of sea walls and land reclamation have acted so as to modify the wetland habitats. However, such past events can still act currently in terms of on-going modifications to intertidal and coastal habitats as a result of changes to natural processes (e.g. sedimentation or erosion rates).

Human recreational activities at coastal sites occur less frequently during winter months and the range of activities is much reduced. Nevertheless, a range of activities and events were recorded at the site that resulted in disturbance to waterbirds, and recreational activity in the form of walkers (with/without dogs) is widespread and frequent around the site.

Any activity that causes 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<sup>23</sup> (reduced survival or reproductive success) consequences at population level may result.

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

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

and be influenced by:-

- Temporal availability – whether waterbirds have the opportunity to exploit the food resources in a disturbed area at times when the disturbance does not occur;
- Availability of compensatory habitat - whether there is suitable alternative habitat to move to during disturbance events;
- Behavioural changes as a result of a disturbance - e.g. degree of habituation;
- Time available for acclimatisation - whether there is time available for habituation to the disturbance. (there may be a lack of time for waterbirds during the staging period);
- Age - for example when feeding, immature (1<sup>st</sup> 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;

---

<sup>23</sup> defined as a measure of the relative contribution of an individual to the gene pool of the next generation.

- Predation and competition – a knock-on effect of disturbance is that waterbirds may move into areas where they are subject to increased competition for prey resources, or increased predation – i.e. the disturbance results in an indirect impact which is an increased predation risk.

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

## REFERENCES

- Atkinson, P. W., Austin, G. E., Rehfisch, M. M., Baker, H., Cranswick, P., Kershaw, M., Robinson, J., Langston, R. H. W., Stroud, D. A., Turnhout, C. van. & Maclean, I. M. D. (2006) Identifying declines in waterbirds: the effects of missing data, population variability and count period on the interpretation of long-term survey data. *Biological Conservation* 130, 549-559.
- Birdlife International (2006) *Monitoring Important Bird Areas: a global framework*. Cambridge, UK.
- Boland, H. and Crowe, O. (2012) *Irish wetland bird survey: waterbird status and distribution 2001/02 – 2008/09*. BirdWatch Ireland, Kilcoole, Co. Wicklow.
- BWPI (2004) *Birds of the Western Palearctic Interactive*. BirdGuides Ltd. 2004.
- Calbrade, N.A., Holt, C.A., Austin, G.E., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Musgrove, A.J. (2010) *Waterbirds in the UK 2008/09: The Wetland Bird Survey*. BTO/RSPB/JNCC in association with WWT. Thetford. UK.
- Colhoun, K. & Cummins, S. (2013) Birds of conservation concern in Ireland 2014-2019. *Irish Birds* 9, 523-544.
- Cook, A. S. C. P., Barimore, C., Holt, C. A., Read, W. J. & Austin, G. E. (2013) Wetland Bird Survey Alerts 2009/2010: changes in numbers of wintering waterbirds in constituent countries of United Kingdom Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs). BTO Research report 641. BTO. Thetford. <http://www.bto.org/webs/alerts>.
- Corepoint (2008). (Eds.) Cummins, V., Griffin, P., Gault, J., O'Mahony, C. & O'Suilleabhain D. Cork Harbour Integrated Management Strategy: 2008. Corepoint: Coastal Research and Policy Integration, EU Interreg IIIB Project.
- Cork County Council (2013) Draft County Development Plan. [www.corkcocodevplan.com](http://www.corkcocodevplan.com)
- Cork County Council (2013b) Draft County Development Plan. Volume 3. Environment and Natura Impact reports. December 2013. [www.corkcocodevplan.com](http://www.corkcocodevplan.com)
- Crowe, O. (2005) *Ireland's Wetlands and their waterbirds: status and distribution*. BirdWatch Ireland.
- Crowe, O. & Holt, C. (2013) Estimates of waterbird numbers wintering in Ireland 2006/07 – 2010/11. *Irish Birds* 9, 545-552.
- Crowe, O., Austin, G. E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A. J. (2008) Estimates and trends of waterbird numbers wintering in Ireland, 1994/95-2003/04. *Bird Study* 55, 66-77.
- Crowe, O., Boland, H. & Walsh, A. (2011) Irish Wetland Bird Survey: results of waterbird monitoring in Ireland 2009/10. *Irish Birds* 9, 229-240.
- Culloty, S. C. & Mulcahy, M. F. (2007) *Bonamia ostreae in the native oyster Ostrea edulis. A Review*. Marine Environment and Health Series, No. 29, 2007.
- Cummins, S. & Crowe, O. (2011) *Collection of baseline waterbird data for Irish coastal Special Protection Areas 2010/2011*. Report to National Parks & Wildlife Service. June 2011.
- Cummins, V. & O'Donnell, V. (2005) Cork Harbour and the challenge of change. In: (eds J. S. Crowley, R. J. N. Devoy, D. Linehan & P. O'Flanagan) *Atlas of Cork City*. Cork University press.
- Delaney, S., Scott, D., Dodman, T. & Stroud, D. (2009) (eds) *An atlas of wader populations in Africa and Western Eurasia*. Wetlands International, Wageningen, The Netherlands.
- Dit Durell, S. E. A. Le V. & Kelly, C. P. (1990) Diets of Dunlin *Calidris alpina* and Grey Plover *Pluvialis squatarola* on the Wash as determined by dropping analysis. *Bird Study* 37, 44-47.

- DoEHLG (2009) *Shellfish Pollution Reduction Programme. As required by Article 5 of the Shellfish Water Directive 2006/113/EC and Section 6 of the Quality of Shellfish Waters Regulations, 2006 (S.I. No. 268 of 2006). Characterisation Report Number 39 Cork Great Island North Channel Shellfish Area. County Cork.* Department of the Environment, Heritage and Local Government.
- ERU (1989) *Cork Harbour Water Quality.* Environmental Research Unit. December 1989.
- EU Commission (2012) *Commission note on setting Conservation Objectives for Natura 2000 sites.* Final version 23/11/2012. DG Environment.
- Fewster, R.M., Buckland, S.T., Siriwardena, G.M., Baillie, S.R. & Wilson, J.D. (2000) Analysis of population trends for farmland birds using generalized additive models. *Ecology* 81, 1970–1984.
- Gill, J. A., Norris, K. & Sutherland, W. J. (2001a) Why behavioural responses to disturbance may not reflect the population consequences of human disturbance. *Biological Conservation* 97, 265-268.
- Gill, J. A., Sutherland, W. J. & Norris, K. (2001b) Depletion models can predict shorebird distribution at different spatial scales. *Proceedings of the Royal Society B* 267, 369-376.
- Gillings, S., Austin, G. E., Fuller, R. J., & Sutherland, W. J. (2006) Distribution shifts in wintering Golden Plover *Pluvialis apricaria* and Lapwing *Vanellus vanellus* in Britain. *Bird Study* 53, 274-284.
- Gregory, R. D., van Strien, A., Vorisek, P., Gmelig Meyling, A. W., Noble, D. G., Foppen, R. P. B. & Gibbons D. W. (2005) Developing indicators for European birds. *Philosophical Transactions of the Royal Society B* 360, 269-288.
- Halcrow Group (2008) Lee CFRAMS Lee Catchment Flood Risk Assessment and Management Study. Hydrology Report. Report for the Office of Public Works, Cork City Council and Cork County Council, April 2008.
- Halcrow Group (2010) Habitats Directive Assessment. Lee CFRAMS Lee Catchment Flood Risk Assessment and Management Study. Report for the Office of Public Works, Cork City Council and Cork County Council, February 2010.
- Hannon, C., Berrow, S.D. & Newton, S.F. (1997) The status and distribution of breeding Sandwich Sterna *sandvicensis*, Roseate S. *dougallii*, Common S. *hirundo*, Arctic S. *paradisaea* and Little Terns S. *albifrons* in Ireland in 1995. *Irish Birds*. 6, 1-22.
- Hill, D., Hockin, D., Price, D., Tucker, G., Morris, R & Treweek, J. (1997) Bird disturbance: improving the quality and utility of disturbance research. *Journal of Applied Ecology* 34, 275-288.
- Hill, D., Rushton, S. P., Clark, N., Green, P & Prys-Jones, R. (1993) Shorebird communities on British estuaries: factors affecting community composition. *Journal of Applied Ecology* 30, 220-234.
- Holt, C., Austin, G., Calbrade, N., Mellan, H., Hearn, R., Stroud, D., Wotton, S. & Musgrove, A. (2012) *Waterbirds in the UK 2010/11: The Wetland Bird Survey.* British Trust for Ornithology, Royal Society for the Protection of Birds and the Joint Nature Conservation Committee in association with the Wetlands & Wildfowl Trust.
- Houlahan, J. E., Findlay, C. S., Schmidt, B. R., Meyer, A. H. & Kuzmin. S. L. (2000) Quantitative evidence for global amphibian population declines. *Nature* 404, 752-755.
- JNCC (1998) *Statement on common standards monitoring.* Joint Nature Conservation Committee.
- JNCC (2004) *Common standards monitoring for birds.* Version August 2004. Joint Nature Conservation Committee. ISSN 1743-8160 (online).
- Köpke, K. (2005) *A study of land-use change and present habitats at Marino Point - a coastal brownfield site in Cork Harbour.* A thesis submitted to the University College Cork and the National University of Ireland, Galway in partial fulfilment of the requirements for the Degree of M.Sc. in Ecosystem Conservation and Landscape Management. August 2005.

- Kushlan, J. (2006) Integrating waterbird conservation: populations, habitats and landscapes. Workshop Introduction. In: *Waterbirds around the world* (Eds. G.C. Boere, C.A. Galbraith & D.A. Stroud.). The Stationery Office, Edinburgh, UK.
- Kushlan, J. A. & Hancock, J. A. (2005) *The herons*. Oxford University Press, Oxford, U.K.
- Leech, D. I., Rehfish, M. M. & Atkinson, P. W. (2002) *A Guide to Waterbird Alerts*. BTO Research Report No. 281.
- Lynas, P., Newton, S. F. & Robinson, J. (2007) The status of birds in Ireland: an analysis of conservation concern 2008-2013. *Irish Birds* 8, 149-166.
- Ma, Z., Cai Y., Li, B. & Chen, J. (2010) Managing Wetland Habitats for Waterbirds: An International Perspective. *Wetlands* 30, 15-27.
- McCorry, M & Ryle, T. (2009) *Saltmarsh Monitoring Project 2007-2008*. Volume 2. Final Report 2009. Report for Research Branch, National Parks & Wildlife Service.
- MERC (2012) Intertidal benthic survey of Great Island Channel SAC and Cork Harbour SPA. August 2012.
- Met Éireann (2010a) *Monthly Weather Bulletin No. 285*.
- Met Éireann (2010b) *Monthly Weather Bulletin No 296*.
- Mitchell, I.P., Ratcliffe, N., Newton, S, & Dunn, T.E. (2004) *Seabird Populations of Britain and Ireland*. T & AD Poyser, London.
- Musgrove, A. J., Langston, R. H. W., Baker, H. & Ward, R. M. (eds) (2003) *Estuarine waterbirds at Low Tide: the WeBS Low Tide Counts 1992/93 to 1998/99*. WSG/BTO.RSPB/JNCC, Thetford.
- NPWS (2011) *Waterbird surveys within Irish coastal Special Protection Areas. Survey methods and guidance notes*. Unpublished Report. National Parks & Wildlife Service June 2011.
- NPWS (2014a) *Great Island Channel SAC Site Code 1058: Conservation Objectives Supporting Document. Marine Habitats*. May 2014.
- NPWS (2014b) *Cork Harbour SPA: intertidal benthic communities*. May 2014.
- O'Boyle, S., Wilkes, R., McDermott, G. & Noklegaard, T (2010) *Quality of Estuarine and Coastal Waters 2007-2009. Chapter 5. Water Quality in Ireland*. Environmental Protection Agency.
- O'Donnell, V. & Cummins, V. (2004) Poster: GIS Tools for Decision Support: The Coastal Inventory Dataset. ECO-IMAGINE Conference Proceedings, Saville. May 13th-15th 2004. May 13th-15th. In: *The Atlas of Cork City - The Challenge of Change Contemporary Marine Geography of Cork Harbour* by Valerie Cummins and Vicki O'Donnell (2005)  
<http://corkharbourbirds.ucc.ie/information/cork%20harb.htm>
- O'Donoghue, P. D. & Gittings, T. (2014) *Presentation of geospatial data relating to the use of Cork Harbour by wintering waterbirds & a literature review of published data relating to waterbirds and disturbance*. Unpublished report for Cork County Council prepared with the support of National Parks & Wildlife Service and BirdWatch Ireland. May 2014.
- Port of Cork (2004) *Port of Cork Yearbook 2003/2004*. Published by Hillgate Publishing Ltd., Dublin.
- Ramsar Convention Bureau (1971) *Convention on wetlands of international importance especially as waterfowl habitat*. Ramsar Convention Bureau, Gland, Switzerland.
- Rehfish M.M., H. Insley & B. Swann (2003) Fidelity of overwintering shorebirds to roosts on the Moray Basin, Scotland: implications for predicting impacts of habitat loss. *Ardea* 91, 53-70.
- Robinson J. A (1999) Migration and morphometrics of the Red-breasted Merganser *Mergus serrator* in northern Eurasia and the implications for conservation of this species in Britain and Ireland. *Wildfowl* 50, 139-148.

- RPS Group (2012) *Port of Cork Bird Surveys. Night roosting Cormorants at Monkstown Creek, Cork Harbour 2011/2012*. Unpublished Report for Port of Cork.
- Santos, C. D., Granadeiro, J. P. & Palmeirim, J. M. (2005) Feeding ecology of Dunlin (*Calidris alpina*) in a southern European estuary. *Ardeola* 52, 235-252.
- Scott Cawley (2012) Natura Impact Statement. Provision of information for an Appropriate Assessment of the Dunkettle Interchange Improvement Scheme, Co Cork. Report for Jacobs Engineering Limited.
- Scott D. A. & Rose, P. M. (1996) *Atlas of Anatidae populations in Africa and Western Eurasia. Special Publication 41*. Wetlands International. The Netherlands.
- Shepherd, P. C. F., Evans Ogden, L. J. & Lank, D. B. (2003) Integrating marine and coastal terrestrial habitats in shorebird conservation planning. *Wader Study Group Bulletin* 100, 40-42.
- Smiddy, P., O'Halloran, J., Coveney, J. A., Leonard, P. G. & Shorten, M. (1995) Winter wildfowl populations of Cork Harbour: an update. *Irish Birds* 5, 285-294.
- SWRBD (2010a) South Western River Basin District (SWRBD) River Basin Management Plan 2011 – 2015. [www.wfdireland.ie](http://www.wfdireland.ie)
- SWRBD (2010b) South Western River Basin Transitional and Coastal Waters Action Programme. [www.wfdireland.ie](http://www.wfdireland.ie)
- Thaxter, C. B., Sansom, A., Thewlis, R. M., Calbrade, N. A. & Austin, G. E. (2010) *Wetland Bird Survey Alerts 2006/2007: Changes in numbers of wintering waterbirds in the Constituent Countries of the United Kingdom, Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs)*. BTO Research Report 556.
- Underhill, L. G. & Prŷs-Jones, R. P. (1994) Index numbers for waterbird populations. I. Review and methodology. *Journal of Applied Ecology* 31, 463-480.
- Warnock, N. (2010) Stopping vs. staging: the difference between a hop and jump. *Journal of Avian Biology* 41, 621-626.
- Weller, M. W. (1999) *Wetland Birds: habitat resources and conservation implications*. Cambridge University Press. UK.
- Wernham, V. V., Toms, M. P., Marchant, J. H., Clark, J. A., Siriwardena, G. M. & Baillie, S. R. (eds) (2002) *The Migration Atlas: movements of birds of Britain and Ireland*. T & A D Poyser. London.
- Wetlands International (2002) *Waterfowl Population Estimates – Third Edition*. Wetlands International, Wageningen, The Netherlands.
- Wetlands International (2006) *Waterfowl Population Estimates – Fourth Edition*. Wetlands International, Wageningen, The Netherlands.
- Wetlands International (2012) *Waterfowl Population Estimates – Fifth Edition*. Wetlands International, Wageningen, The Netherlands.
- Zwarts, L. & Wanink, J. H. (1993) How the food supply harvestable by waders in the Wadden sea depends on the variation in energy, density, bodyweight, biomass, burying depth and behaviour of tidal-flat invertebrates. *Netherlands Journal of Sea Research* 31, 441-476.
- Zwarts, L., Ens, B., Goss-Custard, J. D., Hulscher, J. B. & Ditt Durrell, S. E. A. le vit (1996) Causes of variation in prey profitability and its consequences for the intake rate of the Oystercatcher *Haematopus ostralegus*. *Ardea* 84A, 229-268.

## APPENDIX 1

**SITE NAME: CORK HARBOUR SPA**

**SITE CODE: 004030**

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay and the Rostellan and Poul nabibe inlets.

Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nephtys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site and these provide high tide roosts for the birds. Some shallow bay water is included in the site. Rostellan Lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds.

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, Shelduck, Wigeon, Teal, Pintail, Shoveler, Red-breasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Black-headed Gull, Common Gull, Lesser Black-backed Gull and Common 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.

Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl. Of particular note is that the site supports internationally important populations of Black-tailed Godwit (1,896) and Redshank (2,149) - all figures given are five year mean peaks for the period 1995/96 to 1999/2000. At least 18 other species have populations of national importance, as follows: Little Grebe (57), Great Crested Grebe (253), Cormorant (521), Grey Heron (80), Shelduck (2,009), Wigeon (1,791), Teal (1,065), Pintail (57), Shoveler (103), Red-breasted Merganser (121), Oystercatcher (1,809), Golden Plover (3,342), Grey Plover (95), Lapwing (7,569), Dunlin (9,621), Bar-tailed Godwit (233) and Curlew (2,237). The Shelduck population is the largest in the country (over 10% of national total). Other species using the site include Mute Swan (38), Whooper Swan (5), Pochard (72), Gadwall (6), Mallard (513), Tufted Duck (64), Goldeneye (21), Coot (53), Ringed Plover (73), Knot (26), Greenshank (46) and Turnstone (113). Cork Harbour is an important site for gulls in winter and autumn, especially Black-headed Gull (3,640), Common Gull (1,562) and Lesser Black-backed Gull (783), all of which occur in numbers of national importance. Little Egret and Mediterranean Gull, two species which have recently colonised Ireland, also occur at this site.

A range of passage waders occurs regularly in autumn, including such species as Ruff (5-10), Spotted Redshank (1-5) and Green Sandpiper (1-5). Numbers vary between years and usually a few of each of these species over-winter.

Cork Harbour has a nationally important breeding colony of Common Tern (102 pairs in 1995). The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually and the chicks are ringed.

Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (i.e. > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, there are at least 20 species that have wintering populations of national importance, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Little Egret, Golden Plover, Bar-tailed Godwit, Ruff, Mediterranean Gull and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it. Cork Harbour is also a Ramsar Convention site and part of Cork Harbour SPA is a Wildfowl Sanctuary.



**Legend**

Cork Harbour SPA 004030

*An Roinn Ealaíon, Oidhreacht agus Gaeltachta*  
 Department of Arts, Heritage and the Gaeltacht

**CORK HARBOUR SPA CONSERVATION OBJECTIVES SPA DESIGNATION**

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

**SITE CODE:**  
 SAC 004030; version 2.04. CO. CORK

0 1 2 3 4 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
 Ordnance Survey of Ireland Licence No EN 0056214 ©. Ordnance Survey of Ireland Government of Ireland

Ní sna teorainneacha ar na léarscáilleana ach nod garshuíomhach ginearálta. Feadfar athbhreithniú a déanamh ar theorainneacha na gceantar comhairleithe. Suirbhéartha Orlonáil na hÉireann Ceardúis Uimh EN 0056214. © Suirbhéartha Orlonáil na hÉireann Rialtas na hÉireann

**Map Version 1**  
 Date: Nov 2014

## 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) and Boland & Crowe (2012).

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

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

- Swan Surveys

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

- Greenland White-fronted Goose

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

- Greylag Geese

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

- Barnacle Goose (*Branta leucopsis*)

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

- Light-bellied Brent Geese

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

## APPENDIX 3

### Analysing population trends: a synopsis

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

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

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

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

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

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

Un-smoothed indices are also calculated and provide a means of examining ('eye-balling') the variation across time and can also be used to provide a measure of the mean annual change over the entire period. However, the GAM extension to the methodology and resultant smoothed indices allows for the calculation of proportional change in population size between one season and another. This latter calculation is used in Section 4.2 whereby trends are calculated for the 'long-term' 14-year period (1995/96–2009/10) and the recent five-year period (2004/05–2009/10). 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 (2009):-

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

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 (2010) is therefore likely to be the least robust because it has no following year.

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

### Worked example

Year	Unsmoothed	Smoothed
1994	0.36	0.46
1995	0.81	0.53
1996	0.57	0.60
1997	0.67	0.67
1998	0.64	0.74
1999	0.91	0.79
2000	0.93	0.83
2001	0.87	0.86
2002	1.05	0.87
2003	1.00	0.87
2004	0.67	0.87
2005	0.92	0.88
2006	0.87	0.89
2007	1.24	0.91
2008	0.84	0.93
2009	1.10	0.96
2010	1.00	1.00

Term	Change
5YR	10.51
10YR	21.56
ALL YR	83.57

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) and Cook et al. (2013).

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

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

## APPENDIX 5

Waterbird foraging guilds (after Weller, 1999)

<b>Guild</b>	<b>Foods</b>	<b>Tactics</b>	<b>Examples...</b>
(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 <sup>a</sup>	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

<sup>a</sup> dives <3m.

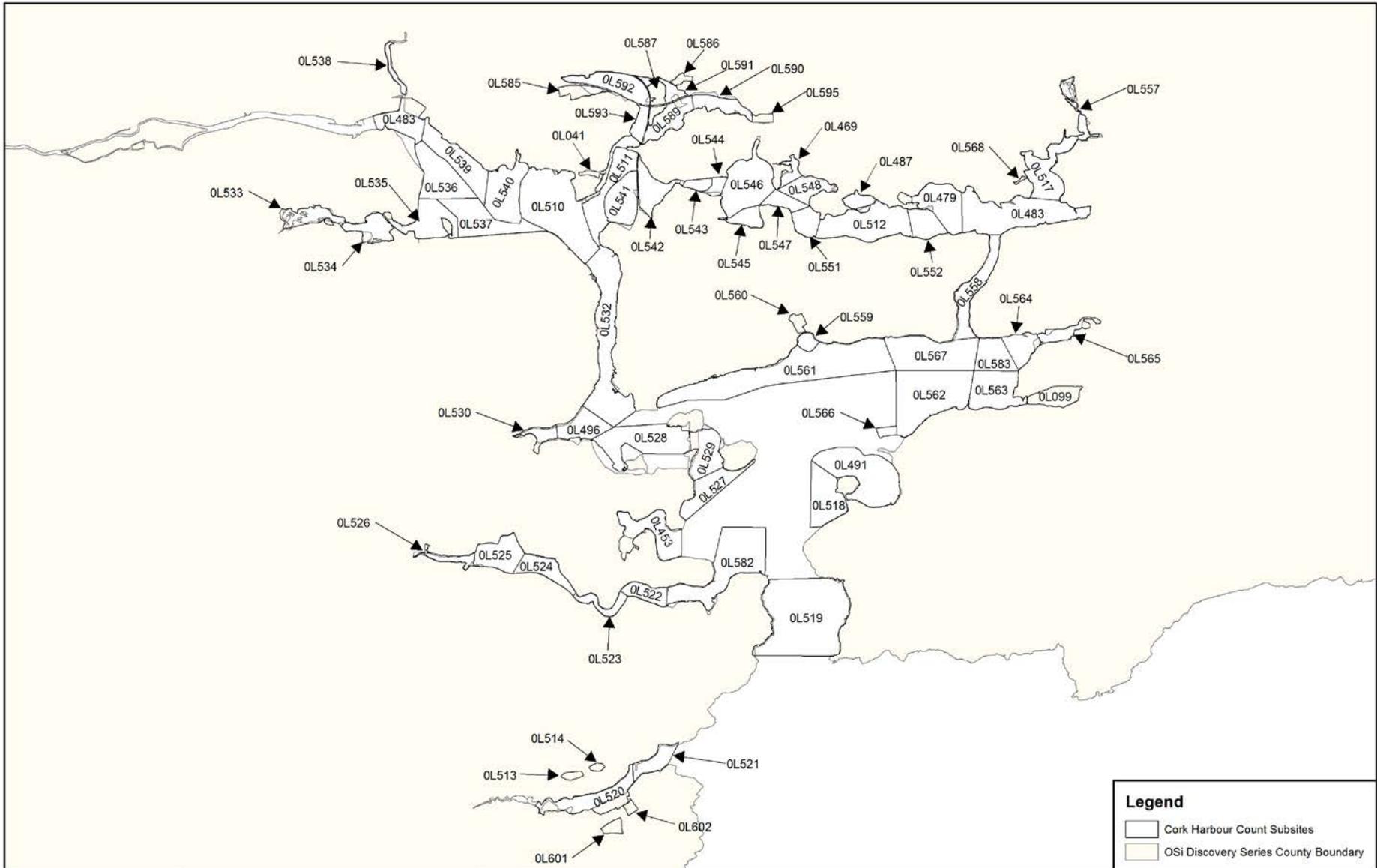
Please note that this table refers to generalised foraging strategies and is meant as a guide only. There is a great deal of variation between sites, seasons, tidal states and indeed, individual birds themselves. For example, some waterbird species may deploy several of the methods, e.g. Shelduck may 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

### Cork Harbour – Waterbird Survey Programme 2010/11 – Count Subsites

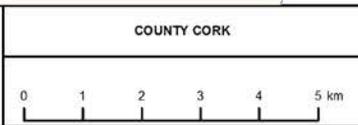
Subsite Code	Subsite Name	Subsite Area ha	Count Day 1 or 2
0L041	Carrigrenan Pools	6	Day 2
0L099	Rostellan Lake	42	Day 1
0L453	Lough Beg	93	Day 1
0L469	Weir Island	18	Day 2
0L479	Brown Island	88	Day 2
0L483	Rathcoursey	173	Day 2
0L486	Dunkettle	66	Day 2
0L487	Brick Island	19	Day 2
0L491	Whitegate Bay	157	Day 1
0L496	Monkstown Creek	55	Day 1
0L510	Carrigrenan Pt	239	Day 2
0L511	Marino Pt to Carrigrenan Pt	83	Day 2
0L512	Currabally - Ballyellane	129	Day 2
0L513	Gortigrennane west	7	Day 1
0L514	Gortigrennane east	5	Day 1
0L517	Loughatalia	86	Day 2
0L518	Black Rock, Whitegate	84	Day 1
0L519	White Bay to Graball Bay	311	Day 1
0L520	Ringabella Inner Creek	87	Day 1
0L521	Ringabella Outer creek	36	Day 1
0L522	Currabinny to Crosshaven	35	Day 1
0L523	Coolmore Woods	25	Day 1
0L524	Coolmore to Kellehers Woods	48	Day 1
0L525	Carrigaline Castle to Rabbit pt	67	Day 1
0L526	Carrigaline Owenboy	20	Day 1
0L527	Lough More (Cork Harbour)	65	Day 1
0L528	Ringaskiddy Port	129	Day 1
0L529	Haulbowline to Spike Is	68	Day 1
0L530	Raffeen Creek	22	Day 1
0L532	Glenbrook	205	Day 1
0L533	Inner Douglas Estuary (Goat Is)	45	Day 2
0L534	Bloomfield	45	Day 2
0L535	Harty's Quay	77	Day 2
0L536	Ringmahon Pt	98	Day 2

0L537	Hop Island to Passage West	99	Day 2
0L538	Glashaboy	13	Day 2
0L539	Wallingstown	90	Day 2
0L540	Flaxfort (Little Is)	98	Day 2
0L541	Martello west to Carrigrenan	70	Day 2
0L542	Belvelly Br. West	54	Day 2
0L543	Belvelly Br. East	15	Day 2
0L544	Sheepark	14	Day 2
0L545	Rosslague	27	Day 2
0L546	Fota Is to Weir Is.	119	Day 2
0L547	Rosslague east	26	Day 2
0L548	Rossmore Bay	45	Day 2
0L551	Ballydaniel	33	Day 2
0L552	Ballyelane to Brown Is.	43	Day 2
0L557	Bailich	27	Day 2
0L558	Great Island east channel	77	Day 1
0L559	Cuskinny Bay	15	Day 1
0L560	Cuskinny Marsh	11	Day 1
0L561	Cobh	309	Day 1
0L562	Agahda	185	Day 1
0L563	Agahda Lower	91	Day 1
0L564	Saleen west	43	Day 1
0L565	Saleen East	29	Day 1
0L566	Aghada Pools	9	Day 1
0L567	Marloag Point	143	Day 1
0L568	Ballyannan pool	2	Day 2
0L582	Carrabinny Wood	172	Day 1
0L583	Garranekinnefeake	56	Day 1
0L585	Courtstown Lagoon	22	Day 2
0L586	Killacloyne Fields	7	Day 2
0L587	Harpers Island (only)	26	Day 2
0L589	Brown Island West	55	Day 2
0L590	Brown Island East	39	Day 2
0L591	Brown Island North	21	Day 2
0L592	Harper's Island North	69	Day 2
0L593	Harper's Island South	22	Day 2
0L595	Slatty's Pool	9	Day 2
0L601	Ringabella Fields	12	Day 1
0L602	Kilbeg Fields	6	Day 1



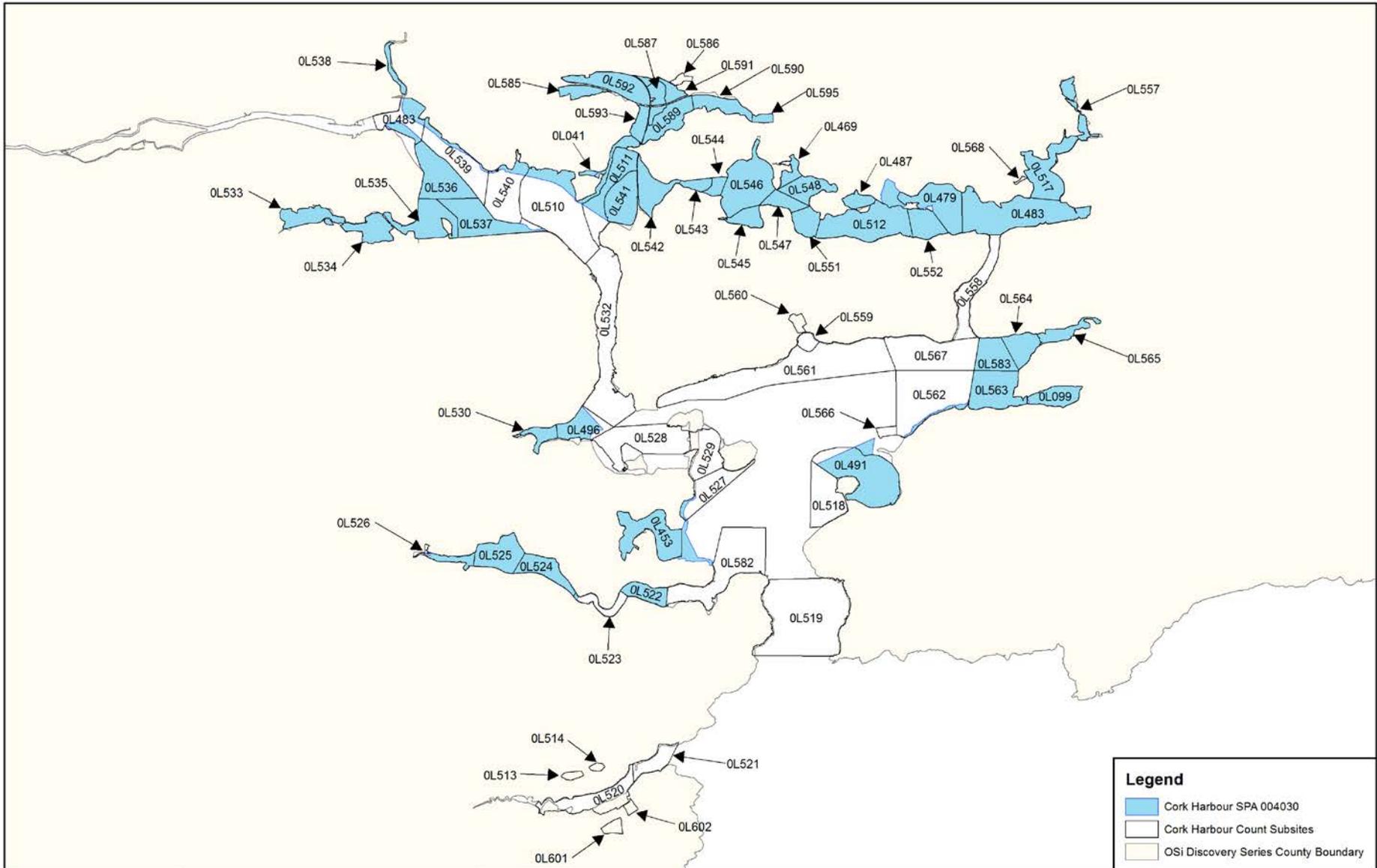

**An Roinn Ealaíon, Oidhreachta agus Gaeltachta**  
 Department of Arts, Heritage and the Gaeltacht

**Count Subsites used during the 2010/2011 Waterbird Survey Programme**  
 Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.



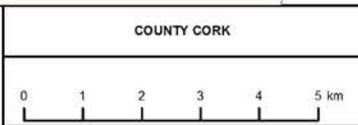
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
 Ordnance Survey of Ireland Licence No EN 0059214 © Ordnance Survey of Ireland Government of Ireland  
 Níl sna teorainneacha ar na léarscáilleana ach nóid garshuíomhach ginearálta. Feadfar athbheithníte a ósánamh ar theorainneacha na geoinneacha na geoinneacha. Suidhreachta Ordónáis na hÉireann Ceardúnas Uimh. CN 0059214. © Suidhreachta Ordónáis na hÉireann Rialtas na hÉireann

  
**Map Version 1**  
**Date: Nov 2014**



An Roinn  
Ealaíon, Oidhreachta agus Gaeltachta  
Department of  
Arts, Heritage and the Gaeltacht

**Cork Harbour SPA 004030 & Count Subsites used during the 2010/2011 Waterbird Survey Programme**  
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.  
Ordnance Survey of Ireland Licence No EN 0059214 © Ordnance Survey of Ireland Government of Ireland  
Níl sna teorainneacha ar na léarscáileanna ach nóid garshuíomhach ginearálta. Feadfar aithbhreithníte a ósánamh ar theorainneacha na geantar comharthaíthe. Suidhreachta Ordónáis na hÉireann Ceardúnas Uimh. CN 0059214. © Suidhreachta Ordónáis na hÉireann Rialtas na hÉireann

N  
Map Version 1  
Date: Nov 2014

## APPENDIX 7

### Subsite species richness

Subsite Code	Subsite Name	Mean Species Richness ( $\pm$ S.D) (LT surveys)	HT Survey	Peak Overall (H/L)
0L041	Carrigrenan Pools	4 (2.6)	5	L
0L099	Rostellan Lake	11 (2.5)	17	H
0L453	Lough Beg	24 (1.3)	14	L
0L469	Weir Island	4 (1.2)	10	H
0L479	Brown Island	20 (4.0)	23	L
0L483	Rathcoursey	18 (2.0)	17	L
0L486	Dunkettle	14 (3.5)	16	L
0L487	Brick Island	13 (3.3)	13	L
0L491	Whitegate Bay	18 (1.9)	14	L
0L496	Monkstown Creek	14 (1.0)	13	L
0L510	Carrigrenan Pt	17 (3.9)	6	L
0L511	Marino Pt to Carrigrenan Pt	12 (3.3)	6	L
0L512	Currabally - Ballyellane	15 (3.4)	11	L
0L513	Gortigrennane west	1 (1.5)	0	L
0L514	Gortigrennane east	1 (2.0)	0	L
0L517	Loughatalia	10 (1.9)	9	L
0L518	Black Rock, Whitegate	5 (1.4)	2	L
0L519	White Bay to Graball Bay	12 (3.6)	12	L
0L520	Ringabella Inner Creek	17 (1.7)	14	L
0L521	Ringabella Outer creek	8 (2.5)	7	L
0L522	Currabinny to Crosshaven	8 (1.7)	7	L
0L523	Coolmore Woods	7 (1.8)	2	L
0L524	Coolmore to Kellehers Woods	9 (1.3)	11	H
0L525	Carrigaline Castle to Rabbit pt	13 (2.1)	12	L
0L526	Carrigaline Owenboy	11 (2.2)	8	L
0L527	Lough More (Cork Harbour)	7 (4.8)	7	L
0L528	Ringaskiddy Port	8 (0.5)	5	L
0L529	Haulbowline to Spike Is	11 (2.8)	10	L
0L530	Raffeen Creek	13 (0.9)	11	L
0L532	Glenbrook	9 (0.8)	9	L
0L533	Inner Douglas Estuary (Goat Is)	15 (2.9)	10	L
0L534	Bloomfield	15 (3.8)	11	L
0L535	Harty's Quay	15 (4.8)	13	L
0L536	Ringmahon Pt	11 (4.4)	1	L
0L537	Hop Island to Passage West	12 (0.9)	6	L
0L538	Glashaboy	7 (2.4)	4	L

0L539	Wallingstown	9 (1.3)	6	L
0L540	Flaxfort (Little Is)	9 (3.5)	7	L
0L541	Martello west to Carrigrenan	13 (2.2)	12	L
0L542	Belvelly Br. West	14 (3.5)	17	L
0L543	Belvelly Br. East	9 (1.4)	6	L
0L544	Sheepark	1 (1.5)	2	L
0L545	Rosslague	7 (0.8)	9	H
0L546	Fota Is to Weir Is.	13 (3.4)	10	L
0L547	Rosslague east	8 (1.4)	4	L
0L548	Rossmore Bay	9 (0.5)	4	L
0L551	Ballydaniel	8 (4.7)	12	L
0L552	Ballyelane to Brown Is.	9 (3.3)	5	L
0L557	Bailich	12 (1.7)	14	H
0L558	Great Island east channel	8 (1.4)	12	H
0L559	Cuskinny Bay	11 (3.2)	10	L
0L560	Cuskinny Marsh	12 (1.0)	11	L
0L561	Cobh	10 (2.1)	7	L
0L562	Agahda	11 (2.1)	12	L
0L563	Agahda Lower	20 (2.2)	15	L
0L564	Saleen west	15 (1.3)	13	L
0L565	Saleen East	12 (0.9)	12	L
0L566	Aghada Pools	1 (1.3)	2	L
0L567	Marloag Point	8 (2.2)	7	L
0L568	Ballyannan pool	3 (2.1)	7	H
0L582	Carrabinny Wood	12 (1.7)	6	L
0L583	Garranekinnefeake	2 (1.7)	2	L
0L585	Courtstown Lagoon	2 (1.5)	9	H
0L586	Killacloyne Fields	4 (1.5)	4	L
0L587	Harpers Island (only)	11 (1.4)	16	H
0L589	Brown Island West	11 (3.3)	9	L
0L590	Brown Island East	12 (2.5)	11	L
0L591	Brown Island North	11 (2.4)	12	L
0L592	Harper's Island North	19 (2.9)	13	L
0L593	Harper's Island South	12 (3.9)	5	L
0L595	Slatty's Pool	13 (2.9)	14	L
0L601	Ringabella Fields	0 (0)	0	-
0L602	Kilbeg Fields	0 (0.5)	2	H

## APPENDIX 8

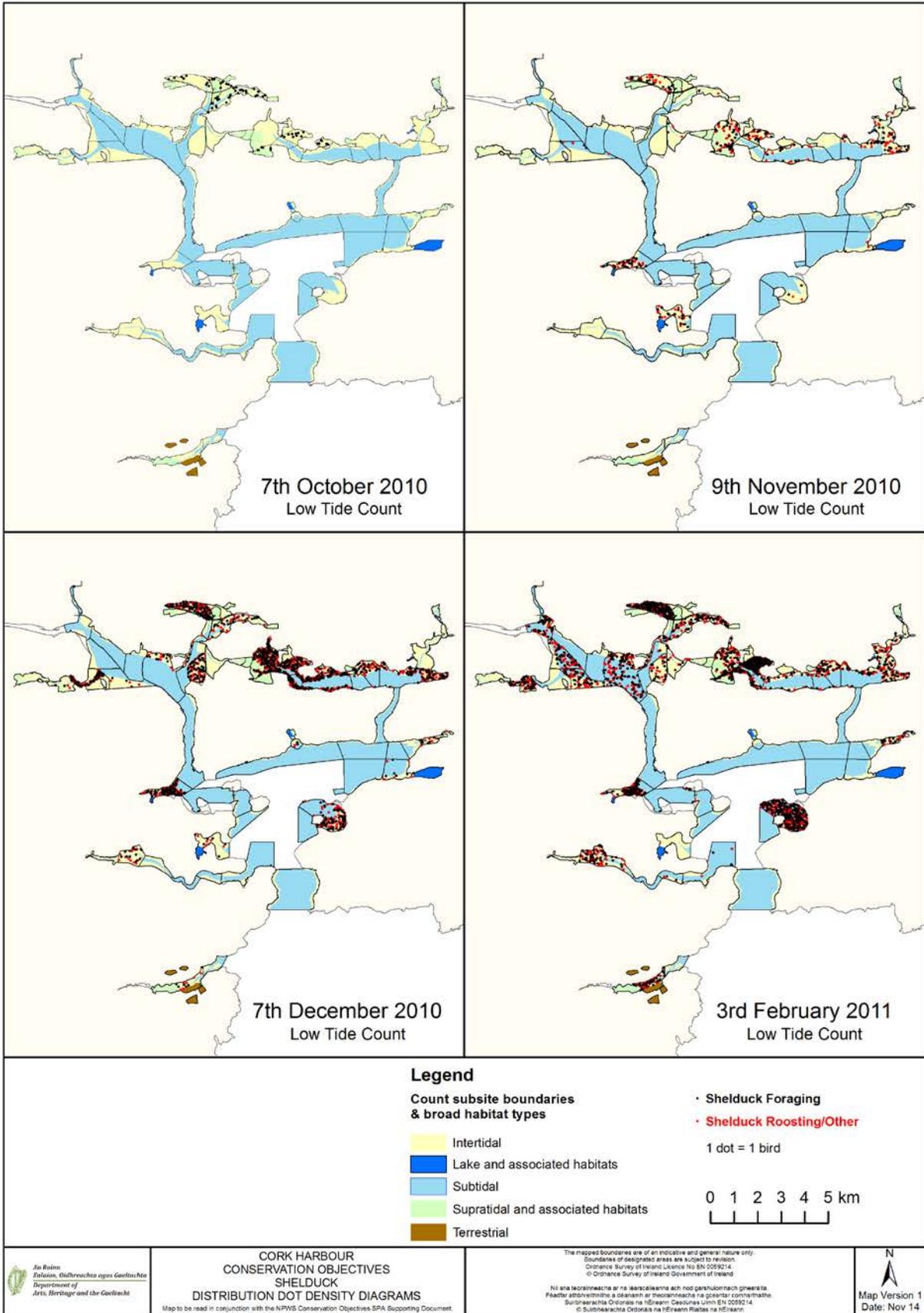
### Cork Harbour

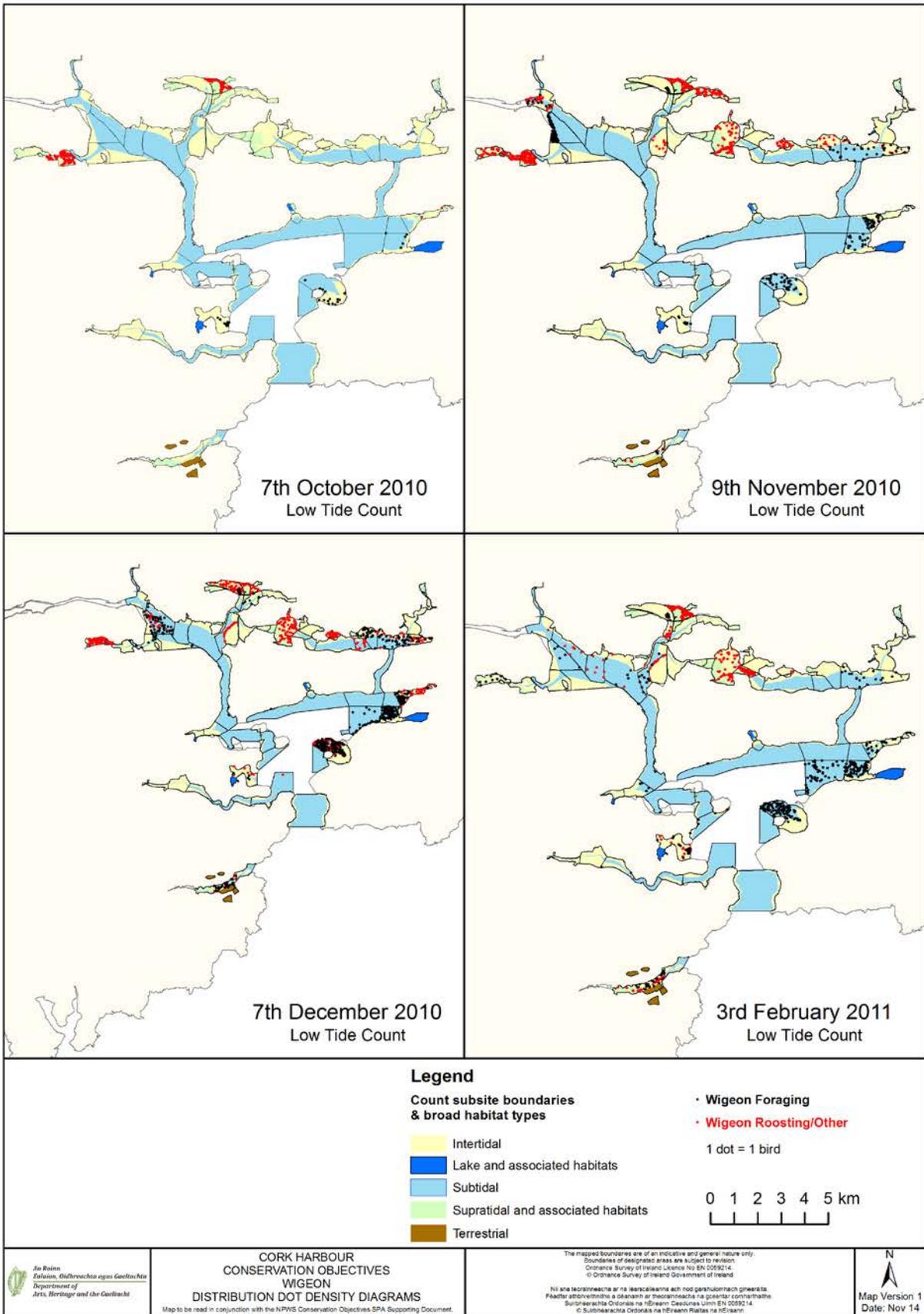
Waterbird distribution (dot-density diagrams) recorded during low tide surveys  
(October 2010 – February 2011)

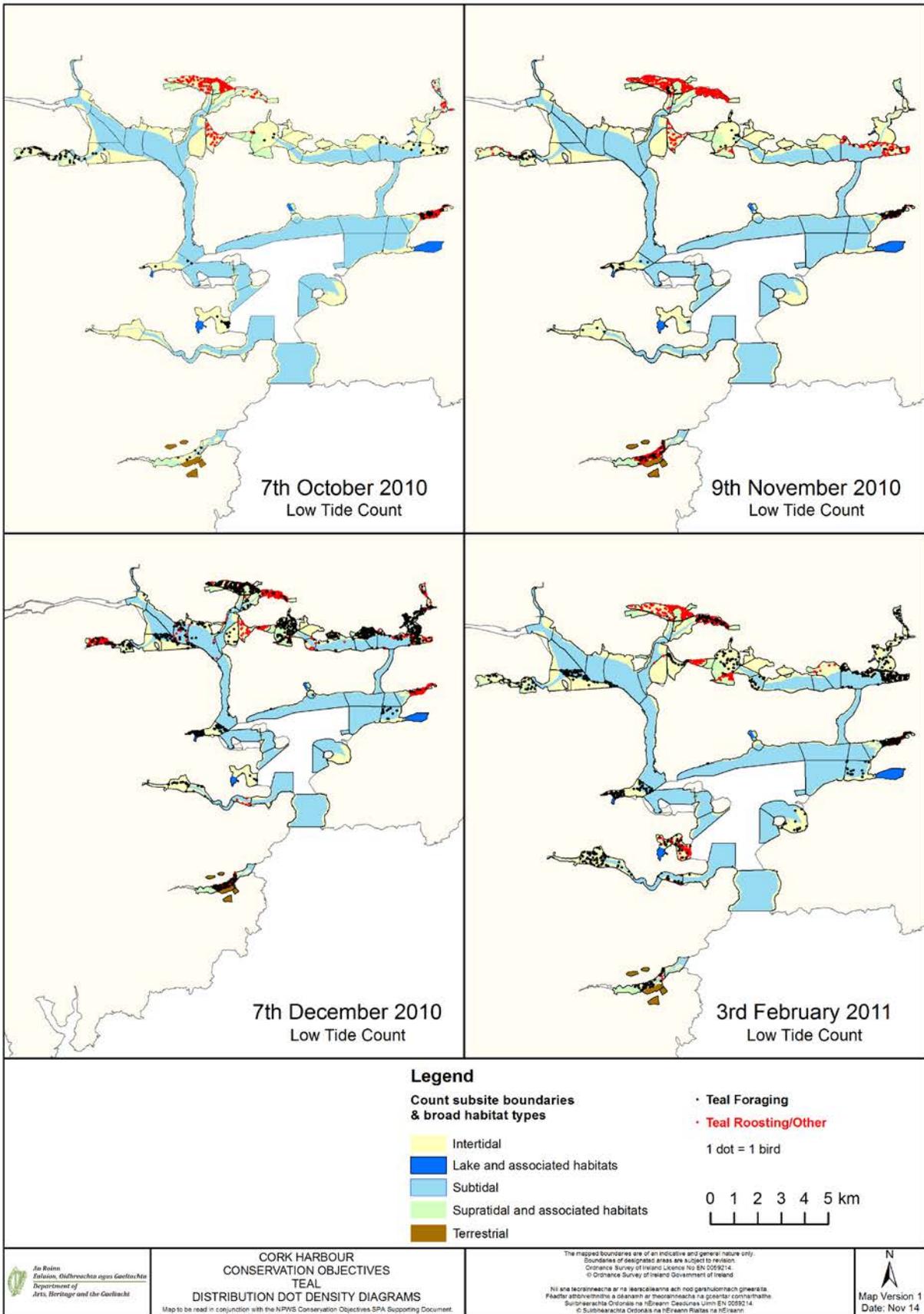
**(NB data are presented for birds located in intertidal and subtidal habitats only)**

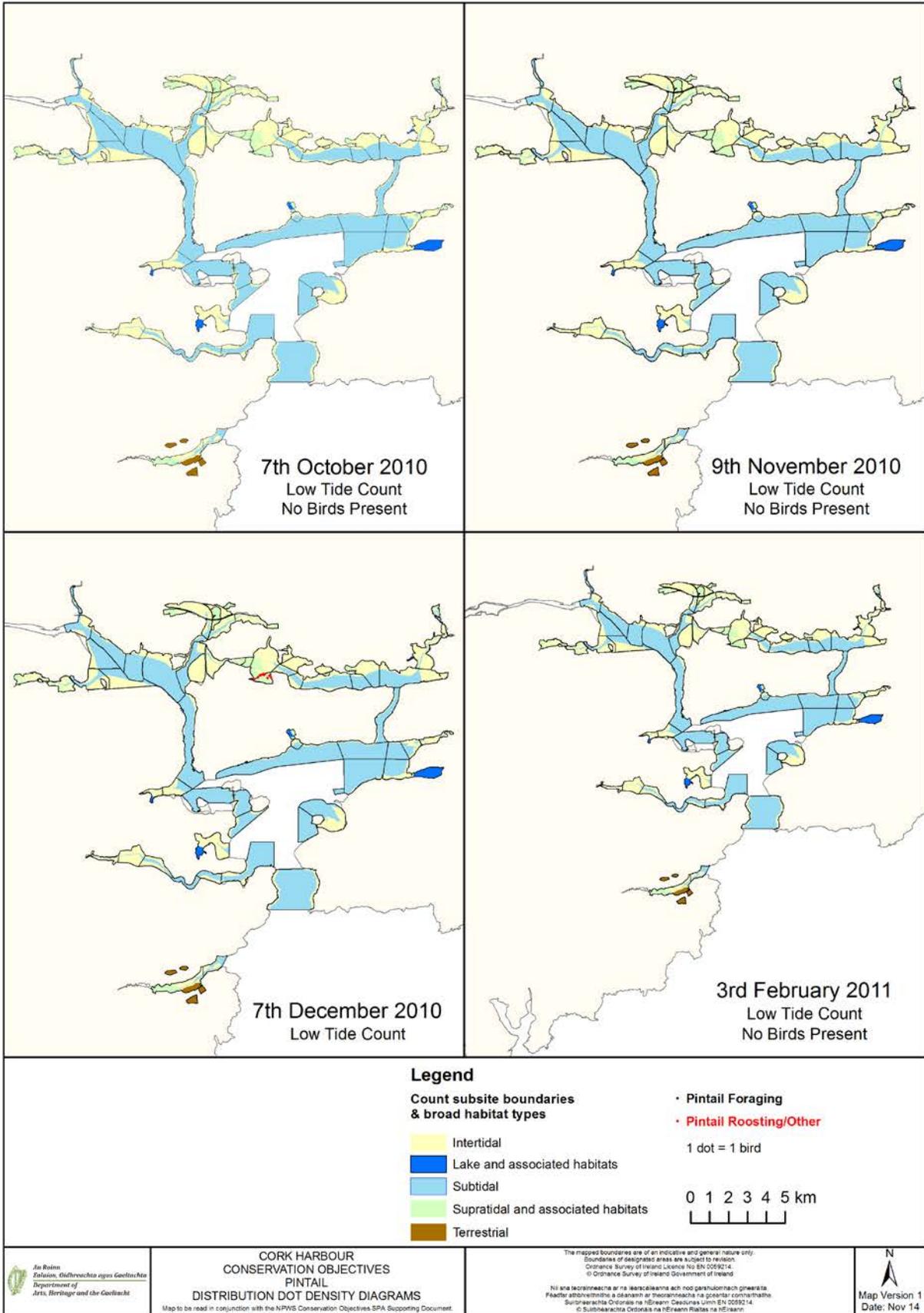
**NOTE – surveys were conducted over 2 days as follows:**

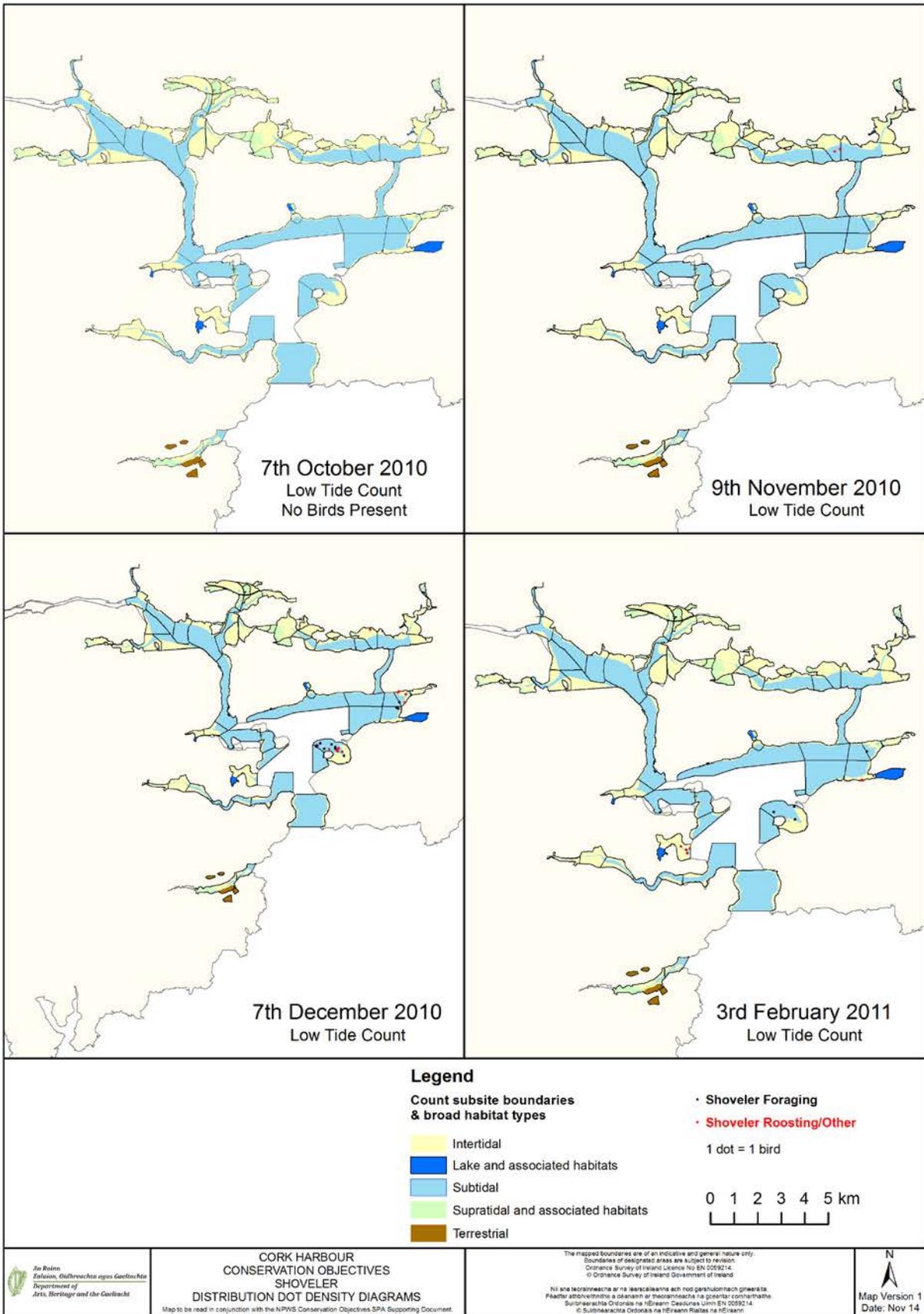
Survey	Day 1	Day 2
Low Tide 1	07.10.10	08.10.10
Low Tide 2	08.11.10	09.11.10
Low Tide 3	06.12.10	07.12.10
Low Tide 4	03.02.11	04.02.11

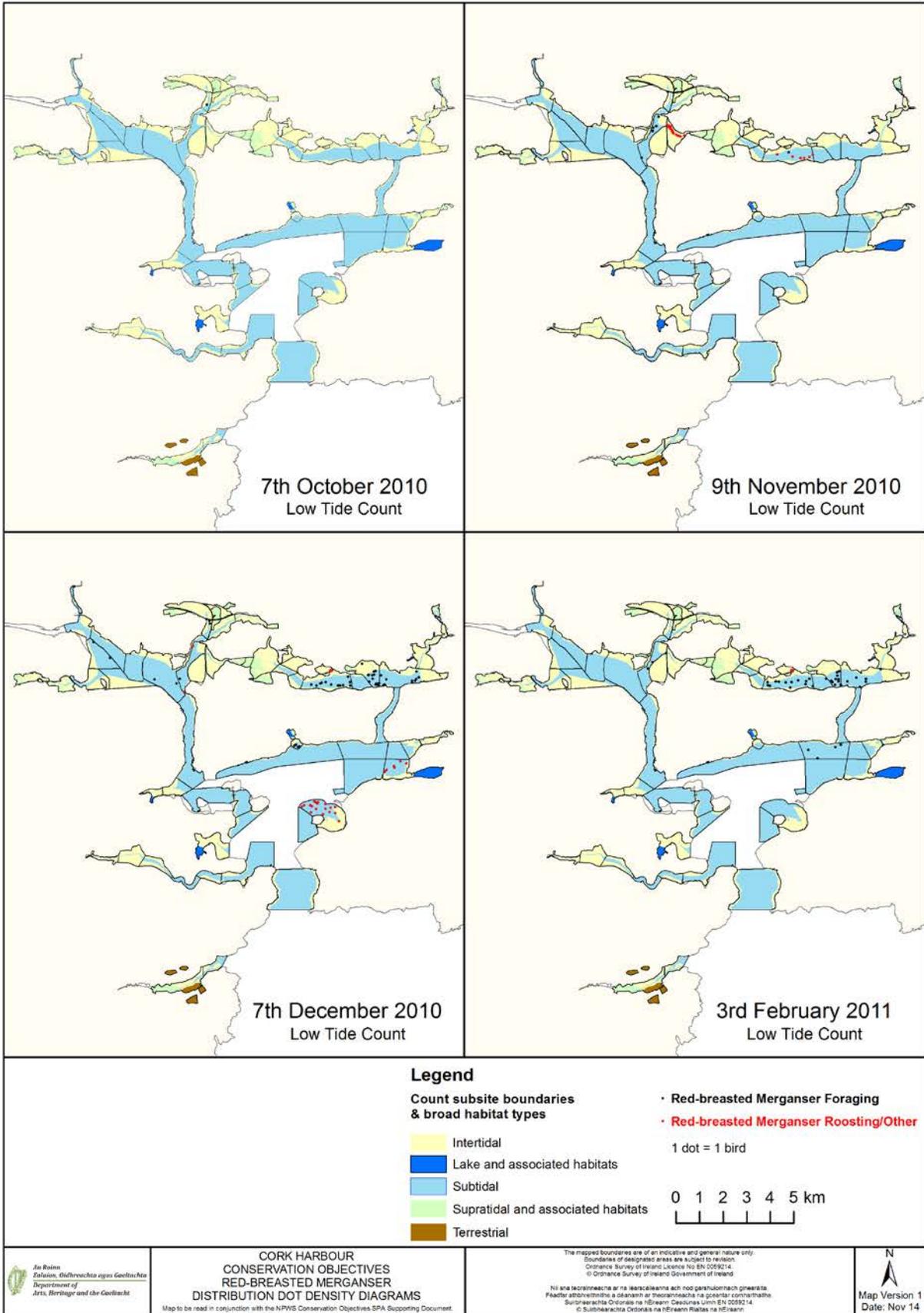


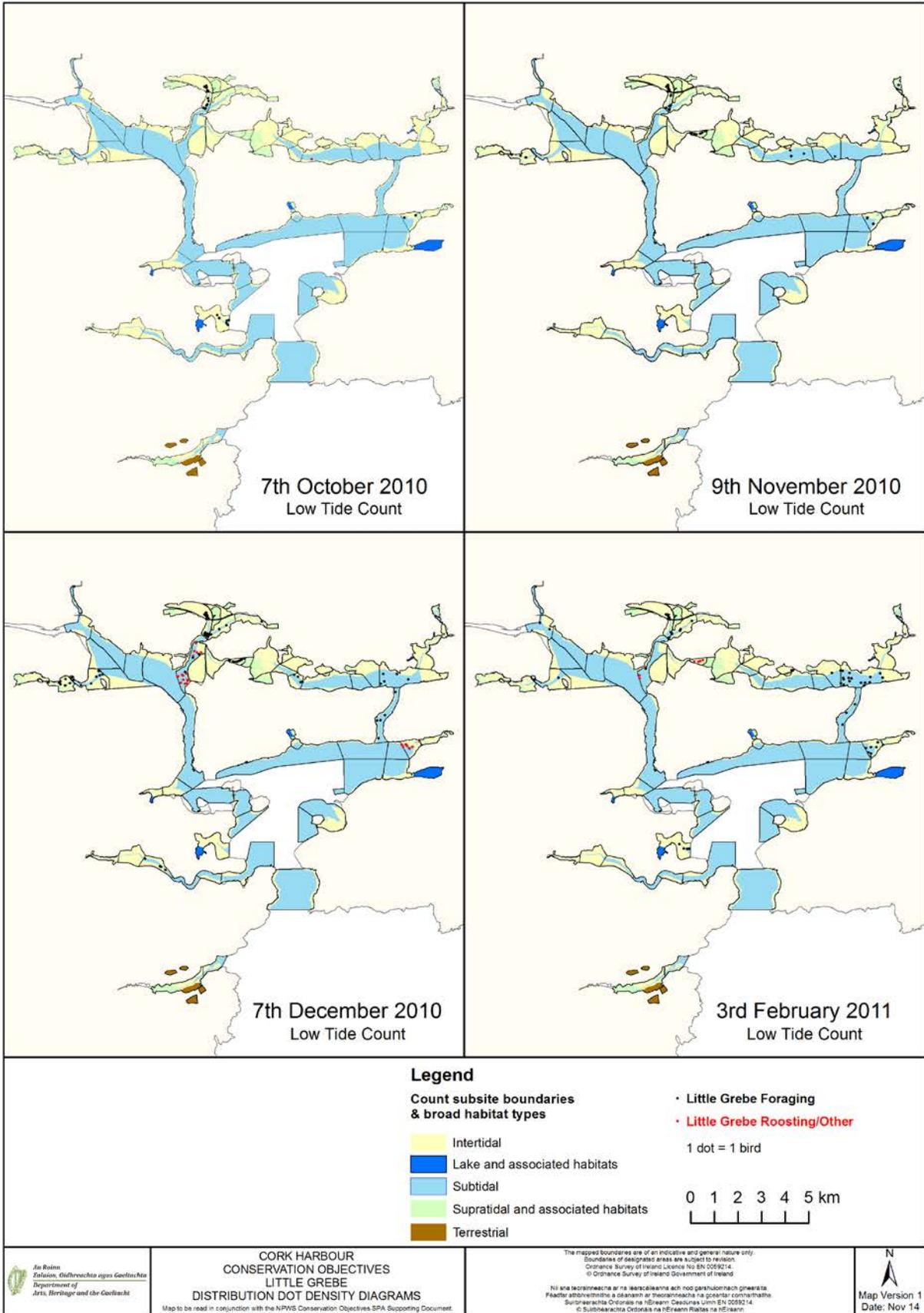


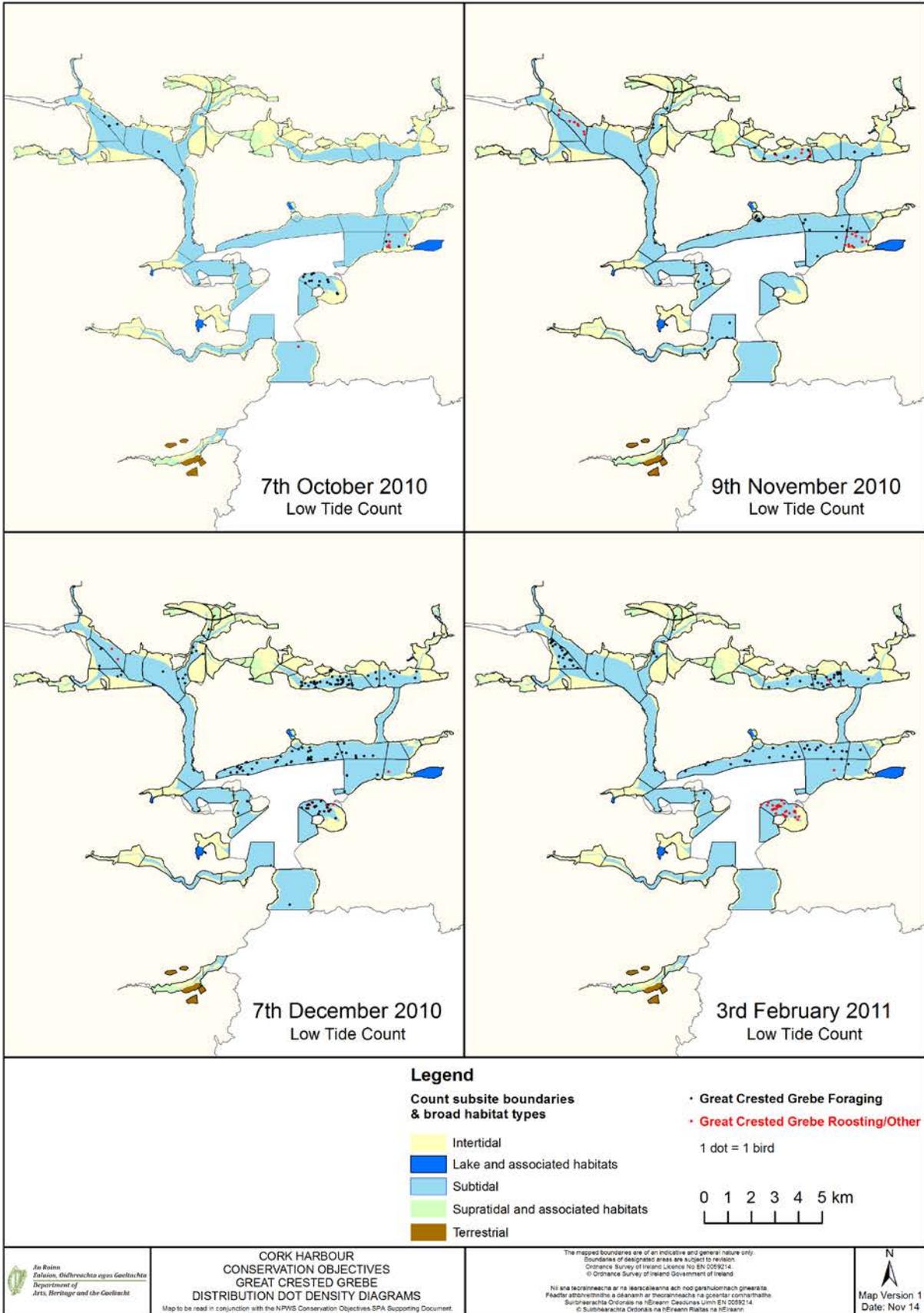


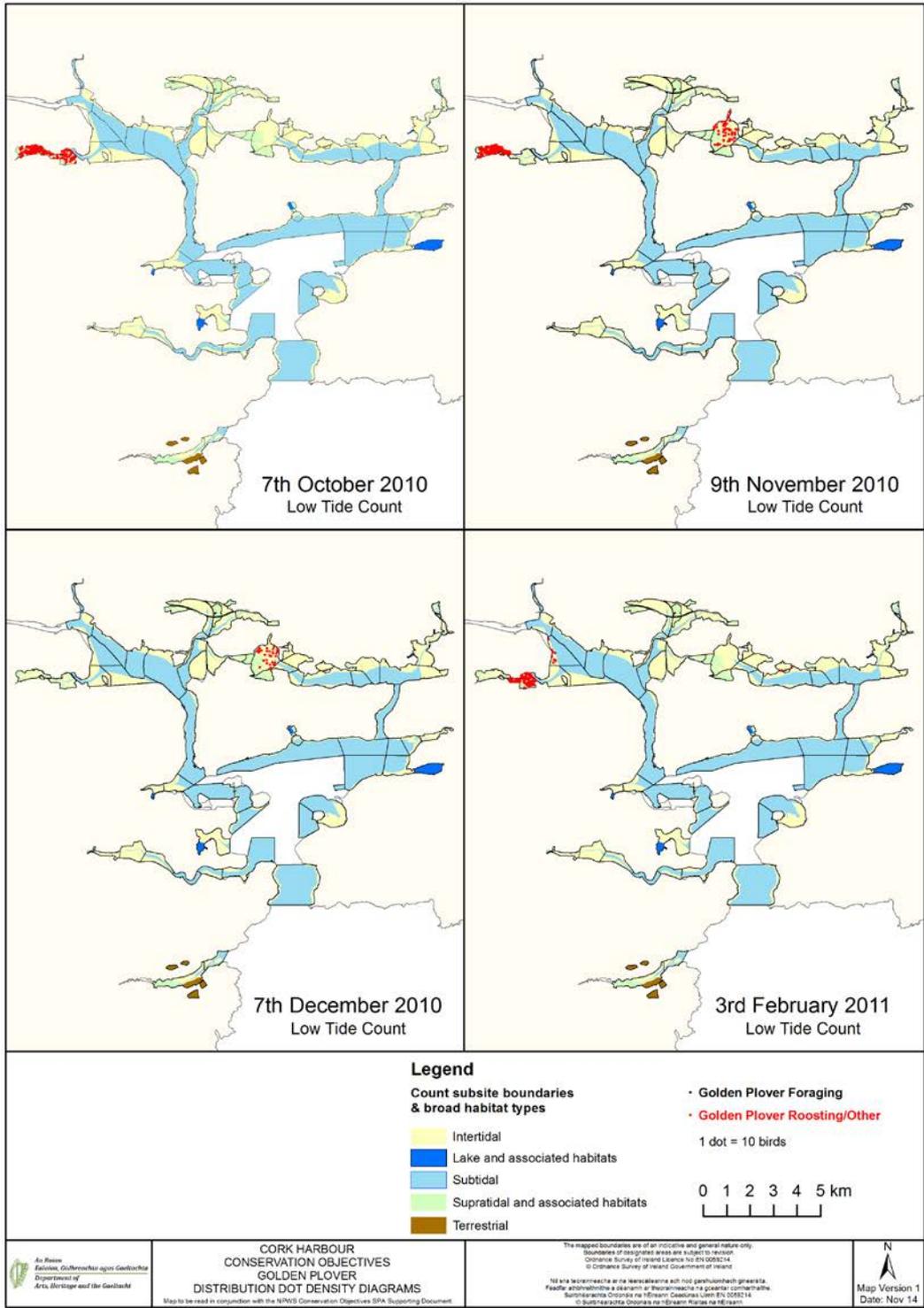


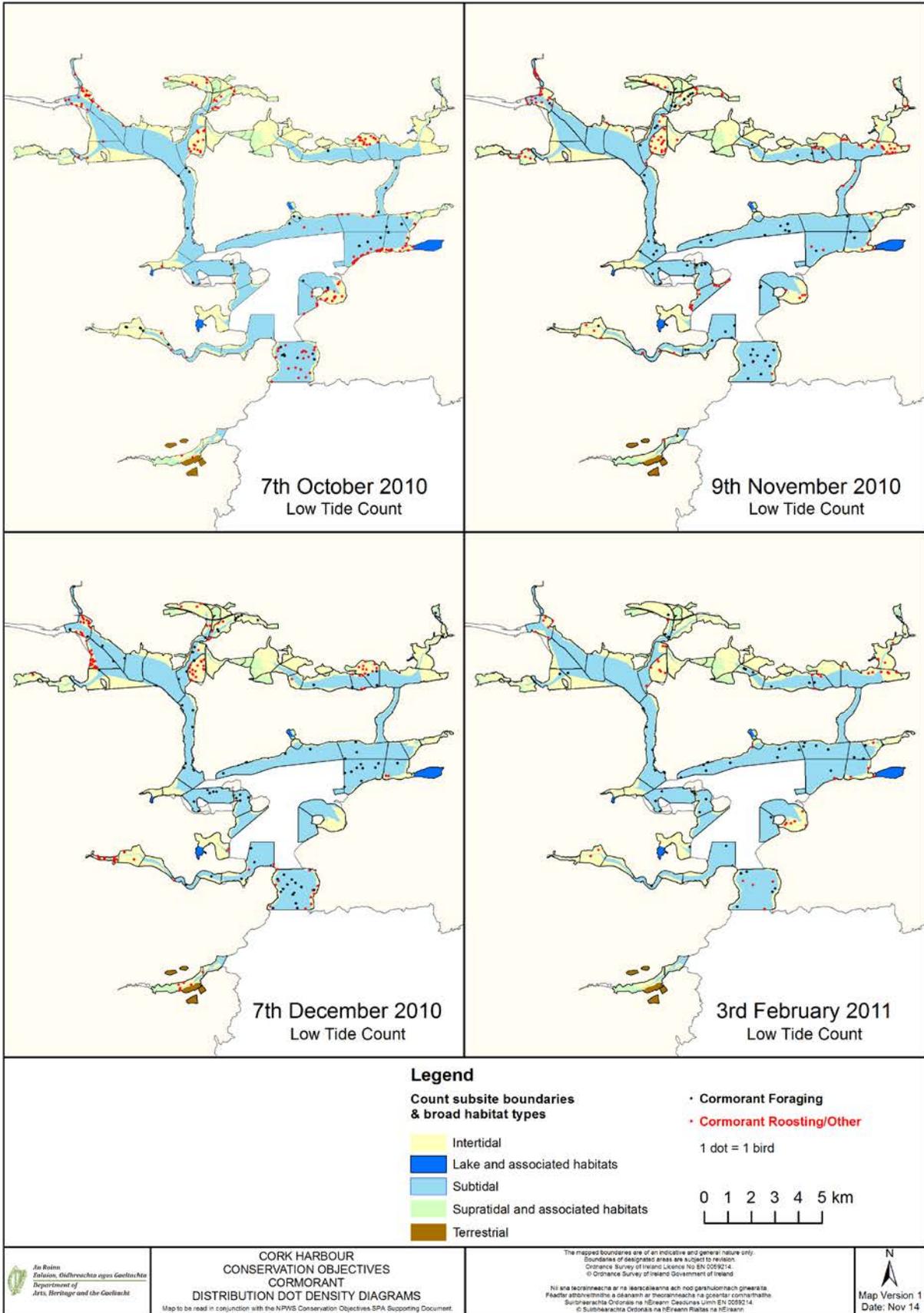


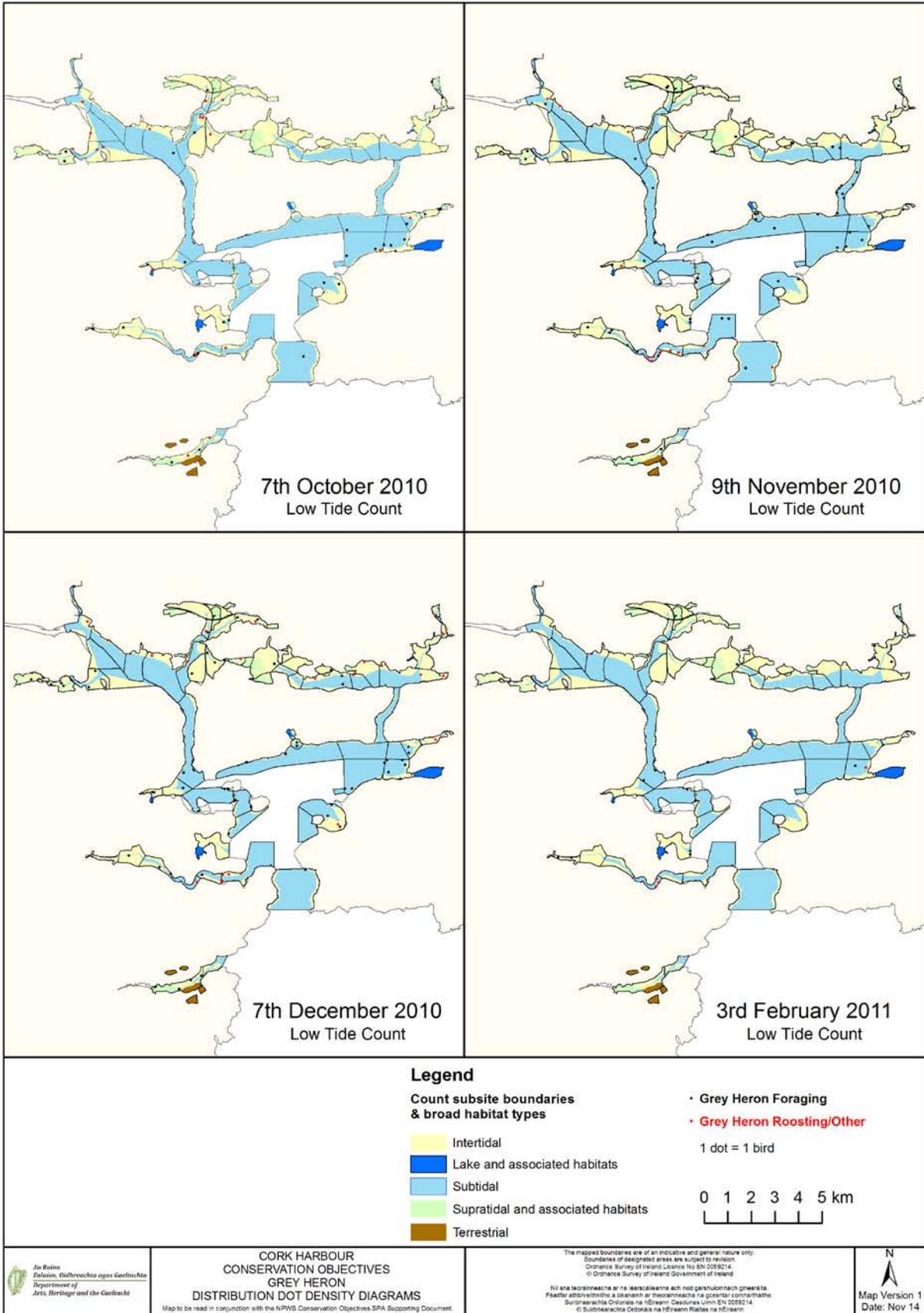


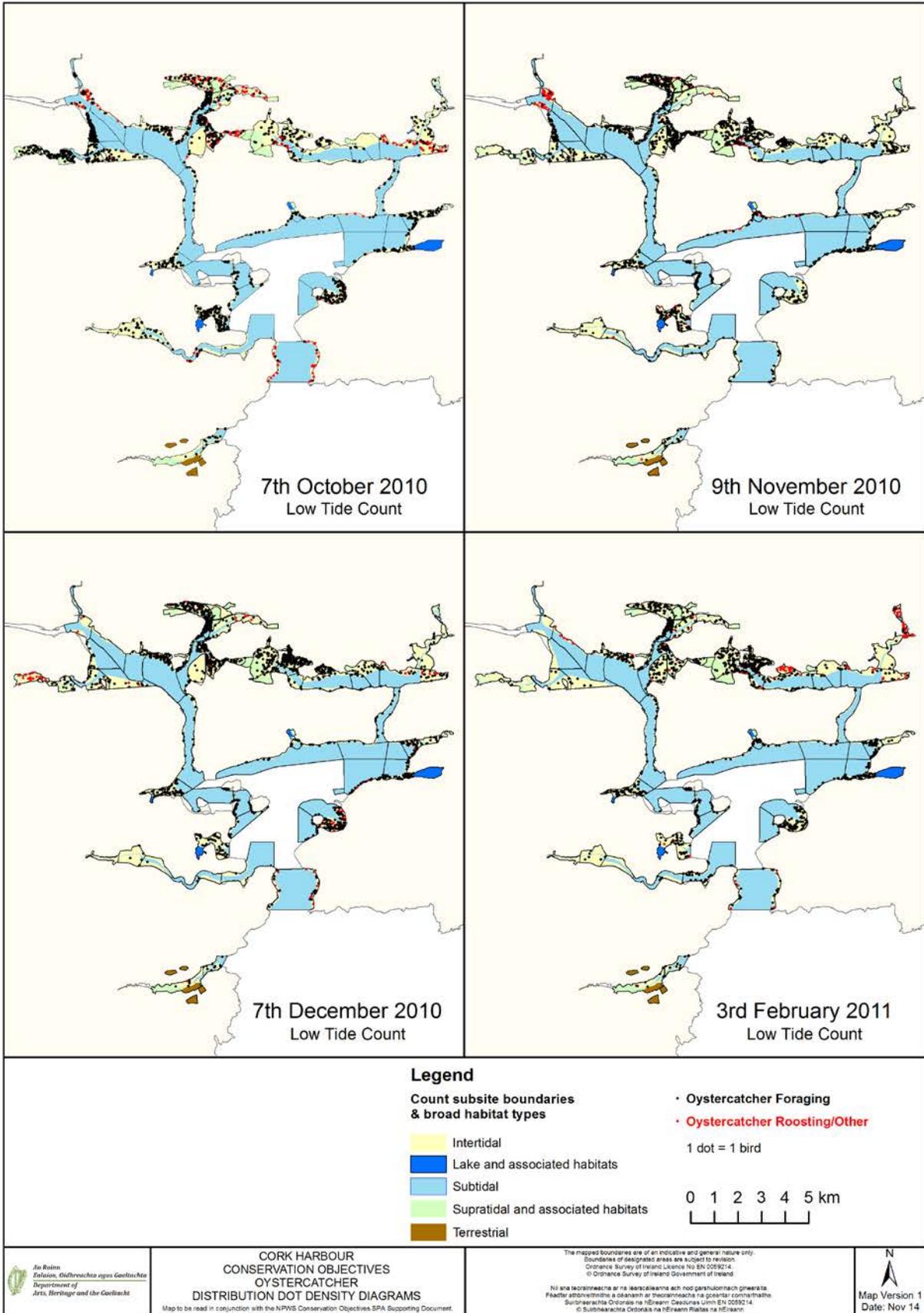


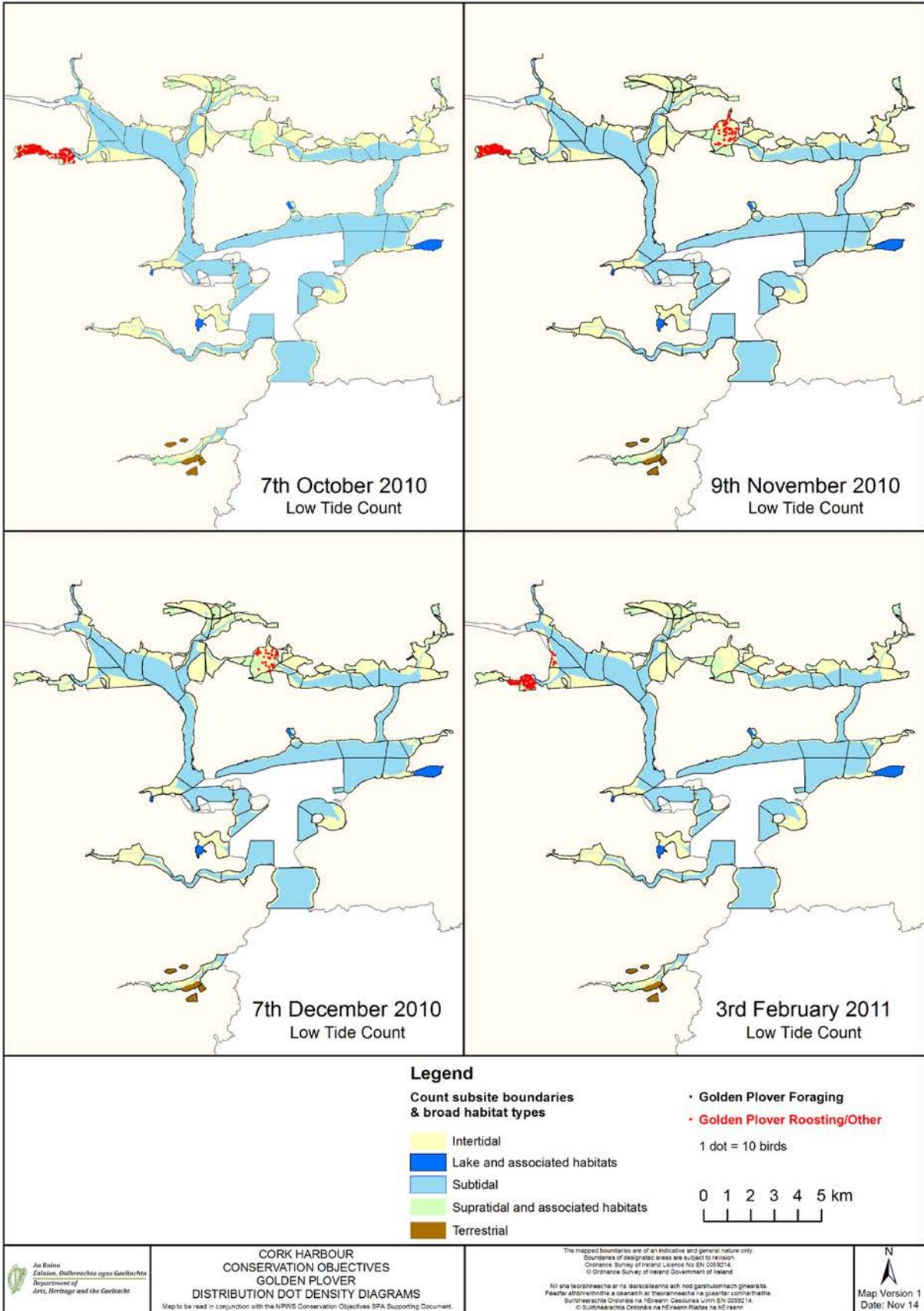


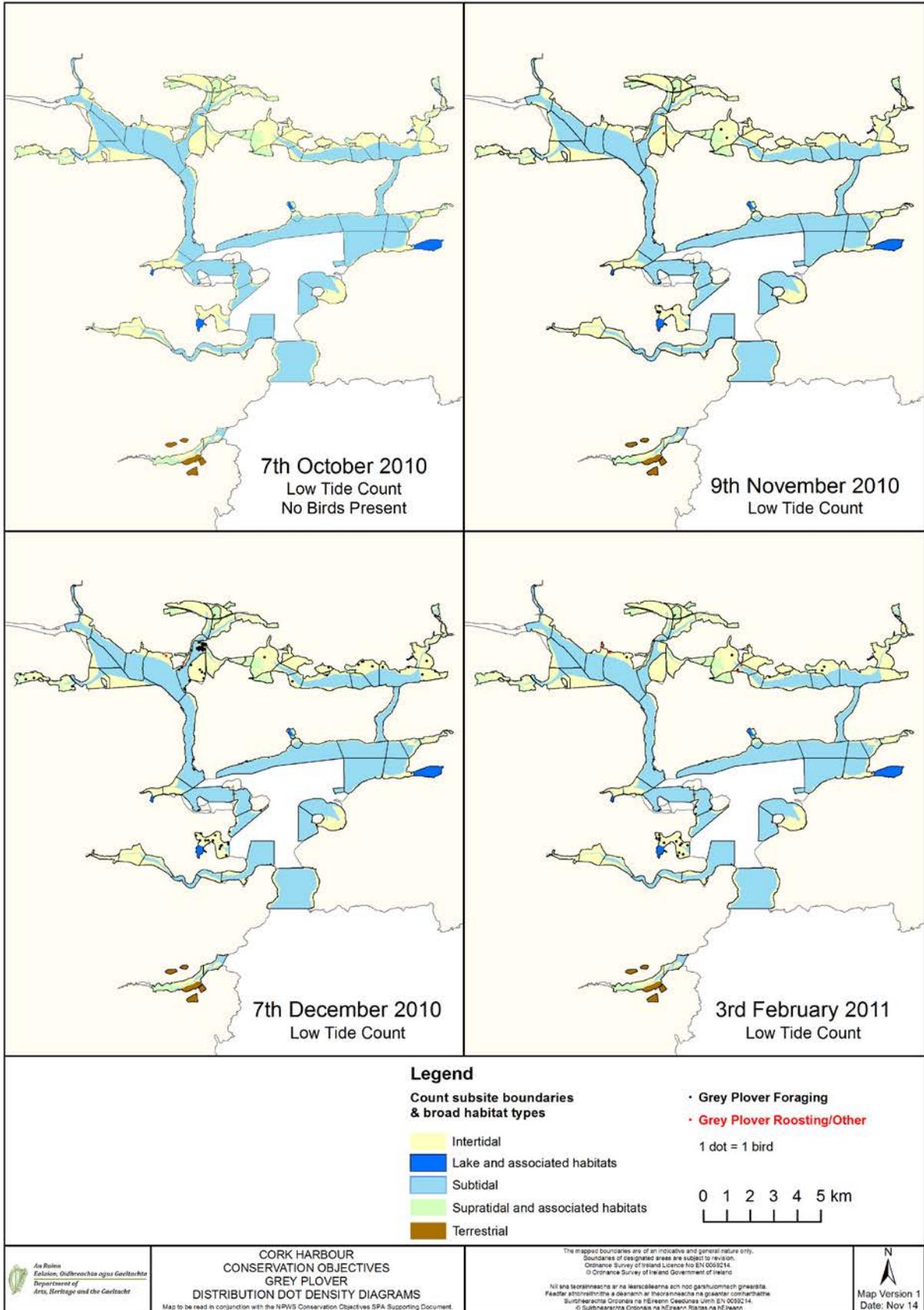


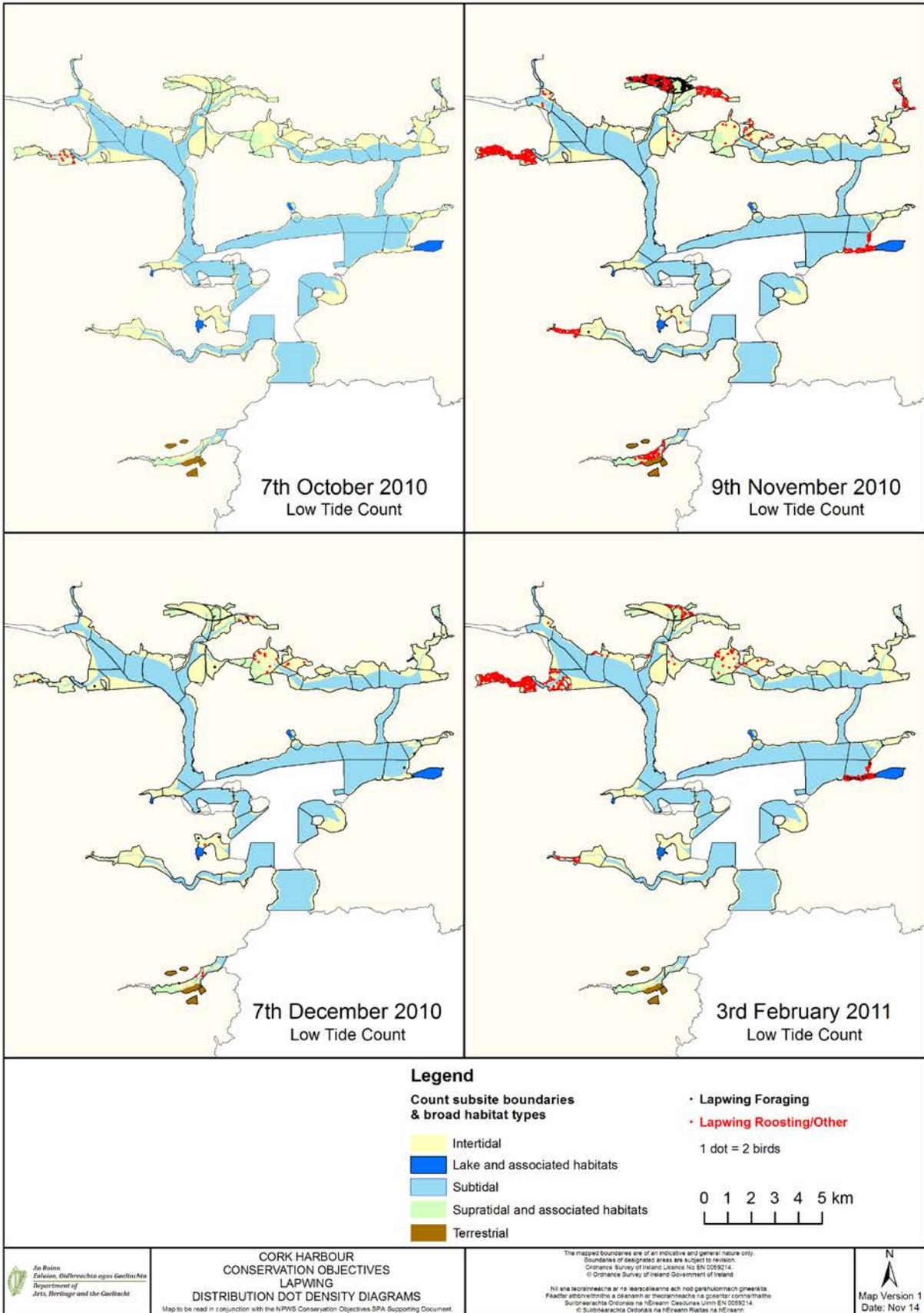


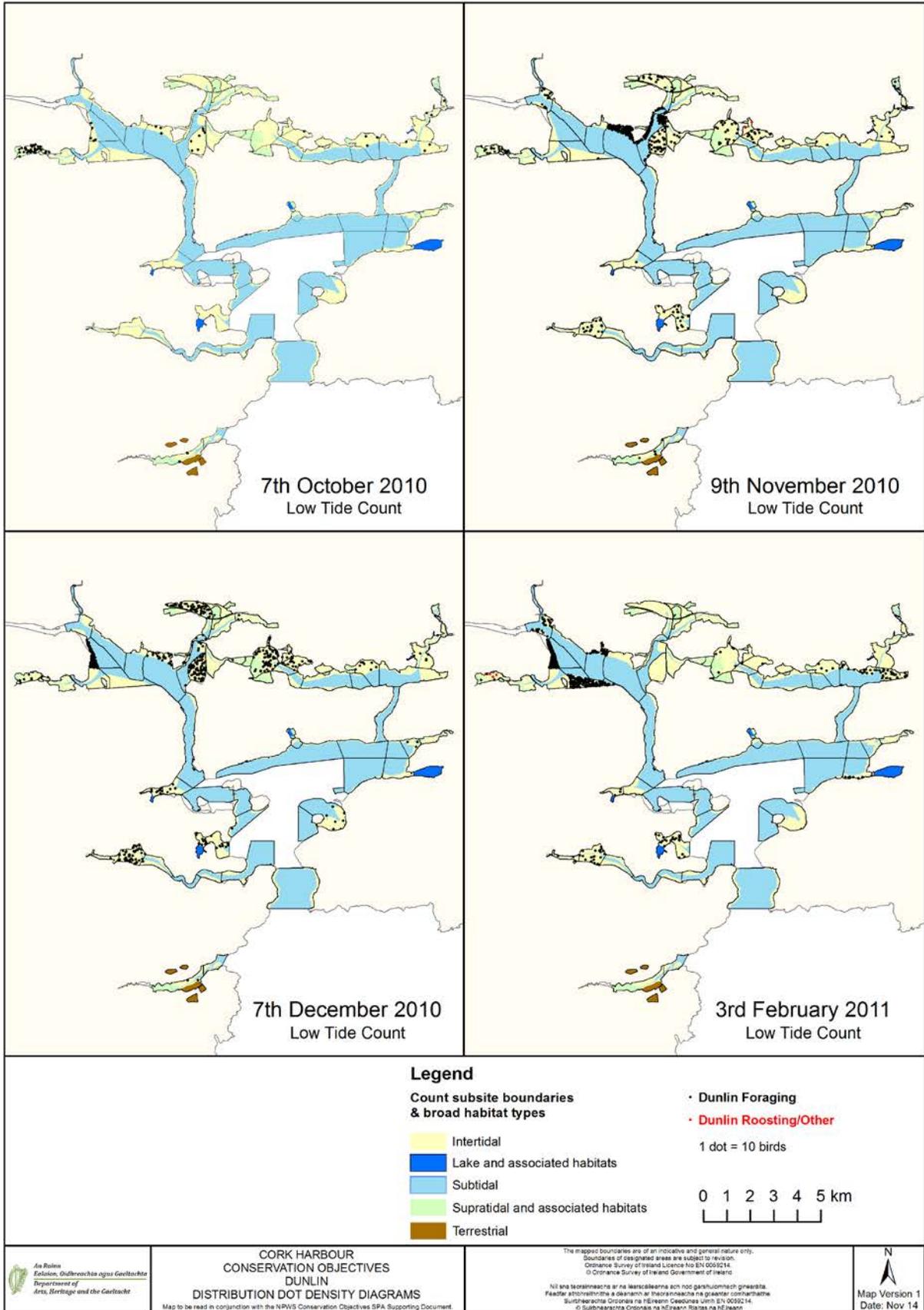


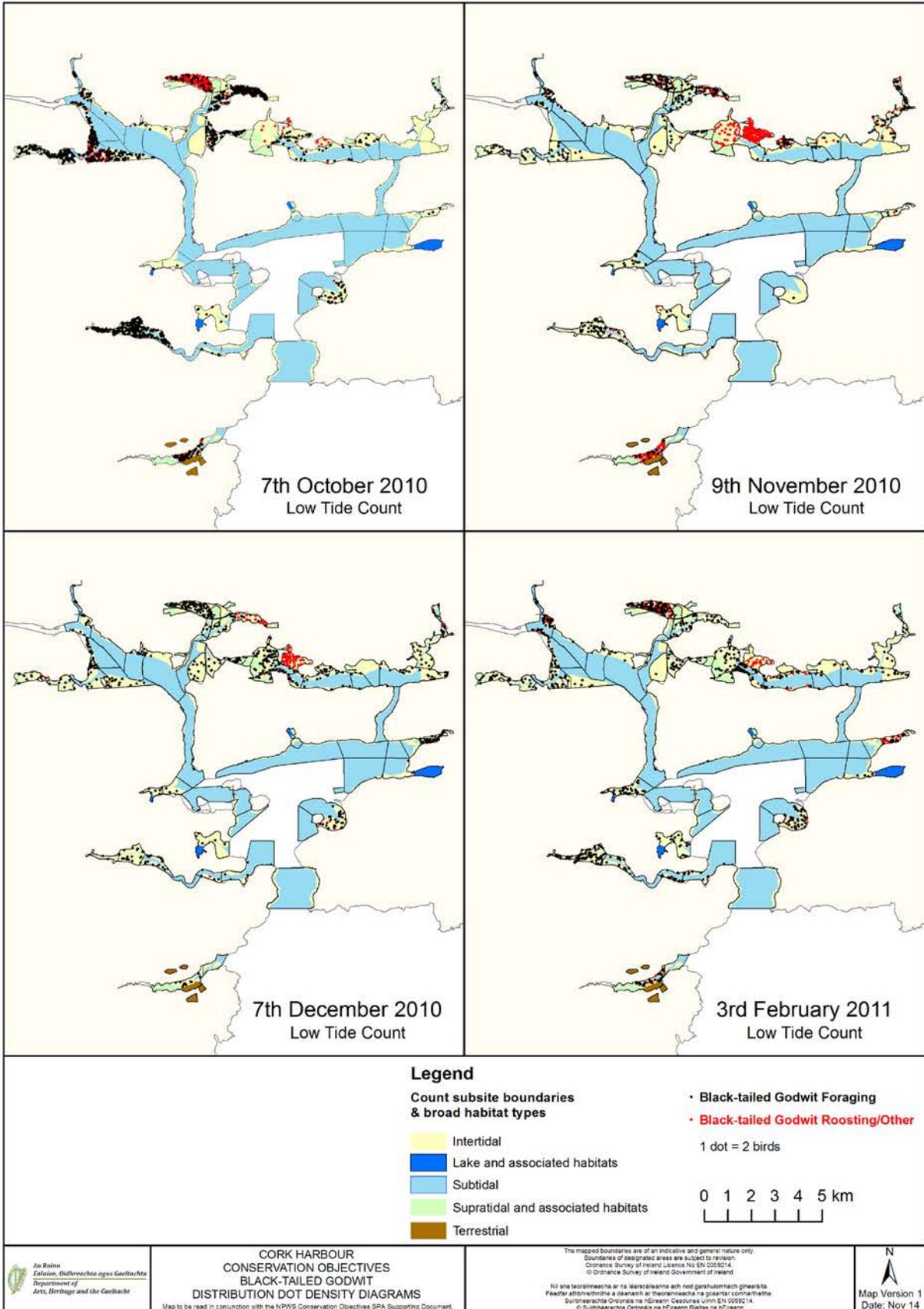


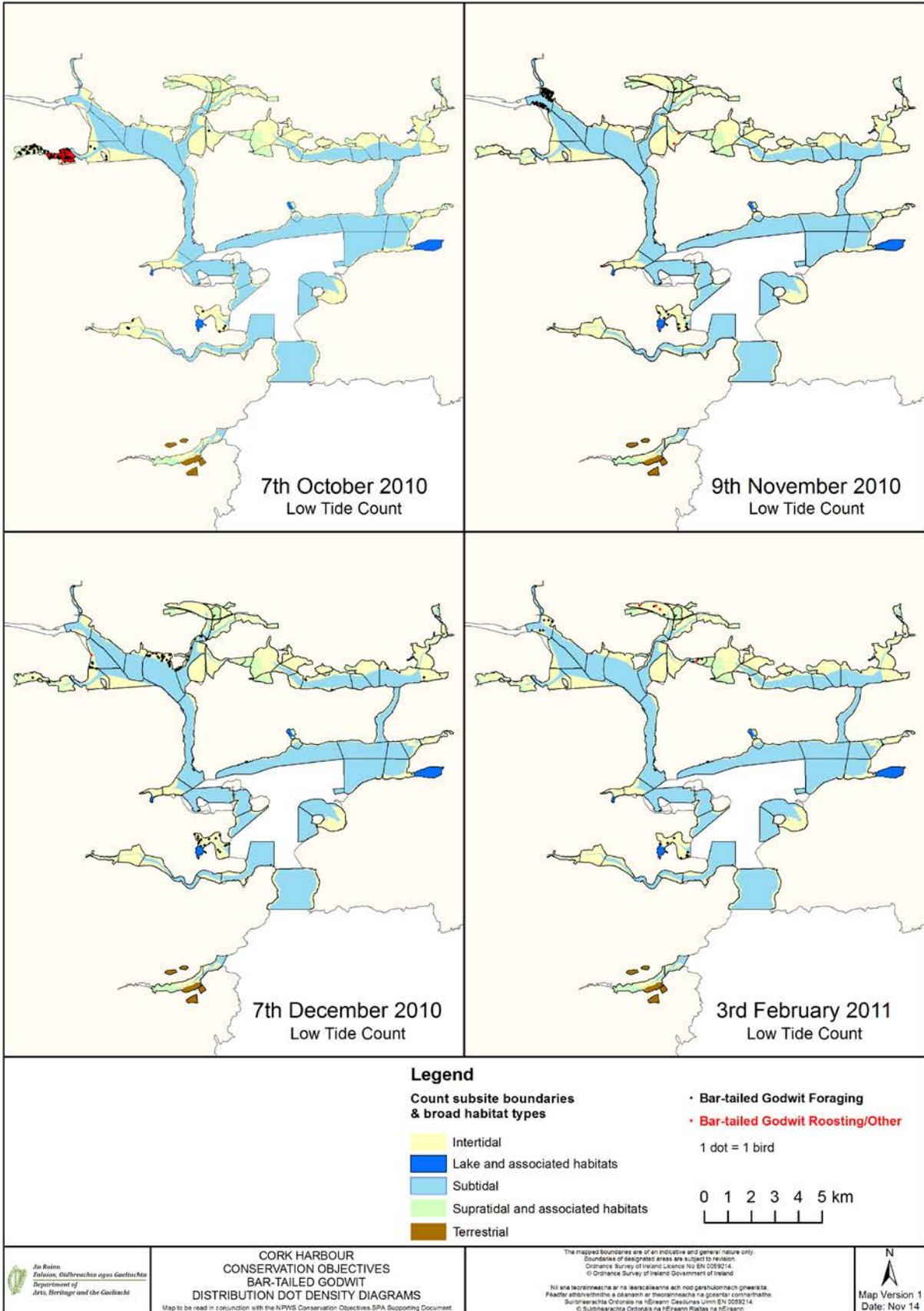


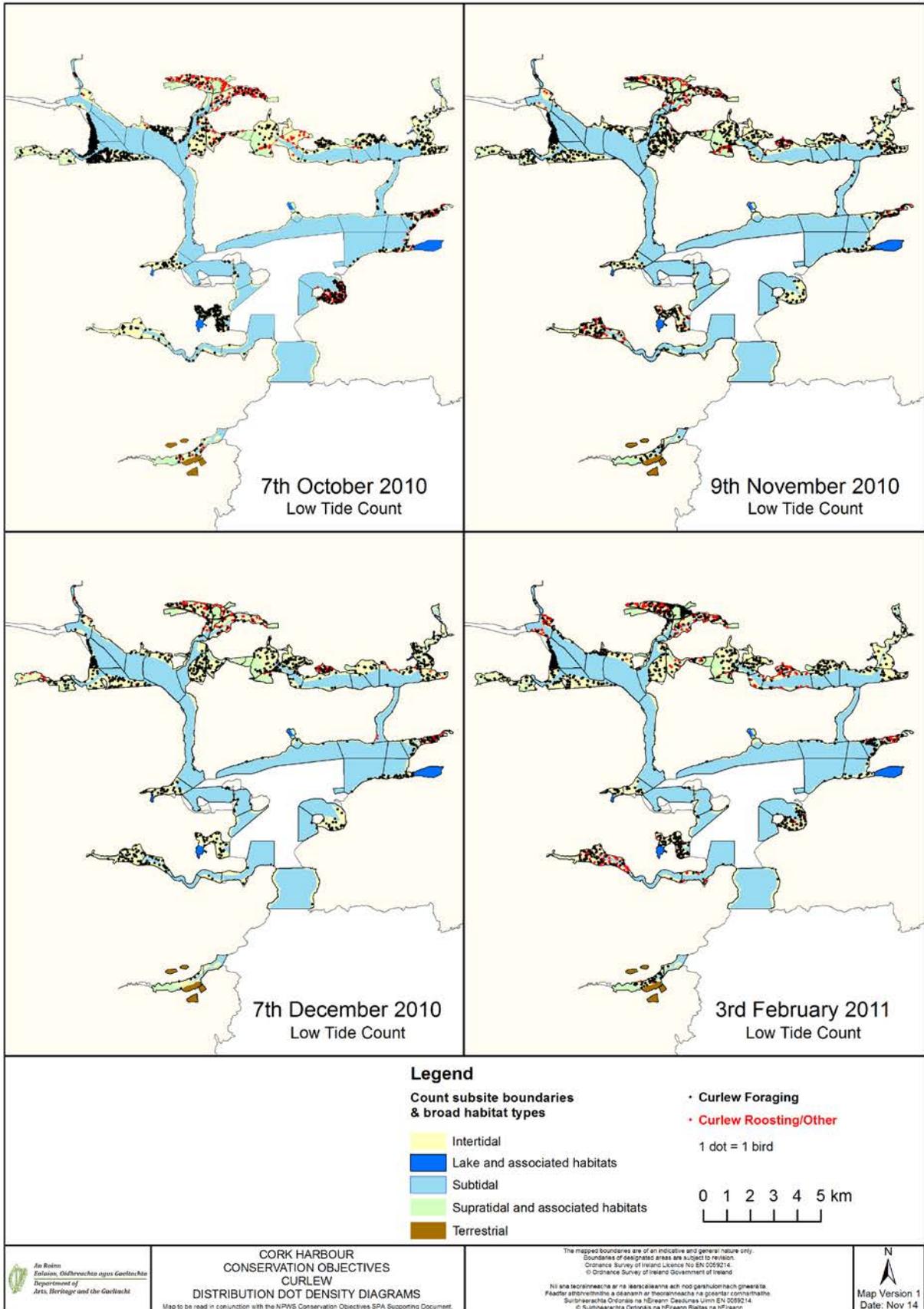


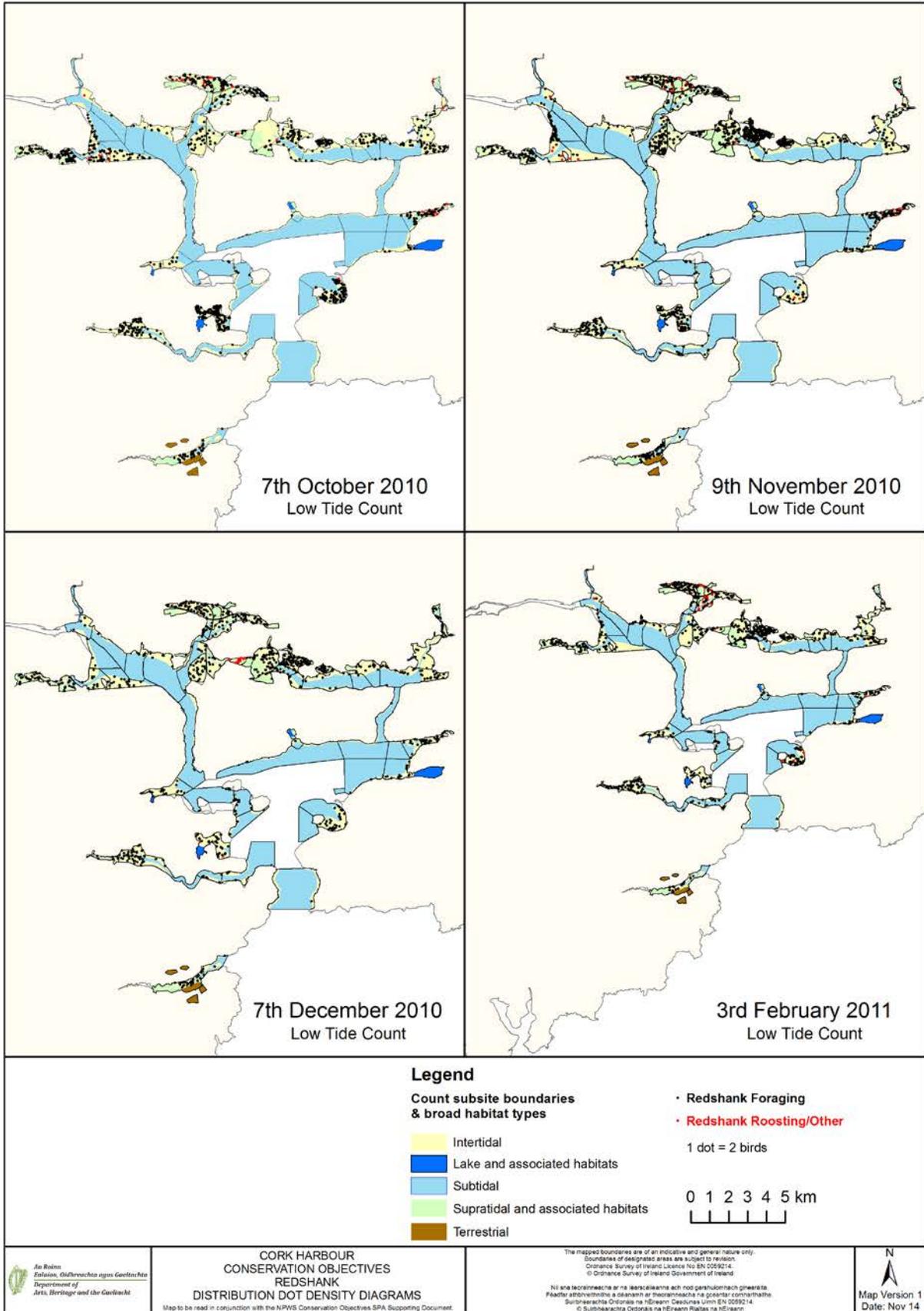


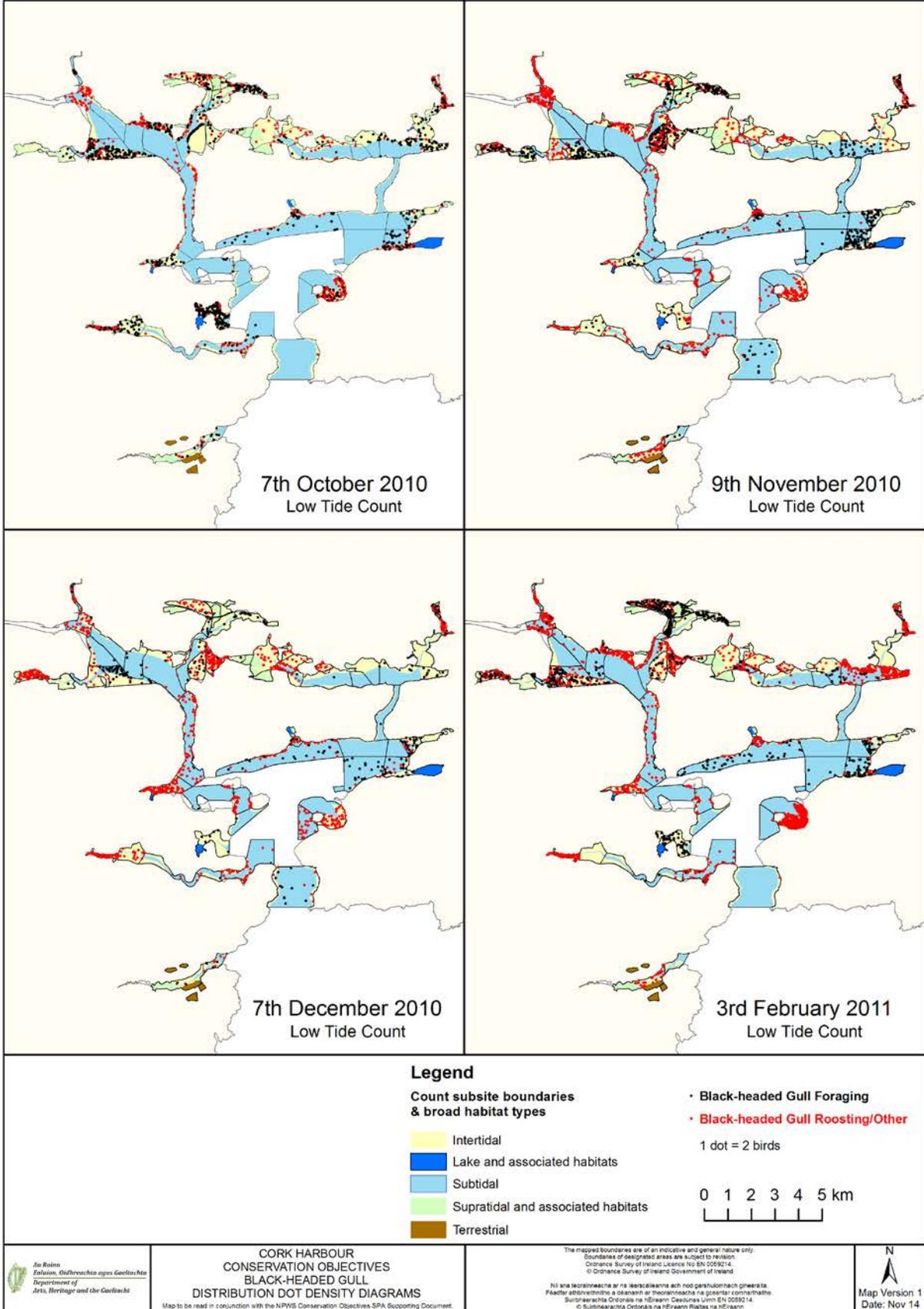


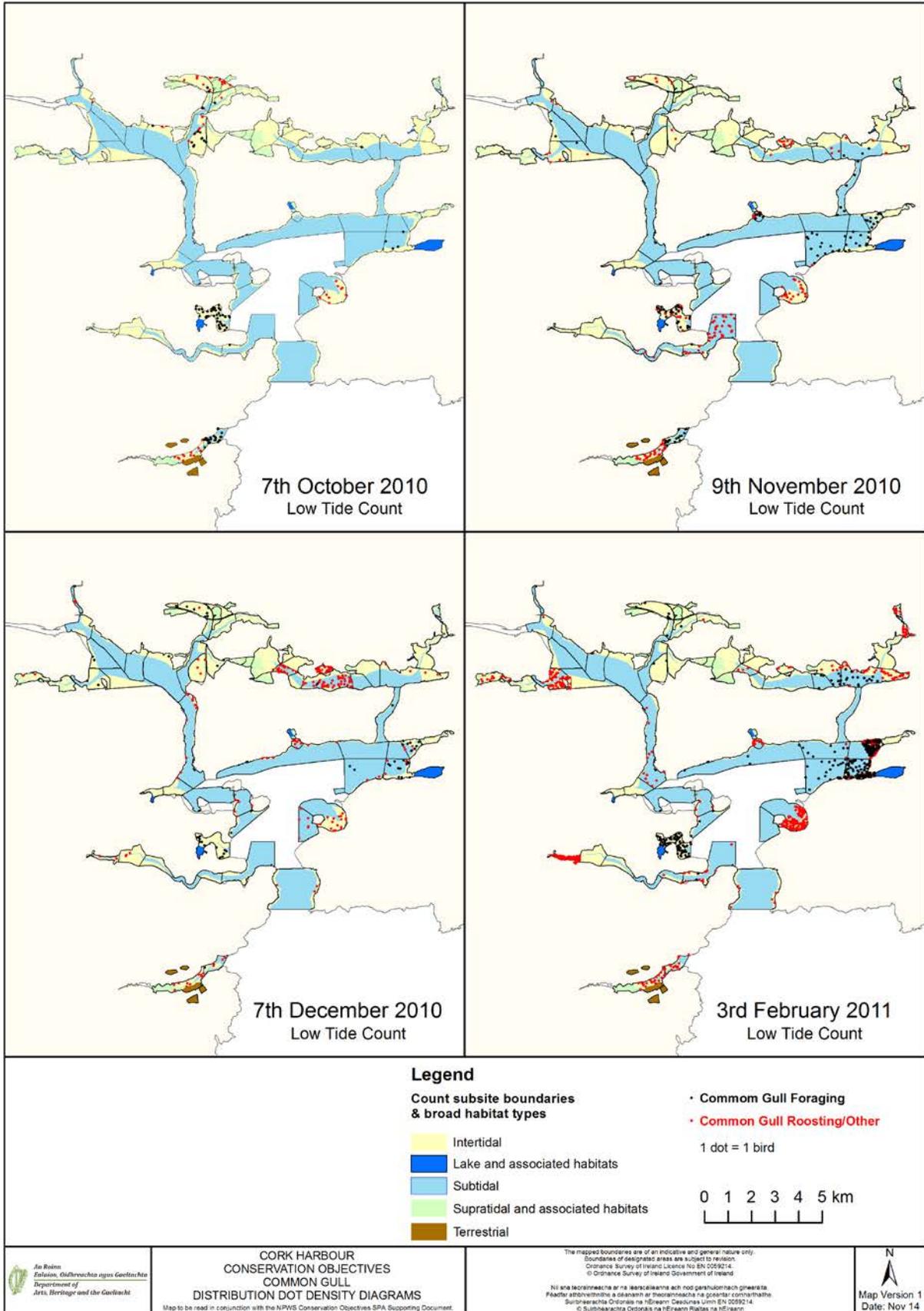


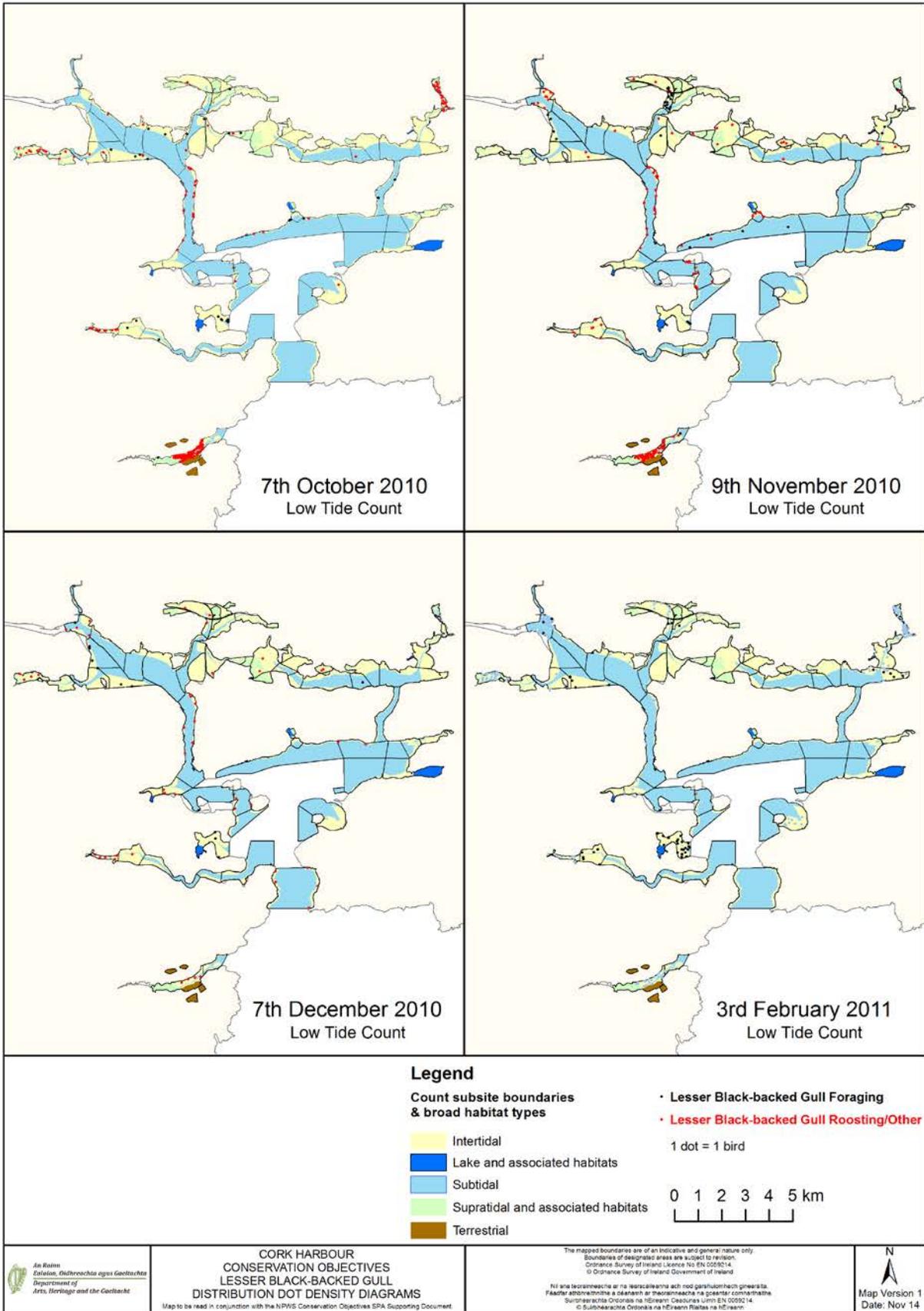












## APPENDIX 9

### Cork Harbour

#### (1a) Summary data and roost location maps from the roost survey on 29<sup>th</sup> & 30<sup>th</sup> November 2010

(Please see Sections 5.3.1 and 5.3.2 for further details on methods/limitations)

Subsite Code	Subsite Name	No. roost locations	No. species	Species
0L041	Carrigrenan Pools	1	1	T.
0L099	Rostellan Lake	4	6	BH, CA, CM, MA, PT, T.
0L453	Lough Beg	11	13	BH, CU, DR, H., MA, MS, OC, PB, RK, RP, SU, T., TT
0L469	Weir Island	5	5	BW, DN, OC, RK, SU
0L479	Brown Island	2	11	BW, CA, CU, DN, GA, GV, MA, OC, RP, SV, T.
0L483	Rathcoursey	3	13	BH, BW, CA, CU, GB, GK, H., MA, MS, RK, SU, T., WN
0L486	Dunkettle	2	5	BH, CM, CU, LB, RK
0L487	Brick Island	2	3	CU, RK, WN
0L491	Whitegate Bay	5	13	BH, CM, CU, ET, GA, GK, H., MA, MU, OC, RM, SU, WN
0L496	Monkstown Creek	2	2	CA, TT
0L510	Carrigrenan Pt	2	3	BH, OC, TT
0L511	Marino Pt to Carrigrenan Pt	4	5	BH, ET, H., OC, RK
0L512	Currabally - Ballyellane	12	8	CM, CU, MA, OC, RK, RP, TT, WN
0L513	Gortigrennane west	0	-	
0L514	Gortigrennane east	0	-	
0L517	Loughatalia	1	4	GP, MA, RK, T.
0L518	Black Rock, Whitegate	-	-	<i>not counted</i>
0L519	White Bay to Graball Bay	7	9	BH, CA, GB, H., HG, LB, OC, RP, SA
0L520	Ringabella Inner Creek	13	13	BW, CA, CU, DN, GK, L., MA, OC, RK, SU, T., TT, WN
0L521	Ringabella Outer creek	1	2	GK, RK
0L522	Currabinny to Crosshaven	4	8	BH, CU, GK, H., MA, OC, RK, TT
0L523	Coolmore Woods	1	1	MA
0L524	Coolmore to Kellehers Woods	7	9	BH, CA, CU, DR, GK, H., MA, OC, RK
0L525	Carrigaline Castle to Rabbit pt	9	12	BH, BW, CA, CU, DN, GK, L., RK, RP, SV, T., TT
0L526	Carrigaline Owenboy	4	8	BH, CM, ET, GK, HG, LB, MA, SN
0L527	Lough More (Cork Harbour)	5	8	CA, CM, CU, DN, GV, OC, RK, RP
0L528	Ringaskiddy Port	1	1	RK
0L529	Haulbowline to Spike Is	2	2	CA, RK
0L530	Raffeen Creek	3	4	BW, OC, SU, T.
0L532	Glenbrook	3	3	BH, CA, MS
0L533	Inner Douglas Estuary (Goat Is)	6	12	BA, BH, BW, CU, DN, GV, L., LB, OC, RK, T., WN
0L534	Bloomfield	5	9	BA, BH, BW, CA, CU, L., OC, SU, WN
0L535	Harty's Quay	4	4	CU, RK, SU, T.

0L536	Ringmahon Pt	1	2	RK, RP
0L537	Hop Island to Passage West	-	-	<i>not counted</i>
0L538	Glashaboy	0		
0L539	Wallingstown	-	-	<i>not counted</i>
0L540	Flaxfort (Little Is)	0		
0L541	Martello west to Carrigrenan	5	6	BH, CU, DN, H., LB, OC
0L542	Belvelly Br. West	7	5	BH, ET, SU, T., WN
0L543	Belvelly Br. East	1	1	T.
0L544	Sheepark	1	2	CU, RK
0L545	Rosslague	25	11	BW, CU, DN, GK, H., L., MA, RK, SU, T., WN
0L546	Fota Is to Weir Is.	6	5	PT, SU, SV, T., WN
0L547	Rosslague east	0	-	
0L548	Rossmore Bay	2	2	OC, RK
0L551	Ballydaniel	2	2	CA, RM
0L552	Ballyelane to Brown Is.	2	4	CA, MA, RK, SU
0L557	Bailich	1	3	RK, SU, T.
0L558	Great Island east channel	1	5	CA, MA, OC, RK, T.
0L559	Cuskinny Bay	1	5	BH, GB, HG, LB, OC
0L560	Cuskinny Marsh	2	7	BH, CA, CM, GB, LB, MA, MS
0L561	Cobh	3	8	BH, CU, GB, H., HG, LB, MS, OC
0L562	Agahda	3	6	CA, CU, GK, OC, RP, TT
0L563	Agahda Lower	2	9	BH, CA, CM, CU, H., LB, MU, OC, SU
0L564	Saleen west	4	9	BH, BW, CM, CU, LG, MA, OC, RK, TT
0L565	Saleen East	7	13	BW, CU, ET, GK, H., HG, LG, MA, RK, SU, SV, T., WN
0L566	Aghada Pools	2	1	CA
0L567	Marloag Point	0	-	
0L568	Ballyannan pool	0	-	
0L582	Carrabinny Wood	6	5	BH, CM, GB, H., RK
0L583	Garranekinnefeake	1	2	HG, OC
0L585	Courtstown Lagoon	1	1	L.
0L586	Killacloyne Fields	0	-	
0L587	Harpers Island (only)	3	13	BH, BW, CM, CU, DN, GP, H., L., LB, MA, OC, RK, T.
0L589	Brown Island West	2	6	CA, CU, OC, RK, T., WN
0L590	Brown Island East	4	12	BH, BW, CA, CU, GD, H., L., MA, OC, RK, SU, T.
0L591	Brown Island North	2	12	BH, CA, CM, CU, ET, GB, GK, H., L., LB, MA, RK
0L592	Harper's Island North	3	7	BH, CM, CU, GB, MA, RK, WN
0L593	Harper's Island South	1	3	CU, OC, RM
0L595	Slatty's Pool	1	5	BH, CG, L., MA, OC
0L601	Ringabella Fields	0	-	
0L602	Kilbeg Fields	0	-	

(1b) Cork Harbour SPA (4030) SCI species and recorded roosts 29<sup>th</sup> and 30<sup>th</sup> November 2010 - shows number of roost locations within subsite, and in brackets, the peak number recorded at a single roost location

Species ▶ Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP
OL041			1 (23)					<i>not</i>				
OL099			2 (78)	1 (1)				<i>recorded</i>	1 (9)			
OL453	4 (41)		2 (11)							1 (1)	8 (15)	
OL469	1 (37)										1 (57)	
OL479			3 (36)		1 (10)				1 (9)		1 (31)	
OL483	1 (22)	1 (14)	2 (47)						1 (37)	1 (3)		
OL486												
OL487		1 (33)										
OL491	1 (72)	2 (53)				1 (6)				1 (1)	1 (106)	
OL496									1 (33)			
OL510											1 (9)	
OL511			1 (23)							1 (1)	2 (1)	
OL512		2 (8)									5 (46)	
OL513												
OL514												
OL517			1 (12)									1 (23)
OL518												
OL519									3 (37)	1 (1)	3 (12)	
OL520	2 (3)	2 (16)	1 (26)						1 (1)		1 (6)	
OL521												
OL522										1 (1)	1 (2)	
OL523												
OL524									2 (3)	1 (1)	1 (10)	
OL525			2 (12)		1 (1)				1 (1)			
OL526												
OL527									1 (20)		2 (10)	
OL528												
OL529									1 (25)			
OL530	1 (91)		1 (25)								1 (12)	
OL532									1 (16)			
OL533		1 (10)	1 (8)								4 (15)	
OL534		1 (300)							1 (7)		1 (28)	
OL535	2 (36)		1 (6)									

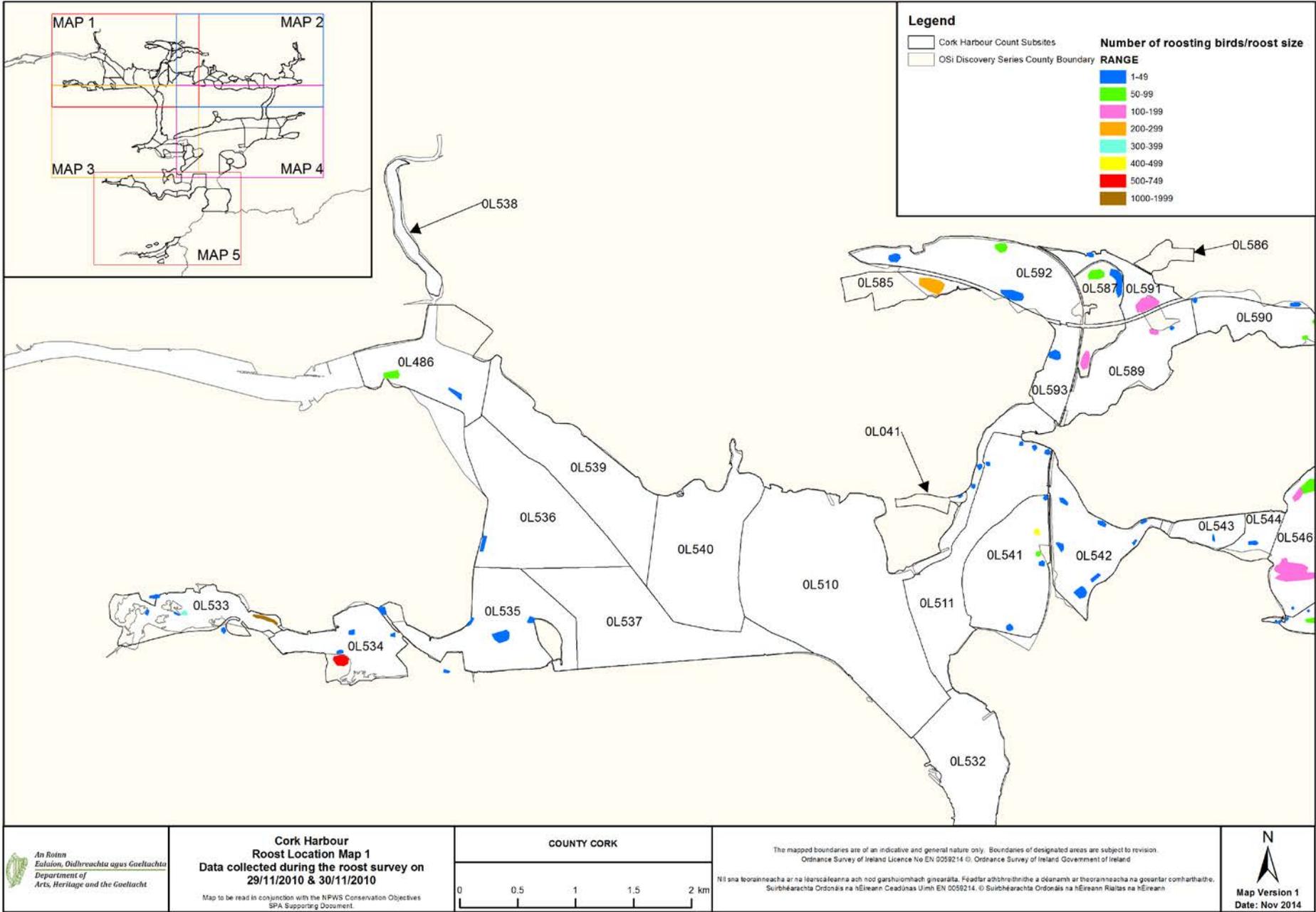
Species ► Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP
OL536												
OL537												
OL538												
OL541										1 (1)	4 (167)	
OL542	2 (21)	1 (22)	2 (10)									
OL543			1 (42)									
OL544												
OL545	2 (88)	6 (71)	4 (15)							2 (1)		
OL546	2 (125)	3 (116)	1 (84)	1 (21)	1 (15)							
OL547												
OL548											1 (26)	
OL551						1 (32)			1 (11)			
OL552	1 (1)								1 (14)			
OL557	1 (12)		1 (36)									
OL558											1 (7)	
OL559												
OL560												
OL561									1 (3)			
OL562									1 (4)		1 (1)	
OL563	1 (2)								1 (9)	1 (1)	1 (12)	
OL564							1 (6)				3 (34)	
OL565	3 (13)	5 (52)	6 (34)		1 (1)		1 (4)			1 (3)		
OL566									2 (27)			
OL567												
OL568												
OL582										1 (4)		
OL583											1 (3)	
OL585												
OL586												
OL587			1 (23)							1 (1)	1 (11)	1 (21)
OL589		1 (11)	2 (22)						2 (9)		1 (53)	

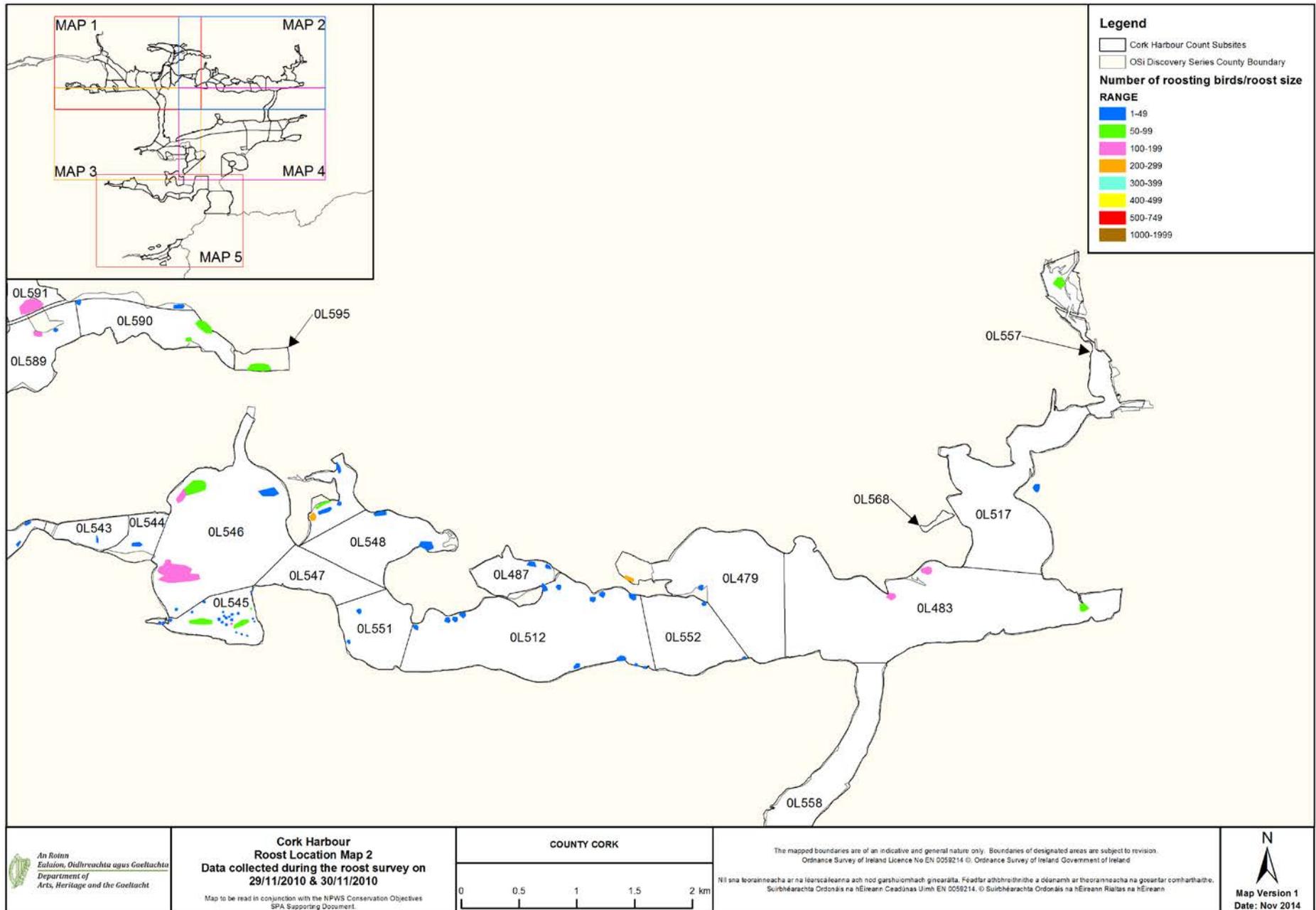
Species ▶ Subsites ▼	SU	WN	T.	PT	SV	RM	LG	GG	CA	H.	OC	GP
0L590	2 (8)		2 (22)						1 (1)	1 (1)	1 (47)	
0L591									1 (3)	1 (1)		
0L592		2 (8)										
0L593						1 (14)					1 (1)	
0L595											1 (3)	
0L601												
0L602												

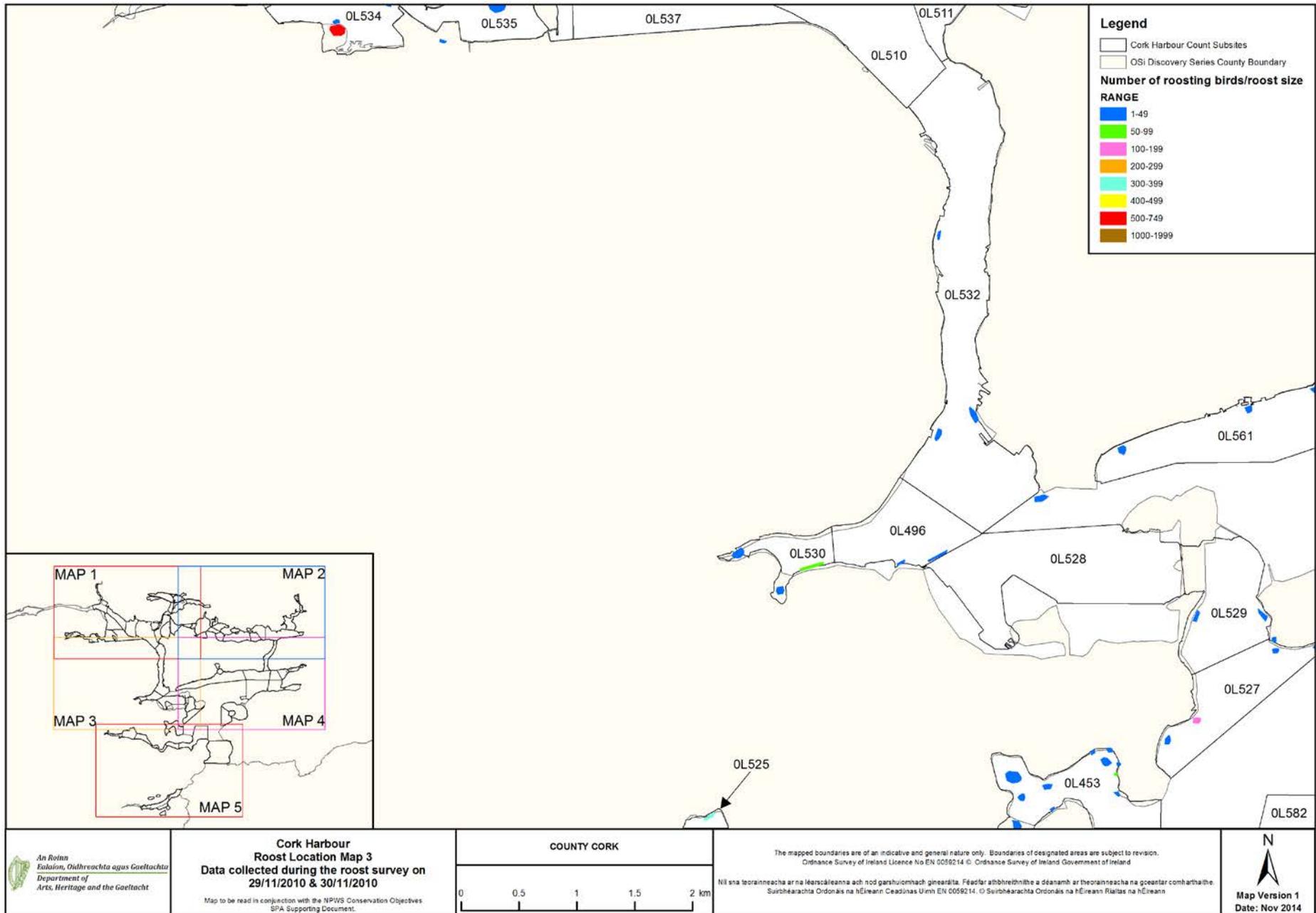
Species ► Subsites ▼	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB
OL041										
OL099								1 (31)	1 (2)	
OL453						3 (18)	5 (43)	1 (16)		
OL469			1 (210)	1 (19)			1 (47)			
OL479	1 (4)		1 (136)	1 (24)						
OL483				1 (23)		1 (30)	1 (46)	1 (12)		
OL486						1 (1)	1 (2)	1 (42)	1 (1)	1 (15)
OL487						1 (18)	1 (26)			
OL491						1 (15)	1 (72)	2 (160)	2 (24)	
OL496										
OL510								1 (2)		
OL511							1 (2)	1 (1)		
OL512						3 (2)	2 (8)		1 (1)	
OL513										
OL514										
OL517							1 (6)			
OL518										
OL519								1 (12)		1 (2)
OL520		1 (5)	2 (2)	2 (144)		3 (8)	5 (35)			
OL521							1 (2)			
OL522						2 (14)	2 (4)	1 (1)		
OL523										
OL524						1 (1)	2 (70)	1 (2)		
OL525		1 (1)	1 (250)	1 (11)		1 (3)	4 (66)	1 (6)		
OL526								2 (40)	1 (3)	1 (10)
OL527	1 (2)		1 (150)			2 (8)	1 (20)		1 (1)	
OL528							1 (46)			
OL529							1 (15)			
OL530				1 (14)						
OL532								2 (34)		
OL533	2 (8)	4 (35)	2 (1000)	2 (105)	2 (30)	3 (12)	5 (35)	1 (34)		1 (8)
OL534		2 (95)		1 (46)	1 (42)	1 (165)		1 (30)		
OL535						1 (1)	2 (1)			

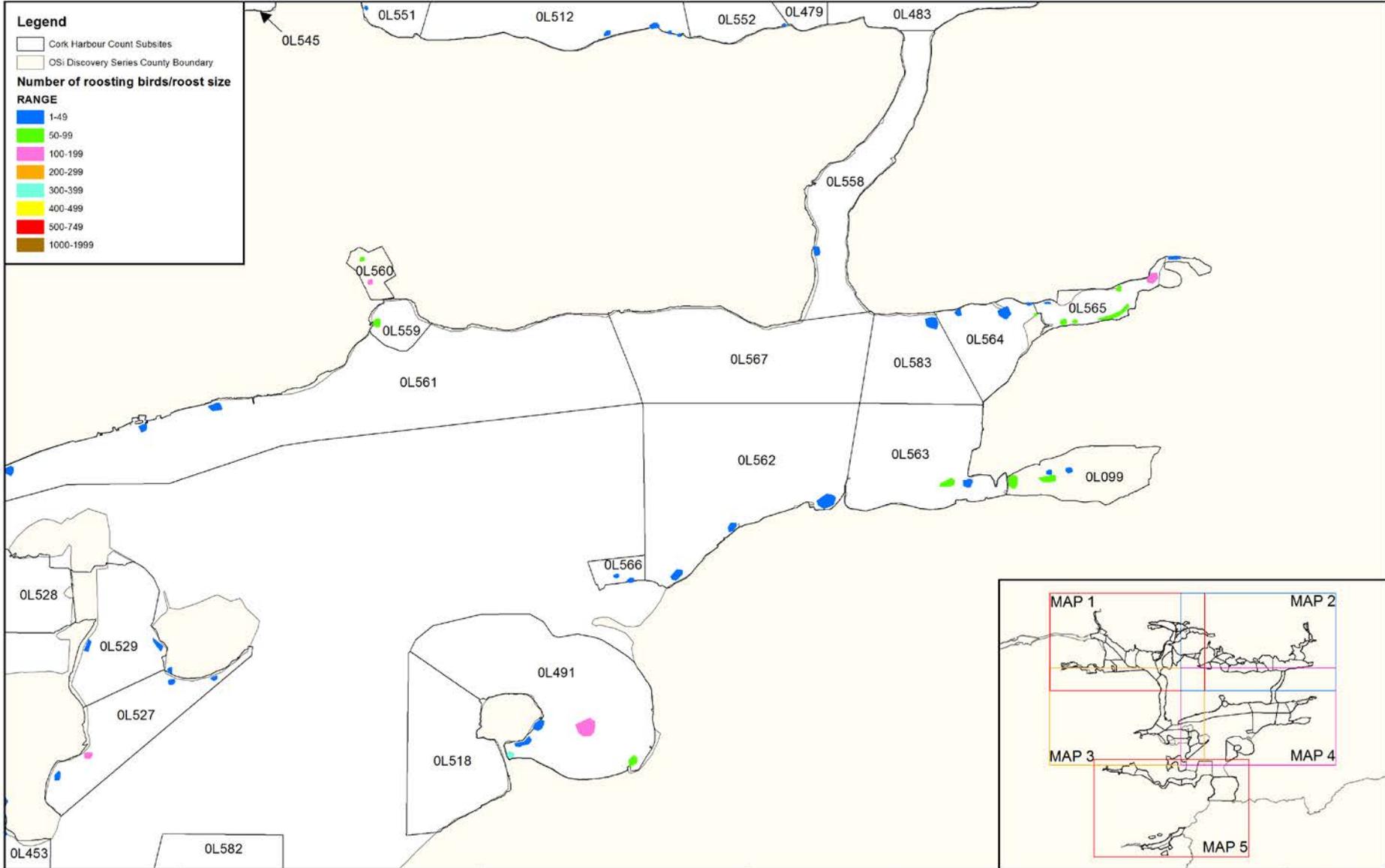
Species ▶ Subsites ▼	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB
OL536							1 (3)			
OL537										
OL538										
OL539										
OL540										
OL541			1 (190)			1 (2)		1 (67)		1 (2)
OL542								1 (18)		
OL543										
OL544						1 (22)	1 (19)			
OL545		1 (5)	2 (10)	3 (140)		6 (17)	4 (36)			
OL546										
OL547										
OL548							1 (31)			
OL551										
OL552							1 (5)			
OL557							1 (12)			
OL558							1 (1)			
OL559								1 (14)		1 (11)
OL560								2 (82)	1 (12)	1 (11)
OL561								2 (14)		1 (4)
OL562						1 (2)				
OL563						1 (1)		2 (26)	1 (5)	1 (2)
OL564				1 (16)		1 (32)	2 (8)	1 (8)	1 (4)	
OL565				1 (30)		1 (2)	2 (39)			
OL566										
OL567										
OL568										
OL582							1 (1)	2 (57)	2 (2)	
OL583										
OL585		1 (220)								
OL586										
OL587		1 (37)	1 (34)	1 (36)		1 (6)	1 (13)	1 (2)	1 (2)	1 (3)
OL589						1 (3)	1 (11)			

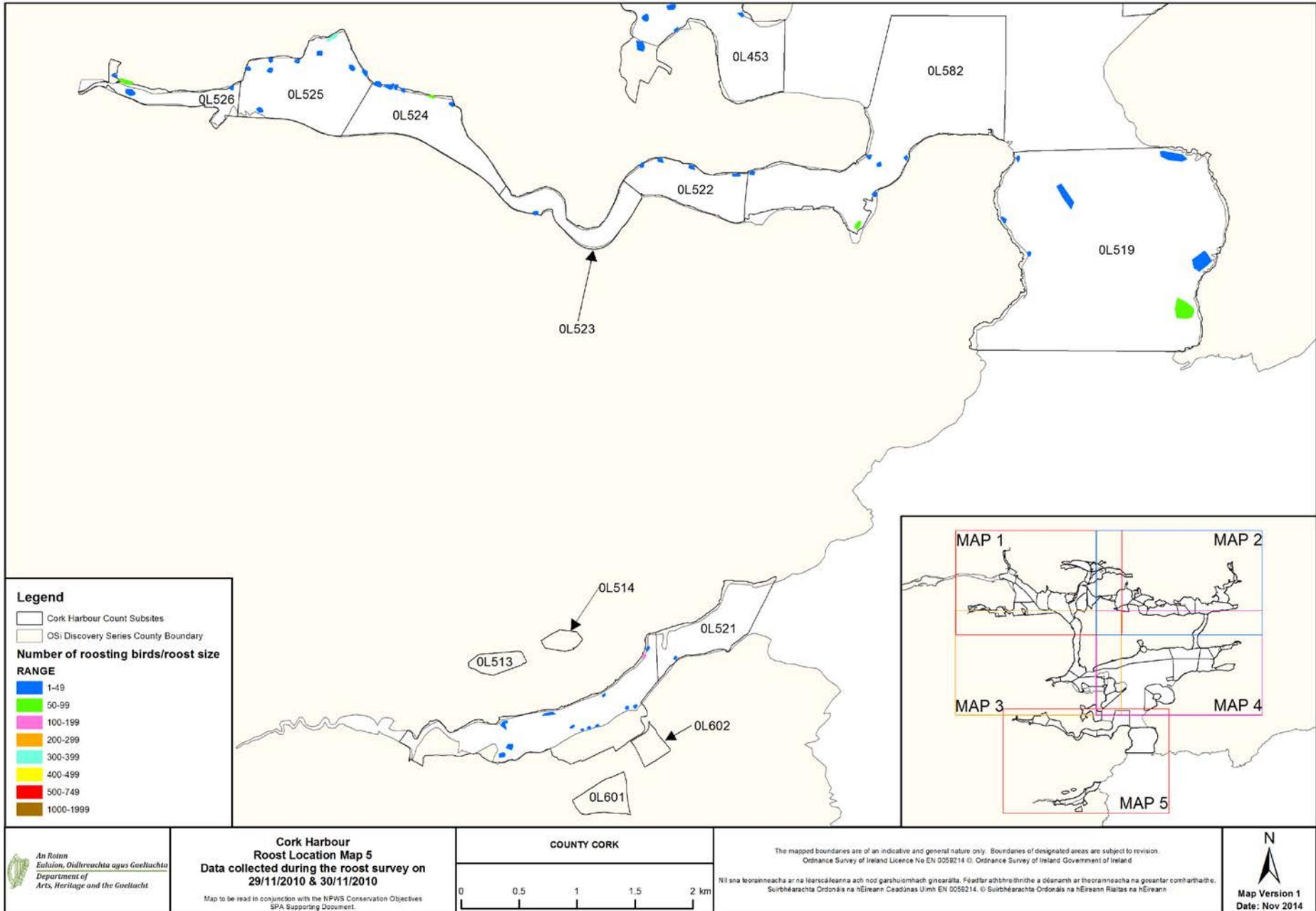
Species ▶ Subsites ▼	GV	L.	DN	BW	BA	CU	RK	BH	CM	LB
OL590		2 (28)		1 (41)		1 (6)	2 (17)	1 (16)		
OL591		1 (28)				1 (88)	1 (4)	1 (17)	1 (6)	1 (6)
OL592						1 (1)	1 (1)	3 (29)	1 (1)	
OL593						1 (2)				
OL595		1 (12)						1 (47)		
OL601										
OL602										











### Cormorant Roost Data

In December 2013 a co-ordinated survey of Cormorant roosts was undertaken by volunteers. Night-time roosts were identified and counted and these data are shown below:

Roost Location	Subsite *	Number of roosting Cormorant
Drake's Pool (Owenboy Estuary)	0L523	19
Monkstown Creek	0L496	151
Glanmire Wood (Glashaboy Estuary)	0L538	109
Fota Island south	0L542	42
Fota Island north	0L511	34
Bagwell's Hill east (east ferry channel)	0L558	49
Saleen Creek	0L564	51
Rostellan	0L099	7

\* related subsite as used during the 2010/11 NPWS Waterbird Survey Programme.

Unpublished data courtesy of T. Gittings (collator).

Volunteer Observers: Dara Fitzpatrick, Tom Gittings, Tony Nagle, Paul O'Donoghue, Barry O'Mahony, John Meade and Paul Moore.

## APPENDIX 10

### Cork Harbour - Activities & Events

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

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

Activity/Event	0L041	0L099	0L453	0L469	0L479	0L483	0L486	0L487	0L491	0L496	0L510	0L511	0L512	0L513	0L514
<b>1. Coastal protection, sea defences &amp; stabilisation</b>															
1.1 Linear defences					○	○	○		○	○	○	○			
1.4 <i>Spartina</i> planting/growing			○					○							
1.6 Other modifications			○							○	○	○			
<b>2. Barrage schemes/drainage</b>															
2.2 Altered drainage/river channel					○										
2.3 Other channel modifications								○							
2.5 Other		○													
<b>3. Power generation</b>															
3.1 Power stations									○						
3.2 Oil & gas exploration									○						
<b>4. Industrial, port &amp; related development</b>															
4.1 Industrial port							○								
4.3 Slipway											○				
4.4 Pier					○				○						
4.5 Manufacturing industries										○					
4.6 Chemical industries			○									○			
4.7 Ship & boat building/repair													○		
<b>6. Pollution</b>															
6.1 Domestic & urban waste water					○	○			○						
6.2 Industrial											H	○			
6.3 Landfill						○		○							
6.4 Agricultural & forestry effluents					○										
6.6 Thermal discharges									○						
6.7 Solid waste incl. fly-tipping							○	○	○			○			
<b>7. Sediment extraction (marine &amp; terrestrial)</b>															

Activity/Event	OL041	OL099	OL453	OL469	OL479	OL483	OL486	OL487	OL491	OL496	OL510	OL511	OL512	OL513	OL514
7.1 Channel dredging (maintenance & navigation)												○			
7.2 Quarrying				○				H							
<b>8. Transport &amp; communications</b>															
8.3 Bridges & aqueducts		○	○		○			○							
8.5 Roads	○	○	○	○	○	○	○	○	○	○	○		○		
8.6 Car parks		○									○				
8.7 Shipping channel, shipping lanes							○				○				
8.8 Rail lines							○					○			
8.9 Cables - suspended		○													
<b>9. Urbanisation</b>															
9.1 Urbanised areas, housing		○				○			○	○	○				
9.2 Commercial & industrial areas			○				○				○	H			
<b>11. Education &amp; scientific research</b>															
11.2 Nature trails					○										
<b>12. Tourism &amp; recreation</b>															
12.2 Non-marina moorings									○						
12.5 Leisure centres, sports ground											○				
12.6 Power boating & water-skiing							○		○						
12.7 Jet-skiing						○									
12.13 Rowing									○						
12.14 Tourist boat trips									○						
12.18 Walking, incl. dog walking		○	○	○	○		○	○	○	○	○		○		
12.19 Birdwatching		○	○						○			○			
12.22 Motorised vehicles															
12.26 Clay-pigeon shooting								○							
<b>13. Wildfowl &amp; hunting</b>															

Activity/Event	0L041	0L099	0L453	0L469	0L479	0L483	0L486	0L487	0L491	0L496	0L510	0L511	0L512	0L513	0L514
13.1 Wildfowling		O						O					O		
<b>14. Bait-collecting</b>															
14.1 Digging for lugworms/ragworms			O		O	O							O		
<b>15. Fisheries &amp; Aquaculture</b>															
15.1 Professional passive fishing			U	U	U	U			U	U	U	U	U	U	U
15.2 Professional active fishing			U	U	U	U			U	U	U	U	U	U	U
15.6 Molluscs - hand-gathering									O		O	O			
15.9 Intertidal aquaculture e.g. trestles								H					O		
<b>16. Agriculture &amp; forestry</b>															
16.2 Grazing: intensive (terrestrial)					O									O	O
16.3 Grazing: non-intensive (terrestrial)					O										
16.9 Removal of hedges, scrub														H	H
16.10 Mowing/grassland cutting					O									O	O
16.13 Agricultural land-claim				H	H										
16.14 In-filling (e.g. ditches, ponds, marshes)				H											
16.18 Forest and plantation management & use			O												
<b>19. Natural events</b>															
19.1 Storms, floods and storm surges		O							O		O	O			
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

Activity/Event	0L517	0L518	0L519	0L520	0L521	0L522	0L523	0L524	0L525	0L526	0L527	0L528	0L529	0L530	0L532
<b>1. Coastal protection, sea defences &amp; stabilisation</b>															
1.1 Linear defences	O		O	O	O	O	O								
1.2 Training walls								O	O	O					
1.4 <i>Spartina</i> planting/growing				H										O	
1.6 Other modifications												H		O	
<b>2. Barrage schemes/drainage</b>															
2.4 Tidal barrages				H										O	
<b>3. Power generation</b>															
3.2 Oil & gas exploration		O													
<b>4. Industrial, port &amp; related development</b>															
4.1 Industrial port												O			
4.3 Slipway			O	O		O	O								
4.4 Pier												O			
4.5 Manufacturing industries												O		O	
4.6 Chemical industries												O			O
<b>5. Military activities</b>															
5.3 Military constructions													H		
<b>6. Pollution</b>															
6.1 Domestic & urban waste water										O					
6.4 Agricultural & forestry effluents	O														
6.7 Solid waste incl. fly-tipping			O												
<b>7. Sediment extraction (marine &amp; terrestrial)</b>															
7.3 Sand and gravel extraction	H														
<b>8. Transport &amp; communications</b>															
8.2 Flight path			O						O	O					

Activity/Event	0L517	0L518	0L519	0L520	0L521	0L522	0L523	0L524	0L525	0L526	0L527	0L528	0L529	0L530	0L532
8.3 Bridges & aqueducts		○											○		
8.5 Roads	○			○	○	○	○	○	○	○		○		○	○
8.6 Car parks			○	○	○					○					
8.7 Shipping channel, shipping lanes			○									○			○
8.8 Rail lines							H	H	H	H					
8.9 Cables - suspended	○									○					
<b>9. Urbanisation</b>															
9.1 Urbanised areas, housing			○		○	○			○	○					○
9.2 Commercial & industrial areas		○							○	○	○				○
<b>12. Tourism &amp; recreation</b>															
12.1 Marinas															○
12.2 Non-marina moorings			○			○	○								○
12.4 Caravan parks & chalets					○										
12.6 Power boating & water-skiing			H		○										
12.8 Sailing			○		○	○	○								○
12.10 SCUBA & snorkeling			○												
12.13 Rowing						○	○								
12.14 Tourist boat trips			○												
12.15 Angling			○												
12.17 Bathing & general beach recreation		○	○		○										
12.18 Walking, incl. dog walking	○	○	○	○	○	○	○	○	○	○	○				
12.19 Birdwatching			○												
12.22 Motorised vehicles													○		
12.25 Golf courses														○	
<b>13. Wildfowl &amp; hunting</b>															
13.1 Wildfowling	○														
<b>14. Bait-collecting</b>															

Activity/Event	0L517	0L518	0L519	0L520	0L521	0L522	0L523	0L524	0L525	0L526	0L527	0L528	0L529	0L530	0L532
14.1 Digging for lugworms/ragworms				O	O						O		O	O	
<b>15. Fisheries &amp; Aquaculture</b>															
15.1 Professional passive fishing	U	U	U	U	U	U	U	U	U		U	U	U	U	U
15.2 Professional active fishing	U	U	U	U	U	U	U	U	U		U	U	U	U	U
15.5 Leisure fishing			O												
15.6 Molluscs - hand-gathering			O												
<b>16. Agriculture &amp; forestry</b>															
16.2 Grazing: intensive (terrestrial)				O											
16.9 Removal of hedges, scrub				H											
16.10 Mowing/grassland cutting				O											
16.12 Polderisation				H											
16.13 Agricultural land-claim				H										H	H
16.14 In-filling (e.g. ditches, ponds, marshes)				H										H	
<b>19. Natural events</b>															
19.1 Storms, floods and storm surges		O	O												
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

Activity/Event	0L533	0L534	0L535	0L536	0L537	0L538	0L539	0L540	0L541	0L542	0L543	0L544	0L545	0L546	0L547
<b>1. Coastal protection, sea defences &amp; stabilisation</b>															
1.1 Linear defences		o	o				o	o	o	o	o		o		
1.2 Training walls												o			
1.4 <i>Spartina</i> planting/growing					H					o	o	o	o	o	
1.6 Other modifications	o			o		o	o	o	o						
<b>2. Barrage schemes/drainage</b>															
2.2 Altered drainage/river channel										o		o			
2.3 Other channel modifications	o														
2.5 Other											o				
<b>4.Industrial, port &amp; related development</b>															
4.3 Slipway								o		H					o
4.5 Manufacturing industries							o	o							
4.6 Chemical industries							o	o							
4.7 Ship & boat building/repair								H							
4.8 Other			o												o
<b>5.Military activities</b>															
5.3 Military constructions										o			o		o
<b>6.Pollution</b>															
6.2 Industrial							H		N						
6.4 Agricultural & forestry effluents													o		
6.7 Solid waste incl. fly-tipping							o	o	o	o	o		o		
<b>7. Sediment extraction (marine &amp; terrestrial)</b>															
7.2 Quarrying														o	

Activity/Event	0L533	0L534	0L535	0L536	0L537	0L538	0L539	0L540	0L541	0L542	0L543	0L544	0L545	0L546	0L547
<b>8. Transport &amp; communications</b>															
8.2 Flight path					○										
8.3 Bridges & aqueducts	○	○							○	○	○				
8.4 Tunnel											○				
8.5 Roads	○	○	○	○	○	○	○	○		○	○		○	○	
8.6 Car parks							○	○			○				
8.7 Shipping channel, shipping lanes				○			○	○							○
8.8 Rail lines		○	○						○	○					
8.9 Cables - suspended															○
8.10 Communication masts and antennas			○												
<b>9. Urbanisation</b>															
9.1 Urbanised areas, housing	○	○	○	○				○							
9.2 Commercial & industrial areas							○	○							
<b>12. Tourism &amp; recreation</b>															
12.5 Leisure centres, sports ground								○							
12.18 Walking, incl. dog walking	○	○	○	○	○	○	○			○	○			○	
12.22 Motorised vehicles										○					
12.25 Golf courses	○	○													
12.27 Others										○					
<b>13. Wildfowl &amp; hunting</b>															
13.1 Wildfowling										○	○		○		○
<b>15. Fisheries &amp; Aquaculture</b>															
15.1 Professional passive fishing		U	U	U	U	U	U	U	U	U	U	U	U	U	U
15.2 Professional active fishing		U	U	U	U	U	U	U	U	U	U	U	U	U	U
15.6 Molluscs - hand-gathering									○						
15.9 Intertidal aquaculture e.g. trestles															○
<b>16. Agriculture &amp; forestry</b>															

Activity/Event	0L533	0L534	0L535	0L536	0L537	0L538	0L539	0L540	0L541	0L542	0L543	0L544	0L545	0L546	0L547
16.3 Grazing: non-intensive (terrestrial)		O	O												
16.9 Removal of hedges, scrub							H	H							
16.13 Agricultural land-claim				H								O	H		
<b>18. Wildlife habitat management</b>															
18.2 Habitat creation & restoration - intertidal	O	O	O												
<b>19. Natural events</b>															
19.1 Storms, floods and storm surges							O	O	O						
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

Activity/Event	0L548	0L512	0L551	0L552	0L557	0L558	0L559	0L560	0L561	0L562	0L563	0L564	0L565	0L566	0L567
<b>1. Coastal protection, sea defences &amp; stabilisation</b>															
1.1 Linear defences		○		○	○		○	○	○	○	○	○	○	○	
1.2 Training walls							○		○						
1.4 <i>Spartina</i> planting/growing	○	○		○											
1.6 Other modifications								○							
<b>2. Barrage schemes/drainage</b>															
2.2 Altered drainage/river channel					H		○								
2.3 Other channel modifications					H										
<b>3. Power generation</b>															
3.1 Power stations														○	
<b>4. Industrial, port &amp; related development</b>															
4.2 Fishing harbour						○			○						
4.3 Slipway		○		○					○		○				
4.4 Pier									○	○	○				
4.5 Manufacturing industries									○						
4.7 Ship & boat building/repair		H							○						
<b>5. Military activities</b>															
5.3 Military constructions									○						
<b>6. Pollution</b>															
6.1 Domestic & urban waste water					○				○	○					
6.3 Landfill	○		○		○										
6.4 Agricultural & forestry effluents					○		○								
6.7 Solid waste incl. fly-tipping	○	○		○	○	○	○		○		○	○	○		○
<b>7. Sediment extraction (marine &amp; terrestrial)</b>															

Activity/Event	0L548	0L512	0L551	0L552	0L557	0L558	0L559	0L560	0L561	0L562	0L563	0L564	0L565	0L566	0L567
7.1 Channel dredging (maintenance & navigation)									H						
7.2 Quarrying	○		○												
7.3 Sand and gravel extraction	○														
7.6 Removal of estuarine sediment								H							
<b>8. Transport &amp; communications</b>															
8.3 Bridges & aqueducts					○		○	○							
8.5 Roads	○	○	○		○	○	○	○	○	○	○	○	○		
8.6 Car parks					○		○		○		○				
8.7 Shipping channel, shipping lanes		○	○	○					○	○					
8.9 Cables - suspended											○				
<b>9. Urbanisation</b>															
9.1 Urbanised areas, housing					○				○	○	○				
9.2 Commercial & industrial areas					○				○					○	
9.3 Hotel & leisure complex									○						
<b>11. Education &amp; scientific research</b>															
11.2 Nature trails					○		○		○						
<b>12. Tourism &amp; recreation</b>															
12.1 Marinas						○									
12.2 Non-marina moorings						○					○				
12.5 Leisure centres, sports ground										○	○				
12.6 Power boating & water-skiing		○		○						○	○				
12.7 Jet-skiing									○	○	○				
12.8 Sailing						○			○	○	○				
12.9 Sailboarding & wind-surfing										○	○	○			
12.11 Canoeing					○	○									
12.13 Rowing										○					

Activity/Event	OL548	OL512	OL551	OL552	OL557	OL558	OL559	OL560	OL561	OL562	OL563	OL564	OL565	OL566	OL567
12.14 Tourist boat trips									O						
12.15 Angling									O	O					
12.17 Bathing & general beach recreation										O					
12.18 Walking, incl. dog walking		O		O	O	O	O	O	O	O	O	O	O		O
12.19 Birdwatching							O		O	O	O	O	O		
12.22 Motorised vehicles	O	O			O									O	
12.25 Golf courses	O														
<b>13. Wildfowl &amp; hunting</b>															
13.1 Wildfowling		O	O	O											
<b>14. Bait-collecting</b>															
14.1 Digging for lugworms/ragworms		O		O			O		O	O	O	O			O
<b>15. Fisheries &amp; Aquaculture</b>															
15.1 Professional passive fishing	U	U	U	U		U	U	U	U	U	U	U		U	U
15.2 Professional active fishing	U	U	U	U		U	U	U	U	U	U	U		U	U
15.5 Leisure fishing							O		O	O					
15.6 Molluscs - hand-gathering									O	O	O	O			
15.9 Intertidal aquaculture e.g. trestles				H							O	O			
<b>16. Agriculture &amp; forestry</b>															
16.1 Saltmarsh grazing/harvesting	O														
16.19 Forest clearance					H	F									
16.20 Others	O	O													
<b>18. Wildlife habitat management</b>															
18.3 Habitat creation & restoration - terrestrial								O							
18.4 Habitat management								H							
<b>19. Natural events</b>															
19.1 Storms, floods and storm surges										O	O	O	O	O	
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

Activity/Event	0L568	0L582	0L583	0L585	0L586	0L587	0L589	0L590	0L591	0L592	0L593	0L595	0L601	0L602
<b>1. Coastal protection, sea defences &amp; stabilisation</b>														
1.1 Linear defences	O	H			O	O	O	O	O	O	O			
<b>2. Barrage schemes/drainage</b>														
2.2 Altered drainage/river channel												O		
<b>4. Industrial, port &amp; related development</b>														
4.2 Fishing harbour		O												
4.3 Slipway		O												
4.4 Pier		O					O			O				
4.5 Manufacturing industries												O		
4.7 Ship & boat building/repair		O												
<b>6. Pollution</b>														
6.1 Domestic & urban waste water								O		O		O		
6.2 Industrial								H						
6.3 Landfill	H													
6.4 Agricultural & forestry effluents	O											O		
6.7 Solid waste incl. fly-tipping				O		O	O	O		O	O	O		
<b>7. Sediment extraction (marine &amp; terrestrial)</b>														
7.1 Channel dredging (maintenance & navigation)		H												
7.2 Quarrying						H								
7.3 Sand and gravel extraction							H							
<b>8. Transport &amp; communications</b>														
8.2 Flight path		O												

Activity/Event	OL568	OL582	OL583	OL585	OL586	OL587	OL589	OL590	OL591	OL592	OL593	OL595	OL601	OL602
8.3 Bridges & aqueducts						○	○	○	○	○	○	○		
8.4 Tunnel														
8.5 Roads		○	○	○		○	○	○	○	○	○	○	○	○
8.6 Car parks		○								○				
8.8 Rail lines						○	○		○	○	○			
8.9 Cables - suspended						○		○						
<b>9. Urbanisation</b>														
9.1 Urbanised areas, housing		○				○			○	○				
9.2 Commercial & industrial areas		○												
9.3 Hotel & leisure complex		H												
<b>12. Tourism &amp; recreation</b>														
12.1 Marinas		○												
12.2 Non-marina moorings		○					○	○						
12.8 Sailing		○												
12.9 Sailboarding & wind-surfing			○											
12.13 Rowing		○												
12.14 Tourist boat trips														
12.15 Angling		○												
12.18 Walking, incl. dog walking		○												
12.19 Birdwatching			○	○		○	○	○	○	○	○	○		
12.22 Motorised vehicles		○										○		
<b>13. Wildfowl &amp; hunting</b>														
13.1 Wildfowling	○				○	○	○	H	○	H	H	H		
<b>15. Fisheries &amp; Aquaculture</b>														
15.1 Professional passive fishing	U	U	U			U	U	U	U	U	U			
15.2 Professional active fishing	U	U	U			U	U	U	U	U	U			
<b>16. Agriculture &amp; forestry</b>														

Activity/Event	0L568	0L582	0L583	0L585	0L586	0L587	0L589	0L590	0L591	0L592	0L593	0L595	0L601	0L602
16.1 Saltmarsh grazing/harvesting	O													
16.2 Grazing: intensive (terrestrial)	O					H						O		
16.3 Grazing: non-intensive (terrestrial)	O				O	O	H							
16.5 Stock feeding						O								
16.6 Crop production: intensive						H								
16.8 Abandonment of crop production						O	H							
16.9 Removal of hedges, scrub	H													
16.11 Abandonment of mowing						O								
16.12 Polderisation						H								
16.14 In-filling (e.g. ditches, ponds, marshes)								O						
<b>18. Wildlife habitat management</b>														
18.2 Habitat creation & restoration - intertidal							H		H					
<b>19. Natural events</b>														
19.1 Storms, floods and storm surges			O				O	O	O	O	O	O		
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O	O	O	O	O	O

## APPENDIX 11

### Disturbance Assessment

#### Scoring system - definitions & rationale

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

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

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

#### Scoring system – worked example

Disturbance event – humans walking along a beach; the beach is a popular recreational area and this activity was recorded frequently during surveys.		
Attribute	Score	Rationale
Frequency/Duration	2	Recorded frequently during the survey period; known area of beach recreation.
Intensity	2	Medium level - considered likely to result in waterbirds moving away from the source of disturbance although response will be species-specific and some species may even habituate to the activity.
Response	2	Most birds are displaced for short periods and therefore will resume their previous behaviour in the area when the activity ceases.
<b>TOTAL SCORE</b>	<b>6</b>	<b>MODERATE</b>

Results - based on records from the 2010/11 Waterbird Survey Programme.

( - indicates that the activity was recorded but was not observed to cause disturbance to waterbirds )

Activity/Event	OL453	OL469	OL479	OL483	OL486	OL487	OL491	OL510	OL512	OL517	OL520	OL521	OL525	OL527	OL528	OL529	OL533	OL535	OL536
<b>8. Transport &amp; communications</b>																			
8.2 Aircraft													4						
<b>12. Tourism &amp; recreation</b>																			
12.6 Power boating & water-skiing					-														5
12.18 Walking, incl. dog walking	5	4	4		4	4			5	4	5	5					5	4	
12.22 Motorised vehicles				-	-											5			
12.27 Other							4				4								
<b>13. Wildfowl &amp; hunting</b>																			
13.2 Shooting (other)			-						-										
<b>14. Bait-collecting</b>																			
14.1 Digging for lugworms/ragworms	4			-					-					4		4			
<b>15. Fisheries &amp; Aquaculture</b>																			
15.6 Molluscs - hand-gathering							-	-											
15.9 Intertidal aquaculture																			

Activity/Event	OL537	OL538	OL542	OL543	OL546	OL547	OL548	OL552	OL557	OL558	OL559	OL560	OL562	OL563	OL564	OL567	OL582	OL585
<b>8. Transport &amp; communications</b>																		
8.2 Aircraft																		
<b>12. Tourism &amp; recreation</b>																		
12.6 Power boating & water-skiing								-										
12.18 Walking, incl. dog walking	4	4	4	4	4		4	-	4	4		4				4	-	
12.22 Motorised vehicles	4		-						-									-
12.27 Other																		
<b>13. Wildfowl &amp; hunting</b>																		
13.2 Shooting (other)																		
<b>14. Bait-collecting</b>																		
14.1 Digging for lugworms/ragworms											4			-				
<b>15. Fisheries &amp; Aquaculture</b>																		
15.6 Molluscs - hand-gathering											4		4		-			
15.9 Intertidal aquaculture						6												