Clonakilty Bay
Special Protection Area

(Site Code 4081)

≡

Conservation Objectives Supporting Document

VERSION 1

National Parks & Wildlife Service

October 2014

TABLE OF CONTENTS

SUMMARY

PART ONE - INTRODUCTION 1

1.1 Introduction to the designation of Special Protection Areas 1
1.2 Introduction to Clonakilty Bay Special Protection Area 2
1.3 Introduction to Conservation Objectives 2

PART TWO – SITE DESIGNATION INFORMATION 4

2.1 Special Conservation Interests of Clonakilty Bay Special Protection Area 4

PART THREE – CONSERVATION OBJECTIVES FOR CLONAKILTY BAY SPA 6

3.1 Conservation Objectives for the non-breeding Special Conservation Interests of Clonakilty Bay SPA 6

PART FOUR – REVIEW OF THE CONSERVATION CONDITION OF WATERBIRD SPECIAL CONSERVATION INTERESTS 10

4.1 Population data for waterbird SCI species of Clonakilty Bay SPA 10
4.2 Waterbird population trends for Clonakilty Bay SPA 11
4.3 Clonakilty Bay SPA – site conservation condition of waterbird SCI species 12

PART FIVE – SUPPORTING INFORMATION 14

5.1 Introduction 14
5.2 Waterbird species – Ecological characteristics, requirements and specialities – summary information 14
5.3 The 2010/11 waterbird survey programme 18
5.3.1 Introduction 18
5.3.2 Waterbird data, analyses and presentation 18
5.3.3 Summary Results 20
5.3.4 Waterbird distribution 22
5.4 Clonakilty Bay - Activities and Events 34
5.4.1 Introduction 34
5.4.2 Assessment Methods 34
5.4.3 Overview of activities at Clonakilty Bay 35
5.4.4 Disturbance Assessment 39
5.4.5 Discussion 41

REFERENCES 43

APPENDIX 1 47
APPENDIX 2 49
APPENDIX 3 50
APPENDIX 4 52
APPENDIX 5 54
APPENDIX 6 55
APPENDIX 7 58
APPENDIX 8 63
APPENDIX 9 65
APPENDIX 10 71

SUMMARY

This document presents conservation objectives for the non-breeding Special Conservation Interests of Clonakilty Bay 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 Clonakilty Bay Special Protection Area, as well as introducing the concept of conservation objectives and their formulation.

Part Two provides site designation information for Clonakilty Bay 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 Clonakilty Bay Special Protection Area

Clonakilty Bay, which is located in west County Cork, is a wetland complex that stretches from the town of Clonakilty to the open sea. It comprises two small estuarine bays, Clonakilty Estuary and Inchydoney Estuary (also known as Muckruss Strand) that are separated by Inchydoney Island and a section of empoldered land called Island Strand Intake.

The main channel of Clonakilty Estuary is formed by the Fealge River but several small rivers also flow into the site.

At low tide, substantial areas of sand and mud flats are exposed. The construction of a causeway across the inner part of Inchydoney Estuary has created an extensive wetland complex known as Clogheen Marsh. In addition to its botanical interest, this marsh provides foraging and roosting opportunities for various waterbird species. There is further lagoon and associated habitat to the north of Clogheen, in an area known as White's Marsh. In addition, the creation of a causeway to private property on Inchydoney Island in the south of Clonakilty Estuary has resulted in a brackish pool known locally as cul-de-sac pool which is flanked by woodland that supports a breeding colony of Little Egrets and Grey Herons.

The SPA also includes a well-developed sand dune system at Inchydoney, with embryonic dunes, marram dunes and fixed dunes all represented. These dune habitats, as well as the intertidal sand and mud flats, are habitats listed on Annex I of the E.U. Habitats Directive and are habitats for which an overlapping Special Area of Conservation is selected.

The site is selected for supporting internationally important numbers of Black-tailed Godwit and nationally important numbers of Shelduck, Dunlin and Curlew, as well as an assemblage of over-wintering waterbirds.

The Site Synopsis for Clonakilty Bay 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[1].

Where relevant, conservation objectives are defined for attributes[2] relating to non-breeding 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 Clonakilty Bay Special Protection Area).

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

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

PART TWO – SITE DESIGNATION INFORMATION

2.1 Special Conservation Interests of Clonakilty Bay Special Protection Area

The **Special Conservation Interest species**[3] for Clonakilty Bay SPA are listed below and summarised in Table 2.1. This table also shows the importance of Clonakilty Bay SPA for these SCI species, relative to the importance of other sites within Ireland, within the South West region[4] and within County Cork.

The Special Conservation Interests listed for Clonakilty Bay SPA are as follows:-

1. During winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorma tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1998/99) was 156 individuals.

2. 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 – 1998/99) was 1,172 individuals.

3. 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 – 1998/99) was 874 individuals.

4. 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 – 1998/99) was 599 individuals.

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

[3] Special Conservation Interest species are listed in taxonomic order.

[4] '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.

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

Special Conservation Interests	Annex I species	Baseline Population[a]	Population status at baseline	National Importance Rank[1]	Regional Importance Rank[2]	County Importance Rank[3]
Shelduck (*Tadorna tadorna*)	-	156	All-Ireland Importance	17	4	2
Dunlin (*Calidris alpina*)	-	1,172	All-Ireland Importance	24	6	3
Black-tailed Godwit (*Limosa limosa*)	-	874	International Importance	6	3	3
Curlew (*Numenius arquata*)	-	599	All-Ireland Importance	14	7	6
Other conservation designations associated with the site[b]	**SAC**	**RAMSAR SITE**	**IMPORTANT BIRD AREA (IBA)**	**WILDFOWL SANCTUARY**	**OTHER**	**OTHER**
	SAC 00091	Yes	Yes		pNHA	

[a] Baseline data are the 4-year mean peak counts for the period 1995/96 – 1998/99 (I-WeBS).
[b] Note that other designations associated with Clonakilty Bay may relate to different areas and/or some of these areas may extend outside the SPA boundary.
[1] National importance rank – the number given relates to the importance of the site for the non-breeding populations of the SCI species during the baseline period (1995/96 – 1999/00) relative to other sites in Ireland.
[2] Regional importance rank - the number given relates to the importance of the site for the non-breeding 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.
[3] 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 CLONAKILTY BAY SPA

3.1 Conservation Objectives for the non-breeding Special Conservation Interests of Clonakilty Bay SPA

The overarching Conservation Objective for Clonakilty Bay 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 Clonakilty Bay 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 Clonakilty Bay SPA.*

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

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

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

Factors that can adversely 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).

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

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

[7] Waterbird distribution from the 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 Clonakilty Bay 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 **508 ha**, other than that occurring from natural patterns of variation.

The boundary of Clonakilty Bay 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 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 Clonakilty Bay SPA this broad category is estimated to be **67 ha**. Subtidal areas are continuously available for benthic and surface feeding waterfowl and piscivorous/other waterbirds. Various waterbirds roost in subtidal areas.

The intertidal area is defined, in this context, as the area contained between the mean high water mark and the mean low water mark. For Clonakilty Bay SPA this is estimated to be **325 ha**. When exposed or partially exposed by the tide, intertidal habitats provide important foraging areas for many species of waterbirds, especially wading birds, as well as providing roosting/loafing[8] areas. When the intertidal area is inundated by the tide it becomes available for benthic and surface feeding ducks and piscivorous/other waterbirds. During this tidal state this area can be used by various waterbirds as a loafing/roosting resource.

The supratidal category refers to areas that are not frequently inundated by the tide (i.e. occurring above the mean high watermark) but contain shoreline and coastal habitats and can be regarded as an integral part of the shoreline. For Clonakilty Bay SPA this is estimated to be **39 ha**. Supratidal areas are used by a range of waterbird species as a roosting resource as well as providing feeding opportunities for some species.

The category known as 'lagoon and associated habitats' in this context refers to lagoons and freshwater/brackish lakes and their associated wetland habitats. For Clonakilty Bay SPA this habitat category is estimated to be **77 ha**.

[8] 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 Clonakilty Bay SPA.

Objective 1: *To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Clonakilty Bay SPA, which is defined by the following list of attributes and targets:*				
Parameter	**Attribute**	**Measure**	**Target**	**Notes**
Population	Population trend	Percentage change as per population trend assessment using waterbird count data collected through the Irish Wetland Bird Survey and other surveys.	The long term population trend should be stable or increasing	Waterbird population trends are presented in Part Four of this document.
Range	Distribution	Range, timing 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.
Objective 2: *To maintain the favourable conservation condition of the wetland habitat at Clonakilty Bay SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attributes and targets:*				
Parameter	**Attribute**	**Measure**	**Target**	**Notes**
Area	Wetland habitat	Area (ha)	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 508 ha, other than that occurring from natural patterns of variation.	The wetland habitat area was estimated as 508 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 Clonakilty Bay SPA

Non-breeding waterbirds are counted at Clonakilty Bay each winter as part of the Irish Wetland Bird Survey (I-WeBS). The dataset spans the period 1995/96 to 2012/13 although count coverage has been variable across this time period with incomplete data for some seasons (notably 1999/00, 2002/03 and 2003/04). In recent seasons, count coverage has increased to the maximum seven counts per season. During counts the site is subdivided into count subsites covering Clonakilty Estuary, Inchydoney Estuary, Clogheen Marsh and White's Marsh.

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[9]. 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[10] data for the non-breeding waterbird SCI species of Clonakilty Bay. Annual maxima were identified and used to calculate a mean peak for each species. The baseline period was 1995/96 – 1998/99 (four-year mean) while the recent average relates to the five-year period 2008/09 – 2012/13. 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 indicates where the numbers shown surpass the threshold for all-Ireland or international 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.

[9] 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).

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

Table 4.1 Population data for non-breeding waterbird Special Conservation Interest Species of Clonakilty Bay SPA

Site Special Conservation Interests (SCIs)	Baseline Period[1] (1995/96 – 1998/99)	Recent Site Data[2] (2008/09 – 2012/13)
Shelduck (*Tadorna tadorna*)	156 (n)	77
Dunlin (*Calidris alpina*)	1,172 (n)	882 (n)
Black-tailed Godwit (*Limosa limosa*)	874 (i)	988 (i)
Curlew (*Numenius arquata*)	599 (n)	366 (n)

[1]Baseline data is the 4-year mean peak for the period 1995/96 – 1998/99;
[2]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 Clonakilty Bay 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 Clonakilty Bay however, low count coverage during I-WeBS in some seasons precludes the use of this analysis process. 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 recent peak mean as shown in Table 4.1. The results (% change) are shown in Table 4.2.

Table 4.2 Site Population trends – comparison of five-years means

Site Special Conservation Interests (SCIs)	Trend*
Shelduck (*Tadorna tadorna*)	- 51
Dunlin (*Calidris alpina*)	- 25
Black-tailed Godwit (*Limosa limosa*)	+ 13
Curlew (*Numenius arquata*)	- 39

*Site population change based on comparison of a four and five-year mean (1995/96 – 1998/99 and 2008/09 – 2012/13).

Explanatory notes are given below to aid the interpretation of trends. Site trends are compared with national trends (Boland & Crowe, 2012[11]); all-Ireland trends (Crowe & Holt, 2013), and British trends (Holt et al. 2012).

Shelduck – numbers of Shelduck at Clonakilty Bay have declined over the long-term. Recent annual peak counts for this species rarely exceed 100 individuals; contrasting with annual peaks during the baseline period that were over 100 individuals in every season. Nationally, numbers of Shelduck have shown a slight but steady decline since the mid 1990's, consistent with the trend observed in Britain. The all- Ireland trend is currently stable.

[11] National trends presented in Boland & Crowe (2012) update those previously shown in Crowe (2005).

Dunlin – the observed trend for decline is consistent with the national trend. A marked decline in numbers of Dunlin across Irish wintering sites is evident (Boland & Crowe, 2012) with a similar and consistent trend for decline observed in Britain and Northern Ireland.

Black-tailed Godwit – the trend for increasing numbers at Clonakilty Bay is consistent with the national and all-Ireland trends and that observed in the UK.

Curlew – the trend for decline observed at Clonakilty Bay is consistent with the national trend where numbers have declined throughout I-WeBS by an average *c.*3% per year. In Britain, numbers of Curlew increased from the 1970's until the start of the 2000's but have since steadily declined.

4.3 Clonakilty Bay SPA – site conservation condition of waterbird SCI species

Conservation condition of SCI species was determined using a species site trend and therefore relates to Conservation Objective 1 (population trend) only[12]. Conservation condition was 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 four waterbird species of Special Conservation Interest listed for Clonakilty Bay SPA, and based on the population trend for the site, it has been determined that (Table 4.3):-

1. 1 species is currently considered as **Highly Unfavourable** (Shelduck);
2. 2 species are currently considered as **Unfavourable** (Dunlin and Curlew);
3. 1 species is currently considered as **Favourable** (Black-tailed Godwit).

Site conservation condition and population trends were also reviewed in light of species' all-Ireland and international trends (Table 4.3). All-Ireland tends follow Crowe & Holt (2013) while International trends follow Wetlands International (2012).

[12] Conservation condition in relation to Objective 1 (range, timing or intensity of use of areas by SCI species) has yet to be assigned.

Table 4.3 SCI species of Clonakilty Bay SPA – Current Site Conservation Condition

Special Conservation Interests	BoCCI Category[a]	Site Population Trend[b]	Site Conservation Condition	Current All-Ireland Trend[c]	Current International Trend[d]
Shelduck	Amber	- 51	Highly Unfavourable	Stable	Stable
Dunlin	Red	- 25	Unfavourable	Declining	Stable
Black-tailed Godwit	Amber	+ 13	Favourable	Increasing	Increasing
Curlew	Red	- 39	Unfavourable	Declining	Declining

[a]After Colhoun & Cummins, 2013; [b] Site population trend analysis; see Table 4.2; [c]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); [d] current international trend after Wetlands International, 2012.

Table 4.3 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:-

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

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

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 Clonakilty Bay SPA.

Section 5.2 provides selected ecological summary information for non-breeding waterbirds of Clonakilty Bay. 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 Clonakilty Bay 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 May 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 1995/96 – 2012/13, the I-WeBS database shows a total of 59 waterbird species that have been recorded at Clonakilty Bay. 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[13] or species that use the site at certain times only (e.g. as a cold weather refuge).

During the I-WeBS period 1995/96 – 2012/13, 20 waterbird species occurred on a regular basis[14] at Clonakilty Bay in addition to the four listed SCI species. These additional regularly-occurring species are listed in Table 5.1.

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

[14] Regular is defined as a species that has occurred in 12 out of the 15-year data period (the seasons 1999/00, 2002/03 and 2003/04 not included).

Table 5.1 Regularly-occurring non SCI waterbird species of Clonakilty Bay during the non-breeding season

Species*	Baseline Data Period[1] (1995/96 – 1998/99)	Recent Site Average[2] (2008/09 – 2012/13)
Mute Swan (*Cygnus olor*)	53	46
Wigeon (*Anas penelope*)	487	525
Teal (*Anas crecca*)	216	164
Mallard (*Anas platyrhynchos*)	93	135
Red-breasted Merganser (*Mergus serrator*)	10	9
Little Grebe (*Tachybaptus ruficollis*)	2	13
Cormorant (*Phalacrocorax carbo*)	13	22
Grey Heron (*Ardea cinerea*)	14	7
Little Egret (*Egretta garzetta*)	5	19
Moorhen (*Gallinula chloropus*)	3	5
Oystercatcher (*Haematopus ostralegus*)	316	329
Ringed Plover (*Charadrius hiaticula*)	103	115 (n)
Golden Plover (*Pluvialis apricaria*)	857	1,464 (n)
Grey Plover (*Pluvialis squatarola*)	61	25
Lapwing (*Vanellus vanellus*)	1,658	671
Knot (*Calidris canutus*)	166	448 (n)
Snipe (*Gallinago gallinago*)	10	29
Bar-tailed Godwit (*Limosa lapponica*)	79	40
Greenshank (*Tringa nebularia*)	33	26 (n)
Redshank (*Tringa totanus*)	252	294
Turnstone (*Arenaria interpres*)	38	41

Grey shading denotes an Annex I species; (n) = numbers of all-Ireland importance (thresholds are presented within Crowe et al. (2008) and Crowe & Holt (2013) for the baseline and recent site data respectively).
[1] Baseline data is the 4-year mean peak for the period 1995/96 – 1998/99 (I-WeBS); [2]recent data is the 5-year mean peak for the period 2008/09 – 2012/13 (I-WeBS).
* Note that gull species have not been routinely counted at this site.

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 Clonakilty Bay SPA. Information is provided for the following categories[15]:-

- 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).

[15] 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 Waterbirds – Ecological characteristics, requirements & specialities

Special Conservation Interests	Family (group)	Winter distribution[A]	Trophic Guild[B]	Food/Prey Requirements[C]	Principal supporting habitat within site[D]	Ability to utilise other/alternative habitats[E]	Site Fidelity[F]
Shelduck *Tadorna tadorna*	Anatidae (shelducks)	Localised	1, 5	Wide	Intertidal mud and sand flats	3	High
Dunlin *Calidris alpina*	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	3	High
Black-tailed Godwit *Limosa limosa*	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	High
Curlew *Numenius arquata*	Scolopacidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	High

[A] Winter distribution: Very widespread (>300 sites); Widespread (200 – 300 sites); Intermediate (100 – 200 sites); Localised (50-100 sites); Highly restricted (<50 sites) (based on Boland & Crowe, 2012).
[B] Waterbird foraging guilds. 1 = Surface swimmer, 2 = water column diver (shallow), 3 = water column diver (deeper), 4/5 = intertidal walker (out of water), 6 = intertidal walker (in water), 7 = terrestrial walker. Further details are given within Appendix 5.
[C] Food/prey requirements - species with a wide prey/food range; species with a narrower prey range (e.g. species that forage upon a few species/taxa only), and species with highly specialised foraging requirements (e.g. piscivores).
[D] Principal supporting habitat present within Clonakilty Bay (main habitat used when foraging).
[E] Ability to utilise alternative habitats refers to the species ability to utilise other habitats adjacent to the site. 1 = wide-ranging species with requirement to utilise the site as and when required; 2 = reliant on site but highly likely to utilise alternative habitats at certain times (e.g. high tide); 3 = considered totally reliant on wetland habitats due to unsuitable surrounding habitats and/or species limited habitat requirements.
[F] Site fidelity on non-breeding grounds: Unknown; Weak; Moderate; or High (based on published literature).

5.3 The 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.

At Clonakilty Bay, a standard survey programme of four low tide counts (October, November and December 2010 and February 2011) and one high tide count (January 2011) were undertaken.[16] Waterbirds were counted within a series of 17 count subsites (refer to Appendix 6). It should be noted that the 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 grave/pebbles or shingle and gravel shores.
Subtidal (area that lies below mean low water)	Refers to areas that are covered by seawater during counts. During low-tide counts it will include offshore water, tidal channels and creeks as well as tidal rivers.
Supratidal	This category pertains to the shore area and habitats immediately marginal to and above the mean high-water mark. The supratidal section is an integral part of the shoreline. This broad habitat also includes areas of saltmarsh where the saltmarsh is contiguous with coastal habitats lying above. Note that patches of lower saltmarsh (e.g. *Spartina* sp.) surrounded by intertidal flats, were included in the intertidal category.
Terrestrial	Used where birds were recorded within habitats close to the shoreline but were above the intertidal and supratidal levels. The terrestrial category was also used for non-tidal waterbodies such as lagoons and lakes.

In addition to the main survey programme described above, two high tide roost surveys were undertaken on 03/11/10 and 16/02/11 to reflect neap and spring tides. During these surveys 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 Clonakilty Bay 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.

[16] Low tide counts on 09/10/10, 10/11/10, 09/12/10 & 08/02/11 plus a high tide count on 16/01/11.

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[17] 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.

Notes on data interpretation and methodological limitations

Weather conditions during the winter of 2010/11 proved extremely challenging for fieldworkers, December 2010 being the coldest on record (Met Éireann, 2010). 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).

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

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 44 waterbird species were recorded during the 2010/11 survey programme at Clonakilty Bay. Cummins and Crowe (2011) provide a summary of waterbird data collected. Note that the total count area and SPA area are not exactly coincident; a map showing count subsites is provided in Appendix 6.

All four SCI species were recorded within all counts of the main survey programme. Table 5.4 shows peak numbers (whole site) 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 76% (Curlew) to 19% (Shelduck); with three of the SCI species occurring on average, in over half of the count subsites.

Average percentage area occupancy is defined as the average proportion of the whole site area that a species occurred in during low tide counts. Although this is a broad calculation across all habitat zones it presents some indication of the range of a species across the site as a whole. The Curlew was the most widespread species followed by the Black-tailed Godwit, with Shelduck occurring, on average, in only 14% of the total count area (Table 5.4).

Table 5.4 Clonakilty Bay 2010/2011 waterbird surveys – summary data

Site Special Conservation Interests (SCIs)	Peak number - LT surveys[I]	Peak number - HT survey[II]	Average subsite % occupancy [III]	Average % area occupancy [III]
Shelduck (*Tadorna tadorna*)	97	56	19 (7)	14 (4)
Dunlin (*Calidris alpina*)	1,006 (n)	1,081 (n)	53 (14)	46 (12)
Black-tailed Godwit (*Limosa limosa*)	761 (i)	481 (n)	60 (7)	52 (4)
Curlew (*Numenius arquata*)	399 (n)	545 (n)	76 (5)	72 (11)

(i) denotes numbers of international importance (after Wetlands International, 2012); (n) denotes numbers of all-Ireland importance (after Crowe & Holt, 2013);
[I] 4 low-tide counts undertaken on 09/10/10, 10/11/10, 09/12/10 & 08/02/11; [II] High-tide count undertaken on 16/01/11;
[III] Mean (± s.d.) averaged across the four low tide surveys.

Whole site species richness (total number of species) ranged between 32 species and 34 species during low tide surveys and 33 species were recorded during the high tide survey on 16/01/11.

During low tide surveys, 12 subsites supported, on average ten or more species. Average subsite species richness ranged from three species (0L502 and 0L504) to 22 species (0L507 Ring Harbour). 15 out of the total 17 subsites recorded a greater number of species during low tide surveys, as opposed to the high tide survey (Table 5.5).

Table 5.5 Subsite species richness

Subsite Code	Subsite Name	Mean (±S.D) LT Survey	HT Survey	Peak Overall (H/L)
0L447	Deasys Quay	15 (2)	8	17 (L)
0L448	Desert North	10 (2)	0	12 (L)
0L449	Desert South	13 (6)	3	17 (L)
0L450	Youghals House	11 (2)	1	13 (L)
0L451	Muckruss Head	5 (4)	3	10 (L)
0L462	East Muckruss.Strand	14 (5)	13	18 (L)
0L465	West Muckruss Strand	12 (2)	8	14 (L)
0L500	Causeway	18 (2)	11	20 (L)
0L501	Island Strand Intake	6 (2)	3	7 (L)
0L502	Clogheen Strand Intake	3 (1)	10	10 (H)
0L503	Inchidoney Island	12 (1)	5	13 (L)
0L504	Inchidoney House	3 (3)	10	10 (H)
0L505	Youghals SE	12 (4)	5	16 (L)
0L506	Ring Quay	17 (4)	17	23 (L)
0L507	Ring Harbour	22 (1)	15	23 (L)
0L508	Ring Head	8 (2)	0	10 (L)
0L509	Desert Church	12 (3)	2	17 (L)

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. Species are listed by their waterbird codes and a full list of these is given in Appendix 4.

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

Table 5.6 (a) Clonakilty Bay 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	DN	BW	CU
0L447		H	M	M
0L448	M	M	M	H
0L449		H	H	H
0L450	L	M	H	H
0L451				
0L462		L	L	M
0L465	M	V	H	V
0L500	V	H	V	V
0L501			L	M
0L502			V	H
0L503	V	V	H	H
0L504				
0L505	H	H	H	M
0L506		V	V	V
0L507		M	H	V
0L508				H
0L509	M	M	M	M

Table 5.6 (b) Clonakilty Bay Subsite assessment – highest rank obtained during the high tide survey

Species ► Subsites ▼	SU	DN	BW	CU
0L447		4	5	6
0L448				
0L449				
0L450				
0L451				
0L462			5	5
0L465	2	1	4	
0L500	4	3	3	4
0L501				
0L502		2	2	2
0L503				
0L504			5	
0L505	2			
0L506	1		1	1
0L507				3
0L508				
0L509				

Table 5.6 (c) Clonakilty Bay Subsite assessment – total numbers foraging intertidally
(L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods)

Species ► Subsites ▼	SU	DN	BW	CU
0L447		H	M	M
0L448	M	M	H	M
0L449		M	M	H
0L450	L	M	H	H
0L451				
0L462		L	L	M
0L465	M	V	H	H
0L500	V	H	V	V
0L501				
0L502				
0L503	V	V	H	V
0L504				
0L505	H	H	H	H
0L506		V	V	V
0L507		M	M	H
0L508				
0L509	M	M	V	M

Table 5.6 (d) Clonakilty Bay Subsite assessment – ranked peak low tide intertidal foraging densities - LT surveys

Species ► Subsites ▼	SU	DN	BW	CU
0L447		1	9	1
0L448	1	3	1	7
0L449		7	4	5
0L450	5	10	2	2
0L451				
0L462		12	12	12
0L465	7	5	6	11
0L500	6	4	5	3
0L501				
0L502				
0L503	2	2	3	4
0L504				
0L505	4	6	8	9
0L506		9	7	10
0L507		11	11	8
0L508				
0L509	3	8	10	6

Table 5.6 (e) Clonakilty Bay Subsite assessment – total numbers (roosting/other behaviour) during LT surveys, intertidal[I] and subtidal[II] (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods).

Species ► Subsites ▼	SU[II]	DN[I]	BW[I]	CU[I]
0L447		H	M	M
0L448				V
0L449		V	H	H
0L450			V	
0L451				
0L462			L	M
0L465			M	M
0L500		V	V	H
0L501				
0L502				
0L503			V	
0L504				
0L505				
0L506				V
0L507			V	V
0L508				
0L509	V		H	

Table 5.6 (f) Clonakilty Bay Subsite assessment – highest rank obtained (roosting/other behaviour) during the HT survey (Intertidal[I], Subtidal[II])

Species ► Subsites ▼	SU[II]	DN[I]	BW[I]	CU[I]
0L447		*not recorded*		
0L448				
0L449				
0L450				
0L451				
0L462				
0L465	2			
0L500	1		1	2
0L501				
0L502				
0L503				
0L504				
0L505				
0L506			2	3
0L507				1
0L508				
0L509				

Clonakilty Bay - 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 MERC (2012) and NPWS (2014).

'I-WeBS' refers to count data recorded at Clonakilty Bay 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 were low during the first three low tide surveys (maximum 15 individuals on 10/11/10), and peaked at 97 individuals on 08/02/11. 56 Shelduck were counted during the high tide survey (16/01/11). No count surpassed the threshold of all-Ireland importance.

Shelduck were recorded in eight subsites overall (0L448, 0L450, 0L465, 0L500, 0L503, 0L505, 0L506 and 0L509). Two subsites recorded the species during three low tide surveys: 0L500 (Causeway) and 0L505 (Youghals SE). 0L500 (Causeway) held peak numbers on 10/11/10 and 09/12/10 and 0L503 (Inchidoney Island) held peak numbers on 09/10/10 and 08/02/11. 0L505 (Youghals SE) held numbers ranked as second highest during three low tide surveys. The subsite peak count of 45 individuals was recorded for 0L505 (Youghals SE) on 08/02/11.

Recent low tide surveys carried out by NPWS Regional Staff recorded site peak counts of 46 (2011-12), 85 (2012-13) and 60 Shelduck (2013-14).

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 (Thompson, 1981). They can therefore forage throughout the tidal cycle. While the mud snail *Peringia* (*Hydrobia*) *ulvae* is considered a favoured prey of Shelduck (Olney, 1965, Bryant & Leng, 1975; Vian et al. 2011), Shelducks take a variety of small invertebrates.

Shelducks were recorded foraging intertidally at Clonakilty Bay. Seven subsites were utilised (0L448, 0L450, 0L465, 0L500, 0L503, 0L505 and 0L509) but a distinct preference was evident; 0L500 (Causeway) and 0L503 (Inchidoney Island) holding peak numbers, while 0L505 (Youghals SE) held numbers ranked as second highest during three low tide surveys.

The interdidal benthic community of Clonakilty Bay has been classified as the single broad benthic habitat 'sand to sandy mud with *Tubificoides benedii* and *Peringia* (*Hydrobia*) *ulvae*'. While the sediment ranges from sand to sandy mud, areas with a higher proportion of silt-clay (mud) occur in the south west of Inchydoney Estuary and along the western shore of Clonakilty Estuary. *P. ulvae* generally occurs in low abundances but, based on the samples taken, is locally abundant in muddier areas such as the southwest shore of both Clonakilty Harbour and Muckruss Strand (relating to subsites 0L500, 0L503 and 0L505).

The peak intertidal foraging density was recorded for 0L448 (Desert North) and 0L503 (Inchidoney Island) (2 Shelduck ha^{-1}). No other subsite recorded a density of greater than 2 Shelduck ha^{-1}. The average whole site foraging density was 0.1 individuals ha^{-1}.

Recent low tide surveys carried out by NPWS Regional Staff recorded peak numbers of foraging Shelduck within 0L503 and 0L505 (2011-12), 0L503 (2012-13) and 0L505 (2013-14); highly consistent with results of the 2010/11 Waterbird Survey Programme.

Roosting Distribution

Shelduck were not recorded in roosting/other behaviour during low tide surveys with the exception of one individual in 0L509 (Desert Church) on 10/11/10.

During the high tide survey, 44 Shelduck roosted intertidally in 0L509 (Desert Church) while a further five and two individuals were recorded in 0L465 (West Muckruss Strand) and 0L500 (Causeway). Just seven individuals roosted subtidally, five in 0L465 (West Muckruss Strand) and two in 0L500 (Causeway).

The November 2010 roost survey recorded only a single intertidal roost of five individuals within 0L507 (Ring Harbour); these birds positioned centrally upon the sandflats.

The February 2011 roost survey recorded a single subtidal roost of 82 individuals in 0L503 (Inchydoney Island).

Dunlin *Calidris alpina* - Family (group): Scolopacidae (wading birds)

The Dunlin is a Holarctic and highly migratory wader, breeding widely in Arctic zones across Europe, Asia and North America. The nominate form *alpina* breeds from northern Scandinavia eastwards across European Russia and western Siberia to 85^0 E (Delaney et al. 2009). This race migrates southwest to winter along the coasts of Western Europe, south to Iberia, western Mediterranean and beyond.

The majority of Dunlin wintering in Ireland are *C. a. alpina* that originate from the western part of their breeding range and moult mainly in the Wadden Sea before starting to arrive in Ireland during October (Crowe, 2005). Ireland has a small and declining breeding population of *Calidris alpina schinzii* which are believed to winter mainly in west Africa (Delaney et al. 2009).

Numbers

Low tide numbers of Dunlin rose each month to a low tide site peak count of 1,006 on 08/02/11. 1,081 Dunlin were counted during the high tide survey (16/01/11). All whole-site counts with the exception of October 2010 exceeded the threshold of all-Ireland importance.

Dunlin were recorded within 13 subsites during the survey programme (0L447, 0L448, 0L449, 0L450, 0L462, 0L465, 0L500, 0L502, 0L503, 0L505, 0L506, 0L507 and 0L509). Four subsites recorded this wader during all four low tide surveys: 0L447 (Deasy's Quay), 0L465 (West Muckruss Strand), 0L503 (Inchidoney Island) and 0L507 (Ring Harbour). Peak numbers during low tide surveys were held by 0L506 (Ring Quay), 0L465 (West Muckruss Strand), 0L503 (Inchidoney Island) and 0L503 for the four respective survey dates.

The low tide subsite peak count of 376 Dunlin was recorded for 0L503 on 08/02/11. However a higher subsite peak count was recorded by 0L465 (West Muckruss Strand) during the high tide survey (16/01/11) (605 Dunlin).

Recent low tide surveys carried out by NPWS Regional Staff recorded site peak counts of 1,390 (2011-12), 1,030 (2012-13) and 1,050 Dunlin (2013-14).

Foraging Distribution

The Dunlin diet is relatively wide (e.g. Hill et al. 1993; Santos et al. 2005) and may comprise polychaete worms (e.g. *Hediste diversicolor*), amphipod crustaceans and small bivalves (e.g. *Macoma balthica and Scrobicularia plana*) as well as isopods and insects. The Mud Snail *Peringia* (*Hydrobia*) *ulvae* has been shown to be favoured at some sites (Santos et al. 2005).

The majority of Dunlin were recorded foraging during both low and high tide surveys. Intertidally foraging Dunlin were recorded within 12 subsites during the survey programme (0L447, 0L448, 0L449, 0L450, 0L462, 0L465, 0L500, 0L503, 0L505, 0L506, 0L507 and 0L509).

During low tide surveys peak numbers were held by 0L506 (Ring Quay), 0L465 (West Muckruss Strand), 0L503 (Inchidoney Island) and 0L503 for the four respective survey dates. 0L465 (West Muckruss Strand) is notable for supporting the peak number of 605 foraging individuals during the high tide survey (16/01/11), peak numbers during one low tide survey, and numbers ranked in the top three in all other surveys. 0L500 (Causeway) was also of note for supporting numbers ranked in the top five during the three low tide surveys and numbers ranked as second highest during the high tide survey.

The interdidal benthic community of Clonakilty Bay has been classified as the single broad benthic habitat 'sand to sandy mud with *Tubificoides benedii* and *Peringia* (*Hydrobia*) *ulvae*'. While the sediment ranges from sand to sandy mud, areas with a higher proportion of silt-clay (mud) occur in the south west of Inchydoney Estuary and along the western shore of Clonakilty Estuary. The distinguishing species of this complex are the oligochaete *Tubificoides benedii*, the gastropod *Peringia* (*Hydrobia*) *ulvae*, the amphipods *Deshayesorchestia deshayesii* and *Talitrus saltator* and the polychaetes *Hediste diversicolor*, *Scoloplos* (*Scoloplos*) *armiger* and *Pygospio elegans*. *T. benedii* occurs throughout the complex in moderate to low abundances and is locally very abundant in the inner reaches of Clonakilty Estuary. The remaining distinguishing species are not uniformly distributed throughout the complex. *P. ulvae* generally occurs in low abundances; it is locally abundant in the southwest shore of both Clonakilty Estuary and Inchydoney Estuary. *H. diversicolor* is generally recorded in low abundances and is locally abundant in the inner reaches of Clonakilty Estuary.

The peak intertidal foraging density was recorded for 0L447 (Deasys Quay) (36 Dunlin ha^{-1}) relating to the very high number recorded there on 08/02/11. Other densities recorded within this subsite ranged from 2 – 5 Dunlin ha^{-1}. Other subsites of note were 0L448 (Desert North) and 0L503 (Inchidoney Island), both supporting over 10 Dunlin ha^{-1} on occasion. The whole site average intertidal foraging density was 2 Dunlin ha^{-1}.

Recent low tide surveys carried out by NPWS Regional Staff recorded peak numbers of foraging Dunlin within 0L447, 0L500 and 0L506 (2011-12), 0L465, 0L500 and 0L505 (2012-13) and 0L448, 0L465 and 0L505 (2013-14). Interestingly, 0L503, that held peak numbers during 2010/11, only recorded foraging Dunlin once in these more recent surveys although large numbers (>500) were recorded roosting intertidally during the low tide period.

A previous long-term study (2000/01 – 2010/11) of low tide distribution of waders at Clonakilty Estuary (not including Inchydoney Estuary) found that the peak mean densities of Dunlin were highest in subsite 0L447, and that this species has become more widespread in distribution over time with numbers increasing within the inner estuary and in subsite 0L503 in recent seasons (Lewis & Kelly, 2012). Mean and peak numbers were highest in subsites 0L505 and 0L503 in early seasons, while inner estuary sites 0L447 and 0L449 have held peak numbers in more recent seasons. Results from the 2010/11 Waterbird Survey Programme are therefore consistent with this study.

Roosting Distribution

Relatively few Dunlin were recorded in roosting/other behaviour during low tide surveys. Once-off records were made of roosting individuals in 0L447 (Deasys Quay), 0L449 (Desert South) and 0L500 (Causeway).

During the high tide survey (16/01/11) 17 individuals roosted intertidally within 0L447 (Deasys Quay), the majority of Dunlin during this survey recorded foraging.

The November 2010 roost survey recorded four roosting flocks of Dunlin within two subsites: 0L447 (three flocks) and 0L462 (one flock). The single roost in 0L462 held the largest numbers of birds (281) and these birds roosted upon a sandbank that remained exposed. The three roosts in 0L447 held two, 26 and 28 birds respectively, and the birds were roosting mainly terrestrially along the edge of the southern sea

walls.

The February 2011 roost survey recorded single roosts in four subsites: 0L447, 0L451, 0L507 and 0L508. The largest flock of 270 individuals roosted supratidally on rock along the southern shore of this subsite. One and four individuals respectively roosted supratidally in 0L508 and 0L447, while 15 individuals roosted intertidally on sand in 0L507.

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

Black-tailed Godwits *Limosa limosa* have a widespread Palearctic breeding distribution. Four populations are recognised – three populations of the nominate *L. l. limosa* and one *L. l. islandica*, the latter of which breeds almost exclusively in Iceland and winters in Britain, Ireland, Spain, Portugal and Morocco (Delaney et al. 1999). Recoveries and sightings confirm that Black-tailed Godwits wintering in Ireland are of the *islandica* race, whereas further south (e.g. Spain and Portugal) some mixing of *limosa and islandica* occurs in the non-breeding season (Wernham et al. 2002).

Numbers

Numbers of Black-tailed Godwits peaked in November 2010 when a site total count of 761 was recorded. Numbers dropped to 662 in December 2010 likely a result of the cold weather spell. 481 individuals were recorded during the high tide survey (16/01/11). All low tide counts with the exception of October 2010 exceeded the threshold for international importance.

Black-tailed Godwits were recorded in 15 subsites overall (0L447, 0L448, 0L449, 0L450, 0L462, 0L465, 0L500, 0L501, 0L502, 0L503, 0L504, 0L505, 0L506, 0L507 and 0L509). Six subsites recorded the species during all four low tide surveys: 0L447 (Deasy's Quay), 0L449 (Desert South), 0L450 (Youghals House), 0L465 (West Muckruss Strand), 0L500 (Causeway) and 0L507 (Ring Harbour).

0L502 (Clogheen Strand Intake) held peak numbers on 09/10/10, 0L500 (Causeway) on 10/11/10 and 09/12/10, and 0L506 (Ring Harbour) on 08/02/11 and during the high tide survey (16/01/11), the latter being the subsite peak count of 250 individuals. 0L503 (Inchidoney Island) was notable for supporting numbers ranked in the top three subsites during three low tide surveys.

Recent low tide surveys carried out by NPWS Regional Staff recorded site peak counts of 1,177 (2011-12), 1,511 (2012-13) and 1,065 (2013-14) Black-tailed Godwits.

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 12 subsites (0L447, 0L448, 0L449, 0L450, 0L462, 0L465, 0L500, 0L503, 0L505, 0L506, 0L507 and 0L509). Only 0L447 (Deasys Quay) and 0L465 (West Muckruss Strand) held foraging individuals in all four low tide surveys.

Peak numbers during low tide surveys were held by 0L509 (Desert Church), 0L500 (Causeway), 0L500 and 0L506 (Ring harbour) for the four respective survey dates. 0L465 (West Muckruss Strand) was notable for supporting numbers ranked third highest in three low tide surveys plus peak numbers during the high tide survey. 0L503 (Inchidoney Island) recorded foraging individuals on two occasions only but with numbers ranked as second highest.

The interdidal benthic community of Clonakilty Bay has been classified as the single broad benthic habitat 'sand to sandy mud with *Tubificoides benedii* and *Peringia* (*Hydrobia*) *ulvae*'. While the sediment ranges from sand to sandy mud, areas with a higher proportion of silt-clay (mud) occur in the south west of Inchydoney Estuary and along the western shore of Clonakilty Estuary. The distinguishing species of this complex are the oligochaete *Tubificoides benedii*, the gastropod *Peringia* (*Hydrobia*) *ulvae*, the amphipods *Deshayesorchestia deshayesii* and *Talitrus saltator* and the polychaetes *Hediste diversicolor*, *Scoloplos* (*Scoloplos*) *armiger* and *Pygospio elegans*. *T. benedii* occurs throughout the complex in moderate to low abundances and is locally very abundant in the inner reaches of Clonakilty Estuary. The remaining distinguishing species are not uniformly distributed throughout the complex. *P. ulvae* generally occurs in low abundances; it is locally abundant in the southwest shore of both Clonakilty Estuary and Inchydoney Estuary. *H. diversicolor* is generally recorded in low abundances and is locally abundant in the inner reaches of Clonakilty Estuary.

Terrestrial foraging was recorded in association with 0L447 (Deasys Quay), 0L465 (West Muckruss Strand) and 0L507 (Ring Harbour) when the birds foraged in fields adjacent to the SPA and outside of the SPA boundary. Terrestrial foraging was also recorded in 0L502 (Clogheen Strand Intake). Terrestrial foraging in fields outside of the SPA boundary is known to be a regular occurrence at this site.

The peak intertidal foraging density was 19 Black-tailed Godwits ha^{-1} recorded for 0L448 (Desert North) on 08/02/11. 0L450 (Youghals House) was notable for supporting densities of over 5 Black-tailed Godwits ha^{-1} on three low tide survey occasions, with a peak of 11 Black-tailed Godwits ha^{-1} recorded on 10/11/10. The whole site average intertidal foraging density was 1 Black-tailed Godwit ha^{-1}.

Recent low tide surveys carried out by NPWS Regional Staff recorded peak numbers of foraging Black-tailed Godwits within 0L449, 0L450 and 0L507 (2011-12), 0L448, 0L500 and 0L507 (2012-13) and 0L447, 0L465 and 0L500 (2013-14).

A previous long-term study (2000/01 – 2010/11) of low tide distribution of waders at Clonakilty Estuary (not including Inchydoney Estuary) found that Black-tailed Godwits were similarly widespread across the site when foraging and highest annual mean and peak numbers have occurred over time in a range of subsites including 0L447, 0L448, 0L449, 0L450, 0L509, 0L505 and 0L503. However the peak mean densities of Black-tailed Godwits were highest in inner estuary subsite 0L448, followed by 0L447; consistent with the results found during the 2010/11 Waterbird Survey Programme.

Roosting Distribution

Good numbers of Black-tailed Godwits were recorded roosting intertidally during low tide surveys and in ten subsites across the survey programme (0L447, 0L449, 0L450, 0L462, 0L465, 0L500, 0L503, 0L506, 0L507 and 0L509).

Peak numbers during low tide surveys were held by 0L503 (Inchidoney Island), 0L450 (Youghals House), 0L500 (Causeway) and 0L507 (Ring Harbour) for the four respective survey dates. 0L449 (Desert South) held individuals on two occasions ranked second and third highest during these surveys.

Black-tailed Godwits have long been known to position themselves alongside the river channel in inner Clonakilty Estuary to roost at low tide; a position that can span subsites 0L448 and 0L450 (Hutchinson & O'Halloran, 1994; Lewis & Kelly, 2012). While this roost did not feature

prominently in the results of the 2010/11 Waterbird Survey Programme, this may be due to the cold weather experienced that winter that saw numbers drop during December and likely lead to the observed higher proportions of foraging individuals.

During the high tide survey a total of 294 Black-tailed Godwits were recorded roosting intertidally. 85% of these were within 0L506 (Ring Quay), the remainder within 0L500 (Causeway). 155 Black-tailed Godwits roosted terrestrially within 0L502 (Clogheen Strand Intake) with low numbers in 0L504 (Inchydoney House); the latter however has been found to support high numbers on occasion during I-WeBS counts (L. J. Lewis. pers. obs.). In addition, and particularly during periods of high spring tides, good numbers of Black-tailed Godwits can be found in 0L502 (Clogheen Strand Intake) and alongside the lagoons (White's Marsh) in 0L501 (Island Strand Intake) (L. J. Lewis. pers. obs.).

The November 2010 roost survey recorded five roosting flocks in three subsites: 0L500, 0L506 and 0L507. The largest flock of 310 individuals roosted intertidally in 0L506; these birds positioned on sand in the south east of the subsite. 22 individuals roosted intertidally in 0L507; single birds also positioned supratidally near Ring Bridge. 41 Black-tailed Godwits roosted supratidally in 0L500; positioned on rock along the western causeway.

The February 2011 roost survey recorded four flocks of roosting birds in 0L501, 0L502 and 0L507. Largest numbers were in 0L507 where 70 birds roosted intertidally on sand and a further 145 roosted terrestrially on Inchydoney Island. 75 Black-tailed Godwits roosted terrestrially in 0L502 (Clogheen Strand Intake) while a further 23 roosted alongside the lagoons (White's Marsh) in 0L501 (Island Strand Intake).

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 a. 2002).

Numbers

Whole-site numbers of Curlew were variable and at their lowest during December 2010 (100 individuals) likely a result of the cold weather spell. Numbers rose however to the low tide peak count of 399 on 08/02/11 and 545 Curlew were recorded during the high tide survey (16/01/11). The final low tide count plus the high tide count exceeded the threshold of all-Ireland importance.

Curlews were widespread and occurred in all 15 subsites overall (all except 0L451 and 0L504). Ten subsites recorded the species during all four low tide surveys (0L447, 0L448, 0L449, 0L450, 0L500, 0L503, 0L505, 0L506, 0L507 and 0L509).

Peak numbers were recorded in 0L507 (Ring Harbour), 0L506 (Ring Quay), 0L500 (Causeway) and 0L465 (West Muckruss Strand) for the four respective low tide surveys. 0L507 (Ring Harbour) recorded the subsite peak count of 114 Curlew (09/10/10).

Recent low tide surveys carried out by NPWS Regional Staff recorded site peak counts of 480 (2011-12), 235 (2012-13) and 450 (2013-14) Curlew.

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.

Intertidally foraging Curlews were recorded in 12 subsites (0L447, 0L448, 0L449, 0L450, 0L462, 0L465, 0L500, 0L503, 0L505, 0L506, 0L507 and 0L509). Peak numbers were recorded for 0L506 (Ring Quay), 0L500 (Causeway), 0L500 and 0L503 (Inchidoney Island) for the four low tide survey dates. 0L507 (Ring Harbour) recorded numbers ranked in the top three on two survey occasions. 0L450 (Youghals House) recorded numbers ranked as 'high' on three survey occasions.

Terrestrial foraging was recorded adjacent to 0L465 (West Muckruss Strand) and 0L508 (Ring Head) on 08/02/11 and adjacent 0L506 (Ring Quay) and 0L507 (Ring Harbour) during the high tide survey (outside the SPA boundary), as well as small numbers (six) foraging within 0L502 (Clogheen Strand Intake) on 16/01/11. Terrestrial foraging in fields outside of the SPA boundary is known to be a regular occurrence at this site.

The interdidal benthic community of Clonakilty Bay has been classified as the single broad benthic habitat 'sand to sandy mud with *Tubificoides benedii* and *Peringia* (*Hydrobia*) *ulvae*'. While the sediment ranges from sand to sandy mud, areas with a higher proportion of silt-clay (mud) occur in the south west of Inchydoney Estuary and along the western shore of Clonakilty Estuary. The distinguishing species of this complex are the oligochaete *Tubificoides benedii*, the gastropod *Peringia* (*Hydrobia*) *ulvae*, the amphipods *Deshayesorchestia deshayesii* and *Talitrus saltator* and the polychaetes *Hediste diversicolor*, *Scoloplos* (*Scoloplos*) *armiger* and *Pygospio elegans*. *T. benedii* occurs throughout the complex in moderate to low abundances and is locally very abundant in the inner reaches of Clonakilty Estuary. The remaining distinguishing species are not uniformly distributed throughout the complex. *P. ulvae* generally occurs in low abundances; it is locally abundant in the southwest shore of both Clonakilty Estuary and Inchydoney Estuary. *H. diversicolor* is generally recorded in low abundances and is locally abundant in the inner reaches of Clonakilty Estuary. Also present are polychaetes *Nephtys hombergii* and *Arenicola marina*.

The peak intertidal foraging density was 2 Curlew ha^{-1} recorded for 0L447 (Deasys Quay) on 08/02/11. 0L450, 0L500 and 0L500 recorded densities of over 1 Curlew ha^{-1} on occasion. The whole site mean feeding density (intertidal habitat) was 0.3 Curlew ha^{-1}.

Recent low tide surveys carried out by NPWS Regional Staff recorded peak numbers of foraging Curlew within 0L449, 0L465 and 0L507 (2011-12), 0L449, 0L500 and 0L506 (2012-13) and 0L503, 0L506 and 0L507 (2013-14).

A previous long-term study (2000/01 – 2010/11) of low tide distribution of waders at Clonakilty Estuary (not including Inchydoney Estuary) found that Curlew were similarly widespread across the site when foraging and highest annual mean and peak numbers have occurred over time in a range of subsites including 0L449, 0L450, 0L503 and most frequently in 0L506. However the peak mean densities of Curlews were highest in inner estuary subsite 0L448, followed by 0L449, 0L450 and 0L447.

Roosting Distribution

Good numbers of Curlew were recorded roosting intertidally across the site with the exception of 09/12/10 when all individuals were foraging. 0L507 (Ring Harbour) and 0L506 (Ring Quay) held peak numbers on 09/10/10 and 10/11/10, while 0L448 (Desert North) held peak numbers on 08/02/11. 385 Curlew roosted intertidally during the high tide survey, 96% of these within 0L506 (Ring Quay) with smaller numbers in 0L500 and 0L507.

Terrestrial roosting was recorded within 0L502 (Clogheen Strand Intake) with a maximum 109 birds during the high tide survey; small numbers (10) also recorded during low tide surveys in 0L501 (Island Strand Intake).

Curlews at Clonakilty Bay appear highly site faithful to intertidal low tide roost positions within 0L506 and 0L507 (L. J. Lewis pers. obs) while a further intertidal roost that spans subsites 0L449 and 0L450 has been recorded since 2000/01 (Lewis & Kelly, 2012).

The November 2010 roost survey recorded seven flocks of roosting Curlew across six subsites: 0L451, 0L462, 0L501, 0L502, 0L506 and 0L507. The largest flock was of 31 individuals that roosted terrestrially in 0L502 (Clogheen Strand Intake) close to the northern lagoon, while a second flock of 28 birds was recorded further south within grassland. 26 Curlew roosted terrestrially alongside the lagoons (White's Marsh)

in 0L501 (Island Strand Intake). Smaller flocks of intertidally roosting Curlew (<12 individuals) were recorded in 0L451, 0L462, 0L506 and 0L507.

The February 2011 roost survey recorded five roosting flocks of Curlew across four subsites: 0L501, 0L502, 0L506 and 0L507. The largest flock of 71 individuals roosted terrestrially in 0L502 (Clogheen Strand Intake) close to the northern lagoon. 70 Curlew roosted terrestrially on Inchydoney Island (together with 145 Black-tailed Godwits) while a further four individuals roosted supratidally. 17 Curlew roosted terrestrially in a field alongside 0L506 (outside of the SPA boundary) and 16 Curlew roosted terrestrially alongside the lagoons (White's Marsh) in 0L501 (Island Strand Intake).

5.4 Clonakilty Bay - 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 Clonakilty Bay 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 60+ 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 Clonakilty Bay (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 Clonakilty Bay;
   U known to occur but unknown spatial area hence all potential subsites are included (e.g. fisheries activities);
   H historic, known to have occurred in the past.
   P potential to occur in the future.

2. Of the activities and events identified to occur in and around Clonakilty Bay, 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 Clonakilty Bay

Activities and events identified to occur in and around Clonakilty Bay are shown in Appendix 9, 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

Clonakilty Bay is a wetland complex that stretches from the town of Clonakilty to the open sea. It comprises two small estuarine bays - Clonakilty Harbour and Muckruss[18] Strand

[18] Sometimes referred to as 'Muckross'

(otherwise known as Inchydoney Estuary) that are separated by Inchydoney Island and an area of polderland known as Island Strand Intake (subsite 0L501). Island Strand Intake was effectively cut-off from the estuarine habitat by the construction of two causeways in the early 1800's. These causeways divide subsites 0L501 and 0L503 (Clonakilty Estuary and Island Strand Intake); and 0L501 and 0L500 (Inchydoney Estuary and Island Strand Intake). The polderland now comprises relatively unimproved agricultural grassland habitat, mostly wet grassland criss-crossed by a network of drainage ditches. In its southern reaches is a small conifer plantation that backs a brackish artificial lagoon called White's Marsh that was created when the causeway was built. Water flow into and out of White's Marsh is artificially controlled via sluices.

Further claimed land occurs in the west of the site: Clogheen Marsh (also known as Clogheen Strand Intake; subsite 0L502) was separated from Inchydoney Estuary by the construction of a causeway creating two artificial lagoons in its northern and southern extents (Oliver, 2007). These lagoons are connected to the estuary by a tidal flap and receive freshwater as overflow through a breached embankment, from a raised channel that runs along its boundary, and through groundwater seepage, runoff and precipitation (WWT, 2003).

Management work in the past such as maintenance of sluices by Cork County Council has lowered water levels in the aforementioned lagoons to a point that may have caused adverse effects on lagoon ecology (Oliver, 2007). Furthermore, Oliver (2007) reported an 'unfavourable-inadequate' conservation status for lagoons at both White's Marsh and Clogheen Marsh. Potential impacts were identified as moderate eutrophication from surrounding farmland, occasional low water levels (drainage), modification of hydrology, urbanisation, landfill (infill), dumping (waste) and silting up. In recent years however, water levels of the lagoons appear maintained (LJ Lewis pers. obs) and during periods of high rainfall such as winter 2013/14 large areas of Clogheen Marsh extending beyond the lagoons become flooded, creating a larger wetland habitat.

A further artificial lake/lagoon is located to the south of Clonakilty Estuary. Inchydoney Lake (also called Cul-de-sac pool) was cut off from the estuary by the construction of a causeway leading to a farm on Inchydoney Island. A Grey Heron and Little Egret breeding colony is located in Alder trees that line the north-eastern corner of this lake.

In addition to causeways that cross the site at various places, Clonakilty Estuary is almost entirely bounded by sea walls, with pavements running along their length in several places (e.g. down the eastern side of Clonakilty Estuary as far as subsite 0L509). The site is also bounded by roadways for a large proportion of its length. Perhaps as a consequence of this accessibility, the dumping of waste (fly-tipping) is a regular occurrence at the site; particularly observed at the margins of Clogheen and White's Marsh.

Claimed land is also present at the head of Clonakilty Estuary at Deasy's Quay where the resulting grassland and largely unmanaged land that line the inner northern boundary is an important high tide roost site for various species of waterbird; especially given the predominance of a man-made shoreline (seawalls) and lack of natural roosting habitat. On the opposite side of the harbour Clonakilty WWTP was built on formerly claimed land (adjacent subsite 0L448).

Clonakilty Town lies at the head of Clonakilty Estuary. Scattered residential housing line both Clonakilty and Inchydoney Estuary and there has been an increase in holiday homes on Inchydoney island (overlooking subsite 0L451) in recent years. The surrounding landscape is relatively hilly and dominated by agricultural grassland used mostly for cattle grazing.

Goats and sometimes ponies are grazed along the shoreline of subsite 0L465 (West Muckruss Strand) and are partly grazing saltmarsh habitat. Horses graze both Clogheen Marsh and White's Marsh as part of a habitat management programme managed by NPWS.

A water mains pipeline was laid across inner Clonakilty estuary (within an excavated trench) in 2000 (Lewis et al. 2002b; 2003).

Algal mats are present at this site annually (see below) and in years where excessive growth occurs, macroalgal material washes up onto the beaches at Inchydoney (subsites 0L451 and 0L508) where it causes considerable nuisance and odour pollution. Cork County Council has obtained permission to remove the mass of macroalgae (which otherwise remains piled up, and rots down gradually).

Water quality

The South Western River Basin District (WRBD) 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 Clonakilty Bay and its inflowing rivers and streams.

Clonakilty Estuary is the estuary of the River Fealge. The river is highly canalised where it flows through Clonakilty Town. The Carhoo Stream enters Inchydoney Estuary in the south-western corner via a stone pipe that runs under the road.

The South Western River Basin District (SWRBD) River Basin Management Plan 2011 – 2015 covers the implementation of the Water Framework Directive (WFD) for the south west coast of Ireland and covers Clonakilty Bay and its inflowing rivers. The current water quality status of Clonakilty Bay is 'moderate' according to the South Western River Basin Transitional and Coastal Waters Action Programme (SWRBD, 2010b); this sub-standard status linked to 'point source pollutants (WWTP) and combined sewer overflows.

Some further insight to causative factors is given in the Skibbereen-Clonakilty Water Management Unit Action Plan (SWRBD, 2010c) which lists several WWTPs within the catchment that are substandard including Clonakilty WWTP itself. In addition to WWTPs, there are known significant combined sewer overflows (CSOs) within the catchment; and the area is likely to be at risk from pathogens from on-site waste water treatment plants (OSWTPs) reaching groundwaters.

Clonakilty WWTP located at the head of Clonakilty Estuary on formerly reclaimed land (adjacent subsite 0L448) has been operating over capacity for a number of years while outlying settlements such as Ring village discharge untreated effluent to the estuary. Overall the existing WWTP fails to meet minimum standards (Cork County Council, 2013). A proposal to upgrade the WWTP has been in place for a number of years and an Environmental Impact Statement was prepared in 2006 for a proposed plant that aims to increase capacity to a PE (population equivalent) of 20,500 to include outlying areas that have no current treatment (WYG, 2006) and to provide for the reduction of nitrogen and phosphates in the treated effluent. Although planning permission was granted for this upgrade, it has not yet been completed.

Improvements in WWTP treatment are aimed at meeting objectives of the Urban Waste Water Treatment Regulations (EU Council Directive 91/271/EEC, as transposed by S.I. No. 254 of 2001 as amended by S.I. 48 of 2010) and the Water Framework Directive (2000/20/EC as transposed by the European Communities (Water Policy) (Amendment) Regulations, 2010)). A reduction in organic and nutrient loading to an estuary may have various consequences for the ecology of the estuarine system. For example, there could be a reduction in the abundance of benthic invertebrate prey species (e.g. Burton et al. 2002) particularly those invertebrates that thrive (proliferate) in organically-enriched sediments. This could therefore have subsequent knock-on effects upon waterbird foraging distribution, prey intake rates, and ultimately upon survival and fitness.

Clonakilty Harbour is a proposed Nutrient Sensitive Water designation within the recent amendments to the Urban Waste Water Treatment Regulations 2001 (S.I. 48 of 2010), and has a long history of eutrophication (nutrient enrichment), most visible in the annual

proliferation of macroalgal mats that cover the mudflats during the summer and autumn months (e.g. Lewis & Kelly, 2001). Although a natural component of shallow estuarine communities, macroalgal mats of species such as *Ulva* spp[19] are considered a consequence of organic enrichment when they occur in excessive amounts.

The ecological consequences of algal mat growth at this site have been studied in detail (e.g. Lewis & Kelly, 2001; Lewis et al. 2002a; Lewis, 2003). Algal mats can have both negative and positive effects upon waterbird foraging ecology; some species avoiding them or being negatively affected by lowered invertebrate abundances beneath them, (Lewis & Kelly, 2001; Lopes et al. 2006) while herbivores such as Light-bellied Brent Geese and Wigeon benefit from the algae being a source of food. Given that sustained high levels of macroalgal growth is linked to organic enrichment, there is a potential for a reduction in macroalgal abundance as a result of improvements to sewage discharges. Although such factors are complex and may operate over the long-term, it is advised that they be considered in future assessments of waterbird distribution patterns at this site.

Fisheries & aquaculture

The site has no current aquaculture activities. Various commercial inshore fishing activities are likely to occur adjacent to the site (detail and spatial scale unknown).

Fishing boats are based at Ring Pier (subsite 0L507) and some small-scale fishing, often recreational fishing, occurs in the outer estuarine subsites (e.g. 0L507, 0L508) but most boats make their way out through the narrow estuary opening and proceed to fishing areas further offshore.

Shore angling is a common activity at the site and at both Clonakilty and Inchydoney estuaries. Some small-scale bait digging occurs.

Recreational activities

Inchydoney Island boasts an impressive hotel that overlooks the sea and a pair of beaches (0L451 and 0L508) that are separated by a cliff (Virgin Mary's Point). This area is a popular holiday destination. Consequently the beaches are used extensively for recreational purposes during both summer and winter months. Inchydoney beach attained Blue Flag Status in 2013 and has held this status for several years.

Inchydoney is also favoured for surfing. Waters are often unsafe for swimming (rip-tides) and a life-guard station is posted on the cliff above the beaches.

The estuarine parts of the site are largely bounded by roads and often pavements, and given this good accessibility, walking is a regular occurrence around the site with people walking immediately adjacent to mudflat feeding areas. Given the muddy nature of sediments however, people rarely encroach onto the estuary itself but rather stay on the perimeter. The tidal channel in 0L451 prevents people walking up Inchydoney Estuary.

The southern shore of Inchydoney Estuary has several houses along it and private gardens and shoreline habitats often merge into one. Several houses have their own private slip and moor boats during the summer months.

Tourist trips aboard a road train from the Model Railway Village located at the head of Clonakilty Estuary, travel along the adjacent roads and causeways of the estuaries year round.

[19] includes species formerly classified as *Enteromoropha* (Hayden et al. 2003).

Horse riding occurs occasionally on the western beach at Inchydoney (0L451).

Others

Wildfowling has been previously recorded at the site e.g. shooting for Snipe in Island Strand Intake, however it is not a regular occurrence. Wildfowling was not recorded at the site during the 2010/11 Waterbird Survey Programme. 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^{th} – 30^{th} December 2010 inclusive).

Raptors were observed at Clonakilty Bay on two survey occasions (four species: Buzzard (*Buteo buteo*), Merlin (*Falco columbarius*), Peregrine Falcon (*Falco peregrinus*) and Sparrowhawk (*Accipiter nisus*)). Only one observation involved the disturbance of waterbirds which were displaced for a short period. No kills observed.

5.4.4 Disturbance Assessment

Despite its accessible location, activities and events recorded at Clonakilty Bay that had the potential to cause disturbance to waterbirds were relatively rare. Four activities/events were recorded that caused disturbance to waterbirds: horse riding, humans walking (including with dogs), shore-angling and surfing (Table 5.8). Fieldworkers themselves at times caused disturbance to waterbirds as they took up observation positions; these disturbances although recorded, are not included in this current assessment.

Walking (including with dogs) was the most widespread activity occurring in nine subsites overall and accounting for the peak disturbance scores in eight of these. However the frequency of occurrence was low for all subsites with the exception of 0L451 (Muckruss Head) which is the eastern beach at Inchydoney. This subsite also recorded the most activities.

A summary of the disturbance assessment is shown in Table 5.8 and full results are shown in Appendix 10. As a final review, Table 5.9 shows the peak disturbance scores overlaid on the subsite assessment table (total waterbird numbers, LT surveys).

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	Subsite Name	Number Activities	Peak Disturbance Score	Activity Responsible
0L447	Deasys Quay	0	-	
0L448	Desert North	1	4	- Walking (incl. with dogs)
0L449	Desert South	0	-	
0L450	Youghals House	0	-	
0L451	Muckruss Head	4	7	- Walking (incl. with dogs)
0L462	East Muckruss Strand	2	5	- Horse riding
0L465	West Muckruss Strand	1	5	- Walking (incl. with dogs)
0L500	Causeway	0	-	
0L501	Island Strand Intake	0	-	
0L502	Clogheen Strand Intake	1	5	- Walking (incl. with dogs)
0L503	Inchidoney Island	0	-	
0L504	Inchidoney House	1	4	- Walking (incl. with dogs)
0L505	Youghals SE	0	-	
0L506	Ring Quay	1	5	- Walking (incl. with dogs)
0L507	Ring Harbour	1	5	- Walking (incl. with dogs)
0L508	Ring Head	1	5	- Walking (incl. with dogs)
0L509	Desert Church	0	-	

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

Species ► Subsites ▼	SU	DN	BW	CU
0L447		H	M	M
0L448	M	M	M	H
0L449		H	H	H
0L450	L	M	H	H
0L451				
0L462		L	L	M
0L465	M	V	H	V
0L500	V	H	V	V
0L501			L	M
0L502			V	H
0L503	V	V	H	H
0L504				
0L505	H	H	H	M
0L506		V	V	V
0L507		M	H	V
0L508				H
0L509	M	M	M	M

5.4.5 Discussion

Many of the 'activities/events' identified at Clonakilty Bay have occurred historically and have shaped the way the site exists today. In particular, the lagoon habitats, that are important for the overall waterbird assemblage, were artificially created when causeways were built to claim land from the estuary in the 1800's. But while such events may be historical in nature they may still impart effects upon a site by means of on-going changes to natural processes such as sedimentation or erosion rates. Future management of the lagoon habitats will be key to maintaining these habitats in a suitable condition for waterbirds.

Human recreational activities at coastal sites occur less frequently during winter months and the range of activities is much reduced. Nevertheless, activity in the form of walkers (with/without dogs) or humans on the shoreline occurred in half of the count subsites. But in general these events were relatively rare in nature and were focused on one subsite in particular (0L451).

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[20] (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 (1st winter birds) may be marginalised by older more dominant flocks so that their access to the optimal prey resources is limited. These individuals may already therefore be under pressure to gain their required daily energy intake before the effects of any disturbance event are taken into account;
- Timing/seasonality - birds may be more vulnerable at certain times e.g. pre- and post-migration, at the end of the winter when food resources are lower;
- Weather - birds are more vulnerable during periods of severe cold weather or strong winds;

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

- Site fidelity – some species are highly site faithful at site or within-site level and will therefore be affected to a greater degree than species that range more widely;
- Predation and competition – a knock-on effect of disturbance is that waterbirds may move into areas where they are subject to increased competition for prey resources, or increased predation – i.e. the disturbance results in an indirect impact which is an increased predation risk.

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

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.

Bryant, D.M. & Leng, J. (1975) Feeding distribution and behaviour of Shelduck in relation to food supply. *Wildfowl* 26, 20–30.

Burton, N.H.K., Paipai, E., Armitage, M.J.S., Maskell, J.M., Jones, E.T., Struve, J., Hutchings, C.J. & Rehfisch, M.M. (2002) Effects of reductions in organic and nutrient loading on bird populations in estuaries and coastal waters of England and Wales. Phase 1 Report. BTO Research Report, No. 267 to English Nature, the Countryside Council for Wales and the Environment Agency. BTO. Thetford, UK.

BWPi (2004) *Birds of the Western Palearctic Interactive*. BirdGuides Ltd. 2004.

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

Cork County Council (2013) Draft County Development Plan. Volume III. 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.

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.

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.

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.

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.

Hayden, H.S., Blomster, J., Maggs, C.A., Silva, P.C., Stanhope, M.J., Waaland, J.R. (2003) Linnaeus was right all along: Enteromorpha and Ulva are not distinct genera. *European Journal of Phycology* 38, 277–293.

Healy, B., Oliver, G., Hatch, P. & J., Good (1997) *Coastal lagoons in the republic of Ireland (Vol. 2). Inventory of lagoons and saline lakes*. Prepared for National Parks and Wildlife Service.

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) Quantitive evidence for global amphibian population declines. *Nature* 404, 752-755.

Hutchinson, C.D. & O'Halloran, J. (1994) The ecology of Black-tailed Godwits at an Irish south-coast estuary. *Irish Birds* 5: 165-172.

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).

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.

Leech, D. I., Rehfisch, M. M. & Atkinson, P. W. (2002) *A Guide to Waterbird Alerts.* BTO Research Report No. 281.

Lewis, L. J. (2003) *Ecological disturbance and its effects on estuarine benthic invertebrate communities and their avian predators.* PhD Thesis. National University of Ireland, College Cork.

Lewis, L.J. and Kelly, T.C. (2001) A short-term study of the effects of algal mats on the distribution and behavioral ecology of estuarine birds. *Bird Study* 48, 354-360.

Lewis, L.J. and Kelly, T.C. (2012) Aspects of the spatial ecology of waders along an estuarine gradient. *Irish Birds* 9, 375-384.

Lewis, L.J., Davenport, J. and Kelly, T.C. (2002a) Responses of benthic invertebrates and their avian predators to the experimental removal of macroalgal mats. *Journal of the Marine Biological Association of the U. K*. 83, 31-36.

Lewis, L.J., Davenport, J. and Kelly, T.C. (2002b) A Study of the Impact of a Pipeline Construction on Estuarine Benthic Invertebrate Communities. *Estuarine, Coastal & Shelf Science* 55, 213-221.

Lewis, L.J., Davenport, J. and Kelly, T.C. (2003) A study of the Impact of a Pipeline Construction on Estuarine Benthic Invertebrate Communities 2: Recolonization by benthic invertebrates after one year and responses of estuarine birds. *Estuarine, Coastal & Shelf Science* 57, 201-208.

Lopes, R.J., Pardal, M. A., Múrias, T., Cabral, J.A. & Marques, J.C. (2006) Influence of macroalgal mats on abundance and distribution of Dunlin Calidris alpina in estuaries: A long-term approach. *Marine Ecology Progress Series* 323, 11-20.

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.

MERC (2012) *Intertidal Benthic Survey of Clonakilty Bay SAC and Clonakilty Bay SPA.* Carried out by MERC on behalf of the Marine Institute in partnership with National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.

Met Éireann (2010) *Monthly weather bulletin No 296.* December 2010. www.met.ie

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 (2014) *Clonakilty Bay SAC (site code 91) – conservation objectives supporting document – marine habitats and species.* Version 1.

Oliver, G.A. (2005) *Seasonal changes and biological classification of Irish coastal lagoons.* Unpublished PhD. thesis. National University of Ireland.

Oliver, G.A. (2007) Conservation Status Assessment Report. Coastal lagoons (1150). March 2007. report for National Parks & Wildlife Service.

Olney, P.J.S. (1965) The food and feeding habits of Shelduck *Tadorna tadorna*. *Ibis* 107, 527–532.

Ramsar Convention Bureau (1971) Convention on wetlands of international importance especially as waterfowl habitat. Ramsar Convention Bureau, Gland, Switzerland.

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.

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.

SWRBD (2010a) South Western River Basin District (SWRBD) River Basin Management Plan 2011 – 2015. www.wfdireland.ie

SWRBD (2010b) South Western River Basin Transitional and Coastal Waters Action Programme. www.wfdireland.ie

SWRBD (2010c) Skibereen Clonakilty Water Management Unit Action Plan. 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.

Thompson, D. B. A. (1981) Feeding behaviour of wintering Shelduck on the Clyde Estuary. *Wildfowl* 32, 88-98.

Underhill, L. G. & Prŷs-Jones, R. P. (1994) Index numbers for waterbird populations. I. Review and methodology. *Journal of Applied Ecology* 31, 463-480.

Van der Kam, J., Ens, B., Piersma, T & Zwarts, L (2004) *Shorebirds: an illustrated behavioural ecology.* KNNV Publishers, Utrecht, The Netherlands.

Viain, A., Corre, F., Delaporte, P., Joyeux, E. & Bocher, P. (2011) Numbers, diet and feeding methods of Common Shelduck *Tadorna tadorna* wintering in the estuarine bays of Aiguillon and Marennes-Oléron, western France. *Wildfowl* 61, 121-141.

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.

WWT (2003) *Clogheen Marsh Feasibility Study.* Unpublished report to County Nature Trust. WWT Wetlands Advisory Service.

WYG (2006) *Environmental Impact Statement for the Clonakilty Wastewater Treatment Plant Upgrade.* Volume 1. 2006. http://www.epa.ie/licences/lic_eDMS/090151b280202dd5.pdf

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.

APPENDIX 1

SITE NAME: CLONAKILTY BAY SPA

SITE CODE: 004081

Clonakilty Bay, which is located in west County Cork, is a wetland complex that stretches from the town of Clonakilty to the open sea. It comprises two small estuarine bays, Clonakility Harbour and Muckruss Strand, separated by Inchydoney Island and its empoldered isthmus. Several small rivers flow into the site, notably the Fealge River. At low tide, substantial areas of sand and mud flats are exposed. The construction of a causeway across the inner part of Muckruss Strand created an extensive wetland complex known as Clogheen Strand Intake.

Intertidal sand and mud flats occupy the majority of the site area and these provide the main food resource for the wintering waterfowl. Sand flats dominate the inter-tidal area, although mud flats occur at the sheltered upper end of the inlets. The vegetation consists of algal mats (*Ulva* spp.), with brown seaweeds (*Fucus* spp.) occurring where the shore is rocky. The invasive Common Cord-grass (*Spartina anglica*) occurs in places. The intertidal flats have a typical diversity of macro-invertebrates, including Lugworm (*Arenicola marina*), Peppery Furrow-shell (*Scrobicularia plana*), Ragworm (*Hediste diversicolor*), the marine bristle worms *Nephtys hombergii* and *N. cirrosa*, Laver Spire-shell (*Hydrobia ulvae*) and Common Cockle (*Cerastoderma edule*).

The Clogheen Strand Intake wetland contains a fine range of habitats from saline lagoons, to brackish grasslands, open freshwater marsh and wet grassland. This area provides the main roosting area for birds at high tide. Birds also roost elsewhere above the shoreline and on the sandy beach associated with the dune system at Inchydoney Island.

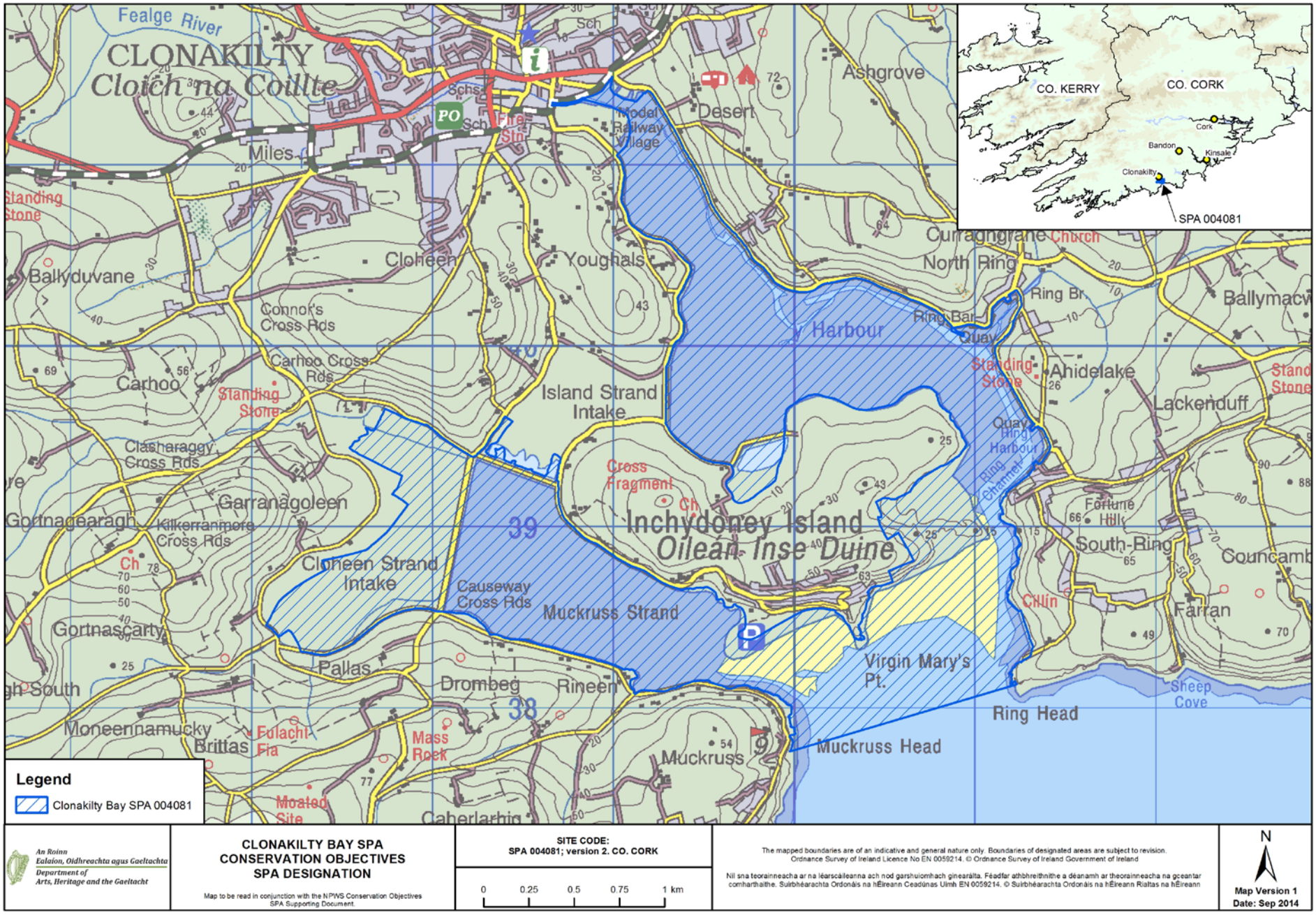
The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Shelduck, Dunlin, Black-tailed Godwit and Curlew. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its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

The site contains a good diversity of wintering waterbirds, with over 8,000 birds occurring regularly. The site is noted for its internationally important population of Black-tailed Godwit (874) - all count data refers to the 4-year mean peak 1995/96 to 1998/99. The ecology of this population has been studied in detail in recent years. Three species occur in nationally important numbers: Shelduck (156), Dunlin (1,172), and Curlew (599). Other species that occur at the site include Mute Swan (53), Wigeon (487), Teal (216), Mallard (93), Red-breasted Merganser (10), Cormorant (13), Oystercatcher (316), Ringed Plover (103), Golden Plover (857), Grey Plover (61), Lapwing (1,658), Knot (168), Bar-tailed Godwit (79) Redshank (252), Greenshank (33) and Turnstone (38).

Little Egret, a species that has recently colonised Ireland, has been recorded in small numbers (4 year mean peak of 5, maximum 7). Grey Heron (14) commonly uses the site and a heronry is located in the trees near Clonakilty. Clogheen Strand Inlet is also a regular wintering site for usually up to 3, but occasionally 7, Short-eared Owl.

The site is a regular staging post for scarce autumn migrants, especially Little Stint, Curlew Sandpiper and Spotted Redshank. In most years it is also visited by vagrant waders from North America.

Clonakilty Bay SPA is of high ornithological importance, particularly for its internationally important population of Black-tailed Godwit. In addition, there are three species with populations of national importance. The presence of the E.U. Birds Directive Annex I species, Golden Plover, Bar-tailed Godwit, Little Egret and Short-eared Owl is of note.


Fealge River
CLONAKILTY
Cloich na Coillte
Miles
Modal Railway Village
Desert
Ashgrove
Standing Stone
Ballyduvane
Cloheen
Youghals
Connor's Cross Rds
Carhoo Cross Rds
Carhoo
Island Strand Intake
Clasharaggy Cross Rds
Garranagoleen
Gortnagearagh
Kilkerranmore Cross Rds
Cross Fragment
Inchydoney Island
Oileán Inse Duine
39
Cloheen Strand Intake
Causeway Cross Rds
Muckruss Strand
Gortnascarty
Pallas
Drombeg
Rineen
38
Moneennamucky
Brittas
Fulacht Fia
Mass Rock
Muckruss
Moated Site
Caherlarhig
Curraghgrane Church
North Ring
Ring Br.
Ring Bar
Quay
Harbour
Ahidelake
Lackenduff
Ring Harbour
Ring Channel
Fortune Hill
South-Ring
Councamb
Farran
Cillin
Virgin Mary's Pt.
Sheep Cove
Ring Head
Muckruss Head
CO. KERRY
CO. CORK
Cork
Bandon
Kinsale
Clonakilty
SPA 004081
Legend
Clonakilty Bay SPA 004081
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
CLONAKILTY BAY SPA
CONSERVATION OBJECTIVES
SPA DESIGNATION
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
SITE CODE:
SPA 004081; version 2. CO. CORK
0 0.25 0.5 0.75 1 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 0059214. © Ordnance Survey of Ireland Government of Ireland
Nil sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059214. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann
N
Map Version 1
Date: Sep 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	*Sterna paradisaea*
BY	Barnacle Goose	*Branta leucopsis*
BA	Bar-tailed Godwit	*Limosa lapponica*
BE	Bean Goose	*Anser fabalis*
BS	Bewick's Swan	*Cygnus columbianus*
AS	Black Swan	*Cygnus atratus*
BH	Black-headed Gull	*Chroicocephalus ridibundus*
BN	Black-necked Grebe	*Podiceps nigricollis*
BW	Black-tailed Godwit	*Limosa limosa*
BV	Black-throated Diver	*Gavia arctica*
BG	Brent Goose	*Branta bernicla*
CG	Canada Goose	*Branta canadensis*
CM	Common Gull	*Larus canus*
CS	Common Sandpiper	*Actitis hypoleucos*
CX	Common Scoter	*Melanitta nigra*
CN	Common Tern	*Sterna hirundo*
CO	Coot	*Fulica atra*
CA	Cormorant	*Phalacrocorax carbo*
CU	Curlew	*Numenius arquata*
CV	Curlew Sandpiper	*Calidris ferruginea*
DN	Dunlin	*Calidris alpina*
GA	Gadwall	*Anas strepera*
GP	Golden Plover	*Pluvialis apricaria*
GN	Goldeneye	*Bucephala clangula*
GD	Goosander	*Mergus merganser*
GB	Great Black-backed Gull	*Larus marinus*
GG	Great Crested Grebe	*Podiceps cristatus*
ND	Great Northern Diver	*Gavia immer*
NW	Greenland White-fronted Goose	*Anser albifrons flavirostris*
GK	Greenshank	*Tringa nebularia*
H.	Grey Heron	*Ardea cinerea*
GV	Grey Plover	*Pluvialis squatarola*
GJ	Greylag Goose	*Anser anser*
HG	Herring Gull	*Larus argentatus*
JS	Jack Snipe	*Lymnocryptes minimus*
KF	Kingfisher	*Alcedo atthis*
KN	Knot	*Calidris canutus*
L.	Lapwing	*Vanellus vanellus*
LB	Lesser Black-backed Gull	*Larus fuscus*
PB	Light-bellied Brent Goose	*Branta bernicla hrotra*
ET	Little Egret	*Egretta garzetta*

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

APPENDIX 5

Waterbird foraging guilds (after Weller, 1999)

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

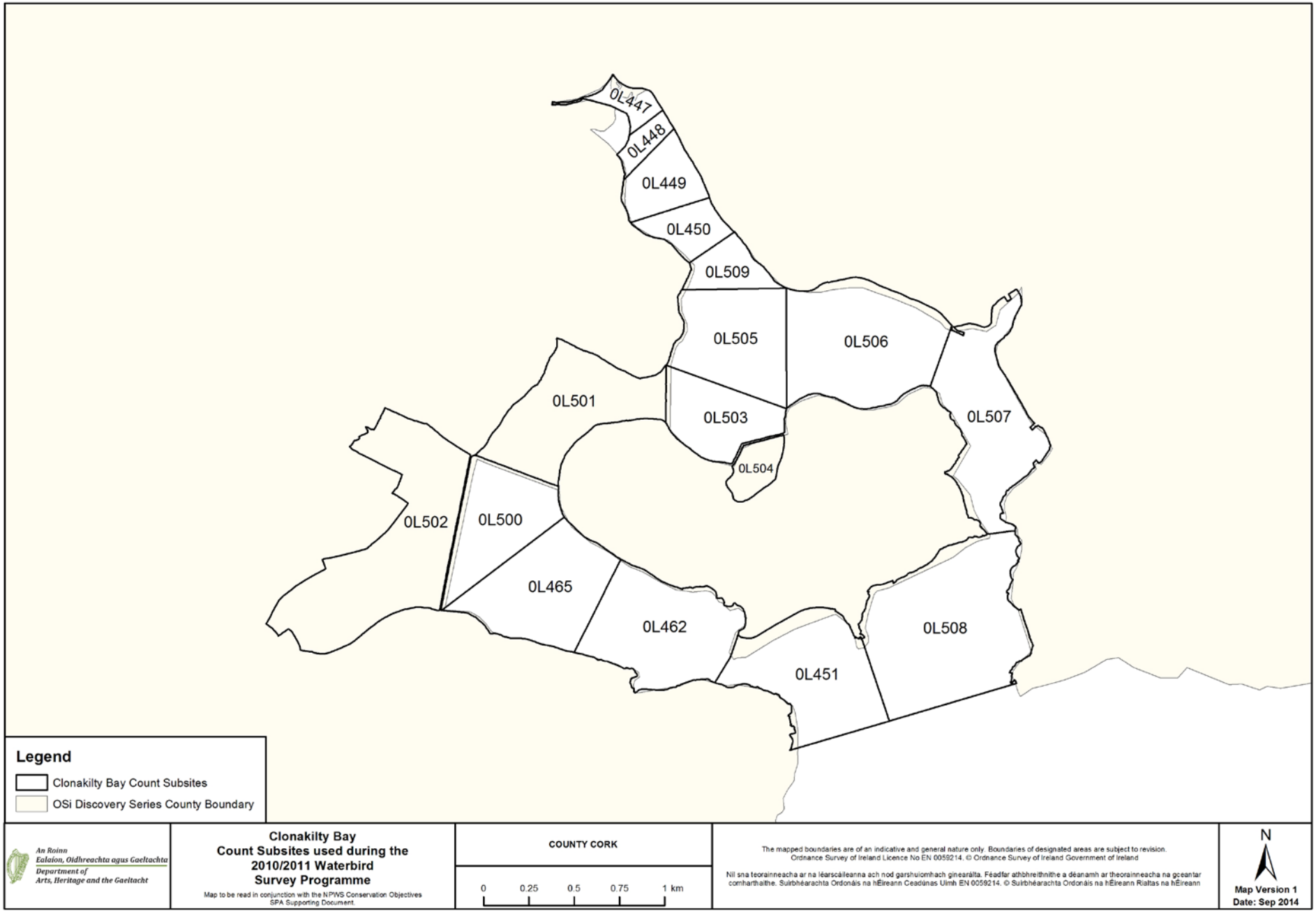
[a] dives <3m.

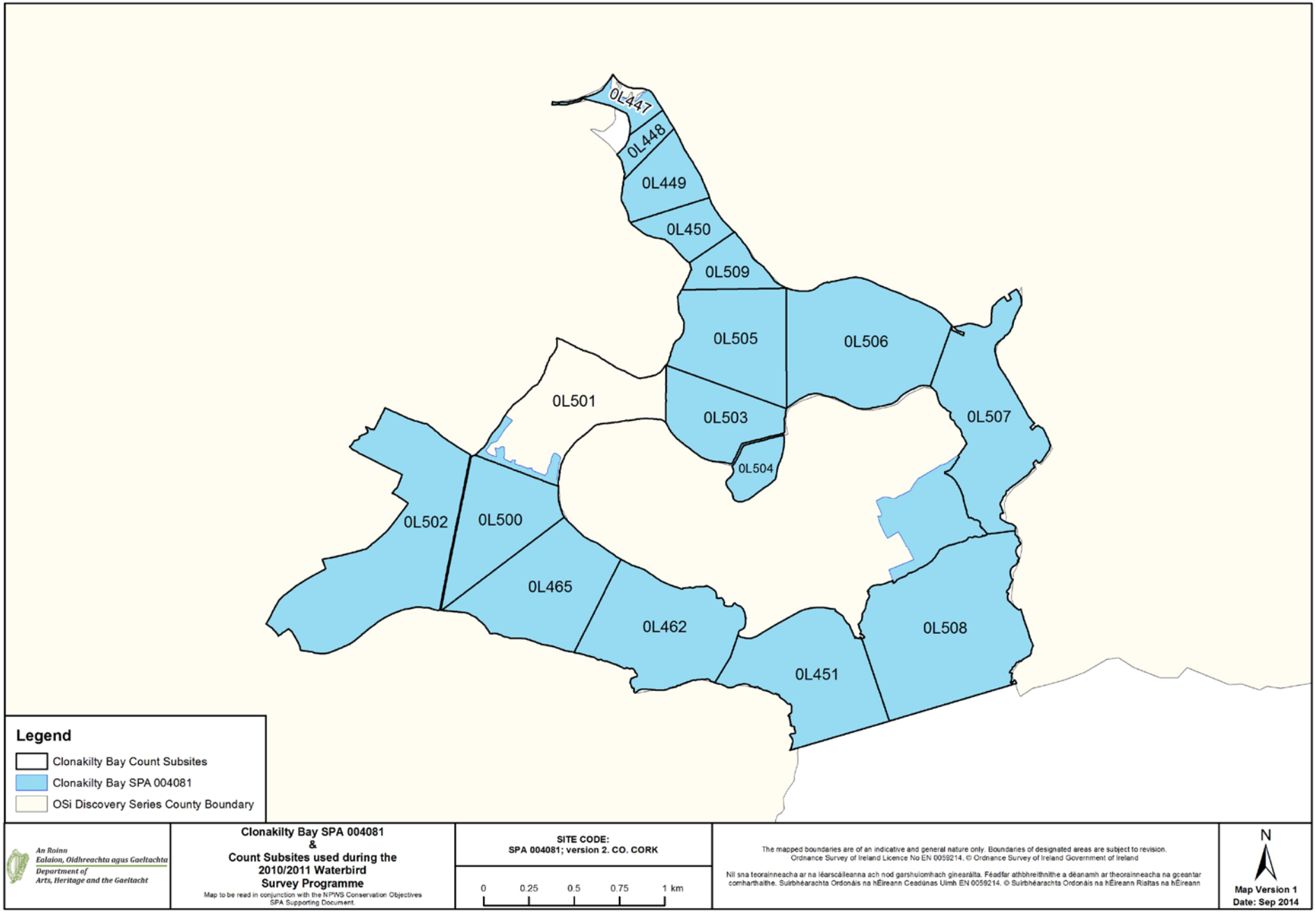
Please note that this table refers to generalised foraging strategies and is meant as a guide only. There is a great deal of variation between sites, seasons, tidal states and indeed, individual birds themselves. For example, some waterbird species may deploy several of the methods, e.g. Shelduck may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

APPENDIX 6

Clonakilty Bay – Waterbird Survey Programme 2010/11 – Count Subsites

Subsite Code	Subsite Name	Area (ha)
0L447	Deasys Quay	6
0L448	Desert North	5
0L449	Desert South	14
0L450	Youghals House	10
0L451	Muckruss Head	42
0L462	East Muckruss Strand	42
0L465	West Muckruss Strand	38
0L500	Causeway	29
0L501	Island Strand Intake	39
0L502	Clogheen Strand Intake	66
0L503	Inchidoney Island	22
0L504	Inchidoney House	7
0L505	Youghals SE	33
0L506	Ring Quay	52
0L507	Ring Harbour	43
0L508	Ring Head	67
0L509	Desert Church	10
	TOTAL	**525**


0L447
0L448
0L449
0L450
0L509
0L505
0L506
0L501
0L503
0L507
0L504
0L502
0L500
0L465
0L462
0L451
0L508
Legend
Clonakilty Bay Count Subsites
OSi Discovery Series County Boundary
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Clonakilty Bay
Count Subsites used during the 2010/2011 Waterbird Survey Programme
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
COUNTY CORK
0 0.25 0.5 0.75 1 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 0059214. © Ordnance Survey of Ireland/ Government of Ireland
Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059214. © Suirbhéarachta Ordonáis na hÉireann/ Rialtas na hÉireann
N
Map Version 1
Date: Sep 2014

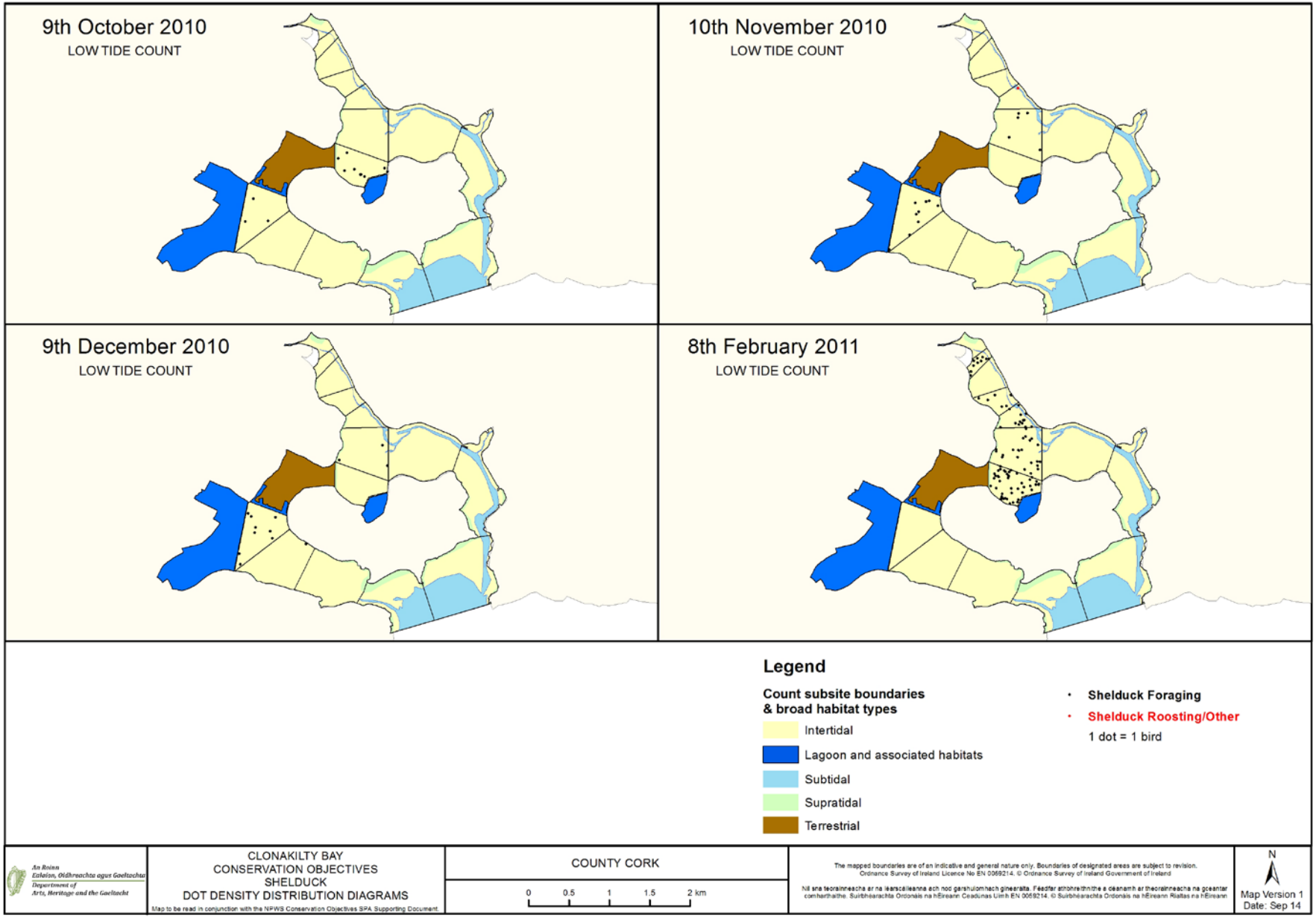

0L447
0L448
0L449
0L450
0L509
0L505
0L506
0L501
0L503
0L507
0L504
0L502
0L500
0L465
0L462
0L451
0L508
Legend
Clonakilty Bay Count Subsites
Clonakilty Bay SPA 004081
OSi Discovery Series County Boundary
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Clonakilty Bay SPA 004081
&
Count Subsites used during the 2010/2011 Waterbird Survey Programme
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
SITE CODE:
SPA 004081; version 2. CO. CORK
0 0.25 0.5 0.75 1 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 0059214. © Ordnance Survey of Ireland/ Government of Ireland
Níl sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059214. © Suirbhéarachta Ordonáis na hÉireann/ Rialtas na hÉireann
N
Map Version 1
Date: Sep 2014

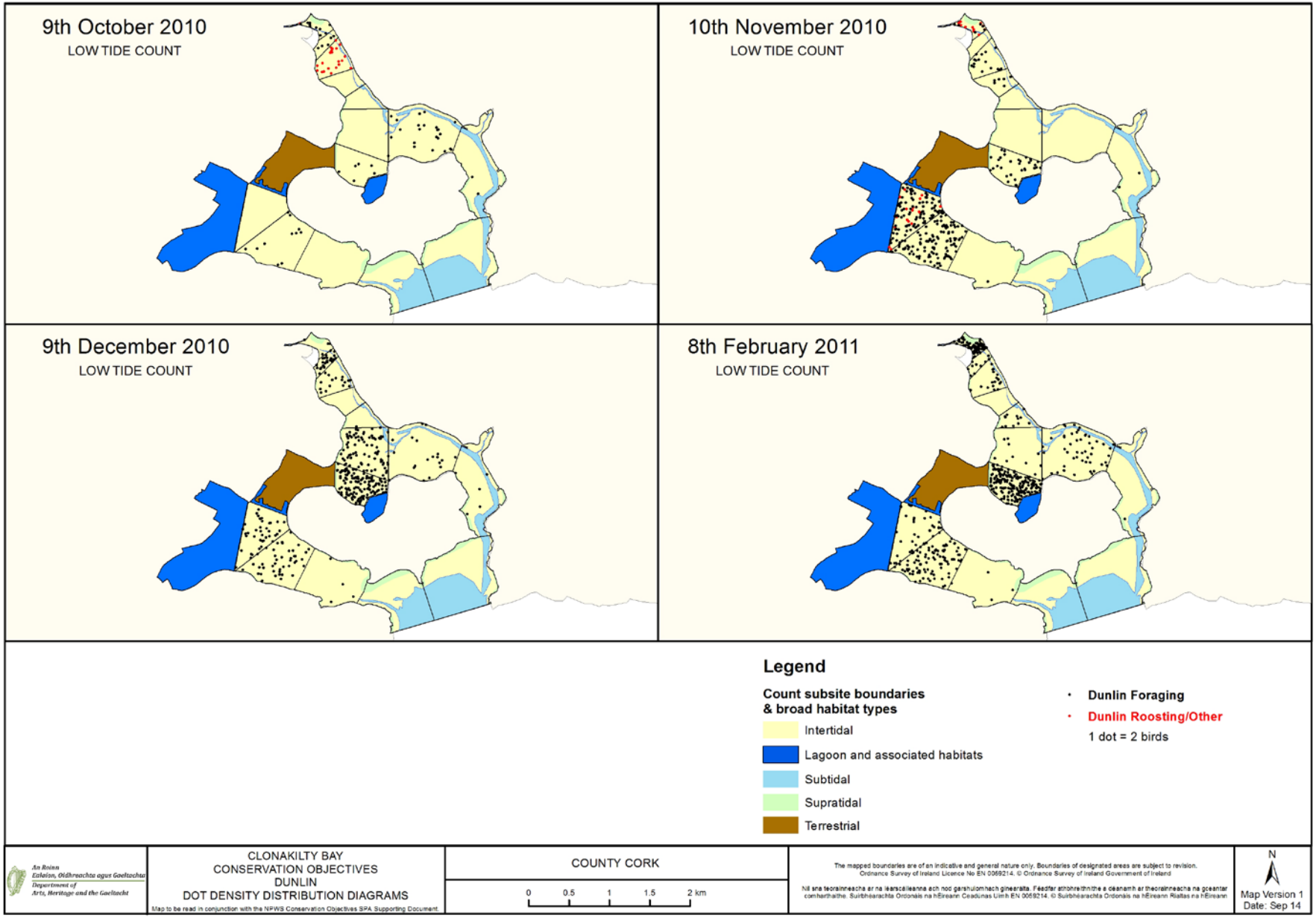
APPENDIX 7

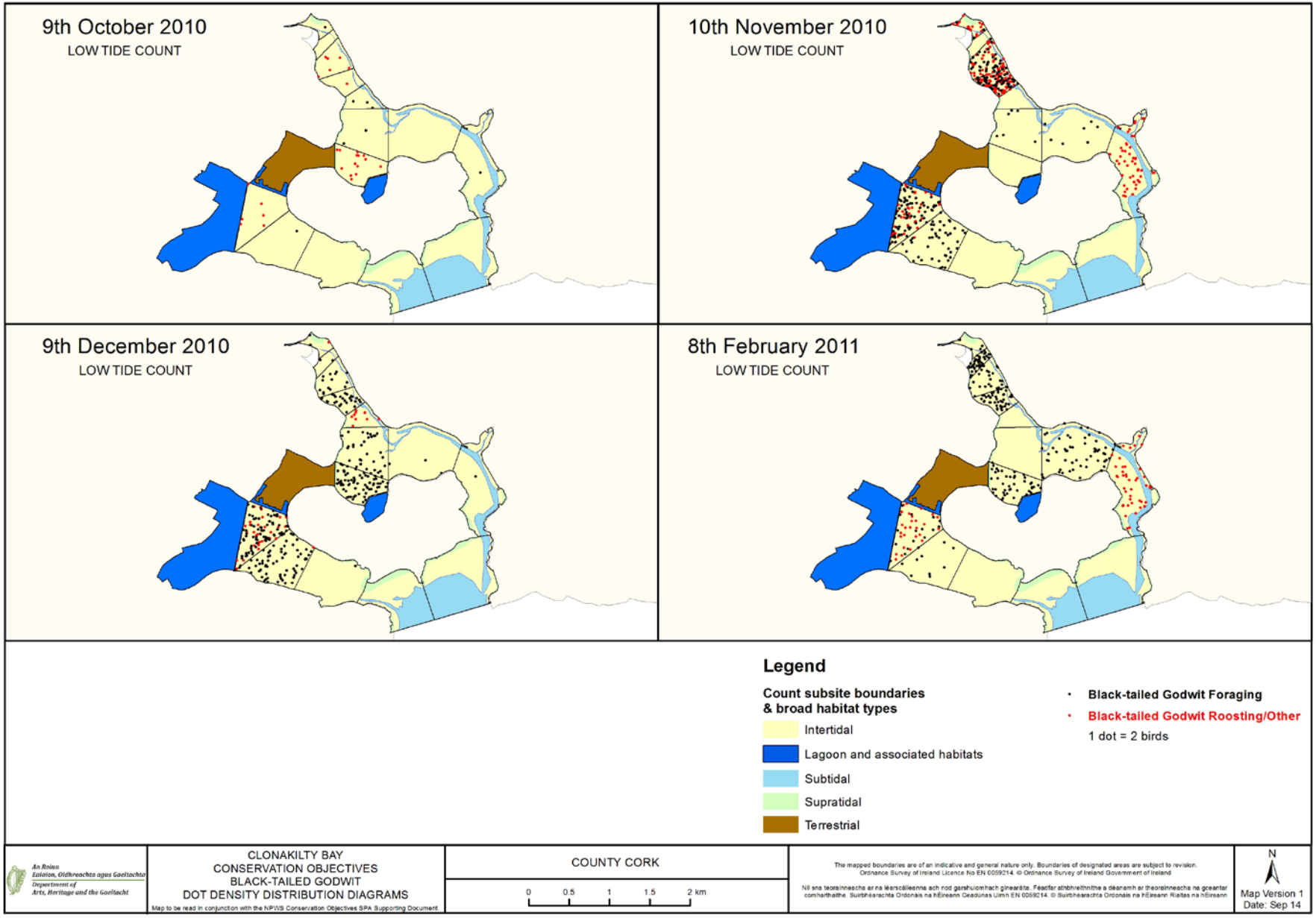
Clonakilty Bay

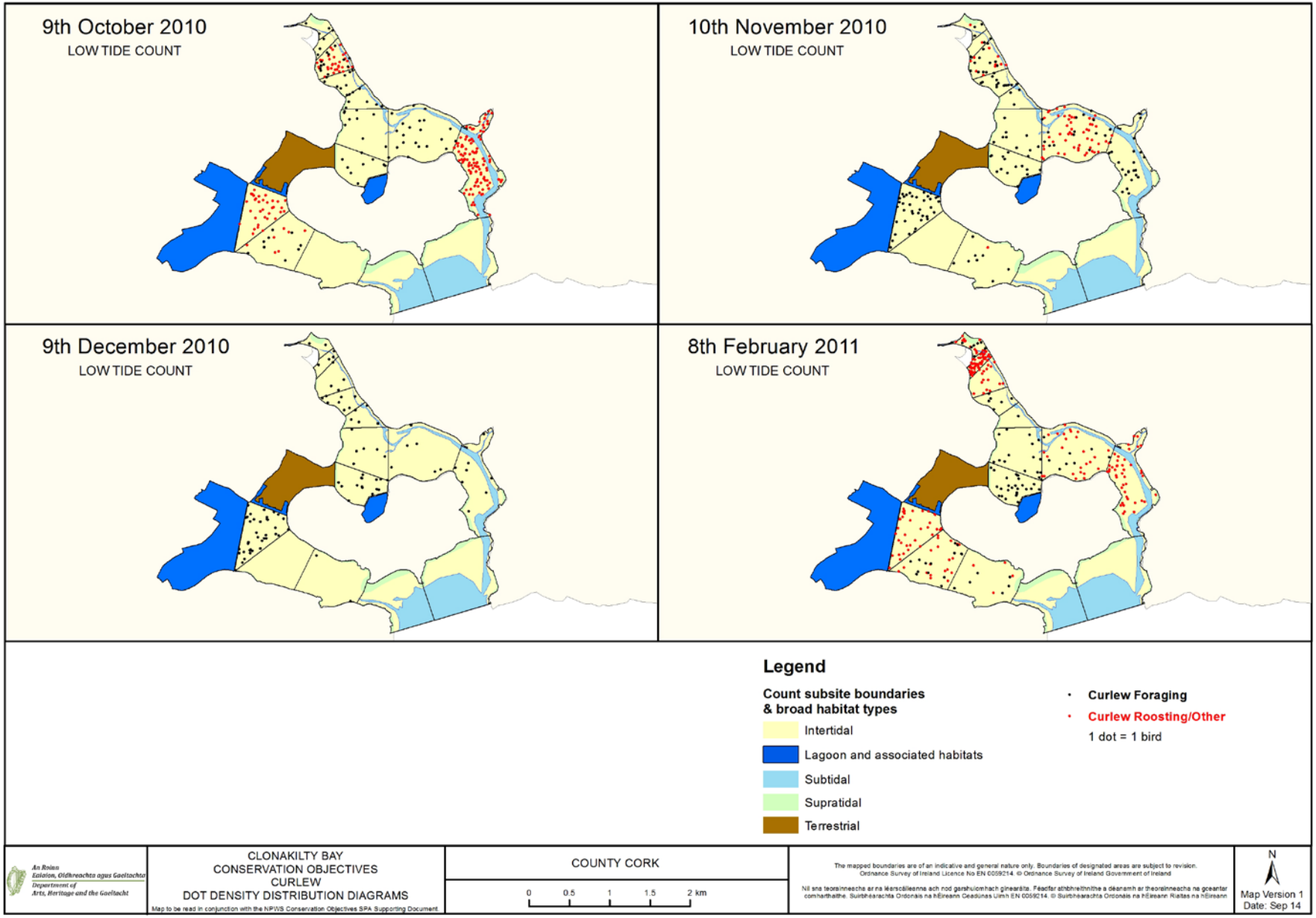
Waterbird distribution (dot-density diagrams) recorded during low tide surveys (October 2010 – February 2011)

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


9th October 2010
LOW TIDE COUNT
10th November 2010
LOW TIDE COUNT
9th December 2010
LOW TIDE COUNT
8th February 2011
LOW TIDE COUNT
Legend
Count subsite boundaries & broad habitat types
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Terrestrial
Shelduck Foraging
Shelduck Roosting/Other
1 dot = 1 bird
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
CLONAKILTY BAY
CONSERVATION OBJECTIVES
SHELDUCK
DOT DENSITY DISTRIBUTION DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
COUNTY CORK
0 0.5 1 1.5 2 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 0069214. © Ordnance Survey of Ireland Government of Ireland
Níl sna teorainneacha ar na hearcaileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0069214. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann
N
Map Version 1
Date: Sep 14


9th October 2010
LOW TIDE COUNT
10th November 2010
LOW TIDE COUNT
9th December 2010
LOW TIDE COUNT
8th February 2011
LOW TIDE COUNT
Legend
Count subsite boundaries & broad habitat types
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Terrestrial
Dunlin Foraging
Dunlin Roosting/Other
1 dot = 2 birds
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
CLONAKILTY BAY
CONSERVATION OBJECTIVES
DUNLIN
DOT DENSITY DISTRIBUTION DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
COUNTY CORK
0 0.5 1 1.5 2 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 0069214. © Ordnance Survey of Ireland Government of Ireland
N
Map Version 1
Date: Sep 14


9th October 2010
LOW TIDE COUNT
10th November 2010
LOW TIDE COUNT
9th December 2010
LOW TIDE COUNT
8th February 2011
LOW TIDE COUNT
Legend
Count subsite boundaries & broad habitat types
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Terrestrial
Black-tailed Godwit Foraging
Black-tailed Godwit Roosting/Other
1 dot = 2 birds
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
CLONAKILTY BAY
CONSERVATION OBJECTIVES
BLACK-TAILED GODWIT
DOT DENSITY DISTRIBUTION DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
COUNTY CORK
0 0.5 1 1.5 2 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 0059214. © Ordnance Survey of Ireland Government of Ireland
N
Map Version 1
Date: Sep 14


9th October 2010
LOW TIDE COUNT
10th November 2010
LOW TIDE COUNT
9th December 2010
LOW TIDE COUNT
8th February 2011
LOW TIDE COUNT
Legend
Count subsite boundaries & broad habitat types
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Terrestrial
Curlew Foraging
Curlew Roosting/Other
1 dot = 1 bird
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
CLONAKILTY BAY
CONSERVATION OBJECTIVES
CURLEW
DOT DENSITY DISTRIBUTION DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
COUNTY CORK
0 0.5 1 1.5 2 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 0059214. © Ordnance Survey of Ireland Government of Ireland
N
Map Version 1
Date: Sep 14

APPENDIX 8

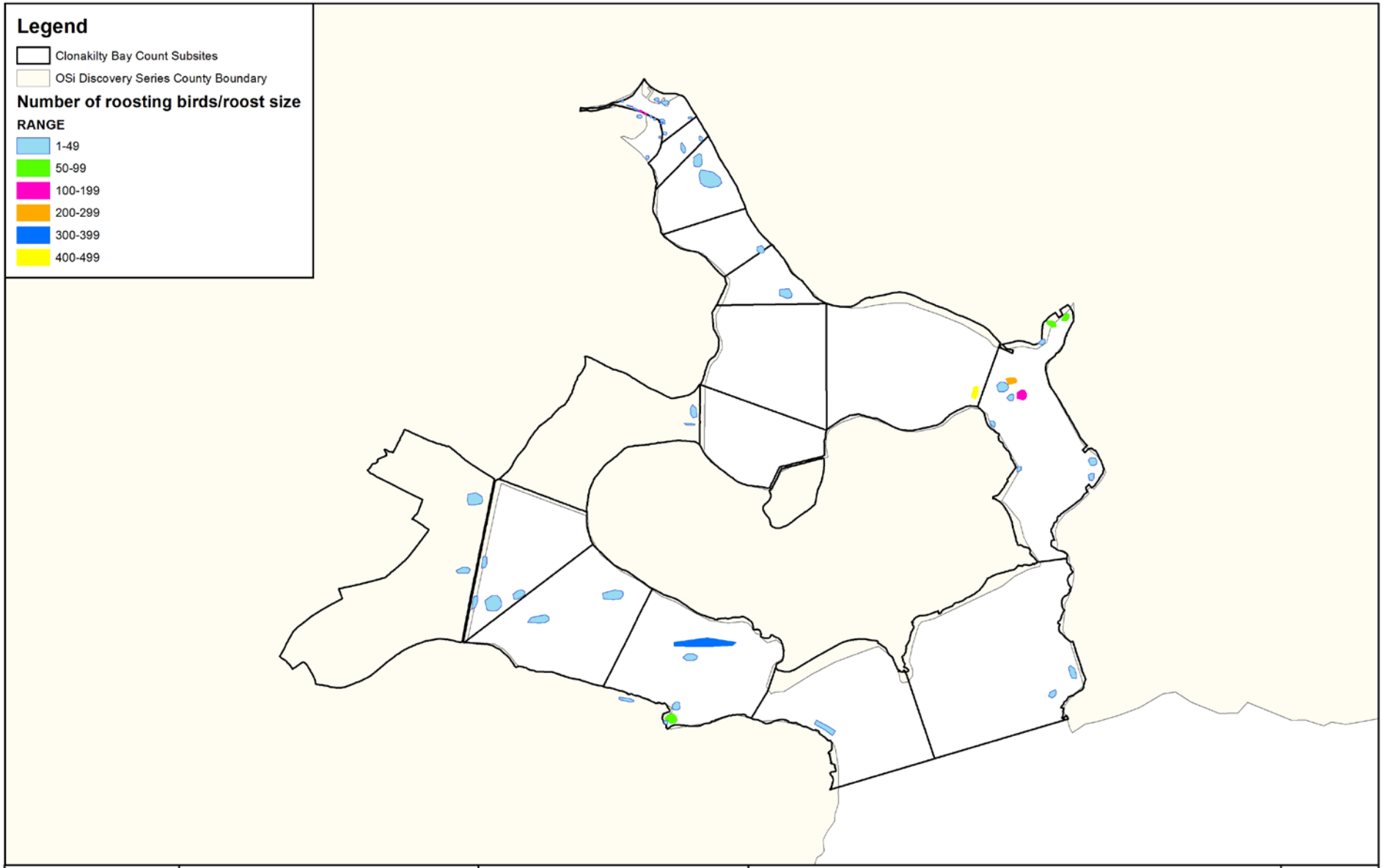
Clonakilty Bay

(1a) Summary data and roost location maps from the roost survey 3rd 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
0L447	Deasys Quay	17	13	BH, CM, DN, GK, H., L., LB, MA, MS, OC, RK, SN, TT
0L448	Desert North	3	2	BH, MS
0L449	Desert South	2	2	MS, WN
0L450	Youghals House	1	1	MS
0L451	Muckruss Head	1	2	CU, OC
0L462	East Muckruss Strand	6	14	BA, BH, CA, CM, CU, DN, GK, HG, L., LB, MA, OC, RK, WN
0L465	West Muckruss Strand	2	3	HG, LB, WN
0L500	Causeway	4	4	BH, BW, RK, WN
0L501	Island Strand Intake	2	2	CU, T.
0L502	Clogheen Strand Intake	2	1	CU
0L503	Inchidoney Island	-		
0L504	Inchidoney House	-		
0L505	Youghals SE	-		
0L506	Ring Quay	1	4	BW, CU, OC, RK
0L507	Ring Harbour	11	16	BH, BW, CA, CM, CU, GB, GK, HG, L., LB, MA, OC, RK, SA, SU, WN
0L508	Ring Head	2	5	CM, GB, HG, OC, SA
0L509	Desert Church	1	2	MS, WN

(1b) Clonakilty Bay SPA (4081) SCI species and recorded roosts 03/11/10 - shows number of roost locations within subsite, and in brackets, the peak number recorded at a single roost location

Species ► Subsites ▼	SU	DN	BW	CU
0L447		3 (28)		
0L448				
0L449				
0L450				
0L451				1 (1)
0L462		1 (281)		1 (2)
0L465				
0L500			1 (41)	
0L501				1 (26)
0L502				2 (31)
0L503				
0L504				
0L505				
0L506			1 (310)	1 (12)
0L507	1 (5)		3 (22)	1 (8)
0L508				
0L509				

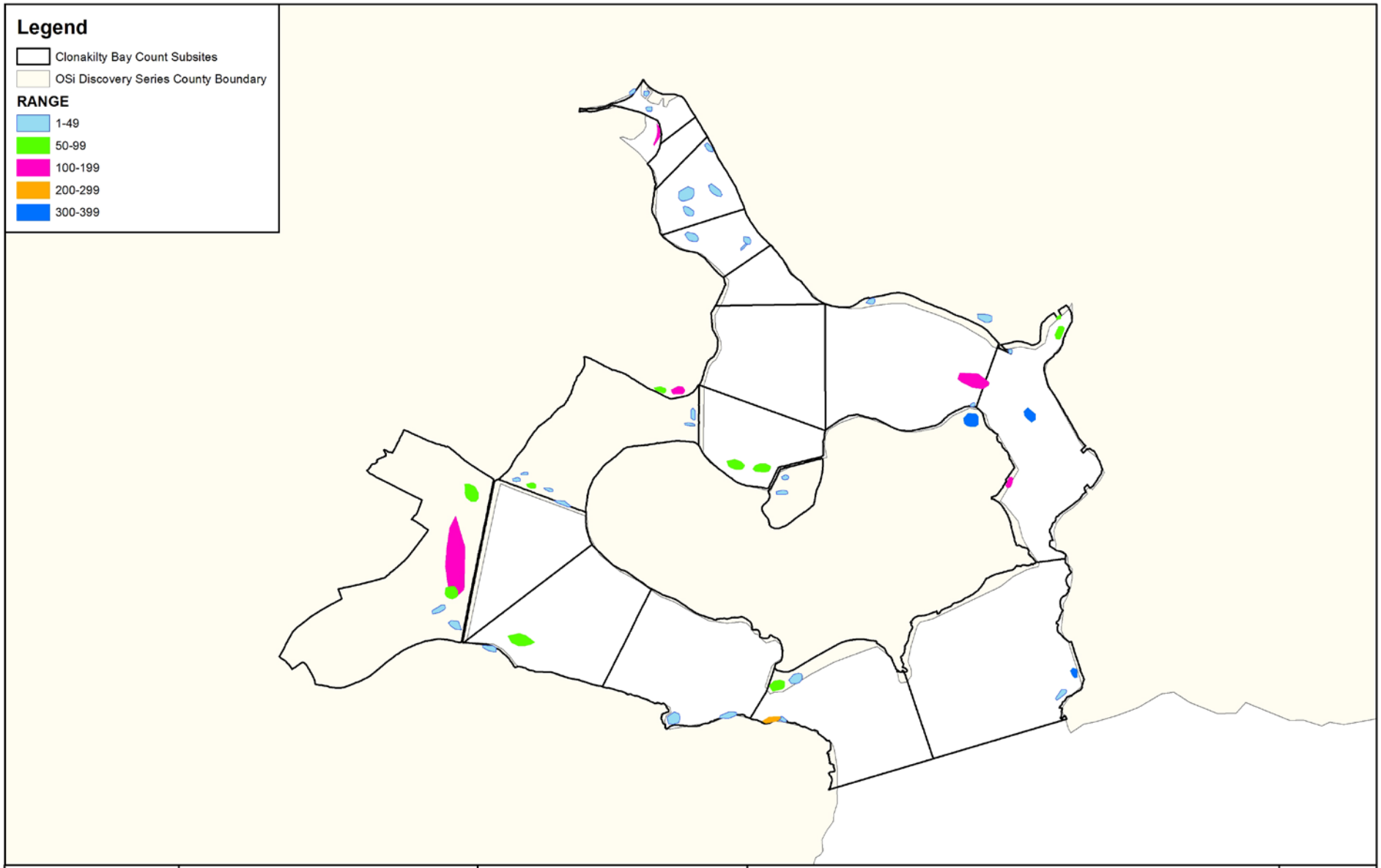

Legend
Clonakilty Bay Count Subsites
OSi Discovery Series County Boundary
Number of roosting birds/roost size
RANGE
1-49
50-99
100-199
200-299
300-399
400-499
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Clonakilty Bay
Roost Location Map
Data collected during
the roost survey on 03/11/2010
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
COUNTY CORK
0 0.25 0.5 0.75 1 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 0059214. © Ordnance Survey of Ireland Government of Ireland
Nil sna teorainneacha ar na léarscáileanna ach nod garshuiomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059214. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann
N
Map Version 1
Date: Sep 2014

(2a) Summary data and roost location maps from the roost survey 16th February 2011
(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
0L447	Deasys Quay	4	8	DN, GK, L., MS, RK, SN, T., WN
0L448	Desert North	-		
0L449	Desert South	4	8	BH, CM, GK, HG, L., RK, TT, WN
0L450	Youghals House	3	5	BH, HG, LB, MS, WN
0L451	Muckruss Head	4	5	BH, CM, DN, LB, RP
0L462	East Muckruss Strand	2	4	CA, OC, T., TT
0L465	West Muckruss Strand	2	2	KN, WN
0L500	Causeway	1	1	GK
0L501	Island Strand Intake	8	7	BH, BW, CM, CU, L., LB, T.
0L502	Clogheen Strand Intake	5	6	BW, CU, L., MA, RK, T.
0L503	Inchidoney Island	2	2	SU, WN
0L504	Inchidoney House	2	3	MA, T., WN
0L505	Youghals SE			
0L506	Ring Quay	4	9	BH, CM, CU, GB, GK, HG, LB, MA, RK
0L507	Ring Harbour	6	19	BA, BH, BW, CM, CU, CA, DN, GB, GV, HG, KN, L., LB, MA, MS, OC, RK, IN, WN
0L508	Ring Head	2	5	CM, DN, GV, KN, OC
0L509	Desert Church	-		

(2b) Clonakilty Bay SPA (4081) SCI species and recorded roosts 16/02/11 - shows number of roost locations within subsite, and in brackets, the peak number recorded at a single roost location

Species ► Subsites ▼	SU	DN	BW	CU
0L447		1 (4)		
0L448				
0L449				
0L450				
0L451		1 (270)		
0L462				
0L465				
0L500				
0L501			1 (23)	1 (16)
0L502			1 (75)	1 (71)
0L503	1 (82)			
0L504				
0L505				
0L506				1 (23)
0L507		1 (15)	2 (145)	2 (70)
0L508		1 (1)		
0L509				


Legend
Clonakilty Bay Count Subsites
OSi Discovery Series County Boundary
RANGE
1-49
50-99
100-199
200-299
300-399
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
Clonakilty Bay
Roost Location Map
Data collected during
the roost survey on 16/02/2011
Map to be read in conjunction with the NPWS Conservation Objectives
SPA Supporting Document.
COUNTY CORK
0
0.25
0.5
0.75
1 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 0059214. © Ordnance Survey of Ireland Government of Ireland
Nil sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059214. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann
N
Map Version 1
Date: Sep 2014

APPENDIX 9

Clonakilty Bay - Activities & Events

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

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

Activity/Event	0L447	0L448	0L449	0L450	0L451	0L462	0L465	0L500	0L501	0L502	0L503	0L504	0L505	0L506	0L507	0L508	0L509
1. Coastal protection, sea defences & stabilisation																	
1.1 Linear defences	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O		O
1.2 Training walls															O		
1.5 Marram grass planting					O											O	
1.6 Other modifications				O													O
2. Barrage schemes/drainage																	
2.2 Altered drainage/river channel	O							O	O	O		O					
2.4 Tidal barrages				P													P
2.5 Other		H	H						O	O							
4. Industrial, port & related development																	
4.2 Fishing harbour															O		
4.3 Slipway														O			
4.4 Pier	H													O	O		
4.8 Other						O											
6. Pollution																	
6.1 Domestic & urban waste water	O	O						O			O						
6.7 Solid waste incl. fly-tipping	O	O	O	O			O	O	O	O					O		
7. Sediment extraction																	
7.4 Removal of beach materials					O											O	
8. Transport & communications																	
8.2 Flight path					O												
8.3 Bridges & aqueducts															O		
8.5 Road schemes	O	O	O	O				O	O	O	O	O	O	O	O		O
8.6 Car parks					O												
9. Urbanisation																	
9.1 Urbanised areas, housing	O					O									O		

Activity/Event	0L447	0L448	0L449	0L450	0L451	0L462	0L465	0L500	0L501	0L502	0L503	0L504	0L505	0L506	0L507	0L508	0L509
9.3 Hotel & leisure complex					O											O	
12. Tourism & recreation																	
12.2 Non-marina moorings						O									O		
12.8 Sailing															O	O	
12.9 Sailboarding & wind-surfing					O											O	
12.12 Surfing					O											O	
12.13 Rowing															O	O	
12.14 Tourist boat trips															O	O	
12.15 Angling					O	O					O			O	O	O	
12.17 Bathing & general beach recreation					O											O	
12.18 Walking, incl. dog walking	O	O	O	O	O	O		O	O	O				O	O	O	O
12.19 Birdwatching	O	O	O					O	O	O							
12.23 Horse-riding					O	O											
13. Wildfowl & hunting																	
13.1 Wildfowling									O								
14. Bait-collecting																	
14.1 Digging for lugworms/ragworms													O	O			O
15. Fisheries & Aquaculture																	
15.4 Fish traps & other fixed devices & nets														U	U		
15.5 Leisure fishing					O									O	O		
16. Agriculture & forestry																	
16.1 Saltmarsh grazing/harvesting							O										
16.2 Grazing: intensive (terrestrial)													O	O	O	O	
16.3 Grazing: non-intensive (terrestrial)	O								O	O							
16.10 Mowing/grassland cutting	O																
16.12 Polderisation	O	O							O	O							

Activity/Event	0L447	0L448	0L449	0L450	0L451	0L462	0L465	0L500	0L501	0L502	0L503	0L504	0L505	0L506	0L507	0L508	0L509
16.13 Agricultural land-claim									O	O		O					
16.14 In-filling ditches, ponds, pools, marshes										O							
19. Natural events																	
19.1 Storms, floods and storm surges	O	O	O	O					O	O							
19.3 Eutrophication	O	O	O	O					O	O	O	O	O	O	O		O

APPENDIX 10

Disturbance Assessment

Scoring system - definitions & rationale

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

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

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

Scoring system – worked example

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

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

Activity/event	0L448	0L451	0L462	0L465	0L502	0L504	0L506	0L507	0L508
12. Tourism & recreation									
12.9 Sailboarding & wind-surfing		4							
12.15 Angling		3							
12.18 Walking, incl. dog walking	4	7	4	5	5	4	5	5	5
12.23 Horse-riding		6	5						