Tralee Bay Complex Special Protection Area

(Site Code 4188)

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Conservation Objectives Supporting Document

VERSION 1

National Parks & Wildlife Service

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SUMMARY

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

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

Part Two provides site designation information for Tralee Bay Complex 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 2009/10 Waterbird Survey Programme, drawing also on data from NPWS monitoring programmes (e.g. benthic surveys) and the Irish Wetland Bird Survey (I-WeBS). Part Five concludes with information on activities and events that occur in and around the site which may interact with waterbirds during the non-breeding season and includes an assessment of those activities that were recorded to cause disturbance to non-breeding waterbirds during the 2009/10 Waterbird Survey Programme.

PART ONE - INTRODUCTION

1.1 Introduction to the designation of Special Protection Areas

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

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

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

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

The National Parks & Wildlife Service (NPWS), part of the Department of the Arts, Heritage and the Gaeltacht, are responsible for the selection and designation of SPAs in Ireland. NPWS have 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 (referred to as a species that occurs in numbers of 'international importance');

- A migratory species that occurs at the site in numbers that exceed the all-Ireland 1% threshold (referred to as a species that occurs in numbers of '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 over-winter 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 Tralee Bay Complex Special Protection Area

Tralee Bay Complex is a large coastal wetland site situated on the north-eastern coast of the Dingle Peninsula, Co Kerry. It comprises four main elements as follows:-

- Inner Tralee Bay – from the inner bay the designated area extends along the northern shoreline towards Fenit, and westwards along the northern shoreline of the Dingle Peninsula to a point on Derrymore Island. This area encompasses the estuary of the River Lee which flows through Tralee Town and has extensive sand and mudflats which support an important area of seagrass *Zostera noltii* at Derrymore, as well as large areas of saltmarsh. This area is important for a diversity of migratory non-breeding waterbirds particularly wading birds that forage on the tidal flats, and Light-bellied Brent Geese that forage amongst the seagrass beds.
- The shoreline from Barrow Harbour in the south towards Ballyheige in the north - this area includes a good diversity of coastal habitats including shingle and sandy beaches, salt marshes, sand dunes and intertidal sand and mud flats. Rocky shore, dry grassland, wet grassland and reed beds are also present. The site includes Akeragh Lough which was formerly a brackish lagoon but has been silting up since the 1970s and is now mainly wet grassland and swamp vegetation. Barrow Harbour is a sheltered inlet providing important feeding and roosting habitat for wintering waterbirds. Carrahane Strand is a sandy inlet backed by saltmarshes.
- The western shore of Tralee Bay which encompasses long stretches of sandy beach and sediment as well as rocky intertidal habitats of the Magharees Peninsula, often backed by extensive sand dunes.
- Lough Gill – this is a large natural and shallow sedimentary lagoon located at the base of the Magharees Peninsula on the western side of Tralee Bay. A freshwater stream flows into the southwest of the lagoon and there is a channel flowing from the lagoon into Tralee Bay but as tidal exchange is limited by a one-way sluice, the lagoon is only slightly brackish. The water depth is mostly less than 50cm and the lough is important for a range of waterfowl species including Whooper Swans. *Phragmites*-dominated swamps occur, particularly around the freshwater inflow, and much of the lagoon is bordered by dunes and dune grassland.

The Site Synopsis for Tralee Bay Complex 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].

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

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

Further guidance is given in Section 3.1 (Conservation Objectives for the Special Conservation Interests of Tralee Bay Complex SPA).

[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 Tralee Bay Complex Special Protection Area

This site is selected for SPA designation as it regularly holds over 20,000 wintering waterbirds making this a site of international importance.

The **Special Conservation Interest species**[3] of Tralee Bay Complex SPA are listed below and summarised in Table 2.1. This table also shows the importance of Tralee Bay Complex SPA for SCI species relative to the importance of other sites within Ireland, within the South Western region, and within Co. Kerry.

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

1. During winter the site regularly supports 1% or more of the all-Ireland population of Whooper Swan (*Cygnus cygnus*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 101 individuals.

2. During winter the site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta bernicla hrota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,412 individuals.

3. During winter the site regularly supports 1% or more of the all-Ireland population of Shelduck (*Tadorna tadorna*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 220 individuals.

4. During winter the site regularly supports 1% or more of the all-Ireland population of Wigeon (*Anas penelope*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,634 individuals.

5. During winter the site regularly supports 1% or more of the all-Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 623 individuals.

6. During winter the site regularly supports 1% or more of the all-Ireland population of Mallard (*Anas platyrhynchos*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 571 individuals.

7. During winter the site regularly supports 1% or more of the all-Ireland population of Pintail (*Anas acuta*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 54 individuals.

8. During winter the site regularly supports 1% or more of the all-Ireland population of Scaup (*Aythya marila*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 892 individuals.

9. During winter the site regularly supports 1% or more of the all-Ireland population of Oystercatcher (*Haematopus ostralegus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,011 individuals.

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

10. During winter the site regularly supports 1% or more of the all-Ireland population of Ringed Plover (*Charadrius hiaticula*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 344 individuals.

11. During winter the site regularly supports 1% or more of the all-Ireland population of Golden Plover (*Pluvialis apricaria*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 6,393 individuals.

12. During winter the site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 195 individuals.

13. During winter the site regularly supports 1% or more of the all-Ireland population of Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 6,106 individuals.

14. During winter the site regularly supports 1% or more of the all-Ireland population of Sanderling (*Calidris alba*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 228 individuals.

15. During winter the site regularly supports 1% or more of the all-Ireland population of Dunlin (*Calidris alpina*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,444 individuals.

16. During winter the site regularly supports 1% or more of the all-Ireland population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 139 individuals.

17. During winter the site regularly supports 1% or more of the all-Ireland population of Bar-tailed Godwit (*Limosa lapponica*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 608 individuals.

18. During winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,170 individuals.

19. During winter the site regularly supports 1% or more of the all-Ireland population of Redshank (*Tringa totanus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 635 individuals.

20. During winter the site regularly supports 1% or more of the all-Ireland population of Turnstone (*Arenaria interpres*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 229 individuals.

21. During winter the site regularly supports 1% or more of the all-Ireland population of Black-headed Gull (*Chroicocephalus ridibundus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,320 individuals.

22. During winter the site regularly supports 1% or more of the all-Ireland population of Common Gull (*Larus canus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 599 individuals.

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

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

Special Conservation Interests	Annex I species	Baseline population	Population status at baseline	National Importance Rank[1]	Regional Importance Rank[2]	County Importance Rank[3]
Whooper Swan *Cygnus Cygnus*	Yes	101	All-Ireland Importance	17	2	1
Light-bellied Brent Goose *Branta bernicla hrota*		1,412	International Importance	3	1	1
Shelduck *Tadorna tadorna*		220	All-Ireland Importance	12	2	1
Wigeon *Anas penelope*		1,634	All-Ireland Importance	15	4	2
Teal *Anas crecca*		623	All-Ireland Importance	19	6	1
Mallard *Anas platyrhynchos*		571	All-Ireland Importance	6	1	1
Pintail *Anas acuta*		54	All-Ireland Importance	10	3	2
Scaup *Aythya marila*		892	All-Ireland Importance	1	1	1
Oystercatcher *Haematopus ostralegus*		1,011	All-Ireland Importance	7	2	1
Ringed Plover *Charadrius hiaticula*		344	All-Ireland Importance	2	1	1
Golden Plover *Pluvialis apricaria*	Yes	6,393	All-Ireland Importance	4	2	1
Grey Plover *Pluvialis squatarola*		195	All-Ireland Importance	12	2	1
Lapwing *Vanellus vanellus*		6,106	All-Ireland Importance	6	2	1
Sanderling *Calidris alba*		228	All-Ireland Importance	6	2	2
Dunlin *Calidris alpina*		2,444	All-Ireland Importance	14	3	1
Black-tailed Godwit *Limosa limosa*		139	All-Ireland Importance	24	7	1
Bar-tailed Godwit *Limosa lapponica*	Yes	608	All-Ireland Importance	7	1	1
Curlew *Numenius arquata*		1,170	All-Ireland Importance	8	4	1
Redshank *Tringa totanus*		635	All-Ireland Importance	1	2	1

Special Conservation Interests	Annex I species	Baseline population	Population status at baseline	National Importance Rank[1]	Regional Importance Rank[2]	County Importance Rank[3]
Turnstone *Arenaria interpres*		229	All-Ireland Importance	4	1	1
Black-headed Gull *Chroicocephalus ridibundus*		1,320	All-Ireland Importance	12	4	1
Common Gull *Larus canus*		599	All-Ireland Importance	7	4	1
Other conservation designations associated with the site[a]	**SAC**	**RAMSAR SITE**	**IBA**	**WILDFOWL SANCTUARY**	**OTHER**	**OTHER**
	Yes 000332 002070	Yes	Yes	Yes (Lough Gill)	pNHA	

[a] Baseline data for the period 1995/96 – 1999/00 from I-WeBS with the exception of Whooper Swan (Robinson et al. 2004a) and Light-bellied Brent Goose (Robinson et al. 2004b).
[b] Note that other designations associated with Tralee Bay Complex SPA may relate to different areas and/or some of these areas may extend outside the SPA boundary.
[1]National importance rank - the number given relates to the importance of the site for the non-breeding population of a SCI species during the baseline period (1995/96 – 1999/00) relative to other sites in Ireland.
[2]Regional importance rank - the number given relates to the importance of the site for the non-breeding population of a SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within the south western region.
[3]County importance rank - the number given relates to the importance of the site for the non-breeding population of a SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within Co Kerry.

PART THREE - CONSERVATION OBJECTIVES FOR TRALEE BAY COMPLEX SPA

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

The overarching Conservation Objective for Tralee Bay Complex 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 Tralee Bay Complex Special Protection Area, based on the principles of favourable conservation status, are described below and summarised in Table 3.1. Note that objectives should be read and interpreted in the context of information and advice provided in additional sections of this report.

Objective 1: *To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Tralee Bay Complex 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.[4] Waterbird populations are deemed to be unfavourable when they have declined by 25% or more over a 12-year period.[5]

- 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.[6]

Factors that can adversely effect 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

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

[5] Species site population trends are presented in Section 4.

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

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).

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

Objective 2: *To maintain the favourable conservation condition of the wetland habitat at Tralee Bay Complex 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 **3,657 ha**, other than that occurring from natural patterns of variation.

The boundary of Tralee 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 three broad types: subtidal; intertidal; and supratidal, plus the additional categories of supratidal (pertaining to Akeragh Lough), lagoon and associated (pertaining to Lough Gill), and lagoon and associated habitats (other areas).

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 Tralee Bay SPA this broad category is estimated to be **1,065 ha**. Subtidal areas are continuously available for ducks (e.g. Teal, Pintail) 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 watermark. For Tralee Bay Complex SPA this is estimated to be **1,745 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[7] areas. When the intertidal area is inundated by the tide it becomes available for 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 Tralee Bay Complex SPA this is estimated to be **540 ha**.

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

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 supratidal (Akeragh Lough) relates to the supratidal/wetland habitat surrounding Akeragh Lough. For Tralee Bay Complex SPA this habitat category is estimated to be **121 ha**.

The category known as lagoon and associated habitats (Lough Gill) relates to the lagoon and associated wetland habitats of Lough Gill. For Tralee Bay Complex SPA this habitat category is estimated to be **129 ha**.

The category known as lagoon and associated habitats (other areas) is estimated to be **56 ha**.

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 non-breeding waterbird Special Conservation Interests of Tralee Bay Complex SPA.

Objective 1: *To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Tralee Bay Complex 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 2009/10 waterbird survey programme is reviewed in Part Five of this document.
Objective 2: *To maintain the favourable conservation condition of the wetland habitat at Tralee Bay Complex 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 3,657 ha, other than that occurring from natural patterns of variation.	The wetland habitat area was estimated as 3,657 ha using OSI data and relevant orthophotographs.

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

4.1 Population data for non-breeding waterbird SCI species of Tralee Bay Complex SPA

Non-breeding waterbirds have been counted regularly at Tralee Bay Complex as part of the Irish Wetland Bird Survey (I-WeBS) since the survey commenced in 1994. The total I-WeBS count area is approximately 3,800 ha. With the exception of the period 1994/95 to 1997/98, the site has been counted five or more times each season during the period September to March inclusive. This core survey period 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[8]. During I-WeBS the site is divided into several count subsites. Although the SPA area and the I-WeBS count area are similar, it should be borne in mind that they are not coincident. Two waterbird species (Whooper Swan and Light-bellied Brent Goose) are also the subject of separate, species-specific surveys (see Appendix 2).

Table 4.1 presents population[9] data for the non-breeding waterbird Special Conservation Interest (SCI) species of Tralee Bay Complex SPA. All data are from the I-WeBS database with the exception of Whooper Swan and Light-bellied Brent Goose where data from their separate, species-specific surveys are also included. For the calculation of the individual species populations shown, total numbers were calculated from counts summed across all subsites counted in each month surveyed. Annual maxima were identified and used to calculate the five-year mean peak for each species. The baseline period was 1995/96 – 1999/00 and the most recent five-year average is 2006/07 – 2010/11. When examining waterbird data, it is standard practice to use the mean of peak counts because it reflects more accurately the importance of a site for a particular species by helping to account for inconsistencies in data gathering (i.e. differing coverage) or extraordinary fluctuations in numbers. However it is important to note that waterbird counts represent a 'snapshot' of bird numbers during a count session, so in general and taking into account all potential sources of error, resulting data are regarded to be underestimates of population size (Underhill & Prŷs-Jones, 1994).

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

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

[8] 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).

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

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

Table 4.1 Population data for waterbird Special Conservation Interest Species of Tralee Bay Complex SPA

Site Special Conservation Interests (SCIs)	Baseline Period (1995/96 - 1999/00)*	Recent Site Data (2006/07 – 2010/11)
Whooper Swan	101 (n)	108
Light-bellied Brent Goose	1,412 (i)	3,484 (i)
Shelduck	220 (n)	62
Wigeon	1,634 (n)	957 (n)
Teal	623 (n)	285
Mallard	571 (n)	382 (n)
Pintail	54 (n)	1
Scaup	892 (n)	322 (n)
Oystercatcher	1,011 (n)	957 (n)
Ringed Plover	344 (n)	136 (n)
Golden Plover	6,393 (n)	3,795 (n)
Grey Plover	195 (n)	17
Lapwing	6,106 (n)	3,594 (n)
Sanderling	228 (n)	693 (n)
Dunlin	2,444 (n)	630 (n)
Black-tailed Godwit	139 (n)	584 (n)
Bar-tailed Godwit	608 (n)	402 (n)
Curlew	1,170 (n)	839 (n)
Redshank	635 (n)	509 (n)
Turnstone	229 (n)	300 (n)
Black-headed Gull	1,320 (n)	834
Common Gull	599 (n)	186

* all data are from I-WeBS with the exception of Whooper Swan (Robinson et al. 2004a) and Light-bellied Brent Goose (Robinson et al. 2004b).
(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 at Tralee Bay Complex 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. The methods include the calculation of annual indices using a standard set of months which excludes passage periods; unlike the mean peaks shown in Section 4.1 that include data across a longer time period; so it should be borne in mind that waterbird population data presented in Section 4.1 and 4.2 are not directly comparable. A detailed methodology for the trend analysis is provided in Appendix 3.

Annual population indices were calculated for waterbird SCI species for the data period 1994/95 to 2010/11. Trends are given for the 'long-term' 14-year period (1995/96–2009/10) and the recent ('short-term') five-year period (2004/05 – 2009/10) (Table 4.2). The values given represent the percentage change in index (population) values across the specified time period. Positive values equate to increases in population size while negative values reflect a decrease in population size. Some caution is necessary with calculated trends as lower count coverage in early seasons of I-WeBS at this site led to a higher imputation process than is desirable.

Waterbirds are relatively long-lived birds and changes in population size can take several years to become evident. The short term trend can be useful as an indicator to assess whether species numbers at the site are remaining stable, showing increase or signs of recovery or are continuing to decline. For example, although a species' long-term trend may be negative, the short-term

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

Trend analysis using population indices was not carried out for Black-headed Gull or Common Gull because these species are not counted routinely during I-WeBS. For these species, a measure of population change was calculated using the generic threshold method (JNCC, 2004) which compares population size at two time intervals, based on five-year means.

Table 4.2 Site Population Trends for waterbird Special Conservation Interest species of Tralee Bay Complex SPA

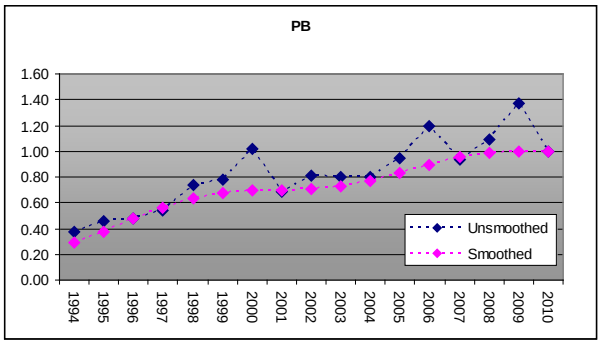
Special Conservation Interests	Site Population Trend[1] 14 Yr	Site Population Trend[2] 5 Yr	Population Change[3]
Whooper Swan	+ 9	- 11	
Light-bellied Brent Goose	+ 164	+ 29	
Shelduck	- 56	- 40	
Wigeon	- 32	- 22	
Teal	- 42	- 38	
Mallard	- 17	+ 5	
Pintail	- 77	- 28	
Scaup	- 77	+ 14	
Oystercatcher	+ 48	+ 5	
Ringed Plover	- 32	- 37	
Golden Plover	- 24	- 54	
Grey Plover	- 80	- 62	
Lapwing	- 60	- 54	
Sanderling	+ 170	+ 19	
Dunlin	- 59	+ 1	
Black-tailed Godwit	+ 110	+ 10	
Bar-tailed Godwit	- 17	- 15	
Curlew	- 23	- 18	
Redshank	+ 44	+ 32	
Turnstone	+ 31	+ 10	
Black-headed Gull			- 37
Common Gull			- 69

[1]Site population trend analysis: 14-year period = 1995/96–2009/10
[2]Site population trend analysis: 5 yr = 2004/05 – 2009/10.
[3]Site population change based on two five-year – means (1995/96 – 1999/00 and 2005/06 – 2009/10).

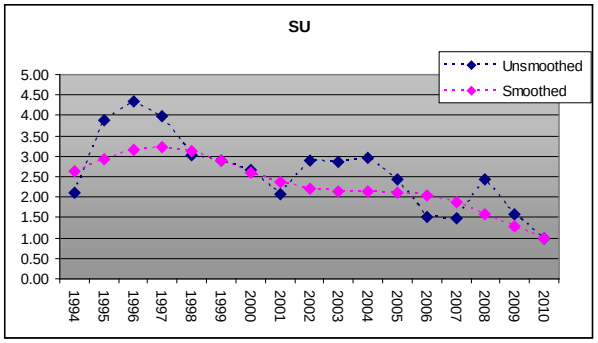
For selected species, explanatory notes are given below to aid the interpretation of trends. Smoothed and unsmoothed indices are shown graphically. Site trends are compared with national trends (Boland & Crowe, 2012[11]); all-Ireland trends (Crowe & Holt, 2013) and British trends (Holt et al. 2012). Graph headings use waterbird species codes and a list of these is provided in Appendix 4.

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

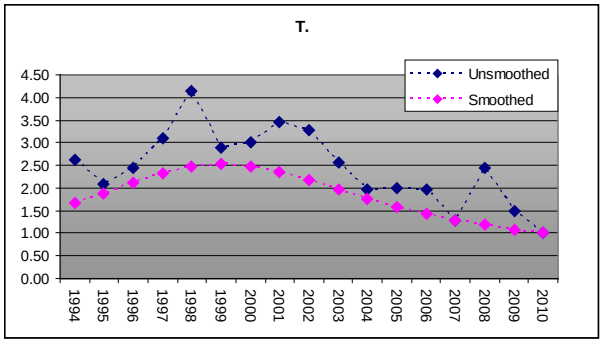
Light-bellied Brent Goose – the long-term trend is for increasing numbers at Tralee Bay. Nationally, numbers increased at an annual rate of 5.1% over the period 1994/95 to 2008/09.



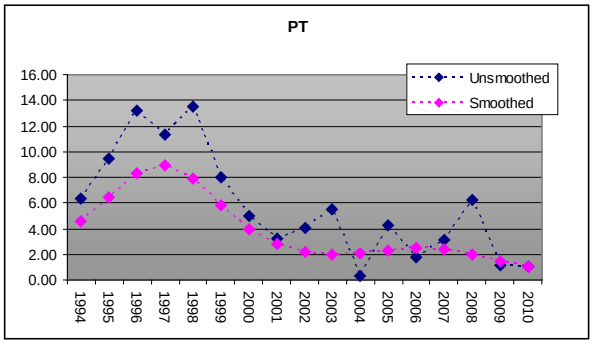
Shelduck – the long-term trend is for progressively decreasing numbers of Shelduck at Tralee Bay. Nationally, numbers have shown a slight but steady decline since the mid 1990's, consistent with the trend observed in Britain.



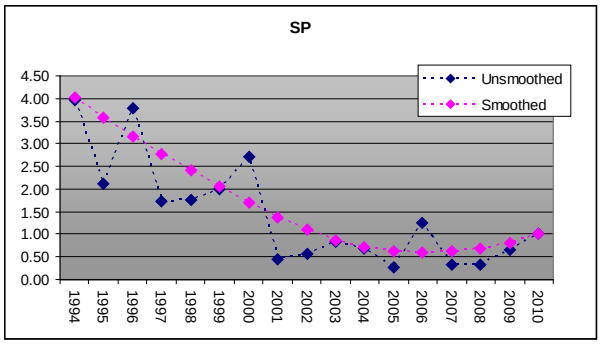
Teal – following a period of increasing numbers in the seasons 1995/96 to 1998/99, numbers at the site have decreased over time. This trend is at variance with the national trend, numbers having increased throughout I-WeBS, while the all-Ireland trend is currently stable (Crowe & Holt, 2013).



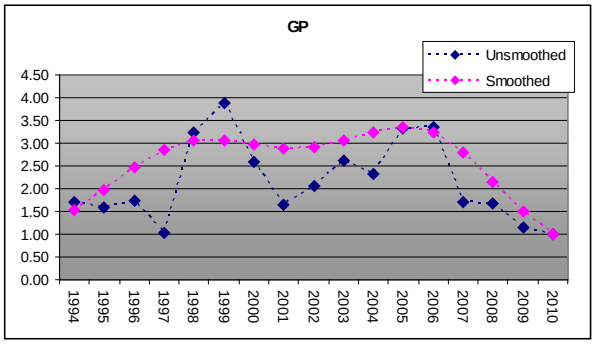
Pintail – following a period of relatively high numbers during the mid to late 1990's, numbers at the site underwent a period of marked decline and this dabbling duck has not been recorded at the site since 2006/07 (recent data points therefore based on imputed values – see methodology in Appendix 3). The decline in numbers from the late 1990's is consistent with that observed at national level however numbers nationally have since recovered to former levels.



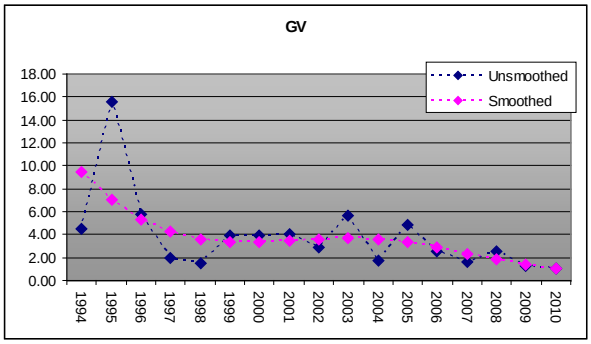
Scaup – numbers of Scaup have fluctuated, both within and between winters. However a long-term trend for decline in numbers at this site is evident. Some recovery since 2007/08 is reflected by the short-term trend for increase. Nationally, numbers have declined throughout I-WeBS while the all-Ireland trend is stable; driven by increasing numbers in Northern Ireland.



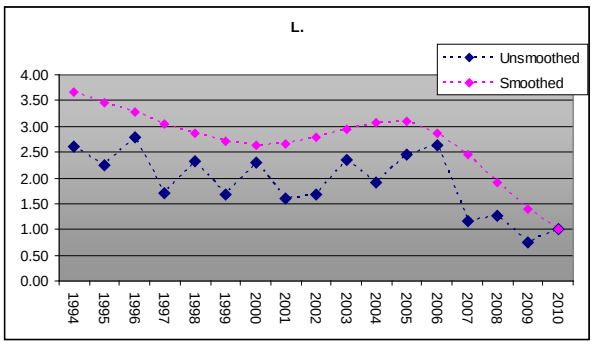
Golden Plover – smoothed indices suggest a period of increasing numbers followed by a period of relative stability until 2006/07 after which numbers declined. The low numbers recorded at both the site and nationally during the seasons 2009/10 and 2010/11 is most likely related to the cold weather experienced in both seasons; January 2010 being the coldest on record for 25 years (Met Éireann, 2010). Golden Plover is one of a suite of species known to respond to cold weather with the birds ranging more widely and some moving to France and the Iberian Peninsula (e.g. Crowe et al. 2012).



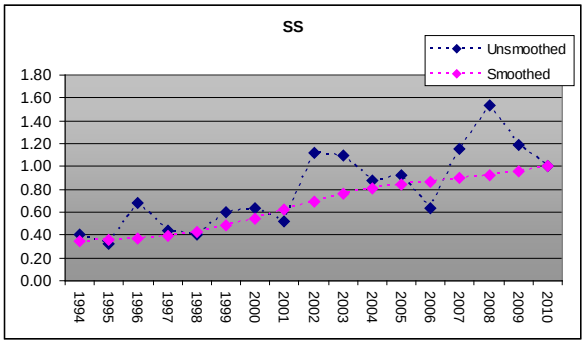
Grey Plover – a marked long-term trend for declining numbers at the site is consistent with the national and all-Ireland trend. In Britain, numbers declined steadily during the period mid 1990's to mid 2000's and are currently relatively stable.



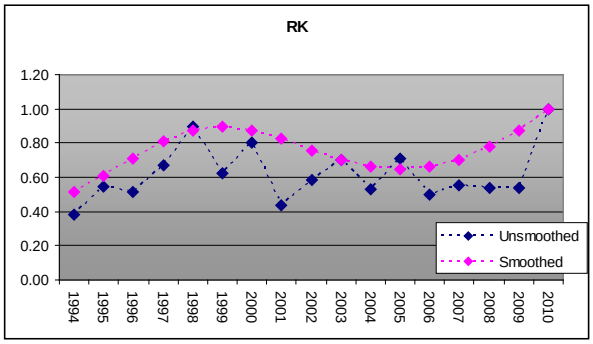
Lapwing – despite recovering somewhat during the period 2002/03 to 2006/07, numbers at the site have shown an overall long-term trend for decline. As with Golden Plover, low numbers recorded at both site and national level during the seasons 2009/10 and 2010/11 is most likely related to the cold weather events experienced in both seasons; with Lapwings ranging more widely and some moving to France and the Iberian Peninsula (e.g. Crowe et al. 2012).



Sanderling – a progressive increase in numbers at the site is consistent with the national trend. Numbers have increased throughout I-WeBS at an annual rate of 7%. The long-term trend in Britain is also for increasing numbers.



Redshank – following a period of increasing numbers in the early seasons up to 2000/01, numbers decreased and levelled off up to the mid 2000's. A site peak number recorded during 2010/11 influences the long- and short-term trend for increase. Nationally this species has an increasing trend while the all-Ireland trend is stable. Numbers in Britain have been relatively stable across the long-term.



4.3 Tralee Bay Complex SPA – site conservation condition of non-breeding waterbirds

Conservation condition of waterbird species is determined using the long-term (14-year) site population trend. For Black-headed Gull and Common Gull, conservation condition has been assigned using % population change (See Section 4.2) but this is tentative given factors (described above) in relation to their count coverage during the non-breeding season.

Conservation condition is assigned using the following criteria:

Favourable population = population is stable/increasing.

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

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

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

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

(Leech et al., 2002). Declines of more than 25.0% are deemed of greater ecological significance for the long-term.

With regards the 22 non-breeding waterbird species of Special Conservation Interest for Tralee Bay Complex SPA, and based on the long-term (14-year) population trend for the site, it has been determined that (Table 4.3):-

1. 7 species are considered as **highly unfavourable** (Shelduck, Pintail, Scaup, Grey Plover, Lapwing, Dunlin and Common Gull);
2. 4 species are considered as **moderately unfavourable** (Wigeon, Teal, Ringed Plover and Black-headed Gull);
3. 4 species are considered as **intermediate (unfavourable)** (Mallard, Golden Plover, Bar-tailed Godwit and Curlew);
4. 7 species are currently considered as **favourable** (Whooper Swan, Light-bellied Brent Goose, Oystercatcher, Sanderling, Black-tailed Godwit, Redshank and Turnstone).

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

Table 4.3 also shows the relationship between a species' long-term site trend and the current national trend. 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 1.0 – 24.9% decline at site level but are stable or increasing at all-Ireland level.
- Pink - species whose populations are exhibiting a 25.0 – 49.9% decline at site level but are stable or increasing at all-Ireland level.
- Red - species whose populations are exhibiting a decline of >50.0% at site level but are stable or increasing at all-Ireland level.

The pink and red categories 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).

Table 4.3 Non-breeding waterbirds of Tralee Bay Complex SPA – Current Site Conservation Condition

Site Special Conservation Interests (SCIs)	Current Site Trend 14 Yr[a]	Site Conservation Condition	BoCCI Category[b]	Current All-Ireland Trend[c]	Current International Trend[d]
Whooper Swan	+ 9	Favourable	Amber	Increasing	Increasing
Light-bellied Brent Goose	+ 164	Favourable	Amber	Increasing	Increasing
Shelduck	- 56	Moderately Unfavourable	Amber	Stable	Increasing
Wigeon	- 32	Moderately Unfavourable	Red	Declining	Stable
Teal	- 42	Intermediate (Unfavourable)	Amber	Stable	Increasing
Mallard	- 17	Intermediate (Unfavourable)	Green	Declining	Unknown
Pintail	- 77	Highly Unfavourable	Red	Increasing	Increasing
Scaup	- 77	Moderately Unfavourable	Amber	Increasing	Declining
Oystercatcher	+ 48	Favourable	Amber	Increasing	Declining
Ringed Plover	- 32	Intermediate (Unfavourable)	Green	Stable	Fluctuating
Golden Plover	- 24	Favourable	Red	Declining	Declining
Grey Plover	- 80	Highly Unfavourable	Amber	Declining	Declining
Lapwing	- 60	Moderately Unfavourable	Red	Declining	Stable
Sanderling	+ 170	Favourable	Green	Increasing	Increasing
Dunlin	- 59	Highly Unfavourable	Red	Declining	Stable
Black-tailed Godwit	+ 110	Favourable	Amber	Increasing	Increasing
Bar-tailed Godwit	- 17	Intermediate (Unfavourable)	Amber	Stable	Increasing
Curlew	- 23	Moderately Unfavourable	Red	Declining	Declining
Redshank	+ 44	Favourable	Red	Stable	Stable/Increasing
Turnstone	+ 31	Favourable	Green	Increasing	Increasing?
Black-headed Gull	-37	Intermediate (Unfavourable)	Red	n/c	n/c
Common Gull	-69	Highly Unfavourable	Amber	n/c	n/c

[a] Site population trend analysis; see Table 4.3; [b]after Colhoun & Cummins (2013); [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).

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 Tralee Bay Complex SPA.

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

The information provided is intended to:-

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

Note however, that this information does not aim to provide a comprehensive assessment on which to assess plans and projects as required under the Habitats Directive, but rather should inform the scope of these assessments and help direct where further detailed examinations are required. The information presented in this report was compiled in December 2011 and updated in January 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. The I-WeBS database shows 87 waterbird species that have been recorded at Tralee Bay Complex SPA during the period 1994/95 – 2010/11 representing 11 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 species and for other waterbird species included in the total waterbird assemblage. These species may include those that utilise the site during passage, those that are present in months of the year outside of the non-breeding season[12] or species that use the site at certain times only (e.g. as a cold weather refuge).

In the period 1994/95 to 2010/11, Tralee Bay supported 17 waterbird species on a regular basis during the non-breeding season[13] in addition to the listed Special Conservation Interest

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

[13] Regular is defined as a species that has occurred in 14 out of the 17-year I-WeBS data period.

species for the site. These species are shown in Table 5.1 together with their population data for the baseline period (1995/96 – 1999/00) and the recent five-year mean (2006/07 – 2010/11). Note that the all-Ireland 1% thresholds used to compare with the baseline and recent site averages are different (Crowe et al. 2008 and Crowe & Holt, 2013 respectively).

Table 5.1 Regularly-occurring non SCI waterbird species that occur at Tralee Bay Complex SPA during the non-breeding season (n) denotes numbers of all-Ireland importance

Species	Baseline Period (1995/96 – 1999/00)	Recent Site Average (2006/07 – 2010/11)
Mute Swan (*Cygnus olor*)	144 (n)	175 (n)
Gadwall (*Anas strepera*)	31 (n)	7
Tufted Duck (*Aythya fuligula*)	47	52
Red-breasted Merganser (*Mergus serrator*)	31	8
Great Northern Diver (*Gavia immer*)	11	13
Great Crested Grebe (*Podiceps cristatus*)	4	7
Cormorant (*Phalacrocorax carbo*)	33	44
Little Egret (*Egretta garzetta*)	2	9
Grey Heron (*Ardea cinerea*)	14	11
Moorhen (*Gallinula chloropus*)	12	3
Coot (*Fulica atra*)	30	12
Knot (*Calidris canutus*)	116	204
Snipe (*Gallinago gallinago*)	145	45
Greenshank (*Tringa nebularia*)	42 (n)	18
Lesser Black-backed Gull (*Larus fuscus*)	19	5
Herring Gull (*Larus argentatus*)	134	16
Great Black-backed Gull (*Larus marinus*)	36	9

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 Tralee Bay Complex SPA. Information is provided for the following categories[14]:-

- waterbird family (group);
- winter distribution – species distribution range during winter. Please note this is based on the period 1996/97 – 2000/01 (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).

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

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

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

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

Thus 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

	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]
Whooper Swan *Cygnus cygnus*	Anatidae (swans)	Widespread	1, 7	Wide	Lough Gill	2	Moderate/ High
Light-bellied Brent Goose *Branta bernicla hrota*	Anatidae (geese)	Localised	1, 5	Highly specialised	Intertidal mud and sand flats, seagrass beds	2	High
Shelduck *Tadorna tadorna*	Anatidae (shelducks)	Localised	1, 5	Wide	Intertidal mud and sand flats	3	High
Wigeon *Anas penelope*	Anatidae (dabbling ducks)	Widespread	1, 5	Narrower	Intertidal mud and sand flats & sheltered & shallow subtidal	1	Weak
Teal *Anas crecca*	Anatidae (dabbling ducks)	Widespread	1	Wide	Shallow subtidal and intertidal mud and sandflats	3	Weak
Mallard *Anas platyrhynchos*	Anatidae (dabbling ducks)	Very widespread	1	Wide	Very shallow water above intertidal mud and sand flats, intertidal mud and sandflats	1	Moderate
Pintail *Anas acuta*	Anatidae (dabbling ducks)	Localised	1	Wide	Sheltered & shallow subtidal over sand flats	1	Weak
Scaup *Aythya marila*	Anatidae (diving ducks)	Highly restricted	2	Wide	Sheltered & shallow subtidal; Lough Gill	1	Unknown
Oystercatcher *Haematopus ostralegus*	Haematopodidae (wading birds)	Intermediate	4	Narrower	Intertidal mud and sand flats	2	High
Ringed Plover *Charadrius hiaticula*	Charadriidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	High
Golden Plover *Pluvialis apricaria*	Charadriidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate
Grey Plover *Pluvialis squatarola*	Charadriidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	High
Lapwing *Vanellus vanellus*	Charadriidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	Moderate
Sanderling *Calidris alba*	Scolopacidae (wading birds)	Localised	4, 6	Wide	Intertidal 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

	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]
Bar-tailed Godwit *Limosa lapponica*	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	Moderate
Curlew *Numenius arquata*	Scolopacidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	High
Redshank *Tringa totanus*	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate
Turnstone *Arenaria interpres*	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	High
Black-headed Gull *Chroicocephalus ridibundus*	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal mud and sand flats & sheltered & shallow subtidal	2	Moderate
Common Gull *Larus canus*	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal mud and sand flats & sheltered & shallow subtidal	2	Moderate

[A] Winter distribution: 1 = very widespread (>300 sites); 2 = widespread (200 – 300 sites); 3 = intermediate (100 – 200 sites); 4 = localised (50-100 sites); 5 = 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 - where 1 = species with a wide prey/food range; 2 = species with a narrower prey range (e.g. species that forage upon a few species/taxa only), and 3 = highly specialised foraging requirements. Note that the known link between Light-bellied Brent Goose and *Zostera* sp. relates to the 'highly specialised' requirement.
[D] Principal supporting habitat present within Tralee Bay Complex SPA. Note that this is the main habitat used when foraging with the exception of Golden Plover and Lapwing (roosting).
[E] Ability to utilise alternative habitats refers to the species ability to utilise other habitats adjacent to the site. 1 = wide-ranging species with requirement to utilise the site as and when required; 2 = reliant on site but highly likely to utilise alternative habitats at certain times (e.g. high tide); 3 = considered totally reliant on wetland habitats due to unsuitable surrounding habitats and/or species limited habitat requirements. Note, a score of 1 for sea ducks and divers relates to propensity for within-season movements although the site is an important part of the species' wintering range.
[F] Site fidelity on non-breeding grounds: 0 = unknown; 1 = weak; 2 = moderate; 3 = high (based on published information).

5.3 The 2009/10 waterbird survey programme

5.3.1 Introduction

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

At Tralee Bay Complex SPA, a survey programme of four low tide counts (October and November 2009, plus January and February 2010) and a high tide count (January 2010) were completed across the site[15].

Waterbird species were counted within a series of 17 count sections (subsites) across the site (Appendix 6) but these do not coincide exactly with the SPA area. For this reason, the 'site' referred to from now on refers to the count area rather than the SPA area. Brandon Bay was included within the area surveyed (Cummins and Crowe, 2010) but was excluded from data analyses for this report because this subsite lies outside of the designated SPA.

The behaviour of waterbirds during counts was attributed to one of two categories (foraging or roosting/other) while the position of birds was recorded in relation to one of four broad habitat types (intertidal, subtidal, supratidal and terrestrial). Note that these broad habitats (Table 5.3) were defined specifically for the survey programme and do not follow strict habitat-based definitions for these areas, nor follow the 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 (areas between mean high water and mean low water)	Refers to the area uncovered by the tide and most likely dominated by mudflats and sandflats. It may also include areas of rocky shoreline, areas of mixed sediment and grave/pebbles or shingle and gravel shores.
Subtidal (areas that lie below mean low water)	Refers to areas that are covered by seawater during counts. During low-tide counts it will include offshore water, tidal channels and creeks as well as tidal rivers.
Supratidal	This category pertains to the shore area and habitats immediately marginal to and above the mean high-water mark. The supratidal section is an integral part of the shoreline. This broad habitat also includes areas of saltmarsh where the saltmarsh is contiguous with coastal habitats lying above. Note that patches of lower saltmarsh (e.g. *Spartina*) surrounded by intertidal flats, were included in the intertidal category. Wetland habitats of Akeragh Lough were also included in this category.
Terrestrial	All areas above supratidal habitat e.g. terrestrial grassland.
Aquatic (terrestrial)	Used for a section of the Tralee canal.
Lagoon and associated habitats	Used for Lough Gill.

In addition to the main survey programme described above, a high tide roost survey was completed on 27th February 2010. During this survey waterbird roost sites were located, species and numbers of waterbirds counted and the position of the roosts marked onto field maps.

[15] Low tide survey dates were 6th October and 20th November 2009 and 3rd January and 2nd February 2010. The high tide survey was undertaken on 26th January 2010.

5.3.2 Waterbird distribution data and analyses

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

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

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

For each of the analyses listed above and for each survey date completed, subsites were ranked in succession from the highest to the lowest in terms of their relative contribution to each species' distribution across all subsites surveyed. Rank positions were then converted to categories (see below) with the exception of those relating to the single 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 selected species and for each low tide survey occasion, by dividing the number of the species within a subsite by the area of intertidal habitat within the same subsite. Subsites were ranked based on the peak foraging density recorded. Whole site intertidal foraging density was calculated by summing the mean subsite counts for each species and dividing by the total area of intertidal habitat.

Waterbird count data for low tide surveys are also presented as species distribution maps ('dot density maps'). Dot-density maps show waterbird species distribution within intertidal or subtidal habitat[16] divided into 'foraging' birds and 'roosting/other' birds. These maps show the number of birds represented by dots; each dot representing one, or a pre-determined number of birds. As the dots are placed in the appropriate subsites and broad habitat types for the birds counted, the resulting map is equivalent to presenting numbers and densities and provides a relatively quick way of assessing species distribution.

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

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

Tralee Bay is a large and complex site in terms of counting waterbirds. All subsites were counted from mainland vantage points and as a result, obtaining suitable vantage points was difficult e.g. around Derrymore Island. One count (low tide 02/02/10), although commencing with good weather conditions, soon became hindered by fog and counts on this date, especially of small waders, are likely to be underestimates (Cummins & Crowe, 2010).

Ireland suffered some extreme cold weather during the winter of 2009/10 with December 2009 being reported as the coldest in 28 years (Met Éireann, 2009) and the extreme cold weather extending into January 2010 (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 (Crowe et al. 2011).

Subsite rankings and dot-density maps relate to the distribution of waterbirds at subsite level as recorded within the survey area during the 2009/10 waterbird survey programme. Care must be taken in the interpretation of these data, and subsite rankings in isolation should not be used to infer a higher level of conservation importance to one area over another without a detailed examination of data and understanding of each species' ecology. For instance, while some species are known to be highly site-faithful, both at site level and within-site level (e.g. Dunlin), other species may range more widely across a site(s). While some species by their nature may aggregate in high numbers, 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 accounts.

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 57 waterbird species were recorded during the 2009/10 survey programme at Tralee Bay Complex SPA. Cummins and Crowe (2010) provide a summary of waterbird data collected. Note that the total count area and SPA area are not exactly coincident. Maps showing the count subsites are provided in Appendix 6.

All SCI species were recorded within all counts undertaken with the exception of Pintail, which was not recorded during the first two low tide surveys. 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 just 3% (Pintail) to 93% (Curlew) (Table 5.4). The majority of species occurred, on average, in less than 50% of subsites with only eight species (Light-bellied Brent Goose, Oystercatcher, Dunlin, Curlew, Redshank, Turnstone, Black-headed Gull and Common Gull) extending their distribution over more than half of the subsites.

Average percentage area occupancy is defined as the average proportion of the whole survey 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 highest average percentage area occupancy was recorded for Curlew (96%); with ten species extending their distribution over more than half of the count area.

Table 5.4 Tralee Bay 2009/2010 waterbird surveys – summary data

Site Special Conservation Interests (SCIs)	Peak number recorded - LT surveys[I]	Peak number recorded - HT survey[II]	Average subsite % occupancy [III]	Average % area occupancy[III]
Whooper Swan	97	36	7 (0)	9 (9)
Light-bellied Brent Goose	5,010 (i)	4,163 (i)	60 (14)	70 (11)
Shelduck	150 (n)	361 (n)	35 (15)	31 (21)
Wigeon	561	415	28 (10)	21 (6)
Teal	947 (n)	496 (n)	38 (6)	25 (7)
Mallard	662 (n)	201	48 (6)	39 (18)
Pintail	30 (n)	68 (n)	3 (4)	3 (3)
Scaup	702 (n)	235 (n)	15 (8)	16 (15)
Oystercatcher	1,027 (n)	841 (n)	80 (9)	84 (8)
Ringed Plover	633 (n)	347 (n)	38 (13)	53 (10)
Golden Plover	3,148 (n)	272	17 (7)	20 (9)
Grey Plover	194 (n)	102 (n)	43 (18)	53 (24)
Lapwing	3,451 (n)	2,436 (n)	42 (21)	49 (30)
Sanderling	643 (n)	306 (n)	20 (5)	37 (4)
Dunlin	1,098 (n)	860 (n)	53 (11)	64 (8)
Black-tailed Godwit	907 (i)	482 (n)	28 (6)	18 (4)
Bar-tailed Godwit	654 (n)	809 (n)	38 (15)	28 (11)
Curlew	1,277 (n)	851 (n)	93 (0)	96 (0)
Redshank	991 (n)	474 (n)	77 (7)	80 (7)
Turnstone	350 (n)	285 (n)	58 (6)	71 (6)
Black-headed Gull	1,322 (n/c)	464 (n/c)	85 (10)	87 (9)
Common Gull	1,825 (n/c)	1,086 (n/c)	82 (6)	84 (7)

n/c = not assessed.
(i) denotes numbers of international importance (after Wetlands International, 2012); (n) denotes numbers of all-Ireland importance (after Crowe & Holt, 2014).
[I] 4 low-tide counts undertaken on (06/10/09, 20/11/09, 03/01/10 & 02/02/10).
[II] 1high-tide count undertaken on (26/01/10).
[iii] Mean (± s.d.) calculated across 4 low tide counts (with the exception of Pintail).

Species richness (total number of species) across the whole site was relatively consistent throughout the survey programme; a total 41, 46, 46 and 45 species was recorded during the four low tide counts respectively. 45 species were recorded during the high tide count on 26th January 2010.

The total number of species (species richness) at subsite level varied considerably. Average low tide species richness was greatest within subsite 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)) (average 24 species), with 32 species recorded during the November low tide

survey (20/11/09) (Table 5.5). This was closely followed by the much smaller subsite 0K484 (Blennerville (Lohercannan)) which supported an average 22 species across low tide surveys. Species diversity was generally highest during low tide surveys.

Table 5.5 Subsite species richness

Subsite	Subsite Name	Mean (±S.D) (LT Surveys)	n	High Tide Survey	Peak Overall
0K010	Lough Gill	15 (3)	4	15	19 (L)
0K301	River Lee	17 (2)	4	13	20 (L)
0K416	Derrymore Island (north shore & east end)	14 (4)	4	16	19 (L)
0K437	Ballyheigh to Akeragh Lough	4 (3)	4	3	7 (L)
0K438	Black Rock	16 (1)	4	16	17 (L)
0K439	Carrahane Strand	10 (1)	4	16	16 (H)
0K440	Barrow Harbour Inner	11 (2)	4	13	13 (L/H)
0K441	Barrow Harbour Outer	14 (2)	4	10	16 (L)
0K442	Fenit	12 (2)	4	9	15 (L)
0K472	Spa	15 (1)	4	11	16 (L)
0K484	Blennerville (Lohercannan)	22 (1)	4	26	26 (H)
0K501	Annagh	16 (5)	4	11	21 (L)
0K502	Derryquay bridge east to Annagh	17 (4)	4	14	20 (L)
0K503	Bealathaleen Creeek	13 (2)	4	15	16 (L)
0K504*	Castlegregory (Carrigaghroe Pt - Kilshannig Pt)	24 (11)	2	13	32 (L)
0K505*	Scraggane Bay (Minnaun - Kilshannig)	21 (1)	2	10	21 (L)
0K506*	Scraggane Bay & Castlegregory	22 (1)	2	-	23 (L)

* See Appendix 6 for subsite details

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. 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 boxes are left blank, it simply means that a species was not recorded.

The fact that different subsites may be ranked as 'Very High' for the same species highlights that several subsites supported peak numbers and are therefore equally important for that species. 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 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 Tralee Bay Complex. Waterbird distribution dot-density maps are provided in Appendix 7. Summary roost data are presented in Appendix 8.

Table 5.6 (a) Tralee 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). Waterbird species codes are presented in Appendix 4).

Subsites ► / Species ▼	0K010	OK301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504*	0K505*	0K506*
WS	V														V		
PB		M	M		M	M	H	M	M	H	H	H	H	V	V	H	V
SU		M	H			M		L		V	V	M	H	V	L		
WN	H	M					V			L	M	V	V	V			
T.	H	V	L			L	H	L			H	H	M	V			
MA	H	H	M				V			M	H	H	M	V	M		L
PT												V					
SP		V										V	V	L	H		
OC		L	M	M	H	M	L	M	V	H	V	H	H	H	V	H	V
RP			H	L	V	M		M	M	M	H	M			H	V	V
GP			H			V	H	M			V						V
GV	M		M		M	H		H	M	V	H	M	V		M	M	H
L.	H	V	L		V	H	H		M	M	V	H	L		M	L	M
SS	V				V			M				L	M		H	V	V
DN		M	L		H	M	L	V		M	V	H	H	H	L	H	M
BW		V			M			M				V	M	V	L		
BA		H			H			M	L	V	H	H	V			M	
CU	M	L	H	L	H	V	M	M	M	H	V	H	V	H	H	L	V
RK		H	H	L	M	L	H	V	M	M	V	V	H	H	M	L	H
TT			M	L	H	L	V	M	H	H	V	L	H	H	V	H	V
BH	M	H	M	M	H	M	H	H	H	V	V	M	M	L	L	H	V
CM	M	M	H	L	H	H	H	H	M	M	H	M	M	L	V	H	V

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Table 5.6 (b) Tralee Bay Subsite assessment – total numbers foraging intertidal[I], subtidal[II], int/sub combined[III] and terrestrial[IV] (LT surveys).
(L Low, M Moderate; H High V Very High; please see Section 5.3.2 for methods).

Subsites ► / Species ▼	0K010	OK301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504*	0K505*	0K506*
WS[II]	V																
PB[I]			L		L	L	H	L	L	M	M	V	M	V	V	H	V
SU[I]		H	H			M				V	V	M	L	H			
WN[I]		H					V					M	V	V			
WN[II]	V										V			V			
T.[I]		V					V				V	H	M	V			
T.[II]	V	V	L								V	H	V	V			
MA[I]							V			L		V	M	V			
MA[II]	V	V								H	V	V	M	L			M
PT[I]												V					
SP[II]	V																
OC[III]		L	M	M	V	H	L	M	V	H	V	H	H	L	H	H	V
RP[I]				L	V	M		M	M	M	H	L			V	V	V
GP[I]			V			V											
GV[I]			H		M	H		M	M	V	H	L	V		M	L	H
L.[I]		V	L			V					V	L	M				M
L.[IV]	V				V				M	M	V	L			H	L	H
SS[I]					H			M				L	M		H	V	V
DN[I]		M	L		H	M	L	V		M	V	H	H	H	L	H	M
BW[I]		H			H			H			V	L	V	M			
BA[III]		H			H			M	L	V	H	H	V			M	
CU[III]		M	H	L	V	H	H	M	H	H	V	H	V	M	M	L	V
RK[III]		H	H	L	L	L	H	V	M	M	V	V	H	M	M	L	H
TT[I]			M	L	H	L	L	M	H	H	V	L	H	H	V	H	V
BH[I]		V	H	M	V			H	V	M	V	H	H	L	M	H	V
BH[II]		M						L	V	V	V	V	M	M		H	M
CM[I]		M	L	M	H		L	H	M	M	H	H	H		V	H	V

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Table 5.6 (c) Tralee Bay Subsite assessment – ranked top ten peak intertidal foraging densities (selected species; low tide surveys)

Subsites ► / Species ▼	0K301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504	0K505	0K506
PB				7		9		5	6		8	10	2	3	1	4
OC	2		9	3				1	7	6		8			5	4
RP			8	2	9		5	6		4	10			7	1	3
GV				5	7		2	8	1	3				9	4	6
SS				2			4				7	6		5	1	3
DN	5			6			4		9	1	7	8	3		2	
BW	2			4			7			1	5	3	6			
BA	3			4	10		5	7	6	2	9	1			8	
CU	4	6		2		10	5	3	7	1	8	9	12			6
RK	1	10				7	3	4		2	5	9			6	8

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Table 5.6 (d) Tralee Bay Subsite assessment – total numbers (roosting/other behaviour) within LT surveys (Intertidal[I], Subtidal[II], Intertidal/Supratidal[III] and Terrestrial[IV] (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods).

Subsites ► / Species ▼	0K010	OK301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504*	0K505*	0K506*
WS[IV]	V																
PB[I]								V	H	V	V	H		M			
SU[I]								M			H		V	V			
WN[I]							V				H	V		V			
T.[I]		H					H	L			V	H	M	V			
T.[II]	V	H									H	V		V			
MA[I]		V								H	M	H	M	V			
MA[II]	V	L	V								M	H	V	H	V		
PT[I]												V					
SP[II]	V											V	V		H		
OC[I]		M			H			M	M	V	H	V	L	M			V
RP[I]			V		V												V
GP[I]						V	H	M			V						V
GV[I]			H					V									
L.[I]		V				H	V				V	V	M		L	L	
SS[I]								V								V	
DN[I]								V			V						
BW[I]		H									V	V					
BA[I]											V						
CU[III]		H	L		V	V		M		H	H	H	V	L			
RK[I]								V			H			V			M
TT	*Not recorded*																
BH[I]		H			V	H	H	M	L	V	V	L	H	L	L		
BH[II]	V	V	V								H	H	V	M			
CM[I]		H	L	M	V	V	V	M	M	H	M	M	M	M	M		
CM[II]	V	V	M		V						M	V	H				

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Table 5.6 (e) Tralee Bay Subsite assessment – ranked total numbers HT Survey (all habitats).

Subsites ▶ / Species ▼	0K010	OK301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504	0K505
WS	1															
PB		10	11			6	4	9	8	7	1	5		2	3	
SU						6	2			5	1	3	7	4		
WN	1									5	4	3	2			
T.	2	4			8		6				1	5	3	7		
MA	1	5								3	2	7	4	6		
PT							3				2	1				
SP	2										3			1		
OC		14	11	12	7	5	13	6	4	2	7		9	1	3	10
RP			4			2							1			3
GP		2				1										
GV					4	2					1	3				
L.		1	4		5	2	9	7	6		3	10	8			
SS			4		1										3	2
DN					4	2					3			1		
BW		2	3								1		4			
BA		4			3	2					1					5
CU		13	8		5	3	11	7		12	4	2	9	1	9	6
RK		10	7		9	6	4	11		7	3	5	1	2	13	11
TT			11	9	3	7	5	2	7	4	11		10	1		6
BH	11	3	6		6	4	1	8	10	5	2		9			
CM		6	12	11	4	3	1	8		9	5		10		2	7

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Table 5.6 (f) Tralee Bay Subsite assessment – ranked total numbers (roosting/other behaviour) within HT survey (Intertidal[I], Subtidal[II], Intertidal/Supratidal[III].

Subsites ▶ / Species ▼	0K010	OK301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504	0K505	0K506
WS	*Not recorded*																
PB[II]									4		1	3		2			
SU[II]										2	1	3	4				
WN[II]										3	2	1	4				
T.[I]		2					3				1	6	5	4			
T.[II]		2									2	4	1				
MA[II]										2	1		3	4			
PT[II]											2	1					
SP[II]	1																
OC[I]			9					5	5	1	4		7	3	2	8	
RP[I]													1				
GP	*Not recorded*																
GV[I]											1	2					
L.[I]		1					4	2			3						
SS[I]																1	
DN[I]											1						
BW[I]		2									1						
BA[I]											1						
CU[III]		10	9					5		8	4	1	7	2	6	3	
RK[I]		8	4		7					3	5	2	1	5			
TT[III]									3	1				2			
BH[I]		3			4	2	1	5			7		6				
CM[I]		5			4	3	1								2		

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Tralee Bay Complex SPA (4188) - Waterbird Survey Programme 2009/10

Waterbird distribution - discussion notes

Where mentioned, information on benthic communities or sediment is from intertidal and subtidal sampling programmes commissioned by the National Parks & Wildlife Service (NPWS) and Marine Institute and reported in NPWS (2014) and RPS (2013). Data on the intertidal *Zostera* beds were derived from the EPA National Water Framework Directive monitoring programme (http://www.epa.ie/whatwedo/wfd/monitoring/).

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

Whooper Swan *Cygnus Cygnus* - Family (group): Anatidae (geese)
The Whooper Swan is a migratory species and has a widespread breeding distribution across the northern Palearctic, ranging from Iceland and northern Scandinavia in the west, to Russia in the east. Five breeding populations have been identified in the Western Palearctic and Asia and those wintering in Britain and Ireland come almost exclusively from the Icelandic breeding population (McElwaine et al. 1995; Robinson et al. 2004a). Historically the species was known to winter in freshwater wetland habitats or brackish lagoons and coastal bays. A change to feeding on terrestrial habitats has been observed since the mid 1990's (Crowe, 2005) with grassland and increasingly, arable habitats used by foraging individuals. The last coordinated census of Whooper Swans took place in Ireland in January 2010 and counted 14,981 Whooper Swans, representing an increase of 6% in the total number, in comparison with the results from the 2005 census (Boland et al. 2010).
Numbers
Numbers peaked at the site in January 2010 (97 individuals on 03/01/10) and 36 Whooper Swans were recorded during the high tide survey (26/01/10). No count exceeded the threshold of all-Ireland importance. The species was recorded almost exclusively in association with 0K010 (Lough Gill). Three individuals were recorded from 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)) on 20/11/09.
Foraging Distribution
Whooper Swans forage diurnally and roost at night. They are primarily herbivorous, feeding on aquatic plants, grasses and agricultural plants such as grain, vegetables and stubble. During the most recent international swan census, just over half of habitat records for Whooper Swans were for dry improved pasture (Boland et al. 2010). At Tralee Bay Complex, foraging Whooper Swans were recorded exclusively in association with 0K010 (Lough Gill). Individuals were recorded foraging subtidally during three low tide surveys and 55 individuals foraged terrestrially on 03/01/10; these latter individuals being the peak number recorded foraging at any one time.
Roosting Distribution
42 Whooper Swans roosted within terrestrial habitat on 03/01/10. The species was not recorded during the roost survey on 27/02/2010.

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

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

Brent Geese begin to arrive in Ireland in late August when almost three-quarters of the biogeographic population congregate at Strangford Lough in Northern Ireland before dispersing to other sites (Robinson et al., 2004b). There is some evidence that some Brent Geese may travel directly to Castlemaine Harbour and Tralee Bay, by-passing Strangford Lough. An early 'Brent Survey' carried out on 23rd September 2009, recorded 167 Brent Geese at Castlemaine Harbour and a further 303 within Tralee Bay, partially supporting this view.

Numbers

An early 'Brent Survey' carried out on 23rd September 2009, recorded 303 within Tralee Bay. The majority (211 individuals) were located within the eastern inner section of 0K472 (Spa) with a further 49 individuals within 0K501 (Annagh) and 36 within 0K503 (Bealathaleen Creek).

During the main survey programme, internationally-important numbers of Brent Geese were recorded in all surveys undertaken from November 2009 to February 2010. The peak count of 5,010 was recorded during the November low tide survey (20/11/09). 4,163 individuals were counted during the high tide survey (26/01/10).

The peak count recorded during the I-WeBS season 2009/10 was 4,043 individuals, recorded in November 2009.

Across Tralee Bay Complex, Brent Goose was a relatively widespread species, recorded within 14 subsites overall. The species occurred with regularity (three low tide surveys or more) within nine subsites: 0K301, 0K440, 0K441, 0K442, 0K472, 0K501, 0K502, 0K503 and 0K504. Three subsites supported the species in all four low tide surveys: 0K472 (Spa), 0K502 (Derryquay bridge east to Annagh) and 0K503 (Bealathaleen Creek).

Peak numbers (across all behaviours and locations) were recorded within the following subsites for the four low tide survey dates respectively: 0K503 (Bealathaleen Creek), 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)), 0K506 (Scraggane Bay & Castlegregory) and 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)).* Castlegregory subsites were therefore important for Brent Geese on three separate low tide survey occasions. 0K503 (Bealathaleen Creek) was notable for supporting peak numbers (06/10/09) and the second highest numbers during three other surveys (20/11/09, 03/01/10 & 26/10/10).

The overall peak low tide subsite count of 1,751 individuals was recorded within 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)) on 20/11/09. This number, surpassing the international threshold, accounted for 35% of the total Brent Geese recorded on that date. The peak high tide count was recorded within 0K484 (Blennerville (Lohercannan) (2,103 individuals).

Foraging Distribution

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

During low tide surveys the majority of Brent Geese were recorded foraging intertidally. Between six and nine subsites were utilised during the four successive low tide surveys. The whole-site peak number of Brent Geese foraging during any one low tide survey was 3,241 on 20/11/09. Different subsites supported peak numbers during the four low tide surveys: 0K501 (Annagh), 0K503 (Bealathaleen Creek), 0K506 (Scraggane Bay & Castlegregory) and 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)) for the four dates respectively (note the relationship between 0K504 and 0K506*).

0K503 was notable in supporting numbers ranked in the top three during all four low tide surveys and Castlegregory subsites (0K504 & 0K506) supported peak numbers or numbers ranked in the top five during all low tide surveys. 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)) supported large numbers (1,205) of Brent Geese foraging subtidally on 20/11/09.

An extensive intertidal *Zostera* bed is recorded almost continuously along the south shore of the site from Derrymore island to west of Blennerville (encompassing subsites 0K484, 0K501, 0K502 and 0K503). While it is predominantly a *Zostera nolti* meadow, patches of *Zostera marina* are recorded within it at Derrymore Island (NPWS, 2014). A number of small discrete intertidal beds of *Zostera nolti* also occur; these are recorded in inner Tralee Bay at Spa (0K472) and at Fahamore and Cloghane Creek at Fermoyle; the latter two outside of the SPA. Subtidally, beds of *Zostera marina* are recorded in outer Tralee Bay from Kilshannig Point to off the shore at Castlegregory (0K504) and at Scraggane Point (0K504/0K505) at depths of between 0m and 6m. Tralee Bay, and particularly the outer bay, also has a rocky intertidal reef community in many places that supports a diversity of brown algae (e.g. *Fucus vesiculosis*) plus green algae such as *Ulva* spp.

The peak number of intertidally foraging Brent on 06/10/09 was a single flock of 490 individuals that foraged within the *Zostera* bed of 0K501 (Annagh). The following month (20/11/09), 0K503 (Bealathaleen Creek) supported the peak number of 810 individuals; the main flock of 619 individuals foraged in the *Zostera* in the west of the subsite. 1,282 Brent were dispersed across 0K506* on 03/01/10 with no particular preference for areas with *Zostera,* these birds likely foraging upon algae. Areas with and without *Zostera* in 0K504 supported 1,330 individuals during the final low tide count (02/02/10); six main flocks recorded.

The peak intertidal foraging density was 21 Brent Geese ha^{-1} recorded for 0K505 on 20/11/09. The whole site average intertidal foraging density was 1.3 Brent Geese ha^{-1}.

Roosting Distribution

The majority of Brent Geese were recorded foraging during low tide surveys. On 20/11/09, 234 Brent Geese roosted intertidally along the northern shore of 0K441 (Barrow Harbour Outer).

On 03/01/10, 384 Brent Geese roosted along the northern shore and north of the river channel within 0K484 (Blennerville (Lohercannan)). A further 350 individuals roosted centrally within 0K501 (Annagh) together with a further 200 that were foraging.

During the high tide survey, 3,075 Brent Goose were recorded roosting subtidally within four subsites; the greater majority (68%) within 0K484 (Blennerville (Lohercannan)); these birds were positioned along the northern shore, similar to the intertidal position noted above.

During the HT Roost survey 27/02/10, 1,000 Brent Geese were recorded roosting within 0K439 (Carrahane Strand), positioned along the top of the shore (supratidally).

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Shelduck *Tadorna tadorna* - Family (group): Anatidae (ducks)

Tadorna tadorna has five known populations which breed across temperate Eurasia. The northwest Europe population breeds and winters along coasts of Britain, Ireland, Scandinavia, the Baltic and continental Europe. Although a breeding species in Ireland, Shelducks undertake a moult migration each autumn. 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

Numbers of Shelduck of all-Ireland importance were recorded in three surveys (03/01/10, 26/01/10 & 02/02/10). The site peak of 361 individuals occurred on 26/01/10 (HT count).

Shelduck were recorded with regularity (three surveys or more) within five subsites: 0K472 (Spa), 0K484 (Blennerville (Lohercannan)), 0K501 (Annagh), 0K502 (Derryquay bridge east to Annagh) and 0K503 (Bealathaleen Creek). Between three and eight subsites were used by Shelduck during surveys.

0K484 (Blennerville (Lohercannan)) was notable in supporting peak numbers or second highest numbers during all five surveys. 0K503 (Bealathaleen Creek) supported peak numbers on one occasion (06/10/09) and the second highest number recorded during the final low tide survey (02/02/10).

The peak subsite count of 145 individuals was recorded for 0K484 (Blennerville (Lohercannan)) during the high tide survey (26/01/10); exceeding the threshold for all-Ireland importance.

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. Shelducks can therefore forage throughout the tidal cycle. Foraging distribution of Shelduck has been linked to the distribution of a favoured prey *Peringia (Hydrobia) ulvae* (Bryant & Leng; Murphy et al. 2006) which can be preyed upon by a variety of feeding methods depending on whether the tidal flats are exposed (e.g. scything) or covered with shallow water (head dipping) or deeper water (upending).

During low tide surveys at Tralee Bay Complex, the majority of observations of foraging Shelduck were birds within intertidal habitat. 0K484 (Blennerville (Lohercannan)) supported peak numbers on three survey occasions (06/10/09, 20/11/09 & 02/02/10) and the second highest numbers during the other two surveys although the first two low tide surveys involved very low numbers of birds in total. The intertidal community of 0K484 is predominantly classified as 'sand to sandy mud with polychaetes and bivalves' (NPWS, 2014). This community complex is distinguished by the polychaetes *Pygospio elegans* and *Scoloplos armiger,* the gastropod *Peringia (Hydrobia) ulvae* and the oligochaete *Tubificoides benedii.* Other species present here include the bivalves *Cerastoderma edule* and *Macoma balthica* and the polychaetes *Eteone longa* and *Nephtys hombergii. Peringia (Hydrobia) ulvae* is recorded solely from the inner sections of Tralee Bay, highest abundances recorded during sampling off the eastern shore of Derrymore Island (subsites 0K503/0K502), with a peak abundance recorded of 60 individuals/core; equivalent to 6,000/m^2.

0K472 (Spa) supported peak numbers foraging intertidally on 03/10/10 when 65 individuals represented 56% of the total recorded. This subsite is also partially classified as 'sand to sandy mud with polychaetes and bivalves,' although in its western margins gives way to 'sand with *Nephtys cirrosa*.'

Peak numbers (135) foraging intertidally during the high tide survey were recorded within 0K440 (Barrow Harbour Inner) and this subsite is again classified as 'sand to sandy mud with polychaetes and bivalves.'

Overall, very few Shelducks were recorded foraging subtidally.

Roosting Distribution

Throughout the low tide survey programme, very few Shelducks were recorded in roosting/other behaviour.

During the high tide survey (26/01/10), 177 Shelducks were recorded in roosting/other behaviour across five subsites. The majority (71%) were recorded within 0K484 (Blennerville (Lohercannan)) where 126 roosted subtidally. 0K503 (Bealathaleen Creek) supported 19 individuals roosting supratidally (saltmarsh). 0K472 held 14 individuals roosting subtidally, these birds part of a loose mixed species flock in the north-east of the subsite, with 42 Mallard and 14 Wigeon. A further four subsites held <10 individuals each.

During the Roost Survey (27/02/10), the majority of Shelduck recorded were roosting within three locations of 0K503 (Bealathaleen Creek). 27 individuals roosted subtidally and 17 roosted supratidally close to the southern shore of the island, while a further 67 individuals roosted terrestrially upon the island.

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

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

Numbers

Whole site numbers of Wigeon were variable and ranged from 261 (20/11/09) to a site peak of 561 (03/01/10). 415 Wigeon were counted during the high tide survey (26/01/10). No whole-site count exceeded the threshold of all-Ireland importance.

Wigeon were recorded in a total of eight subsites across the entire survey programme. During individual surveys they were present in between three (20/11/09 and 02/02/10) and six (03/01/10) subsites.

The species was recorded with regularity (three surveys or more) within five subsites: 0K010 (Lough Gill), 0K440 (Barrow Harbour Inner), 0K501 (Annagh), 0K502 (Derryquay bridge east to Annagh) and 0K503 (Bealathaleen Creek). Different subsites supported peak numbers on each survey occasion: 0K502, 0K440, 0K501 and 0K503, for the four low tide surveys respectively. The peak subsite count (270 Wigeon) was recorded within 0K501 (Annagh) on 03/01/10.

Foraging Distribution

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

Within Tralee Bay Complex, Wigeon were recorded foraging within intertidal and subtidal habitats. Wigeon foraged intertidally within five subsites across the entire survey programme: 0K301, 0K440, 0K501, 0K502 and 0K503. Between one and three subsites were used within individual surveys.

0K502 (Derryquay bridge east to Annagh) supported peak numbers on two low tide survey occasions and during the high tide survey. 0K440 (Barrow Harbour Inner) and 0K503 (Bealathaleen Creek) also supported peak numbers (03/01/10 & 02/02/10) with *c.*80% of the individuals foraging intertidally on the survey dates. Relatively few Wigeon foraged subtidally during low tide surveys, one notable exception being 72 individuals within 0K503 (Bealathaleen Creek) on 02/02/10.

An extensive intertidal *Zostera* bed is recorded almost continuously along the south shore of the site from Derrymore island to west of Blennerville (encompassing subsites 0K484, 0K501, 0K502 and 0K503). While it is predominantly a *Zostera nolti* meadow, patches of *Zostera marina* are recorded within it at Derrymore Island (NPWS, 2014).

Roosting Distribution

Wigeon were recorded undertaking roosting/other behaviour primarily within intertidal and subtidal habitats. There was no regularity or pattern to the distribution of Wigeon roosting intertidally, many observations being solitary, suggesting no regularity in use. Notable observations include 270 Wigeon within 0K501 (Annagh) on 03/01/10 and 101 Wigeon within 0K440 (Barrow Harbour Inner) on 20/11/09.

0K010 (Lough Gill) supported good numbers on one occasion (154 Wigeon subtidally roosting/other on 03/01/10).

All observations of roosting/other Wigeon during the high tide survey were in subtidal habitat. Over 50% of this species on this day were located within 0K501 (Annagh).

During the Roost Survey (27/02/10), 108 Wigeon were recorded roosting within two subsites, the majority (66%) within 0K503 (Bealathaleen Creek), as one subtidally-roosting flock.

Teal *Anas crecca* - Family (group): Anatidae (ducks)

Anas crecca has five breeding subspecies that occur across north and northwest Europe, Siberia and into Asia (Wetlands International, 2006). Teal are largely migratory, moving south of their breeding range during winter. Being highly responsive to cold spells they can show rapid and extensive movement during these periods. Teal breeding in Britain and Ireland are supplemented during winter by birds from a range extending from Iceland, through Scandinavia to northwest Siberia (Wernham et al. 2002).

Numbers

Across the whole site, numbers of Teal rose to a site peak of 947 individuals on 03/01/10. 496 individuals were recorded during the high tide survey on 26/01/10. All low tide surveys with the exception of February 2010 recorded whole-site numbers that exceeded the threshold of all-Ireland importance.

Teal occurred in a total of 11 subsites across the entire survey programme. Subsite use during individual surveys ranged from five subsites (20/11/09 & 02/02/10) to eight subsites (26/01/10). Five subsites supported Teal during four surveys or more: 0K010, 0K301, 0K484, 0K501 and 0K503.

0K503 (Bealathaleen Creek) supported peak numbers during the first three low tide surveys. 0K301 (River Lee) recorded peak numbers during the final low tide survey date (02/02/10) when 110 individuals represented 61% of the total Teal recorded on that date. The peak subsite count was 306 individuals within 0K503 (Bealathaleen Creek) on 06/10/09.

Foraging Distribution

Teal are omnivores and have a variety of foraging methods (e.g. dabbling and up-ending) within differing habitats and water depths. Dabbling ducks are often abundant around freshwater flows (Ravenscroft & Beardall, 2003).

During the survey programme, Teal foraged within intertidal, subtidal, supratidal and terrestrial habitats. During low tide surveys, intertidal foraging was more commonly recorded. Subtidal foraging dominated during the high tide survey.

With the exception of 06/10/09, Teal were recorded foraging within only two subsites during any one low tide survey. Peak numbers were recorded within 0K503, 0K440, 0K484 and 0K301 for the four low tide survey dates respectively. 0K484 (Blennerville (Lohercannan)) is notable for supporting peak low tide numbers (03/01/10), peak high tide numbers (26/01/10) and the second highest numbers foraging intertidally on all other survey occasions.

During the high tide survey, most Teal foraged subtidally (82% of the total number foraging). 253 Teal foraged across six subsites. 0K010 (Lough Gill) supported 44% of the total (110 individuals), 0K502 (Derryquay bridge east to Annagh) supported a further 58 individuals.

Roosting Distribution

Good numbers of Teal roosted intertidally during low tide surveys, with the exception of the final survey on 02/02/10 (just 14 individuals). For example 446 Teal roosted intertidally on 03/01/10 in three subsites: 0K503 (Bealathaleen Creek), 0K301 (River Lee) and 0K484 (Blennerville (Lohercannan)).

0K503 (Bealathaleen Creek) supported peak numbers roosting intertidally during the first three low tide surveys with numbers substantially higher than other subsites (e.g. between 65% and 80% of all Teal counted roosting intertidally). 0K484 (Blennerville (Lohercannan)) also supported good numbers in all surveys. 0K301 (River Lee) held good numbers on occasion (e.g. 85 individuals on 03/10/10).

There was less pattern to subtidal roosting/other behaviour although 0K503 (Bealathaleen Creek) and 0K010 (Lough Gill) were notable in supporting good numbers on occasion, the latter supporting the peak number of 291 Teal on 03/01/10. Subtidally roosting Teal were also recorded in 0K301, 0K484, 0K501 and 0K502 during the survey programme.

179 Teal roosted intertidally during the high tide survey (26/01/10). Nearly 70% of these were located within 0K484 (Blennerville (Lohercannan)) with small numbers across a further five subsites. A further 42 Teal roosted subtidally with small numbers distributed across four subsites.

Relatively few Teal were recorded roosting during the Roost Survey (27/02/10) and the majority (34 individuals) roosted subtidally within 0K484 (Blennerville (Lohercannan)).

Mallard *Anas platyrynchos* - Family (group): Anatidae (ducks)

Mallard ducks are the most common and widespread of northern hemisphere dabbling ducks with a wide breeding range across northern Eurasia and north America with the band extending from Arctic tundra to the subtropical zone (Wernham et al. 2002). Mallards breeding in northwest Europe, including Ireland, are largely sedentary or dispersive with short movements made during cold spells. The winter population in Ireland is increased by migratory individuals from various locations including Iceland, Northwest Russia, Poland and Germany (Wernham et al. 2002).

Numbers

Across the whole site, numbers of Mallard peaked in October 2009 (662 individuals) and thereafter were highly variable ranging from 116 (20/11/09) to 399 (03/01/10). The early peak in numbers is consistent with the pattern described in Crowe (2005) in that Mallard congregate early at some of the larger sites, with a subsequent reduction in numbers attributable to both the start of the hunting season and the re-distribution of some ducks to other wetland sites. Low tide counts in October 2009 and January 2010 exceeded the threshold of all-Ireland importance.

Mallard were recorded in 11 subsites across the whole survey programme but occurred with regularity (three surveys or more) within eight subsites: 0K010, 0K301, 0K440, 0K472, 0K484, 0K501, 0K502 and 0K503.

0K503 (Bealathaleen Creek) was notable in supporting peak numbers of Mallard during three low tide surveys and the second highest numbers in another low tide survey. The peak subsite count of 290 Mallard was recorded for 0K440 (Barrow Harbour Inner) on 06/10/09 (exceeding threshold of all-Ireland importance) but relatively few Mallard were recorded there for the remainder of the survey programme.

Foraging Distribution

Mallards are omnivores and feed upon a wide variety of food items including seeds, plants and animal material (e.g. crustaceans, molluscs). They also have a variety of foraging methods including dabbling and up-ending, across differing habitats and water depths although the species is essentially a shallow-water duck, water depth usually less than 1m when foraging (Wernham et al. 2002).

At Tralee Bay Complex, Mallard foraged predominantly within intertidal and subtidal habitats. During the first low tide survey (06/10/09), 503 Mallards foraged across five subsites, the majority (58%) within 0K440 (Barrow Harbour Inner) with a further 142 individuals within 0K503 (Bealathaleen Creek). Relatively few records of Mallard foraging intertidally were recorded for the remainder of the surveys, one exception being 29 individuals that foraged intertidally on 03/01/10 within 0K503 (Bealathaleen Creek).

Subtidal foraging was most regularly observed within 0K010 (Lough Gill), 52 foraging Mallards recorded during the high tide survey (26/01/10) accounting for 73% of the total number foraging subtidally on that date. 0K501 (Annagh) supported good numbers (49) foraging subtidally on 06/10/09. 144 Mallards foraged subtidally on 03/01/10; 42% located within 0K484 (Blennerville (Lohercannan)) and 30% within 0K472 (Spa).

Roosting Distribution

Good numbers of Mallard roosted intertidally in low tide surveys. 0K503 (Bealathaleen Creek) supported peak numbers on three low tide survey occasions and good numbers during the remaining low tide survey and during the high tide survey; the peak number recorded was 70 individuals on 02/02/10. Mallards roosted intertidally during all surveys within 0K301 (River Lee) which supported the peak number (41) on 06/10/09. Intertidal roosting was also recorded within 0K472 (Spa), 0K484 (Blennerville (Lohercannan)), 0K501 (Annagh) and 0K502 (Derryquay bridge east to Annagh).

The dataset shows no particular pattern or preference with regards subtidal roosting/other behaviour. Good numbers, on occasion, were recorded within 0K010 (Lough Gill), 0K472 (Spa), 0K503 (Bealathaleen Creek) and 0K484 (Blennerville (Lohercannan)). During the Roost Survey (27/02/10) the majority of roosting Mallards recorded were located subtidally within 0K503 (Bealathaleen Creek).

Pintail *Anas acuta* - Family (group): Anatidae (ducks)

The Pintail has a Holarctic distribution breeding widely over northern temperate and arctic zones. Although there is a small population breeding within Ireland, the main numbers that winter in Ireland come from breeding grounds from Iceland eastwards through Fennoscandia to western Russia (Wernham et al. 2002). The species is highly migratory, in north-west Europe is strikingly coastal in distribution during winter, and is amongst the most concentrated of all wintering waterfowl species (EU Commission, 2007). Cold weather movements are common within northwest Europe (Scott & Rose, 1996). Wintering habitats comprise largely estuaries, coastal brackish lagoons or inland lakes.

Numbers

Pintail were not recorded during the first two low tide surveys (06/10/09 & 20/11/09). Thereafter, a total site count of 20, 68 and 30 Pintail was made for the three remaining surveys of the programme; the peak (68) being from the high tide survey and all three counts exceeding the threshold of all-Ireland importance.

Pintail were recorded in three subsites overall but occurred more than once within one only 0K501 (Annagh). The species was also recorded within 0K440 (Barrow Harbour Inner) and 0K484 (Blennerville (Lohercannan)).

Foraging Distribution

Pintail feed on a variety of plant and animal material most often obtained from the substratum by upending in shallow water. The species has a preference for sheltered parts of estuaries, muddy substratum, adjacent saltmarsh and freshwater flows in which to loaf or drink.

Two Pintail were recorded foraging within 0K440 (Barrow Harbour Inner) during the high tide survey (26/01/10) and 30 foraged intertidally within 0K501 (Annagh) on 02/02/10. Although recorded in intertidal habitat it is likely that these birds were dabbling within water-covered areas.

Roosting Distribution

20 Pintail roosted intertidally within 0K501 (Annagh) on 03/01/10. During the high tide survey, 57 roosted subtidally within 0K501 and a further six individuals roosted within 0K484 (Blennerville (Lohercannan)).

58 Pintail roosted within 0K501 (Annagh) during the Roost Survey (27/02/10), the majority positioned supratidally along the eastern shoreline.

Scaup *Aythya marila* - Family (group): Anatidae (diving ducks)

Two subspecies (*marila, mariloides*) of Scaup have four populations which have a circumpolar breeding distribution (eastern and western Siberia, northern Europe, Alaska and Arctic Canada). The nominate form breeds in northern Europe and western Siberia and spends winter in western Europe, including Ireland. The national wintering population is around 820 birds (Crowe & Holt, 2013) which represents a small proportion of the overall flyway population. Tralee Bay Complex is the most important site for this species within the Republic of Ireland (Boland & Crowe, 2012).

Numbers

At Tralee Bay Complex, numbers of Scaup of all-Ireland importance were recorded during all but the first (October 2009) low tide survey. The site peak of 702 individuals was recorded during the November low tide survey. 235 individuals were recorded during the high tide survey (26/01/10).

Scaup were recorded within six subsites overall. During low tide surveys the species was recorded in between one subsite (06/10/09) and four subsites (20/11/09).

0K010 (Lough Gill) was notable in recording the species during all five surveys. 0K502 (Derryquay bridge east to Annagh) recorded the species on three survey occasions. 0K484, 0K501, 0K503 and 0K504 all recorded the species on one survey date only, and with the exception of 0K484, all of these single subsite counts were of numbers surpassing the all-Ireland threshold. The subsite peak of 270 individuals was recorded for 0K501 (Annagh) on 20/11/09.

Foraging Distribution

During the non-breeding season, Scaup are considered a marine duck species with a distribution concentrated along open coasts and within partially enclosed estuaries and shallow bays, although there is some association with brackish lagoons. A diving species, Scaup take a variety of food items including crustaceans, insects and plant material although molluscs are thought to dominate the diet in many areas (BWPi, 2004). Diving depth is generally within the range 0.5 – 3.5 m, maximum dives up to 6m (BWPi, 2004).

Scaup were recorded foraging within four subsites: 0K010, 0K484, 0K502 and 0K503. Only 0K010 (Lough Gill) recorded foraging individuals on more than one survey occasion. During the November 2009 and February 2010 low tide surveys, a relatively small proportion of the total numbers of Scaup were feeding (*c*.30%), the majority of individuals on these occasions recorded as roosting/other.

Roosting Distribution

All roosting/other records were in subtidal habitat. Scaup were recorded roosting/other within four subsites overall: 0K010 (Lough Gill), 0K501 (Annagh (Kerry)), 0K502 (Derryquay bridge east to Annagh) and 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)). Peak numbers roosted within 0K501 (Annagh) on 20/11/09 comprising a single subtidal flock of 270 individuals.

Oystercatcher *Haematopus ostralegus* - Family (group): Haematopodidae (wading birds)

Haematopus ostralegus is polytypic; four subspecies are recognised of which only two occur within western Europe and Africa (Delaney et al. 2009). The nominate race breeds in western and northern Europe as far as Iceland, Norway and Finland and includes those birds that breed within Ireland. Irish-breeding birds are partial migrants, some moving south during winter while others remain on the Irish coast. Wintering birds are supplemented by breeding birds from Iceland and the Faeroe Islands (Wernham et al. 2002).

Numbers

During the 2009/10 surveys at Tralee Bay Complex, all but the final low tide survey recorded numbers of Oystercatchers of all-Ireland importance. The site peak of 1,176 individuals was recorded on 06/10/09. 841 Oystercatchers were recorded during the high tide survey.

Oystercatchers were widespread across the site occurring in 15 subsites overall and with regularity (three surveys or more) within 14 subsites: 0K301, 0K416, 0K437, 0K438, 0K440, 0K441, 0K442, 0K472, 0K484, 0K501, 0K502, 0K503, 0K504/0K506 and 0K505.

The peak number of Oystercatchers was recorded for subsites 0K484, 0K504, 0K506 and 0K442 for the four low tide survey dates respectively. (Note the relationship between 0K504 and 0K506*). The subsite peak (411 individuals in 0K506 on 03/01/10) represented 40% of the total numbers present, all other subsite peaks accounted for <30% of the total numbers highlighting the species' widespread distribution across the site. Nevertheless, some patterns of subsite preference were evident. 0K484 (Blennerville (Lohercannan)) supported peak numbers on one occasion, second highest on another occasion and good numbers during all low tide surveys. 0K472 (Spa) recorded the second highest numbers on two survey occasions and numbers ranked in the top five during all other surveys. Castlegregory subsites (0K504/0K506) supported peak numbers twice and good numbers during other low tide surveys.

Foraging Distribution

Oystercatchers are large wading birds that forage primarily on tidal flats although the species can be found foraging along non-estuarine coastline or terrestrially for earthworms. On tidal flats their food consists of Cockles (*Cerastoderma edule*), Mussels (*Mytilus edulis*) and to a lesser degree other bivalve molluscs such as *Macoma balthica*, *Scrobicularia plana* and *Mya arenaria* as well as larger polychaetes such as *Arenicola marina* and *Hediste diversicolor.* Cockles and Mussels are favoured prey items and '*universally important during winter'* (Zwarts et al. 1996a) because these bivalves live in the upper sediment and are nearly always accessible, although it is now known that individual birds may be specialised by way of morphology with regards choosing one or the other of these prey items and their means of handling them. Although Oystercatchers are likely to occur at higher densities where their prey abundance and profitability is higher, various factors are likely to contribute to the widespread distribution recorded, including interference competition[17], competitive differences between adults and juveniles (first-winter birds), differences in prey exploitation/specialisation between the sexes, seasonal differences in the accessibility of prey and prey depletion during the course of the wintering period (e.g. Zwarts & Wanink, 1993; Blomert et al. 1996).

Oystercatchers were recorded foraging within intertidal, subtidal (feet in water), supratidal and terrestrial habitats. Intertidal/subtidal data combined reveals that Oystercatchers foraged across 15 subsites overall. Peak numbers were recorded for 0K484, 0K438, 0K506 and 0K442 for the four low tide surveys respectively.

0K484 (Blennerville (Lohercannan)) supported peak numbers foraging intertidally on 06/10/09 with 192 individuals representing 20% of the total foraging on that day. This subsite recorded second highest numbers on 03/01/10 and good numbers in all other low tide surveys. The intertidal community of 0K484 is predominantly classified as 'sand to sandy mud with polychaetes and bivalves' (NPWS, 2014). This community complex is distinguished by the polychaetes *Pygospio elegans* and *Scoloplos armiger,* the gastropod *Peringia (Hydrobia) ulvae* and the oligochaete *Tubificoides benedii.* Other species present here include the bivalves *Cerastoderma edule* and *Macoma balthica* and the polychaetes *Eteone longa* and *Nephtys hombergii.* Furthermore, a *Mytilus edulis* community occurs in the south west of this subsite on the seaward side of seagrass meadows (NPWS, 2014). Unfortunately flocks maps do not elucidate where the main concentrations of Oystercatchers were foraging within this subsite.

0K438 (Black Rock) supported peak numbers (100 individuals) foraging intertidally on 20/11/09 and good numbers in all other surveys. This is a sandy subsite classified by the benthic community 'sand with *Nephtys cirrosa*'; bivalves *Angulus fabula* and *Angulus tenuis* also recorded.

0K506 (Scraggane Bay & Castlegregory) recorded 362 foraging Oystercatchers on 03/01/10 and good numbers (when counted as Castlegregory only (0K504)) on two other survey occasions. These long sandy subsites are also classified as the benthic community 'sand with *Nephtys cirrosa*' but they are often punctuated by intertidal reefs that support a diverse flora and fauna including Mussels that occur in rockpools and crevices.

Oystercatchers were recorded foraging terrestrially in association with five subsites: 0K442, 0K472, 0K484, 0K504/0K506 and 0K505. Terrestrial foraging (outside of the SPA boundary) is likely to occur on a regular basis.

The peak intertidal foraging density was 6 Oystercatchers ha^{-1} recorded for 0K442 on 02/02/10. Seven subsites recorded densities of over 1 Oystercatcher ha^{-1} (0K301, 0K438, 0K442, 0K472, 0K484, 0K505 and 0K506). The whole site average intertidal foraging density was 0.4 Oystercatchers ha^{-1}.

Roosting Distribution

Across the survey programme, Oystercatchers were recorded undertaking roosting/other behaviour within intertidal habitat in 14 subsites. During low tide surveys, no particular pattern for subsite preference is revealed in the dataset apart from the regular occurrence and good numbers roosting within 0K484 (Blennerville (Lohercannan)) and 0K472 (Spa). During the high tide survey, 486 Oystercatcher roosted

[17] Interference competition is defined as the reduction in intake rate as a result of a high density of other predators in the area (density-dependent effect).

intertidally across nine subsites, the peak number (158) recorded within 0K472 (Spa); one roost along the north-eastern shore comprising 147 individuals.

Good numbers (91) were recorded within 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)) with a further 86 individuals within 0K503 (Bealathaleen Creek). 102 Oystercatcher also roosted supratidally within 0K503 (Bealathaleen Creek) during the high tide survey, in saltmarsh at the tip of the island.

658 Oystercatchers were recorded roosting during the roost survey (27/02/10). Of these, 287 (44%) were recorded at three locations within 0K484 (Blennerville (Lohercannan)). The largest individual flock comprised 235 Oystercatchers roosting on Annagh Island and a further 46 roosted on the old mooring posts in the east of this subsite. This latter roost site appears to be used on a transitory basis, birds moving off as the tide rises or due to human disturbance as this area is close to a walkway and car park. During the roost survey a further 139 individuals roosted intertidally at two locations within 0K502 (Derryquay Bridge east to Annagh) and 166 individuals roosted intertidally at two locations within 0K442 (Fenit).

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Ringed Plover *Charadrius hiaticula* - Family (group): Charadriidae (wading birds)

The Ringed Plover breeds across Arctic and temperate zones from the east coast of Baffin Island, Greenland, across northern Europe and the Russian tundra to the coasts of the Bering Sea. Three subspecies are generally recognised of which the nominate subspecies, *C. h. hiaticula,* breeds in northern Europe (including Ireland) and winters in Europe and north-west Africa.

Numbers

Total site numbers of Ringed Plovers were variable across the survey programme (183, 156, 633 and 322 for the four respective low tide surveys) but all surpassed the threshold of all-Ireland importance. Numbers peaked in November 2009 (633 birds). 347 Ringed Plovers were recorded during the high tide survey (26/01/10).

Ringed Plovers were recorded in a total of 13 subsites throughout the entire survey programme but subsite use during individual surveys ranged from three subsites (06/10/09) to seven subsites (20/11/09, 03/01/10 & 02/02/10).

Only one subsite was used by Ringed Plovers in all low tide surveys (0K438 (Black Rock)). Three subsites were used by Ringed Plovers with the most regularity (three surveys or more): 0K441 (Barrow Harbour Outer), 0K484 (Blennerville (Lohercannan)) and 0K504/0K506 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt/Scraggane Bay & Castlegregory)).

The peak subsite count of 349 individuals was recorded for 0K506 (Scraggane Bay & Castlegregory), this number surpassing the threshold of all-Ireland importance and representing 55% of the total Ringed Plovers recorded on that day.

Foraging Distribution

Ringed Plovers are a wader species considered characteristic of coastal wetland sites dominated by sand but may also be found in areas with a varying degree of mud content. Understanding patterns of distribution across a site can therefore be difficult but foraging distribution is likely related to the abundance and availability of their prey species (various shallow depth or surface dwelling benthic polychaetes and molluscs) and distance to their roost sites (i.e. feeding grounds and roosting sites being reasonably close to one another).

At Tralee Bay Complex, Ringed Plovers foraged with regularity (three low tide surveys or more) within three subsites: 0K438 (Black Rock), 0K441 (Barrow Harbour Outer) and 0K484 (Blennerville (Lohercannan)).

0K438 (Black Rock) supported peak numbers foraging intertidally on 06/10/09 and high numbers on two other low tide survey occasions. This is a sandy subsite classified by the benthic community 'sand with *Nephtys cirrosa'*. The distinguishing species of this community complex are the polychaetes *Nephtys cirrosa, Magelona mirabilis, Glycera tridactyla* and *Spiophanes bombyx,* the bivalves *Spisula subtruncata* and *Angulus fabula* and the cumacean *Vaunthompsonia cristata.* Other species recorded within this complex include unidentified nemerteans, the bivalve *Donax vittatus,* the polychaetes *Sigalion mathildae, Scolelepis foliosa,* and *Nephtys hombergii* and the crustaceans *Pontocrates arenarius, Perioculodes longimanus* and *Bathyporeia guilliamsoniana*.

0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)) supported peak numbers on 20/11/09 with a relatively low peak count of 23 individuals; a day when a total 83 Ringed Plovers were recorded foraging. Related subsite 0K506 (Scraggane Bay & Castlegregory) supported peak numbers of 349 on 03/01/10. 0K505 (Scraggane Bay (Minnaun - Kilshannig)) supported peak numbers on 02/02/10. Data therefore suggests a high degree of preference for foraging along sandy stretches of the site at Black Rock and near Castlegregory; the Castlegregory subsites 0K504, 0K506 and 0K505* also being classified by the benthic community 'sand with *Nephtys cirrosa'*, as above.

The peak intertidal foraging density was 4 Ringed Plovers ha^{-1} recorded for 0K505 on 02/02/10. 0K438 and 0K506 held densities of over 1 Ringed Plover ha^{-1} on occasion. The whole site average intertidal foraging density was 0.1 Ringed Plover ha^{-1}.

Roosting Distribution

Ringed Plovers were recorded roosting in intertidal habitats only. During low tide surveys Ringed Plovers roosted intertidally within 0K506 (Scraggane Bay & Castlegregory) (06/10/09), 0K438 (Black Rock) (20/11/09) and 0K416 (Derrymore Island (north shore & east end)) (03/01/10).

During the high tide survey 124 Ringed Plovers roosted within 0K502 (Derryquay bridge east to Annagh). Ringed Plovers were not recorded roosting during the roost survey (27/02/10).

Ringed Plovers are known to be highly faithful to roost sites (e.g. Rehfisch et al. 2003).

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

Golden Plover *Pluvialis apricaria* - Family (group): Charadridae (wading birds)

The Eurasian Golden Plover is a Palearctic species, occurring mainly at higher latitudes of Western Europe to north-central Siberia and wintering south in Europe, north Africa and parts of Asia. Two subspecies are currently described. *P. a. altifrons* is the 'northern' form and breeds at high latitudes in Western Eurasia from Iceland and the Faeroes across northern Scandinavia to 125^{0}E in the north Siberia lowlands south of Taymyr (Delaney et al. 2009). The nominate *P. a apricaria* breeds at more southerly latitudes including Ireland and Britain and migrates south for winter. The Golden Plover that winter in Ireland are thought to be mostly Icelandic-breeding birds *P. a. altifrons* (Wernham et al. 2002).

Numbers

Whole site numbers of Golden Plover were highly variable and ranged from 272 during the high tide survey (26/01/10) to a peak count of 3,148 on 20/11/09. Numbers were notably lower in January 2010, most likely attributed to the cold weather event, Ireland experiencing the coldest January for over 25 years (Met Éireann, 2010). During cold weather events species such as Golden Plover and Lapwing, Teal and Wigeon often move across to mainland Europe, especially the Iberian coast (Wernham et al. 2002). The October and November low tide counts plus the high tide count recorded whole-site numbers that exceeded the threshold of all-Ireland importance.

Golden Plovers were recorded in a total of seven subsites across the entire survey programme but, with the exception of the October low tide survey, were recorded within only two subsites on each survey occasion. Two subsites recorded the species with regularity (three surveys): 0K439 (Carrahane Strand) and 0K484 (Blennerville (Lohercannan)).

The peak subsite count of 3,140 Golden Plover (0K484 (Blennerville (Lohercannan)) on 20/11/09 represented 99% of the individuals recorded on that date.

Foraging Distribution

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

Golden Plovers were recorded foraging intertidally within 0K439 (Carrahane Strand) during the high tide survey. Relatively few other observations were recorded.

Terrestrial foraging is likely to be a feature around Tralee Bay although this was not recorded during the survey programme.

Roosting Distribution

The majority of records of Golden Plovers were of roosting individuals. Across the survey programme this behaviour was recorded across five subsites: 0K439, 0K440, 0K441, 0K484 and 0K506 but during individual surveys was restricted to between one and three subsites.

0K484 (Blennerville (Lohercannan)) supported large numbers on two survey occasions 3,140 and 830 individuals on 20/11/09 and 02/02/10 respectively. On 20/11/09, one large roost of 2,500 individuals roosted in the inner part of the subsite north of the channel. A further flock of 640 were positioned along the southern shore of the subsite.

0K439 (Carrahane Strand) also supported large numbers on two occasions (800 and 700 on 06/10/09 and 02/02/10 respectively). On both occasions, birds were positioned centrally in the north of the subsite.

Relatively few Golden Plovers were recorded roosting during the Roost Survey (27/02/10). Of a total 150 individuals, 135 of these roosted terrestrially outside the site, positioned north of 0K484 (Blennerville (Lohercannan)).

Grey Plover *Pluvialis squatarola* - Family (group): Charadriidae (wading birds)

The Grey Plover is generally considered a monotypic species and has a holarctic breeding distribution across the tundra of Eurasia and North America (Delaney et al. 2009). The species migrates from breeding areas to a very wide wintering range extending to the coastlines of Africa, south and east Asia, Australasia and South America (BWPi, 2004). In Ireland, Grey Plovers occur as both passage and wintering birds and are thought to originate from Russian breeding populations (Wernham et al. 2002).

Numbers

Whole site numbers of Grey Plovers rose from 10 individuals during October 2009 to a peak of 194 individuals during the low tide survey in January 2010 (03/01/10). Apart from the October low tide survey, all whole-site counts passed the threshold of all-Ireland importance (30).

Grey Plovers were recorded in a total 12 subsites throughout the entire survey programme but subsite use during individual surveys ranged from three subsites (06/10/09) to nine subsites (03/01/10). Five subsites were used by Grey Plovers with the most regularity (three surveys or more): 0K438 (Black Rock), 0K439 (Carrahane Strand), 0K441 (Barrow Harbour Outer), 0K472 (Spa) and 0K484 (Blennerville (Lohercannan)).

0K472 (Spa) was notable in supporting peak numbers of Grey Plover in three low tide surveys. 0K484 (Blennerville (Lohercannan)) supported the second highest numbers in two low tide surveys and the peak number during the high tide survey. The peak subsite count was 126 individuals (0K472 Spa, 03/01/10).

Foraging Distribution

During winter Grey Plovers mainly forage intertidally and have a characteristic mode of foraging whereby they stand motionless watching the mudflat surface before snatching a prey item (often a worm) from the sediment surface. Grey Plovers take a wide range of prey species including Lugworms (*Arenicola marina*), Ragworms (*Hediste diversicolor*), amphipod crustaceans and small bivalves (e.g. *Macoma balthica and Scrobicularia plana*) (Dit Durrell & Kelly, 1990).

Grey Plovers showed a clear preference for foraging within 0K472 (Spa), this subsite supporting peak numbers foraging intertidally on three survey occasions. The benthic community of this subsite is largely classified as 'sand to muddy sand with polychaetes and bivalves.' This community complex is distinguished by the polychaetes *Pygospio elegans* and *Scoloplos armiger,* the gastropod *Peringia* (*Hydrobia*) *ulvae* and the oligochaete *Tubificoides benedii.* Other species present here include the bivalves *Cerastoderma edule* and *Macoma balthica* and the polychaetes *Eteone longa* and *Nephtys hombergi*. Intertidal reef habitat occurs along the northern shore of the subsite and a *Zostera nolti* bed occurs in the north-east.

0K484 (Blennerville (Lohercannan)) supported relatively high numbers also on three survey occasions (peak number 27 individuals on 03/01/10). The benthic community of this subsite is also classified as 'sand to muddy sand with polychaetes and bivalves.'

0K439 (Carrahane Strand) recorded peak numbers foraging during the high tide survey (26/01/10) and during the final low tide survey (02/02/10). This is a sandy subsite classified by the benthic community 'sand with *Nephtys cirrosa'*. The distinguishing species of this community complex are the polychaetes *Nephtys cirrosa, Magelona mirabilis, Glycera tridactyla* and *Spiophanes bombyx,* the bivalves *Spisula subtruncata* and *Angulus fabula* and the cumacean *Vaunthompsonia cristata.* Other species recorded within this complex include unidentified nemerteans, the bivalve *Donax vittatus,* the polychaetes *Sigalion mathildae, Scolelepis foliosa,* and *Nephtys hombergii* and the crustaceans *Pontocrates arenarius, Perioculodes longimanus* and *Bathyporeia guilliamsoniana*.

The peak intertidal foraging density was 0.8 Grey Plover ha^{-1} recorded for 0K472 on 03/01/10. The whole site average intertidal foraging density was 0.05 Grey Plover ha^{-1}.

Roosting Distribution

During low tide surveys, relatively few Grey Plovers were recorded in roosting/other behaviour.

During the high tide survey (26/01/10), 69 Grey Plovers were recorded roosting intertidally within two subsites – 57 individuals within 0K484 (Blennerville (Lohercannan)) and 12 individuals within 0K501 (Annagh).

198 Grey Plovers were recorded roosting during the roost survey (27/02/10). 100 of these roosted in one flock along the top of the shore (supratidal) in the north of 0K439 (Carrahane Strand). A further 80 Grey Plovers roosted supratidally as one flock in 0K503 (Bealathaleen Creek), along the edge of Derrymore Island. 0K484 (Blennerville (Lohercannan)) supported a further 18 Grey Plovers in two roost positions.

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

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

Numbers

Whole site numbers of Lapwing were highly variable and ranged from 31 individuals on 06/10/09 to a peak of 3,451 individuals on 20/11/09. 2,436 Lapwings were recorded during the high tide survey (26/01/10). Numbers were notably lower in January 2010, most likely attributed to the cold weather event, Ireland experiencing the coldest January for over 25 years (Met Éireann, 2010). During cold weather events species such as Golden Plover and Lapwing, Teal and Wigeon often move across to mainland Europe, especially the Iberian coast (Wernham et al. 2002).

Apart from the October low tide survey, all whole-site counts passed the threshold of all-Ireland importance.

Across the whole survey programme, Lapwings were recorded within 14 subsites although between six and nine subsites were used during individual surveys, the exception being the October low tide survey when 31 Lapwings were distributed between two subsites.

Six subsites were used with regularity (three surveys or more) as follows: 0K301 (River Lee), 0K439 (Carrahane Strand), 0K440 (Barrow Harbour Inner), 0K484 (Blennerville (Lohercannan)), 0K501 (Annagh) and 0K502 (Derryquay bridge east to Annagh). The peak subsite count (986 Lapwings) was recorded for 0K484 (Blennerville (Lohercannan)), on 02/02/10.

Foraging Distribution

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

With the exception of the low tide survey on 03/01/10, relatively few observations were made of Lapwings foraging intertidally and involving three subsites only (0K301, 0K439 and 0K403). On 03/01/10 however, 870 Lapwings foraged intertidally across six subsites, this behaviour likely as a result of the recent cold weather event that would drive more birds to forage intertidally as opposed to terrestrially where the ground may be frozen. The majority of birds (43%) were within 0K301 (River Lee) with a further 365 (42%) within 0K484 (Blennerville (Lohercannan)).

Terrestrial foraging (outside of the SPA boundary) was recorded in association with ten subsites during the survey programme.

Roosting Distribution

Lapwings roosted within intertidal, supratidal and terrestrial habitats. Lapwings roosted intertidally across nine subsites overall and in up to six subsites during any one survey. Of note was 0K301 (River Lee) which supported peak numbers on two survey occasions and high numbers on all other survey occasions. 0K484 (Blennerville (Lohercannan)), 0K501 (Annagh) and 0K439 (Carrahane Strand) also stand out in supporting high numbers of roosting individuals on more than one occasion.

Good numbers of Lapwings roosted supratidally on 20/11/09 within 0K301 (River Lee) and 0K438 (Black Rock) (460 and 571 birds respectively).

Lapwings roosted terrestrially in association with 0K438 (Black Rock), 0K442 (Fenit) and 0K484 (Blennerville (Lohercannan)) during the high tide survey (26/01/10). The largest number was 365 that roosted in a field just to the east of 0K484.

169 Lapwings roosted within two subsites during the roost survey (27/02/10) and the majority of these (137 individuals) were distributed across two locations within 0K301 (River Lee). These birds were flighty due to the presence of a Peregrine Falcon and a Buzzard as well as shuffling in response to the rising tide.

Sanderling *Calidris alba* - Family (group): Scolopacidae (wading birds)

Sanderlings are one of the most northerly of all Arctic-breeding waders with a circumpolar breeding range that includes Alaska, Northern Canada, Greenland and Svalbard. The species is a long-distance migrant with a wide wintering distribution that includes coastlines of much of the tropics and the Southern Hemisphere as well as northwest Europe. There is evidence of two subspecies with the nominate form *C. a. a.* breeding in East and northeast Greenland, Jan Mayen, Svalbard, Franz Joseph Land and Taymar, and thought to winter and occur on passage in northwest Europe (Delaney et al. 2009).

Numbers

Whole site numbers of Sanderlings were highly variable and ranged from 168 individuals on 20/11/09 to a peak of 643 individuals on 02/02/10. All whole-site counts exceeded the threshold of all-Ireland importance.

Across the whole survey programme, Sanderlings were recorded within seven subsites. With the exception of the October low tide survey, Sanderlings were recorded within four subsites on each LT survey occasion.

Four subsites were used with regularity (three surveys or more) as follows: 0K438 (Black Rock), 0K441 (Barrow Harbour Outer), 0K504/0K506 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)/Scraggane Bay & Castlegregory) and 0K505 (Scraggane Bay (Minnaun - Kilshannig)).

The peak subsite count (363 Sanderlings) was recorded for 0K506 (Scraggane Bay & Castlegregory) on 03/01/10. This number surpasses the threshold for all-Ireland importance.

Foraging Distribution

During the non-breeding season Sanderlings, can be found in a variety of coastal habitats but are characteristic of sandy shorelines (strands) where they often forage along the tide line by rushing in and out with the waves searching for small prey such as sandhoppers. Significant numbers however may also be found along non-estuarine coastlines (Crowe, 2005), outer parts of estuaries (Musgrove et al., 2003) or within some sheltered bays where they may form mixed flocks with Dunlins or Ringed Plovers.

0K505 (Scraggane Bay (Minnaun - Kilshannig)) supported peak numbers foraging on two low tide survey occasions (20/11/09 & 02/02/10) and the related subsite 0K506* (Scraggane Bay & Castlegregory) supported peak numbers foraging on 06/10/09 and 03/01/10, making the Castlegregory subsites the most favoured by foraging Sanderlings. These are sandy subsites classified by the benthic community 'sand with *Nephtys cirrosa'*. The distinguishing species of this community complex are the polychaetes *Nephtys cirrosa, Magelona mirabilis, Glycera tridactyla* and *Spiophanes bombyx,* the bivalves *Spisula subtruncata* and *Angulus fabula* and the cumacean *Vaunthompsonia cristata.* Other species recorded within this complex include unidentified nemerteans, the bivalve *Donax vittatus,* the polychaetes *Sigalion mathildae, Scolelepis foliosa,* and *Nephtys hombergii* and the crustaceans *Pontocrates arenarius, Perioculodes longimanus* and *Bathyporeia guilliamsoniana*.

Black Rock (0K438) supported peak numbers during the high tide survey (26/01/10) and second highest numbers on three other survey occasions. This is also a sandy subsite (Banna Strand) and is classified by the benthic community 'sand with *Nephtys cirrosa'* as above.

Intertidal foraging was also recorded for 0K416, 0K441, 0K501, 0K502 and 0K504*.

The peak intertidal foraging density was 5 Sanderling ha^{-1} recorded for 0K505 on 02/02/10. Black Rock (0K438) recorded a density of over 2 Sanderling ha^{-1} in October 2009. The whole site average intertidal foraging density was 0.2 Sanderling ha^{-1}.

Roosting Distribution

Very few Sanderlings were recorded roosting. The exceptions were 45 individuals within 0K505 (Scraggane Bay (Minnaun - Kilshannig)) during the high tide survey (26/01/10) and 101 individuals within 0K441 (Barrow Harbour Outer) on 02/02/10.

Sanderling were not recorded roosting during the roost survey however 280 were recorded foraging across three subsites (0K438 (10), 0K460 (120) and 0K504 (150).

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

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

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

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

Whole-site numbers of Dunlin peaked in October 2009 when 1,098 individuals were counted; above the threshold of all-Ireland importance. This early peak is likely due to the presence of passage birds. Numbers were somewhat variable thereafter, ranging between 557 individuals (03/01/10) to 860 (26/01/10). Lower numbers were present in February 2010 (472).

Overall, Dunlins were recorded within 13 subsites but subsite use during surveys varied between six to ten subsites overall.

Seven subsites were used with regularity (three surveys or more) as follows: 0K438 (Black Rock), 0K439 (Carrahane Strand), 0K441 (Barrow Harbour Outer), 0K484 (Blennerville (Lohercannan)), 0K502 (Derryquay bridge east to Annagh), 0K503 (Bealathaleen Creek) and 0K504/0K506 (Scraggane Bay & Castlegregory).

0K484 (Blennerville (Lohercannan)) supported peak numbers of Dunlins during three low tide surveys and recorded the subsite peak of 546 on 06/10/09.

Foraging Distribution

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

0K484 (Blennerville (Lohercannan)) supported peak numbers of foraging Dunlin (intertidal) during three low tide surveys (06/10/09, 20/11/09 & 02/02/10) and the second highest numbers on 03/01/10. 0K441 (Barrow Harbour Outer) supported peak numbers of foraging Dunlins on 03/01/10 and good numbers during all other low tide surveys. 0K503 (Bealathaleen Creek) recorded peak numbers (347) foraging during the high tide survey (26/01/10) and good numbers during the October 2009 low tide survey. The intertidal benthic community of these three subsites is predominantly classified as 'sand to sandy mud with polychaetes and bivalves' (NPWS, 2014). This broad community complex is distinguished by the polychaetes *Pygospio elegans* and *Scoloplos armiger,* the gastropod *Peringia (Hydrobia) ulvae* and the oligochaete *Tubificoides benedii.* Other species present here include the bivalves *Cerastoderma edule* and *Macoma balthica* and the polychaetes *Eteone longa* and *Nephtys hombergii.* A mussel bed (*Mytilus edulis* community) occurs in the south west of this subsite on the seaward side of seagrass meadows (NPWS, 2014). Muddier sediment prevails in several areas (up to 88% silt-clay) e.g. around Derrymore Island in 0K503 and in inner Tralee Bay (0K484).

The peak intertidal foraging density was 4 Dunlin ha^{-1} recorded for 0K484 (Blennerville (Lohercannan)) on 06/10/09. 0K441, 0K503 and 0K505 all held densities of over 3 Dunlin ha^{-1} on occasion. The whole site average intertidal foraging density was 0.4 Dunlin ha^{-1}.

Roosting Distribution

During low tide surveys very few Dunlins were recorded undertaking roosting/other behaviour; the exception being small numbers recorded within 0K484 (Blennerville (Lohercannan)) on two occasions plus on one occasion within 0K441 (Barrow Harbour Outer).

During the high tide survey (26/01/10), 68 Dunlins roosted within 0K484 (Blennerville (Lohercannan)) but a further 792 Dunlins were recorded foraging within uncovered tidal flats on that day.

Dunlins are known to be highly faithful to their roost sites, both within and between years (Rehfisch et al, 2003). Previous research also suggests a link between foraging grounds and available roost sites based on distance, with greater numbers of Dunlin generally foraging closer to roost sites, and the majority foraging within 5km of a roost site (Dias et al. 2006). Data from the 2009/10 waterbird programme suggests that Dunlin have a variety of foraging and roosting options across Tralee Bay Complex however a relationship between the subsites used as foraging areas and roosting areas is evident.

1000 Dunlins roosted supratidally off the tip of Derrymore Island (0K503 (Bealathaleen Creek)) during the Roost Survey (27/02/2010). A further 179 Dunlins roosted at two locations within 0K484 (Blennerville (Lohercannan)), the largest flock comprising 154 Dunlin on the old mooring posts in the east of this subsite. This roost appears to be transitory, with birds moving off as the tide rises or due to human disturbance, this area being close to a walkway and car park. A further 25 Dunlins were part of a mixed-species roost on Annagh Island with Oystercatchers (235), Bar-tailed Godwits (12), Grey Plovers (14) and Redshank (8).

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 rose from 38 individuals in October 2009 to 822 individuals in November 2009. Thereafter numbers were variable with a lower 482 recorded during the high tide survey (26/01/10); this lower number possibly due to the species relocating due to the cold weather event that hit Ireland in December and January. However, numbers rose again and the site peak of 902 Black-tailed Godwits was recorded on 02/02/10. The November 2009 and February 2010 low tide surveys recorded whole-site numbers that surpassed the threshold for international importance.

Throughout the survey programme, Black-tailed Godwits were recorded within eight subsites. Three subsites were used with most regularity: 0K301 (River Lee), 0K484 (Blennerville (Lohercannan)) and 0K502 (Derryquay bridge east to Annagh). 0K484 (Blennerville (Lohercannan)) supported peak numbers in four out of the five surveys. This subsite also recorded the subsite peak of 828 individuals (international importance) on 02/02/10.

Foraging Distribution

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

At Tralee Bay Complex, Black-tailed Godwits foraged within seven subsites overall although during individual low tide surveys they foraged within three or four subsites only. 0K484 (Blennerville (Lohercannan)) supported peak numbers foraging intertidally on 06/10/09, 03/01/10 and 02/02/10 and during the high tide survey (26/01/10). This inner bay subsite has been assigned the benthic community 'sand to sandy mud with polychaetes and bivalves' (NPWS, 2014). This broad community complex is distinguished by the polychaetes *Pygospio elegans* and *Scoloplos armiger,* the gastropod *Peringia (Hydrobia) ulvae* and the oligochaete *Tubificoides benedii.* Other species present include the bivalves *Cerastoderma edule* and *Macoma balthica* and the polychaetes *Eteone longa* and *Nephtys hombergii.* Muddier sediment prevails in several areas (up to 88% silt-clay) and especially in the inner sections of Tralee Bay

0K502 (Derryquay bridge east to Annagh) supported peak numbers foraging intertidally on 20/11/09 when 439 individuals represented 92% of those present on that survey day. This subsite has the same broad benthic community as described above. 0K301 (River Lee), again an inner and 'muddier' subsite, was notable in recording the second highest numbers of foraging individuals in four surveys.

Although terrestrial foraging was not frequently recorded during the 2009/10 waterbird survey programme, it is highly likely that Black-tailed Godwits utilise grassland habitats around the site at certain times (e.g. high tide). Of note was 355 Black-tailed Godwits that foraged terrestrially in a field just to the east of 0K484 (Blennerville (Lohercannan)) on 02/02/10 (outside of the SPA boundary).

The peak intertidal foraging density was 4 Black-tailed Godwits ha^{-1} recorded for 0K484 (Blennerville (Lohercannan)) on 03/01/10. 0K301 and 0K502 were the only other subsites to support densities of over one Black-tailed Godwits ha^{-1} and the whole site average intertidal foraging density was 0.2 Black-tailed Godwits ha^{-1}.

Roosting Distribution

During low tide surveys, significant numbers of Black-tailed Godwits were recorded on occasion roosting intertidally within 0K484 (Blennerville (Lohercannan)), 0K301 (River Lee) and 0K501 (Annagh).

During the high tide survey, 77 Black-tailed Godwits roosted within two subsites; 40 within 0K484 (Blennerville (Lohercannan)) and 37 individuals within 0K301 (River Lee). The majority of individuals on this day were recorded foraging intertidally and it is to be expected that more also foraged terrestrially around the site.

1,055 Black-tailed Godwits roosted within four subsites during the roost survey (27/02/10). 0K484 (Blennerville (Lohercannan)) supported the greatest number (750) at four different locations, the largest single flock being located along the inner northern shoreline. A coastal walkway extends along this shoreline and roosts along this area are likely subject to regular disturbance from walkers and dogs.

A single flock of 143 Black-tailed Godwits roosted supratidally off the tip of Derrymore Island (0K503 (Bealathaleen Creek and 100 Black-tailed Godwits roosted within *Spartina* sp. in 0K501 (Annagh). A further 62 individuals roosted south of the river in 0K301 (River Lee).

Bar-tailed Godwit *Limosa lapponica* - Family (group): Scolopacidae (wading birds)

The Bar-tailed Godwit has a widespread breeding distribution across the sub-arctic and low Arctic zones of the Palearctic and extending into western Alaska (Delaney et al. 2009). The taxonomy of the species is complex but five subspecies are generally recognised. The nominate subspecies *L. l. lapponica* breeds across the higher latitudes of Northern Europe, Russia and Siberia and west and winters mainly in Western Europe. The Wadden Sea is used by *L. l. lapponica* and other populations as a staging and moulting area in autumn and spring.

Numbers

Numbers of Bar-tailed Godwits of all-Ireland importance were recorded during the first four surveys of the 2009/10 waterbird survey programme and peaked with 809 individuals during the high tide survey (26/01/10). Apart from the final (February 2010) low tide survey, all whole-site counts passed the threshold of all-Ireland importance.

Across the entire survey period, Bar-tailed Godwits were recorded in 10 count subsites, with subsite occurrence during individual low tide surveys ranging from three to eight subsites. The species was recorded with regularity (three surveys or more) within six subsites: 0K301, 0K438, 0K441, 0K472, 0K484 and 0K502.

0K502 (Derryquay bridge east to Annagh) supported peak numbers during the first two low tide surveys and 0K472 (Spa) recorded peak numbers during the final two low tide surveys. The subsite peak number (372 individuals) was recorded within 0K502 on 20/11/09, this number surpassing the threshold for all-Ireland importance and representing 57% of all Bar-tailed Godwits recorded on that date.

Foraging Distribution

Bar-tailed Godwits are a wader species considered characteristic of coastal wetland sites dominated by sand. The birds forage by probing within the sediment for invertebrate species such as Lugworm *Arenicola marina* and *Nephtys* sp. The species is characteristic of sites with sandy substrates (e.g. Hill et al. 1993).

0K502 (Derryquay bridge east to Annagh) supported peak numbers foraging intertidally during the first two low tide surveys and 0K472 (Spa) recorded peak numbers during the final two low tide surveys. These inner bay subsites are largely assigned the benthic community 'sand to sandy mud with polychaetes and bivalves' (NPWS, 2014). This broad community complex is distinguished by the polychaetes *Pygospio elegans* and *Scoloplos armiger,* the gastropod *Peringia (Hydrobia) ulvae* and the oligochaete *Tubificoides benedii.* Other species present include the bivalves *Cerastoderma edule* and *Macoma balthica* and the polychaetes *Eteone longa* and *Nephtys hombergii.* The western reaches of 0K472 (Spa) are sandier in nature and are assigned the broad benthic community 'sand with *Nephtys cirrosa*.'

0K484 (Blennerville (Lohercannan)) was notable in supporting numbers ranked within the top five in all five surveys of the waterbird survey programme. Similarly, 0K438 (Black Rock) was notable in supporting numbers ranked in the top five on three low tide survey occasions and during the high tide survey.

The peak intertidal foraging density was 2 Bar-tailed Godwits ha^{-1} recorded for 0K502 (Derryquay bridge east to Annagh). 0K301 and 0K484 were the only other subsites to support densities of over one Bar-tailed Godwits ha^{-1} on occasion and the whole site average intertidal foraging density was 0.2 Bar-tailed Godwits ha^{-1}.

Roosting Distribution

During low tide counts, very few Bar-tailed Godwits were recorded undertaking roosting/other behaviour.

During the high tide survey a total of 384 Bar-tailed Godwits roosted within 0K484 (Blennerville (Lohercannan)); the majority of individuals on this day finding suitable exposed intertidal areas in which to forage.

During the roost survey (27/02/10), 800 Bar-tailed Godwits roosted within 0K503 (Bealathaleen Creek). These birds were part of big wader roost off the inner tip of Derrymore. As birds were densely packed, the count is considered an underestimate.

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

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

Numbers

Whole-site numbers of Curlew were variable and ranged from 1,277 individuals in October 2009 to 586 individuals during the final low tide survey on 02/02/10. Numbers tend to peak early in the season (Crowe, 2005) and lower numbers later in the season is not considered unusual as many birds move inland to forage during the winter period although this behaviour would have been influenced by weather conditions (e.g. freezing temperatures) during the winter of 2009/10. All whole-site counts passed the threshold of all-Ireland importance (350).

Curlew had a widespread distribution across the site, occurring in all subsites across the survey programme. 11 subsites supported Curlew in all four low tide surveys. The peak subsite count of 321 was recorded for 0K484 (Blennerville (Lohercannan)).

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 will also feed amongst damp grasslands for terrestrial worms. Terrestrial foraging was recorded around Tralee Bay Complex (outside of the SPA boundary) in association with ten subsites and this activity, perhaps more common during the high tide period, is likely to play an important part in the achievement of sufficient daily energy intake.

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. At Tralee Bay, Curlews foraged widely across the site and were recorded foraging intertidally across 15 subsites during the entire survey programme. 12 subsites supported foraging individuals in all four low tide surveys (0K301, 0K416, 0K438, 0K440, 0K441, 0K442, 0K472, 0K484, 0K501, 0K502, 0K503 and 0K504/0K506).

0K484 (Blennerville (Lohercannan)) recorded peak numbers foraging intertidally on 06/10/09 and supported good numbers (ranked in the top five subsites) on two other low tide survey occasions. 0K502 (Derryquay bridge east to Annagh) supported peak numbers on 20/11/09 and the second highest numbers foraging intertidally on 03/01/10. The Castlegregory subsites did not appear to be favoured highly with the exception of the low tide count on 03/10/10 (0K506) when 209 Curlews were recorded foraging, nearly 30% of the total recorded foraging intertidally on the day. 0K438 (Black Rock) was notable in supporting the second highest proportions of foraging Curlews on two low tide survey occasions and during the high tide survey plus supporting the highest number during the final low tide survey (02/02/10).

The peak intertidal foraging density was 2 Curlew ha^{-1} recorded for 0K484 (Blennerville (Lohercannan)) in October 2009. This was the only subsite to recorded over 2 Curlew ha^{-1}; 0K301, 0K438, 0K441 and 0K442 recorded densities of over 1 Curlew ha^{-1}. The whole site average intertidal foraging density was 0.4 Curlew ha^{-1}.

Roosting Distribution

During the high tide survey (26/01/10) 496 Curlews were recorded roosting within ten subsites (intertidal/supratidal habitats combined). 28% of these birds were located within 0K501 (Annagh), with a further 24% within 0K503 (Bealathaleen Creek). 0K441 (Barrow Harbour Outer), 0K484 (Blennerville (Lohercannan)) and 0K505 (Scraggane Bay (Minnaun - Kilshannig)) supported 50+ roosting individuals.

766 Curlews were recorded roosting during the roost survey (27/02/10), these birds distributed across eight subsites. 241 individuals were located supratidally within 0K503 (Bealathaleen Creek). A further 153 Curlews were distributed across five locations within 0K440 (Barrow Harbour Inner) while 83 Curlews roosted at two locations within 0K441 (Barrow Harbour Outer). 135 Curlews roosted within one flock along the upper shore (supratidal) of 0K439 (Carrahane Strand).

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

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

Numbers

Total numbers of Redshanks peaked in October 2009 (991 individuals) and thereafter steadily declined to a season minimum in February 2010 (306 individuals). All whole-site counts surpassed the threshold for all-Ireland importance. 474 Redshanks were counted during the high tide survey (26/01/10).

Redshanks were widespread and recorded within 15 subsites overall. Nine subsites supported Redshanks during all four low tide surveys (0K301, 0K438, 0K440, 0K441, 0K472, 0K484, 0K502, 0K503 and 0K504/0K506). The subsite peak count was 445 Redshanks (0K484, Blennerville (Lohercannan) on 06/10/09). This number surpasses the threshold for all-Ireland importance.

Foraging Distribution

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

At Tralee Bay Complex, Redshanks foraged regularly (3 low tide counts or more) within 11 subsites (0K301, 0K438, 0K440, 0K441, 0K442, 0K472, 0K484, 0K501, 0K502, 0K503 and 0K504/0K506). Peak foraging proportions during low tide surveys were recorded for different subsites in the four months – 0K484, 0K441, 0K501 and 0K484 for the four surveys respectively.

As well as supporting peak numbers on two occasions, 0K484 (Blennerville (Lohercannan)) also supported the second highest numbers during the November low tide count and during the high tide count (26/01/10). This inner bay subsite is assigned the benthic community 'sand to sandy mud with polychaetes and bivalves' (NPWS, 2014), a broad community complex that is widespread across the bay but exhibits muddier sediment in the inner reaches. This community complex is distinguished by the polychaetes *Pygospio elegans* and *Scoloplos armiger,* the gastropod *Peringia (Hydrobia) ulvae* and the oligochaete *Tubificoides benedii.* Other species present include the bivalves *Cerastoderma edule* and *Macoma balthica* and the polychaetes *Eteone longa* and *Nephtys hombergii.*

0K441 (Barrow Harbour Outer) was important in the early part of the season with second highest and peak numbers foraging respectively during the October and November surveys but with significantly fewer individuals during the rest of the survey programme – this pattern is not unusual for Redshanks who tend to shift their distribution in response to prey depletion and/or changes in the patterns of distribution of mobile prey such as *Corophium volutator*. 0K441 is also characterised by the broad benthic community 'sand to sandy mud with polychaetes and bivalves'

The peak intertidal foraging density was 4 Redshanks ha^{-1} recorded for 0K301 (River Lee) on 06/10/09. 0K441 and 0K484 both held densities of over 2 Redshanks ha^{-1} on occasion. The whole site average intertidal foraging density was 0.3 Redshank ha^{-1}.

Roosting Distribution

The greater majority of Redshanks were observed foraging, including during the high tide survey when double the number of Redshanks foraged in available intertidal areas, as opposed to roosting.

During the high tide survey, 216 Redshanks roosted across 11 subsites. Of these, 119 roosted within intertidal habitats; the peak number (34) located within 0K502 (Derryquay bridge east to Annagh) accounting for 28% of the total number counted. A further 22 Redshanks roosted within 0K501 (Annagh) and 21 within 0K472 (Spa). All other subsites supported <20 individuals.

136 Redshanks roosted supratidally within 0K440 (Barrow Harbour Inner) on 06/10/09. This subsite also supported good numbers roosting terrestrially on the two subsequent survey days.

274 Redshanks were recorded roosting during the roost survey (27/02/10), these birds distributed across six subsites. 44% roosted within 0K484 (Blennerville (Lohercannan)) at five different locations (intertidal/supratidal). A further 75 individuals roosted at three locations within 0K503 (Bealathaleen Creek), these counts being underestimates due to the birds being partially obscured by saltmarsh. A flock of 76 individuals roosted along the southern bank of the river in subsite 0K301 (River Lee).

Turnstone *Arenaria interpres* - Family (group): Family (group): Scolopacidae (wading birds)
Turnstones breed widely in both the high and low arctic zones. Two subspecies are recognised. The nominate subspecies is divided into three recognised populations that occur in Western Eurasia and Africa, one of which breeds in north-eastern Canada and northern and eastern Greenland and winters mainly in Western Europe and West Africa (Delaney et al. 2009). Iceland is used as a staging post. Wintering birds in Ireland have a widespread distribution and are a familiar species of open, non-estuarine, rocky shorelines although they also occur within estuaries.
Numbers
Numbers of all-Ireland importance were recorded in all five surveys undertaken. The whole site peak of 350 individuals was recorded on 06/10/09. Across the entire survey period, Turnstones were recorded in 14 count subsites. Subsite use during individual low tide surveys ranged from eight to ten subsites; Turnstones were recorded in 12 subsites during the high tide survey (26/01/10). The species was recorded with regularity (three surveys or more) within 11 subsites (0K416, 0K437, 0K438, 0K439, 0K440, 0K441, 0K442, 0K472, 0K484, 0K502 and 0K504/0K506. The subsite peak number (137 individuals) was recorded within 0K506 (Scraggane Bay & Castlegregory) on 03/01/10.
Foraging Distribution
Turnstones are associated with shorelines with rocky substratum, particularly those with algal wrack zones within which the birds forage for prey species such as amphipods (crustaceans), insects and small molluscs. A rocky substrata shoreline is found on the upper shore in many locations around the site (intertidal reef community), therefore a widespread distribution is to be expected and it is difficult to link this species' distribution to any specific factors. The intertidal reef community of Tralee Bay has a substrate that varies from sloping and flat bedrock to boulder and cobble shores. Brown algae dominate with species such as *Fucus vesiculosus, Fucus spiralis, F. serratus, Ascophyllum nodosum, Himanthalia elongata* and *Laminaria digitata*. The green alga *Ulva* spp. is abundant at a number of locations. Across the entire survey programme, Turnstones were recorded foraging intertidally within 14 subsites. Peak numbers during low tide surveys were recorded for 0K484 (Blennerville (Lohercannan)), 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)), 0K506 (Scraggane Bay & Castlegregory) and 0K440 (Barrow Harbour Inner) for the dates respectively. Intertidal reef is found in all of these subsites.
Roosting Distribution
The majority of Turnstones recorded during the survey programme were foraging. Roosting individuals were rarely recorded during low tide survey and 42 individuals only were recorded roosting during the high tide survey on 26/01/10. Nearly half of these (45%) were located within 0K472 (Spa). 29 Turnstones were recorded roosting within 0K484 (Blennerville (Lohercannan)) during the roost survey (27/02/10). These birds were positioned on and by the old mooring posts that jut out into the subsite, a large mixed roost that also comprised Lapwing, Oystercatcher, Dunlin and Black-tailed Godwit. However this was noted to be a transitory roost and birds flew off as the tide rose.

Black-headed Gull *Chroicocephalus ridibundus* - Family (group): Laridae (gulls)
Black-headed Gulls breed widely throughout the middle latitudes of the Palearctic and in north-eastern North America (Mitchell et al. 2004). It is the most widespread breeding seabird within Ireland, breeding both inland and on the coast. Winter numbers are boosted by birds arriving from northern and eastern Europe (Wernham et al. 2004). There is some evidence that gulls from Iceland also move into Ireland for the winter (BWPi, 2004).
Numbers
Over 1,000 Black-headed Gulls were recorded during all four low tide surveys, the peak number being 1,322 recorded on 03/01/10. Significantly fewer (464) were recorded during the high tide survey (26/01/10). Black-headed Gulls were widespread across the site and recorded within all subsites. The subsite peak of 460 individuals was recorded for 0K472 (Spa) on 02/02/10. Nine subsites supported Black-headed Gulls during all five surveys: 0K301, 0K438, 0K440, 0K441, 0K442, 0K472, 0K484, 0K502 and 0K504/0K506. 0K484 (Blennerville (Lohercannan)) was notable in supporting peak, or second highest numbers in all surveys.
Foraging Distribution
During low tide surveys, a greater proportion of Black-headed Gulls foraged intertidally, the converse being the case during the high tide survey when the majority foraged subtidally. Seven subsites were used with regularity by Black-headed Gulls foraging intertidally: 0K301, 0K416, 0K441, 0K484, 0K501, 0K502 and 0K504/0K506. Different subsites supported peak numbers of Black-headed Gulls foraging intertidally during the four low tide surveys as follows: 0K301 (River Lee), 0K484 (Blennerville (Lohercannan)), 0K506 (Scraggane Bay & Castlegregory) and 0K438 (Black Rock)/0K442 (Fenit) for the four dates respectively. 0K442 (Fenit), 0K472 (Spa) and 0K484 (Blennerville (Lohercannan)) were regularly used by the highest numbers of Black-headed Gulls recorded foraging subtidally. Terrestrial foraging was also noted around the site (outside of the SPA boundary) and in association with four subsites: 0K301, 0K416, 0K484 and 0K505.
Roosting Distribution
Peak numbers of Black-headed Gulls roosted intertidally within 0K484, 0K438 (twice) and 0K472 for the four low tide survey dates respectively. Good numbers also regularly used 0K301 (River Lee) and 0K440 (Barrow Harbour Inner). During the high tide survey the greater majority of roosting Black-headed Gulls did so intertidally. 152 Black-headed Gulls were located within 0K440 (Barrow Harbour Inner) representing 62% of the total recorded roosting intertidally on that day. Subtidal roosting/other behaviour was less frequently observed during low tide surveys and generally involved small flocks of birds; the exception being 60 individuals recorded in 0K416 (Derrymore Island (north shore & east end)) on 06/10/09. During the high tide survey, only 40 individuals were recorded roosting subtidally across the whole site and over half of these were located within 0K472 (Spa). Relatively few individuals (38) were recorded roosting during the roost survey (27/02/10); 28 of these roosted supratidally within 0K484 (Blennerville (Lohercannan)), part of a mixed-species roost close to where the sluice is located at Reen Point.

Common Gull *Larus canus* - Family (group): Laridae (gulls)
The Common Gull breeds widely across the Palearctic and in North America (Mitchell et al. 2004). In Ireland, the species is most widely seen during winter when wintering birds arrive from Scotland and continental Europe (Wernham et al. 2004).
Numbers
Numbers of Common Gull across the whole site rose from 661 individuals in October 2009 to a site peak of 1,570 on 02/02/10. Over 1,000 were recorded in all surveys undertaken in January and February 2010. Common Gulls were widespread across the site and recorded within all subsites. The subsite peak of 626 individuals was recorded for 0K506 (Scraggane Bay & Castlegregory) on 03/01/10. Seven subsites recorded the species during all five surveys: 0K301, 0K416, 0K438, 0K441, 0K472, 0K484 and 0K504/0K506.
Foraging Distribution
Common Gulls foraged within three habitat types (intertidal, subtidal and terrestrial). Intertidal foraging was most frequently observed. On each survey occasion, large concentrations of Common Gulls foraging intertidally within one or two subsites only, with significantly fewer individuals recorded across several other subsites. This is reflected by the subsite peaks which range from 46% to 96% during low tide surveys. Peak numbers foraging intertidally during low tide surveys were located exclusively within the related Castlegregory subsites 0K504 and 0K506. 0K438 (Black Rock) supported good numbers (126) on one occasion (06/10/09) but with very few individuals recorded there subsequently. Terrestrial records were infrequent but notable numbers foraging terrestrially include 155 individuals close to 0K505 (Scraggane Bay (Minnaun - Kilshannig)) on 20/11/09 and 345 individuals recorded close to 0K484 (Blennerville (Lohercannan)) on 02/02/10 (note that these are outside of the SPA boundary).
Roosting Distribution
During low tide survey the majority of Common Gulls roosted/other in intertidal habitat. The largest numbers were recorded within 0K438 (Black Rock), 0K439 (Carrahane Strand) and 0K440 (Barrow Harbour inner). During the high tide survey, 0K440 (Barrow Harbour inner) supported 76% (600) of the Common Gulls roosting intertidally. Subtidal roosting/other behaviour was less frequently observed during low tide surveys and generally involved small flocks of birds. 75 individuals roosted/other subtidally during the high tide survey (26/01/10) and 60% of these were located within 0K504 (Castlegregory (Carrigaghroe Pt - Kilshannig Pt)). Relatively few individuals (26) were recorded roosting during the roost survey (27/02/10); 25 of these roosted subtidally within 0K439 (Carrahane Strand).

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

Section 5.4 provides information on activities and events that occur in and around Tralee 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 files, Kerry County Development Plan (Kerry County Council, 2009)[18], Tralee Town development Plan (Tralee Town Council 2009a), relevant Local Area Plans and other available documents relevant to the ecology of the site. A 'site activity questionnaire' was completed by NPWS regional staff.

In addition, information was collected during the 2009/10 waterbird survey programme (NPWS, 2010) as field workers recorded activities or events that occurred at the site during their survey work. This information, together with results from the 'site activity questionnaire' provides valuable information gained from 100+ hours of coordinated surveyor effort across the SPA site. All activities and events 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:-

[18] Note that the draft County Kevelopment Plan 2015-2021 is now available for review.

1. Activities and events identified to occur in and around Tralee 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 Tralee 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 Tralee Bay, those that have the potential to cause disturbance to waterbird species are highlighted.

3. Data from the 2009/10 waterbird survey programme were used to inform an assessment which examined the level of disturbance caused by activities recorded during field surveys. The methodology was adapted from that used for monitoring Important Bird Areas (IBAs) (Birdlife International, 2006) and involved assigning scores which ranged between 0 and 3, to three selected attributes of each disturbance event (1) frequency/duration; (2) intensity and (3) likely response of waterbirds (after Hill et al. 1997) (Table 5.7). The rationale for scoring is provided in Appendix 11.

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.

Individual activities/events are scored separately and there was no attempt to produce cumulative scores for different activities occurring at the same time, although cumulative effects are likely.

5.4.3 Overview of activities at Tralee Bay

Activities and events identified to occur in and around Tralee Bay are shown in Appendix 9, listed in terms of the subsites surveyed during the 2009/10 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.

(1) Habitat loss, modification and adjacent landuse

This large site is located along the northern coast of the Dingle Peninsula. The site includes the inner part of Tralee Bay, including Derrymore Island, the inlets of Barrow Harbour and Carrahane Strand, Akeragh Lough, Lough Gill, and much of the intertidal habitat from Scraggane Point at the northern end of the Magharees Peninsula around the coast to *c.*2 km south of Ballyheige.

The site forms part of a particularly scenic landscape, backed by the Sliabh Mish and Brandon mountain ranges of the Dingle peninsula. There are views of the Magharee Islands, Brandon Head, Fenit Island, Kerry Head and (on a good day) Loop Head in Clare (NPWS, 2000).

Sandy beaches are a dominant feature of the site with a series of shingle ridges forming Derrymore Island. Many high value coastal habitats are present including fixed dunes, a priority habitat under the EU Habitats Directive. Two Special Areas of Conservation are associated with the site: Akeragh, Banna and Barrow Harbour (000332) and Tralee Bay and Magharees peninsula, west to Cloghane (002070).

Tralee Town is the major settlement adjoining the site. It is the largest town in County Kerry and is the county administrative, retail and services centre, comprising an area of 1,237ha (3,057 acres) (Tralee Town Council, 2009b). Otherwise settlements around the site are dispersed and generally linear, with small concentrations in villages. There is one integrated pollution prevention control (IPPC) licensed site in Tralee Town (Tralee Town Council, 2009b).

The River Lee, the main river to enter the site, passes through Tralee Town. In addition, the Tralee Ship Canal runs from the town to the sea at Blennerville. This short canal (*c.*2km long) opened in 1846, was built to allow ships to reach the town but was closed in the 1930's, largely due to the build up of silt.

The site also encompasses the mouths and estuaries of several other rivers including the Derryquay, Derrymore, Finglas and Owencashla.

The surrounding landuse is largely agricultural with grazing (particularly cattle) dominating. Some areas of saltmarsh are grazed (NPWS, 2000).

Caravan parks are a common feature around the site, usually behind dune systems (e.g. Banna Strand, Aughaclasla Strand). A golf course lies adjacent to Lough Gill.

Flood hazard maps for the Tralee area, prepared by the Office of Public Works, indicate that there is considerable flood risk within the town, generally adjacent to the Big River and along the Lee River and Estuary. Tidal and fluvial generated flooding and urban drainage contribute to this risk. Flood embankments are present along much of the Lee River to protect land from inundation from river or tidal flooding, these lands are still at risk of flooding from overland

drainage, high ground water tables, floods exceeding the designed flood event or breaches in flood defences (Tralee Town Council, 2009b).

Ballyard, between Tralee town and Blennerville, but outside of designated areas, is the location of the 'Tralee Bay Wetlands Centre' which opened in 2012 which has an artificial lake and other recreational features as well as wildlife habitats, bird hides and wildlife viewing zones.

(2) Water quality

The Shannon River Basin District (ShIRBD) River Basin Management Plan 2009 – 2015 covers the implementation of the Water Framework Directive (WFD) (2000/60/EEC) for the Shannon region and covers Tralee Bay and its inflowing rivers.

Tralee Town is served by a combined sewerage system and a modern waste water treatment plant (WWTP) situated at Lohercannon. The primary outfall is located in the lower Lee Estuary. In times of heavy rainfall waste water heavily diluted with storm water is discharged via storm overflows to local watercourses – mainly the Big River and the River Lee. The WWTP is operated by Kerry County Council and has a design population equivalent (PE) of 42,000 (based on 60g BOD/PE) and is currently operating within capacity (Tralee Town Council, 2009b).

The Lee Estuary has a history of water quality issues and has been previously classified as 'eutrophic.' The Lee Estuary (upper) is classified as a 'nutrient sensitive water' under the Urban Waste Water Treatment Regulations 2001 (as amended in 2004 and 2010)[19], with water quality classified of 'moderate status' (ShIRBD, 2010a) largely attributed to organic inputs. The Shannon River Basin District Action Programme for coastal and transitional waters (ShIRBD, 2010b), classifies Tralee Bay as of 'good ecological status.[20] However the North Kerry/Tralee Bay Water Management Unit Action Plan (ShIRBD, 2010a) identifies seven waste water treatment plants (WWTP) in the catchment as 'at risk': Ardfert WWTP, Ballyferriter Imhoff Tank, Castlegregory, Fenit Septic Tank, Kilcummin, Kilfenora and Tralee WWTP. Similarly a 2008 risk assessment identified a risk from waste water treatment plants within the Tralee Bay catchment while on-site wastewater treatment plants was the second key pressure upon water quality at the site (DoEHLG, 2009b).

The Environmental Protection Agency (EPA) monitors the status of estuarine and coastal water bodies using their Trophic Status Assessment Scheme (TSAS), a requirement under the Urban Waste Water Treatment Directive (UWWT) (91/271/EEC)[21] and Nitrates Directive (91/676/EEC). Following assessment, waterbodies are classified as eutrophic, potentially eutrophic, intermediate, or unpolluted (O'Boyle et al. 2010). The most recent assessment classified inner Tralee Bay as 'unpolluted' and the Lee Estuary as 'intermediate,' an improvement on previous water quality assessments.

An Environmental Quality Standard (EQS) based on molybdate reactive phosphorus (MRP) has been established for estuarine (transitional) waters with good status being achieved if the median (summer or winter) MRP concentration is ≤0.060 mg/l (at salinity 0.0 – 17.0) and ≤0.040 mg/l (at

[19] (SI 254 of 2001)

[20] Ecological status defined as 'An expression of the structure and functioning of aquatic ecosystems associated with surface waters. Such waters are classified as being of good ecological status when they meet the requirements of the Water Framework Directive.

[21] Transposed by the Urban Waste Water Treatment Regulations S. I. No 254 of 2001, as amended by S.I. No 48 of 2010.

salinity 35.0) (O'Boyle et al. 2010). In a recent assessment, Lee estuary (Tralee) was one of four waterbodies that breached the winter MRP criterion and therefore breached the EQS. In determining 'ecological status' the EPA have developed classification schemes that use the characteristics of different biological communities, together with information on the physico-chemical environment to define ecological status[22]. O'Boyle et al. (2010) reported the Lee Estuary as 'moderate' and therefore substandard.

In recognition of the "sensitive area classification" of the Upper Lee Estuary, the Tralee Sewerage Scheme Nutrient Reduction Preliminary Report was prepared in April 2006 and its recommendations were prioritised in the Kerry County Council Water Services Investment Programme Capital Works Programme 2007. The report recommends a detailed investigation and modelling of the existing collection system, together with further waste water testing and sampling, as a basis for planning necessary future improvements. The report also recommends the consideration of the provision of phosphate removal facilities at the WWTP (Tralee Town Council, 2009b).

(3) Fisheries and aquaculture

Tralee Bay Complex SPA contains two areas designated as a Shellfish Waters under the EU Shellfish Waters Directive.[23] The Maharees Shellfish Area covers some 7.9 km^2 and is located on the eastern side of the Magharees Peninsula (DoEHLG, 2009a) (within 0K504). The Tralee Bay Shellfish Area covers some 17.5 km^2 and is located within inner Tralee Bay (DoEHLG, 2009b) (encompassing part or all of the following subsites 0K501, 0K472, 0K502, 0K503, 0K416 and 0K442). These designations relate to a native Oyster (*Ostrea edulis*) fishery with the inner Tralee bay beds being the most important in the country (Tully & Clarke, 2012).

The Sea Fisheries Protection Authority is responsible for classifying shellfish production areas and the current classification of the Tralee Bay Bivalve Mollusc Production Area (encompassing both areas as described above) (as of 20th July 2012) is Class B (www.sfpa.ie) meaning that shellfish may be placed on the market for human consumption only after treatment in a purification centre or after relaying, so as to meet the health standards for live bivalve molluscs laid down in EC Regulations on food safety[24].

Various inshore fishery activities occur within the site. Fishing methods include mobile gear (e.g. dredges for Scallop and Oyster) and static gear (line fishing, pots and creels) (DoEHLG, 2009a, b).

The main fishing harbour and commercial port is located at Fenit, located approximately 10km west of Tralee and facing south over Tralee Bay. Fenit Pier is a working harbour and boating marina and supports the local fishing fleet and sailing club. The marina provides up to 130 berths for leisure boats of varying sizes. Fenit is also a popular tourist destination and hosts activities such as general beach recreation and fishing.

[22] Using measurements of parameters such as dissolved inorganic nitrogen (DIN), dissolved oxygen (DO), BOD, macroalgae, fish, benthic invertebrates.

[23] Shellfish Waters Directive 2006/113/EC which is implemented in Ireland by the European Communities (Quality of Shellfish Waters) Regulations 2006 (SI No 268 of 2006) and the European Communities (Quality of Shellfish Waters) (Amendment) Regulation 2009, (SI 55 of 2009).

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

Leisure fishing occurs within Tralee Bay Complex, the main access points being the pier and slip at Fenit and a slip at Scraggane Bay. Shore angling is popular at Banna Strand, Black Rock, the entrance to Barrow Harbour, the Spa, Derrymore Strand and The Trench (the point of outflow from Lough Gill) (www.traleebayseaangling.ie). Fish species encountered in this area include Bass (*Dicentrarchus labrax*), Flounder (*Platicthys flesus*), Wrasse (*Lubrus*), Pollack (*Pollachius pollachius*) and Turbot (*Scophthalmus maximus*).

Lough Gill is a large, shallow lagoon noted for brackish conditions leading to a rich and diverse invertebrate fauna (Healy et al. 1997). The site is an important trout (*Salmo trutta*) fishery. A survey in autumn 2010 also recorded the following species: Three-spined stickleback (*Gasterosteus aculeatus*), European Eel (*Anguilla anguilla*), Thick-lipped grey mullet (*Chelon labrosus*), Flounder (*Platichthys flesus*) and Sand Goby (*Pomatoschistus minutus*) (Inland Fisheries Ireland, 2010). The site has a known history of physical modifications (e.g. channelisation) and eutrophication, the latter likely due to agricultural run-off.

Bait-digging is widespread across the site and was recorded in ten subsites during the 2009/10 waterbird survey programme. Bait digging occurs to such an extent that the local Tralee Bay Sea Angling Club has evoked a temporary ban on digging Lugworms (*Arenicola marina*) in previous years due to a reduction in the species' abundance.

(4) Recreational activities

Much of the coastline of the inner site is accessible to humans for walking, including walks associated with the River Lee and Tralee Ship Canal. From Blennerville there is an existing coastal amenity walk to the Spa which is part of the North Kerry Way. The North Kerry Way extends along parts of Banna Strand and the Dingle Way extends along much of the coastline of the Magharees Peninsula.

Besides Tralee and Fenit, the site is bordered in places by smaller settlements. Castlegregory and Ballyheigue are important tourist resorts in the area and support associated features such as car parks, caravan parks, golf courses and other amenities. Much of the Tralee Bay coastline however is uninhabited and relatively inaccessible, a notable example being the large stretch of coastline between Tralee Town and Derrymore which supports extensive saltmarsh habitat.

Sandy beaches backed by expanses of 'white dunes' are a common feature at Derrymore Island, the Magharees peninsula, and along Banna Strand. These are popular areas for recreation such as walking and canoeing. Beaches at Magherabeg, Banna, Fenit and Ballyheige are Blue Flag beaches. Several activities including the driving of motor vehicles onto beaches as listed are controlled by Kerry County Council under the Kerry County Council amended (beach) bye-laws, 2007. The Kerry County Council (Recreational Craft and Personal Watercraft) Bye-Laws (2007) also apply to beaches at Magherabeg, Banna and Fenit. Several areas within the site are well-regarded surfing locations (e.g. Banna Strand). A water sports activity centre is located at Castlegregory.

Horse-riding is a regular feature along the beaches.

(5) Others

Lough Gill is a designated Wildfowl Sanctuary (S.I. 243 of 1977 Wild Birds (Open Seasons) Order 1977). There are two further wildfowl reserves at Derrymore and Blennerville. These are No-Shooting Areas.

Shooting/wildfowling has been documented at the site (NPWS, 2000), and was recorded in association with two subsites during the 2009/10 Waterbird Survey Programme. Derrymore Gun Club is active in the area.

January 2010 was the coldest January for 25 years (Met Éireann, 2010) and in response to the freezing conditions, the Department of the Environment, Heritage and Local Government extended a temporary closure of the hunting season for wild birds (6th January 2010 to 20th January 2010).

5.4.4 Disturbance Assessment

Activities highlighted in grey in Appendix 9 are those that have the potential to cause disturbance to waterbirds.[25] Based on this dataset, 0K442 (Fenit) supports the highest number of activities that have the potential to cause disturbance to waterbirds, linked to this subsites' proximity to Fenit Harbour and associated coastal and marine activities, both commercial and recreational in nature. However, many of these listed activities/events are likely to occur infrequently, and their timing (seasonality) is an important factor as many of the activities will be more frequent during summer months when the main concentrations of non-breeding waterbirds are not present. Waterbird responses to an activity are also likely to vary with each individual event and to be species-specific, and the significance of disturbance impacts upon waterbirds depends on a range of factors (see Section 5.4.5).

Of the list of potential disturbance-causing activities and events, relatively few were recorded to cause disturbance to waterbirds during the 2009/10 Waterbird Survey Programme. The activities recorded were: aircraft (flight path), power boating, sailing (non-powered watercraft), walking (incl. dogs), motorised vehicles, hunting (shooting), bait-digging, hand-gathering of molluscs and activities associated with intertidal aquaculture. A summary table (Table 5.8) shows the peak disturbance score recorded for each subsite, while the full assessment is shown in Appendix 10.

Walking (intertidal areas and including dogs) was the most widespread activity and responsible for the peak disturbance score for seven subsites (Table 5.8). The higher score recorded for 0K504/505 Castlegregory (Carrigaghroe Pt - Kilshannig Pt) & Scraggane Bay combined) relates to this activity being observed more frequently within this subsite together with the occurrence of dogs which resulted in a greater response from waterbirds.

[25] As identified through field survey records plus desk-top review and information gathering.

Table 5.8 Disturbance Assessment – Summary Table

Number of activities recorded to cause disturbance to waterbirds during field surveys (2009/10 waterbird survey

Subsite Code	Subsite Name	Number activities causing disturbance	Peak Disturbance Score	Activity Responsible
0K010	Lough Gill	0		
0K301	River Lee	1	5	• Walking (incl. dogs)
0K416	Derrymore Island (north shore & east end)	1	6	• Walking (incl. dogs)
0K437	Ballyheigh to Akeragh Lough	0		
0K438	Black Rock	2	6	• Walking (incl. dogs) • Shooting
0K439	Carrahane Strand	0		
0K440	Barrow Harbour Inner	0		
0K441	Barrow Harbour Outer	1	6	• Walking (incl. dogs) •
0K442	Fenit	2	5	• Powered watercraft
0K472	Spa	2	5	• Walking (incl. dogs)
0K484	Blennerville (Lohercannan)	2	6	• Aircraft (flight path)
0K501	Annagh	0		• Hand gathering - molluscs
0K502	Derryquay bridge east to Annagh	0		
0K503	Bealathaleen Creeek	0		• Walking (incl. dogs)
0K504/505/506	Castlegregory (Carrigaghroe Pt - Kilshannig Pt) & Scraggane Bay	4	7	• Walking (incl. dogs)

programme) plus the calculated peak disturbance score (see text for explanation). Scores 0 – 3 = Low Scores 4 – 6 = Moderate Scores 7 – 9 = High. Grey shading = no activity recorded to cause disturbance during field surveys

As a final review, Table 5.9 shows the peak disturbance scores overlaid on the subsite assessment table (total waterbird numbers, low tide surveys). Where a species distribution and activity responsible for the peak score are not likely to coincide, the table is left unshaded. Examples include 0K301 where people walking along the shore might affect Curlews or Oystercatchers but are unlikely to have any disturbance effects on Scaup, or power boating within 0K442 that might affect gulls or Light-bellied Brent Geese that are distributed subtidally but is likely to have negligible disturbance effects on wading birds foraging intertidally.

Table 5.9 Tralee Bay Complex SPA – subsite rankings based on total numbers (low tide surveys) by peak disturbance score

Note that where a species distribution and activity responsible for the peak score are unlikely to coincide, the table is left unshaded.

Subsites ► / Species ▼	0K010	OK301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504*	0K505*	0K506*
WS	V														V		
PB		M	M		M	M	H	M	M	H	H	H	H	V	V	H	V
SU		M	H			M		L		V	V	M	H	V	L		
WN	H	M					V			L	M	V	V	V			
T.	H	V	L			L	H	L			H	H	M	V			
MA	H	H	M				V			M	H	H	M	V	M		L
PT												V					
SP		V										V	V	L	H		
OC		L	M	M	H	M	L	M	V	H	V	H	H	H	V	H	V
RP			H	L	V	M		M	M	M	H	M			H	V	V
GP			H			V	H	M			V						V
GV	M		M		M	H		H	M	V	H	M	V		M	M	H
L.	H	V	L		V	H	H		M	M	V	H	L		M	L	M
SS	V				V			M				L	M		H	V	V
DN		M	L		H	M	L	V		M	V	H	H	H	L	H	M
BW		V			M			M				V	M	V	L		
BA		H			H			M	L	V	H	H	V			M	
CU	M	L	H	L	H	V	M	M	M	H	V	H	V	H	H	L	V
RK		H	H	L	M	L	H	V	M	M	V	V	H	H	M	L	H
TT			M	L	H	L	V	M	H	H	V	L	H	H	V	H	V
BH	M	H	M	M	H	M	H	H	H	V	V	M	M	L	L	H	V
CM	M	M	H	L	H	H	H	H	M	M	H	M	M	L	V	H	V

*Note that the Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 and 02/02/10 and as one subsite combined (0K506) on 06/10/09 and 03/01/10.

5.4.5 Discussion

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

Many of the 'activities' identified may act so as to modify wetland habitats of the site. While physical loss might be considered more historic in nature (e.g. the construction of piers, slipways etc.), on-going modifications to intertidal habitats may occur due to changes in natural processes (e.g. sedimentation or erosion rates) as a result of former physical events. Physical damage may occur from trampling or compaction (e.g. horse-riding, humans walking, motorised vehicles). The grazing of salt marsh areas can modify waterbird roosting areas. Bait-digging and the hand-gathering of molluscs may cause some physical damage while at the same time removing waterbird prey resources. Fisheries and aquaculture interact with waterbirds in a variety of ways including the direct removal of waterbird prey (e.g. fish species, bivalves), habitat loss/modification (e.g. due to the physical presence of oyster trestles within intertidal habitat), habitat damage (e.g. from machinery, vehicles) and indirect effects upon invertebrate distribution and abundance.

Activities that cause disturbance can lead to the displacement of waterbirds. The significance of the impact that results from even a short-term displacement should not be underestimated. In terms of foraging habitat, displacement from feeding opportunities not only reduces a bird's energy intake but also leads to an increase in energy expenditure as a result of the energetic costs of flying to an alternative foraging area. Displacement also has knock-on ecological effects such as increased competition within and/or between different species for a common food source. In areas subject to heavy or on-going disturbance, waterbirds may be disturbed so frequently that their displacement is equivalent to habitat loss. When disturbance effects reduce species fitness[26] (reduced survival or reproductive success) consequences at population level may result.

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

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

and be influenced by:-

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

Knowledge of site activities and events is important when examining waterbird distribution and understanding the many factors that might influence a species' distribution across a site. The above points also highlight the complex nature of waterbird behaviour and species specificity, as well as the need for careful consideration of the impacts of disturbance upon waterbird species when undertaking Appropriate Assessments or other environmental assessments. This review could therefore form the starting point for any future study aiming to quantify the effects of

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

activities/disturbance events across the site, as well as to help identify the extent to which existing use and management of the site are consistent with the achievement of the conservation objectives described in Part Three of this document.

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APPENDIX 1

SITE NAME: TRALEE BAY COMPLEX SPA

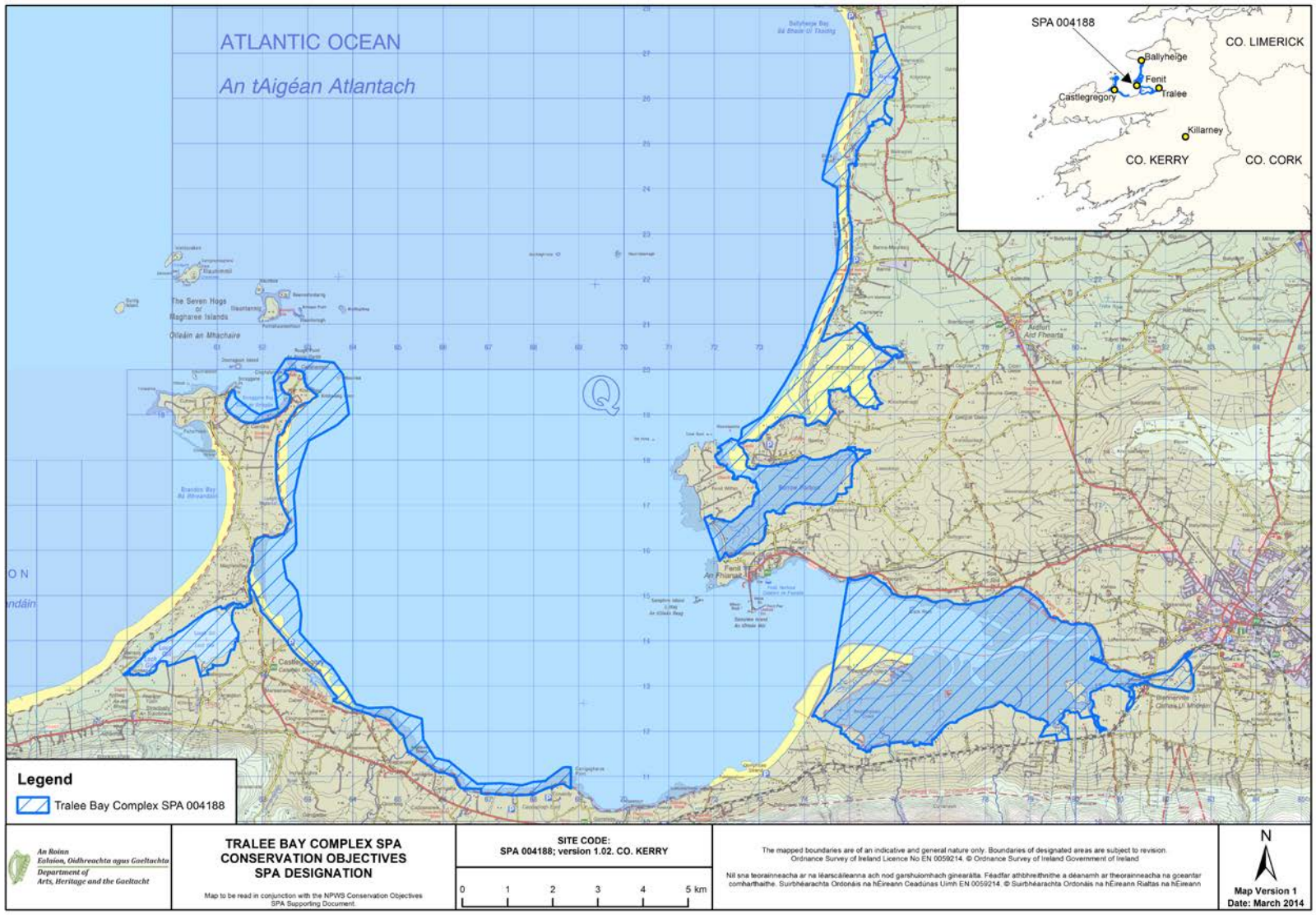
SITE CODE: 004188

The Tralee Bay Complex SPA is located along the coast of north Co. Kerry between Ballyheige in the north, Tralee in the east and Stradbally in the west. The site includes the inner part of Tralee Bay, including Derrymore Island, the inlets of Barrow Harbour and Carrahane Strand, Akeragh Lough, Lough Gill, and much of the intertidal habitat from Scraggane Point at the northern end of the Magharees Peninsula around the coast to c. 2 km south of Ballyheige. Inner Tralee Bay is well sheltered by the Derrymore Island peninsula. The intertidal sediments vary from muddy sands on the upper shore to firm rippled sands on the lower, more exposed shore. The sediments have a diverse macro-invertebrate fauna, with such species as Cockle (*Cerastoderma edule*), Lugworm (*Arenicola marina*), Ragworm (*Hediste diversicolor*), Baltic Tellin (*Macorna balthica*) and Shrimp (*Crangon crangon*) occurring. The intertidal flats have extensive beds of Eelgrass (*Zostera* spp.).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Mallard, Pintail, Scaup, Oystercatcher, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Sanderling, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Turnstone, Black-headed Gull and Common Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Tralee Bay Complex SPA is an internationally important wetland for wintering waders and wildfowl. It supports an internationally important population of Light-bellied Brent Goose (1,412) and nationally important populations of a further 21 species, i.e. Whooper Swan (101), Shelduck (220), Wigeon (1,634), Teal (623), Mallard (571), Pintail (54), Scaup (892), Oystercatcher (1,011), Ringed Plover (344), Golden Plover (6,393), Grey Plover (195), Lapwing (6,106), Sanderling (228), Dunlin (2,444), Black-tailed Godwit (139), Bar-tailed Godwit (608), Curlew (1,170), Redshank (635), Turnstone (229), Black-headed Gull (1,320) and Common Gull (599) – all figures are five year mean peak counts for the period 1995/96 to 1999/2000, except the gulls which are four year mean peak counts for the period 1996/97 to 1999/2000.

Tralee Bay Complex SPA is of high ornithological importance as it annually supports over 20,000 wintering waterbirds, including an international important population of Light-bellied Brent Goose and nationally important populations of 21 other species. It is of note that three of the species that regularly occur, Whooper Swan, Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive.


ATLANTIC OCEAN
An tAigéan Atlantach
SPA 004188
CO. LIMERICK
Ballyheige
Fenit
Tralee
Castlegregory
Killarney
CO. KERRY
CO. CORK
The Seven Hogs
or
Magharee Islands
Oileáin an Mhachaire
Legend
Tralee Bay Complex SPA 004188
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX SPA
CONSERVATION OBJECTIVES
SPA DESIGNATION
Map to be read in conjunction with the NPWS Conservation Objectives
SPA Supporting Document.
SITE CODE:
SPA 004188; version 1.02. CO. KERRY
0 1 2 3 4 5 km
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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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
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APPENDIX 2

Waterbird data sources

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

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

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

- Swan Surveys

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

- Greenland White-fronted Goose

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

- Greylag Geese

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

- Barnacle Goose (*Branta leucopsis*)

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

- Light-bellied Brent Geese

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

APPENDIX 3

Analysing population trends: a synopsis

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

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

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

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

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

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

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

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

Example

Year	Unsmoothed	Smoothed
1994	3.53	0.84
1995	2.39	0.97
1996	2.95	1.11
1997	3.70	1.23
1998	5.20	1.30
1999	3.86	1.33
2000	5.14	1.31
2001	3.39	1.27
2002	3.51	1.23
2003	5.20	1.20
2004	3.98	1.18
2005	2.63	1.17
2006	2.91	1.16
2007	2.21	1.14
2008	6.37	1.10
2009	5.35	1.05
2010	1.00	1.00

Term	Change
5YR	-10.64
10YR	-20.42
ALL YR	8.59

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

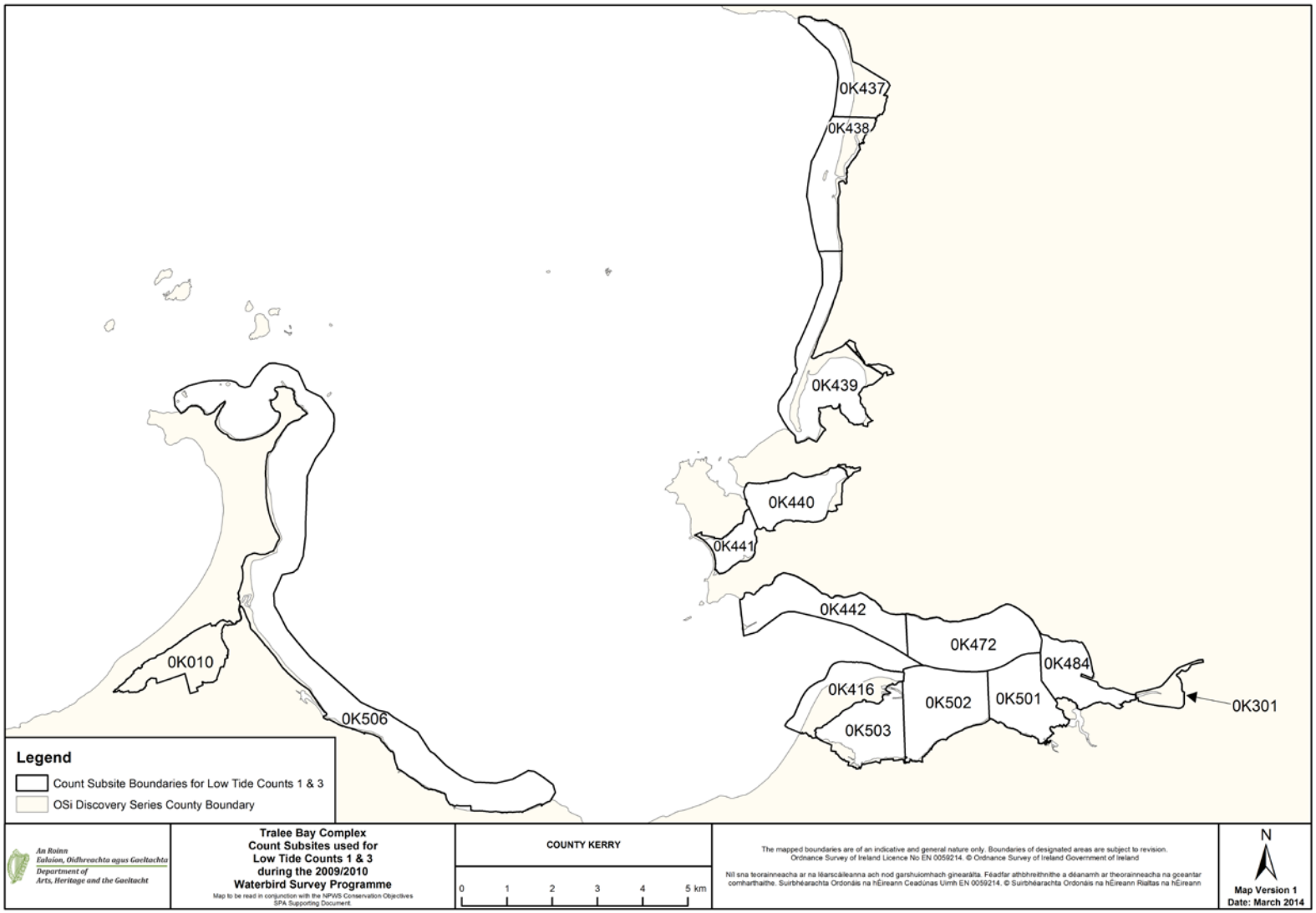
Tralee Bay Complex – Waterbird survey programme 2009/10 – Count Subsites

Subsite	Subsite Name
0K010	Lough Gill
0K301	River Lee
0K416	Derrymore Island (north shore & east end)
0K437	Ballyheigh to Akeragh Lough
0K438	Black Rock
0K439	Carrahane Strand
0K440	Barrow Harbour Inner
0K441	Barrow Harbour Outer
0K442	Fenit
0K472	Spa
0K484	Blennerville (Lohercannan)
0K501	Annagh
0K502	Derryquay bridge east to Annagh
0K503	Bealathaleen Creeek
0K504*	Castlegregory (Carrigaghroe Pt - Kilshannig Pt)
0K505*	Scraggane Bay (Minnaun - Kilshannig)
0K506*	Scraggane Bay & Castlegregory

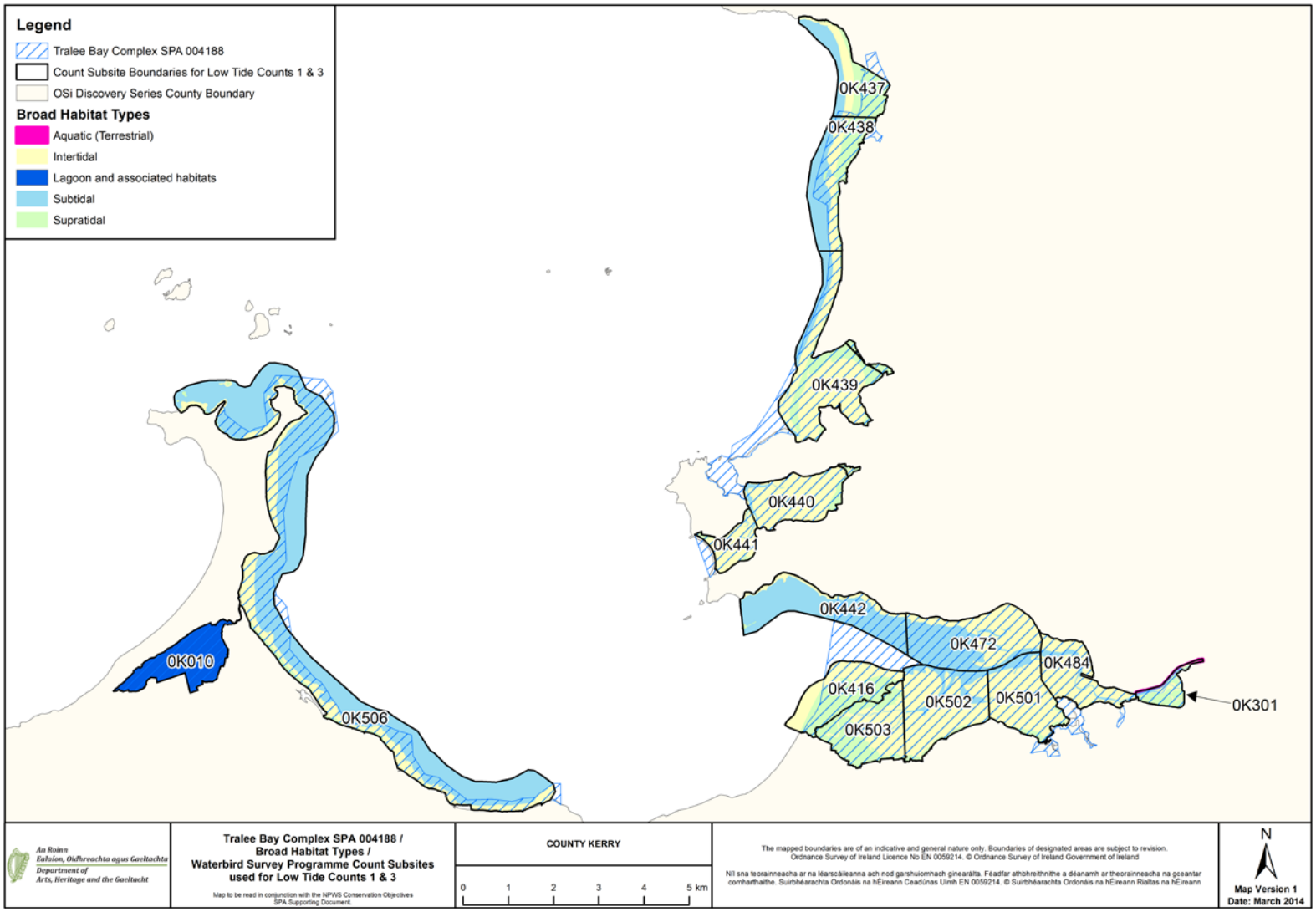
* Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on 20/11/09 (LT), 26/01/10 (HT) and 02/02/10 (LT) and as one subsite combined (0K506) on the low tide survey dates of 06/10/09 and 03/01/10.

* Note: Cummins & Crowe (2010) included subsites 0K459 and 0K460 (Cloghane Estuary and Brandon Bay). However, as these are not part of Tralee Bay Complex SPA they were not included within analyses undertaken for this report.

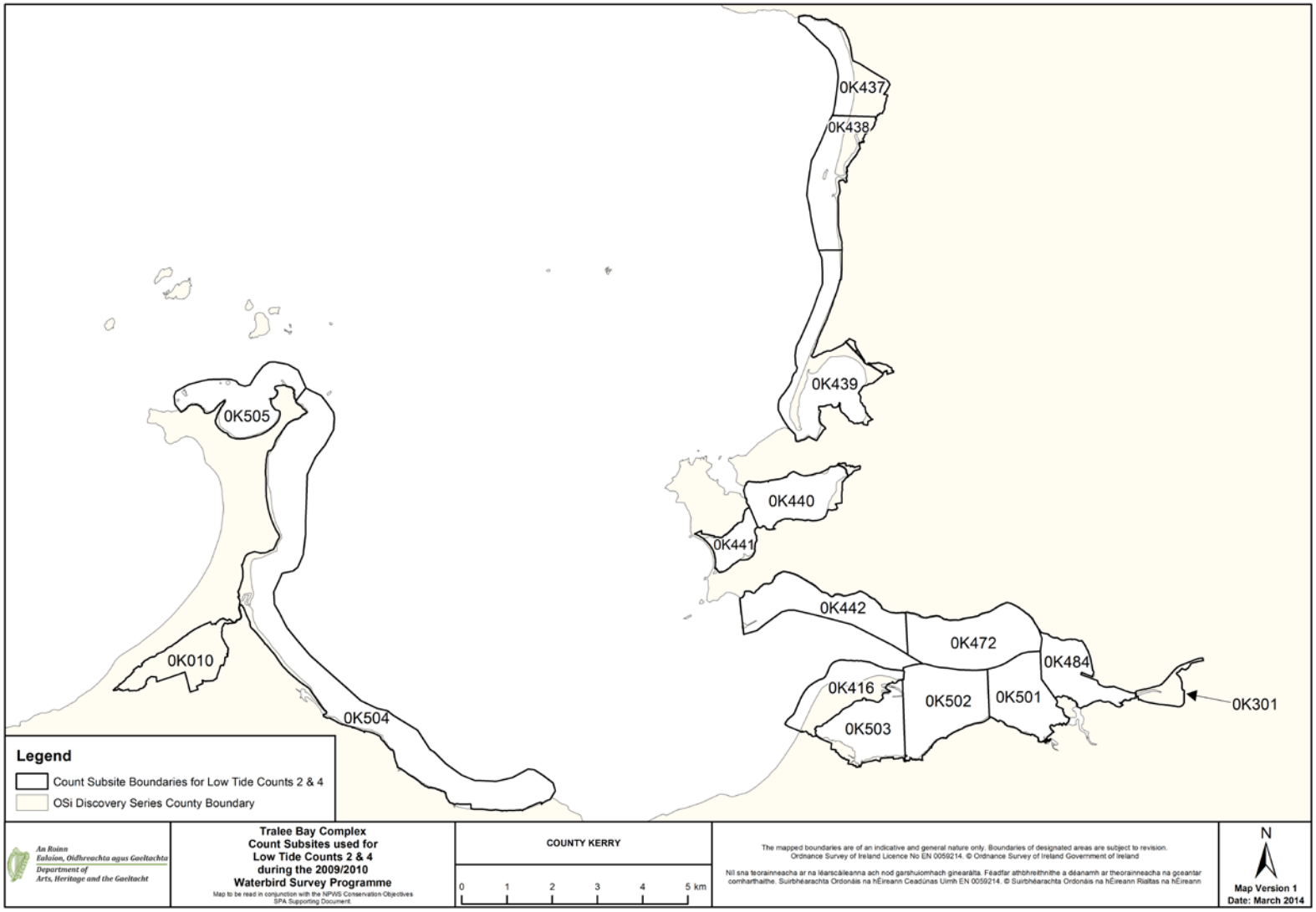
Count Subsite Map 1a Castlegregory and Scraggan Bay sections were counted as one subsite combined (0K506) on the low tide survey dates of 06/10/09 and 03/01/10.



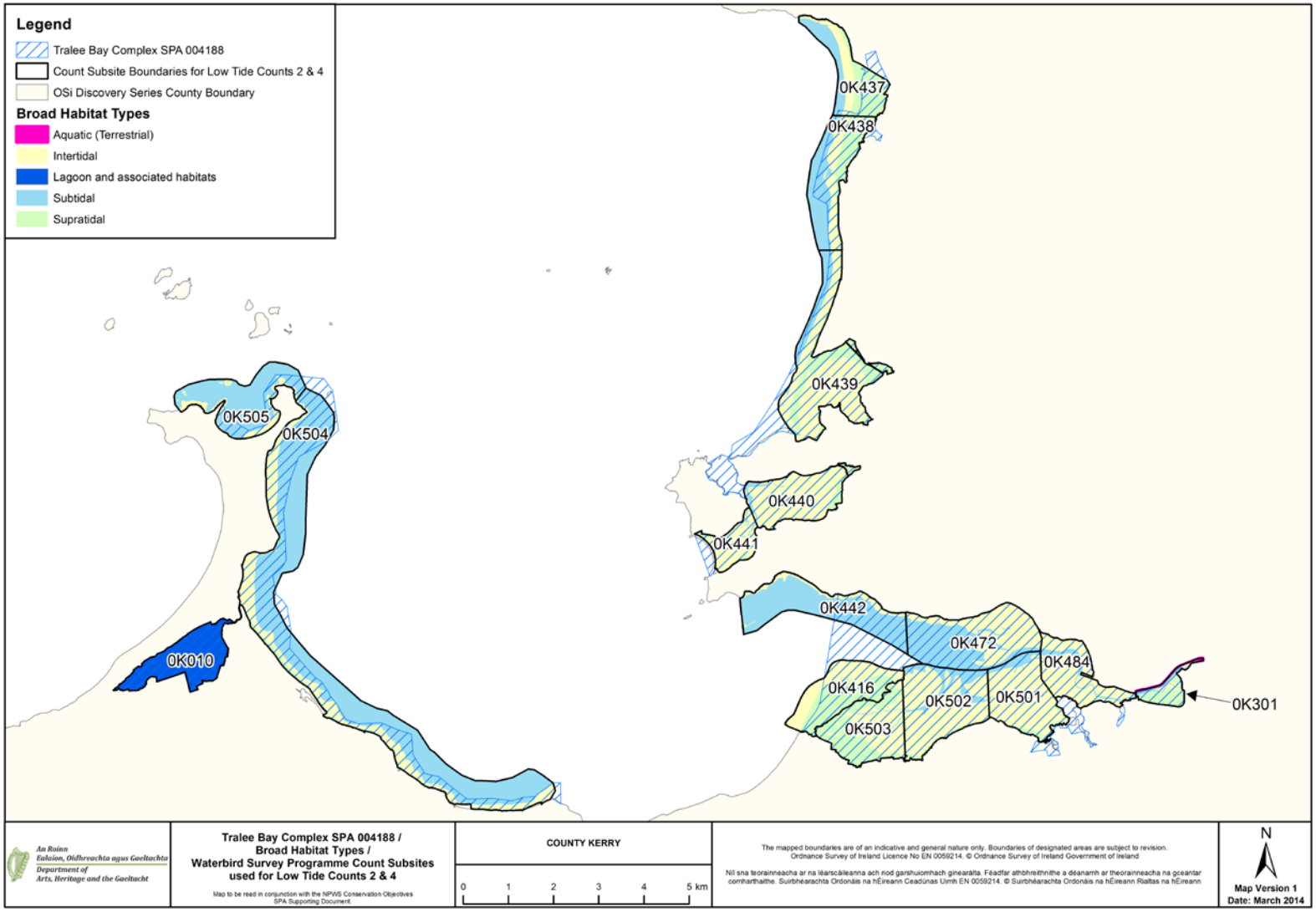
Count Subsite Map 1b Castlegregory and Scraggan Bay sections were counted as one subsite combined (0K506) on the low tide survey dates of 06/10/09 and 03/01/10.



Count Subsite Map 2a Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on the low tide survey dates 20/11/09 and 02/02/10.



Count Subsite Map 2b Castlegregory and Scraggan Bay sections were counted as two separate subsites (0K504 and 0K505 respectively) on the low tide survey dates 20/11/09 and 02/02/10.

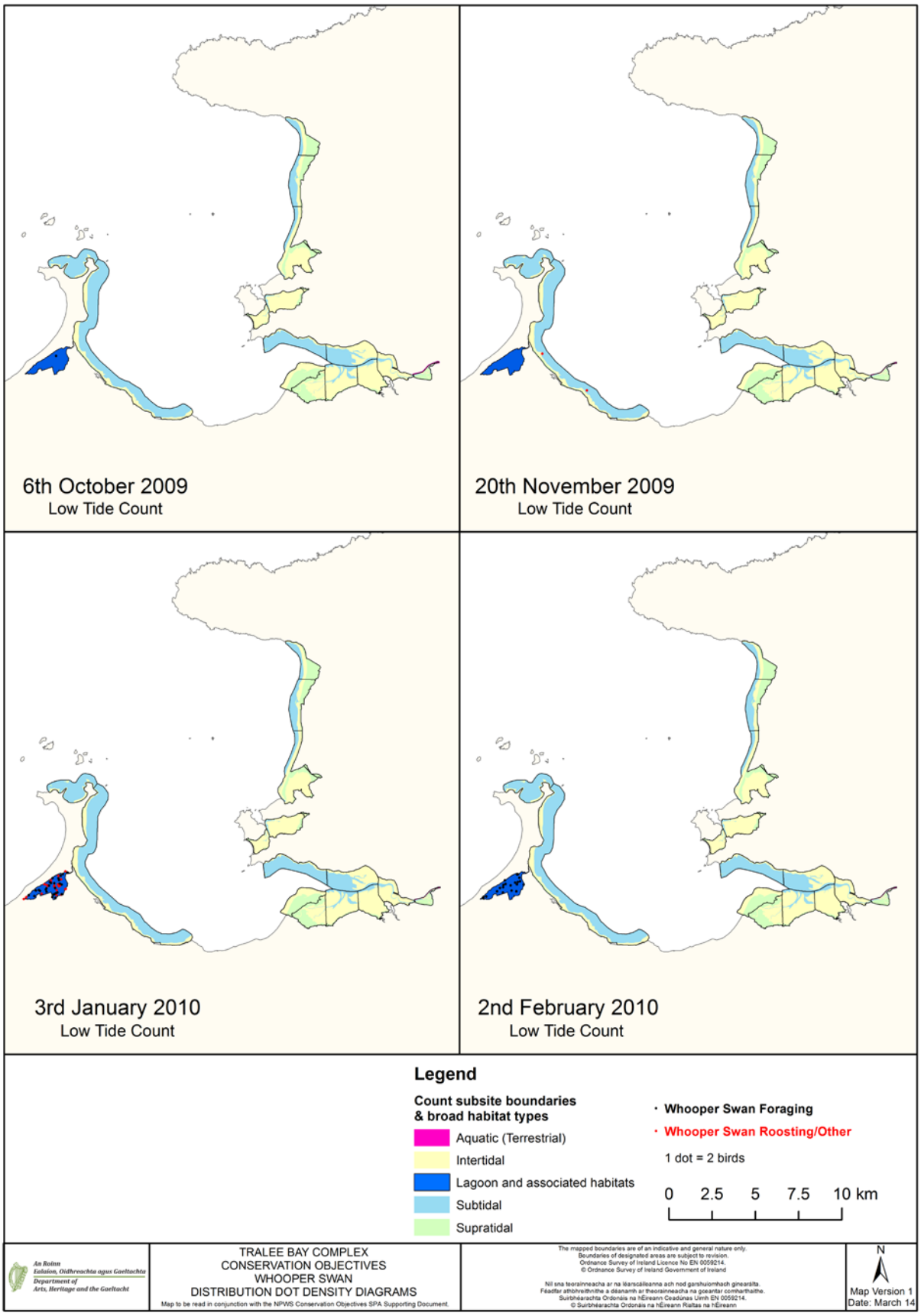


APPENDIX 7

Tralee Bay Complex

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

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


6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Whooper Swan Foraging
Whooper Swan Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
WHOOPER SWAN
DISTRIBUTION DOT DENSITY DIAGRAMS
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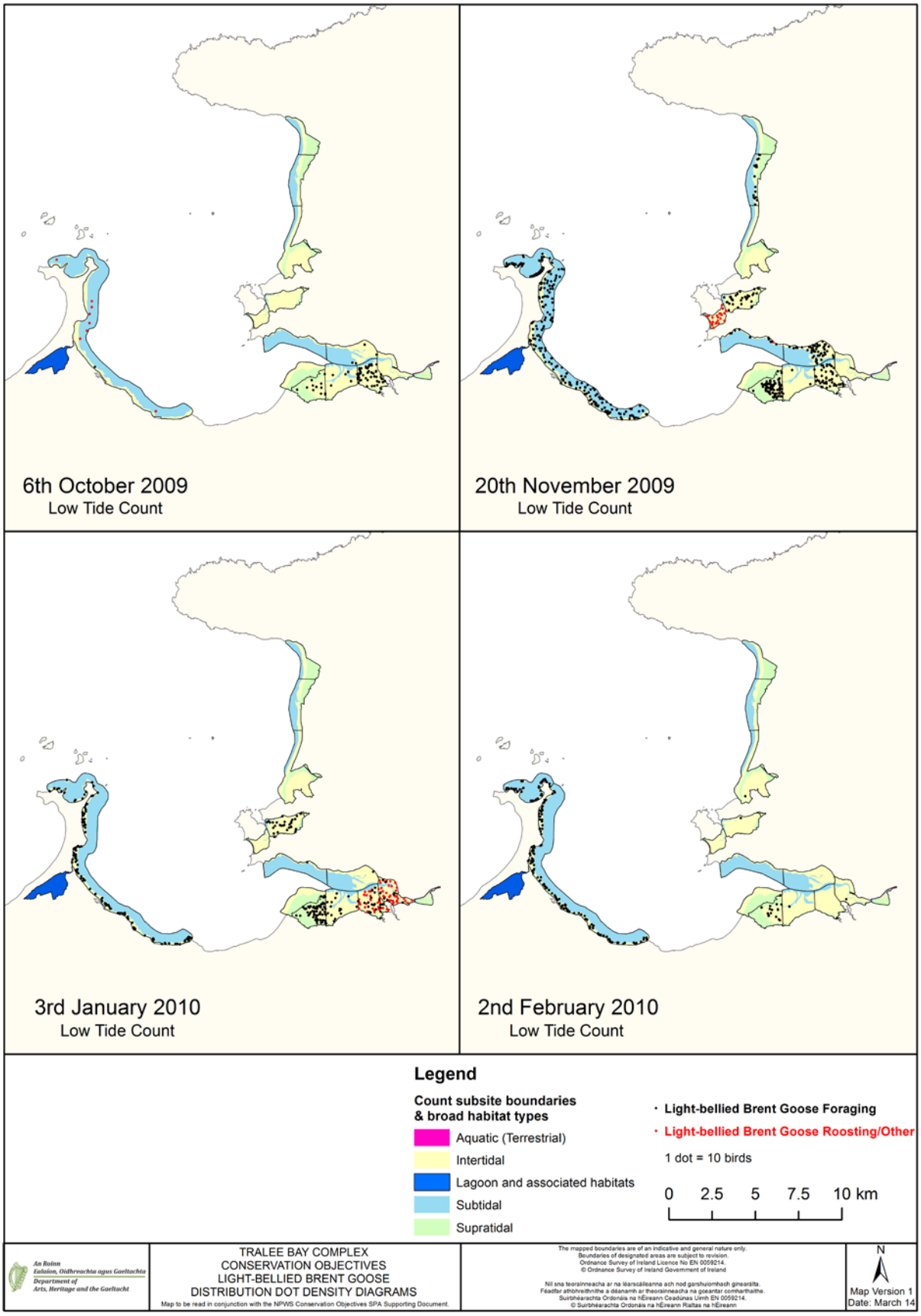
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Light-bellied Brent Goose Foraging
Light-bellied Brent Goose Roosting/Other
1 dot = 10 birds
0 2.5 5 7.5 10 km
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CONSERVATION OBJECTIVES
LIGHT-BELLIED BRENT GOOSE
DISTRIBUTION DOT DENSITY DIAGRAMS
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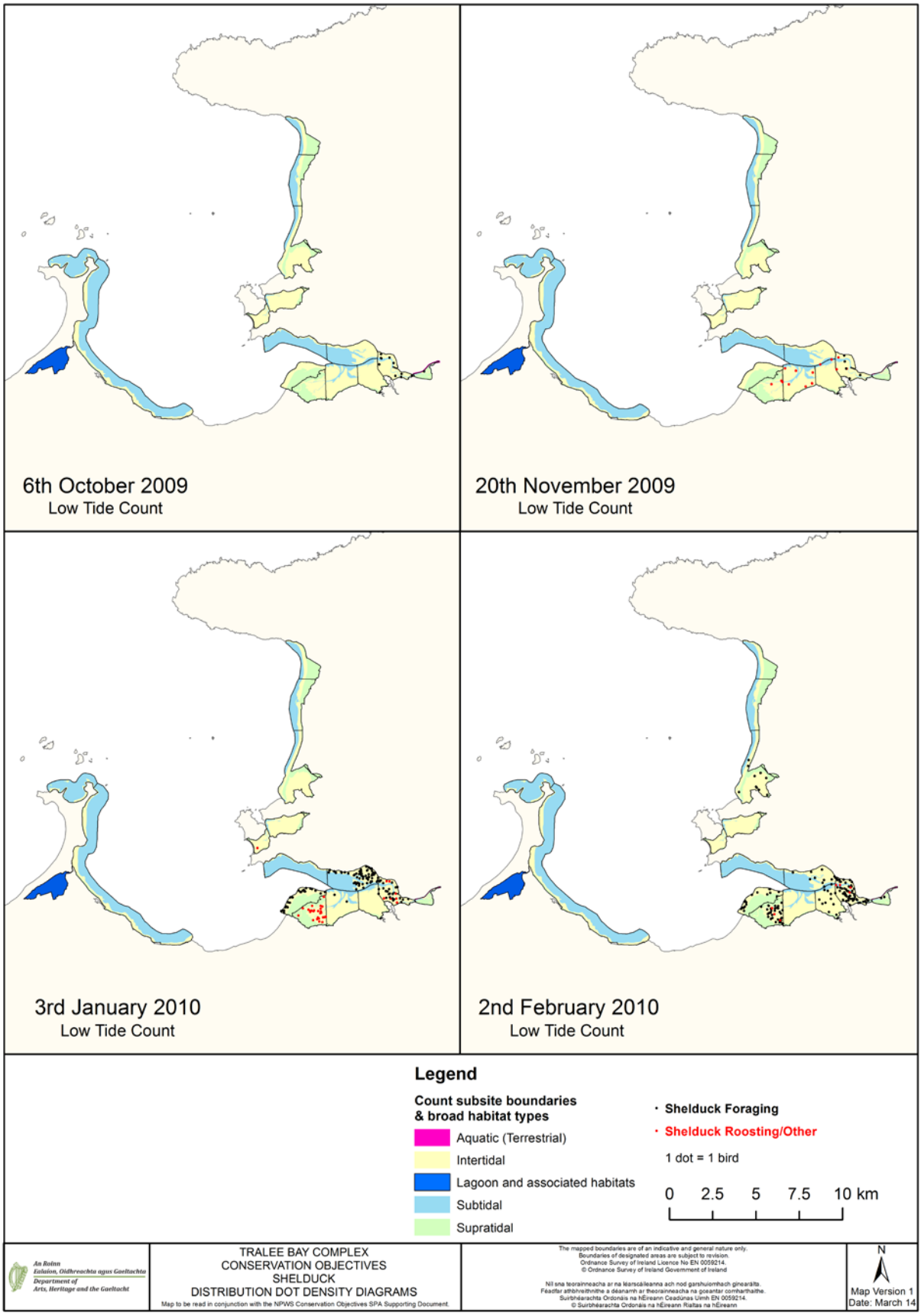
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20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Shelduck Foraging
Shelduck Roosting/Other
1 dot = 1 bird
0 2.5 5 7.5 10 km
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CONSERVATION OBJECTIVES
SHELDUCK
DISTRIBUTION DOT DENSITY DIAGRAMS
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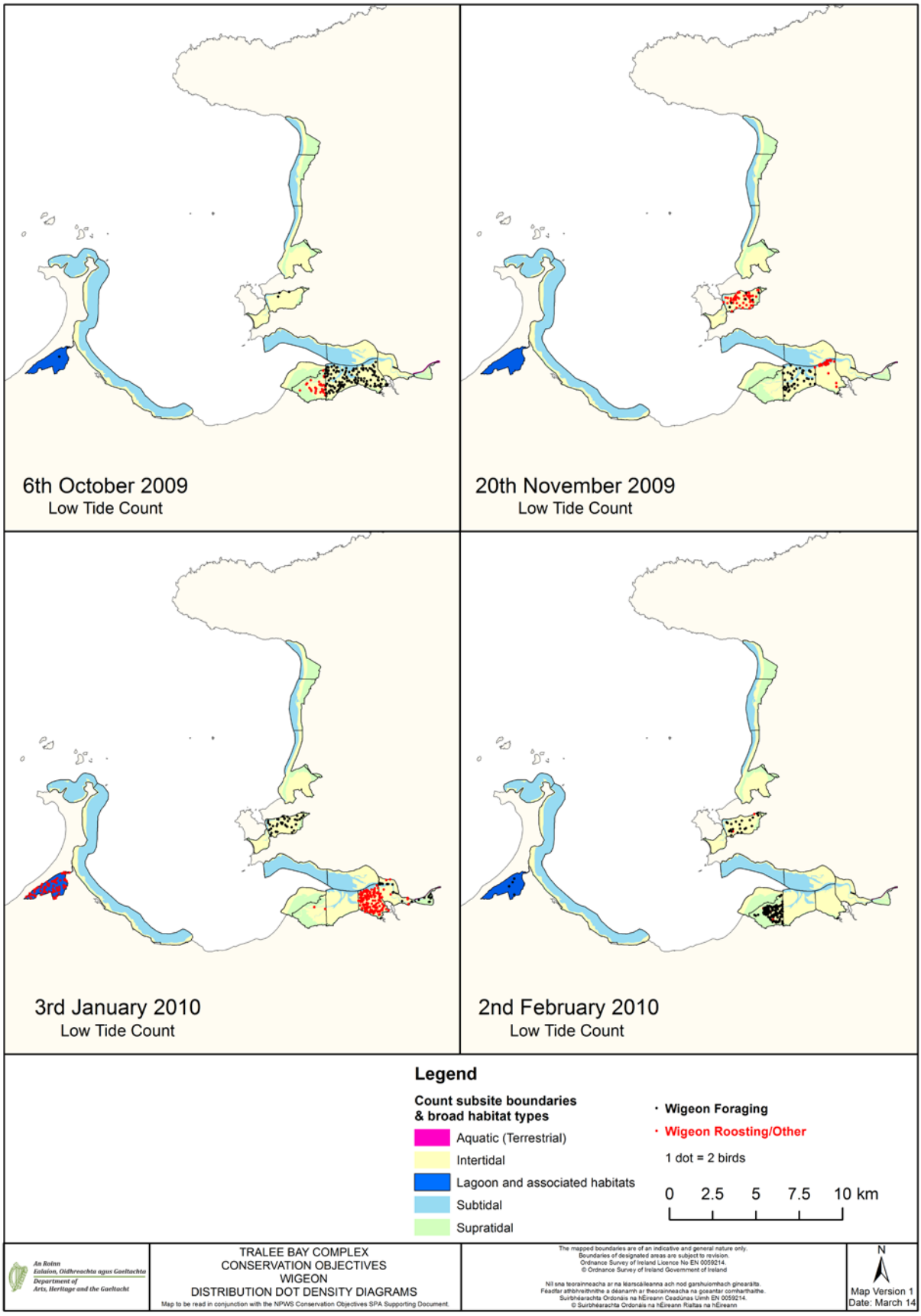
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20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Wigeon Foraging
Wigeon Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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CONSERVATION OBJECTIVES
WIGEON
DISTRIBUTION DOT DENSITY DIAGRAMS
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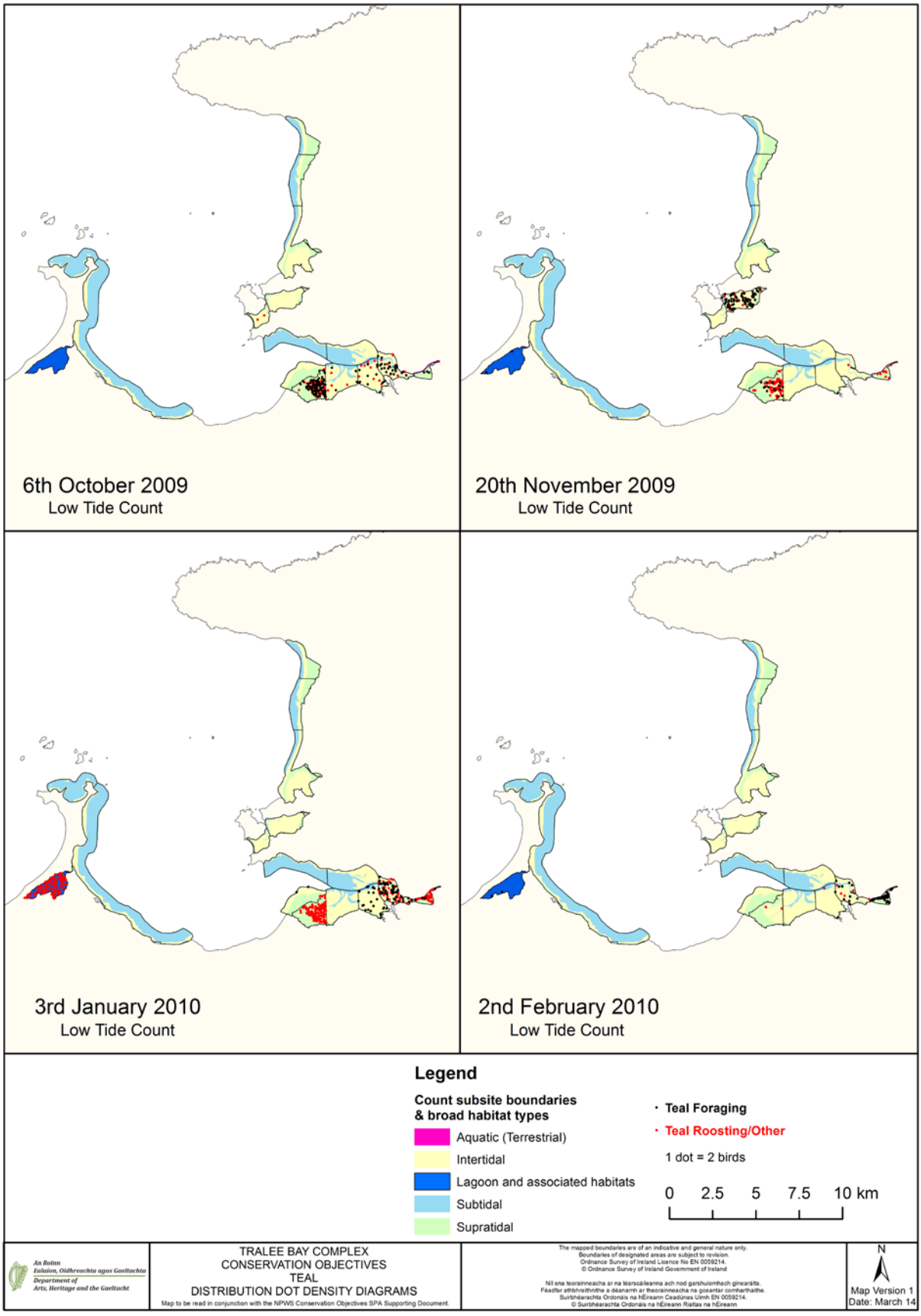
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20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Teal Foraging
Teal Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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CONSERVATION OBJECTIVES
TEAL
DISTRIBUTION DOT DENSITY DIAGRAMS
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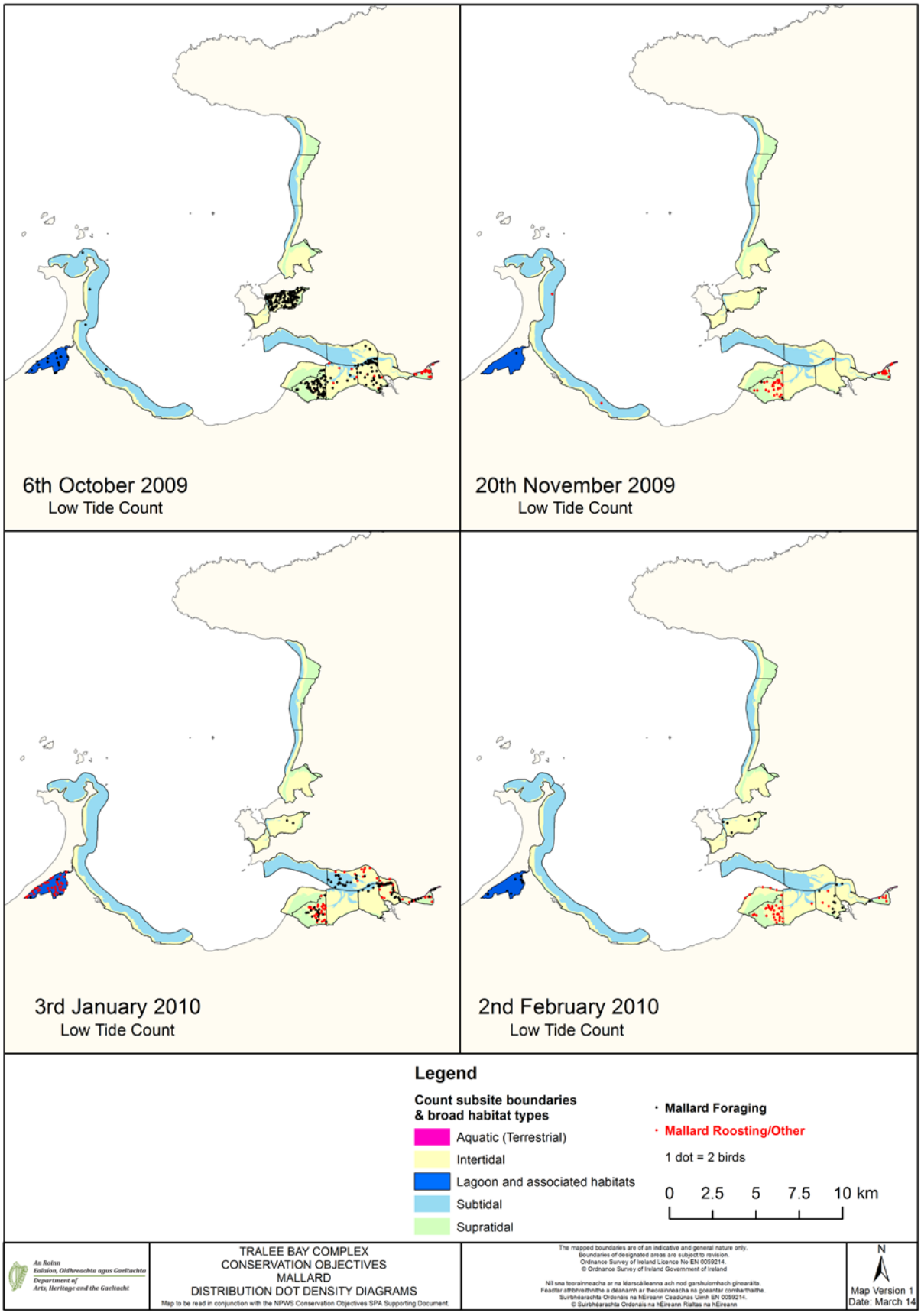
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20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Mallard Foraging
Mallard Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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CONSERVATION OBJECTIVES
MALLARD
DISTRIBUTION DOT DENSITY DIAGRAMS
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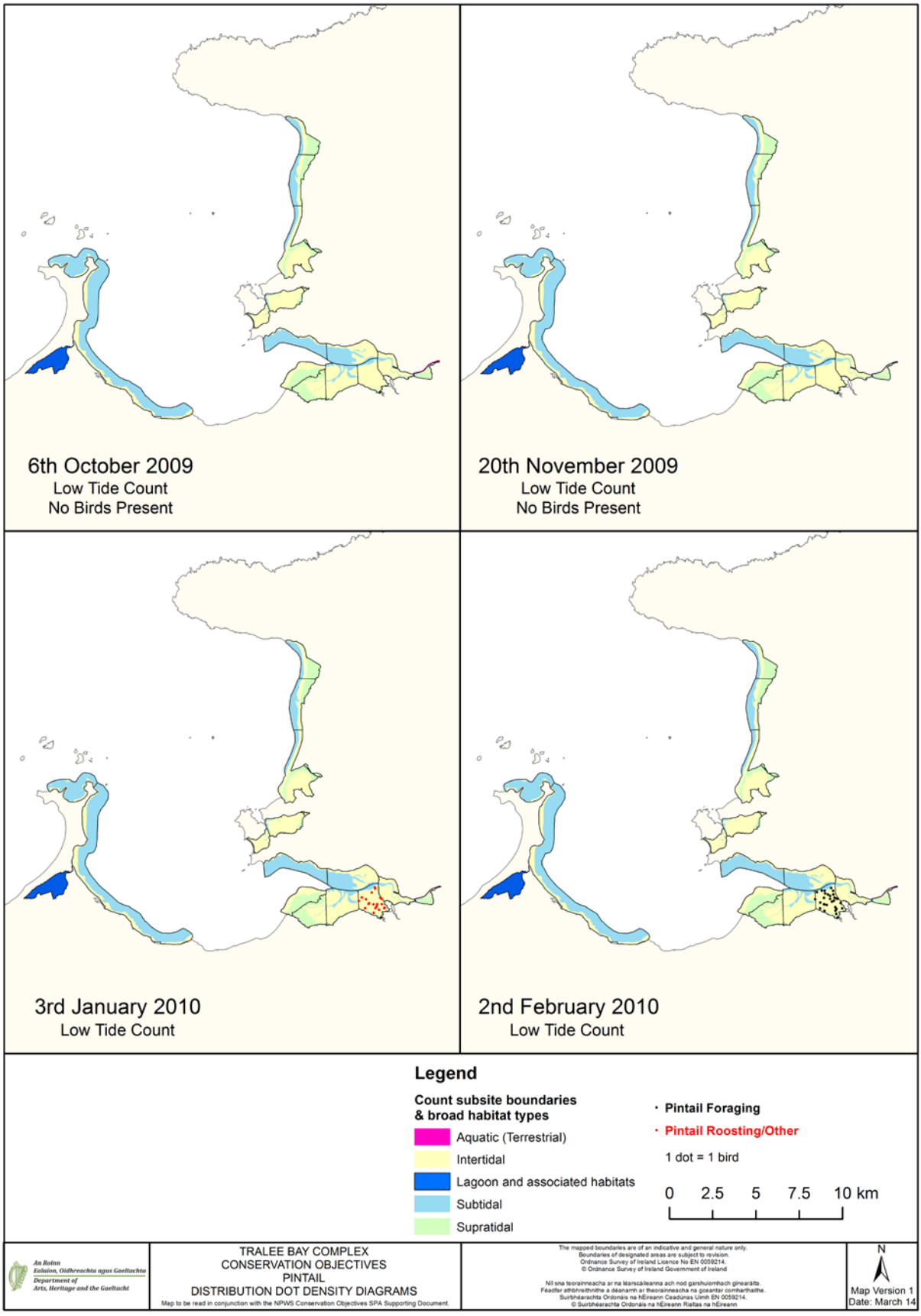
6th October 2009
Low Tide Count
No Birds Present
20th November 2009
Low Tide Count
No Birds Present
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Pintail Foraging
Pintail Roosting/Other
1 dot = 1 bird
0 2.5 5 7.5 10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
PINTAIL
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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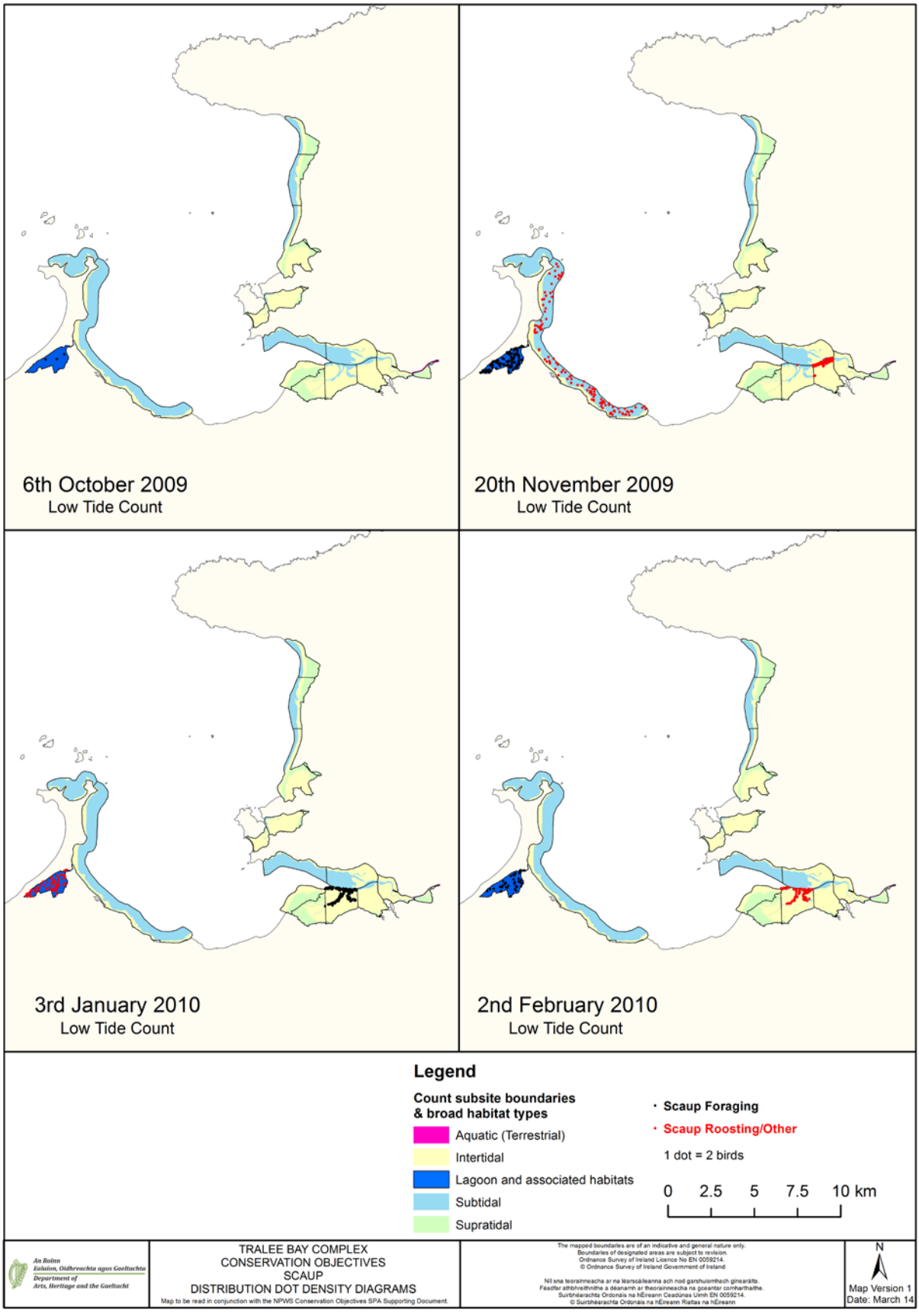
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Scaup Foraging
Scaup Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
SCAUP
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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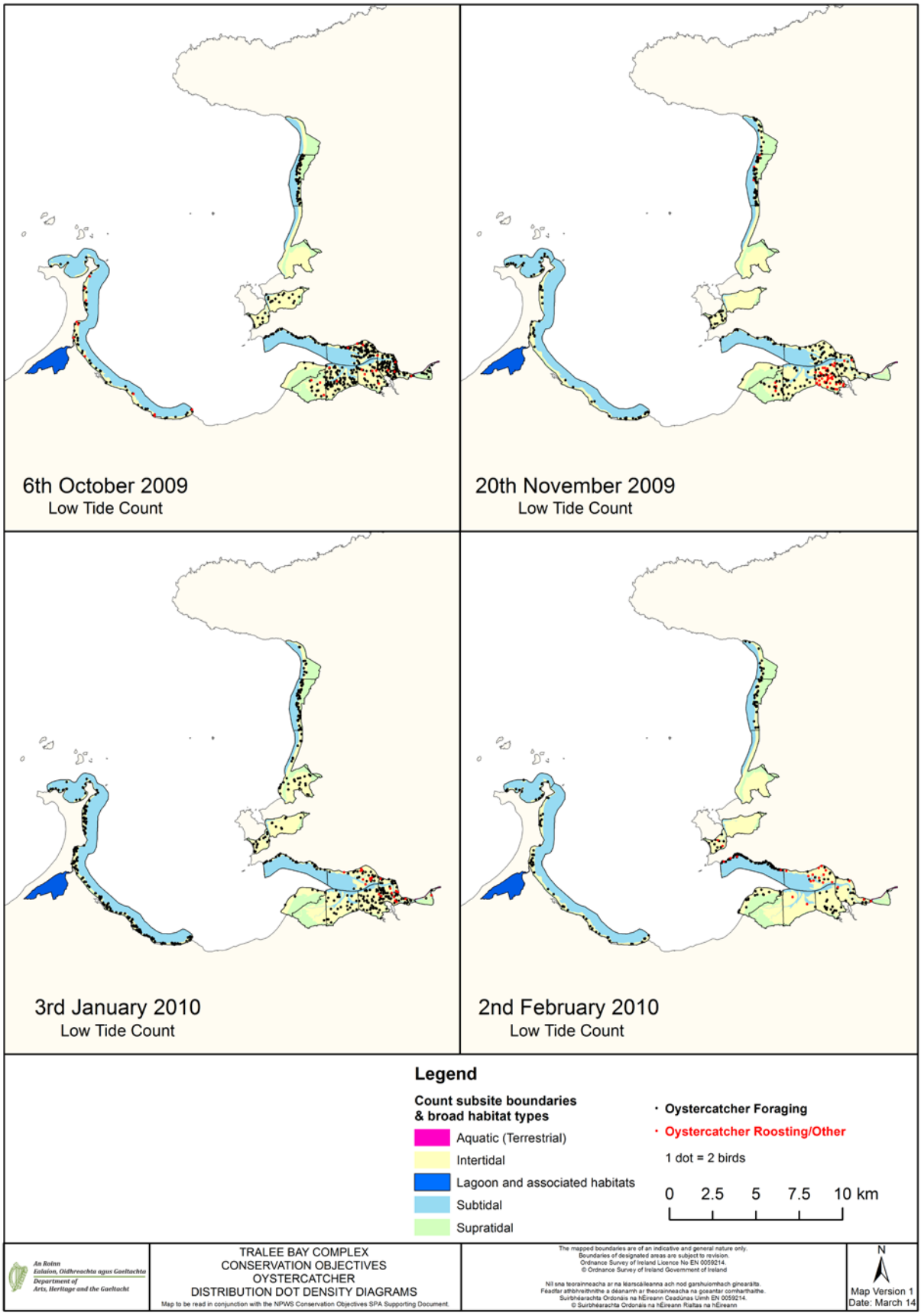
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Oystercatcher Foraging
Oystercatcher Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
OYSTERCATCHER
DISTRIBUTION DOT DENSITY DIAGRAMS
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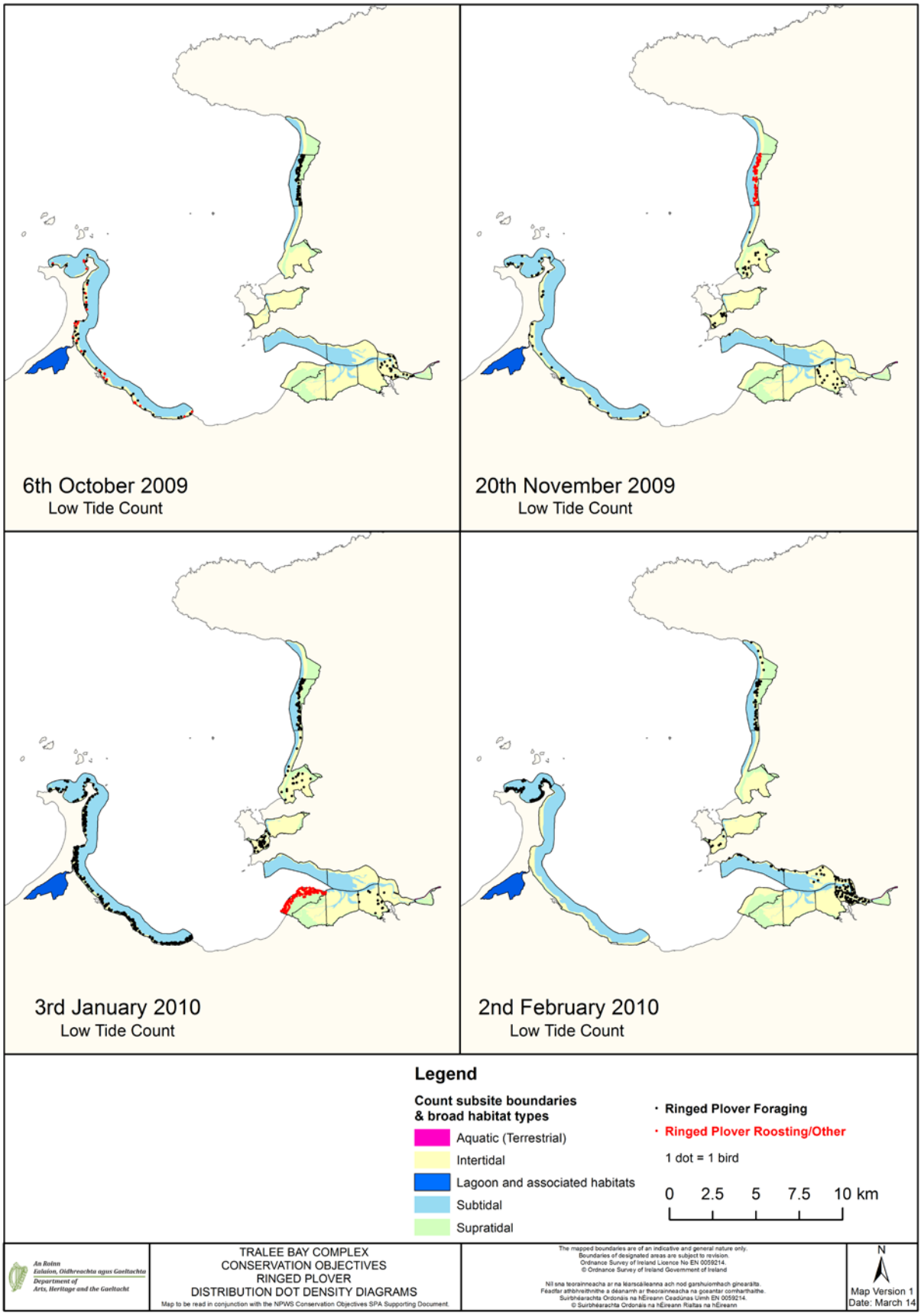
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Ringed Plover Foraging
Ringed Plover Roosting/Other
1 dot = 1 bird
0 2.5 5 7.5 10 km
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Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
RINGED PLOVER
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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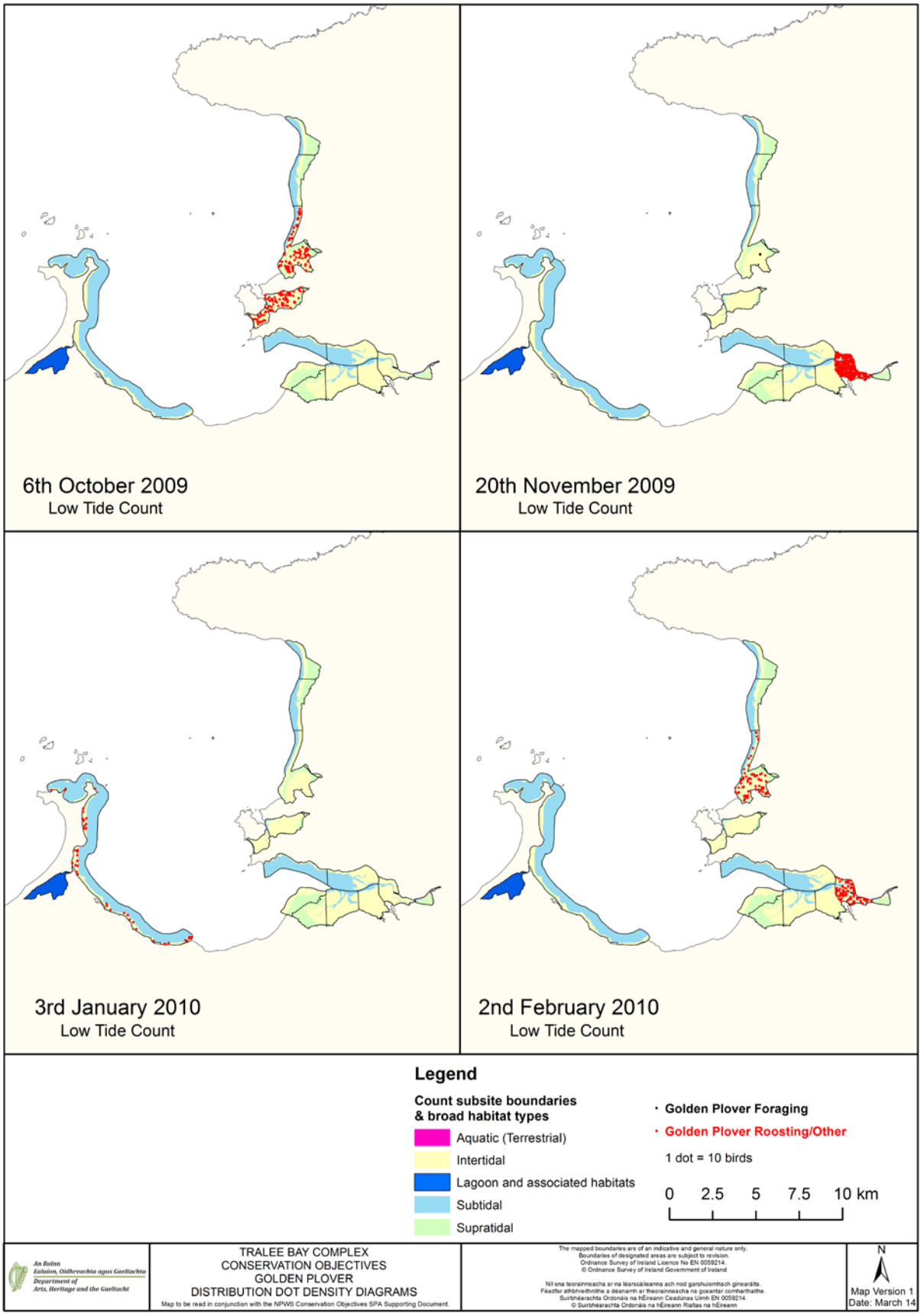
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Golden Plover Foraging
Golden Plover Roosting/Other
1 dot = 10 birds
0 2.5 5 7.5 10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
GOLDEN PLOVER
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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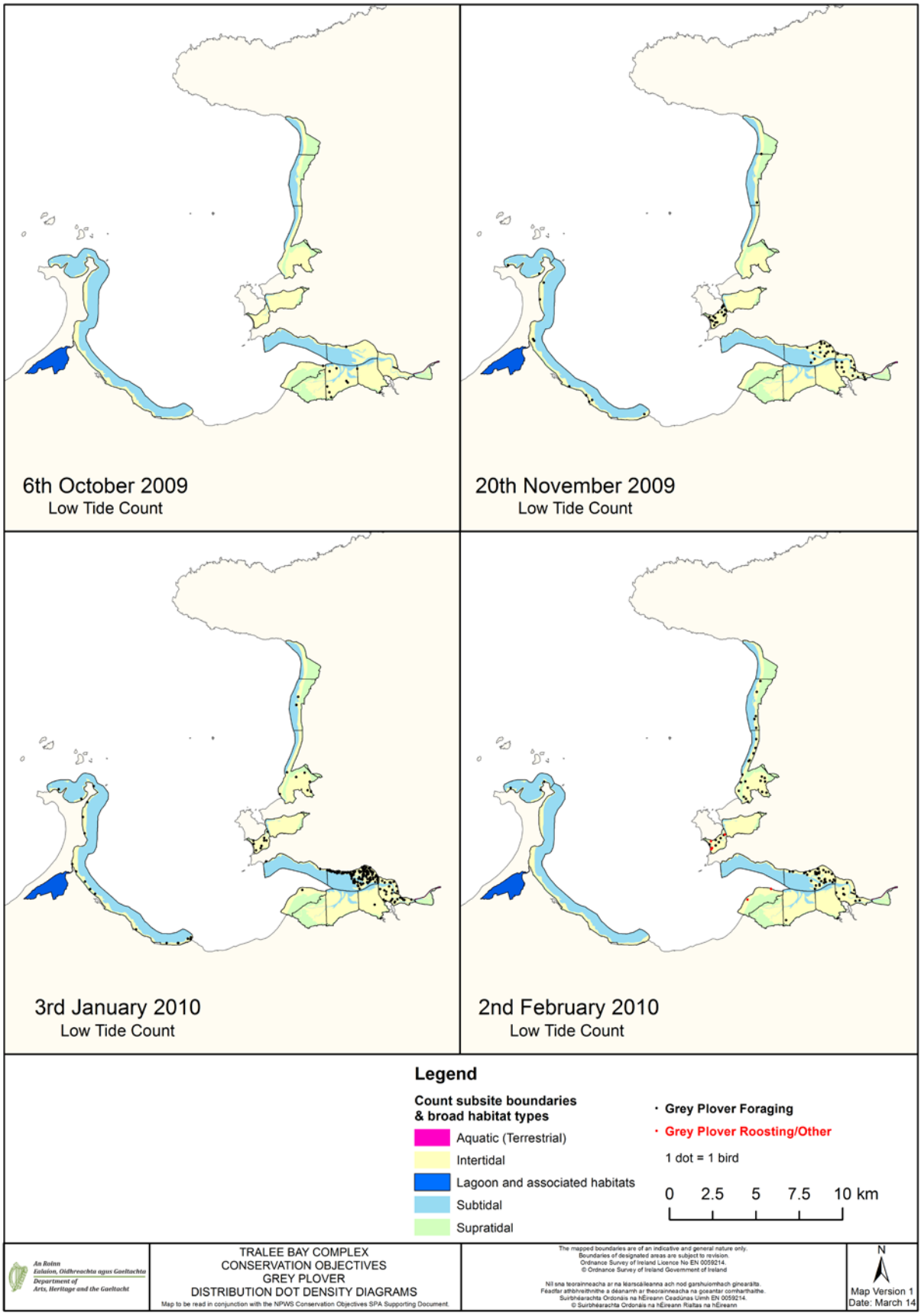
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Grey Plover Foraging
Grey Plover Roosting/Other
1 dot = 1 bird
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
GREY PLOVER
DISTRIBUTION DOT DENSITY DIAGRAMS
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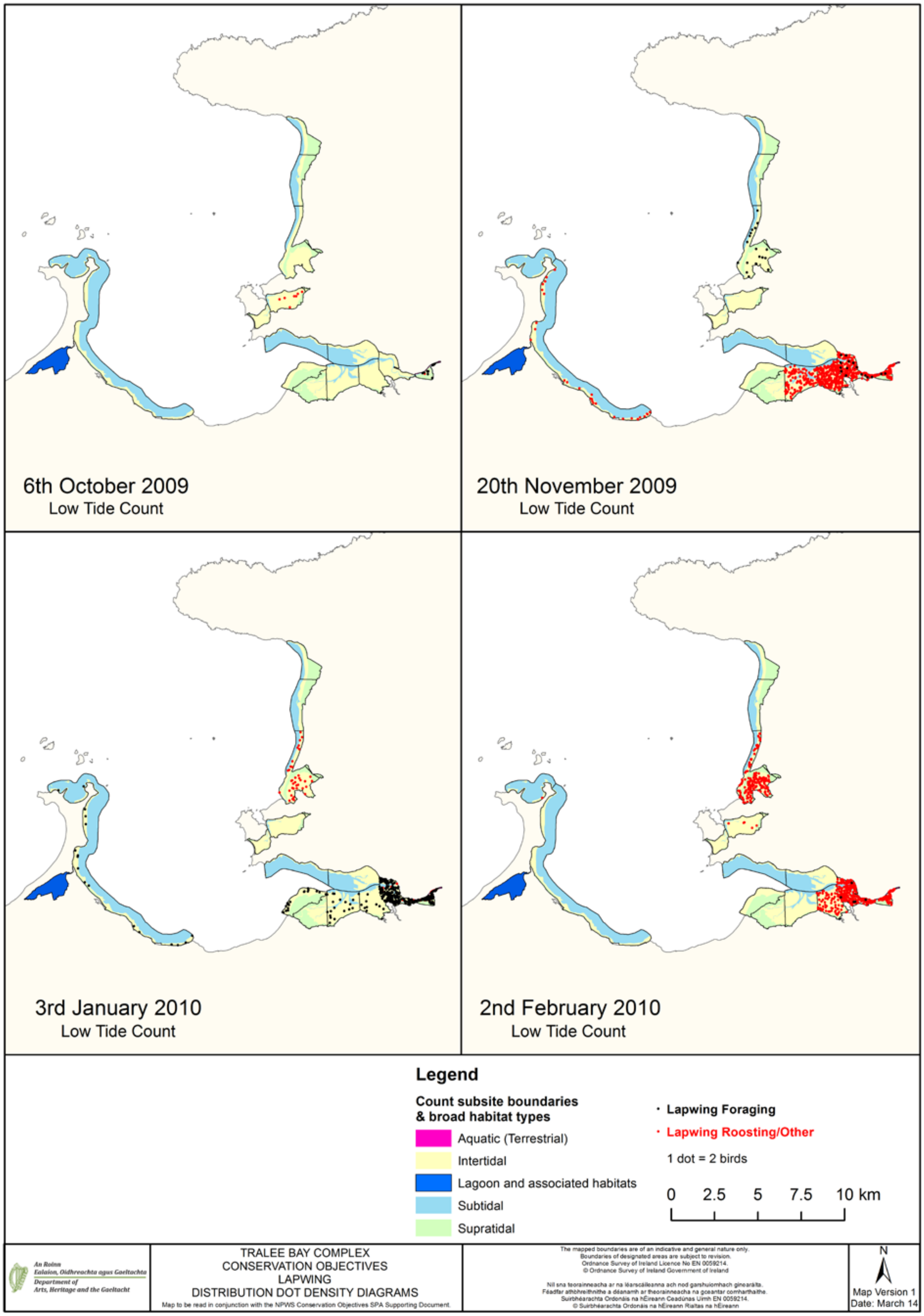
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Lapwing Foraging
Lapwing Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
LAPWING
DISTRIBUTION DOT DENSITY DIAGRAMS
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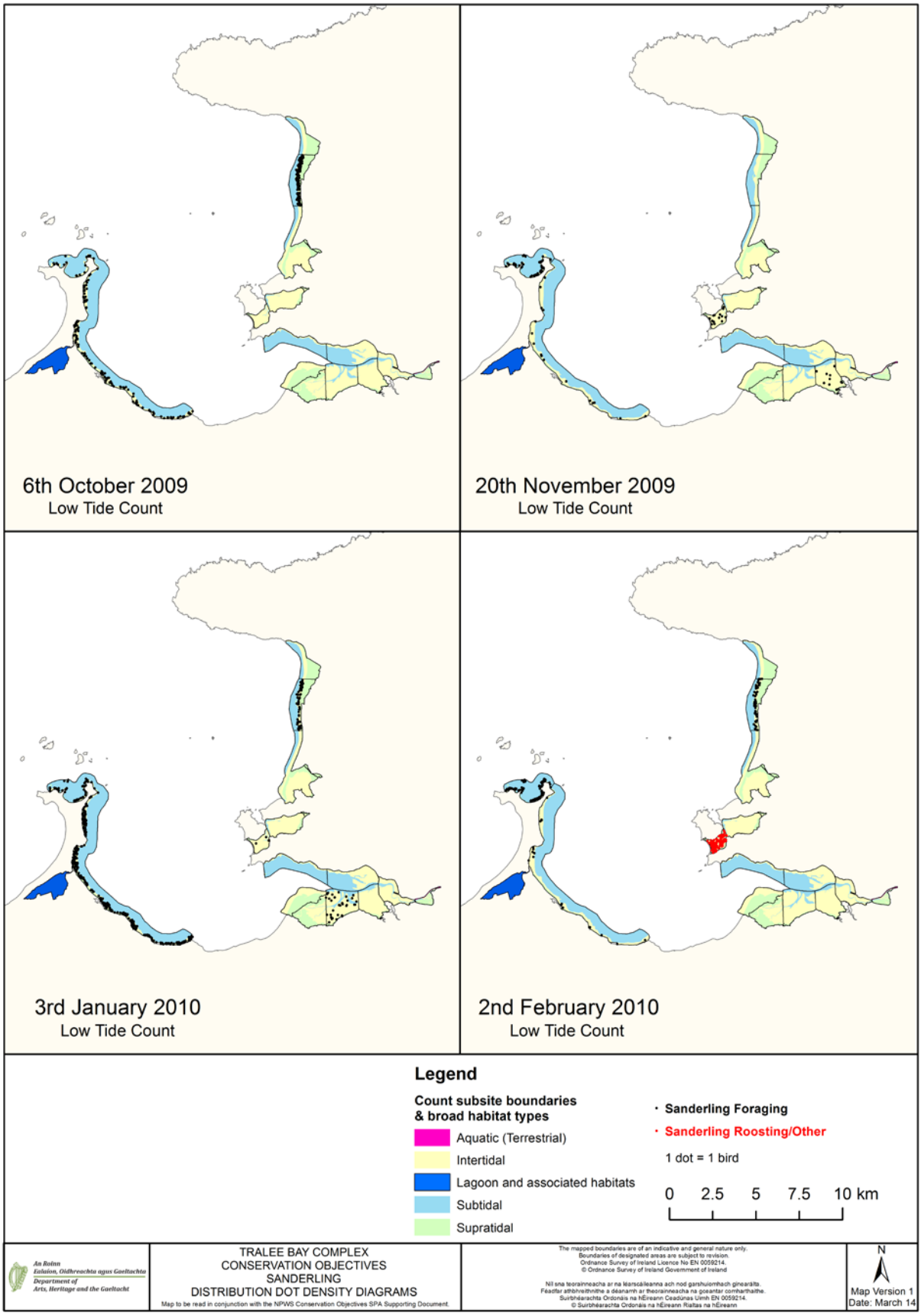
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Sanderling Foraging
Sanderling Roosting/Other
1 dot = 1 bird
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
SANDERLING
DISTRIBUTION DOT DENSITY DIAGRAMS
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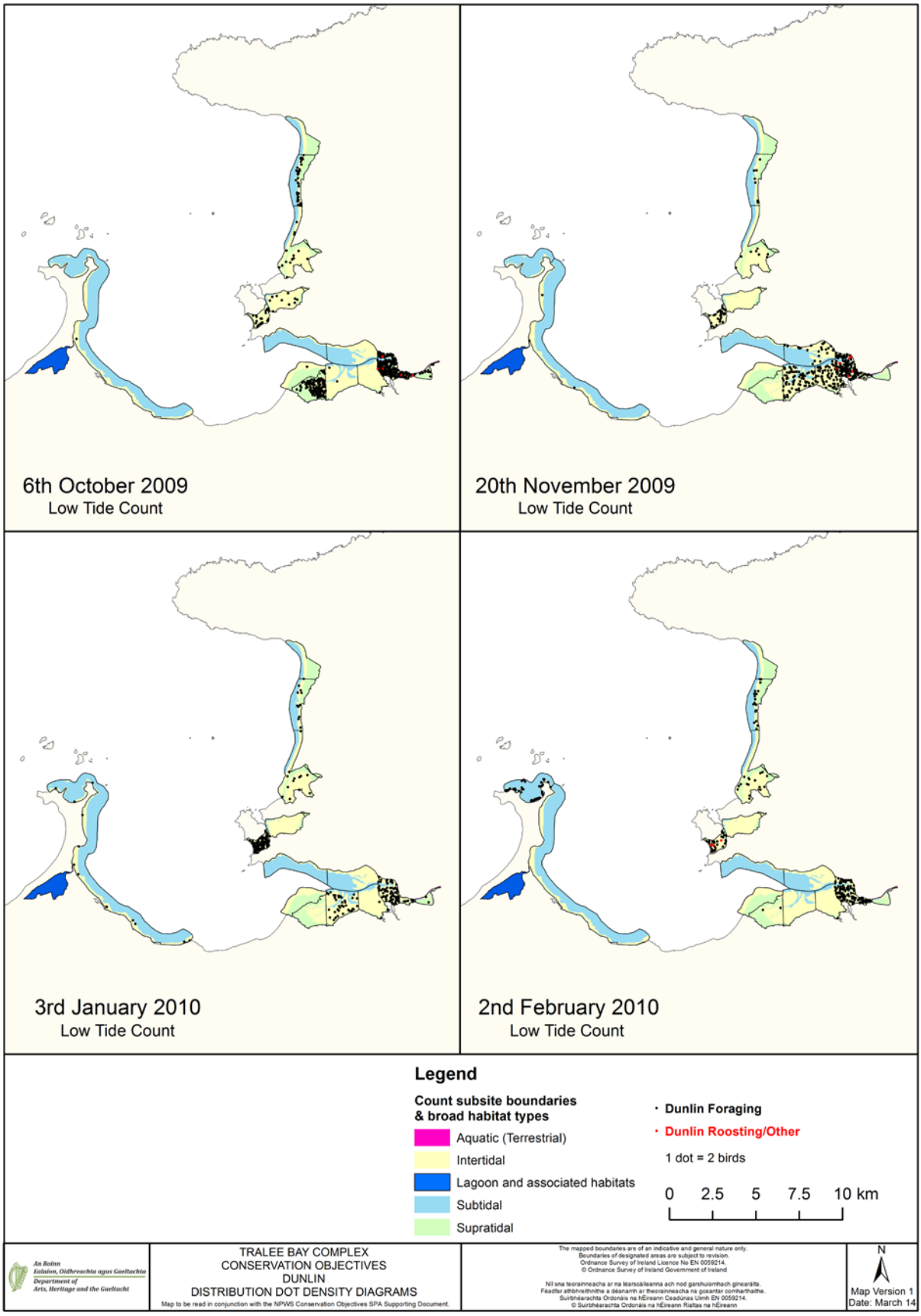
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Dunlin Foraging
Dunlin Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
DUNLIN
DISTRIBUTION DOT DENSITY DIAGRAMS
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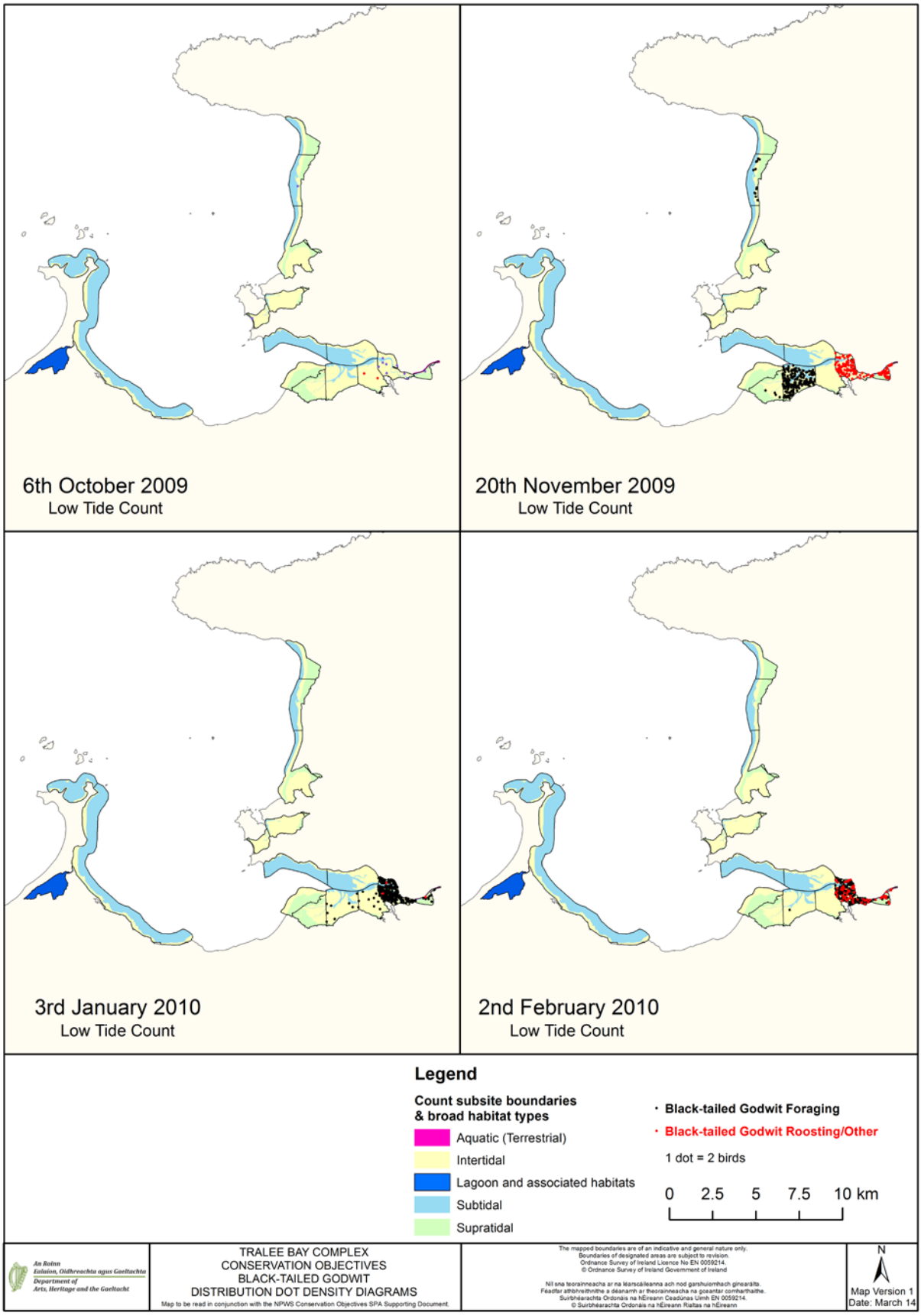
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Black-tailed Godwit Foraging
Black-tailed Godwit Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
BLACK-TAILED GODWIT
DISTRIBUTION DOT DENSITY DIAGRAMS
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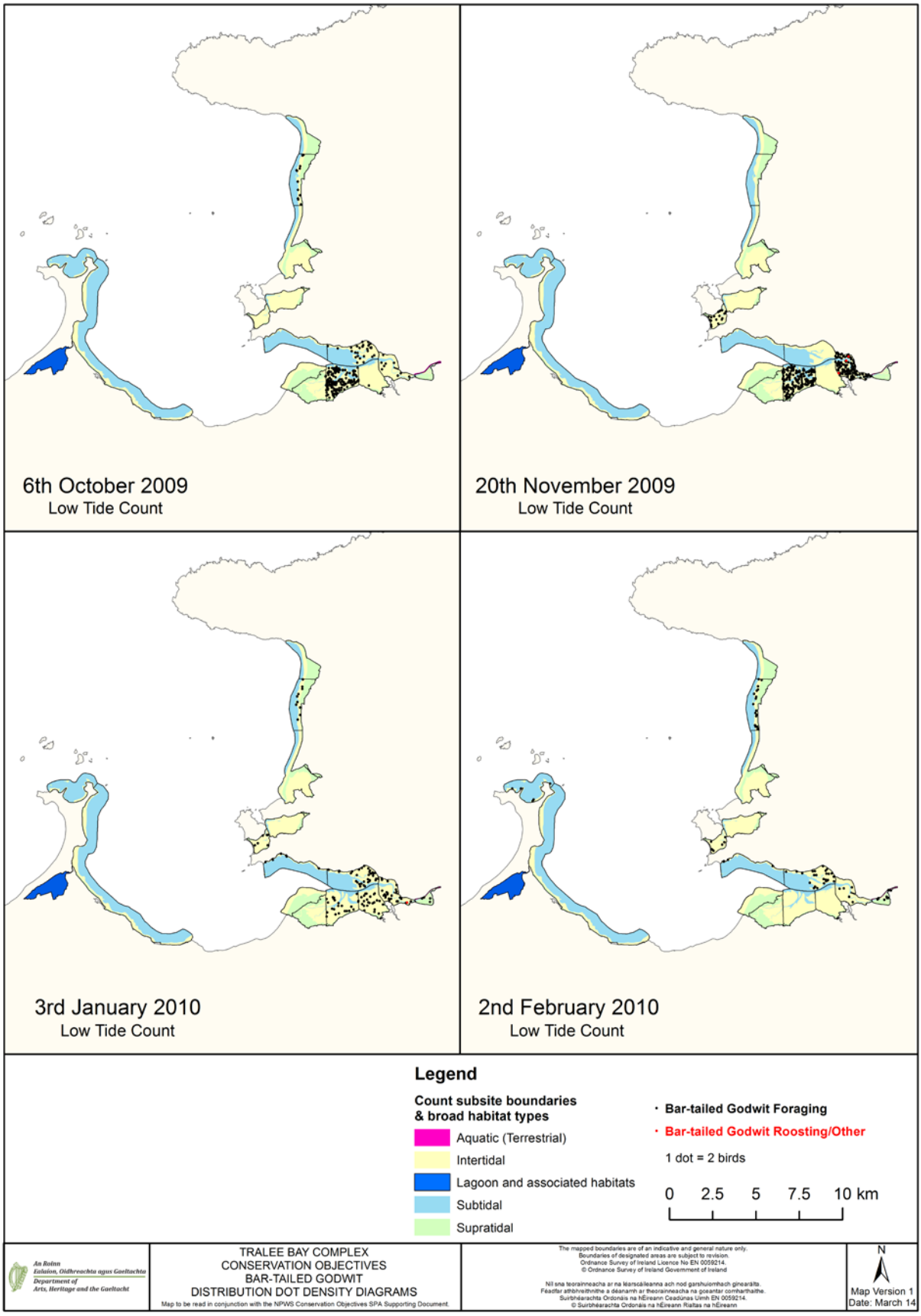
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Bar-tailed Godwit Foraging
Bar-tailed Godwit Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
BAR-TAILED GODWIT
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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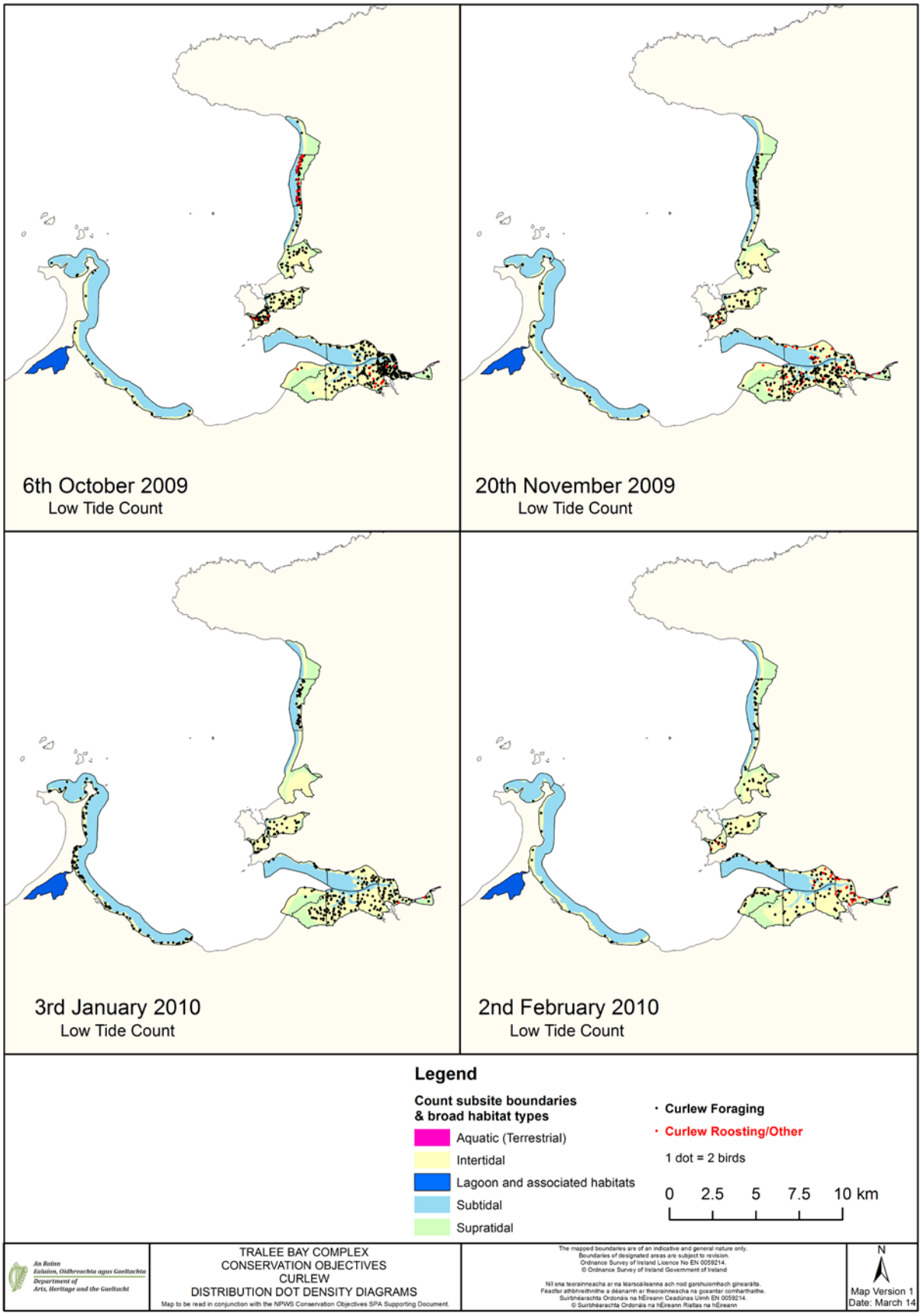
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Curlew Foraging
Curlew Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
CURLEW
DISTRIBUTION DOT DENSITY DIAGRAMS
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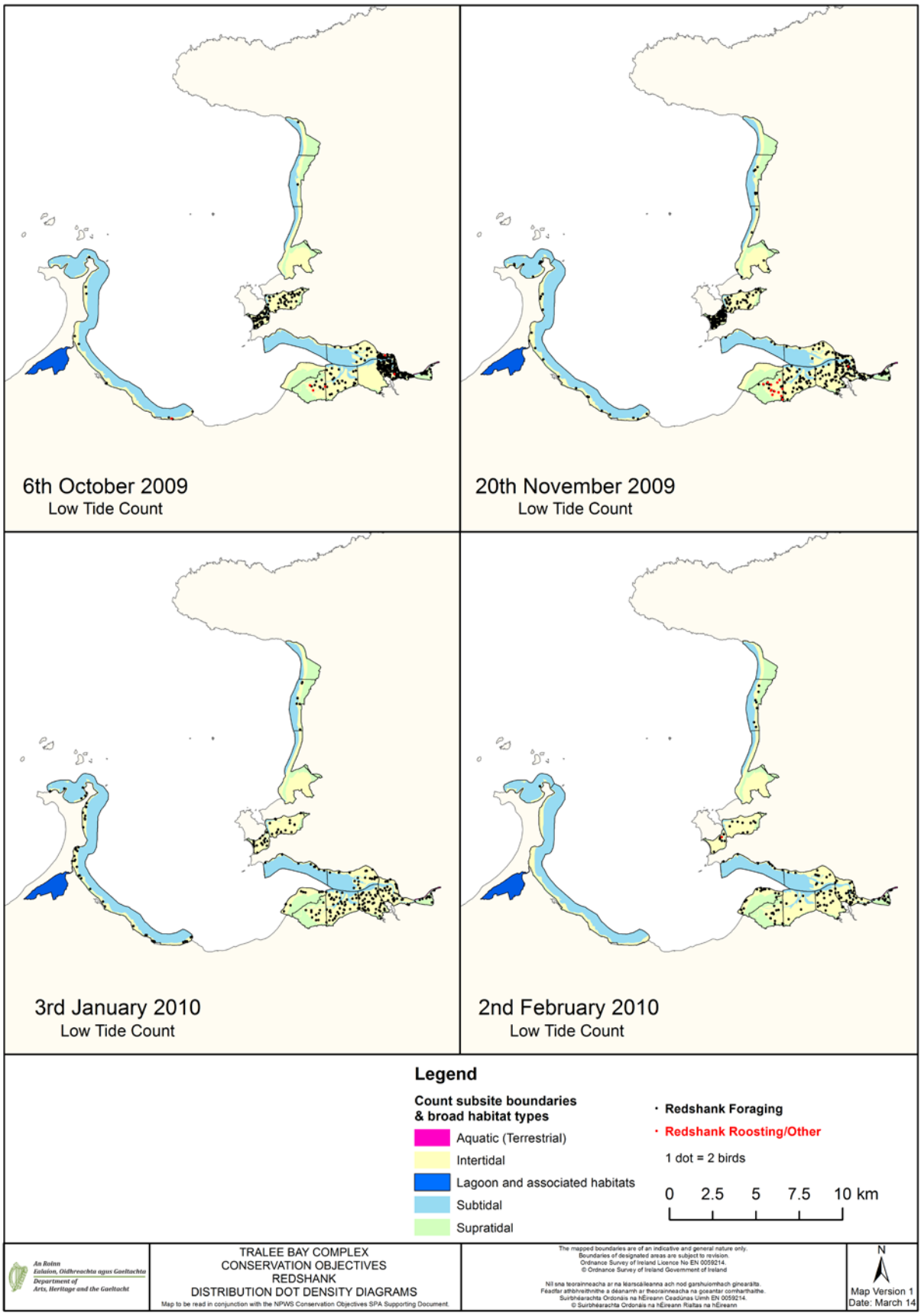
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Redshank Foraging
Redshank Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
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Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
REDSHANK
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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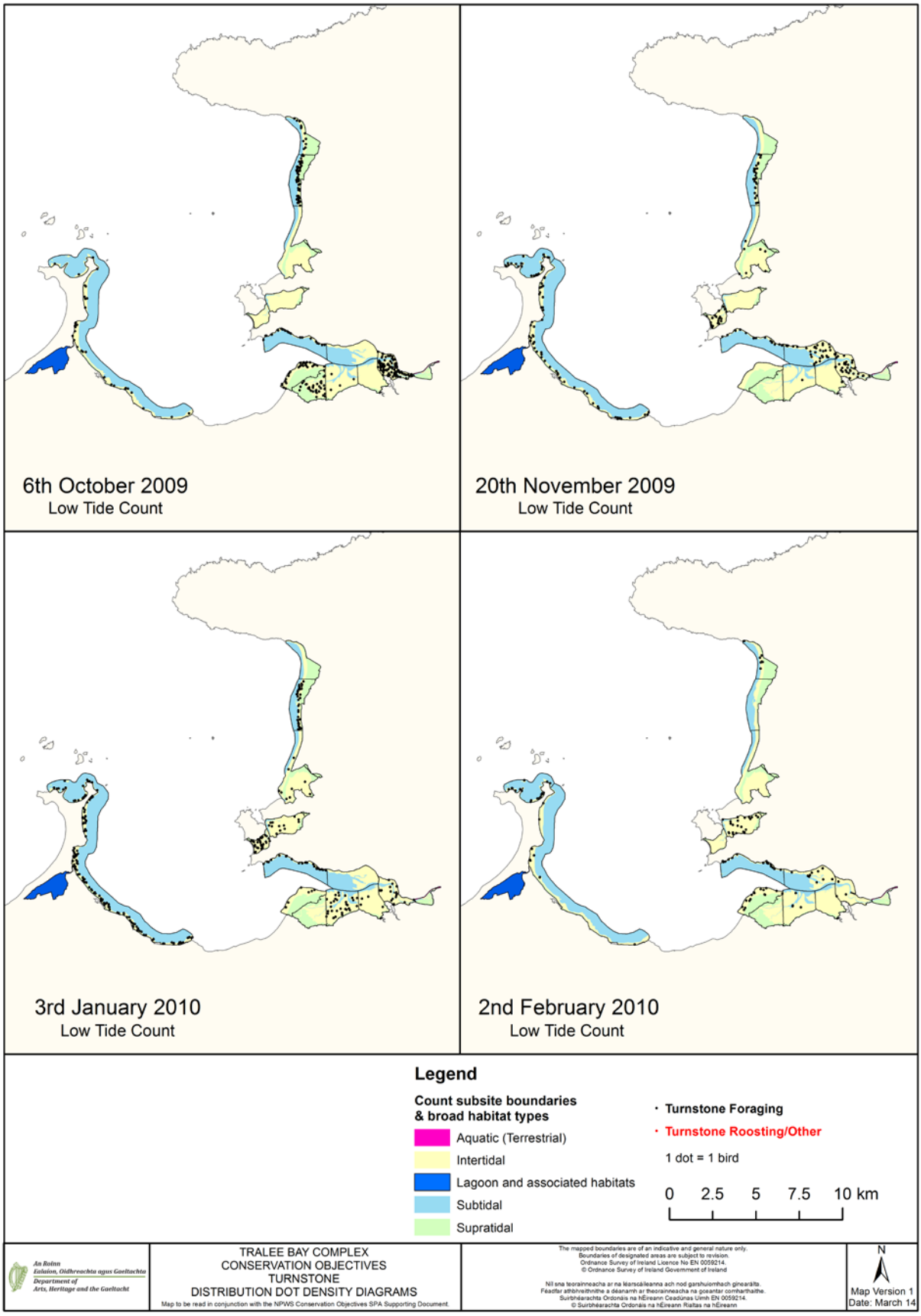
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Turnstone Foraging
Turnstone Roosting/Other
1 dot = 1 bird
0 2.5 5 7.5 10 km
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Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
TURNSTONE
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
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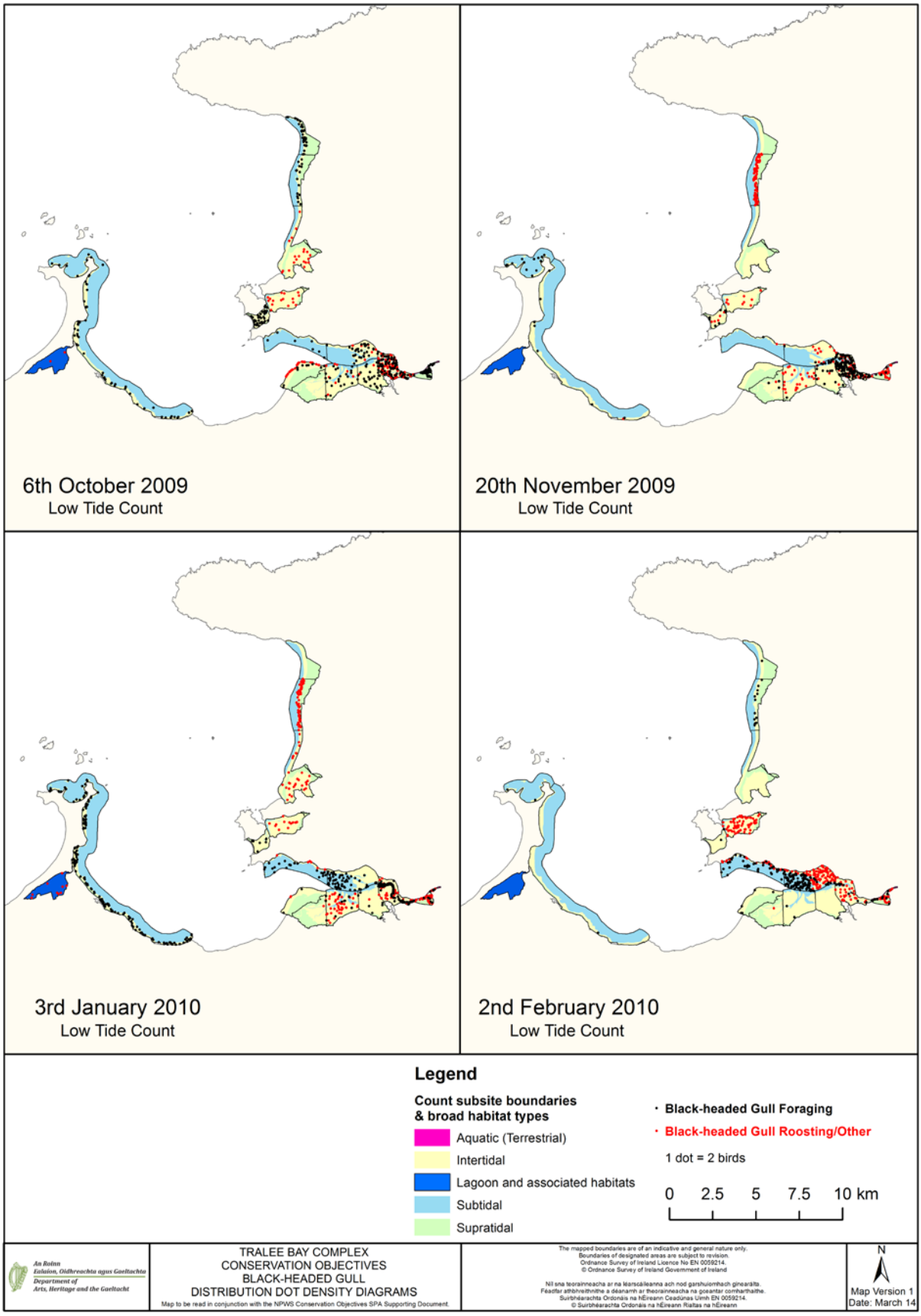
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Black-headed Gull Foraging
Black-headed Gull Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
BLACK-HEADED GULL
DISTRIBUTION DOT DENSITY DIAGRAMS
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Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe.
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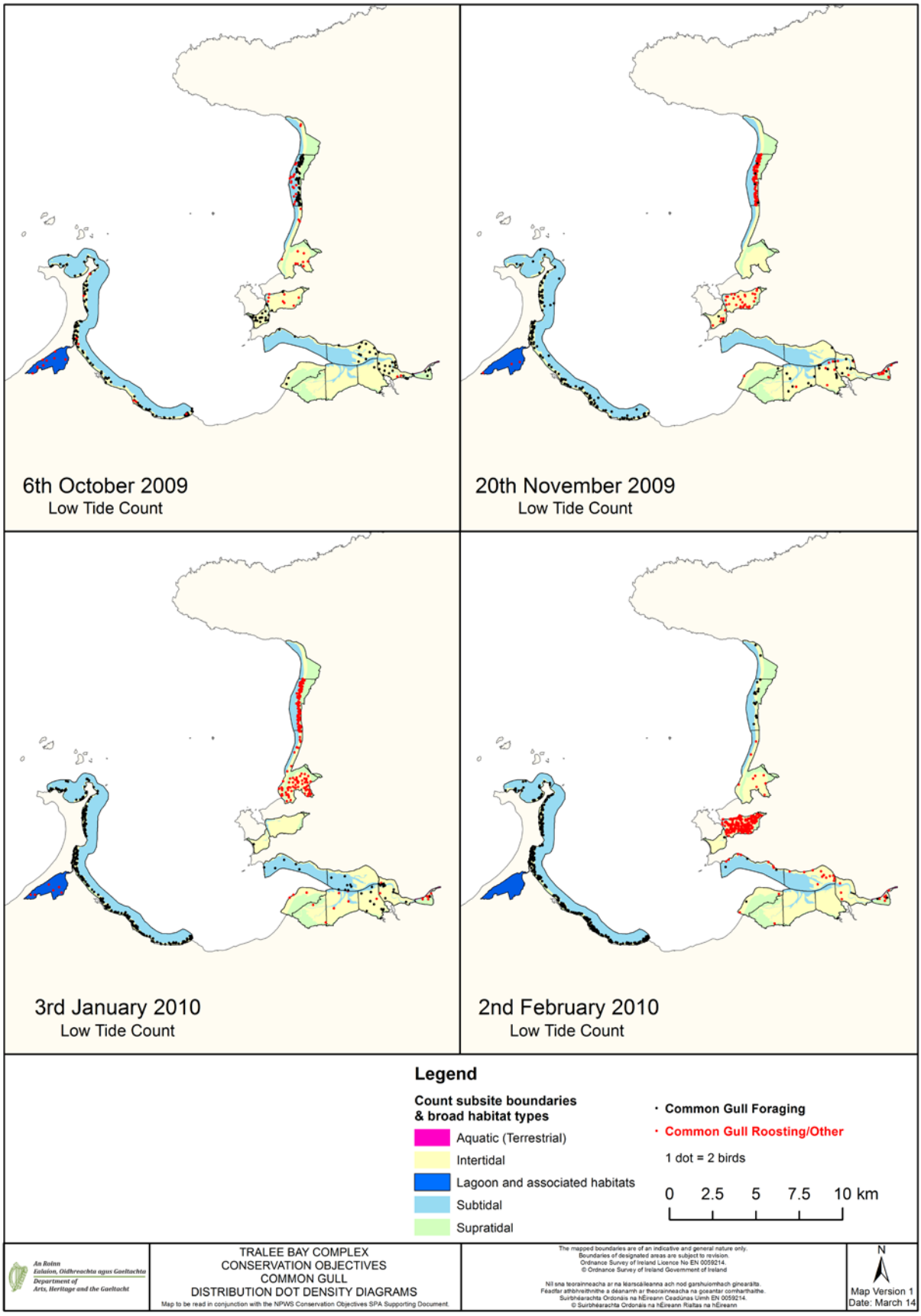
6th October 2009
Low Tide Count
20th November 2009
Low Tide Count
3rd January 2010
Low Tide Count
2nd February 2010
Low Tide Count
Legend
Count subsite boundaries & broad habitat types
Aquatic (Terrestrial)
Intertidal
Lagoon and associated habitats
Subtidal
Supratidal
Common Gull Foraging
Common Gull Roosting/Other
1 dot = 2 birds
0 2.5 5 7.5 10 km
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
TRALEE BAY COMPLEX
CONSERVATION OBJECTIVES
COMMON GULL
DISTRIBUTION DOT DENSITY DIAGRAMS
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
The mapped boundaries are of an indicative and general nature only.
Boundaries of designated areas are subject to revision.
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APPENDIX 8

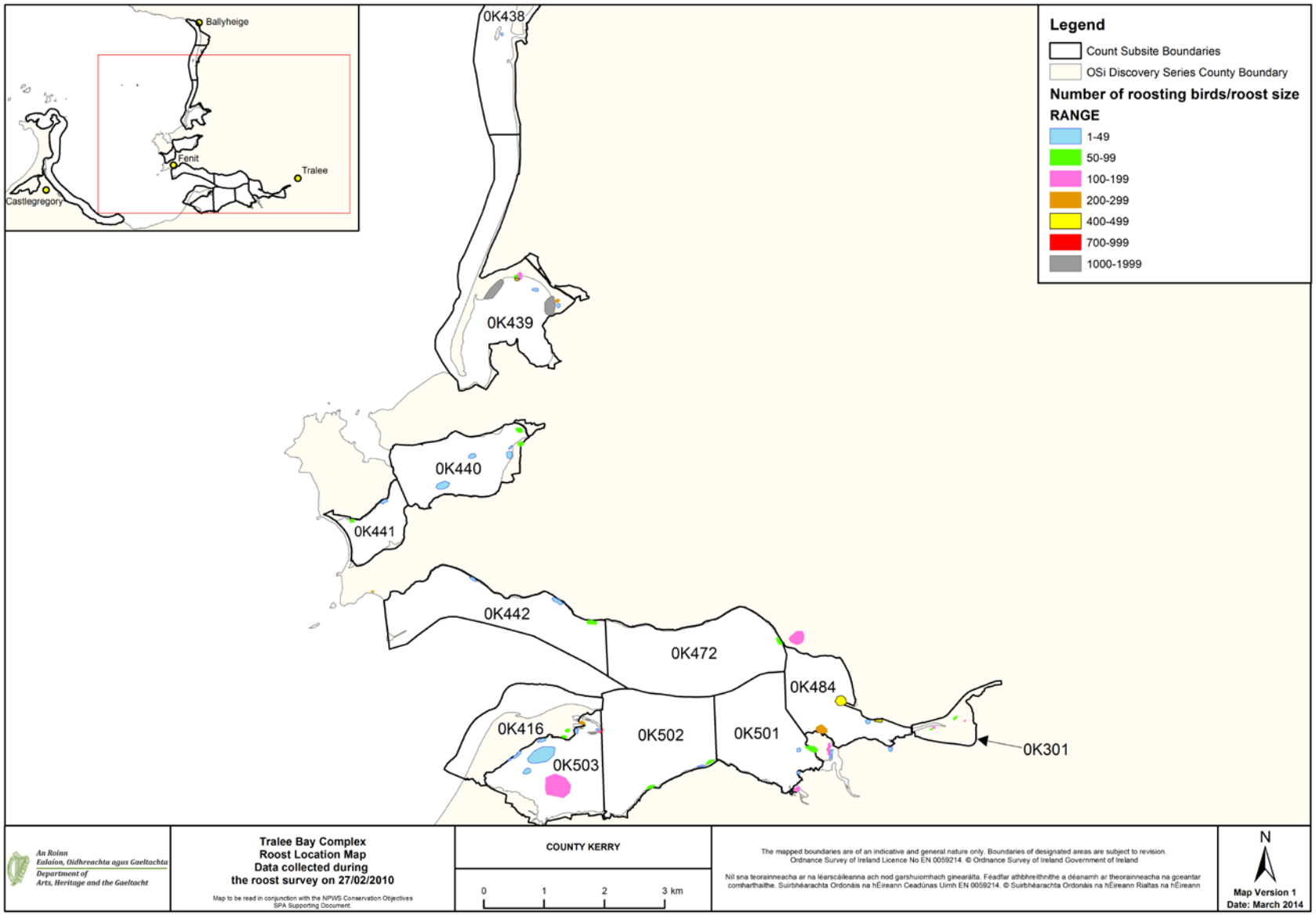
Tralee Bay Complex

(1a) Summary data and roost location maps from the roost survey 27th February 2010
(Please see Sections 5.3.1 and 5.3.2 for further details on methods/limitations)

Subsite	Subsite Name	No. roost locations	No. Species	Species
0K010	Lough Gill	Not surveyed	-	-
0K301	River Lee	4	9	BH, BW, CA, CM, CU, L., MA, OC, RK
0K416	Derrymore Island (north shore & east end)	No roosting individuals		
0K437	Ballyheigh to Akeragh Lough	Not surveyed		
0K438	Black Rock	1	1	OC
0K439	Carrahane Strand	9	7	CM, CU, GV, KN, OC, PB, U.
0K440	Barrow Harbour Inner	6	6	CU, GP, MA, OC, RK, RM
0K441	Barrow Harbour Outer	2	2	CU, OC
0K442	Fenit	3	6	BH, CU, GK, HG, OC, RK
0K472	Spa	1	2	OC, RK
0K484	Blennerville (Lohercannan)	7	14	BA, BH, BW, CA, CU, DN, GV, L. MA, OC, RK, T., SU, TT
0K501	Annagh	4	4	BW, CU, PT, SU
0K502	Derryquay bridge east to Annagh	3	2	OC, RK
0K503	Bealathaleen Creek	14	10	BA, BW, CU, DN, GK, GV, MA, RK, SU, WN
0K504	Castlegregory (Carrigaghroe Pt - Kilshannig Pt)	No roosting individuals	-	-
0K505	Scraggane Bay (Minnaun - Kilshannig)	No roosting individuals	-	-
0K506	Scraggane Bay & Castlegregory	No roosting individuals	-	-

(1b) Tralee Bay SPA (4188) SCI species and recorded roosts 27/02/10 - shows number of roost locations within subsite, and in brackets, the peak number recorded at a single roost location
(Note that WS, SP, RP and SS were not recorded)

Subsites ►	0K301	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503
PB			1 (1,000)								
SU								1 (1)	2 (17)		1 (111)
WN											1 (71)
T.								2 (32)			
MA	1 (1)			1 (6)				1 (9)			1 (44)
PT									2 (58)		
OC	1 (4)	1 (7)	1 (40)	1 (24)	1 (26)	2 (116)	1 (4)	3 (287)		2 (139)	
GP				1 (15)							
GV			1 (100)					2 (18)			1 (80)
L.	2 (132)							1 (37)			
DN								2 (179)			1 (1,000)
BW	1 (62)							4 (750)	1 (100)		1 (143)
BA								1 (12)			1 (800)
CU	1 (53)		1 (135)	5 (153)	2 (83)	1 (1)		1 (35)	3 (65)		4 (241)
RK	1 (67)			1 (4)		1 (1)	1 (72)	5 (122)		1 (5)	3 (75)
TT								1 (29)			
BH	1 (9)					1 (1)		1 (28)			
CM	1 (1)		1 (25)								


Ballyheige
Fenit
Tralee
Castlegregory
0K438
0K439
0K440
0K441
0K442
0K472
0K484
0K416
0K502
0K501
0K503
0K301
Legend
Count Subsite Boundaries
OSi Discovery Series County Boundary
Number of roosting birds/roost size
RANGE
1-49
50-99
100-199
200-299
400-499
700-999
1000-1999
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Tralee Bay Complex
Roost Location Map
Data collected during
the roost survey on 27/02/2010
Map to be read in conjunction with the NPWS Conservation Objectives SPA Supporting Document.
COUNTY KERRY
0 1 2 3 km
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Map Version 1
Date: March 2014

APPENDIX 9

Tralee Bay Complex - 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 Tralee Bay Complex
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	0K010	0K301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504	0K505
Coastal protection, sea defences & stabilisation																
1.1 Linear defences				O					O	O	O				O	O
1.2 Training walls															O	
1.3 Groynes										O						
1.4 *Spartina* planting/growing			O											O		
1.5 Marram grass planting/growing			O													
1.6 Other modifications					O				O							
Barrage schemes/drainage																
2.1 Weirs and barrages for river management	H															
2.2 Altered drainage/river channel	H			H											O	
2.3 Other channel modifications	O	H	H	H							O					
2.5 Other	O			H												
Industrial, port & related development																
4.2 Fishing harbour									O						O	O
4.3 Slipway	O								O	O					O	O
4.4 Pier									O						O	O
4.7 Ship & boat building/repair									O							O
Pollution																
6.1 Domestic & urban waste water		O		O					O		O				O	
6.4 Agricultural & forestry effluents	O													H		
6.7 Solid waste incl. fly-tipping											O					H
Sediment extraction (marine & terrestrial)																
7.1 Channel dredging (maintenance & navigation)	O				O						H					
7.3 Sand and gravel extraction	H			O	O				O						O	
7.4 Removal of beach materials				O	O				O				O	O	H	
7.6 Removal of estuarine sediment									O						O	

Activity/Event	0K010	0K301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504	0K505
Transport & communications																
8.2 Flight path											O					
8.3 Bridges & aqueducts							O				O					
8.5 Road schemes		O					O		O	O	O				O	
8.6 Car parks						O			O		O			O	O	
8.7 Shipping channel, shipping lanes									O		H					
8.10 Communication masts and antennas									O							
Urbanisation																
9.1 Urbanised areas, housing		O		O					O	O	O					
9.2 Commercial & industrial areas		O							O		O					O
9.3 Hotel & leisure complex						O			O							
Education & scientific research																
11.1 Scientific sampling, specimen collection											O			O		
Tourism & recreation																
12.1 Marinas									O							
12.2 Non-marina moorings				O	O				O						O	O
12.3 Dinghy & boat parks	O								O						O	O
12.4 Caravan parks & chalets				O	O	O			O						O	
12.5 Leisure centres, sports ground									O							
12.6 Power boating & water-skiing									O					O		
12.7 Jet-skiing																O
12.8 Sailing	O			O	O				O						O	
12.9 Sailboarding & wind-surfing				O	O	O			O						O	O
12.10 SCUBA & snorkeling				O	O	O			O						O	

Activity/Event	0K010	0K301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504	0K505
12.11 Canoeing				O	O				O						O	O
12.12 Surfing				O	O	O			O						O	
12.13 Rowing	O								O						O	
12.14 Tourist boat trips				O	O	O			O						O	
12.15 Angling	O		O	O	O			O	O						O	O
12.16 Other non-commercial fishing									O							
12.17 Bathing & general beach recreation				O	O	O			O					O	O	O
12.18 Walking, incl. dog walking		O	O	O	O	O		O	O	O	O			O	O	O
12.19 Birdwatching			O	O	O	O		O	O	O	O	O	O	O	O	
12.21 4WD, trial & quad bikes			O	O	O	O									O	
12.22 Motorised vehicles				O	O	O			O						O	O
12.23 Horse-riding			O	O	O	O			O						O	O
12.25 Golf courses	O								O						O	
12.26 Clay-pigeon shooting	O															
12.27 Others						O										
Wildfowl & hunting																
13.1 Wildfowling			H	H	H	H	O		O				H	H		
13.2 Other hunting-related activities					O											
Bait-collecting																
14.1 Digging for lugworms/ragworms			O		O		O		O	O	O		O	O	O	O

Activity/Event	0K010	0K301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504	0K505
Fisheries & Aquaculture																
15.1 Professional passive fishing (e.g. longlining)			U						U	U			U	U	U	
15.2 Professional active fishing			U						U	U			U	U	U	
15.3 Bottom (benthic) dredging			U							U			U		U	
15.4 Fish traps & other fixed devices & nets			U						U	U			U	U	U	
15.5 Leisure fishing	O		O													
15.6 Molluscs - hand-gathering			O		O	O	O		O	O	O		O	O		O
15.7 Hand raking						O										
15.9 Intertidal aquaculture e.g. trestles			U						U	U		U	U	U	U	
Agriculture & forestry																
16.1 Saltmarsh grazing/harvesting			H	O	H	O			O			O			O	O
16.3 Grazing: non-intensive (terrestrial)	O	O							O		O	O	O	O		
16.4 Sand dune grazing	O		H	O	O	O			O						O	O
16.5 Stock feeding				O	O	O			O						O	
16.9 Removal of hedges, scrub	H				H								H	H		
16.13 Agricultural land-claim		H									H	H				
16.14 In-filling of ditches, ponds, pools, marshes and pits	H								O							
16.15 Removal of stone walls/embankments	H															
16.16 Agricultural activities not mentioned above															O	
Natural events																
19.1 Storms, floods and storm surges								O	O	O	O					
19.2 Severe cold weather	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O

APPENDIX 10

Disturbance Assessment

Scoring system - definitions & rationale

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

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

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

Scoring system – worked example

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

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

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

Activity/Event	0K010	0K301	0K416	0K437	0K438	0K439	0K440	0K441	0K442	0K472	0K484	0K501	0K502	0K503	0K504/505
8.2 Flight path											6				
12.6 Power boating & water-skiing (powered watercraft)									5						
12.8 Sailing (non-powered watercraft)															
12.18 Walking, incl. dog walking		5	6		6			6		5	5				7
12.21/22 Motorised vehicles incl. 4WD, trial & quad bikes															6
13.2 Other hunting-related activities					6										
14.1 Digging for lugworms/ragworms															4
15.6 Molluscs - hand-gathering									3	4					
15.9 Intertidal aquaculture- associated activity															4