

Lough Foyle
Special Protection Area

(Site Code 4087)



Conservation Objectives
Supporting Document

VERSION 1

National Parks & Wildlife Service

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SUMMARY

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

Part One presents an introduction to the Special Protection Area (SPA) designation process and to the site designated as Lough Foyle Special Protection Area, as well as introducing the concept of conservation objectives and their formulation.

Part Two provides site designation information for Lough Foyle 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 2011/12 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 2011/12 Waterbird Survey Programme.

PART ONE - INTRODUCTION

1.1 Introduction to the designation of Special Protection Areas

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

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

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

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

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

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

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

Site specific information relevant to the selection and designation of a SPA is collated from a range of sources including the Irish Wetland Bird Survey (I-WeBS), The Wetland Bird Survey (WeBS) in Northern Ireland, species specific reports and a wide range of scientific publications, reports and other surveys. If, following collation of all the available scientific data, a site meets the relevant criteria for designation and is selected as an SPA, a list of species for which the site is nationally and internationally important is compiled. These species are known as **Special Conservation Interests** and may be one of the following:

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

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

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

1.2 Introduction to Lough Foyle Special Protection Area

Lough Foyle is a large shallow sea inlet located along the central north coast near the city of Derry. Lough Foyle SPA (4087) comprises a section of the western shore of the lough and is part of the wider site complex that straddles the border between the Republic and Northern Ireland

The designated site comprises a section of the western shore from Muff to north of Vances Point in Co. Donegal. The site is part of the larger cross-border Lough Foyle complex which regularly supports in excess of 20,000 wintering waterbirds. The majority of the wintering waterbirds that utilise this site occur along the southern and eastern shoreline of Lough Foyle in Derry, which is also designated as an SPA in Northern Ireland.

In the Republic of Ireland the site is selected as a Special Protection Area as it is part of an internationally important wetland site that regularly supports in excess of 20,000 wintering waterbirds. The site supports internationally important populations of three waterbird species and nationally important populations of a further 20 species.

The Site Synopsis for Lough Foyle 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 network¹.

Where relevant, conservation objectives are defined for attributes² relating to non-breeding waterbird species populations, and for attributes related to the maintenance and protection of habitats that support them. These attributes are:

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

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

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

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

PART TWO – SITE DESIGNATION INFORMATION

2.1 Special Conservation Interests of Lough Foyle Special Protection Area

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

The **Special Conservation Interest species**³ for Lough Foyle SPA are listed below and summarised in Table 2.1. This table also shows the importance of Lough Foyle SPA for these SCI species, relative to the importance of other sites within Ireland, within the Border region⁴ and within County Donegal.

The Special Conservation Interests listed for Lough Foyle SPA are as follows:-

1. During winter the site regularly supports 1% or more of the all-Ireland population of Bewick's Swan (*Cygnus columnianus*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 43 individuals.
2. During winter the site regularly supports 1% or more of the biogeographic 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 811 individuals.
3. During winter the site regularly supports 1% or more of the all-Ireland population of Greylag Goose (*Anser anser*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 391 individuals.
4. During winter the site regularly supports 1% or more of the biogeographic 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 3,765 individuals.
5. 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 468 individuals.
6. 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 9,011 individuals.
7. 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 660 individuals.
8. 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 1,635 individuals.
9. During winter the site regularly supports 1% or more of the all-Ireland population of Eider (*Somateria mollissima*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 143 individuals.

³ Special Conservation Interest species are listed in taxonomic order.

⁴ 'Region' refers to regions as defined by Irish Regions Office.

10. During winter the site regularly supports 1% or more of the all-Ireland population of Red-breasted Merganser (*Mergus serrator*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 82 individuals.
11. During winter the site regularly supports 1% or more of the all-Ireland population of Red-throated Diver (*Gavia stellata*). The mean peak number of this Annex I species within the SPA during the baseline period (1995/96 – 1999/00) was 28 individuals.
12. During winter the site regularly supports 1% or more of the all-Ireland population of Great Crested Grebe (*Podiceps cristatus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 148 individuals.
13. 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 3,101 individuals.
14. 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 4,562 individuals.
15. 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 4,024 individuals.
16. During winter the site regularly supports 1% or more of the all-Ireland population of Knot (*Calidris canutus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 499 individuals.
17. 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 4,991 individuals.
18. During winter the site regularly supports 1% or more of the biogeographic 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 2,059 individuals.
19. During winter the site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 2,265 individuals.
20. 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 998 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 2,212 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 2,846 individuals.
23. During winter the site regularly supports 1% or more of the all-Ireland population of Herring Gull (*Larus argentatus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,261 individuals.

24. The wetland habitats contained within Lough Foyle 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 Lough Foyle Special Protection Area, plus site importance at national, regional and county scale

Special Conservation Interests	Annex I species	Baseline Population ^{a/b}	Population status at baseline	National Importance Rank ¹	Regional Importance Rank ²	County Importance Rank ³
Bewick's Swan (<i>Cygnus columbianus</i>)	Yes	43	All-Ireland Importance	3	1	1
Whooper Swan (<i>Cygnus cygnus</i>)	Yes	811	International Importance	19	2	2
Greylag Goose (<i>Anser anser</i>)		391	All-Ireland Importance	5	4	2
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>)		3,765	International Importance	24	6	3
Shelduck (<i>Tadorna tadorna</i>)		468	All-Ireland Importance	10	3	2
Wigeon (<i>Anas penelope</i>)		9,011	All-Ireland Importance	7	1	1
Teal (<i>Anas crecca</i>)		660	All-Ireland Importance	17	2	2
Mallard (<i>Anas platyrhynchos</i>)		1,635	All-Ireland Importance	3	2	2
Eider (<i>Somateria mollissima</i>)		143	All-Ireland Importance	1	1	1
Red-breasted Merganser (<i>Mergus serrator</i>)		82	All-Ireland Importance	8	2	2
Red-throated Diver (<i>Gavia stellata</i>)	Yes	28	All-Ireland Importance	4	1	1
Great Crested Grebe (<i>Podiceps cristatus</i>)		148	All-Ireland Importance	4	3	2
Oystercatcher (<i>Haematopus ostralegus</i>)		3,101	All-Ireland Importance	8	3	2
Golden Plover (<i>Pluvialis apricaria</i>)	Yes	4,562	All-Ireland Importance	17	2	1
Lapwing (<i>Vanellus vanellus</i>)		4,024	All-Ireland Importance	13	2	1
Knot (<i>Calidris canutus</i>)		499	All-Ireland Importance	11	2	1
Dunlin (<i>Calidris alpina</i>)		4,991	All-Ireland Importance	9	3	2
Bar-tailed Godwit (<i>Limosa lapponica</i>)	Yes	2,059	International Importance	20	5	1
Curlew (<i>Numenius arquata</i>)		2,265	All-Ireland Importance	10	3	2
Redshank (<i>Tringa totanus</i>)		988	All-Ireland Importance	10	4	2
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)		2,212	All-Ireland Importance	7	2	1
Common Gull (<i>Larus canus</i>)		2,846	All-Ireland Importance	1	1	1
Herring (<i>Larus argentatus</i>)		1,261	All-Ireland Importance	2	1	1

	SAC	RAMSAR SITE	IMPORTANT BIRD AREA (IBA)	WILDFOWL SANCTUARY	OTHER	OTHER
Other conservation designations associated with the site ^c		Yes	Yes		Nature Reserves at Magilligan and the Roe Estuary (Northern Ireland)	ASSI, SPA (Northern Ireland)

^a Baseline data are the 5-year mean peak counts for the period 1995/96 – 1999/00 (I-WeBS).

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

^c Note that other designations associated with Lough Foyle may relate to different areas and/or some of these areas may extend outside the SPA boundary. Also note that as Lough Foyle is a cross-border site, UK conservation designations also apply.

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

² Regional importance rank - the number given relates to the importance of the site for the non-breeding populations of the SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within the Border Region; includes the cross-region sites Carlingford Lough and Killala Bay/Moy Estuary.

³ County importance rank - the number given relates to the importance of the site for the non-breeding populations of the SCI species during the baseline period (1995/96 – 1999/00) relative to other sites within Co Donegal.

PART THREE – CONSERVATION OBJECTIVES FOR LOUGH FOYLE SPA

3.1 Conservation Objectives for the non-breeding Special Conservation Interests of Lough Foyle SPA

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

Objective 1: *To maintain the favourable conservation condition of the non-breeding waterbird Special Conservation Interest species listed for Lough Foyle SPA.*

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

- To be favourable, the long term **population trend** for each waterbird Special Conservation Interest species should be stable or increasing.⁵ Waterbird populations are deemed to be unfavourable when they have declined by 25% or more, as assessed by the most recent population trend analysis.⁶
- To be favourable, there should be no significant decrease in the range, timing or intensity of use of areas by the waterbird species of Special Conservation Interest, other than that occurring from natural patterns of variation.⁷

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

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

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

⁶ Population trend analysis is presented in Section 4.

⁷ Waterbird distribution from the 2011/2012 waterbird survey programme is examined in Section 5.

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

Objective 2: *To maintain the favourable conservation condition of the wetland habitat at Lough Foyle 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 **588 ha**, other than that occurring from natural patterns of variation.

The boundary of Lough Foyle SPA was defined to include the primary wetland habitats of this site. Objective 2 seeks to maintain the permanent extent of these wetland habitats, which constitute an important resource for regularly-occurring migratory waterbirds. The wetland habitats can be categorised into three broad types: subtidal; intertidal; and supratidal. Over time and 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 Lough Foyle SPA this broad category is estimated to be **246 ha**. Subtidal areas are continuously available for benthic and surface feeding waterfowl (e.g. Wigeon) and piscivorous/other waterbirds. Various waterbirds roost in subtidal areas (e.g. Brent Goose).

The intertidal area is defined, in this context, as the area contained between the mean high water mark and the mean low water mark. For Lough Foyle SPA this is estimated to be **308 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/loafing⁸ areas. When the intertidal area is inundated by the tide it becomes available for benthic and surface feeding ducks and piscivorous/other waterbirds. During this tidal state this area can be used by various waterbirds as a loafing/roosting resource.

The supratidal category refers to areas that are not frequently inundated by the tide (i.e. occurring above the mean high watermark) but contain shoreline and coastal habitats and can be regarded as an integral part of the shoreline. For Lough Foyle SPA this is estimated to be **33 ha**. Supratidal areas are used by a range of waterbird species as a roosting resource as well as providing feeding opportunities for some species.

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

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

Table 3.1 Conservation Objectives for the waterbird Special Conservation Interests of Lough Foyle SPA.

Objective 1:				
<i>To maintain the favourable conservation condition of the waterbird Special Conservation Interest species listed for Lough Foyle SPA, which is defined by the following list of attributes and targets:</i>				
Parameter	Attribute	Measure	Target	Notes
Population	Population trend	Percentage change as per population trend assessment using waterbird count data collected through Wetland Bird Surveys 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 2011/12 waterbird survey programme is reviewed in Part Five of this document.
Objective 2:				
<i>To maintain the favourable conservation condition of the wetland habitat at Lough Foyle SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attributes and targets:</i>				
Parameter	Attribute	Measure	Target	Notes
Area	Wetland habitat	Area (ha)	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 588 ha, other than that occurring from natural patterns of variation.	The wetland habitat area was estimated as 588 ha using OSI data and relevant orthophotographs.

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

4.1 Population data for waterbird SCI species of Lough Foyle SPA

Lough Foyle SPA (4087) comprises a section of the western shore of the lough and is part of the wider site complex that straddles the border between the Republic and Northern Ireland. Wintering waterbirds have been surveyed at Lough Foyle as part of the Irish Wetland Bird Survey (I-WeBS) and its UK counterpart, the Wetland Bird Survey (WeBS) since 1994/95 and 1989/90 respectively. Count coverage of the western shore during I-WeBS has been variable over time. In addition, the majority of the wintering waterbirds that utilise this site occur along the southern and eastern shoreline in Derry, which is designated as an SPA in Northern Ireland. Therefore to assess waterbird site numbers we have used data from the UK WeBS.

Like I-WeBS, WeBS counts are undertaken during what is termed the 'core survey period' which covers the main wintering period when many species occur in their largest concentrations, but also the autumn and spring passage periods when total waterbird numbers may be enhanced by staging/stopover birds⁹. In addition to these surveys, Bewick's Swan, Whooper Swan, Greylag Goose and Light-bellied Brent Goose are the subject of species-specific surveys that are undertaken periodically. Information on I-WeBS and other waterbird surveys is given in Appendix 2.

Table 4.1 presents population¹⁰ data for the non-breeding waterbird SCI species of Lough Foyle based on UK WeBS data. Annual maxima were identified and used to calculate the five-year mean peak for each species. The baseline period was 1995/96 – 1999/00 while the recent average relates to the five-year period 2007/08 – 2011/12. When examining waterbird data, it is standard practice to use the mean of peak counts generated for each species because it reflects more accurately the importance of a site for a particular species by helping to account for inconsistencies in data gathering (i.e. differing coverage) or extraordinary fluctuations in numbers. However it is important to note that waterbird counts represent a 'snapshot' of bird numbers during a count session, so in general and taking into account all potential sources of error, resulting data are regarded to be underestimates of population size (Underhill & Prÿs-Jones, 1994).

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

Gull species are not assigned 1% thresholds in Table 4.1. The wintering distributions of gull species are widespread and not monitored routinely during I-WeBS therefore standard methods of population estimation and threshold setting are difficult. SCI selection in relation to gull species therefore relates to the known most important sites for the gull species in question and a 'threshold of significance' is applied (Crowe, 2005).¹¹

⁹ The terms 'stopover' and 'staging' are often used interchangeably. A stopover site can be defined as any place where a bird takes a break during migration. Staging areas can be defined as stopover sites that attract large numbers of individuals and play an important part in re-fuelling the birds before their onward migration (e.g. Warnock, 2010).

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

¹¹ Current threshold of significance is 1,000 for Black-headed Gull and 500 for Common Gull and Lesser Black-backed Gull (Crowe, 2005).

Table 4.1 Population data for non-breeding waterbird Special Conservation Interest Species of Lough Foyle SPA

Site Special Conservation Interests (SCIs)	Baseline Period ¹ (1995/96 – 1999/00)	Recent Site Data ² (2007/08 – 2011/12)
Bewick's Swan (<i>Cygnus columbianus</i>)	43 (n)	2
Whooper Swan (<i>Cygnus cygnus</i>)	811 (i)	1,291 (i)
Greylag Goose (<i>Anser anser</i>)	391 (n)	796 (n)
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>)	3,765 (i)	3,049 (i)
Shelduck (<i>Tadorna tadorna</i>)	468 (n)	231 (n)
Wigeon (<i>Anas penelope</i>)	9,011 (n)	1,883 (n)
Teal (<i>Anas crecca</i>)	660 (n)	1,653 (n)
Mallard (<i>Anas platyrhynchos</i>)	1,635 (n)	994 (n)
Eider (<i>Somateria mollissima</i>)	143 (n)	227 (n)
Red-breasted Merganser (<i>Mergus serrator</i>)	82 (n)	99 (n)
Red-throated Diver (<i>Gavia stellata</i>)	28 (n)	58 (n)
Great Crested Grebe (<i>Podiceps cristatus</i>)	148 (n)	78 (n)
Oystercatcher (<i>Haematopus ostralegus</i>)	3,101 (n)	3,190 (n)
Golden Plover (<i>Pluvialis apricaria</i>)	4,562 (n)	5,906 (n)
Lapwing (<i>Vanellus vanellus</i>)	4,024 (n)	2,203 (n)
Knot (<i>Calidris canutus</i>)	499 (n)	301 (n)
Dunlin (<i>Calidris alpina</i>)	4,991 (n)	2,025 (n)
Bar-tailed Godwit (<i>Limosa lapponica</i>)	2,059 (i)	2,007 (i)
Curlew (<i>Numenius arquata</i>)	2,265 (n)	2,156 (n)
Redshank (<i>Tringa totanus</i>)	988 (n)	989 (n)
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)	2,212 (n)	3,348 (n)
Common Gull (<i>Larus canus</i>)	2,846 (n)	4,044 (n)
Herring Gull (<i>Larus argentatus</i>)	1,261 (n)	792 (n)

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

²recent site data is the mean peak for the 5-year period 2007/08 – 2011/12 (UK WeBS) (Austin et al. 2013)

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

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

4.2 Waterbird population trends for Lough Foyle SPA

The calculation and assessment of waterbird population trends at Irish coastal SPA sites follows the UK Wetland Bird Survey 'Alerts System' which provides a standardised technique for monitoring changes in the numbers of non-breeding waterbirds over a range of spatial scales and time periods (Appendix 3). Lough Foyle SPA (4087) is part of the wider site complex that supports over 20,000 birds during winter; and birds that utilise the Republic of Ireland SPA range more widely over the whole site. Therefore waterbird trends are based on total site data and therefore follow those calculated for the UK Wetland Bird Survey 'Alerts System' (Cook et al. 2013).

Short, medium and long-term trends for the data period 1989/90 to 2010/11¹² are shown in Table 4.2 which relate to the status of waterbird populations as of 2009/10 (Cook et al. 2013). The values 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. Alerts were not calculated for Greylag Goose, Eider, Red-throated Diver, Black-headed Gull, Common Gull or Lesser Black-backed Gull so for these species a measure of population change was calculated using the generic threshold method which compares population size at two time intervals, and based on the baseline and recent five-year means (see Appendix 3 for methods).

Waterbirds are relatively long-lived birds and changes in population size can take several years to become evident. The short-term trend can be useful to assess whether species

¹² *first winter 1998/99; reference winter 2009/10.

numbers at the site are remaining stable, showing increase or signs of recovery, or are continuing to decline. For example, although a species' long-term trend may be negative, the short-term trend could be positive if numbers have increased during the recent five year period being assessed. Importantly, the short-term trend may detect more rapidly where a species population is beginning to decline.

Table 4.2 Site Population trends for waterbird Special Conservation Interest species of Lough Foyle SPA

Site Special Conservation Interests (SCIs)	Short-term % change ¹	Medium-term % change ²	Long-term % change ³	Site Population Trend ⁴
Bewick's Swan (<i>Cygnus columbianus</i>)	- 86	- 84	- 99	
Whooper Swan (<i>Cygnus cygnus</i>)	+ 7	+ 83	+ 23	
Greylag Goose (<i>Anser anser</i>)	-	-	-	+ 104
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>)	+ 47	- 1	- 34	
Shelduck (<i>Tadorna tadorna</i>)	- 34	- 55	- 32	
Wigeon (<i>Anas penelope</i>)	- 53	- 80	-89	
Teal (<i>Anas crecca</i>)	+ 42	+ 118	+ 51	
Mallard (<i>Anas platyrhynchos</i>)	+ 26	- 9	- 45	
Eider (<i>Somateria mollissima</i>)	-	-	-	+ 59
Red-breasted Merganser (<i>Mergus serrator</i>)	- 10	+ 119	+ 93	
Red-throated Diver (<i>Gavia stellata</i>)	-	-	-	+ 107
Great Crested Grebe (<i>Podiceps cristatus</i>)	- 68	+ 16	- 12	
Oystercatcher (<i>Haematopus ostralegus</i>)	+ 3	- 13	+ 10	
Golden Plover (<i>Pluvialis apricaria</i>)	- 58	0	+ 77	
Lapwing (<i>Vanellus vanellus</i>)	-36	- 23	- 1	
Knot (<i>Calidris canutus</i>)	- 77	- 32	- 63	
Dunlin (<i>Calidris alpina</i>)	- 33	- 60	- 43	
Bar-tailed Godwit (<i>Limosa lapponica</i>)	+ 11	+ 17	- 7	
Curlew (<i>Numenius arquata</i>)	- 14	- 13	- 13	
Redshank (<i>Tringa totanus</i>)	- 25	- 19	+ 2	
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)	-	-	-	+ 51
Common Gull (<i>Larus canus</i>)	-	-	-	+ 42
Herring Gull (<i>Larus argentatus</i>)	-	-	-	- 37

¹Short-term (five-year);

²Medium-term (ten-years);

³Long-term (up to 25 years)

⁴Site population change based on difference between baseline 5-year mean (1995/96 – 1999/00) and recent 5-year mean (2007/08 – 2011/12).

For selected species, explanatory notes to aid the interpretation of trends are given below, based largely on species accounts provided by Cook et al. (2013). National trends (Republic of Ireland) follow Boland & Crowe (2012) while All-Ireland trends are after Crowe & Holt (2013).

Bewick's Swan – caution is applied to the trend for Bewick's Swan because they occur too infrequently at the site to make interpretation meaningful. However, WeBS data show that this species has not been recorded at Lough Foyle since the 2008/09 season. The trend for decline is consistent with that reported for national level with - 83% and - 92% declines reported for the short (2003/04-2008/09) and long (1994/95 - 2008/09) time periods. The all-Ireland trend is also for decline (-20%) (1999/00 to 2010/11).

Whooper Swan – numbers over-wintering at Lough Foyle have been stable in the short-term having previously increased. Note that results from the International Swan Census found a 7% decline in numbers at Lough Foyle between the two surveys undertaken in 2005 and 2010 (Boland et al. 2010). Nationally, numbers have increased throughout I-WeBS while the all-Ireland trend is also for increase.

Greylag Goose – the most recent international goose census was in 2012 and reported a 12.7% decrease in the total Icelandic-breeding population on the previous year (Mitchell, 2013). Greylag Geese that occur at Lough Foyle belong to the flock that use the Lough

Swilly/Lough Foyle/River Foyle complex and this is the largest flock in Ireland during the non-breeding season. Use of Lough Foyle is irregular so site-based trends cannot be calculated. Nationally, numbers have declined over the long-term but are stable/increasing in the short term.

Light-bellied Brent Goose – site numbers have increased over the short-term following a previous decline. Numbers over-wintering in Northern Ireland have been increasing in the short-term having been previously stable. The all-Ireland trend is stable.

Wigeon – the long-term trend for decline is consistent with the long term national trend for decline, and the decline observed in Northern Ireland. In contrast, numbers in Britain have shown an increasing trend since the late 1980's.

Mallard – site numbers have increased in the short-term following a previous decline. The national trend is for decline while the all-Ireland trend is stable.

Eider – Eiders are highly gregarious during winter and flocks often occur too far offshore to be detected or for accurate counts to be made. Weather conditions during counts also have a bearing on the accuracy of counts, and overall there is a high likelihood that flocks are missed or numbers underestimated (Boland & Crowe, 2012).

Up to four of the 15 described flyway populations of Eider are thought to occur in Ireland during winter. The status of the *mollissima* populations is mixed with the Baltic, Denmark and Netherlands, and Britain/Ireland population considered to be in decline, the Norway and Russia population considered stable, and the trend of the White Sea population unknown (Wetlands International, 2012).

Red-breasted Merganser – site numbers have fluctuated throughout the WeBS period so interpretation of the underlying trend is difficult. The all-Ireland trend is stable.

Red-throated Diver – Like Eider, flocks of Red-throated Diver can often occur too far offshore to be detected or for accurate counts to be made, and their detection and identification is dependent on favourable counting conditions (Crowe, 2005). Total numbers wintering around Ireland and at site-level are therefore difficult to estimate with accuracy.

Great Crested Grebe – site numbers have declined over the long- and short-term with a period of increasing numbers in the middle. Numbers in Northern Ireland have been decreasing in the short-term having previously been stable. The all-Ireland and national trends are also for declining numbers.

Golden Plover – while numbers over the long-term have increased, the numbers of Golden Plover at the site have declined over the short-term. The all-Ireland trend (1999-2010) is for decline.

Knot – site numbers have fluctuated throughout WeBS so interpretation of the underlying trend is difficult and while the trend is for decline in all three time periods, they should be treated with some degree of caution.

Dunlin – the numbers over-wintering at Lough Foyle have been decreasing over the long-term; consistent with the trends for Northern Ireland, all-Ireland and at national level.

Bar-tailed Godwit – site numbers have fluctuated throughout WeBS so interpretation of the underlying trend is difficult. In Britain, numbers declined from the early 2000's but have increased in recent seasons. The all-Ireland and national trends across the long-term are for broadly stable numbers.

Curlew – site numbers have declined over the long-term. This is consistent with the all-Ireland trend and the national trend where numbers have declined throughout I-WeBS by an average 3% per year.

4.3 Lough Foyle SPA – site conservation condition of waterbird SCI species

Conservation condition of SCI species was determined using a species site trend and therefore relates to Conservation Objective 1 (population trend) only¹³. Note that trends are tentative for Greylag Goose, Eider, Red-throated Diver, Black-headed Gull, Common Gull and Herring Gull (refer to Section 4.2). Conservation condition was assigned using the following criteria:

Favourable population = population is stable/increasing.

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

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

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

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

With regards the 23 waterbird species of Special Conservation Interest listed for Lough Foyle SPA, and based on the population trend for the site, it has been determined that (Table 4.3):-

1. 3 species are currently considered as **Highly Unfavourable** (Bewick's Swan, Wigeon and Knot);
2. 5 species are currently considered as **Unfavourable** (Light-bellied Brent Goose, Shelduck, Mallard, Dunlin, and Herring Gull);
3. 4 species are currently considered as **Intermediate Unfavourable** (Great Crested Grebe, Lapwing, Bar-tailed Godwit and Curlew);
4. 11 species are currently considered as **Favourable** (Whooper Swan, Greylag Goose, Teal, Eider, Red-breasted Merganser, Red-throated Diver, Oystercatcher, Golden Plover, Redshank, Black-headed Gull and Common Gull).

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).

¹³ Conservation condition in relation to Objective 1 (range, timing or intensity of use of areas by SCI species) has yet to be assigned.

Table 4.3 SCI species of Lough Foyle SPA – Current Site Conservation Condition

Special Conservation Interests	BoCCI Category ^a	Site Population Trend ^b	Site Conservation Condition	Current all-Ireland Trend ^c	Current International Trend ^d
Bewick's Swan	Red	- 99	Highly Unfavourable	Declining	Declining
Whooper Swan	Amber	+ 23	Favourable	Increasing	Increasing
Greylag Goose	Amber	+ 104	Favourable	n/c	Increasing
Light-bellied Brent Goose	Amber	- 34	Unfavourable	Increasing	Increasing
Shelduck	Amber	- 32	Unfavourable	Stable	Increasing
Wigeon	Red	-89	Highly Unfavourable	Declining	Stable
Teal	Amber	+ 51	Favourable	Stable	Increasing
Mallard	Green	- 45	Unfavourable	Declining	Unknown
Eider	Amber	+ 59	Favourable	Increasing	n/c refer to Section 4.2
Red-breasted Merganser	Green	+ 93	Favourable	Stable	Unknown
Red-throated Diver	Amber	+ 107	Favourable	n/c	Stable
Great Crested Grebe	Amber	- 12	(Intermediate) Unfavourable	Declining	Declining?
Oystercatcher	Amber	+ 10	Favourable	Stable	Declining
Golden Plover	Red	+ 77	Favourable	Declining	Declining
Lapwing	Red	- 1	(Intermediate) Unfavourable	Declining	Stable
Knot	Amber	- 63	Highly Unfavourable	Increasing	Fluctuating
Dunlin	Red	- 43	Unfavourable	Declining	Stable
Bar-tailed Godwit	Amber	- 7	(Intermediate) Unfavourable	Stable	Increasing
Curlew	Red	- 13	(Intermediate) Unfavourable	Declining	Declining
Redshank	Red	+ 2	Favourable	Stable	Stable/Increasing?
Black-headed Gull	Red	+ 51	Favourable	n/c	n/n
Common Gull	Amber	+ 42	Favourable	n/c	n/c
Herring Gull	Red	- 37	Unfavourable	n/c	n/c

^aAfter Colhoun & Cummins, 2013; ^b Site population trend analysis; see Table 4.2; ^call-Ireland trend - where a species is deemed to be increasing or declining if the annual rate of change is equal to or greater than 1.2% (after Crowe & Holt, 2013); ^d current international trend after Wetlands International, 2012.

Table 4.3 also shows the relationship between a species' long-term site trend and the current all-Ireland trend for the period 1999/00 to 2010/11. The colour coding used represents the following cases:-

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

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

PART FIVE – SUPPORTING INFORMATION

5.1 Introduction

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

Section 5.2 provides selected ecological summary information for non-breeding waterbirds of Lough Foyle. Section 5.3 presents results from the 2011/12 Waterbird Survey Programme. Finally, Section 5.4 provides summary information on activities and events that occur in and around Lough Foyle that may either act upon the habitats within the site, or may interact with waterbirds using the site.

The information provided is intended to:-

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

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

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

Waterbirds, defined as “birds that are ecologically dependent on wetlands” (Ramsar Convention, 1971), are a diverse group that includes divers, grebes, swans, geese and ducks, gulls, terns and wading birds. During the data period 2007/08 – 2009/10 (three seasons), the I-WeBS database shows a total of 30 waterbird species that were recorded within the SPA area¹⁴ at Lough Foyle. These species represent nine waterbird families: *Gaviidae* (divers), *Podicipedidae* (grebes), *Anatidae* (swans, geese and ducks), *Haematopodidae* (oystercatchers), *Charadriidae* (plovers and lapwings), *Scolopacidae* (sandpipers and allies) and *Laridae* (gulls and terns) plus *Phalacrocoracidae* (Cormorants), and *Ardeidae* (Hérons).

As described in Section 1.1, the wetland habitats contained within this SPA are considered to be a Special Conservation Interest in their own right. The wetland habitat is an important resource for listed SCI species and for other waterbird species included in the total waterbird assemblage. These species may include those that utilise the site during passage, those that are present in months of the year outside of the non-breeding season¹⁵ or species that use the site at certain times only (e.g. as a cold weather refuge).

During the I-WeBS period 2007/08 – 2009/10, a total of nine non-SCI waterbird species occurred on a regular basis¹⁶ at Lough Foyle SPA (4087) (Table 5.1).

¹⁴ Relates only to the area within SPA 4087.

¹⁵ Non-breeding season is defined as September – March inclusive.

¹⁶ Regular is defined as a species that occurred in two out of the three seasons 2007/08 – 2009/10.

Table 5.1 Regularly-occurring non SCI waterbird species at Lough Foyle SPA 4087 during the non-breeding season

Species	Peak number ¹ (2007/08 – 2009/10)
Pochard (<i>Aythya ferina</i>)	3
Great Northern Diver (<i>Gavia immer</i>)	17
Cormorant (<i>Phalacrocorax carbo</i>)	6
Grey Heron (<i>Ardea cinerea</i>)	16
Common Sandpiper (<i>Actitis hypoleucos</i>)	2
Greenshank (<i>Tringa nebularia</i>)	63 (n)
Turnstone (<i>Arenaria interpres</i>)	27
Lesser Black-backed Gull (<i>Larus fuscus</i>)	50
Great Black-backed Gull (<i>Larus marinus</i>)	18

Grey shading denotes an Annex I species; (n) = numbers of all-Ireland importance (as per Crowe & Holt, 2013).

¹ peak number recorded during any one of the three seasons 2007/08 to 2009/10 (I-WeBS).

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

Table 5.2 provides selected ecological information for waterbird SCI species of Lough Foyle SPA. Information is provided for the following categories¹⁷:-

- waterbird family (group);
- winter distribution – species distribution range during winter (based on the period 2001/02 – 2008/09 (after Boland & Crowe, 2012);
- trophic (foraging) guild (after Weller, 1999; see Appendix 5);
- food/prey requirements;
- principal supporting habitat within the site;
- ability to utilise other/alternative habitat in/around the site;
- site fidelity (species 'faithfulness' to wintering sites).

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

Reliance on alternative habitats will vary between species and from site to site. Use of alternative habitats is also likely to vary through time, from seasonally through to daily, and different habitats may be used by day and night (Shepherd et al. 2003). Different waterbirds may utilise wetland habitats in different ways. For example, while the majority of wading birds forage across exposed tidal flats, species such as Lapwing and Golden Plover are considered to be 'terrestrial waders,' typically foraging across grassland and using tidal flats primarily for roosting. When tidal flats are covered at high water, intertidally-foraging waterbirds are excluded and many will move to nearby fields to feed. Terrestrial foraging is also important when environmental factors (e.g. low temperature) reduce the profitability of intertidal foraging (e.g. Zwarts & Wanink, 1993). Some waterbird species are simply generalists, and make use of a range of habitats, for example the Black-tailed Godwit that forages across intertidal mudflats and grassland habitats. Other waterbird species such as Greenland White-fronted

¹⁷ Notes to aid the understanding of categories and codes used in Table 5.2 are provided in the table sub text.

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

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

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

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

Special Conservation Interests	Family (group)	Winter distribution ^A	Trophic Guild ^B	Food/Prey Requirements ^C	Principal supporting habitat within site ^D	Ability to utilise other/alternative habitats ^E	Site Fidelity ^F
Bewick's Swan <i>Cygnus columbianus</i>	Anatidae (swans & geese)	Highly restricted	1, 7	Wide	Refer to Section 4.2 and 5.3.4	2	High
Whooper Swan <i>Cygnus cygnus</i>	Anatidae (swans & geese)	Widespread	1, 7	Wide	Forage largely terrestrially, using wetland for roosting	2	Moderate/ High
Greylag Goose <i>Anser anser</i>	Anatidae (geese)	Highly restricted	7	Narrower	Forage largely terrestrially, using wetland for roosting	2	High
Light-bellied Brent Goose* <i>Branta bernicla hrota</i>	Anatidae (geese)	Highly restricted	1, 5	Highly specialised	Intertidal mudflats; shallow subtidal	2	High
Shelduck <i>Tadorna tadorna</i>	Anatidae (shelducks)	Localised	1, 5	Wide	Intertidal mud and sand flats, shallow subtidal	3	High
Wigeon <i>Anas penelope</i>	Anatidae (dabbling ducks)	Widespread	1, 5	Narrower	Intertidal mud and sand flats, shallow subtidal	1	Weak
Teal <i>Anas crecca</i>	Anatidae (dabbling ducks)	Very widespread	1	Wide	Intertidal mud and sand flats, shallow subtidal	3	Weak
Mallard <i>Anas platyrhynchos</i>	Anatidae (dabbling ducks)	Very widespread	1	Wide	Intertidal mud and sand flats, shallow subtidal	1	Moderate
Eider <i>Somateria mollissima</i>	Anatidae (diving ducks)	Highly restricted	2	Narrower/specialised	Sheltered & shallow subtidal	1	High
Red-breasted Merganser <i>Mergus serrator</i>	Anatidae (sea ducks)	Localised	2	Highly specialised	Sheltered & shallow subtidal	1	Unknown
Red-throated Diver <i>Gavia stellata</i>	Gaviidae (divers)	Intermediate	3	Highly specialised	Sheltered & shallow subtidal	1	Unknown
Great Crested Grebe <i>Podiceps cristatus</i>	Podicipedidae (grebes)	Widespread	2/3	Narrower	Sheltered & shallow subtidal over sand flats	2	High
Oystercatcher <i>Haematopus ostralegus</i>	Haematopodidae (wading birds)	Intermediate	4	Narrower	Intertidal mud and sand flats	2	High
Golden Plover <i>Pluvialis apricaria</i>	Charadriidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate
Lapwing <i>Vanellus vanellus</i>	Charadriidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	Moderate
Knot <i>Calidris canutus</i>	Scolopacidae (wading birds)	Localised	4	Narrower	Intertidal mud and sand flats	3	Moderate
Dunlin <i>Calidris alpina</i>	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	3	Moderate
Bar-tailed Godwit <i>Limosa lapponica</i>	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	Moderate
Curlew <i>Numenius arquata</i>	Scolopacidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	High
Redshank <i>Tringa totanus</i>	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate

Special Conservation Interests	Family (group)	Winter distribution ^A	Trophic Guild ^B	Food/Prey Requirements ^C	Principal supporting habitat within site ^D	Ability to utilise other/alternative habitats ^E	Site Fidelity ^F
Black-headed Gull <i>Chroicocephalus ridibundus</i>	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal flats & sheltered & shallow subtidal	2	Moderate
Common Gull <i>Larus canus</i>	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal mud and sand flats & sheltered & shallow subtidal	2	Moderate
Herring Gull <i>Larus argentatus</i>	Lariidae (gulls)	n/c	1, 2, 4, 6, 7	Wide	Intertidal mud and sand flats & sheltered & shallow subtidal	1	Unknown

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

^B Waterbird foraging guilds. 1 = Surface swimmer, 2 = water column diver (shallow), 3 = water column diver (deeper), 4/5 = intertidal walker (out of water), 6 = intertidal walker (in water), 7 = terrestrial walker. Further details are given within Appendix 5.

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

^D Principal supporting habitat present within Lough Foyle. 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.

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

5.3 The 2011/12 waterbird survey programme

5.3.1 Introduction

The 2011/12 waterbird survey programme was designed to investigate how waterbirds are distributed across coastal wetland sites during the low tide period. The surveys ran alongside and are complementary to the Irish Wetland Bird Survey (I-WeBS) and the UK WeBS which are primarily undertaken on a rising tide or at high tide.

The 2011/12 Waterbird Survey Programme surveyed the area designated as Lough Foyle SPA (4087) in the Republic of Ireland. The survey programme consisted of four low tide counts (October and November 2011 and February and March 2012) and one high tide count (January 2012). Waterbirds were counted within a series of ten count subsites and a map of these is shown in Appendix 6. Note that the subsite boundaries and the SPA boundaries are similar but not always coincident.

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

Table 5.3 Definition of broad habitat types used

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

5.3.2 Waterbird data, analyses and presentation

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

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

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

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

Subsite Rank Position - Categories

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

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

Waterbird count data for low tide surveys are also presented as species distribution maps ('dot density maps'). Dot-density maps show waterbird species distribution within intertidal or subtidal habitat¹⁸ 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.

Field maps (flock maps) completed during the high tide survey (January 2012) were used to produce roost maps. These maps show the locations of recorded roosts, but note the limitations in relation to field mapping discussed below.

Notes on data interpretation and methodological limitations

Subsite rankings and dot-density maps relate to the distribution of waterbirds at subsite level as recorded within the survey area during the 2011/12 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.

¹⁸ Note that birds within supratidal or terrestrial habitat are not included within these maps.

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

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

5.3.3 Summary Results

A total of 30 waterbird species were recorded during the 2011/12 survey programme at Lough Foyle. Note that the total count area and SPA area are not exactly coincident. A map showing count subsites is provided in Appendix 6.

Table 5.4 shows peak numbers for SCI species recorded during the low tide (LT) and high tide (HT) surveys. Bewick's Swan, Greylag Goose, Shelduck and Red-throated Diver were not recorded during the survey programme.

Average subsite occupancy, the average proportion of subsites in which a species occurred during low tide counts, was relatively low overall with only four species (Oystercatcher, Curlew, Redshank and Common Gull) occurring in more than half of the count subsites. Of these, Curlew was the most widespread, and occurred on three count occasions in all ten subsites.

Average percentage area occupancy is defined as the average proportion of the whole site area that a species occurred in during low tide counts. Although this is a broad calculation across all habitat zones it presents some indication of the range of a species across the site as a whole. In line with subsite occupancy, area occupancy was relatively low for most species; only Oystercatcher, Curlew, Redshank and Common Gull distributing on average, over more than half of the total count area (Table 5.4).

Table 5.4 Lough Foyle 2011/2012 waterbird surveys – summary data for SCI species

Site Special Conservation Interests (SCIs)	Peak number - LT surveys ⁱ	Peak number - HT survey	Average subsite % occupancy ⁱⁱ	Average % area occupancy ⁱⁱ
Bewick's Swan (<i>Cygnus columbianus</i>)	0	0	-	-
Whooper Swan (<i>Cygnus Cygnus</i>)	11 (1)	0	20 (0)	22 (0)
Greylag Goose (<i>Anser anser</i>)	0	0	-	-
Light-bellied Brent Goose (<i>Branta bernicla hrota</i>)	207 (4)	153	35 (6)	38 (3)
Shelduck (<i>Tadorna tadorna</i>)	0	0	-	-
Wigeon (<i>Anas penelope</i>)	34 (3)	52	17 (6)	18 (7)
Teal (<i>Anas crecca</i>)	3 (1)	0	10 (0)	10 (0)
Mallard (<i>Anas platyrhynchos</i>)	54 (4)	14	38 (13)	45 (16)
Eider (<i>Somateria mollissima</i>)	38 (4)	19	23 (5)	21 (4)
Red-breasted Merganser (<i>Mergus serrator</i>)	9 (2)	3	15 (7)	15 (9)
Red-throated Diver (<i>Gavia stellata</i>)	0	0	-	-
Great Crested Grebe (<i>Podiceps cristatus</i>)	19 (2)	1	30 (14)	32 (21)
Oystercatcher (<i>Haematopus ostralegus</i>)	248 (4)	125	88 (10)	86 (13)
Golden Plover (<i>Pluvialis apricaria</i>)	21 (4)	0	10 (0)	9 (1)
Lapwing (<i>Vanellus vanellus</i>)	54 (3)	78	37 (15)	40 (1)
Knot (<i>Calidris canutus</i>)	7 (1)	0	10 (0)	10 (0)
Dunlin (<i>Calidris alpina</i>)	18 (3)	0	23 (6)	22 (4)
Bar-tailed Godwit (<i>Limosa lapponica</i>)	24 (4)	32	23 (10)	20 (11)
Curlew (<i>Numenius arquata</i>)	260 (4)	181	95 (10)	95 (10)
Redshank (<i>Tringa totanus</i>)	60 (4)	31	68 (32)	70 (28)
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)	146 (4)	128	43 (10)	47 (16)
Common Gull (<i>Larus canus</i>)	117 (4)	76	63 (19)	55 (24)
Herring Gull (<i>Larus argentatus</i>)	13 (3)	10	30 (10)	26 (6)

(i) denotes numbers of international importance (after Wetlands International, 2012); (n) denotes numbers of all-Ireland importance (1% thresholds; 2006/07 – 2010/11 Crowe & Holt, 2013).

ⁱ Survey dates are given in Section 5.3.1; the number in brackets refers to the number of low tide surveys that the species was recorded in (n). ⁱⁱ Mean (± s.d.) averaged across the four low tide surveys, or the number of surveys that the species occurred in.

Whole site species richness (total number of species) ranged between 27 species (October 2011) and 20 species (February and March 2012) during low tide surveys and 19 species were recorded during the high tide survey.

All subsites supported a greater number of species during low tide as opposed to the high tide survey (Table 5.5). Average subsite diversity (species richness) was greatest for 0AL08 (11 species), with three subsites supporting an average ten waterbird species (0AL01, 0AL02 and 0AL07). 0AL08 also supported the greatest number of species during the high tide survey (Table 5.5).

Table 5.5 Subsite species richness

Subsite Code	Mean (\pm S.D) LT Survey	HT Survey	Peak Overall (H/L)
OAL01	10 (7)	7	L
OAL02	10 (2)	2	L
OAL03	8 (2)	2	L
OAL04	7 (1)	1	L
OAL05	5 (2)	2	L
OAL06	8 (2)	2	L
OAL07	10 (1)	1	L
OAL08	11(3)	3	L/H
OAL09	7 (1)	1	L
OAL10	9 (2)	2	L

5.3.4 Waterbird distribution

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

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

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

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

Table 5.6 (a) Lough Foyle Subsite assessment – total numbers during LT surveys (across all behaviours and habitats) (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods).

Species ▶	WS	PB	WN	T.	MA	E.	RM	GG	OC	GP	L.	KN	DN	BA	CU	RK	BH	CM	HG
Subsites																			
0AL01	H	V	V	V	V		H		L	V			V		H	V	V	H	
0AL02	V	H	H		V		V	V	H		L				V	H	V	M	
0AL03		V			H			H	H		H			V	V	V	V	V	
0AL04					H				V		H				H	L	M	M	M
0AL05		V							H						M			L	V
0AL06		H						V	H	V	V		M		M	V		M	V
0AL07		H						H	V					V	M	H	H	V	H
0AL08						H			V			V	V	M	V	V	L	V	
0AL09		L			M	M			L	V	V			V	M	V	L	H	M
0AL10					L	V	V	H	H		M		H		L	V		V	V

Table 5.6 (b) Lough Foyle Subsite assessment – highest rank obtained during the high tide survey (across all behaviours and habitats)

Species ▶	WS	PB	WN	T.	MA	E.	RM	GG	OC	GP	L.	KN	DN	BA	CU	RK	BH	CM	HG				
Subsites																							
0AL01	<i>not recorded</i>			<i>not recorded</i>				1	7	<i>not recorded</i>		<i>not recorded</i>	<i>not recorded</i>		1								
0AL02			1			2													4				
0AL03																			2	1	1	2	
0AL04														1					3				
0AL05		1												2								3	1
0AL06		4												6					7	3	5	4	
0AL07		3												4						2	3	5	
0AL08		2					1	2	1					3					1		2	5	
0AL09														5						5	3	4	7
0AL10								1								1				6			1

Table 5.6 (c) Lough Foyle Subsite assessment – total numbers foraging intertidally^I and subtidally^{II} (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods).

Species ▶	WS	PB ^I	WN ^I	T. ^I	MA ^I	E. ^{II}	RM ^{II}	GG ^{II}	OC ^I	GP ^I	L. ^I	KN	DN ^I	BA ^I	CU ^I	RK ^I	BH ^I	CM ^I	HG ^I		
Subsites																					
	▼																				
0AL01	not recorded	V	V	V	M		H		L	V		not recorded	V		V	V	H	V			
0AL02		H	H		V		V	V	H		V					H	H	H			
0AL03		V			H			H	H						V	V	V	V			
0AL04					H				V							H	L	M	H		
0AL05									H							M					V
0AL06		H							V	H	V				H		M	H		H	
0AL07		V							H	V						V	M	H	H	V	
0AL08							V			V					H	H	V	V	V	V	
0AL09		M								L						H	V	V	L	V	H
0AL10								V	H	H					V		L	V			

Table 5.6 (d) Lough Foyle Subsite assessment – ranked top ten peak low tide intertidal foraging densities for selected wader species - LT surveys

Species ▶	OC	DN	BA	CU	RK
Subsites					
	▼				
0AL01	10	2		7	4
0AL02	7			8	5
0AL03	8		3	4	8
0AL04	2			1	9
0AL05	3			9	
0AL06	4	3		3	3
0AL07	1		1	2	1
0AL08	6	4	4	6	6
0AL09	9		2	5	7
0AL10	5	1		10	2

Table 5.6 (e) Lough Foyle Subsite assessment – total numbers (roosting/other behaviour) during LT surveys, intertidal^I and subtidal^{II} (L Low, M Moderate; H High V Very high; please see Section 5.3.2 for methods)

Species ▶	WS ^{II}	PB ^I	WN ^I	T.	MA ^I	E. ^I	RM	GG	OC	GP ^I	L. ^I	KN	DN ^I	BA ^I	CU ^I	RK	BH ^I	CM ^I	HG ^I						
Subsites																									
0AL01	H	H	V	<i>not recorded</i>	V		<i>not recorded</i>	<i>not recorded</i>	<i>not recorded</i>			<i>not recorded</i>			H	<i>not recorded</i>	V	M							
0AL02	V	V																		V		V	H		
0AL03					V										H					V			H	V	
0AL04															H									M	M
0AL05		H																						M	
0AL06															V					V				H	V
0AL07																				V			V	V	H
0AL08																			V		M		V	H	
0AL09															V		V			V	H			H	
0AL10										V							M							V	V

Table 5.6 (f) Lough Foyle Subsite assessment – highest rank obtained (roosting/other behaviour) during the HT survey (Intertidal^I, Subtidal^{II})

Species ▶	WS	PB ^I	WN ^I	T.	MA ^I	MA ^{II}	E. ^I	RM	GG	OC ^I	GP	L. ^I	KN	DN	BA	CU ^I	RK ^I	BH ^I	CM ^I	HG ^I										
Subsites																														
0AL01	<i>not recorded</i>			<i>not recorded</i>	V	V		<i>not recorded</i>	<i>not recorded</i>	<i>not recorded</i>	<i>not recorded</i>	<i>not recorded</i>	<i>not recorded</i>	<i>not recorded</i>	<i>not recorded</i>	3														
0AL02			1				H																			2				
0AL03						V														1							1	1	1	
0AL04																				2										
0AL05			1																											
0AL06			3																									6	5	3
0AL07			2																									2	3	4
0AL08																													2	4
0AL09																V												3	4	
0AL10																H	V					1								

Lough Foyle - Waterbird Survey Programme 2011/12

Waterbird distribution - discussion notes

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

'WeBS' refers to count data recorded at Lough Foyle as part of the UK Wetland Bird Survey.

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

Bewick's Swan *Cygnus columbianus bewickii* - Family (group): Anatidae (geese)

Cygnus columbianus, known as the Bewick's or Tundra swan, has a widespread breeding distribution extending across Alaska, northern Canada and Arctic Russia. Two populations of the *Cygnus c. bewickii* sub-species are recognised (Wetlands International, 2012). The population that breeds in Arctic northern Russia spends winter in Northwest Europe from Denmark, Germany through the Netherlands, Belgium, to Northern France, Great Britain and Ireland with small numbers in the Camargue, southern France (Nagy et al. 2012).

The total size of the Northwest European population of Bewick's Swan *Cygnus columbianus bewickii* is monitored at 5-year intervals by a coordinated midwinter census throughout the swans' wintering range. Numbers are known to be in decline, a coordinated international census in January 2005 recorded a total of c.21, 500 birds; a 27% decrease on the peak count of 29,277 in January 1995 (Rees & Beekman, 2010). The reason for the declining population trend is unclear and whether this is due to conditions on the breeding grounds, staging areas or wintering sites, or to a combination of factors is not known (Nagy et al. 2012).

In Ireland, wintering Bewick's swans are limited to relatively few sites and are highly site faithful. Winter numbers are in decline (Crowe et al. 2005; 2008). The most recent co-ordinated international census took place over the weekend of 16th/17th January 2010 in Ireland. Just 80 Bewick's Swans were counted in six flocks, with the majority recorded at three sites in Co Wexford (Cull and Killag, Tacumshin Lake and Wexford Harbour and Slobs) with smaller numbers at two locations in Co Roscommon (Boland et al. 2010).

Numbers

Bewick's Swans were not recorded at Lough Foyle during the 2011/12 Waterbird Survey Programme.

Recent WeBS data for the UK shows that eight individuals were recorded at the site in 2008/09 but this species has not been recorded since. As such the Bewick's Swan has generated a 'red-alert' in terms of site population size across the long-term data period (Austin et al. 2014).

Foraging Distribution

Bewick's Swans are primarily herbivorous, feeding on aquatic plants, grasses and agricultural plants such as grain and vegetables.

Winter feeding sites are located in close proximity to permanent waters serving as roost sites. The species generally requires disturbance-free roosts and aquatic feeding sites (AEWA, 2011).

Bewick's Swans traditionally winter on shallow tidal waters, coastal lagoons, freshwater lakes, marshes or slow-moving rivers near or adjacent to extensive grasslands liable to flooding. However, use of agricultural habitats has increased since the 1970's with increasing proportions now found on arable land including winter cereals and sugar beet (Worden et al. 2006). Beet is the main habitat used at Wexford Harbour and Slobs and Ballyteige Burrow (Crowe et al. 2005).

Roosting Distribution

In general, Bewick's Swans feed by day and return to wetland areas to roost overnight. The species is highly gregarious.

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

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

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

The sixth international swan census undertaken in January 2010 reported a total 29,232 Whooper Swans, representing a 1% increase on the previous survey in 2005 (Hall et al. 2012).

Numbers

At Lough Foyle, the Whooper Swan was recorded during the October 2011 survey only and in relatively small numbers (11 individuals).

Lough Foyle is the second most important site for Whooper Swan in the Republic of Ireland (after Lough Swilly) (Boland & Crowe, 2012).

The most recent co-ordinated international census took place over the weekend of 16/17 January 2010 in Ireland. A total of 14,981 Whooper Swans were counted in Ireland in 387 flocks representing a 6% increase compared to the 2005 census (Boland et al. 2010). A total of 883 Whooper Swans were counted at Lough Foyle making this the second most important site after Loughs Neagh and Beg, but also representing a 7% drop in numbers since the 2005 census.

Lough Foyle is currently the fourth most important site for Whooper Swan in the UK (Austin et al. 2014). The most recent data from the UK WeBS provides a five-year average of 1,509 Whooper Swan for the period 2007/08 to 2011/12 (Austin et al. 2014) which is an increase on the previously reported five-year mean (1,198 reported in Holt et al. 2012).

Foraging Distribution

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

Whooper Swans were not recorded foraging during the 2011/12 Waterbird Survey Programme.

Roosting Distribution

Whooper Swans forage diurnally and roost at night.

During the 2011/12 Waterbird Survey Programme, Whooper Swans were recorded in roosting/other behaviour (loafing) within two subsites 0AL01 and 0AL02 that held three and eight individuals respectively during the October 2011 low tide survey.

Greylag Goose *Anser anser* - Family (group): Anatidae (geese)

The Greylag Goose occurs throughout the mid-latitudes of Europe and Asia and is polytypic with eight recognised populations within two subspecies (Wetlands International, 2006). The Icelandic-breeding population (*A. A. anser*) winters largely in the UK with smaller numbers wintering in Ireland, the Faeroe Islands and southern Norway (Hearn & Mitchell, 2004). During winter the migratory population overlaps with resident populations. Icelandic birds are known to congregate in up to nine main flocks in the Republic of Ireland (Boland & Crowe, 2012).

The most recent international goose census was in 2012 and provided a population estimate of 104,632 Icelandic Greylag Geese, a 12.7% decrease on the previous survey (Mitchell, 2013).

Numbers

Greylag Geese that occur at Lough Foyle belong to a flock that uses the Lough Swilly/Lough Foyle/River Foyle complex. This is the largest flock of Icelandic birds present in Ireland during the non-breeding season (Boland & Crowe, 2008).

No Greylag Geese were recorded at Lough Foyle during the 2011/12 Waterbird Survey Programme.

The most recent data from the UK WeBS shows a five-year average of 796 Greylag Geese for the period 2007/08 to 2011/12 which is on a par with the previously reported five-year mean (Austin et al. 2014).

A survey at Lough Foyle during the winter of 2007/08 and the following autumn (August-September 2009) found that Greylag Geese were located on the levels along the southern shore, between Black Brae & Faughanvale, and along the east shore at Myroe. It is likely that birds roost on the lake adjacent to these feeding areas, and possibly also adjacent to other known feeding areas along the western shore at Quigleys Point (Boland & Crowe, 2008).

Foraging Distribution

During the non-breeding season Greylag Geese utilise lowland farmland, lakes, reservoirs, coastal lagoons and estuaries (del Hoyo et al. 1992). The goose is herbivorous with a diet consisting of grass, roots, shoots, leaves, stems, aquatic plants, agricultural grain and potatoes.

Greylag Geese were not recorded during the 2011/12 Waterbird Survey Programme.

Roosting Distribution

Greylag Geese were not recorded during the 2011/12 Waterbird Survey Programme.

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).

Numbers

During the 2011/12 Waterbird Survey programme, numbers of Brent Goose at Lough Foyle peaked in October 2011 when a site total of 207 geese were recorded. Numbers dropped in the two following low tide surveys but rose to 182 individuals in March 2012. 153 individuals were counted during the high tide survey. No count exceeded the threshold for international or all-Ireland importance. Annual I-WeBS counts of the SPA area during the period 2007/08 to 2009/10 recorded a peak count of 305 Brent Geese.

Lough Foyle is currently the third most important site for Brent Geese Swan in the UK (Austin et al. 2014). The most recent data from the UK WeBS provides a five-year average of 3,049 Brent Geese for the period 2007/08 to 2011/12 which is an increase on the previously reported five-year mean, although the long term trend is for decline (Austin et al. 2014).

Brent Geese were recorded in eight of the ten subsites during the 2011/12 survey (not in 0AL04 or 0AL10). Four subsites held peak numbers during the survey programme: 0AL01 (October and November 2011); 0AL03 (February 2012) and 0AL05 (March 2012). The latter recorded the subsite peak count of 140 individuals and held peak numbers (90) during the January 2012 high tide survey. 0AL08 did not record the species during low tide surveys but supported good numbers (51) during the January 2012 high tide survey.

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. 2004b). Where this food source is absent or becomes depleted, the birds feed upon algae species, saltmarsh plants and may also undertake terrestrial grazing.

During the 2011/12 Waterbird Survey programme; the largest total number of Brent Geese recorded foraging was 139 individuals on 12/10/11. Thereafter between 21 and 42 individuals were recorded foraging in the survey area. This species foraged intertidally within six subsites: 0AL01, 0AL02, 0AL03, 0AL06, 0AL07 and 0AL09. 0AL01 recorded peak numbers in October and November 2011; 0AL03 in February 2012, and 0AL07 in March 2012.

0AL02 was the only subsite to record foraging individuals in all four low tide surveys and held numbers ranked as second or third highest in all. 0AL06 held good numbers in October 2011 (38) but no geese were recorded there again.

Zostera spp. is not known within the area designated as Lough Foyle SPA in the Republic of Ireland. However, in 2012 *Zostera marina* was recorded in shallow subtidal waters along the north-west shore near Merville (www.coastwatch.org). *Zostera* spp. beds are extensive along the eastern shore however, with both *Zostera noltii* and *Z. marina* var. *angustifolia* found (Portig, 2006).

Roosting Distribution

During the 2011/12 Waterbird Survey programme, Brent Geese were recorded roosting/other intertidally within five subsites: 0AL01, 0AL02, 0AL05, 0AL06 and 0AL07. The maximum number recorded was 140 individuals that roosted intertidally in 0AL05 on 13/03/12; these birds positioned along the upper shore in the south of the subsite.

0AL01 held 60 individuals in October 2011 representing 98% of all those counted as roosting/other. These birds were positioned intertidally in the mid shore at the southern extent of the subsite. No roosting/other behaviour was recorded in the November or February low tide surveys.

0AL05 held peak numbers in the high tide survey (90) positioned in the south of the subsite. 0AL06 and 0AL07 also held roosting/other individuals during the high tide survey (one and 11 individuals respectively).

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

The Shelduck 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

Shelduck were not recorded at Lough Foyle during the 2011/12 Waterbird Survey Programme.

The UK WeBS recorded a site peak of 210 Shelduck in the winter 2011/12. The most recent five-year average is 231 Shelduck for the period 2007/08 to 2011/12 which is a decrease on recent previous site averages, and this species has generated an 'amber-alert' in terms of site population size across the long-term data period (Austin et al. 2014).

Foraging Distribution

Shelducks can forage in a variety of ways from scything their bill through wet mud on exposed tidal flats, to dabbling and scything in shallow water and up-ending in deeper waters. They can therefore forage throughout the tidal cycle.

Shelduck were not recorded foraging at Lough Foyle during the 2011/12 Waterbird Survey Programme.

Roosting Distribution

Shelduck were not recorded roosting at Lough Foyle during the 2011/12 Waterbird Survey Programme.

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 Bering Sea coast (Wernham et al. 2002). The species is highly migratory. Five main wintering groups are known; birds breeding in northwest and northeast Europe and west Siberia spend winter in northwest Europe.

Numbers

Whole site numbers of Wigeon peaked at 34 individuals during the February low tide survey and 52 individuals during the high tide survey (28/01/12). No whole-site count exceeded the threshold of all-Ireland importance. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 408 Wigeon.

Wigeon were recorded in two subsites - 0AL01 and 0AL02. 0AL01 held peak numbers during the first three low tide surveys with a peak count of 31 Wigeon on 08/02/12. Wigeon were not recorded in the final March 2012 low tide survey. 0AL02 held peak numbers during the high tide survey (52).

The UK WeBS recorded a site peak of 782 Wigeon during the 2011/12 season. The most recent five-year average is 1,883 Wigeon for the period 2007/08 to 2011/12 which is a decrease on the previous site averages, and this species has generated a 'red-alert' in terms of site population size across the short, mid and long-term data period (Austin et al. 2014).

Foraging Distribution

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

Wigeon were recorded foraging in intertidal habitat only of two subsites (0AL01 and 0AL02). No foraging behaviour was recorded in the October 2011 or March 2012 low tide surveys. 0AL01 held peak numbers during the November and February low tide surveys with numbers representing 90% and 91% of all foraging individuals counted respectively.

Roosting Distribution

Five Wigeon were recorded in roosting/other behaviour in intertidal habitat during the October 2011 low tide survey (0AL01). This was the only record of roosting during low tide surveys.

0AL02 supported 52 roosting individuals during the high tide survey in January 2012. These birds were positioned at a mixed-species roost in the south of the subsite which also held 15 Curlew, five Mallard and six unidentified waders.

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

Teal 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

During the 2011/12 Waterbird Survey Programme at Lough Foyle just three Teal were recorded in October 2011. These birds were in 0AL01. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 45 Teal.

The UK WeBS recorded a site peak of 1,360 Teal in the 2011/12 season. The most recent five-year average is 1,653 Teal for the period 2007/08 to 2011/12 (Austin et al. 2014) which is on a par with previous site averages.

Foraging Distribution

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

Three Teal foraged intertidally in 0AL01 during the October 2011 low tide survey.

Roosting Distribution

Teal were not recorded in roosting/other behaviour during the 2011/12 Waterbird Survey Programme.

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

Mallard ducks are the most common and widespread of northern hemisphere dabbling ducks (Delaney et al. 1999) with a wide breeding range across northern Eurasia and north America with the band extending from Arctic tundra to the subtropical zone (Wernham et al. 2002). Mallards breeding in northwest Europe, including Ireland, are largely sedentary or dispersive with short movements made during cold spells. The winter population in Ireland is increased by migratory individuals from various locations including Iceland, northwest Russia, Poland and Germany (Wernham et al. 2002).

Numbers

Mallard were recorded in all five surveys undertaken during the 2011/12 Waterbird Survey Programme at Lough Foyle. Low tide numbers peaked in November 2011 (54) while 14 Mallard were recorded during the January 2012 high tide survey. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 93 Mallard.

Seven subsites were used by Mallard overall: 0AL01, 0AL02, 0AL03, 0AL04, 0AL08, 0AL09 and 0AL10.

0AL01 and 0AL02 recorded the species in all four low tide surveys, and 0AL02 recorded peak numbers in November, February and March low tide surveys with a subsite peak count of 47 in November 2011. 0AL01 held peak numbers in October 2011. 0AL03 was notable for holding numbers ranked as second highest during three low tide surveys.

The UK WeBS recorded a site peak of 1,103 Mallard in the winter 2011/12. The most recent five-year average is 994 Mallard for the period 2007/08 to 2011/12 (Austin et al. 2014) which is on a par with previous site averages.

Foraging Distribution

Mallard ducks 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).

Mallards foraged intertidally in four subsites: 0AL01, 0AL02, 0AL03 and 0AL04. No foraging individuals were recorded in October 2011; thereafter 0AL02 recorded peak numbers in all low tide surveys with numbers representing up to 87% of the total recorded foraging. 0AL03 was notable for holding numbers ranked as second highest in three low tide surveys.

Roosting Distribution

Relatively little roosting/other behaviour was recorded in intertidal habitat. 11 Mallards were recorded in 0AL01 in October 2011 and three individuals were in 0AL03 in March 2012.

18 Mallards roosted/other subtidally in October 2011; the majority (89%) in 0AL01. 0AL09 and 0AL10 recorded a few individuals (two and one respectively) during the March 2012 low tide survey.

14 Mallards were recorded in roosting/other behaviour intertidally during the high tide survey; nine ducks in 0AL08 and five in 0AL02.

Eider *Somateria mollissima* - Family (group): Anatidae (ducks)

The Eider has a circumpolar distribution, breeding into the high Arctic (up to 80°N) across northern Eurasia and North America and wintering mainly within the breeding range (Scott & Rose 1996).

It has been estimated that up to four of the 15 described flyway populations of Eider may occur in Ireland during winter. The status of the *mollissima* populations is mixed with the Baltic, Denmark and Netherlands, and Britain/Ireland population considered to be in decline, the Norway and Russia population considered stable, and the trend of the White Sea population unknown (Wetlands International, 2012).

In Ireland and Britain, non-breeding Eiders have a predominantly northern distribution. Lough Foyle is the main wintering site in Ireland while the Tay Estuary, based on recent five-year mean data, is the main wintering site in Britain.

Numbers

During the 2011/12 Waterbird Survey Programme at Lough Foyle, Eider ducks were recorded in all five surveys undertaken. Low tide numbers peaked in October 2011 (38) which exceeds the threshold for all-Ireland importance. 19 Eider were recorded during the January 2012 high tide survey.

Eider were recorded in three subsites overall: 0AL08, 0AL09 and 0AL10. 0AL10, the most northerly subsite, held peak numbers in all five surveys undertaken and recorded a subsite peak count of 22 individuals in the October, November and February surveys.

The UK WeBS recorded a site peak of 35 Eider during the 2011/12 season. The most recent five-year average is 227 Eider for the period 2007/08 to 2011/12 (Austin et al. 2014) which is a decrease on recent previous site averages.

Foraging Distribution

A single record of two subtidally foraging individuals was made for 0AL08 in March 2012.

Roosting Distribution

Eider ducks were recorded in roosting/other behaviour in intertidal and subtidal habitat. 0AL10 was the only subsite to record intertidally roosting individuals, with seven, 22 and 22 individuals recorded in the first three low tide surveys. 0AL08 held all intertidally roosting birds during the high tide survey (nine).

0AL08 supported subtidally roosting/other individuals with most regularity (three surveys) and peak numbers in two of these (nine birds). 0AL10 supported 15 subtidally roosting/other Eiders during the October 2011 low tide survey and ten individuals during the high tide survey.

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

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

The wintering population is thought to be increased to some extent by the addition of birds from central Europe, eastern Greenland (Robinson, 1999) and Iceland (Scott & Rose, 1996).

Numbers

Very low numbers of Red-breasted Merganser were recorded during the 2011/12 Waterbird Survey Programme at Lough Foyle. Nine individuals were recorded in October 2011. The species was not recorded again until the January 2012 high tide survey (three individuals) and the March 2012 low tide survey (three individuals). By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 53 Red-breasted Merganser; representing numbers of all-Ireland importance.

Red-breasted Mergansers were recorded in 0AL01 and 0AL02 in October 2011 and in 0AL10 in March 2012. Three individuals were recorded in 0AL08 during the high tide survey.

The UK WeBS recorded a site peak of 48 Red-breasted Mergansers during the 2011/12 season. The most recent five-year average is 99 Red-breasted Mergansers for the period 2007/08 to 2011/12 (Austin et al. 2014) which is on a par with recent previous site averages.

Foraging Distribution

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

During the 2011/12 Waterbird Survey Programme, all Red-breasted Mergansers recorded were foraging subtidally. One and eight individuals respectively foraged in 0AL01 and 0AL02 in October 2011. Three individuals foraged in 0AL10 in March 2012. Three foraged in 0AL08 during the high tide survey.

Roosting Distribution

No roosting/other behaviour was recorded during the 2011/12 Waterbird Survey Programme at Lough Foyle.

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

The Red-throated Diver is an arctic breeding species across northern Eurasia and north America. In Europe, it breeds in Iceland, northern Scotland, north-western Ireland, Scandinavia and northern Russia, and winters along the coast as far south as Spain. The Irish breeding population is very small and restricted to freshwater lochs and bog pools in County Donegal (Balmer et al, 2013); just six pairs were recorded in 2010 (Hillis, 2010).

Numbers

Red-throated Divers were not recorded during the 2011/12 Waterbird Survey Programme at Lough Foyle.

The UK WeBS recorded a site peak of nine Red-throated Divers in the 2011/12 season. The most recent five-year average is 58 Red-throated Divers for the period 2007/08 to 2011/12 (Austin et al. 2014) which is on a par with recent previous site averages. Based on the period 2007/08 to 2011/12, Lough Foyle is the 11th most important site in the UK for Red-throated Diver.

Foraging Distribution

Red-throated Divers were not recorded foraging during the 2011/12 Waterbird Survey Programme at Lough Foyle.

Roosting Distribution

Red-throated Divers were not recorded roosting during the 2011/12 Waterbird Survey Programme at Lough Foyle.

Great Crested Grebe *Podiceps cristatus* - Family (group): Podicipedidae (grebes)

Great Crested Grebes are a widespread breeding species; one population of the nominate subspecies breeds and winters in north and west Europe (Wetlands International, 2006). It is thought likely that the majority that breed within Ireland are resident, with individuals breeding at inland wetlands (lakes) moving to coastal sites for the winter period. Some immigration of individuals due to cold weather movements is likely (Crowe, 2005) but the true nature of this species' movements is poorly known (Wernham et al. 2002).

Numbers

During the 2011/12 Waterbird Survey Programme at Lough Foyle, Great Crested Grebes were recorded in two low tide surveys (October and March) and the high tide survey. Low tide numbers peaked in October 2011 (19). Just one individual was recorded during the high tide survey. No site count exceeded the threshold of all-Ireland importance. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 82 Great Crested Grebes, representing numbers of all-Ireland importance.

Great Crested Grebes were recorded in six subsites overall: 0AL01, 0AL02, 0AL03, 0AL06, 0AL07 and 0AL10. 0AL02 held peak numbers (15) in October 2011. In March 2012, 0AL02, 0AL03, 0AL06 and 0AL10 all held one or two individuals each.

The UK WeBS recorded a site peak of 30 Great Crested Grebes in the 2011/12 season. The most recent five-year average is 78 Great Crested Grebes for the period 2007/08 to 2011/12 which is a decrease from recent previous site averages (Austin et al. 2014).

Foraging Distribution

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

During the 2011/12 Waterbird Survey Programme at Lough Foyle, all Great Crested Grebes recorded were foraging subtidally.

0AL02 held peak numbers (15) in October 2011 with a further four individuals in 0AL07. In March 2012, 0AL02, 0AL03 and 0AL10 all held one individual each, while 0AL06 held two individuals.

Roosting Distribution

Great Crested Grebes were not recorded roosting/other during the 2011/12 Waterbird Survey Programme at Lough Foyle.

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

The Oystercatcher 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

Oystercatchers were recorded at Lough Foyle in all five surveys undertaken. Whole site numbers peaked in November 2011 when 248 Oystercatchers were counted. 214 Oystercatchers were counted in February 2012 before numbers dropped back to a count of 147 in the March 2012 count. 125 Oystercatchers were counted during the high tide survey (January 2012). None of the whole site counts exceeded the threshold of all-Ireland importance. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 558 Oystercatchers (December 2007/08).

Oystercatchers were widely distributed and recorded in all ten subsites. Six subsites recorded the species during all four low tide surveys (0AL04, 0AL05, 0AL07, 0AL08, 0AL09 and 0AL10). 0AL08 held peak numbers during the first two low tide surveys with 0AL04 and 0AL07 supporting peak numbers in the two remaining surveys. 0AL04 also held the peak number (40) during the high tide survey. The subsite peak count was 62 Oystercatchers held by 0AL08 in November 2011.

The UK WeBS recorded a site peak of 3,044 Oystercatchers in the 2011/12 season. The most recent five-year average is 3,190 Oystercatchers for the period 2007/08 to 2011/12 which is an increase on recent previous site averages (Austin et al. 2014).

Foraging Distribution

Oystercatchers are large wading birds that forage primarily on tidal flats although the species can be found foraging along non-estuarine coastline or terrestrially for earthworms. On tidal flats their food consists of Cockles (*Cerastoderma edule*), Blue Mussels (*Mytilus edulis*) and to a lesser degree other bivalve molluscs such as *Macoma balthica*, *Scrobicularia plana* and *Mya arenaria* as well as larger polychaetes such as *Arenicola marina* and *Hediste diversicolor*. Cockles and Mussels are favoured prey items and 'universally important during winter' (Zwarts et al. 1996) because these bivalves live in the upper sediment and are nearly always accessible, although it is now known that individual birds may be specialised by way of morphology with regards choosing one or the other of these prey items and their methods of handling them.

Oystercatchers were recorded foraging intertidally within all ten subsites. 0AL08 held peak numbers during the first two low tide surveys and during the high tide survey, with good numbers in all other surveys undertaken. 0AL04 recorded peak numbers in February 2012 and numbers ranked as second highest in November 2011. 0AL07 supported peak numbers in March 2012 and held numbers ranked as second highest in October 2011 and during the high tide survey.

The intertidal benthic habitat within the survey area has been classified as the community complex 'intertidal mixed sediment with polychaetes and *Corophium volutator*' of which the distinguishing species are the polychaetes *Hediste diversicolor*, *Eteone longa* and *Capitella* sp., the amphipod *Corophium volutator* and unidentified nematode worms. The polychaetes *Nephtys hombergii* and *Malacoceros fuliginosus*, the oligochaete *Baltidrilus costatus* and oligochaetes of the family Enchytraeidae are also recorded. On reef outcrops, brown alga including *Fucus vesiculosus* occurs while blooms of green algae including *Ulva intestinalis* occur on reef outcrops and on sediments as transitory features of this complex.

Lough Foyle is an important shellfish area and while various areas support intertidal and subtidal aquaculture, commercial fisheries also focus on native Mussel (*Mytilus edulis*) and native oyster (*Ostrea edulis*). Oysters occur extensively down the western side of Lough Foyle and within the SPA boundary e.g. at Quigley's Point (subsite 0AL08) while the lough has the largest native Mussel beds in Ireland (www.afbini.gov.uk). Despite their name, Oysters do not form a great proportion of the Oystercatcher diet and any relationship between the bird species and an oyster bed is more likely related to the fact that native shellfish beds support diverse communities of invertebrates through their role as providing substratum (for attachment e.g. algae), shelter, sediment stabilisation and habitat complexity amongst other factors. Native intertidal Mussel beds however, are likely to be a major factor determining the distribution of Oystercatchers within the lough.

The highest intertidal foraging density recorded within a subsite was 4 Oystercatchers ha⁻¹ (0AL07). 0AL04, 0AL05 and 0AL06 all held 2 Oystercatchers ha⁻¹ on occasion. The whole site mean feeding density (intertidal habitat) was 0.6 Oystercatchers ha⁻¹.

Roosting Distribution

No roosting behaviour was recorded during low tide surveys.

70 Oystercatchers roosted intertidally during the high tide survey; peak numbers (40) in 0AL04, with a further 30 individuals in 0AL05.

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

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

Numbers

Relatively few Golden Plover were recorded during the 2011/12 survey programme at Lough Foyle. The peak whole-site count was 21 individuals in December 2012. The three other low tide surveys held three or less individuals. The species was not recorded during the high tide survey. I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 15 Golden Plover.

Golden Plovers were recorded in three subsites overall: 0AL01, 0AL06 and 0AL09.

The UK WeBS recorded a site peak of 4,375 Golden Plovers in the 2011/12 season. The most recent five-year average is 5,906 Golden Plovers for the period 2007/08 to 2011/12 which is a decrease on recent previous site averages (Austin et al. 2014).

Foraging Distribution

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

Two Golden Plovers foraged intertidally in 0AL01 in October 2011. 0AL06 recorded one and 21 foraging individuals respectively in the November and February low tide surveys. No other foraging was recorded.

Roosting Distribution

Three Golden Plovers roosted intertidally in 0AL09 during March 2012. No other roosting behaviour was recorded in the survey area.

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

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

Numbers

Lapwings were recorded in the first three low tide surveys (October, November and February) with a site peak count of 54 individuals in November 2011. 78 Lapwings were counted during the high tide survey. No count exceeded the threshold of all-Ireland importance. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 182 Lapwing (December 2007).

Seven subsites were used overall: 0AL02, 0AL03, 0AL04, 0AL05, 0AL06, 0AL09 and 0AL10.

The UK WeBS recorded a site peak of 2,459 Lapwings in the 2011/12 season. The most recent five-year average is 2,203 Lapwings for the period 2007/08 to 2011/12 which is a decrease on recent previous site averages (Austin et al. 2014).

Foraging Distribution

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

Lapwings were recorded foraging intertidally in just one subsite - four individuals foraged within 0AL04 during the November 2011 low tide survey.

Roosting Distribution

The majority of Lapwings recorded during surveys were roosting intertidally and six subsites were used overall: 0AL03, 0AL04, 0AL05, 0AL06, 0AL09 and 0AL10.

0AL09 held peak numbers during the November and February low tide surveys and numbers ranked as second highest in October 2011. 0AL06 held peak numbers in October 2011 (18) but the species was not recorded there again throughout the survey programme.

0AL10 held peak numbers of roosting Lapwing during the high tide survey (43) with two flocks comprising 32 and 11 individuals. This subsite held roosting birds (maximum number 11) in two low tide surveys. 0AL05 held a further 35 individuals during the high tide survey.

Knot *Calidris canutus* - Family (group): Scolopacidae (wading birds)

Knot are a high Arctic breeding species. Two populations are recognised in Western Eurasia and Africa - *C. c canutus* and *C. c islandica*. The latter breeds in north and east Greenland and northern Canada and winters in north-west Europe. The Knot that winter in Ireland are almost entirely from the *islandica* population. The Wadden Sea is an important staging ground for the species after a non-stop flight from the breeding grounds (Van der Kam, 2004).

Numbers

Knot were recorded on just one survey occasion (November 2011) when seven individuals were counted in 0AL08.

The UK WeBS recorded a site peak of 218 Knot in the 2011/12 season. The most recent five-year average is 301 Knot for the period 2007/08 to 2011/12 (Austin et al. 2014).

Foraging Distribution

Knots are mud and sandflat foragers; pecking visible items off the surface or probing to the depth that their bill (3.5cm) allows. The preferred prey items are bivalve molluscs including *Scrobicularia plana*, *Macoma balthica* and *Mytilus edulis* of smaller size-classes that are able to be swallowed (shell length in the range 6 – 16mm depending on bivalve species and shape of shell) (Dekinga & Pierma, 1993). *Peringia (Hydrobia) ulvae* may also be an important prey at some sites (Moreira, 1994).

No foraging Knot were recorded during the 2011/12 survey programme at Lough Foyle.

Roosting Distribution

Seven Knot were recorded roosting intertidally within 0AL08 during the November 2011 low tide survey. No other roosting behaviour was recorded.

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

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

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

Numbers

Dunlin were recorded during the first three low tide surveys at Lough Foyle. The peak whole-site count was 18 individuals in December 2012. No whole-site count exceeded the threshold of all-Ireland importance.

The species was recorded in four subsites overall: 0AL01, 0AL06, 0AL08 and 0AL10.

The UK WeBS recorded a site peak of 1,651 Dunlin in the 2011/12 season. The most recent five-year average is 2,025 Dunlin for the period 2007/08 to 2011/12 which is a decrease on recent previous site averages (Austin et al. 2014).

Foraging Distribution

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

The majority of Dunlin were recorded foraging intertidally during low tide surveys. Four subsites were used overall (0AL01, 0AL06, 0AL08 and 0AL10) and low numbers were recorded overall (peak number 10 individuals)

0AL01 held peak numbers (10) in October 2011. 0AL10 held peak numbers (3) in the following two low tide surveys. 0AL06 and 0AL08 held foraging individuals on a single occasion each (two and four birds respectively).

The intertidal benthic habitat within the survey area has been classified as the community complex 'intertidal mixed sediment with polychaetes and *Corophium volutator*' of which the distinguishing species are the polychaetes *Hediste diversicolor*, *Eteone longa* and *Capitella* sp., the amphipod *Corophium volutator* and unidentified nematode worms. The polychaetes *Nephtys hombergii* and *Malacoceros fuliginosus*, the oligochaete *Baltidrilus costatus* and oligochaetes of the family Enchytraeidae are also recorded.

The highest intertidal foraging density recorded for a subsite was 0.3 Dunlin ha⁻¹ (0AL10). The whole site mean feeding density (intertidal habitat) was 0.01 Dunlin ha⁻¹.

Roosting Distribution

Just two records of roosting Dunlin were made; both for subsite 0AL08. Five individuals roosted intertidally in the November 2011 low tide survey, and 15 individuals were recorded in the same subsite and similar position along the shore in February 2012.

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

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

Numbers

Bar-tailed Godwits were recorded in all five surveys undertaken with relatively low numbers throughout; whole-site numbers peaking at 24 individuals in March 2012. 32 Bar-tailed Godwits were recorded during the high tide survey. No count exceeded the threshold of all-Ireland importance. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 43 Bar-tailed Godwits (January 2009).

The UK WeBS recorded a site peak of 1,971 Bar-tailed Godwits in the 2011/12 season. The most recent five-year average is 2,007 Bar-tailed Godwits for the period 2007/08 to 2011/12 (Austin et al. 2014).

Foraging Distribution

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

Bar-tailed Godwits were recorded foraging within four subsites (0AL03, 0AL07, 0AL08 and 0AL09) during the November, February and March low tide surveys (no birds in October 2011). 0AL07 held peak numbers on two survey occasions with a peak count of 16 individuals in February 2012. 0AL03 held peak numbers in March 2012.

The intertidal benthic habitat within the survey area has been classified as the community complex 'intertidal mixed sediment with polychaetes and *Corophium volutator*' of which the distinguishing species are the polychaetes *Hediste diversicolor*, *Eteone longa* and *Capitella* sp., the amphipod *Corophium volutator* and unidentified nematode worms. The polychaetes *Nephtys hombergii* and *Malacoceros fuliginosus*, the oligochaete *Baltidrilus costatus* and oligochaetes of the family Enchytraeidae are also recorded.

The highest intertidal foraging density recorded within a subsite was 1 Bar-tailed Godwits ha⁻¹ (0AL07). The whole site mean feeding density (intertidal habitat) was 0.04 Bar-tailed Godwits ha⁻¹.

Roosting Distribution

The only record of roosting behaviour was of seven individuals in 0AL07 during the March 2012 low tide survey. These birds were part of a larger mixed-species roost that also comprised Light-bellied Brent Goose (33), Curlew (3), Greenshank (1), Oystercatcher (19), Common Gull (20), Herring Gull (3) and Great Black-backed Gull (2). No roosts were recorded during the high tide survey.

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

The Curlew has a widespread breeding range across temperate latitudes of the Palearctic region, occurring across Europe and Asia from Ireland in the west to northern China in the east (Delaney et al. 2009). The nominate subspecies breeds across Europe and winters in Europe. Ireland supports a small and declining population of breeding Curlew. Irish breeding Curlew are thought to make only short migrations and be mainly resident during winter. Wintering numbers are enhanced by birds moving in from breeding grounds in Fennoscandia, the Baltic and northwest Russia (Delaney et al. 2009) and Britain (Wernham et al. 2002).

Numbers

Curlews were recorded in all surveys at Lough Foyle. Low tide numbers rose from just 33 individuals in October 2011 to a peak count in March 2012 (260). 181 Curlew were recorded during the high tide survey. No count exceeded the threshold of all-Ireland importance. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 268 Curlew (December 2007).

Curlews were widespread and occurred in all ten subsites. Peak numbers during low tide surveys were held by 0AL08, 0AL03, 0AL03 and 0AL02 for the four respective dates; the latter subsite recording the subsite peak count (110 Curlew) on 13/03/12.

The UK WeBS recorded a site peak of 2,194 Curlew in the 2011/12 season. The most recent five-year average is 2,156 Curlew for the period 2007/08 to 2011/12 which is a decrease on recent previous site averages (Austin et al. 2014).

Foraging Distribution

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

Foraging Curlew were recorded in all ten subsites. Peak numbers during low tide surveys were held by 0AL08, 0AL03, 0AL03 and 0AL01 for the four respective low tide survey dates, with nine, 53, 36 and 26 individuals respectively. 0AL02 and 0AL04 are notable for supporting numbers ranked in the top three during three low tide surveys.

Just two individuals were recorded foraging during the high tide survey and these birds were in 0AL10.

The intertidal benthic habitat within the survey area has been classified as the community complex 'intertidal mixed sediment with polychaetes and *Corophium volutator*' of which the distinguishing species are the polychaetes *Hediste diversicolor*, *Eteone longa* and *Capitella* sp., the amphipod *Corophium volutator* and unidentified nematode worms. The polychaetes *Nephtys hombergii* and *Malacoceros fuliginosus*, the oligochaete *Baltidrilus costatus* and oligochaetes of the family Enchytraeidae are also recorded.

Terrestrial foraging was recorded in association with two subsites during the high tide survey - both 0AL01 and 0AL03 recorded 60 Curlews foraging in adjacent grassland.

The highest intertidal foraging density recorded within a subsite was 1.5 Curlew ha⁻¹ (0AL04). 0AL07 was the only other subsite to support a density of >1.5 Curlew ha⁻¹. The whole site mean feeding density (intertidal habitat) was 0.3 Curlew ha⁻¹.

Roosting Distribution

Intertidal roosting/other behaviour was irregularly recorded during low tide surveys with single observations recorded in 0AL01, 0AL02, 0AL03, 0AL06, 0AL08 and 0AL09. The largest count was 110 individuals within 0AL02 in March 2012; a linear roost along the upper shore.

During the high tide survey a total of 48 Curlew roosted intertidally across four subsites. 0AL04 held the largest proportion (20 birds); these birds roosting alongside 40 Oystercatchers on the upper shore. 0AL01 and 0AL02 recorded 12 and 15 Curlews respectively. A further 11 individuals were also roosting terrestrially in grassland adjacent 0AL09.

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

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

Numbers

Whole site numbers peaked in October 2011 when a count of 60 Redshank was recorded. Thereafter numbers dropped in each survey to just ten individuals recorded during March 2012. The high tide survey recorded 31 Redshank. No whole site count surpassed the threshold of all-Ireland importance. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 160 Redshank (January 2009).

Redshank were recorded in nine of the total ten subsites (not in 0AL05). Only one subsite recorded the species during all four low tide surveys (0AL03) and this subsite also recorded peak, albeit low numbers (three and six) in two of these surveys. 0AL01 held peak numbers in October 2011 (18) and 0AL08 held peak numbers (8) in November 2011. 0AL06, 0AL09 and 0AL10 held joint peak numbers (three birds) in February 2012.

The UK WeBS recorded a site peak of 1,001 Redshank in the 2011/12 season. The most recent five-year average is 989 Redshank for the period 2007/08 to 2011/12 which is a decrease on recent previous site averages (Austin et al. 2014).

Foraging Distribution

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

Redshank were recorded foraging intertidally in nine of the total ten subsites (not in 0AL05).

0AL01 held peak numbers in October 2011 (18) and 0AL08 held peak numbers (8) in November 2011. 0AL03, 0AL06, 0AL09 and 0AL10 held joint peak numbers (three birds) in February 2012. 0AL03 recorded peak numbers (six) in March 2012.

The intertidal benthic habitat within the survey area has been classified as the community complex 'intertidal mixed sediment with polychaetes and *Corophium volutator*' of which the distinguishing species are the polychaetes *Hediste diversicolor*, *Eteone longa* and *Capitella* sp., the amphipod *Corophium volutator* and unidentified nematode worms. The polychaetes *Nephtys hombergii* and *Malacoceros fuliginosus*, the oligochaete *Baltidrilus costatus* and oligochaetes of the family Enchytraeidae are also recorded.

The peak intertidal foraging density was 0.8 Redshanks ha⁻¹ recorded for 0AL07. The whole site average intertidal foraging density was 0.1 Redshanks ha⁻¹.

Roosting Distribution

No roosting Redshanks were recorded during low tide surveys.

The high tide survey recorded a total of 31 roosting Redshanks. 65% of these were in 0AL03 where 20 Redshanks roosted alongside 60 Black-headed Gulls and 20 Common Gulls on the upper shore just south of Sand Point. Smaller numbers were located within 0AL06, 0AL07 and 0AL09.

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

Black-headed Gulls were recorded in all five surveys during the 2011/12 survey programme at Lough Foyle. Low tide numbers ranged from 53 gulls (March 2012) to a low tide peak count of 146 gulls in February 2012. 128 Black-headed Gulls were counted during the high tide survey. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 281 Black-headed Gulls (December 2007).

Black-headed Gulls were widely distributed and recorded in eight subsites overall: 0AL01, 0AL02, 0AL03, 0AL04, 0AL06, 0AL07, 0AL08 and 0AL09. 0AL03 held peak numbers during two low tide surveys (peak number 63 individuals), numbers ranked as second highest during one other survey plus peak numbers during the high tide survey. 0AL01 held peak numbers in October 2011 (26) while 0AL02 held peak numbers in March 2012 (23).

The UK WeBS recorded a site peak of 5,339 Black-headed Gulls in the 2011/12 season. The most recent five-year average is 3,348 Black-headed Gulls for the period 2007/08 to 2011/12 (Austin et al. 2014).

Foraging Distribution

Black-headed Gulls were recorded foraging intertidally in seven subsites overall: 0AL01, 0AL02, 0AL03, 0AL04, 0AL07, 0AL08 and 0AL09.

0AL08 held peak numbers in October 2011 (15). Thereafter 0AL03 held peak numbers in all low tide surveys and recorded a subsite peak count of 67 gulls in February 2012. 0AL02 held joint peak numbers (13) in March 2012.

Black-headed Gulls were recorded foraging subtidally in just two subsites (0AL04 and 0AL08) with low numbers (three and four gulls on single occasions only).

Roosting Distribution

Intertidal roosting/other behaviour was recorded irregularly during low tide surveys and for five subsites overall (0AL01, 0AL02, 0AL03, 0AL07, 0AL08). The peak number recorded was 29 gulls in 0AL07 during the February low tide survey. 0AL01 and 0AL08 also held >20 individuals on one occasion each.

Subtidal roosting/other behaviour was recorded on single occasions in 0AL04 and 0AL08 involving low numbers (<5) only.

128 Black-headed Gulls were roosting/other in intertidal habitat during the high tide survey. The largest number (60) were in 0AL03, representing 47% of all counted. Smaller numbers were located within 0AL06, 0AL07 and 0AL08.

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

Common Gulls were recorded in all five surveys during the 2011/12 survey programme at Lough Foyle. Low tide numbers peaked in October 2011 (117 gulls), the only count to exceed 100 individuals. 76 Common Gulls were recorded during the high tide survey. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 236 Common Gulls (December 2007).

Common Gulls were widespread across the site and recorded in all ten subsites overall. They occurred with most regularity (in all five surveys) within three subsites: 0AL06, 0AL07 and 0AL08. Subsite use was greatest in October 2011 (nine) and thereafter ranged between five and six subsites. Peak numbers were recorded by 0AL03, 0AL10, 0AL08 and 0AL07 for the four respective low tide survey dates.

The UK WeBS recorded a site peak of 7,231 Common Gulls in the 2011/12 season. The most recent five-year average is 4,044 Common Gulls for the period 2007/08 to 2011/12 (Austin et al. 2014).

Foraging Distribution

Common Gulls were recorded foraging intertidally in seven subsites overall: 0AL01, 0AL04, 0AL06, 0AL07, 0AL08, 0AL09 and 0AL10. Peak numbers were recorded by 0AL01, 0AL09, 0AL08 and 0AL07 for the four respective low tide survey dates with 14, 11, 11 and 20 individuals respectively.

No subtidal foraging was recorded.

Roosting Distribution

Common Gulls were recorded in roosting/other behaviour in intertidal habitat in all ten subsites. A greater number of Common Gulls were recorded in roosting/other behaviour than foraging in all low tide surveys. The whole-site peak number recorded was 93 individuals in October 2011. Subsite peak numbers were recorded by 0AL03, 0AL10, 0AL10 and 0AL07 for the four respective low tide survey dates. 0AL08 was notable for supporting numbers ranked as second highest in all four low tide surveys.

Subtidal roosting/other behaviour was recorded in the October 2011 survey when six and two Common Gulls respectively, were recorded in 0AL03 and 0AL04.

44 Common Gulls were recorded in roosting/other behaviour during the high tide survey. The largest number (20) was recorded in 0AL03; smaller numbers recorded in 0AL05, 0AL06, 0AL07 and 0AL08.

Herring Gull *Larus argentatus* - Family (group): Laridae (gulls)

The Herring Gull has a Holarctic breeding distribution, nesting at boreal and middle latitudes; absent from high arctic zones apart from in Siberia (Wernham et al. 2002). The nominate *L. a. argentatus* breeds in north-west Europe of which the race *argenteus* breeds in Britain and Ireland and is largely present and seen throughout the year. Outside of the breeding season, Herring Gulls have a widespread distribution and are found along much of the coastline as well as inland.

Numbers

Herring Gulls were recorded in three low tide surveys (not in October 2011) and in the high tide survey during the 2011/12 survey programme at Lough Foyle. Overall numbers were relatively low. By way of comparison, I-WeBS counts undertaken across the SPA area in the seasons 2007/08 – 2009/10 recorded a peak count of 43 Herring Gulls (January 2008).

Low tide numbers peaked in March 2013 (13 gulls) and ten individuals were recorded during the high tide survey.

Herring Gulls were recorded in all six subsites overall: 0AL04, 0AL05, 0AL06, 0AL07, 0AL08 and 0AL09. The subsite peak count was ten individuals, recorded for 0AL05 during the high tide survey.

The UK WeBS recorded a site peak of 511 Herring Gulls in the 2011/12 season. The most recent five-year average is 792 Herring Gulls for the period 2007/08 to 2011/12 (Austin et al. 2014).

Foraging Distribution

Intertidal foraging was recorded rarely with low numbers recorded in 0AL05 on two occasions and in 0AL09 on one occasion. No subtidal foraging was recorded.

Roosting Distribution

Low numbers of Herring Gull were recorded in roosting/other behaviour during the low tide survey programme. The maximum number recorded was 13 individuals recorded across four subsites (0AL04, 0AL06, 0AL07 and 0AL10) in March 2012.

Ten individuals were recorded roosting intertidally in 0AL05 during the high tide survey.

5.4 Lough Foyle - Activities and Events

5.4.1 Introduction

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

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

Section 5.4 provides information on activities and events that occur in and around Lough Foyle that may either act upon the habitats within the site, or may interact with the Special Conservation Interest species and other waterbirds using the site.

5.4.2 Assessment Methods

Information on ‘activities’ and ‘events’ across the site was collected during a desk-top review which included NPWS site reporting files, County Development and other plans (e.g. Donegal County Council, 2012), North West Region International River Basin District documents (NWRBD, 2010a, b) and other available documents relevant to the ecology of the site. Although information was reviewed in relation to the wider Lough Foyle, focus was directed on the area designated as SPA 4087.

In addition, information was collected during the 2011/12 waterbird survey programme (NPWS, 2011) as field workers recorded activities or events that occurred at the site during their survey work. This information, together with results from a ‘site activity questionnaire’ provides valuable information gained from 60+ hours of surveyor effort across the site. All data collected were entered into a database but as the dataset will be subject to change over time, the assessment should be viewed as a working and evolving process.

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

Data are presented as follows:

Activities and events identified as occurring in and around Lough Foyle (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 Lough Foyle;
- U** unknown spatial area hence all potential subsites are included (e.g. fisheries activities);
- H** historic, known to have occurred in the past.
- P** potential to occur in the future.

5.4.3 Overview of activities at Lough Foyle

Activities and events identified to occur in and around Lough Foyle are shown in Appendix 9, listed in terms of the subsites surveyed during the 2011/12 Waterbird Survey Programme. Activities highlighted in grey are those that have the potential to cause disturbance to waterbirds (see Section 5.4.4).

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

Habitat loss, modification and adjacent landuse

Lough Foyle is a large, shallow sea lough and includes the estuaries of the Rivers Foyle, Faughan and Roe. The lough covers an area of approximately 186 km² (McGonigle et al. 2011).

The River Foyle flows through the city of Derry at the estuary head. A number of small rivers enter the site along its western shore, including the Aught River, Burnfoot River, Meanngland River and Rooskey River.

Derry is the largest populated area close to the SPA and is also the regional transportation hub of the northwest via its port and harbour and associated shipping channel. The smaller villages of Muff and Quigley's Point lie adjacent to the SPA.

Landuse adjacent to the SPA is predominantly grassland for grazing. A portion of the SPA is bounded by a local road (R238). A ferry operates between Greencastle (RoI) and Magilligan Point (NI) across the narrow lough mouth and outside of the SPA boundary. A railway line runs along parts of the southern and eastern shore of the lough (also outside SPA 4087).

Water quality

The water quality of Lough Foyle is classified as 'moderate' according to the North Western River Basin District Transitional and Coastal Waters Action Plan (NWRBD, 2010a).

The lough is fed by a number of small rivers and streams, and overall 16 river/streams are assessed in the Lough Foyle water management unit action plan, of which four have a 'high' status, and ten have 'good' status. One river has a 'poor' status (upper Roosky river) attributed to farm pollution, and one has a 'bad' status (Bredagh at Moville) (NWRBD, 2010b).

On the western shore wastewater treatment plants (WWTP) are located at Moville and Greencastle (outside the SPA boundary) (NWRBD, 2010b). An upgrade to the current waste water treatment is proposed via the planned Moville/Greencastle sewerage scheme project (current status unknown). A large waste water treatment plant at Derry discharges to the lough in deep waters at Culmore (<http://www.afbini.gov.uk/>).

Fisheries & aquaculture

Lough Foyle is an important shellfish area and several areas support intertidal and subtidal aquaculture. Blue Mussel (*Mytilus edulis*) cultivation is primarily through bottom culture where seed is dredged and relayed to areas (plots) where they are on-grown. Since 2003 the DCMNR and DARD Fisheries Division (Northern Ireland) have implemented a joint management strategy for the exploitation of seed mussel in the Irish Sea, Carlingford Lough and Lough Foyle. There are also a small number of oyster farmers in the Lough that cultivate pacific Oysters (*Crassostrea gigas*) via the bag and trestle method.

More recently green and velvet crab, pacific oyster, lobster, clam, whelk, periwinkle and cockle fisheries have developed (McGonigle et al. 2011).

Historically, commercial fisheries in the Lough included the native Oyster (*Ostrea edulis*), Mussel (*Mytilus edulis*) and Atlantic Salmon (*Salmo salar*) (McGonigle et al. 2011). The oyster fishery is one of the last remaining productive native oyster fisheries in Europe. In September 2008 the Loughs Agency of the Foyle Carlingford and Irish Lights Commission began to regulate the fishery for the first time (McGonigle & Scott, 2012). Oysters occur extensively down the western side of Lough Foyle and within the SPA boundary e.g. at Quigley's Point (subsite 0AL08).

Management of fisheries within Lough Foyle (and Carlingford Lough) comes under the auspices of the Lough's Agency. The responsibilities of this agency are set out in North/South Co-operation (Implementation Bodies) (NI) Order 1999, the British-Irish Agreement Act 1999, the Foyle Fisheries Act (NI) 1952 (as amended) and the Foyle Fisheries Act 1952 (as amended) and are as follows:-

- the promotion of development of Lough Foyle and Carlingford Lough for commercial and recreational purposes in respect of marine, fishery and aquaculture matters;
- the management, conservation, protection, improvement and development of the inland fisheries of the Foyle and Carlingford Areas;
- the development and licensing of aquaculture;
- the development of marine tourism.

The Sea Fisheries Protection Authority (SFPA) is responsible for classifying shellfish production areas and the current classification of the Lough Foyle Shellfish Area (Magilligan Head to Inishown Head) is Class B for both Mussels and Oysters (www.sfpa.ie).

Unknown levels of seaweed harvesting and bait digging also occur within the site.

Various inshore fishery activities are likely to take place, details and spatial scale unknown. The main fishing port on the Lough is at Greencastle which has important landings of pelagic, demersal, salmon and shellfish. Other ports including Moville, Lisahally and Carrickarory pier (McGonigle et al. 2011).

Recreational fishing occurs for Salmon and Trout (*Salmo trutta*), and particularly in the Lough's tributaries. Sea anglers can launch from Moville and Mackerel (*Scomber scombrus*) and Mullet (*Chelon labrosus*) are also fished from the Moville Pier (Dunlop, 2007). The most abundant fish in the estuary is likely Flounder (*Platichthys flesus*) (McGonigle et al. 2011).

Recreational activities

Given its expansive, sheltered waters, Lough Foyle is popular with all forms of maritime recreation including sailing, sea kayaking and canoeing. Lough Foyle Yacht Club is located at Culmore (outside of the SPA).

Other

Wildfowling occurs at the site. Over 18 miles of foreshore on the Northern Ireland side of the lough (from Magilligan Point Northwards to the River Faughan Southwards) is under the control of the Lough Foyle Wildfowling Association.

5.4.4 Review of disturbance during 2011/12 waterbird surveys

Activities that had the potential to disturb waterbirds using the lough were monitored throughout the 2011/12 waterbird survey. A summary of the data collected is given in Table 5.7.

Table 5.7 Activities recorded at lough Foyle that have the potential to cause disturbance to wintering waterbirds

Subsite Code	Number of Activities	Activity Type	Recorded disturbance to waterbirds ?
OAL03	1	Human (on-foot, intertidal aquaculture)	Yes
OAL04	2	Aquaculture machinery	Yes
		Powered watercraft	No
OAL05	1	Human (walking shoreline)	No
OAL06	1	Human (walking shoreline)	Yes
OAL07	3	Human (on-foot, intertidal aquaculture)	No
		Aquaculture machinery	Yes
		Human (walking shoreline)	Yes
OAL08	1	Human (on-foot, intertidal aquaculture)	Yes
OAL10	1	Human (walking shoreline)	Yes

5

.4.5 Discussion

Human recreational activities at coastal sites occur less frequently during winter months and the range of activities is much reduced. Activities associated with aquaculture however, can occur year-round.

Any activity that causes disturbance can lead to the displacement of waterbirds. The significance of the impact that results from even a short-term displacement should not be underestimated. In terms of foraging habitat, displacement from feeding opportunities not only reduces a bird's energy intake but also leads to an increase in energy expenditure as a result of the energetic costs of flying to an alternative foraging area. Displacement also has knock-on ecological effects such as increased competition (within and/or between different species) for a common food source. In areas subject to heavy or on-going disturbance, waterbirds may be disturbed so frequently that their displacement is equivalent to habitat loss. When disturbance effects reduce species fitness¹⁹ (reduced survival or reproductive success) consequences at population level may result.

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

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

and be influenced by:-

- Temporal availability – whether waterbirds have the opportunity to exploit the food resources in a disturbed area at times when the disturbance does not occur;
- Availability of compensatory habitat - whether there is suitable alternative habitat to move to during disturbance events;
- Behavioural changes as a result of a disturbance - e.g. degree of habituation;
- Time available for acclimatisation - whether there is time available for habituation to the disturbance. (there may be a lack of time for waterbirds during the staging period);
- Age - for example when feeding, immature (1st winter birds) may be marginalised by older more dominant flocks so that their access to the optimal prey resources is limited. These individuals may already therefore be under pressure to gain their required daily energy intake before the effects of any disturbance event are taken into account;

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

- Timing/seasonality - birds may be more vulnerable at certain times e.g. pre- and post-migration, at the end of the winter when food resources are lower;
- Weather - birds are more vulnerable during periods of severe cold weather or strong winds;
- Site fidelity – some species are highly site faithful at site or within-site level and will therefore be affected to a greater degree than species that range more widely;
- Predation and competition – a knock-on effect of disturbance is that waterbirds may move into areas where they are subject to increased competition for prey resources, or increased predation – i.e. the disturbance results in an indirect impact which is an increased predation risk.

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

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APPENDIX 1

SITE NAME: LOUGH FOYLE SPA

SITE CODE: 004087

The site comprises a section of the western shore of Lough Foyle from Muff to north of Vances Point in Co. Donegal. The site is part of the larger cross-border Lough Foyle complex which regularly supports in excess of 20,000 wintering waterbirds. The majority of the wintering waterbirds that utilise this site occur along the southern and eastern shoreline of Lough Foyle in Derry, which is also designated as an SPA in Northern Ireland.

The site is selected as a Special Protection Area (SPA) under the E.U. Birds Directive, as it is part of an internationally important wetland site that regularly supports in excess of 20,000 wintering waterbirds. The assemblage of birds that utilise Lough Foyle includes internationally important populations of Whooper Swan (811), Light-bellied Brent Goose (3,765) and Bar-tailed Godwit (2,059), and nationally important populations of a further 20 species: Red-throated Diver (28), Great Crested Grebe (148), Bewick's Swan (43), Greylag Goose (391), Shelduck (468), Wigeon (9,011), Teal (660), Mallard (1,635), Eider (143), Red-breasted Merganser (82), Oystercatcher (3,101), Golden Plover (4,562), Lapwing (4,024), Knot (499), Dunlin (4,991), Curlew (2,265), Redshank (988), Black-headed Gull (2,212), Common Gull (2,846) and Herring Gull (1,261) – all counts are five year mean peaks for the entire Lough Foyle complex during the period 1995/96 to 1999/2000. 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.

Lough Foyle SPA is of high ornithological importance as it is part of an internationally important wetland site that regularly supports internationally important populations of Whooper Swan, Light-bellied Brent Goose and Bar-tailed Godwit, and nationally important populations of a further 18 species.

30.11.10



Legend

 Lough Foyle SPA 004087

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

**LOUGH FOYLE SPA
CONSERVATION OBJECTIVES
SPA DESIGNATION**

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

SITE CODE:
SPA 004087; version 2.01, CO. DONEGAL

0 0.5 1 km

The mapped boundaries are of an indicative and general nature only.
Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léanntaibh seo ach nod gearrthuilleach ginearálta.
Feadar atbhreithnithe a déanamh ar theorainneacha na gceantar
comharthaí. Suibhreachta Ordónais na hÉireann Ceardúnas Uimh EN 0059214.
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**Map Version 1
Date: Sep 2014**

APPENDIX 2

Waterbird data sources

Irish Wetland Bird Survey (I-WeBS)

I-WeBS began in the Republic of Ireland in 1994/95 and aims to monitor wintering (non-breeding) waterbird populations at the wetland sites upon which they rely. Counts are carried out by volunteers and professional staff of the partner organisations across the months September to March of each year. I-WeBS counts take place on a rising tide or close to high tide. For further information please refer to Crowe (2005) and Boland & Crowe (2012).

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

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

UK Wetland Bird Survey (WeBS)

Details on the UK Wetland Bird Survey can be found at <http://www.bto.org/volunteer-surveys/webs>.

- Swan Surveys

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

- Greenland White-fronted Goose

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

- Greylag Geese

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

- Barnacle Goose (*Branta leucopsis*)

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

- Light-bellied Brent Geese

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

APPENDIX 3

Analysing population trends: a synopsis

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

The first stage in the analytical process involves the use of the Underhill Program (Underhill & Prÿs-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 & Prÿs-Jones, 1994).

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

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

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

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

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

The reference year is the penultimate year in the time series because, when smoothing, the GAM takes into account values from both the preceding and following year. The last value in the smoothed dataset (2010) is therefore likely to be the least robust because it has no following year.

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

Worked example

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

Term	Change
5YR	10.51
10YR	21.56
ALL YR	83.57

Further information on population indexing and trend analysis can be found in various references; for particular reference to waterbirds see Leech et al (2002) and Atkinson et al. (2006). For information on the UK WeBS Alerts system, please see Thaxter et al. (2010) and Cook et al. (2013).

Limitations

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

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

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

APPENDIX 4

Waterbird species codes

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

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

APPENDIX 5

Waterbird foraging guilds (after Weller, 1999)

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

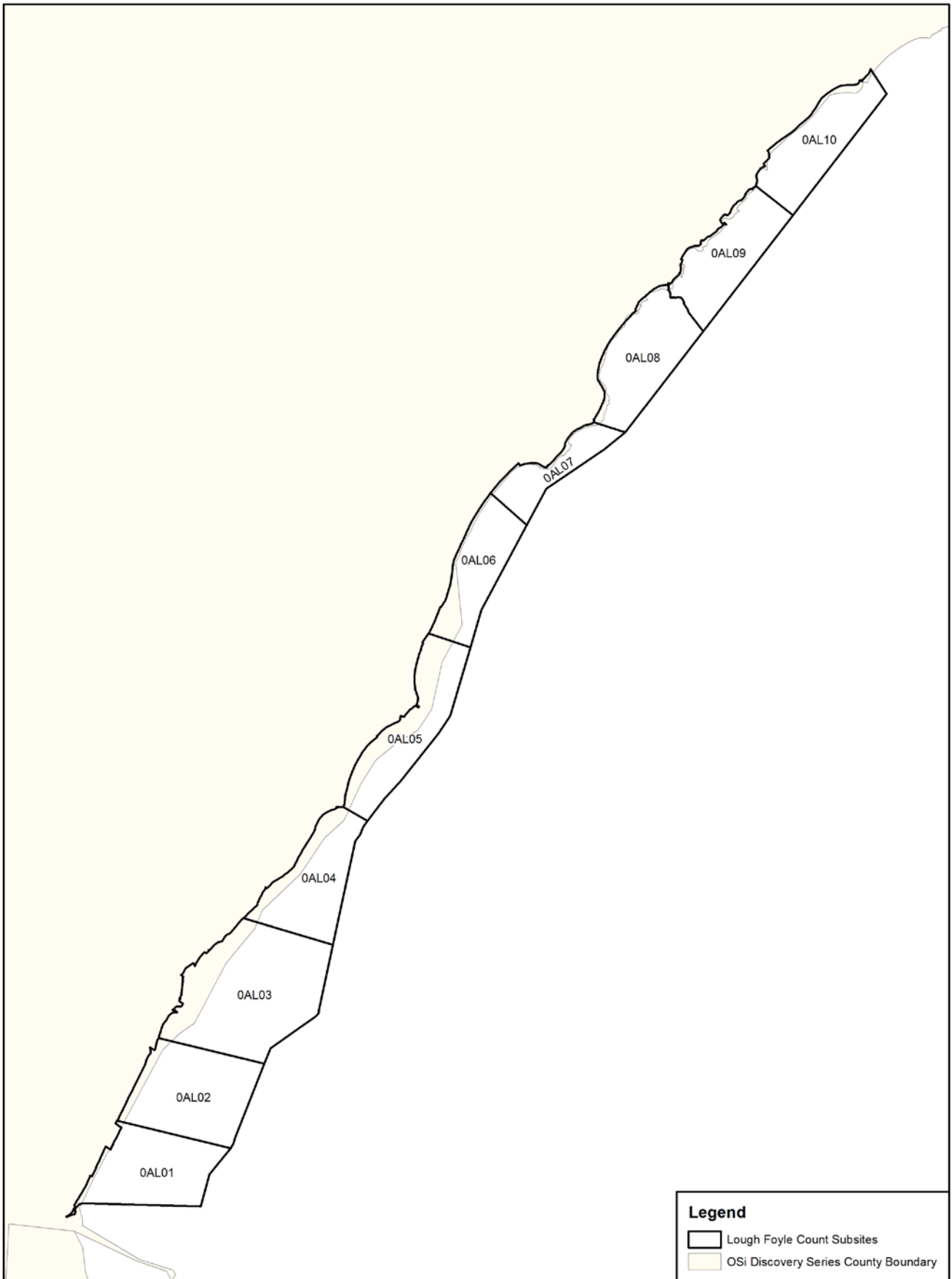
^a dives <3m.


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

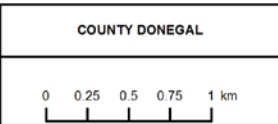
Lough Foyle – Waterbird Survey Programme 2011/12 – Count Subsites

Subsite Code	Subsite Area (ha)
0AL01	58
0AL02	70
0AL03	110
0AL04	55
0AL05	59
0AL06	45
0AL07	29
0AL08	58
0AL09	52
0AL10	52
TOTAL	588



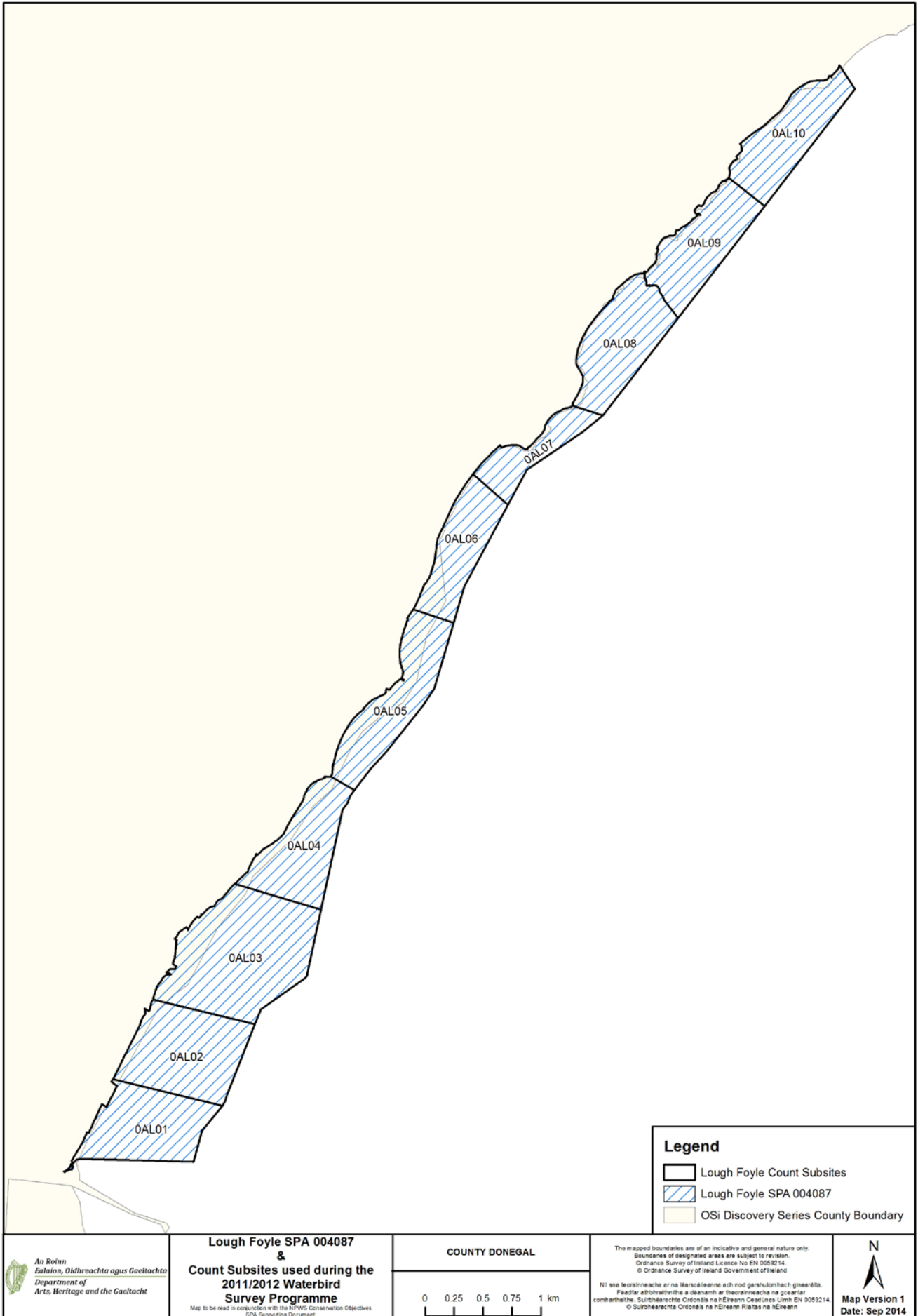

An Roinn Ealaíon, Oidhreachta agus Gaeltachta
 Department of Arts, Heritage and the Gaeltacht

Lough Foyle Count Subsites used during the 2011/2012 Waterbird Survey Programme
Map to be read in conjunction with the NPWS Conservation Objectives EPA Supporting Document.



The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Ordnance Survey of Ireland Licence No EN 0059214. © Ordnance Survey of Ireland Government of Ireland.
Níl aon teorainneacha ar na léarscálleanna ach nod garthulomheach ginearálta. Feadfar aibhreacha a déanamh ar theorainneacha na gceantar comharthaíthe. Suidhreachtaí Críonáil na hÉireann Ceardúnas Uimh EN 0059214. © Suidhreachta Críonáil na hÉireann Rialas na hÉireann.


Map Version 1
Date: Sep 2014

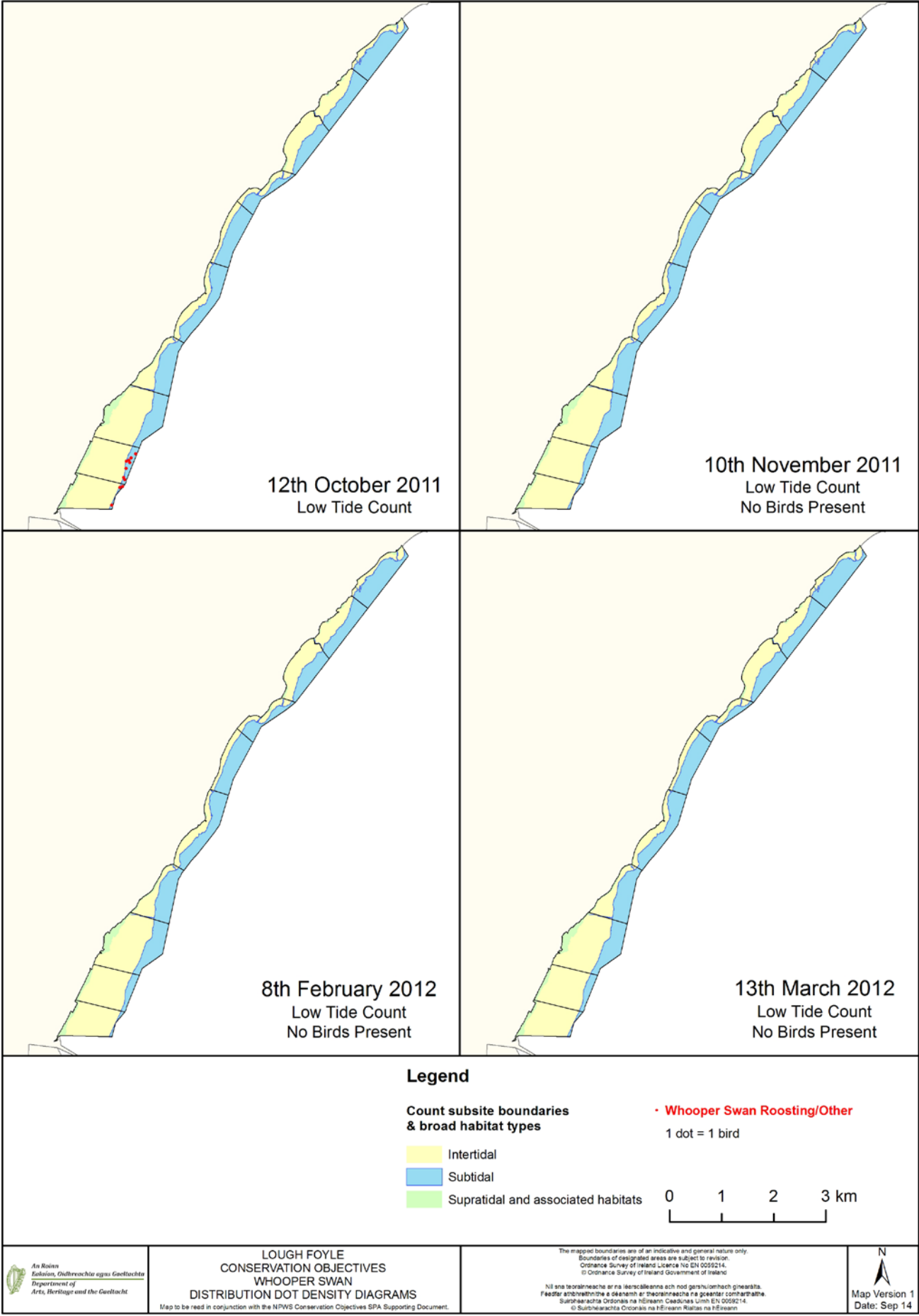


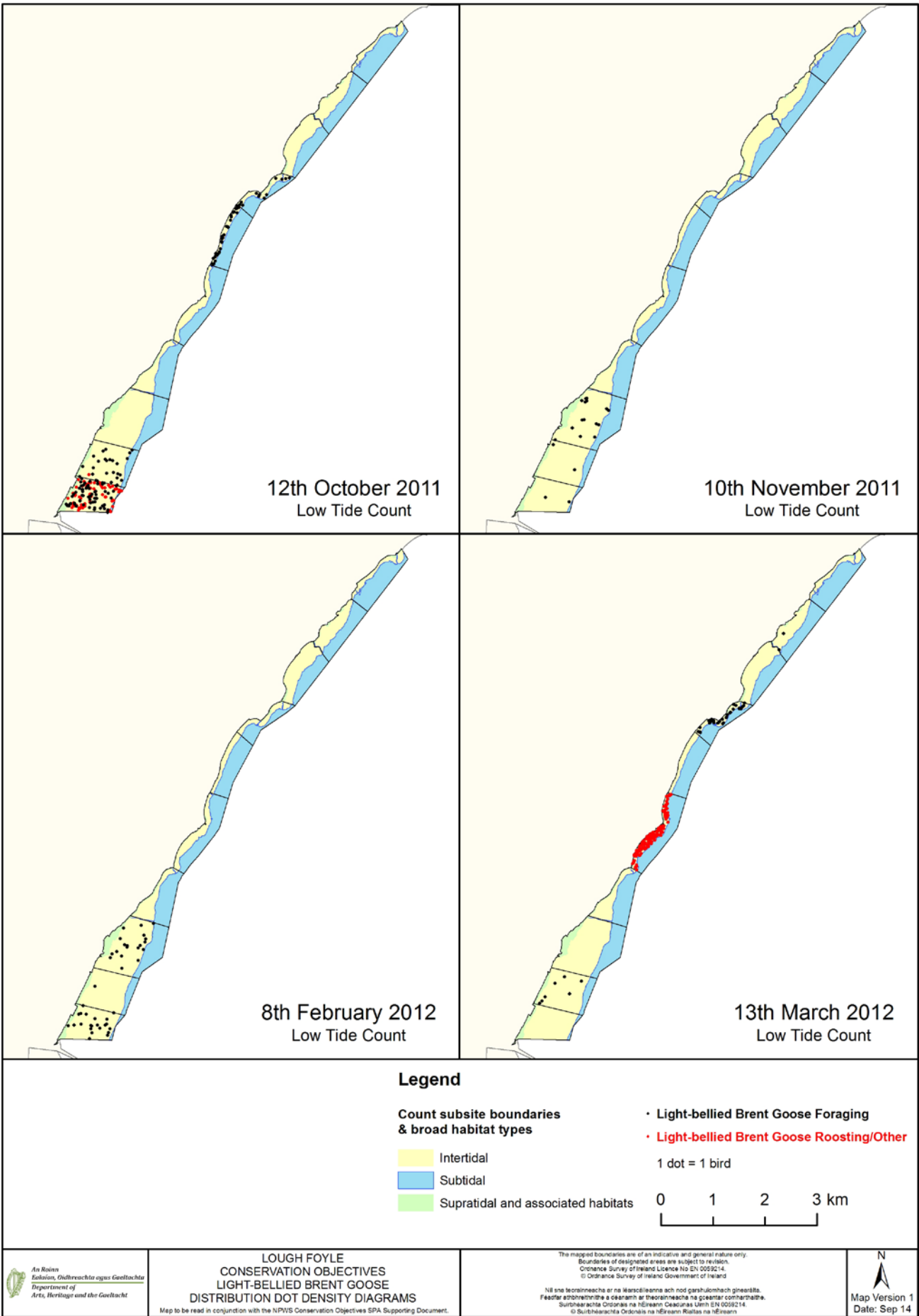
APPENDIX 7

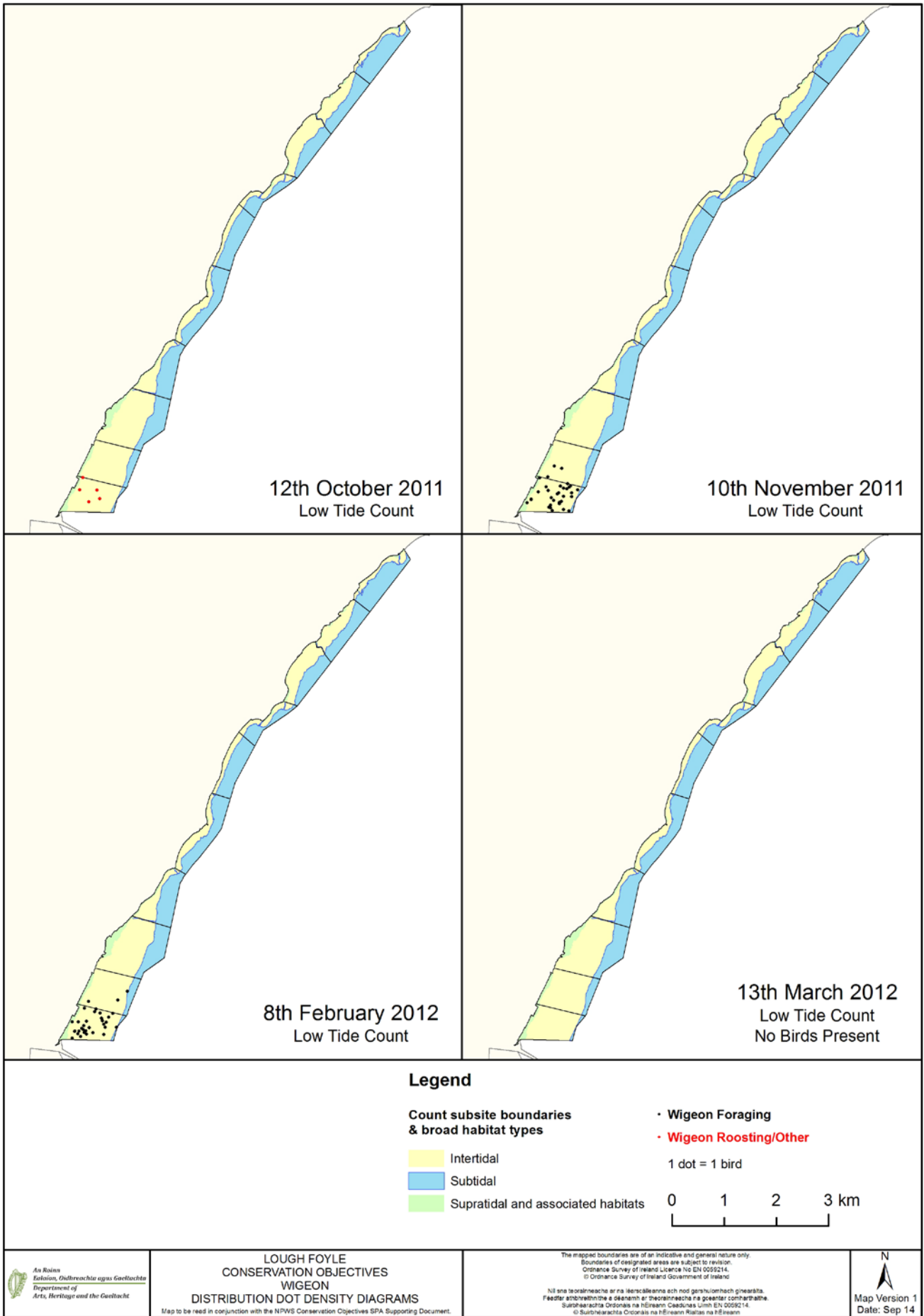
Lough Foyle

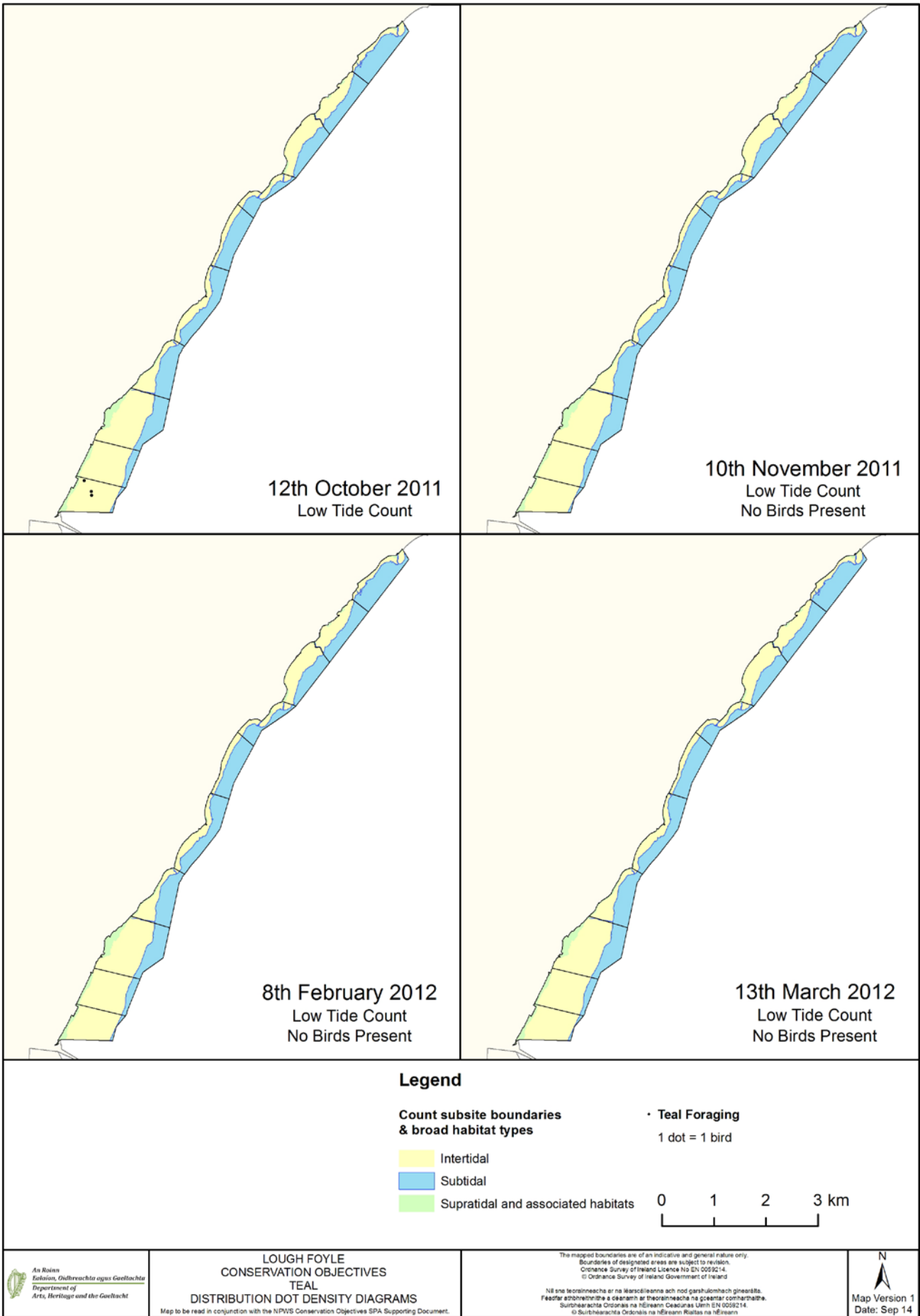
Waterbird distribution (dot-density diagrams) recorded during low tide surveys
(October 2011 – March 2012)

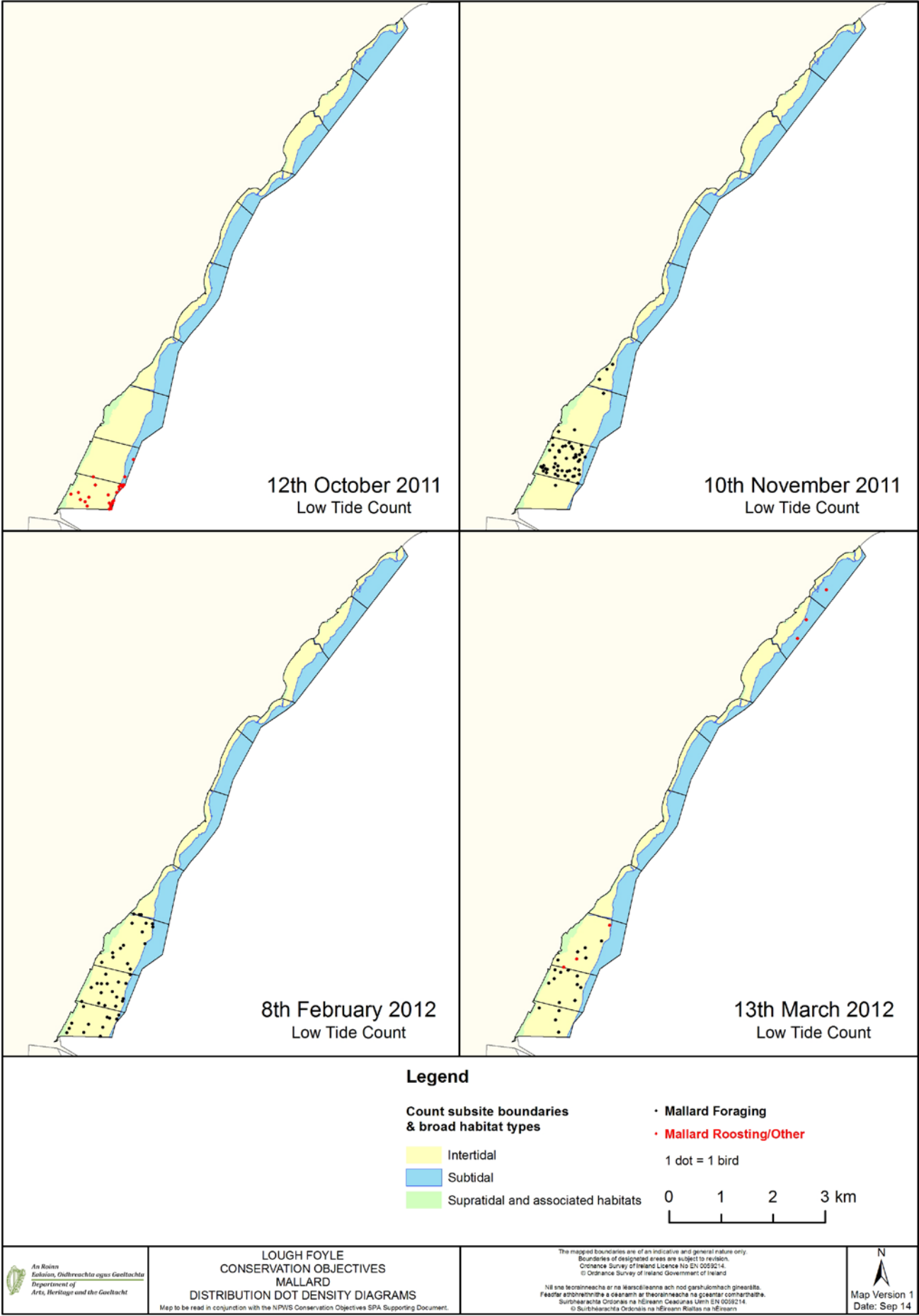
(NB data are presented for birds located in intertidal and subtidal habitats only)

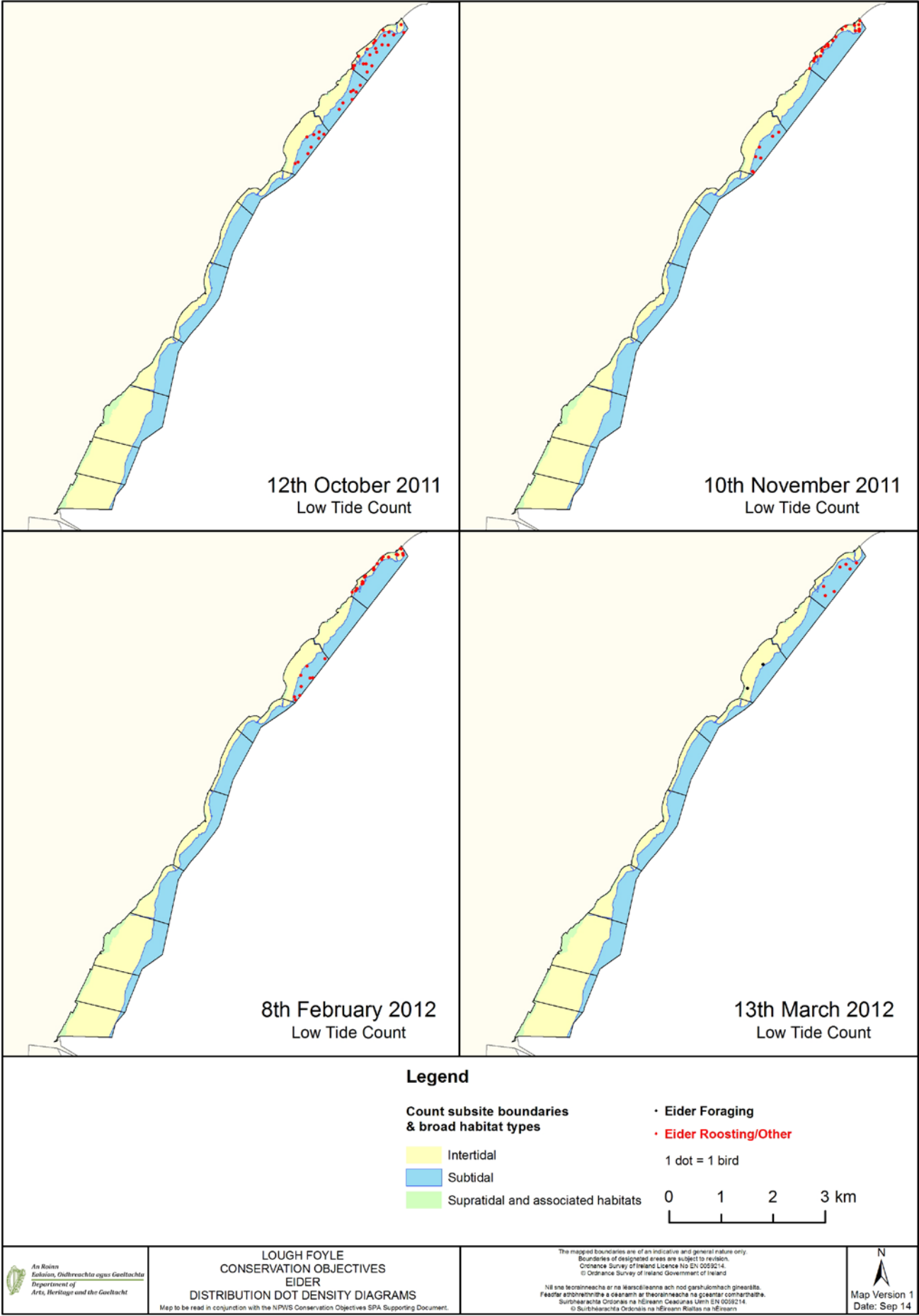


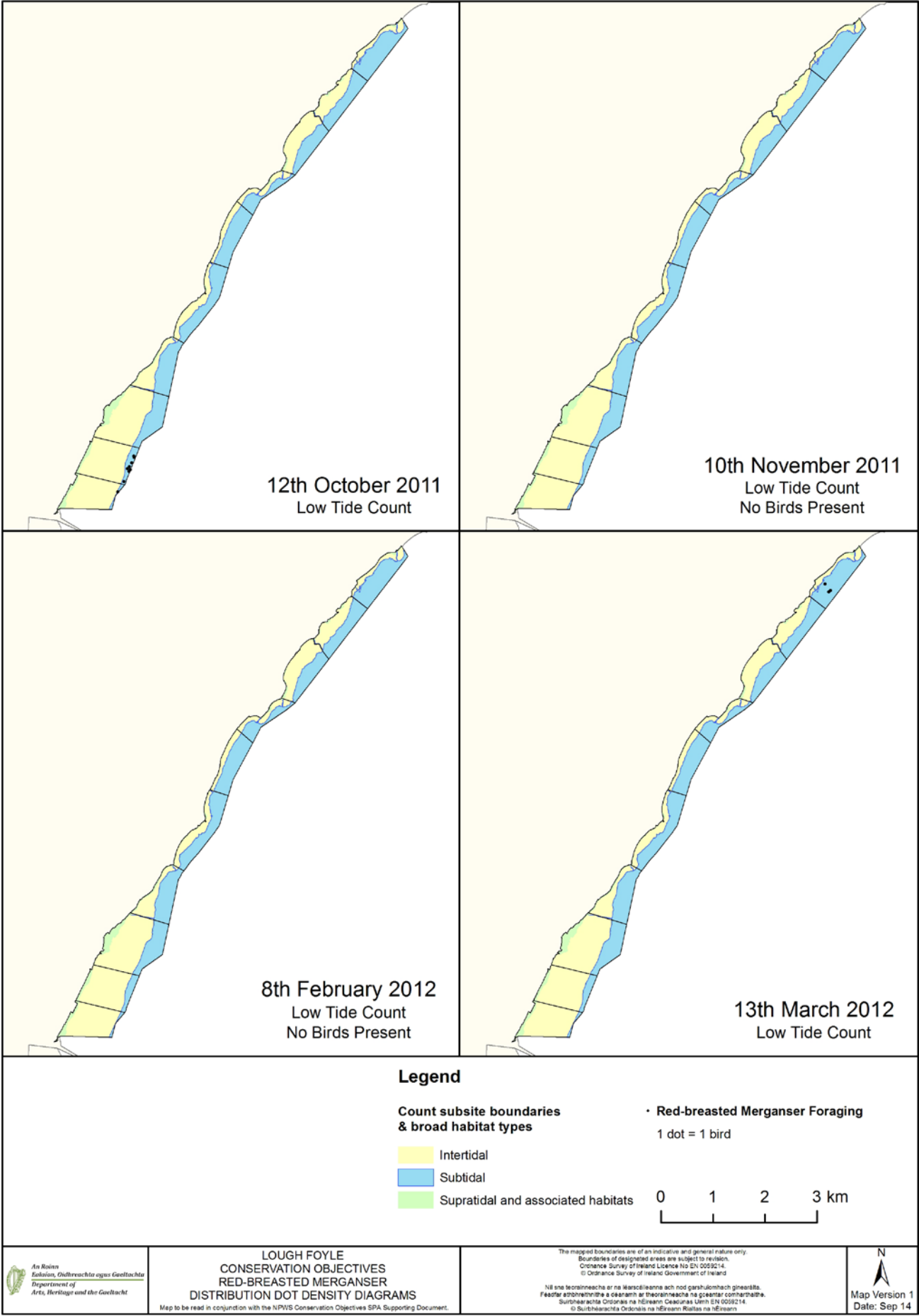


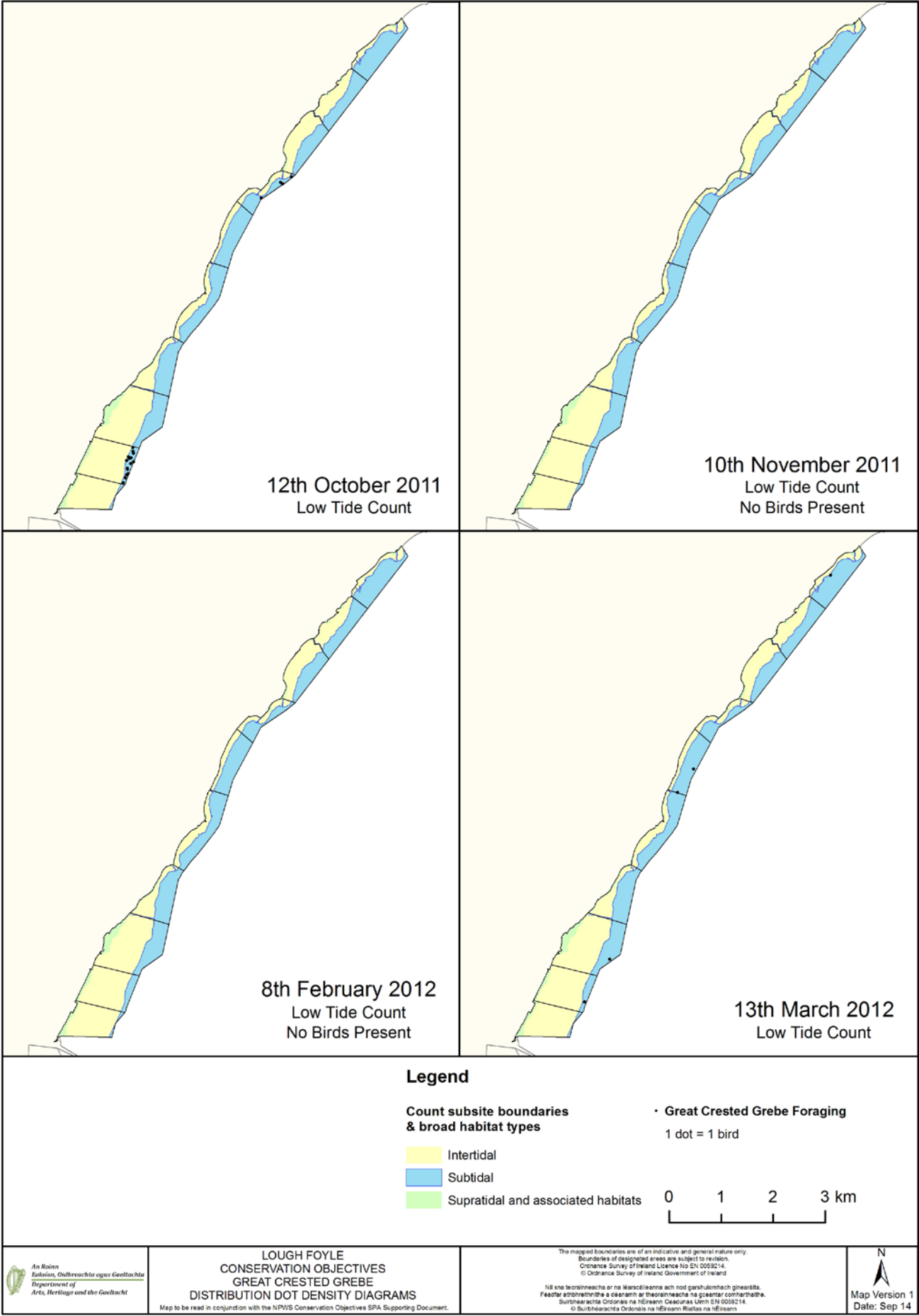


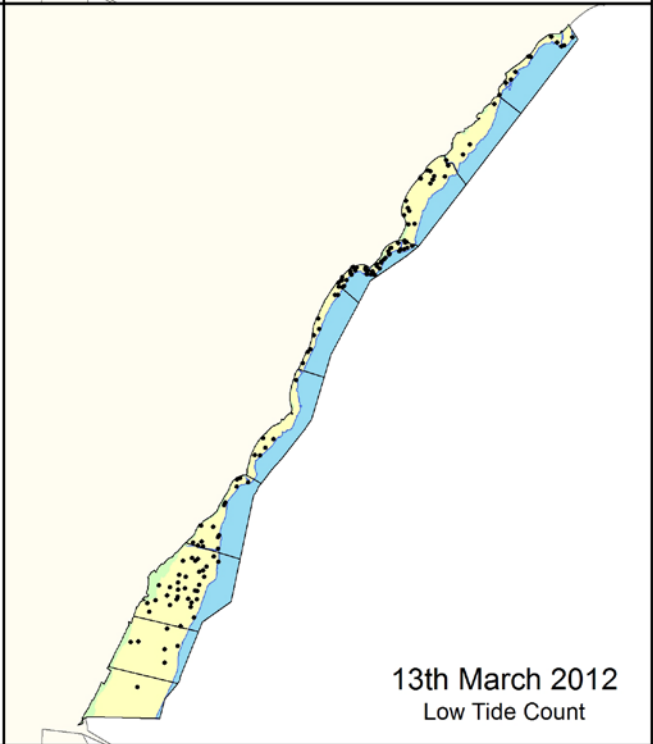
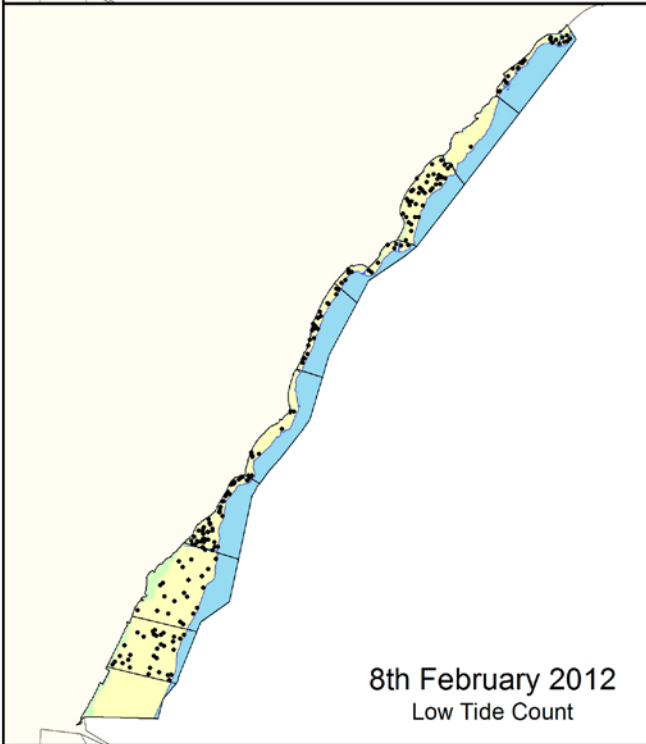
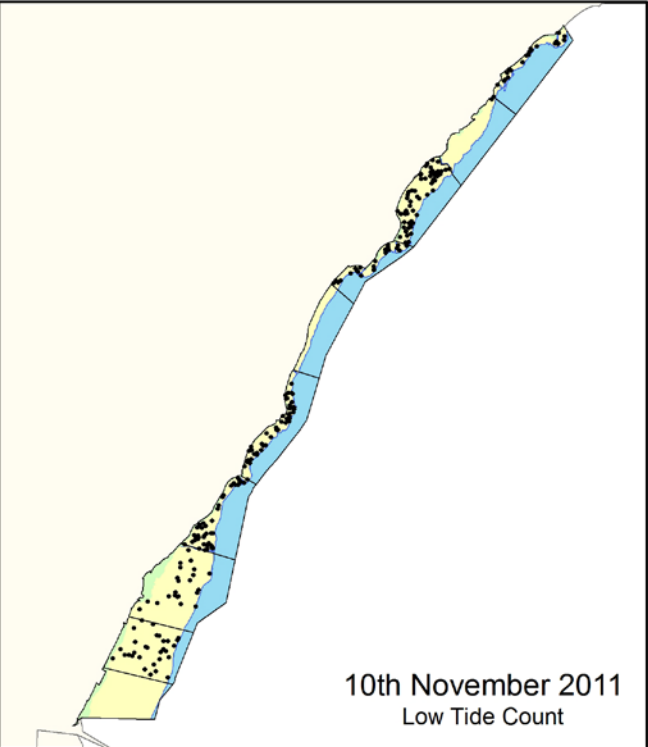
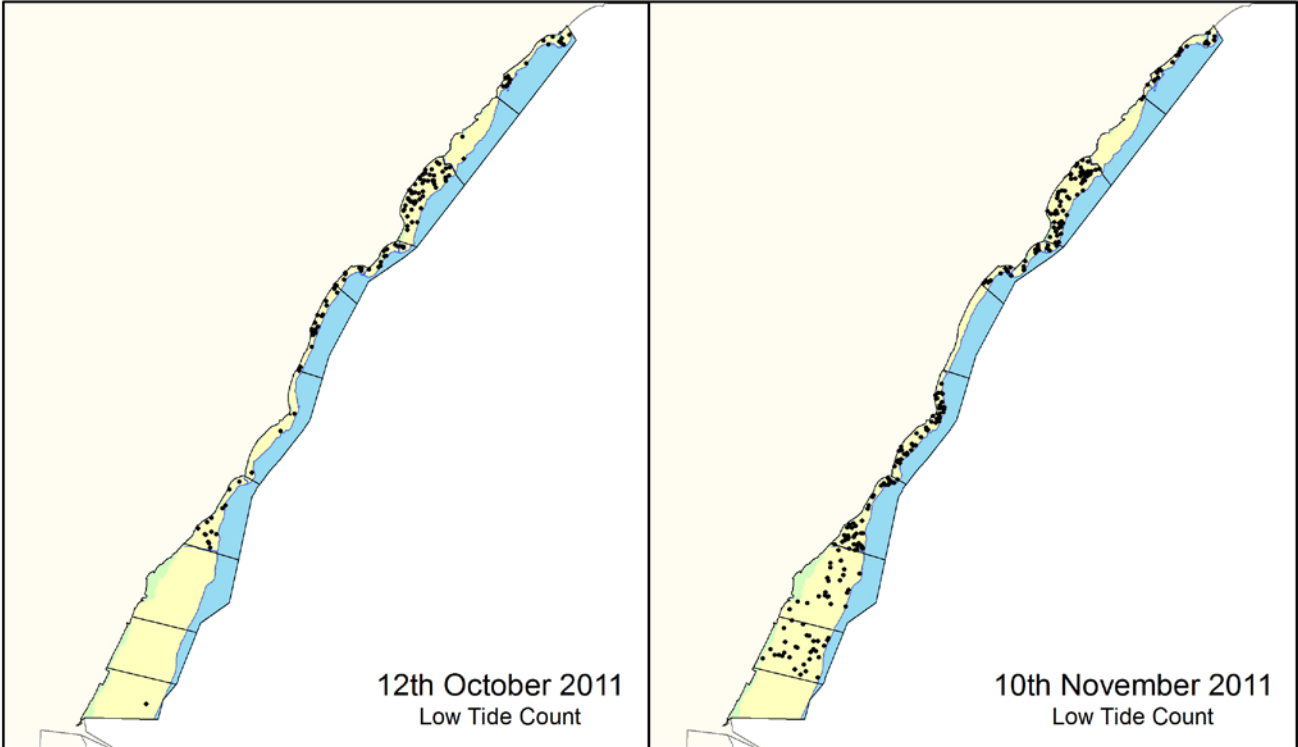












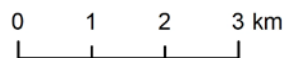
Legend

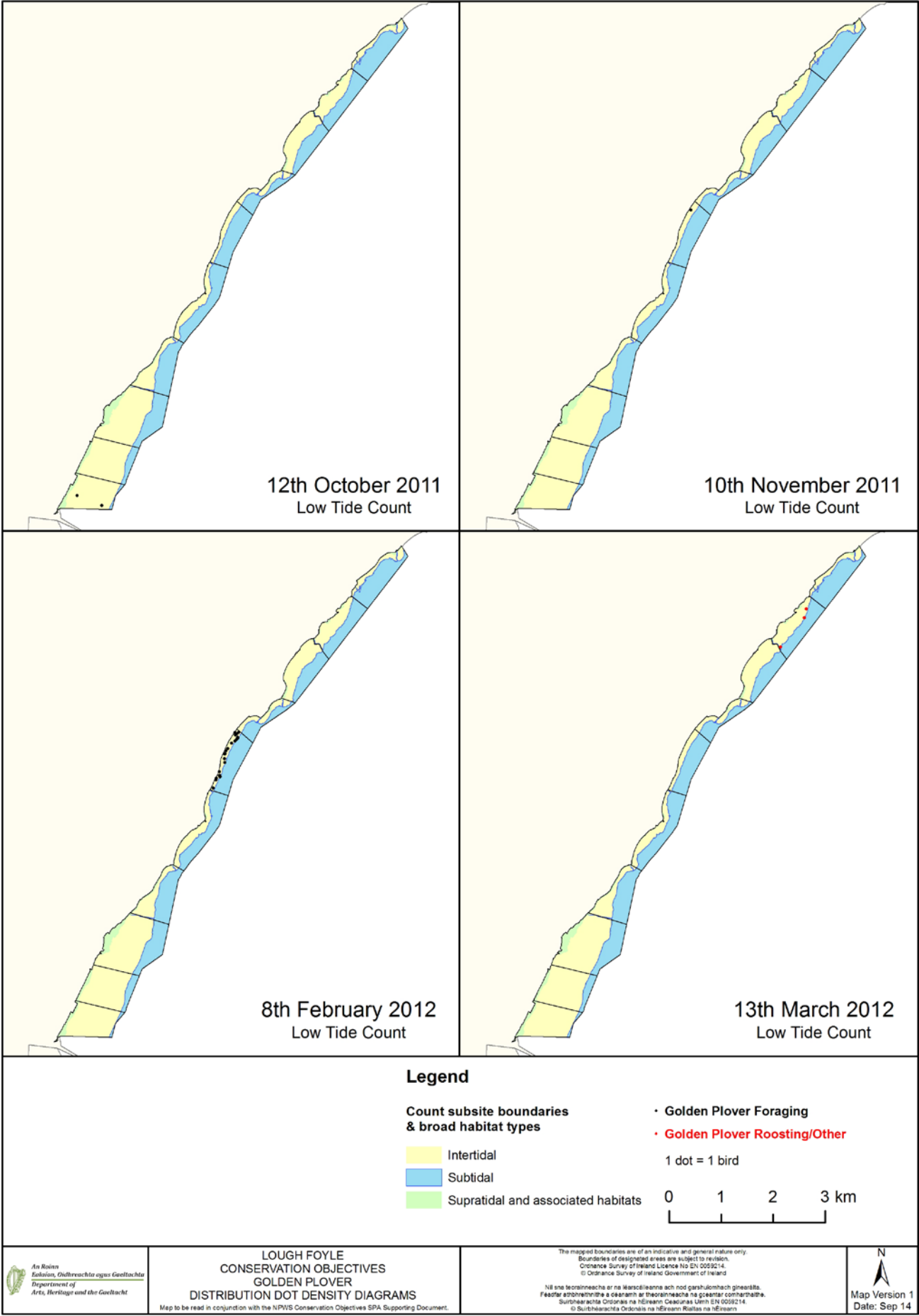
Count subsite boundaries
& broad habitat types

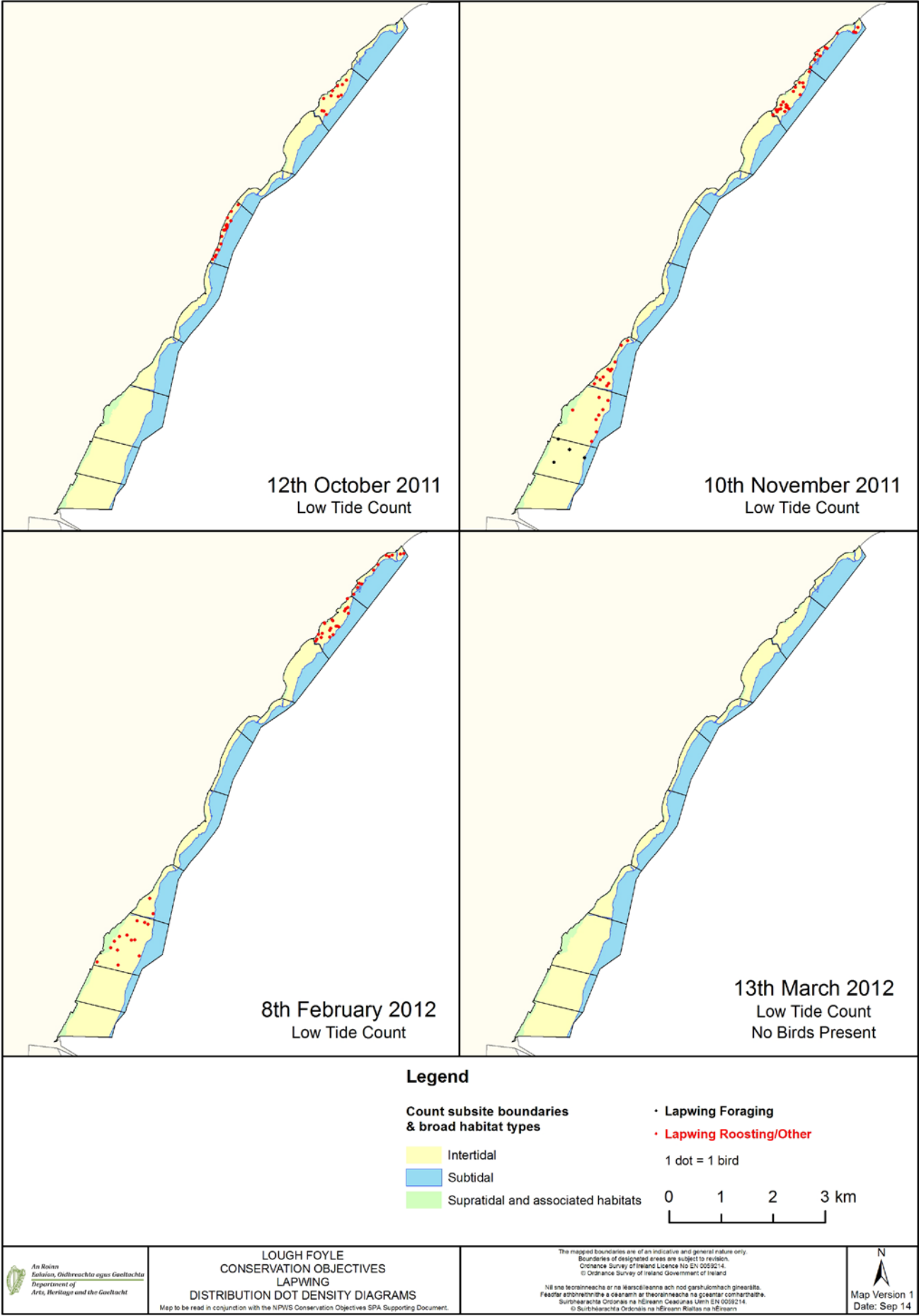
- Intertidal
- Subtidal
- Supratidal and associated habitats

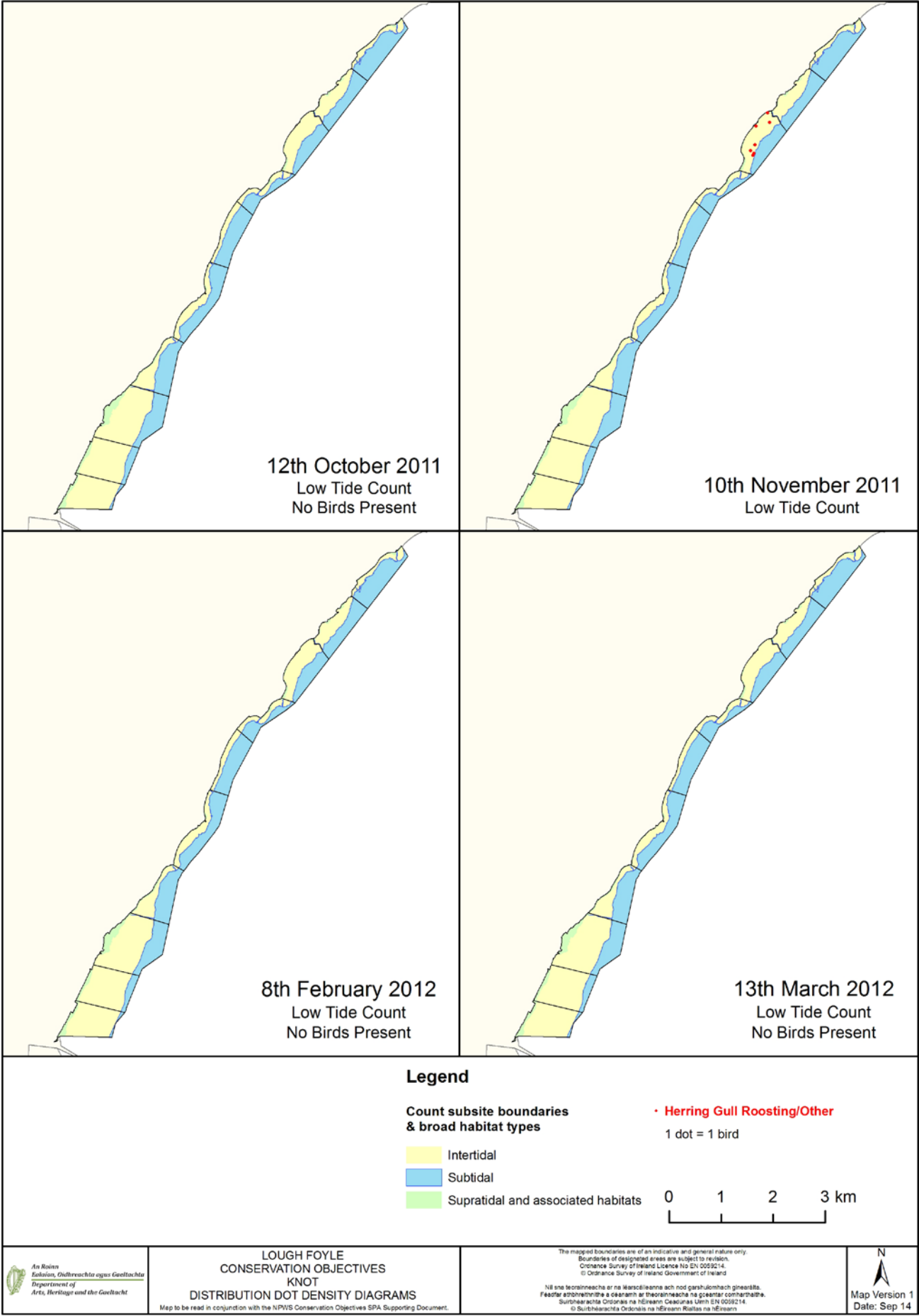
• Oystercatcher Foraging

1 dot = 1 bird









12th October 2011
Low Tide Count
No Birds Present

10th November 2011
Low Tide Count

8th February 2012
Low Tide Count
No Birds Present

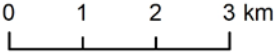
13th March 2012
Low Tide Count
No Birds Present

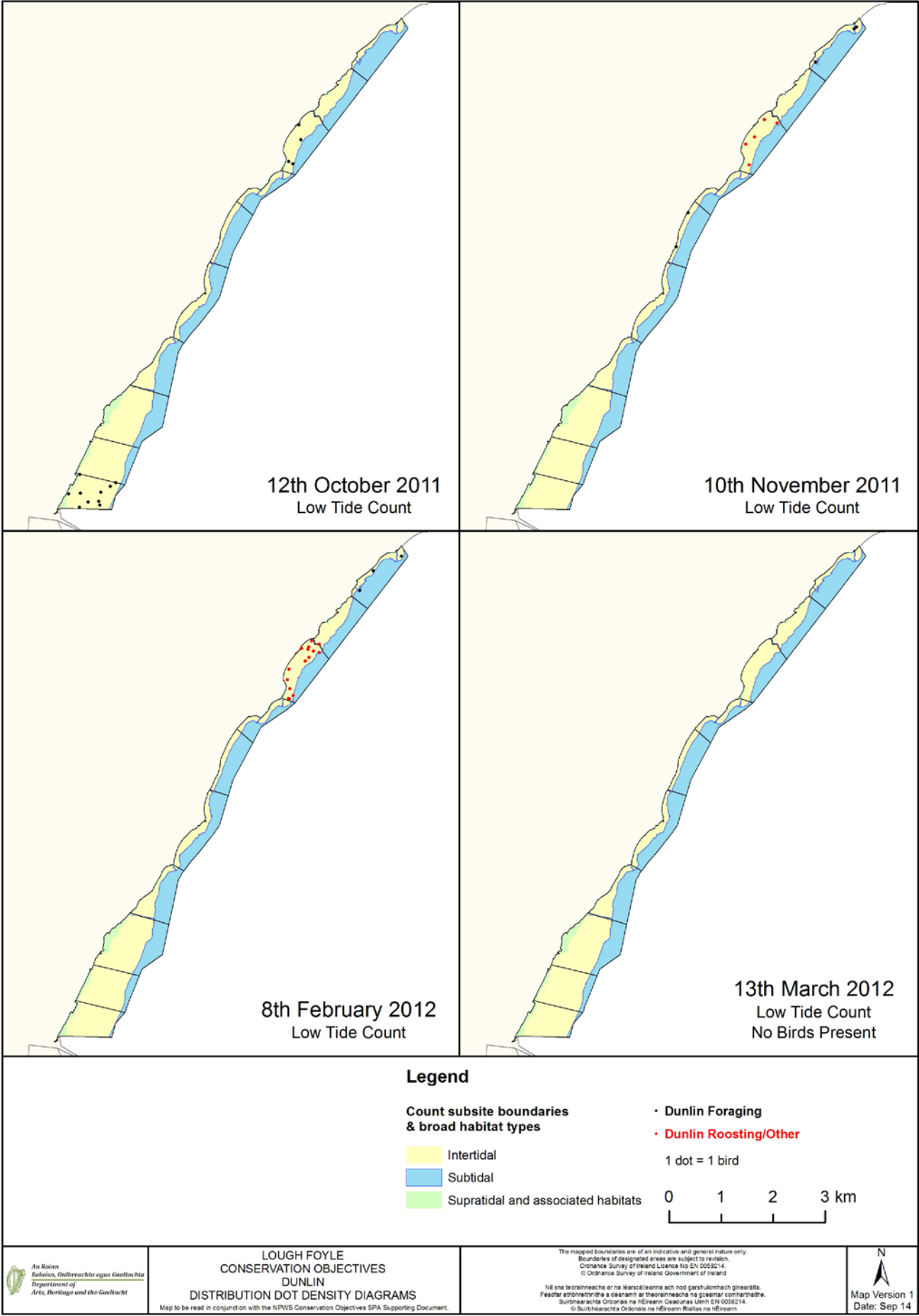
Legend

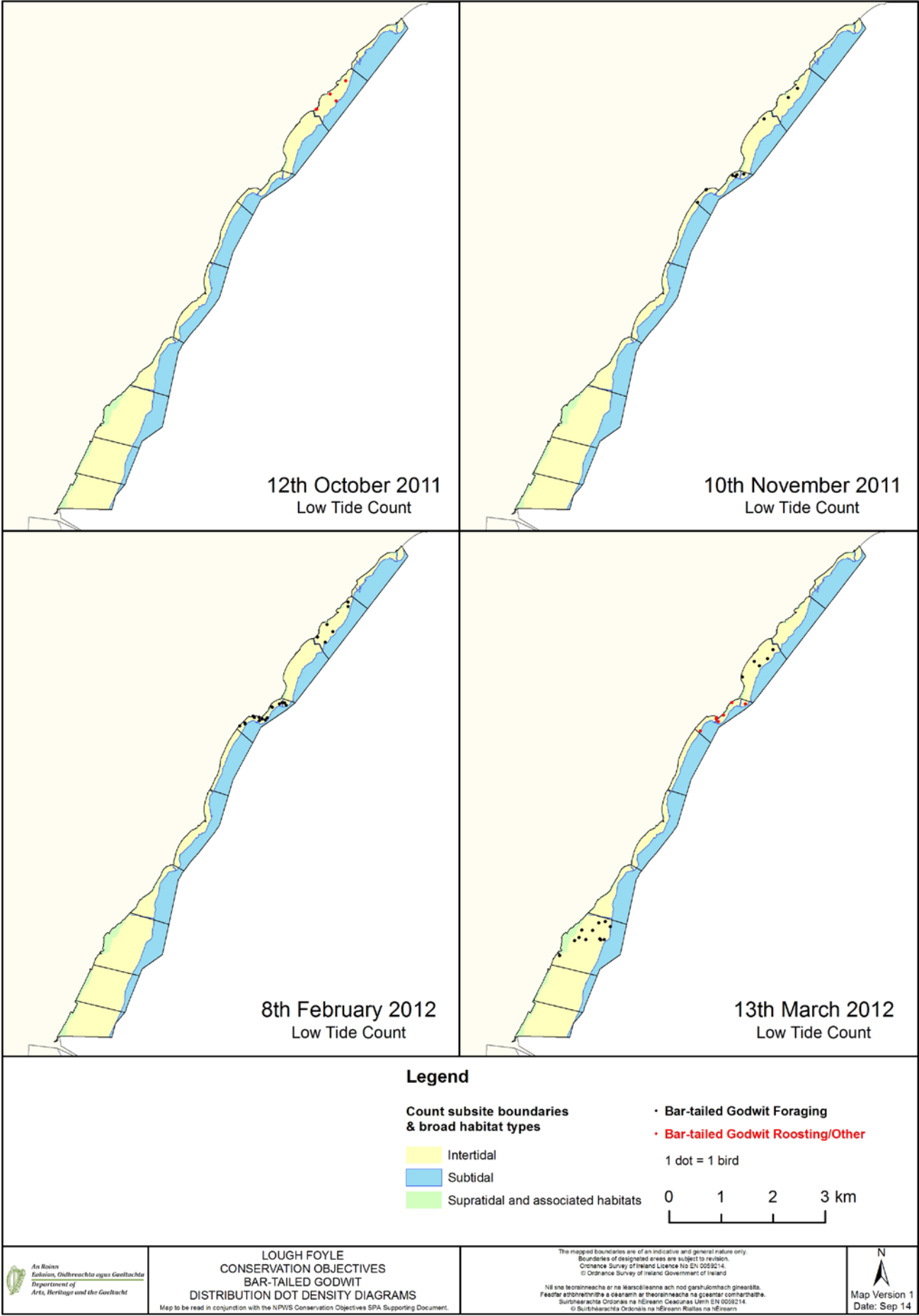
Count subsite boundaries
& broad habitat types

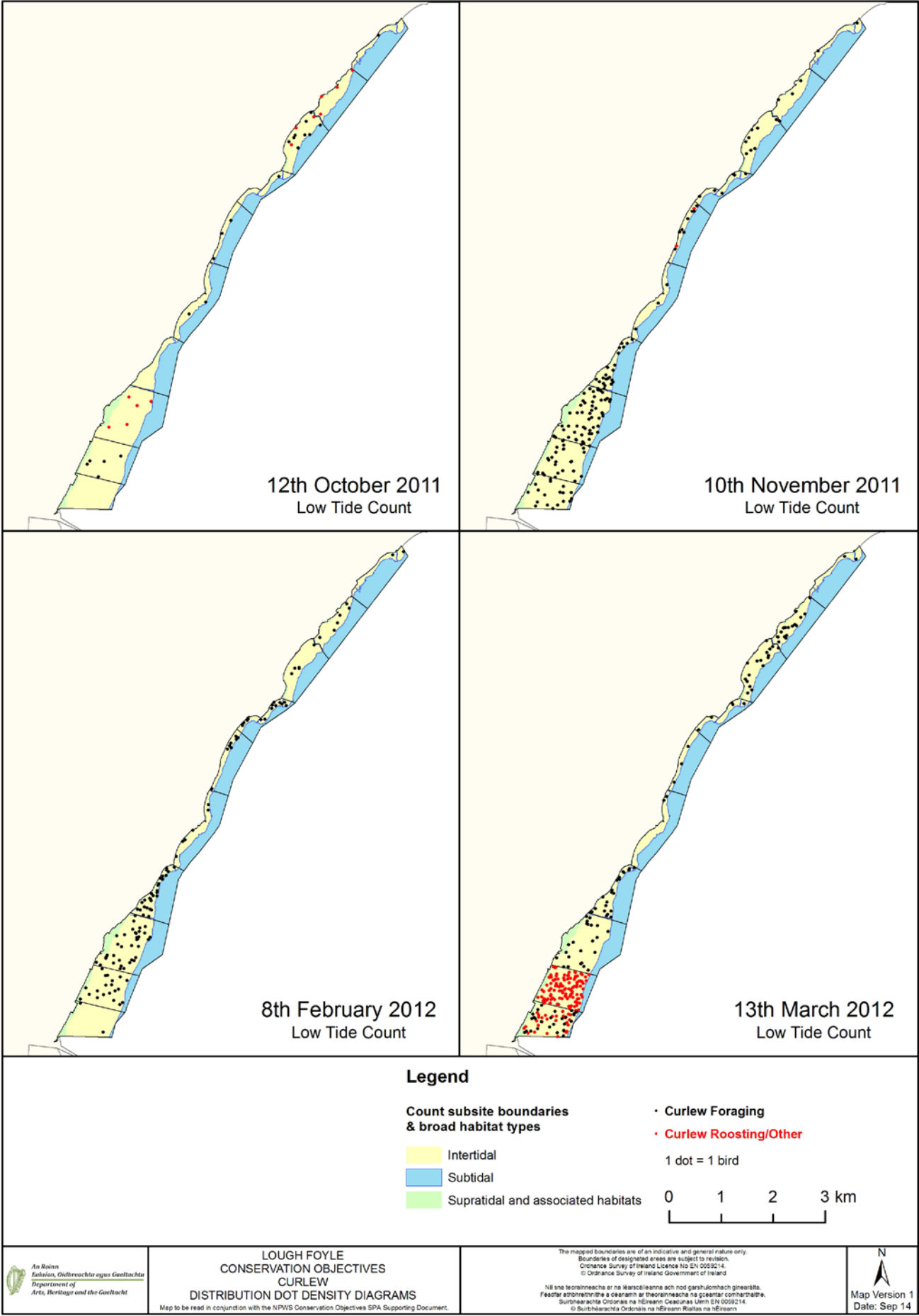
- Intertidal
- Subtidal
- Supratidal and associated habitats

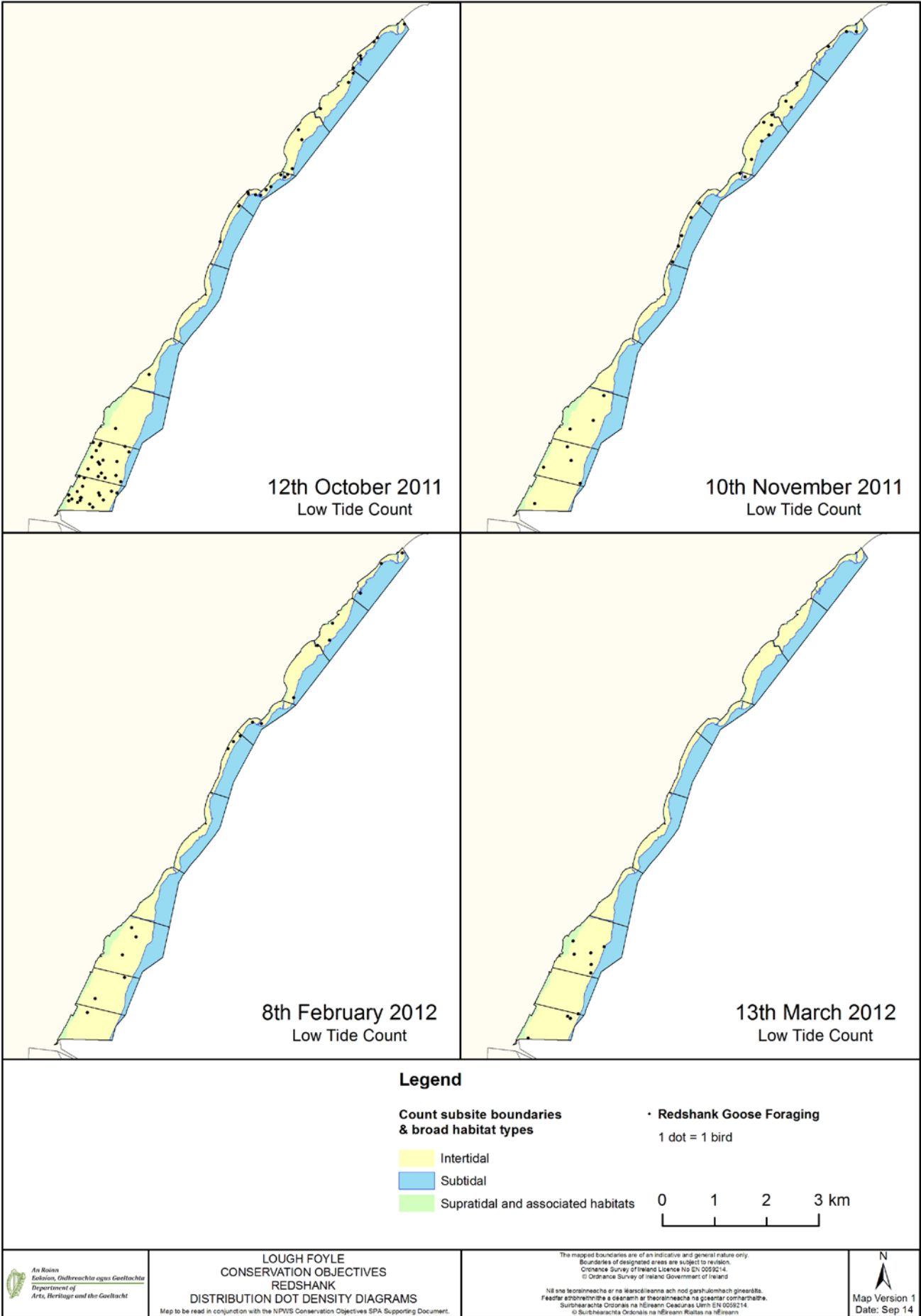
• **Herring Gull Roosting/Other**
1 dot = 1 bird

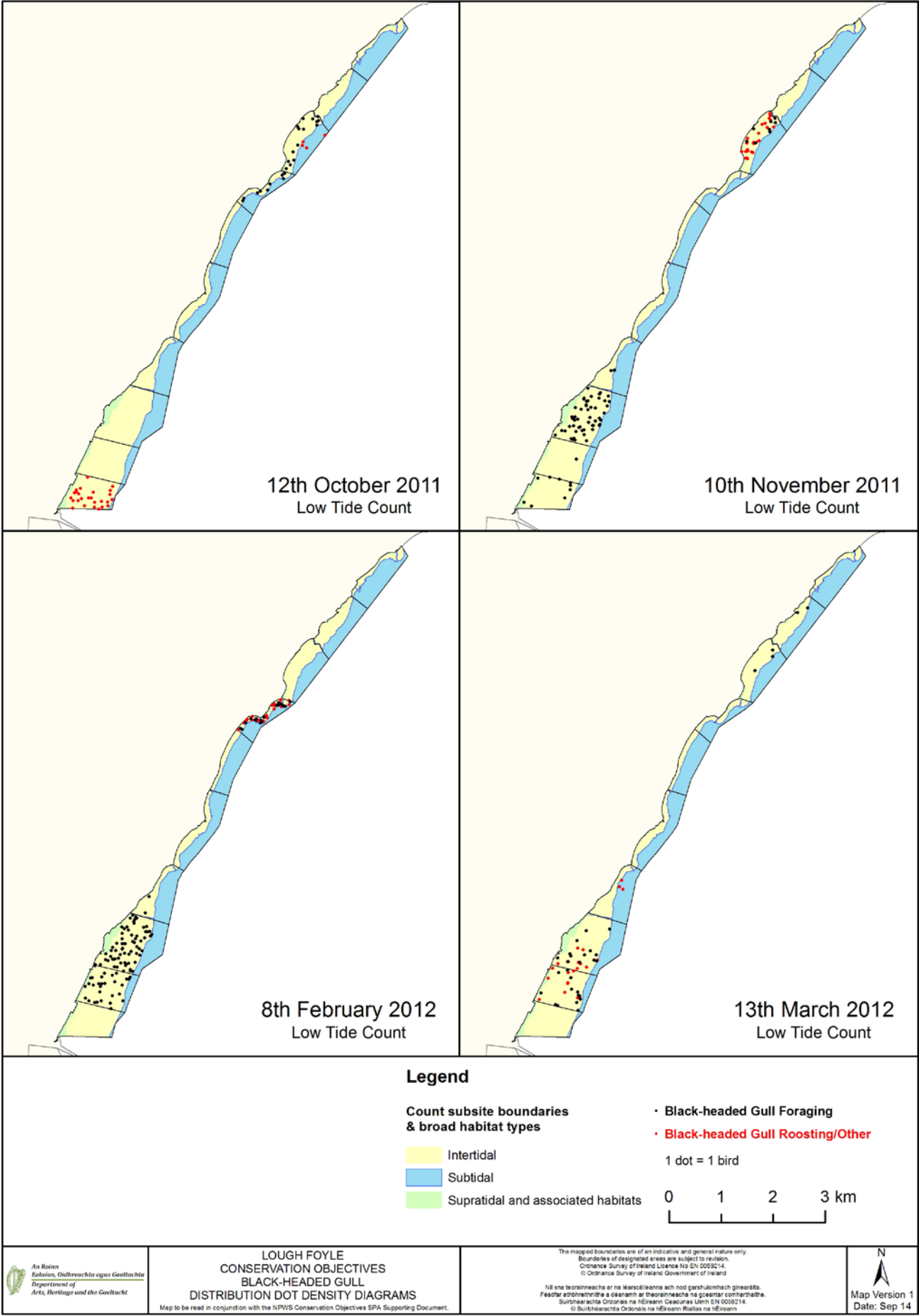


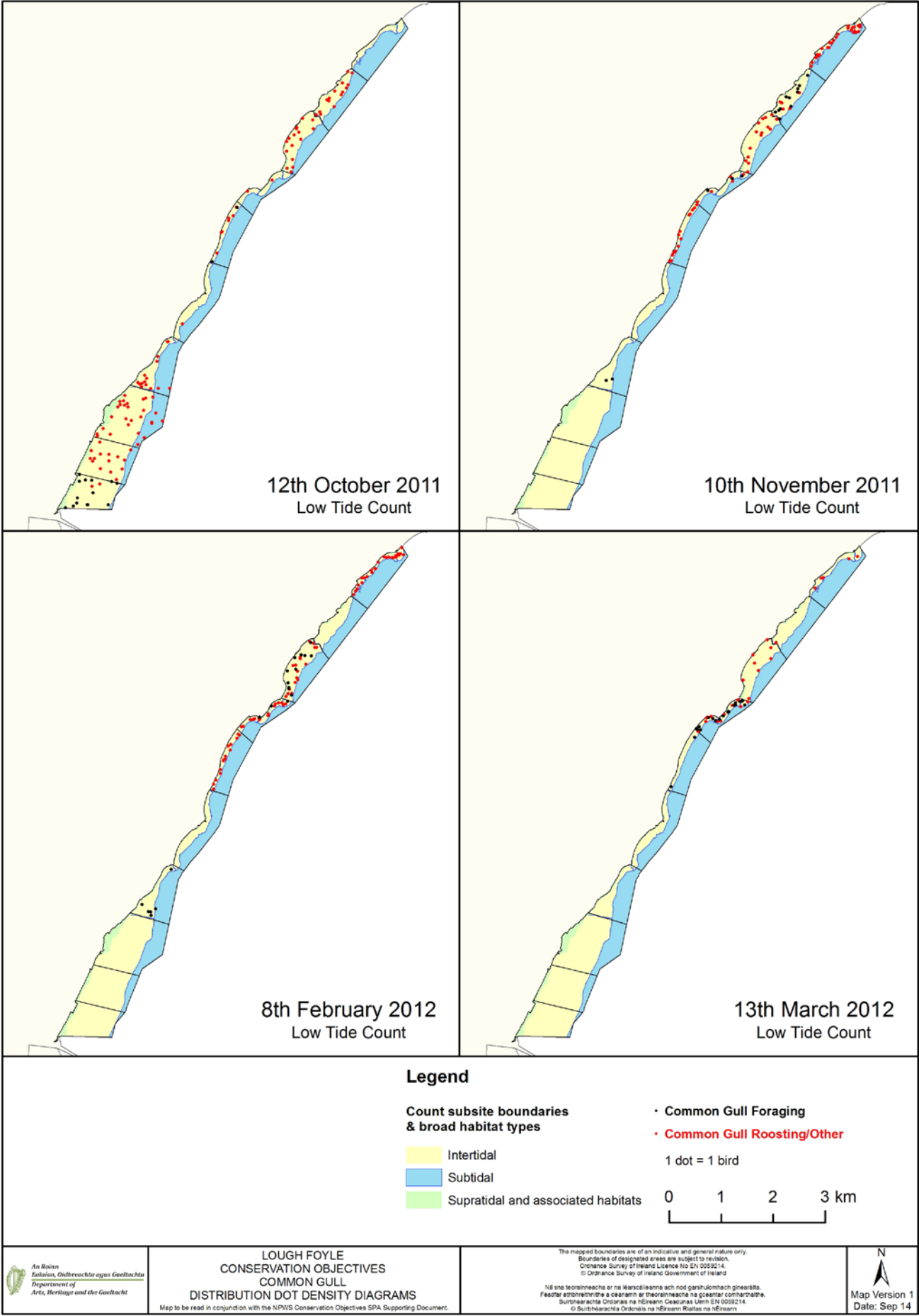


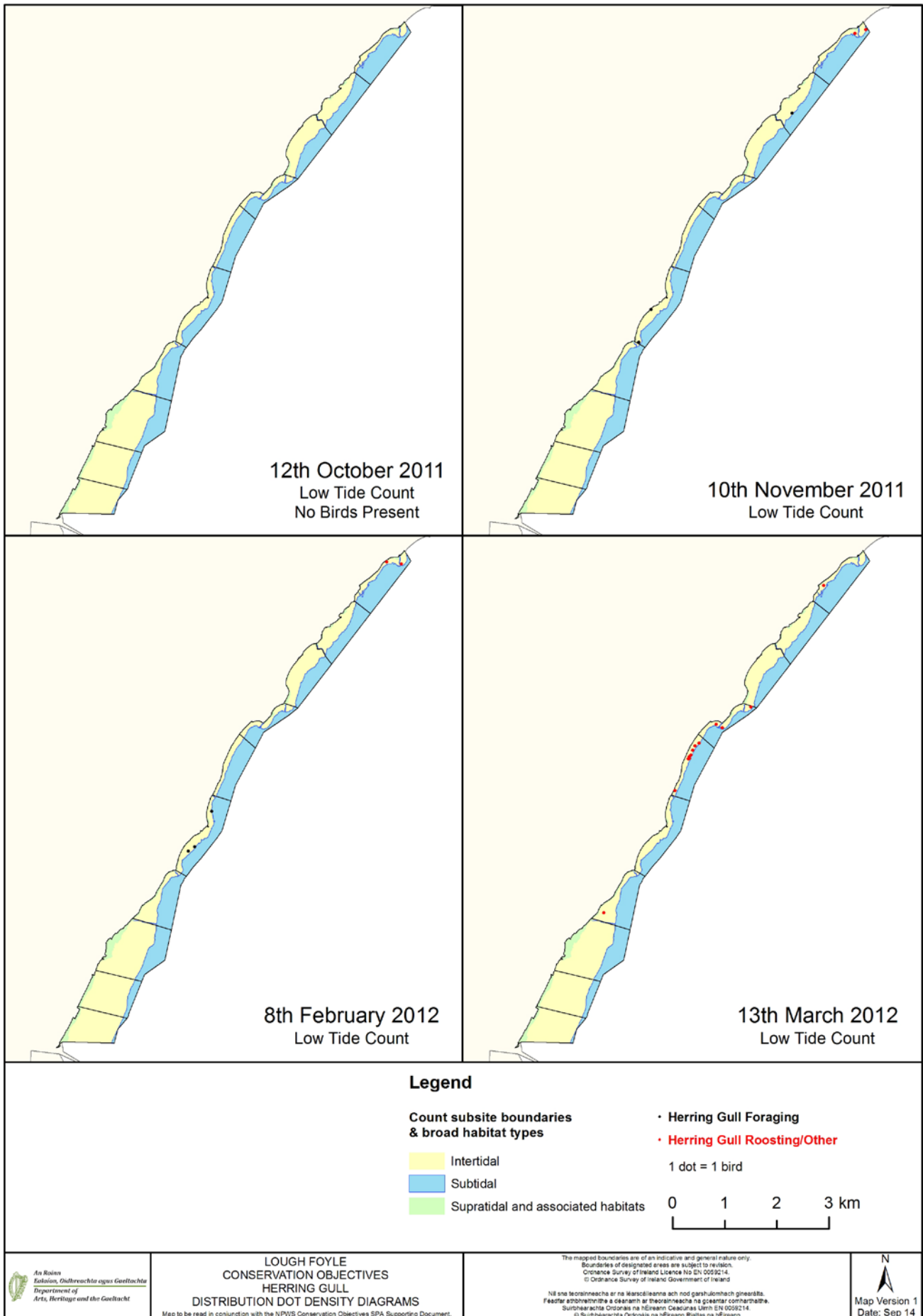












APPENDIX 8

Lough Foyle

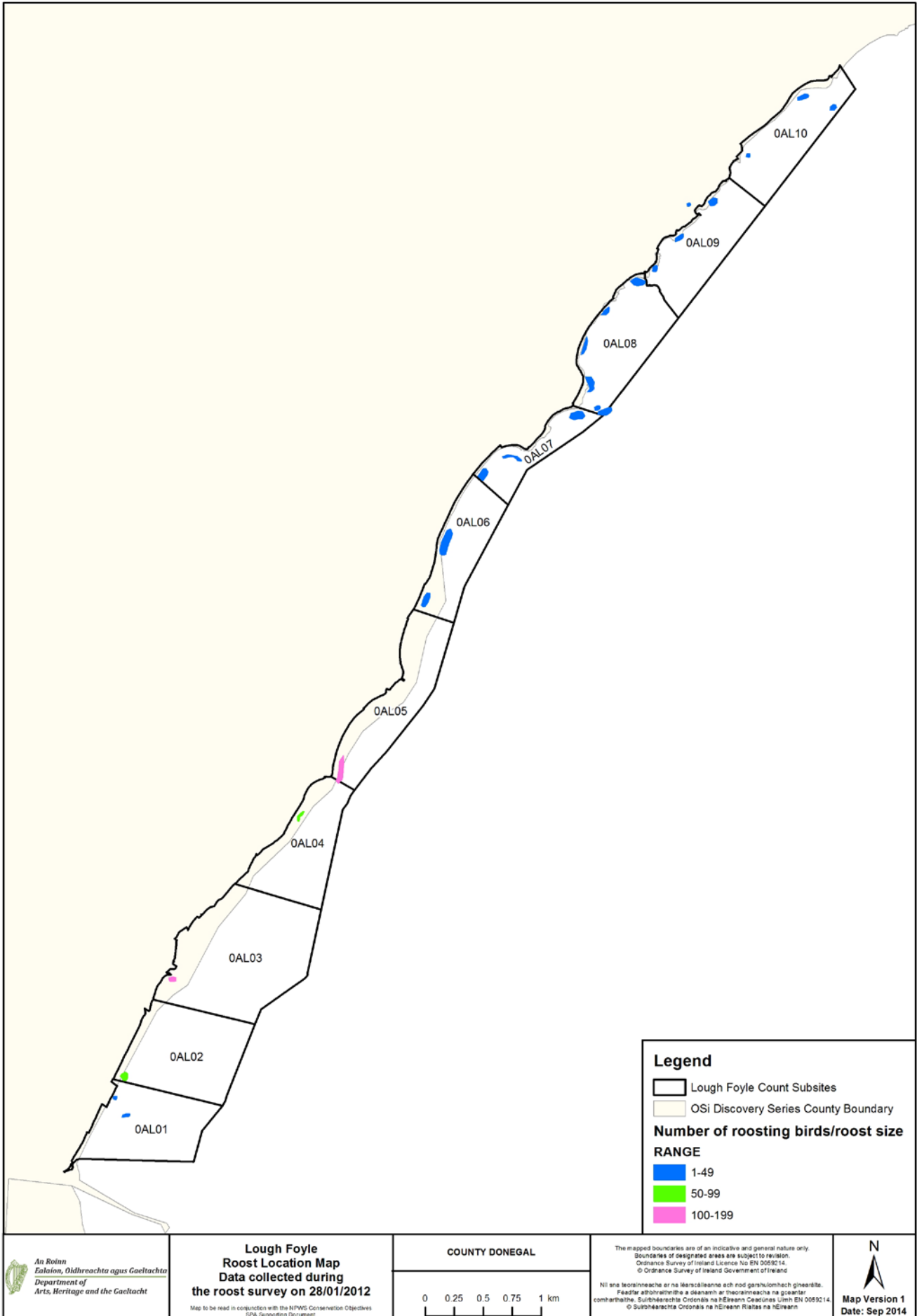
(1) Summary data and roost location map from the high tide survey on 28th January 2012.

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

Subsite	No. roost locations	No. species	species
0AL01	2	2	CU, TT
0AL02	1	4	CU, MA, WN, UW,
0AL03	1	3	BH, CM, RK
0AL04	1	2	CU, OC
0AL05	1	5	CM, HG, L., OC, PB
0AL06	2	5	BH, CM, CU, PB, RK
0AL07	3	5	BH, CM, LB, PB, RK
0AL08	6	6	BH, CM, E., LB, MA, PB
0AL09	4	3	BH, CU, RK
0AL10	3	2	E., L.

(1b) Lough Foyle SPA (4087) SCI species and recorded roosts 28th January 2012 - shows number of roost locations within subsite, and in brackets, the peak number recorded at a single roost location

Species ► Subsites ▼	PB	WN	MA	E.	OC	L.	CU	RK	BH	CM	HG
0AL01							1 (12)				
0AL02		1 (52)	1 (5)				1 (15)				
0AL03								1 (20)	1 (60)	1 (20)	
0AL04					1 (40)		1 (20)				
0AL05	1 (90)				1 (30)	1 (35)					1 (10)
0AL06	1 (1)						1 (1)	1 (3)	1 (1)	1 (10)	
0AL07	1 (11)							1 (5)	1 (19)	2 (3)	
0AL08	1 (25)		2 (5)	1 (9)					4 (23)	2 (4)	
0AL09							1 (11)	2 (2)	1 (5)	2 (2)	
0AL10				1 (10)		2 (32)					



APPENDIX 9

Lough Foyle - 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 Lough Foyle.
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	0AL01	0AL02	0AL03	0AL04	0AL05	0AL06	0AL07	0AL08	0AL09	0AL10
1. Coastal protection, sea defences & stabilisation										
1.1 Linear defences				○			○			○
1.4 <i>Spartina</i> growing/planted				○	○					
4. Industrial, port & related development										
4.2 Fishing harbour							○			
4.3 Slipway							○			
6. Pollution										
6.7 Solid waste incl. fly-tipping					○		○			○
7.1 Channel dredging (maintenance & navigation)	○	○	○	○	○	○	○	○	○	○
8. Transport & communications										
8.5 Road schemes					○	○	○			○
8.7 Shipping channel, shipping lanes	○	○	○	○	○	○	○	○	○	○
9.1 Urbanised areas, housing				○			○	○		
12. Tourism & recreation										
12.4 Caravan parks & chalets								○		
12.6 Power boating & water-skiing				○						
12.11 Canoeing	○									○
12.13 Rowing	○									○
12.18 Walking, incl. dog walking					○	○	○			○
12.19 Birdwatching	○									○
13. Wildfowl & hunting										
13.1 Wildfowling		○								
14. Bait-collecting										
14.1 Digging for lugworms/ragworms							○	○		
15. Fisheries & Aquaculture										
15.1 Professional passive fishing (e.g. longlining)	U	U	U	U	U	U	U	U	U	U
15.3 Bottom (benthic) dredging	U	U	U	U	U	U	U	U	U	U
15.4 Fish traps & other fixed devices & nets	U	U	U	U	U	U	U	U	U	U
15.5 Leisure fishing	U	U	U	U	U	U	U	U	U	U
15.9 Intertidal aquaculture e.g. trestles				○	○		○	○		