EMFF Operational Programme 2014-2020

Marine Biodiversity Scheme

Marine Institute Bird Studies

Poulnasherry Bay Waterbird Survey.

2022-2023

Lead Agency: Marine Institute

Authors: INIS Environmental Consultants Ltd.

Ireland's EU Structural and Investment Funds Programmes 2014 - 2020
Co-funded by the Irish Government and the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

EUROPEAN UNION
This measure is part-financed by the European Maritime and Fisheries Fund

Foras na Mara
Marine Institute

Operational Programme	European Maritime and Fisheries Fund (EMFF) Operational Programme 2014-2020
Priority	Union Priority 1 Sustainable Development of Fisheries Union Priority 6 Fostering the implementation of the Integrated Maritime Policy
Thematic Objective	TO 6 - Preserving and protecting the environment and promoting resource efficiency
Specific Objective	UP1 SO1 - Reduction of the impact of fisheries and aquaculture on the marine environment, including the avoidance and reduction, as far as possible, of unwanted catch. UP1 SO2 - Protection and restoration of aquatic biodiversity and ecosystems. UP6 SO1 - Development and implementation of the Integrated Maritime Policy
Measure	Marine Biodiversity Scheme
Project No.	MB/2019/08
EMFF Certifying Body	Finance Division, Department of Agriculture, Food and the Marine
Managing Authority	Marine Agencies & Programmes Division, Department of Agriculture, Food and Marine
Specified Public Beneficiary Body	Marine Institute
Grant Rate	100%
EU Co-Financing Rate	50%
Legal Basis	Article 29, 40 & 80 EMFF
Details	Report to the Marine Institute Inís.

This project or operation is part supported by the Irish government and the European Maritime & Fisheries Fund as part of the EMFF Operational Programme for 2014-2020

Ireland's EU Structural and Investment Funds Programmes 2014 - 2020
Co-funded by the Irish Government and the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

EUROPEAN UNION
This measure is part-financed by the European Maritime and Fisheries Fund

Foras na Mara
Marine Institute

Marine Institute

Poulnasherry Bay Waterbird Survey

Winter 2022-23 Bird Survey Report

March 2023

This report considers the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

INIS Environmental Consultants Ltd.

Suite 16,
Block A,
Clare Technology Park,
Gort Road,
Ennis,
County Clare
Ireland.

Quality Assurance

The findings outlined within this report and the data we have provided are to our knowledge true and express our bona fide professional opinions. This report has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) good practice guidelines. Where pertinent CIEEM Guidelines used in the preparation of this report include the *Guidelines for Ecological Report Writing* (CIEEM, 2017a), *Guidelines for Preliminary Ecological Appraisals* (CIEEM, 2017b) and *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine*, (CIEEM, 2019). CIEEM Guidelines include model formats for Preliminary Ecological Appraisal and Ecological Impact Assessment. Also, where pertinent, evaluations presented herein take cognisance of recommended Guidance from the EPA such as *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017), and in respect of European sites, *Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* (European Commission, 2018).

Due cognisance has been given at all times to the provisions of the *Wildlife Acts, 1976-2021,* the *European Communities (Birds and Natural Habitats) Regulations 2011-2021,* EU Regulation on Invasive Alien Species under *EU Regulation 1143/2014*, the EU Birds *Directive 2009/147/EC* and *Habitats Directive 92/43/EEC*.

No method of assessment can completely remove the possibility of obtaining partially imprecise or incomplete information. Any limitation to the methods applied or constraints however are clearly identified within the main body of this document.

Version	**Date**		**Name**	**Signature**
1	09/03/2023	**Report prepared by:**	Dr Lesley Lewis BSc PhD MCIEEM	
1	28/03/2023	**Report checked by:**	Dr. Alex Copland BSc PhD MIEnvSc	
1	29/03/2023	**Report signed off by:**	Howard Williams BSc CEnv MCIEEM CBiol MRSB MIFM	
Title		Poulnasherry Bay Waterbird Survey: Winter 2022-23 Bird Survey Report		

Notice

This report was produced by INIS Environmental Consultants Ltd. (INIS) on behalf of the Marine Institute, the client, for the specific purpose of assessing wintering bird populations in Poulnasherry Bay SPA, Co. Clare, with all reasonable skill, care and due diligence within the terms of the contract with the client, incorporating our terms and conditions and taking account of the resources devoted to it by agreement with the client.

This report may not be used by any person other than the Marine Institute, the client, without the client's express permission. In any event, INIS accepts no liability for any costs, liabilities or losses arising as a result of the use of or reliance upon the contents of this report by any person other than the client.

This report is confidential to the client and INIS accepts no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

Table of Contents

1. INTRODUCTION

INIS Environmental Consultants Ltd. were contracted to coordinate a series of waterbird surveys at Poulnasherry Bay, Co. Clare during the 2022/23 winter season. Following standard methodology used for surveying wintering waterbirds at low tide (Lewis & Tierney, 2014), the surveys included four low tide surveys and a single high tide survey. This report details the results of this survey programme. The results are examined and discussed in light of similar surveys undertaken during recent previous winter seasons, and a baseline low tide survey undertaken during 2009/10 as part of the National Parks & Wildlife Service (NPWS) Waterbird Survey Programme (NPWS, 2012).

1.1. Constraints and Limitations

There are a number of limitations inherent to field-based surveying. These particularly relate to availability of suitable weather conditions for completing surveys, with good visibility and little wind or rain of paramount importance. As such, when undertaking and completing fieldwork, careful consideration and planning is made to ensure optimal weather conditions during survey periods. The data presented here were all collected in optimal weather conditions.

When counting shorebirds, disturbance can substantially impact on the birds present within small areas if they are able to disperse away from the source of disturbance to adjacent areas of similar habitat but out with the areas where surveying is taking place. Such disturbance may happen in advance of the count taking place or during the survey period. To gauge levels of disturbance best practice methods include an assessment of disturbance levels encountered during the recording period. Such an assessment of disturbance allows the likely impact on shorebird numbers and distribution to be determined, particularly when looking at likely response to different disturbance events. Details of recorded disturbance are therefore provided.

Constraints and any limitations to available datasets used for comparative analysis are presented where known.

1.2. Statement of Authority

Dr. Lesley Lewis BSc PhD MCIEEM is a specialist waterbird ecologist and wrote this report. Lesley has a first-class honours degree in Zoology and a PhD in waterbird ecology (PhD Title: Ecological disturbance and its effects on estuarine benthic invertebrate communities and their avian predators).

Lesley has run the ecological consultancy 'Limosa Environmental' for the past 19 years. Lesley acts as Project Manager for each contract and over the years has gained considerable experience working on a range of contracts including Environmental Impact Assessments, Ecological Assessments (EcIA), Stage I Screening for Appropriate Assessment and Natura Impact Statements (NIS).

In addition, Lesley has worked part-time for BirdWatch Ireland since 2009, and from 2009 to 2014 was contracted to the National Parks and Wildlife Service (NPWS) as a Waterbird Ecologist. In this role, Lesley was responsible for the design and implementation of the NPWS baseline low tide waterbird survey programme and the preparation of site-specific Conservation Objectives for 32 coastal SPA sites. This work culminated in the publication of standard low-tide survey methods for waterbirds

(Lewis & Tierney, 2014). After November 2014, Lesley was engaged in a number of BirdWatch Ireland projects including various aspects of the Irish Wetland Bird Survey (I-WeBS), as well as work on forestry birds, seabirds and the Hen Harrier. In 2015 she was assistant project manager on the Seabird4 Survey (survey of cliff-nesting seabirds 2015, NPWS). From September 2017, Lesley took over the project management of both the Irish Wetland Bird Survey (I-WeBS) and the Countryside Bird Survey (CBS). She manages a team of four and is responsible for the delivery of these projects for the National Parks and Wildlife Service.

Dr Alex Copland BSc PhD MIEnvSc is Technical Director with INIS. He undertook all of the survey work reported here and reviewed this report. He has over 25 years of professional experience working in both statutory and private companies, in third-level research institutions and with environmental NGOs. He is proficient in experimental design and data analysis and has managed several large-scale, multi-disciplinary ecological projects. These have included research and targeted management work for species of conservation concern, the design and delivery of practical conservation actions with a range of stakeholders and end-users, education and interpretation on the interface between people and the environment and the development of coordinated, strategic plans for birds and biodiversity.

He has written numerous scientific papers, developed and contributed to evidence-based position papers, visions and strategies on birds and habitats in Ireland. He has supervised the successful completion of research theses for several post-graduate students, including doctoral candidates. He lectures to both undergraduate and post-graduate students at UCD, as well as being a collaborative researcher with both UCD and UCC. He also sits on the Editorial Panel of the scientific journal, Irish Birds, which publishes original ornithological research relevant to Ireland's avifauna.

Mr Howard Williams MCIEEM CEnv CBiol MRSB MIFM is Lead Ecologist with Inis and reviewed and signed off on this report. He has more than 20 years' experience as a professional ecologist, specialising in birds. Following his degree, he worked as a biologist for the ESB for three years (1997-2000). Mr Williams has completed in excess of 500 separate ecology assessments in Ireland and the UK since 2000. Mr Williams is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). He is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Chartered Biologist (CBiol) with the Society of Biology. He is also a full member of the Institute of Fisheries Management. Mr Williams is principal ecologist with INIS Environmental Consultants Ltd and currently project manager on all INIS projects in the Republic of Ireland and the UK.

2. EXISTING ENVIRONMENT

2.1. Site Description

Poulnasherry Bay (see **Figure 2.1.1**) forms part of the wider Shannon Estuary which is designated as the River Shannon and River Fergus Estuaries Special Protection Area (SPA Site Code 4077) under the EU Birds Directive 2009/147/EC[1] (see Appendix I for the River Shannon and River Fergus Estuaries SPA Site Synopsis). Poulnasherry Bay is also a designated Shellfish Area under the EU Shellfish Waters Directive.[2] The *West Shannon Poulnasherry Shellfish Area* covers an area of 7.1 km^2 and extends from Querrin Point to Baunahard Point, taking in the entirety of Poulnasherry Bay (Co. Clare) **(Figure 2.1.2).**

Figure 2.1.1: *Location of Poulnasherry Bay, Co. Clare*

On foot of a full assessment of Oyster (*Crassostrea gigas*) culture using bags and trestles in intertidal areas in Poulnasherry Bay as part of the Shannon and Fergus Estuary SPA, it was concluded that disturbance from aquaculture activities allied with other potential stressors on the distribution of some bird species could not be fully discounted. On this basis, a monitoring programme was deemed required to determine the current and ongoing status of waterbird species in the SPA, in light of current licencing decisions. The monitoring programme was required to have a minimum of four low tide surveys, and one high tide survey following standard methodology as used by the National Parks & Wildlife Service (NPWS) Waterbird Survey Programme 2009-2012 (Lewis & Tierney, 2014). This

[1] the codified version of Council Directive 79/409/EEC (as amended) (Birds Directive).

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

survey programme was therefore undertaken at Poulnasherry Bay during the period October 2018 to March 2019, and subsequently followed by surveys during winters 2019/20, 2020/21, 2021/22 and the current reporting period, winter 2022/23. This report details the results of the surveys during winter 2022/23 and examines these results in the context of the previous winter surveys, and existing waterbird data for the site and wider Shannon and Fergus estuaries system.

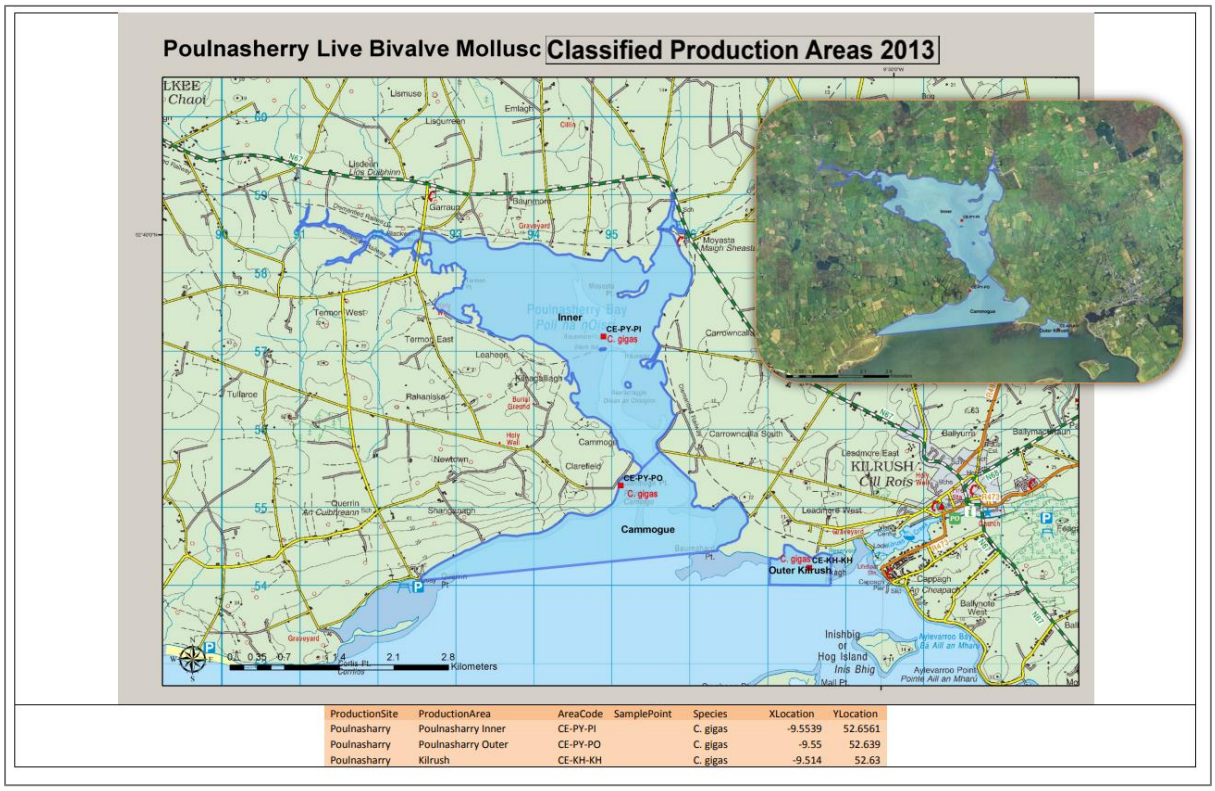


Figure 2.1.2: *Poulnasherry Live Bivalv Mollusc Classified Production Area (www.sfpa.ie).*

2.2. Waterbirds of Poulnasherry Bay

The Shannon Estuary is a large estuary on the west coast of Ireland where Ireland's longest river, the River Shannon enters the Atlantic Ocean[3]. The largest estuarine complex in Ireland (Crowe, 2005), the Shannon estuary comprises the tidal reaches of the river between Limerick City and the Atlantic Ocean including the Fergus Estuary (Hickey & Healey, 2005).

The Shannon and Fergus Estuaries SPA covers a total area of 32,261 ha (NPWS, 2012a; NPWS, 2012b) and is of special conservation interest for 21 waterbird species (**Table 2.2.1**). In addition, the site is selected as a SPA because it regularly supports over 20,000 waterbirds during the non-breeding season making this a site of international importance.

[3] *http://www.infomar.ie/surveying/Bays/Shannon.php*

2.2.1. Published status and trends of Poulnasherry Bay waterbirds

Updated waterbird site trends for 97 wetland sites around the Republic of Ireland were published in April 2022 (Kennedy *et al.*, 2022). These species trends are based on data from the Irish Wetland Bird Survey (I-WeBS) but only sites with sufficient bird count data over the lifetime of the project can be included in analyses. Lewis *et al*. (2016) prepared a review and assessment of waterbird data for the Shannon & Fergus Estuaries based on I-WeBS data and data from the NPWS Waterbird Survey Programme. This review revealed that count coverage during I-WeBS has declined considerably since 2010/11 largely due to a lack of volunteer counters in the area, and to the very large extent of the site. For this reason, site trends for the Shannon & Fergus Estuaries cannot be calculated using I-WeBS data.

Lewis *et al*. (2016) also concluded that waterbird count site totals generated using I-WeBS data largely underestimate the number of waterbirds using the Shannon and Fergus site complex. However, where adequate data existed, it was possible to examine trends at a smaller scale (i.e. subsite scale). These subsite trends were deemed to be robust because they were based on the same count areas and calculated using data from years with the best count coverage (Lewis *et al*., 2016). It was noted that I-WeBS subsite Poulnasherry Bay (0H498) which is an equivalent area to low tide subsites 0H519 and 0H520 (Poulnasherry inner and outer bay) almost exclusively exhibited negative trends for the period examined, with many waterbirds no longer recorded within these subsites.

Table 2.2.1 *Waterbird Special Conservation Interest (SCI) species listed for the Shannon & Fergus Estuaries Special Protection Area.*

Species Name	Latin name	Annex I species	BoCCI[a]	Baseline population[b]	Population status at baseline
Whooper Swan	*Cygnus cygnus*	Yes	Amber	118	All-Ireland Importance
Light-bellied Brent Goose	*Branta bernicla hrota*		Amber	494	International Importance
Shelduck	*Tadorna tadorna*		Amber	1,025	All-Ireland Importance
Wigeon	*Anas penelope*		Amber	3,761	All-Ireland Importance
Teal	*Anas crecca*		Amber	2,260	All-Ireland Importance
Pintail	*Anas acuta*		Amber	62	All-Ireland Importance
Shoveler	*Anas clypeata*		Red	107	All-Ireland Importance
Scaup	*Aythya marila*		Red	102	All-Ireland Importance
Cormorant	*Phalacrocorax carbo*		Amber	245	All-Ireland Importance
Ringed Plover	*Charadrius hiaticula*		Amber	223	All-Ireland Importance
Golden Plover	*Pluvialis apricaria*	Yes	Red	5,664	All-Ireland Importance
Grey Plover	*Pluvialis squatarola*		Red	558	All-Ireland Importance
Lapwing	*Vanellus vanellus*		Red	15,126	All-Ireland Importance
Knot	*Calidris canutus*		Red	2,015	All-Ireland Importance
Dunlin	*Calidris alpina*		Red	15,131	International Importance
Black-tailed Godwit	*Limosa limosa*		Red	2,035	International Importance
Bar-tailed Godwit	*Limosa lapponica*	Yes	Red	460	All-Ireland Importance
Curlew	*Numenius arquata*		Red	2,396	All-Ireland Importance
Greenshank	*Tringa nebularia*		Green	61	All-Ireland Importance
Redshank	*Tringa totanus*		Red	2,645	All-Ireland Importance
Black-headed Gull	*Chroicocephalus ridibundus*		Amber	2,681	All-Ireland Importance

[a] After Birds of Conservation Concern in Ireland (Gilbert *et al*., 2021), [b] Five-year peak mean for the period 1995/96-1999/00.

3. METHODOLOGICAL APPROACH

3.1. Background to the low tide survey programme

The Irish Wetland Bird Survey (I-WeBS) is the primary method by which data are collected for wintering waterbird populations at Irish wetland sites (Lewis *et al.,* 2019). These data, largely collected by volunteer field surveyors since the winter season of 1994/95, have underpinned the designation of Special Protection Areas (SPAs), and have enabled the production of waterbird population estimates and trends at national and site level (Crowe & Holt, 2013; Burke *et al*., 2019; Kennedy *et al.*, 2022). I-WeBS surveys are undertaken primarily on a rising or high tide, when birds are pushed closer to shore or are gathering at roost sites and are easier to count.

While I-WeBS surveys are designed to obtain the most accurate peak counts of waterbirds at a site, they cannot provide information about waterbird abundance or distribution during the low tide period, when many waterbirds are foraging. This gap in knowledge was addressed somewhat during 2009/10, when the National Parks and Wildlife Service (NPWS) initiated a programme of low tide surveys which took place over the three winter seasons of 2009/10, 2010/11 and 2011/12 at 33 coastal SPAs (The NPWS Waterbird Survey Programme). Each SPA site was surveyed in a single winter season and the Shannon & Fergus Estuaries was surveyed in 2010/11. Standard methodology was designed to ensure consistency in data capture and recording at each site (Lewis & Tierney, 2014).

Waterbird surveys at Poulnasherry Bay during the 2022/23 winter season therefore followed the standard methodology developed by the NPWS waterbird survey programme. Similar surveys were also undertaken during the 2018/19, 2019/20, 2020/21 and 2021/22 seasons (Inis Environmental, 2019, 2020, 2021, 2022). Furthermore, a similar survey across the entire Shannon and Fergus estuarine system was undertaken during the 2017/18 season in relation to the Shannon Integrated Framework Programme (SIFP) (MKOS, 2019).

3.2. Survey design and count area

During the NPWS Waterbird Survey Programme, Poulnasherry Bay was sub-divided into two count subsites: 0H519 (Poulnasherry bay outer) and 0H520 (Poulnasherry bay inner).

During the waterbird survey programme of 2018/19, it was discovered that subsites 0H519 (outer) and 0H520 (inner) were wrongly coded/allocated in the subsite map in Appendix 6 of the SPA Conservation Objectives Supporting Document (NPWS, 2012b). The winter bird survey report for 2018/19 (Inis Environmental, 2019) therefore referred to subsites as 0H519 (outer) and 0H520 (inner).

Since then, it has been discovered that data collection and mapping for the SPA Conservation Objectives Supporting Document use **0H519 (Poulnasherry bay inner)** and 0H520 **(Poulnasherry bay outer**). The easiest way to rectify the error would therefore be to make changes to the text within the SPA Conservation Objectives Supporting Document i.e. the data tables/raw data are correct.

Consequently, we have used **0H519 (Poulnasherry bay inner)** and 0H520 **(Poulnasherry bay outer**) going forwards. Care has been taken throughout this report to ensure that data comparison over the various surveys are based on the correct subsite dataset.

As the Poulnasherry Bay Shellfish Area covers a larger area than that covered by subsites 0H519 and 0H520, additional count areas were included in current monitoring. During their 2017/18 monitoring work MKOS (2019) included additional subsites in the outer bay as follows 0H517, 0H518, 0N025 and

0N026. The current monitoring work therefore followed suit (**Table 3.2.1**, **Figure 3.2.1**). A further subsite (0N028 Kilrush Marina) was also added.

Table 3.2.1: *Count Subsites of Poulnasherry Bay*

Subsite Code	Subsite Name
0H517	Querrin
0H519	Poulnasherry inner bay
0H520	Poulnasherry outer bay
0N025	
0N026	
0N027	Subsite created to encompass 0H517 and 0H518 combined
0N028	Kilrush Marina

Figure 3.2.1: *Count subsites used for the Poulnasherry Bay waterbird surveys. 0NO28 (Kilrush Marina) is the small water body immediately north-east of 0NO25 (marked with a star).*

3.3. Field survey methods

Optimum dates were chosen in each month when the survey period spanned midday to facilitate travel to/from the site and ensure surveys were carried out in the best weather and light conditions.

The survey period extended two hours either side of low or high tide (depending on the survey being undertaken). Waterbirds were counted within each count subsite, and the data for each subsite were recorded separately. Waterbird counts were conducted on the 'look-see' basis (Bibby *et al.*, 2000) which involves scanning across the survey area and counting all birds seen. Birds were recorded according to their species code following the two-letter coding system used by I-WeBS and developed by the British Trust for Ornithology.

In addition to counts of each species, the behaviour of waterbirds during counts was attributed to one of two categories (foraging or roosting/other) while the position of the birds was recorded as per one of four broad habitat types (intertidal, subtidal, supratidal and terrestrial). Field maps of count subsites were used to map significant flocks of foraging/roosting birds ('flock maps').

Information was also collected which included the presence of activities that could cause disturbance to waterbirds. Following Lewis & Tierney (2014), activity types were categorised as follows:

(1) human, on-foot - shoreline (2) human, on foot – intertidal aquaculture, (3) bait-diggers (4) non-powered watercraft (5) powered watercraft, (6) water-based recreation (e.g. wind-surfers) (7) horse-riding (8) dogs (9) aircraft (10) shooting (11) other (12) winkle pickers (13) aquaculture machinery (14) other vehicles.

When an activity was observed to cause a disturbance, the waterbird species affected were recorded and a letter code system used to indicate the bird's response to the activity as follows:

W - Weak response, waterbirds move slightly away from the source of the disturbance.

M - Moderate response, waterbirds move away from the source of the disturbance to another part of your subsite; they may return to their original position once the activity ceases.

H - High response, waterbirds fly away to areas outside of your subsite and do not return during the current count session.

The length of the activity was also recorded by adding by the codes **A – D** (see below) and a record was made as to whether the activity was already occurring within the subsite when the count started.

A – short/discrete event.

B – activity occurs for up to 50% of the count period.

C – activity length estimated at >50% but < 100% of the count period.

D – activity continues after the count period has ended.

3.4. Data analysis

3.4.1. General

Field data were collected in notebooks and later transferred by field surveyors into Excel datasheets. At the end of the survey season the Excel datasheets were compiled and validated before being formatted and entered into a MS Access database. From the database, data summaries were produced such as site totals, subsite totals etc.

Waterbird numbers were assessed in relation to the numbers of waterbirds that occur across the wider Shannon and Fergus system and with reference to national and international threshold levels as follows:

- A waterbird species that occurs in numbers that correspond to 1% or more of the individuals in the all-Ireland population of the species is said to occur in numbers of all-Ireland importance. Current population threshold values are published in Burke *et al*. (2019).
- A waterbird species that occurs in numbers that correspond to 1% or more of the individuals in the biogeographic population of the species or subspecies is said to occur in 'internationally important numbers.' Current international population threshold values are published by the African-Eurasian Migratory Waterbird Agreement (AEWA) Conservation Status Review 7 (CSR7) (AEWA, 2018) (published online at wpe.wetlands.org).

3.4.2. Waterbird distribution

Following the methods used in NPWS (2012), data analyses were undertaken to determine the proportional use of subsites by each waterbird Special Conservation Interest (SCI) species for the River Shannon and River Fergus Estuaries SPA, relative to the whole area surveyed on each survey occasion. This gives an indication of the preferred distribution of each species. 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)

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. NPWS (2012b) converted subsite rankings to categories (very high, high, moderate and low) but as the current survey did not cover all of the Shannon & Fergus Estuaries SPA, we simply ranked subsites used in this study numerically within each analysis.

3.4.3. Trends

Poulnasherry Bay (I-WeBS subsite 0H498) received nearly full count coverage during the baseline period used for SPA designation (1995/96 – 1999/00). As this I-WeBS subsite is the same area as the subsites 0H519 and 0H520 combined, this enabled a comparison between the baseline mean peak number of waterbirds within Poulnasherry Bay, the peak count recorded during 2010/11 NPWS Waterbird Survey programme and the more recent winter surveys.

In addition, short-term trends were calculated for selected waterbird SCI species using an indexing method. The species summed counts from the 2022/23 winter season (all five counts summed), along with the four previous seasons were compiled. The summed counts were then used to calculate annual indices. 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). An index for the first season (2018/19) was constrained to a value of one, and indices for all seasons after this were expressed relative to this base value. The mean annual change was then calculated by fitting a trend line (line-of-best-fit) to the data points. The equation of that straight line was then obtained ($y = mx + c$). The gradient (slope) gives a measure of the annual percentage change in index numbers, representing the short-term trend i.e. the annual change in numbers between 2018/19 and 2022/23.

4. RESULTS

4.1. Survey schedule and conditions

The 2021/22 winter waterbird survey season proceeded unhampered by weather conditions. All surveys were carried out with good weather conditions (Table **4.1.1**). Full count coverage of subsites was achieved (Table **4.1.2**).

Table 4.1.1: *Dates and survey type for the 2022/23 survey programme.*

Date	Survey[a]	Wind	Cloud (%)	Rain	Visibility	Notes
28.10.22	LT1	Breezy	34-66	None	Good	No constraints
11.11.22	LT2	Breezy	67-100	None	Good	No constraints
12.12.22	LT3	Light	34-66	None	Good	No constraints
31.01.23	HT	Light	34-66	None	Good	No constraints
06.02.23	LT4	Light	34-66	None	Good	No constraints

[a] LT = Low tide; HT = High tide.

Table 4.1.2: *Count coverage of subsites during winter 2022/23.*

Subsite Code	Subsite Name	LT1	LT2	LT	LT4	HT
0H517	Querrin	1	1	1	1	1
0H519	Poulnasherry inner bay	1	1	1	1	1
0H520	Poulnasherry outer bay	1	1	1	1	1
0N025		1	1	1	1	1
0N026		1	1	1	1	1
0N027	0H517 and 0H518 combined	1	1	1	1	1
0N028	Kilrush Marina	1	1	1	1	1

4.2. Species assemblage, diversity and occurrence

A total of 34 waterbird species was recorded during the winter 2022/23 surveys (**Table 4.2.1**). The species list included 15 wildfowl and allies, 14 wader species and five gull species. **Table 4.2.1** provides the species Latin names; hereafter species common names are used in this report.

The species list includes four species (Great Northern Diver, Little Egret, Golden Plover and Bar-tailed Godwit) listed on Annex I of the EU Bird's Directive. The species list includes 18 out of the total 21 waterbird species listed as Special Conservation Interests (SCIs) for the Shannon & Fergus Estuaries SPA. Species diversity across the entire survey area peaked in December 2022 (30 species) (**Figure 4.2.1**).

Of the total 34 species, 20 (59%) were recorded in all five surveys. Five species occurred in one survey only and were therefore the most scare (Shoveler, Little Grebe, Shag, Ringed Plover and Knot).

Table 4.2.1: *Species recorded during the winter surveys of Poulnasherry Bay 2022/23. A ticked cell means that a species was recorded in the monthly survey. The table also highlights (*) Annex I species on the EU Bird's Directive.*

Species Common name	Species Latin name	Code	LT1	LT2	LT3	LT4	HT1
Light-bellied Brent Goose	*Branta bernicla hrota*	PB		√	√	√	√
Shelduck	*Tadorna tadorna*	SU	√	√	√	√	√
Wigeon	*Anas penelope*	WN	√	√	√	√	√
Teal	*Anas crecca*	T.	√	√	√	√	√
Mallard	*Anas platyrhynchos*	MA			√	√	√
Pintail	*Anas acuta*	PT			√	√	√
Shoveler	*Anas clypeata*	SV			√		
Red-breasted Merganser	*Mergus serrator*	RM			√	√	√
Great Northern Diver	*Gavia immer*	ND	√	√	√	√	√
Little Grebe	*Tachybaptus ruficollis*	LG			√		
Great Crested Grebe	*Podiceps cristatus*	GG	√	√	√	√	√
Cormorant	*Phalacrocorax carbo*	CA	√	√	√	√	√
Shag	*Phalacrocorax aristotelis*	SA		√			
Little Egret*	*Egretta garzetta*	ET	√	√	√	√	√
Grey Heron	*Ardea cinerea*	H.	√	√	√	√	√
Oystercatcher	*Haematopus ostralegus*	OC	√	√	√	√	√
Ringed Plover	*Charadrius hiaticula*	RP			√		
Golden Plover*	*Pluvialis apricaria*	GP	√	√	√		√
Grey Plover	*Pluvialis squatarola*	GV	√	√	√	√	
Lapwing	*Vanellus vanellus*	L.	√	√	√	√	√
Knot	*Calidris canutus*	KN					√
Dunlin	*Calidris alpina*	DN	√	√	√	√	√
Snipe	*Gallinago gallinago*	SN	√	√	√		√
Black-tailed Godwit	*Limosa limosa*	BW	√			√	
Bar-tailed Godwit*	*Limosa lapponica*	BA	√	√	√	√	√
Curlew	*Numenius arquata*	CU	√	√	√	√	√
Greenshank	*Tringa nebularia*	GK	√	√	√	√	√
Redshank	*Tringa totanus*	RK	√	√	√	√	√
Turnstone	*Arenaria interpres*	TT	√	√	√	√	√
Black-headed Gull	*Chroicocephalus ridibundus*	BH	√	√	√	√	√
Common Gull	*Larus canus*	CM	√	√	√	√	√
Lesser Black-backed Gull	*Larus fuscus*	LB	√			√	
Herring Gull	*Larus argentatus*	HG	√	√	√	√	√
Great Black-backed Gull	*Larus marinus*	GB	√	√	√	√	√

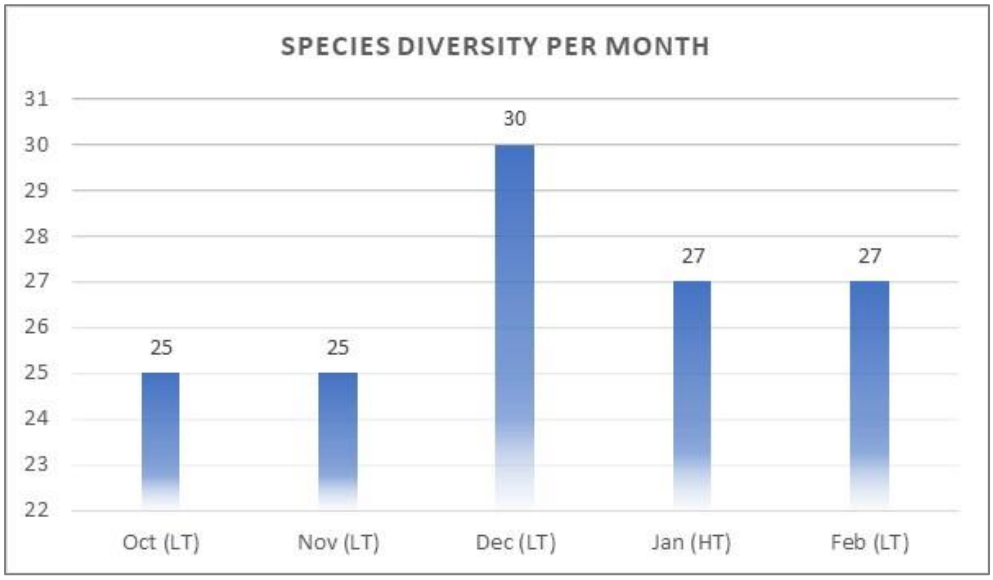


Figure 4.2.1: *Overall species diversity during the monthly surveys.*

Subsite diversity ranged from five species (0N026) to a peak of 31 species (0H519 Poulnasherry inner bay) (**Table 4.2.2**, **Figure 4.2.2**). Poulnasherry inner bay (0H519) and outer bay (0H520) supported a total of 31 and 18 species respectively, similar to the total of 34 species (inner bay) and 15 species (outer bay) recorded during the NPWS Waterbird Survey Programme of winter 2010/11.

The most widely distributed species were Oystercatcher, Curlew and Redshank, recorded in all seven subsites. This was followed by Cormorant and Herring Gull, recorded in six subsites (**Table 4.2.2**). Seven species occurred in one subsite only: Pintail, Shoveler, Little Grebe, Shag, Grey Plover, Knot and Black-tailed Godwit. Waterbird species diversity was highest in 0H519 (Poulnasherry inner bay) during all low tide surveys and during the high tide survey (Figure 4.2.3).

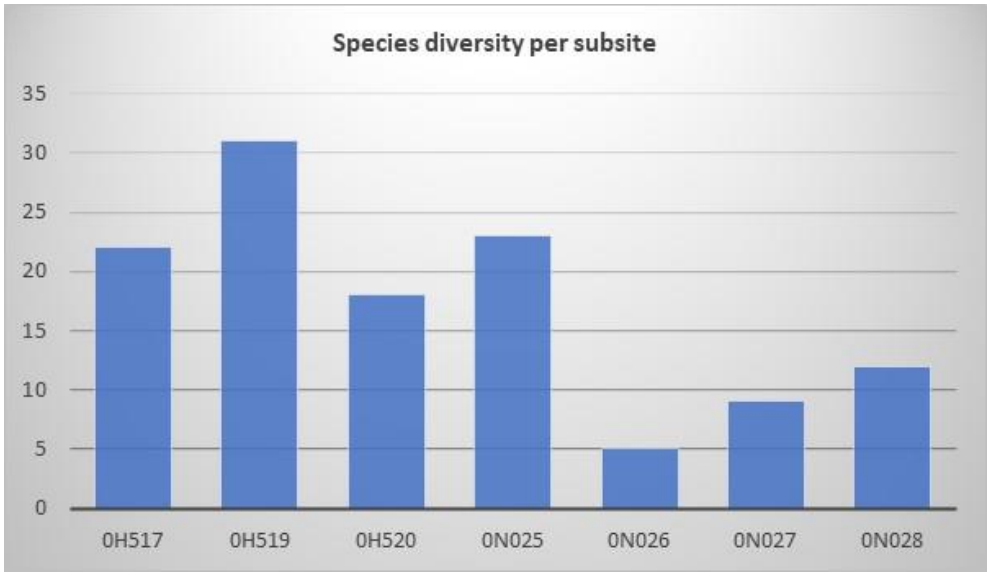


Figure 4.2.2: *Species diversity per subsite.*

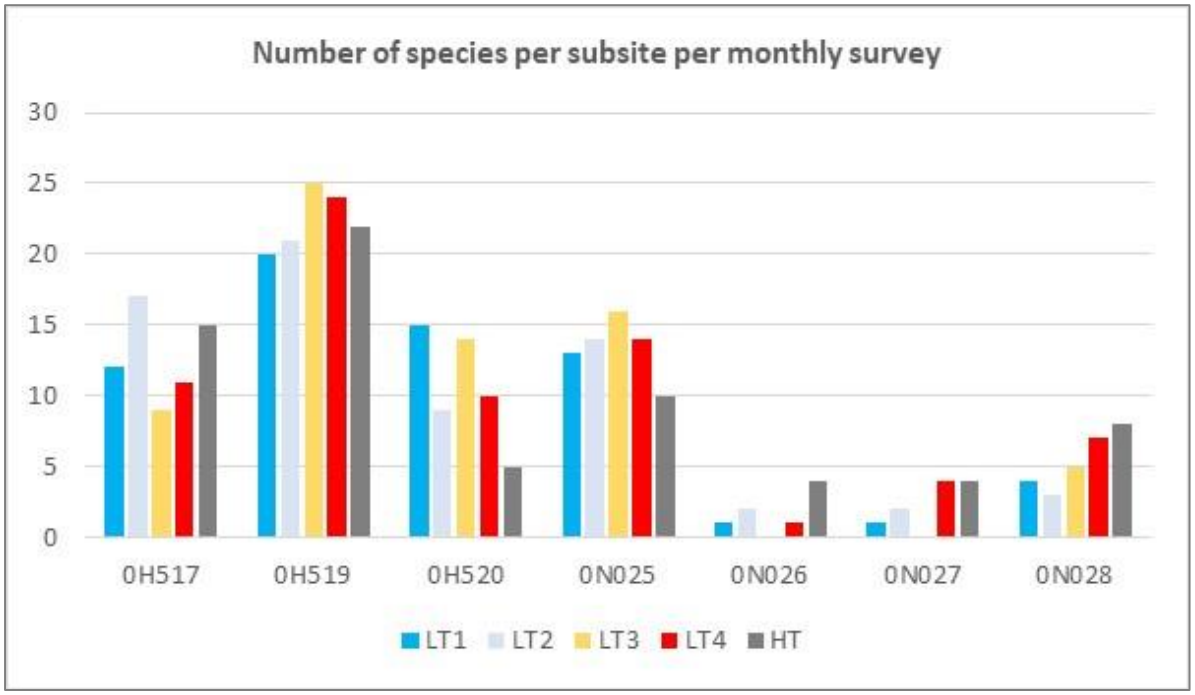


Figure 4.2.3: *Monthly species diversity per subsite.*

Table 4.2.2: *Subsite diversity recorded during the winter surveys of Poulnasherry Bay 2022/23. Numbers refer to the number of surveys in which a species was recorded in each subsite, as well as the number of subsites that a species was recorded within overall.*

Species name	0H517	0H519	0H520	0N025	0N026	0N027	0N028	Number of subsites overall
Light-bellied Brent Goose	2	4	2	2		1		5
Shelduck	3	5						2
Wigeon	4	5						2
Teal	5	4		3			4	4
Mallard		3		1				2
Pintail		3						1
Shoveler		1						1
Red-breasted Merganser		3				1		2
Great Northern Diver	3	3		1	3	1		5
Little Grebe		1						1
Great Crested Grebe		4	4	1				3
Cormorant	1	3	4	3	1		3	6
Shag				1				1
Little Egret	4	5	3	2				4
Grey Heron	3	3	3	5				4
Oystercatcher	5	5	5	5	1	2	1	7
Ringed Plover		1		1				2
Golden Plover	2	3	2	1				4
Grey Plover		4						1
Lapwing	4	5	2	5			2	5
Knot		1						1
Dunlin	4	4		1				3
Snipe		3		2			3	3
Black-tailed Godwit			2					1
Bar-tailed Godwit	1	3	1	3		1		5
Curlew	5	5	5	5	2	1	3	7
Greenshank	4	5	1	4			2	5
Redshank	5	5	3	5	1	2	2	7
Turnstone	3	5	1					3
Black-headed Gull	4	5	4	5			4	5
Common Gull	1	5	4	5			1	5
Lesser Black-backed Gull	1						1	2
Herring Gull	1	3	4	4		1	1	6
Great Black-backed Gull	2	3	2	2		1		5

4.3. Total numbers of waterbirds

During winter 2022/23, total numbers of waterbirds during low tide surveys (across the entire survey rea) peaked at a total 3,704 waterbirds during December 2022 (**Table 4.3.1**). The lowest total count was in October 2022 (1,906 waterbirds). Peak waterbird numbers across the entire survey area have been relatively consistent across recent winters (**Figure 4.3.1**). Total numbers appear to have increased since the NPWS baseline waterbird survey programme (Figure 4.3.1). While only subsites 0H519 and 0H520 were counted in 2010/11, as these two subsites hold the majority of waterbirds, an overall increase in numbers is still apparent.

Table 4.3.1: *Total numbers of waterbirds counted within the study area during 2022/23, plus count totals from the 2010/11 Waterbird Survey Programme for 0H519 and 0H520, and from the waterbird surveys during winter 2018/19, 2019/20, 2021/21 and 2021/22. Winter peak low tide counts are shown in bold font.*

Winter	LT1 (Oct)	LT2 (Nov)	LT3 (Dec)	LT4 (Feb)	HT (Jan)
2022/23	1,906	1,961	**3,704**	3,345	2,664
2021/22	2,698	**3,088**	2,817	1,750	1,911
2020/21	**3,771**	1,809	2,396	1,921	2,187
2019/20	1,756	**3,757**	915	1,170	1,691
2018/19	1,294	**3,314**	760	547	614
2010/11	**1,570**	1,232	1,503	1,167	805

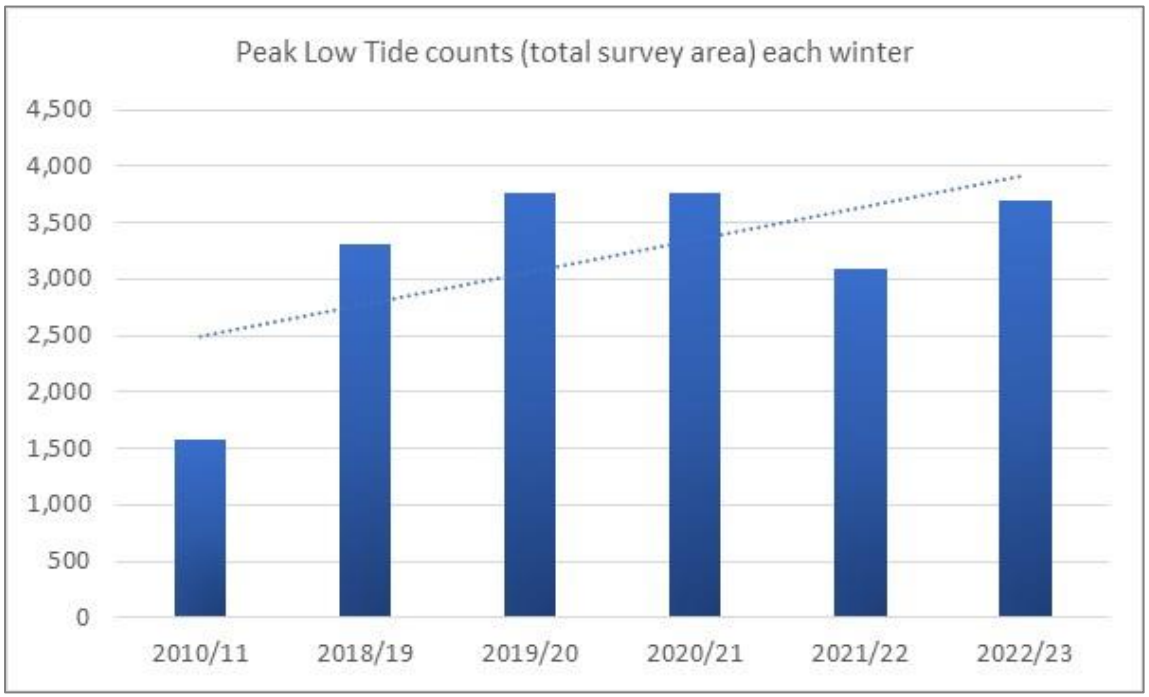


Figure 4.3.1: *Peak numbers (total waterbirds) recorded within the entire study area over time.*

0H519 (inner bay) has supported the greatest number of waterbirds over time **(Table 4.3.2),** and numbers within this subsite have increased over time **(Figure 4.3.2).** Similarly, numbers in the outer bay (0H520) appear to have increased over time although the peak count in the current winter was considerably less than recent winters (**Figure 4.3.3**).

Table 4.3.2: *Total numbers of waterbirds within the inner bay (0H519) and outer bay (0H520) during 2022/23, plus count totals from the 2010/11 Waterbird Survey Programme for 0H519 and 0H520, and from the waterbird surveys during winter 2018/19, 2019/20, 2021/21 and 2021/22.*

Winter	Subsite	LT1 (Oct)	LT2 (Nov)	LT3 (Dec)	LT4 (Feb)	HT (Jan)
2022/23	0H519	1,147	1,318	2,760	2,688	1,346
2021/22		2,238	2,265	2449	1,458	1,608
2020/21		3,021	1,733	1.643	1,467	1,307
2019/20		1,477	3,099	715	825	1315
2018/19		1,198	1,943	677	511	573
2010/11		1,518	1,200	1,440	1,103	761
2022/23	0H520	87	100	71	86	37
2021/22		161	76	62	136	133
2020/21		161	76	62	136	113
2019/20		42	118	73	101	22
2018/19		84	102	19	18	19
2010/11		52	32	63	64	44

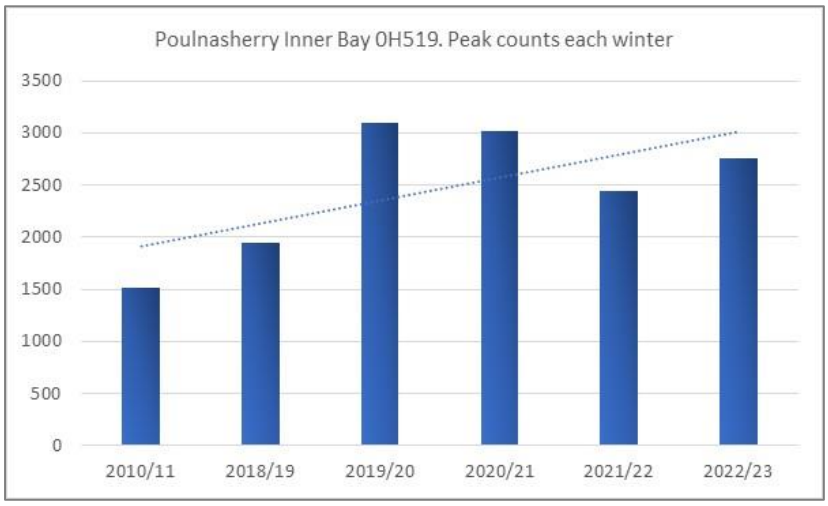


Figure 4.3.1: *Peak numbers recorded within 0H519 over time.*

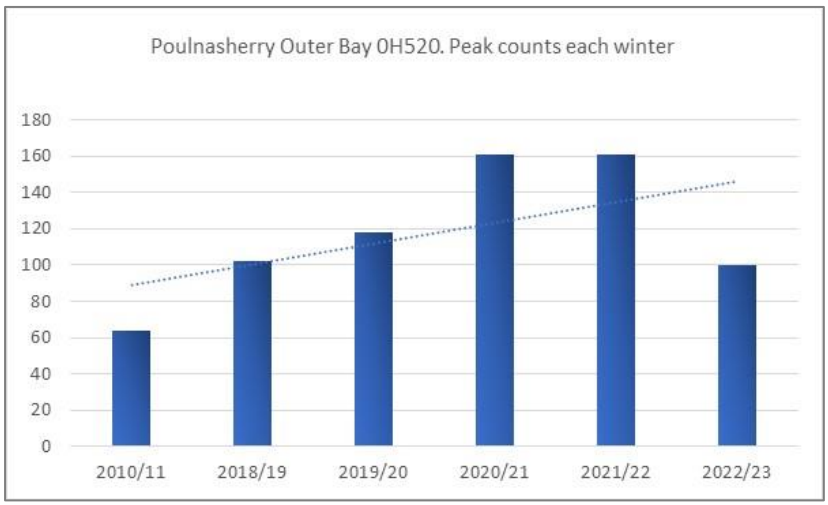


Figure 4.3.2: *Peak numbers recorded within 0H520 over time.*

4.4. Species numbers

4.4.1 Site totals

Waterbird species peak counts for the 2022/23 winter season at Poulnasherry Bay are shown in **Table 4.4.1.** Seven waterbird species were recorded in numbers of national (all-Ireland) importance namely Shelduck, Wigeon, Pintail, Little Egret, Golden Plover, Grey Plover, and Dunlin. Wigeon and Teal were the most numerous of the wildfowl and allies, while Golden Plover and Dunlin were the most numerous wading birds. Black-headed Gull was the most abundant gull species.

Table 4.4.1: *Waterbird species totals per survey (across entire survey area). * denotes numbers of birds of national (all-Ireland) importance (after Burke* et al*. 2019).*

Species Common name	1% National	1% international	LT1	LT2	LT3	LT4	HT1
Light-bellied Brent Goose	350	400		1	100	102	91
Shelduck	100	2500	7	26	52	135*	216*
Wigeon	560	14,000	154	66	739*	260	135
Teal	360	5,000	165	257	263	299	193
Mallard	280	53,000			10	18	21
Pintail	20	600			14	75*	38*
Shoveler	20	650			4		
Red-breasted Merganser	25	860			1	2	2
Great Northern Diver	20	50	2	5	3	6	8
Little Grebe	20	4,700			1		
Great Crested Grebe	30	6,300	14	4	5	1	5
Cormorant	110	1,200	18	6	1	6	4
Shag	-	-		1			
Little Egret	20	1,100	24*	22*	23*	10	2
Grey Heron	25	5,000	9	3	8	6	1
Oystercatcher	610	8,200	29	42	18	37	81
Ringed Plover	120	540			18		
Golden Plover	920	9,300	182	107	19		1,020*
Grey Plover	30	2,000	20	16	52*	39*	
Lapwing	850	72,300	190	379	20	246	270
Knot	160	53,00					58
Dunlin	460	13,300	478*	431	1,153*	1,315*	35
Snipe	-	-	3	12	4		2
Black-tailed Godwit	200	1,100	3			2	
Bar-tailed Godwit	170	1,500	2	6	32	9	1
Curlew	350	7,600	133	235	118	174	166
Greenshank	20	3,300	10	5	6	9	7
Redshank	240	2,400	148	181	165	156	75
Turnstone	95	1,400	2	8	5	2	72
Black-headed Gull	-	-	238	38	824	352	137
Common Gull	-	-	60	84	27	56	11
Lesser Black-backed Gull	-	-	1			1	
Herring Gull	-	-	10	14	18	23	2
Great Black-backed Gull	-	-	4	12	1	4	12

4.4.2 Subsite totals

Monthly subsite count data are provided for waterbird SCI species in Appendix 2.

4.5. Trends in waterbird numbers

Poulnasherry Bay (I-WeBS subsite 0H498) received nearly full I-WeBS count coverage during the baseline period used for SPA designation (1995/96 – 1999/00). As this I-WeBS subsite is the same area as the subsites 0H519 and 0H520 combined, this enables a comparison between the baseline mean peak number of waterbirds within Poulnasherry Bay, the peak count recorded during 2010/11 NPWS Waterbird Survey Programme, and peak counts from the 2018/19, 2019/20, 2020/21, 2021/22 and 2022/23 winter waterbird surveys. These data are shown in **Table 4.5.1.**

While a simple comparison of peak numbers is crude, it does provide some indication of the trends in numbers. The results of the comparison are shown in **Table 4.5.2** where the comparison of peak counts used the calculation of percentage change, calculated as:

$$\% \text{ Change} = ((I_{recent} - I_{early}) / (I_{early})) \times 100$$

Where I_{recent} is the most recent peak count, and I_{early} is the earlier peak count.

Results in Table 4.5.2 suggest that 13 of the total 21 waterbird SCI species (62%) have decreased in number in Poulnasherry Bay since the baseline period (1995/96 – 1999/00) with five species (Teal, Pintail, Shoveler, Ringed Plover and Grey Plover) appearing to occur in similar numbers. The remaining three species are considered stable. Comparing peak counts recorded in winter 2010/11 with the most recent winter surveys however suggests that two-thirds of the species have increased in number. These varying results are discussed in **Section 5** of this report.

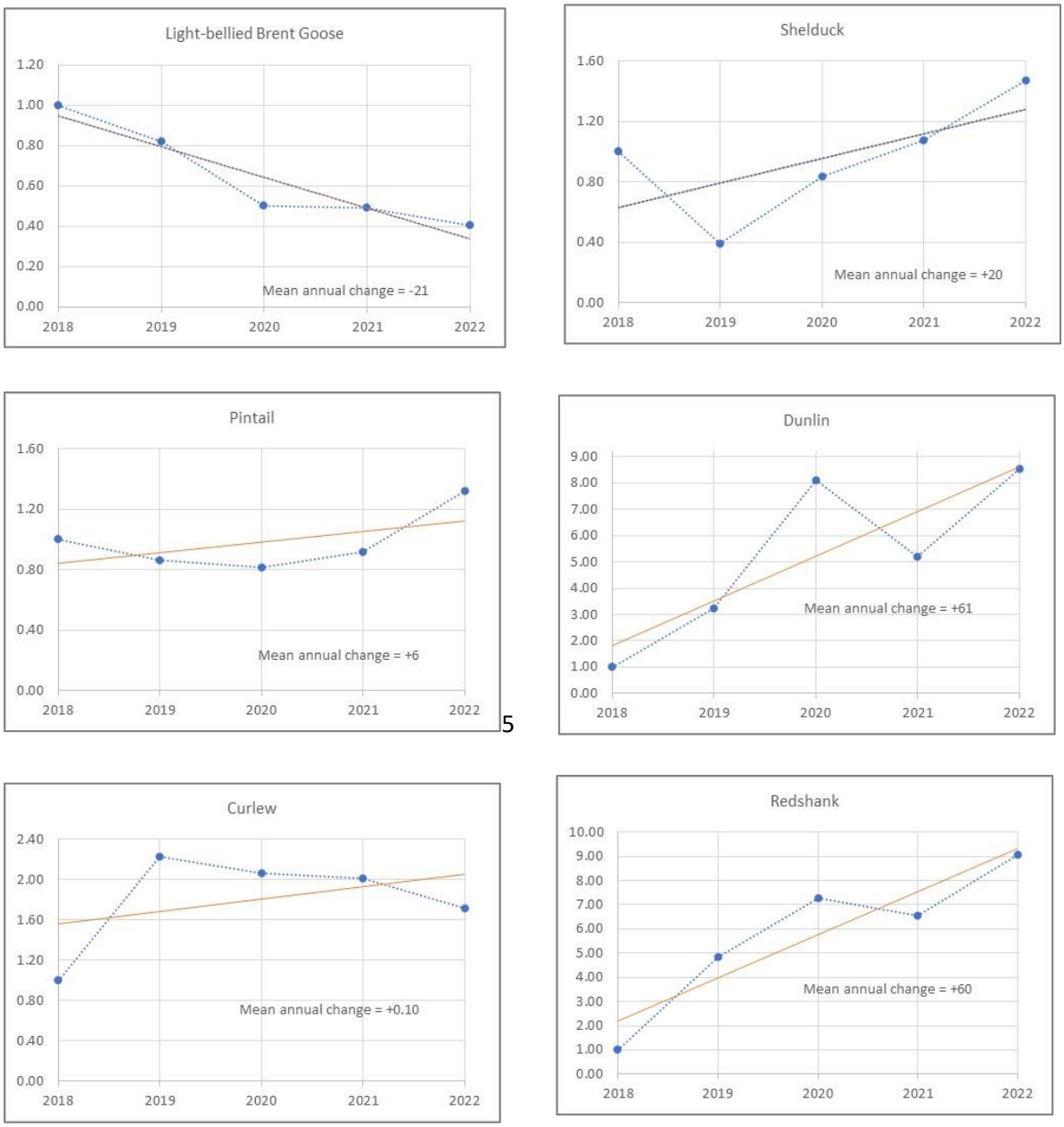
Table 4.5.1: *Baseline data for waterbird SCI species of the Shannon & Fergus Estuaries SPA within Poulnasherry Bay, plus the peak count from the NPWS Waterbird Survey programme 2010/11, and the peak species count from the 2018/19, 2019/20, 2020/21, 2021/22 and 2022/23 winter seasons.*

Species	(A) Mean 95/96 - 99/00	(B) Peak count 2010/11	(C) Peak count 2018/19	(D) Peak count 2019/20	(E) Peak count 2020/21	(F) Peak count 2021/22	(G) Peak count 2022/23	(H) Peak C-G
Whooper Swan	1	0	0	0	0	0	0	0
Light-bellied Brent Goose	539	56	256	179	214	106	102	256
Shelduck	180	196	115	48	104	133	216	216
Wigeon	1,125	61	332	763	750	679	739	763
Teal	176	510	218	274	1,103	805	299	1,103
Pintail	57	0	82	51	71	57	75	82
Shoveler	3	37	6	13	0	5	4	13
Scaup	22	8	0	0	0	0	0	0
Cormorant	58	12	8	5	9	5	6	9
Ringed Plover	155	28	53	213	54	32	18	213
Golden Plover	1,380	7	80	102	52	111	1,020	1,020
Grey Plover	66	37	7	10	113	6	52	113
Lapwing	2,522	155	483	238	107	554	379	554
Knot	164	33	0	26	18	65	58	65
Dunlin	2,300	457	336	921	888	591	1,315	1,315
Black-tailed Godwit	16	10	2	4	7	0	2	7
Bar-tailed Godwit	95	16	5	33	13	26	32	33
Curlew	654	209	146	269	234	316	235	316
Greenshank	32	13	8	10	6	9	9	10
Redshank	197	153	80	96	145	222	181	222
Black-headed Gull	1,818	42	109	118	213	296	824	824

Table 4.5.2: *Comparison between the baseline mean peak number of waterbirds within Poulnasherry Bay, and the peak count recorded during 2010/11 NPWS Waterbird Survey Programme, with the peak count across the winters 2018/19, 2019/20, 2020/21, 2021/22 and 2022/23. Letters in parentheses relate to the columns in Table 4.5.1 above.* ↓ = decline, ↑ = increase, ------ = stable.

Species	% Change (A) vs (H)	% Change (B) vs (H)	Trend direction (A) vs (H)	Trend direction (B) vs (H)
Whooper Swan	-100	-	----------	----------
Light-bellied Brent Goose	-53	357	↓	↑
Shelduck	20	10	----------	----------
Wigeon	-32	1151	↓	↑
Teal	527	116	↑	↑
Pintail	44	100	↑	↑
Shoveler	333	-65	↑	↓
Scaup	-100	-100	↓	↓
Cormorant	-84	-25	↓	↓
Ringed Plover	37	661	↑	↑
Golden Plover	-26	14471	↓	↑
Grey Plover	71	205	↑	↑
Lapwing	-78	257	↓	↑
Knot	-60	97	↓	↑
Dunlin	-43	188	↓	↑
Black-tailed Godwit	-56	-30	↓	↓
Bar-tailed Godwit	-65	106	↓	↑
Curlew	-52	51	↓	↑
Greenshank	-69	-23	↓	----------
Redshank	13	45	----------	↑
Black-headed Gull	-55	1862	↓	↑

Following methods described in Section 3.4.3, the mean annual change was calculated to represent a short-term trend reflecting the change in waterbird numbers between 2018/19 and 2022/23. Results for selected SCI species are shown in **Figure 4.5.1.** This short-term analysis reveals that numbers of Light-bellied Brent Gese have declined in the past five years, while numbers of Shelduck, Pintail, Dunlin, Redshank and Curlew have increased.



5

Figure 4.5.1: *Short-term trend for selected waterbird SCI species.*

4.6. Relative importance of subsites

Based on total numbers across all four low tide surveys, 0H519 (Poulnasherry inner bay) was the most important subsite for all of the waterbird SCI species recorded during the survey (**Table 4.6.1**), with all SCI species except occurring in their largest numbers on at least one occasion in this subsite.

Poulnasherry inner bay (0H519) held peak numbers of the majority of intertidally foraging species at low tide (**Table 4.6.2**) and 11 species during the high tide period (**Table 4.6.3**).

Table 4.6.1: *Relative importance of each subsite – subsites are ranked 1-7 based on the total numbers of waterbird SCI species during low tide surveys. The highest rank number from any of the four low tide surveys is shown and the number in brackets is the number of surveys that a species was recorded in that subsite. Blank cells mean that a species was not recorded in that subsite.**

Species	0H517	0H519	0H520	0N025	0N026	0N027	0N028*
Light-bellied Brent Goose	3 (1)	1(3)	2 (2)	3 (1)			
Shelduck	2 (2)	1 (4)					
Wigeon	1 (3)	1 (4)					
Teal	1 (4)	1 (3)		3 (2)			3 (4)
Pintail		1 (2)					
Shoveler		1 (1)					
Cormorant	2 (1)	1 (2)	2 (3)	3 (2)			3 (2)
Ringed Plover		1 (1)		2 (1)			
Golden Plover	2 (1)	1 (2)	2 (2)	2 (1)			
Grey Plover		1 (4)					
Lapwing	1 (3)	1 (4)	4 (2)	2 (4)			3 (2)
Knot*	-						
Dunlin	2 (3)	1 (4)		3 (1)			
Black-tailed Godwit			1 (2)				
Bar-tailed Godwit		1 (3)	1 (1)	1 (3)		2 (1)	
Curlew	2 (4)	1 (4)	2 (4)	3 (4)	5 (1)		5 (2)
Greenshank	1 (3)	1 (4)	3 (1)	2 (4)			3 (1)
Redshank	2 (4)	1 (4)	4 (2)	3 (4)		4 (1)	4 (1)
Black-headed Gull	4 (3)	1 (4)	2 (4)	1 (4)			4 (3)

*Only recorded during high tide survey

Table 4.6.2: *Relative importance of each subsite (highest ranked number) based on numbers of selected waterbird SCI species foraging intertidally during low tide surveys. The highest rank number from any of the four low tide surveys is shown.*

Species	0H517	0H519	0H520	0N025	0N026	0N027	0N028
Light-bellied Brent Goose	3	1	2	3			
Shelduck	2	1					
Ringed Plover		1		2			
Grey Plover		1					
Lapwing	1	1	3	2			
Knot*							
Dunlin	2	1		3			
Bar-tailed Godwit		1	1	1		2	
Curlew	2	1	2	3			**4**
Redshank	2	1	3	3		4	

*Only recorded during high tide survey

Table 4.6.3: *Relative importance of each subsite for SCI species at high tide based on ranked total numbers.*

Species	0H517	0H519	0H520	0N025	0N026	0N027	0N028
Light-bellied Brent Goose	3	1		2		4	
Shelduck	2	1					
Wigeon	2	1					
Teal	2	1		3			
Pintail		1					
Shoveler*							
Cormorant		1	1		1		1
Ringed Plover*							
Golden Plover	1	2					
Grey Plover*							
Lapwing	1	3		2			
Knot		1					
Dunlin	1						
Black-tailed Godwit*							
Bar-tailed Godwit	1						
Curlew	2	1	3	4	5	6	6
Greenshank	2	1					2
Redshank	2	1	4	3	4	4	4
Black-headed Gull	4	1		3			2

*Not recorded during high tide survey

4.7. Activities and disturbance

Disturbance events were recorded within three count subsites only (0H519, 0H520 and 0N025) with activities recorded in a maximum of two out of the five surveys undertaken. All events occurred during low tide surveys (**Table 4.7.1**). These results suggest a low level of activities that cause disturbance at the site, however, as a survey count period is a 'snap-shot' of any given time, further targeted surveys would be required to understand the full extent of activities at the site.

A male Hen Harrier (*Circus cyaneus*) was observed on two survey occasions. On one occasion it flushed Snipe (*Gallinago gallinago*) from saltmarsh, while on the other occasion it disturbed a flock of Curlew.

***Table 4.7.1**: Activities recorded at Poulnasherry Bay 2022/23*

Subsite Code	Subsite Name	Activity	Number of survey occasions recorded	Causing a disturbance?	Response of waterbirds
0H519	Poulnasherry inner Bay	Aquaculture activities (mechanical)	2	Yes	Moderate
		Aquaculture activities (humans on foot)	2	No	
		Bait diggers	2	No	
		Dogs	1	No	
0H520	Poulnasherry outer Bay	Aquaculture activities (mechanical)	1	No	
		Dogs	1	No	
		Shellfish pickers	1	No	
0N025		Shellfish picking	1	No	
		Other (loose horses)	1	Yes	Moderate

5. DISCUSSION

The Shannon & Fergus estuaries system is known to support over 20,000 waterbirds during winter (Crowe, 2005, MKOS, 2019). Although lack of count cover during I-WeBS means that site total counts have not exceeded 20,000 waterbirds in recent years, counts during the winter of 2017/18 season for the Shannon Integrated Framework Programme (SIFP) (MKOS, 2019) confirmed that over 20,000 waterbirds were present across all winter months. The peak count of 43,093 waterbirds (December 2017) (MKOS, 2019) confirmed that the Shannon & Fergus estuaries is the most important site in the Republic of Ireland in terms of total waterbird numbers. This is highly likely to still be the case.

Covering an area of little over 350ha, Poulnasherry Bay is therefore a relatively small area within the overall Shannon and Fergus system. However, as the current and previous Marine Institute monitoring reports have shown, the bay is an important integral part of the Shannon and Fergus estuaries SPA. Data collected during winter 2022/23 again confirm the importance of this bay, with seven waterbird species recorded in numbers of national (all-Ireland) importance namely Shelduck, Wigeon, Pintail, Little Egret, Golden Plover, Grey Plover and Dunlin.

The total number of waterbirds within the inner and outer bay has increased since the NPWS baseline low tide survey programme carried out in winter 2010/11. In that winter, a peak count of 1,570 waterbirds was recorded in the inner and outer bay combined. In more recent winters, the inner bay alone has supported numbers of over 3,000 waterbirds on some survey occasions. However, it is known that the cold weather that occurred between December 2010 and February 2011 is likely to have affected waterbird distribution and numbers across sites (NPWS, 2012b) so the data collected during winter 2010/11 may not serve as a useful baseline. Data collected since winter 2018/19 shows that peak waterbird numbers across the entire survey area have been relatively consistent/stable (3,704 (2022/23), 3,088 (2021/22), 3,771 (2020/21), 3,757 (2019/20) and 3,314 (2018/19)). Numbers of total waterbirds within both the inner and outer bay subsites also show a trend for increase over time.

While the trend for total waterbird numbers is positive, understanding patterns and trends for individual waterbird species is difficult to ascertain because numbers of many species can vary widely between months. This is possibly due to some species ranging more widely across the Shannon system and not frequently occurring within Poulnasherry Bay. We examined species trends in a number of ways, mainly comparing species peak numbers across time. While this simple comparison of peak numbers is crude, it does provide some indication of the trends in numbers. Comparisons of recent peaks with the baseline period (1995/96 – 1999/00) showed that just over half (13 species) of the total 21 waterbird SCI species have decreased in number in Poulnasherry Bay over time. Many of these species are declining at national level however, and as the total numbers of waterbirds wintering in Ireland has declined by almost 40% since the mid 1990's (Burke et al., 2019), such a large decline nationally obviously has implications for numbers at individual sites (Kennedy et al., 2022). There is no doubt that Scaup has declined at the site, but this species has declined substantially throughout Ireland and has a current long-term trend for large decline (-89.2) (Kennedy et al., 2022). Similarly, Lapwing and Golden Plover (large declines nationally) and Dunlin and Curlew (moderate declines nationally) are wading birds that have declined substantially in number across Ireland.

A comparison of recent peak counts with those recorded in winter 2010/11 suggests that two-thirds of the SCI species have increased in number. However, for the reasons described above, data from winter 2010/11 for this site do not appear to serve as a useful baseline. Waterbird numbers in the very

cold winter of 2010/11 were likely unusually low, so caution is advised with these seemingly positive trends.

This year, we examined trends of selected waterbird species by an indexing method. While only five recent consecutive years data are available, this method does allow a more robust assessment over the recent short-term five-year period. Of note within these results was the short-term trend for decline in Light-bellied Brent Goose. This is perhaps surprising because 'Brent' geese have been undergoing a sustained population increase nationally for many years. However, the national short-term trend is now for decline and perhaps the numbers recorded at Poulnasherry reflect this (Kennedy et al., 2022). As one of the former most numerous species of waterbird within Poulnasherry Bay, this is certainly a trend to monitor in the future. The other waterbird species assessed by indexing however showed trends for increase, namely Shelduck, Pintail, Dunlin, Redshank and Curlew. This method for assessing the current/recent trends is certainly the most robust, and the continuation of a bespoke annual waterbird monitoring programme at Poulnasherry Bay is therefore highly recommended to continue these analyses.

Poulnasherry inner bay (0H519) remains the most important subsite for waterbirds across the survey area. The inner parts of the subsite that are sheltered, close to freshwater flows and have expanses of saltmarsh habitat, appear to be favoured to a large extent, especially at high tide for roosting. Results are consistent with the coordinated surveys undertaken during winter 2017/18 (MKOS, 2019) where the inner bay was found to be most important (based on total numbers at low tide) for Light-bellied Brent Goose, Shelduck, Ringed Plover, Grey Plover, Knot, Dunlin, Bar-tailed Godwit and Curlew. As noted above, the total numbers of waterbirds using the area appear to be relatively stable, against the backdrop of known declines in wintering waterbird populations nationally.

6. REFERENCES

AEWA (2018) *AEWA Conservation Status Review 7 (CSR7) Report on the conservation status of migratory waterbirds in the agreement area. Seventh Edition. Agreement on the Conservation of African- Eurasian Migratory Waterbirds.* May 2018.

Bibby, C. J., Burgess, N. D., Hill, D. A. & Mustoe, S. H. (2000). *Bird Census Techniques.* Academic Press.

BirdLife International (2001) Important Bird Areas and potential Ramsar Sites in Europe. BirdLife International, Wageningen, the Netherlands.

Burke, B., Lewis, L. J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, T. D. (2019) Estimates of waterbird numbers wintering in Ireland, 2011/12 – 2015/16. *Irish Birds* **11:** 1-12.

Colhoun, K. & Cummins, S. (2013) Birds of conservation concern in Ireland 2014-2019. *Irish Birds* **9:** 523-544.

Crowe, O. (2005) *Ireland's Wetlands and their waterbirds:* Status and Distribution. BirdWatch Ireland. Newcastle, Co Wicklow.

Crowe, O. & Holt, C. (2013) Estimates of waterbird numbers wintering in Ireland 2006/07 – 2010/11. *Irish Birds* **9**: 545-552.

Crowe, O., Austin, G, E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A. J. (2008) Estimates and trends of waterbird numbers wintering in Ireland, 1994/95-2003/04. *Bird Study* **55**: 66-77.

Gilbert, G., Stanbury, A. & Lewis, L.J. (2021) Birds of conservation concern in Ireland 4 2020 – 2026. *Irish Birds* **43**: 1-22.

Gittings, T. & O'Donoghue, P. (2012) *The effects of intertidal oyster culture on the spatial distribution of waterbirds.* Report to the Marine Institute. 2012.

Hickey K.R. & Healy M.G. (2005) The reclamation of the Shannon Estuary inter-tidal flats: A case study of the Clare Slobland Reclamation Company. *Irish Geography* **38**: 96-106.

Inis Environmental (2019) Poulnasherry Bay Waterbird Survey – Winter 2018-19 Bird Survey Report. Report for the Marine Institute. July 2019.

Inis Environmental (2020) Poulnasherry Bay Waterbird Survey – Winter 2019-20 Bird Survey Report. Report for the Marine Institute. September 2020.

Inis Environmental (2021) Poulnasherry Bay Waterbird Survey – Winter 2020-21 Bird Survey Report. Report for the Marine Institute. April 2021.

Inis Environmental (2022) Poulnasherry Bay Waterbird Survey – Winter 2021-22 Bird Survey Report. Report for the Marine Institute. June 2022.

Kennedy, J., Burke, B., Fitzgerald, N., Kelly, S.B.A., Walsh, A.J. & Lewis, L.J. 2022. Irish Wetland Bird Survey: I-WeBS National and Site Trends Report 1994/95 – 2019/20. BirdWatch Ireland Waterbird Report to the National Parks and Wildlife Service. BirdWatch Ireland, Wicklow. (https://birdwatchireland.ie/app/uploads/2022/04/iwebs_trends_report.html)

Lewis, L. J., Burke, B. & Crowe, O. (2016) *Review and assessment of waterbird data from the Shannon-Fergus Estuary.* A report commissioned by Clare County Council and prepared by BirdWatch Ireland. February 2016.

Lewis L. J. & Tierney, T. D. (2014) Low tide waterbird surveys: survey methods and guidance notes. *Irish Wildlife Manuals* No. 80. National Parks & Wildlife Service, Department of the Arts, Heritage and Gaeltacht.

Lewis, L. J., Burke, B., Fitzgerald, N., Tierney, T. D. & Kelly, S. (2019) Irish Wetland Bird Survey: Waterbird Status and Distribution 2009/10 - 2015/16. *Irish Wildlife Manuals* No. 106. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

MKOS (McCarthy Keville O'Sullivan) (2019) *Waterfowl numbers, usage and distribution on the River Shannon & River Fergus Estuaries.* Volume 1. Final report. Report to Clare County Council.

NPWS (2012a) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012b) River Shannon & River Fergus Estuaries Special Protection Area. Site Code 4077. Conservation Objectives Supporting Document. Version 1. September 2012. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Wetlands International (2012) *Waterfowl Population Estimates – Fifth Edition*. Wetlands International, Wageningen, The Netherlands.

APPENDIX I: RIVER SHANNON AND RIVER FERGUS ESTUARIES SPA SITE SYNOPSIS

Site Name: River Shannon and River Fergus Estuaries SPA

Site Code: 004077

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry.

The site has vast expanses of intertidal flats which contain a diverse macro-invertebrate community, e.g. Macoma-Scrobicularia-Nereis, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

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

The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (57,133 - five year mean for the period 1995/96 to 1999/2000), a concentration easily of international importance. The site has internationally important populations of Light-bellied Brent Goose (494), Dunlin (15,131) and Black-tailed Godwit (2,035). A further 18 species have populations of national importance, i.e. Cormorant (245), Whooper Swan (118), Shelduck (1,025), Wigeon (3,761), Teal (2,260), Pintail (62), Shoveler (107), Scaup (102), Ringed Plover (223), Golden Plover (5,664), Grey Plover (558), Lapwing (15,126), Knot (2,015), Bar-tailed Godwit (460), Redshank (2,645), Curlew (2,396), Greenshank (61) and Black-headed Gull (2,681) - figures are five year mean peak counts for the period 1995/96 to 1999/2000. The site is among the most important in the country for several of these species, notably Dunlin (13 % of national total), Lapwing (6% of national total) and Redshank (9% of national total).

The site also supports a nationally important breeding population of Cormorant (93 pairs in 2010).

Other species that occur include Mute Swan (103), Mallard (441), Red-breasted Merganser (20), Great Crested Grebe (50), Grey Heron (38), Oystercatcher (551), Turnstone (124) and Common Gull (445) - figures are five year mean peak counts for the period 1995/96 to 1999/2000.

Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn.

The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of three species, i.e. Light-bellied Brent Goose, Dunlin and Black-tailed Godwit. In addition, there are 18 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit.

APPENDIX 2: MONTHLY SUBSITE COUNT DATA

*Subsite counts for waterbird SCI species recorded within Poulnasherry Bay winter 2022/23. * indicates numbers of national (all Ireland) importance.*

Species name	Code	Subsite	1% National threshold	LT1	LT2	LT3	LT4	HT1
Light-bellied Brent Goose	0H517	Querrin	350				2	12
	0H519	Poulnasherry inner bay	350		1	69	58	49
	0H520	Poulnasherry outer bay	350			31	40	
	0N025		350				2	23
	0N027	0H517/518 combined	350					7
Shelduck	0H517	Querrin	100		2		6	8
	0H519	Poulnasherry inner bay	100	7	24	52	129	208*
Wigeon	0H517	Querrin	560		37	162	23	57
	0H519	Poulnasherry inner bay	560	154	29	577*	237	78
Teal	0H517	Querrin	360	155	52	38	220	43
	0H519	Poulnasherry inner bay	360		154	165	63	120
	0N025		360	8		14		30
	0N028	Kilrush Marina	360	2	51	46	16	
Pintail	0H519	Poulnasherry inner bay	20			14	75*	38*
Shoveler	0H519	Poulnasherry inner bay	20			4		
Cormorant	0H517	Querrin	110		1			
	0H519	Poulnasherry inner bay	110	8			1	1
	0H520	Poulnasherry outer bay	110	6	1	1		1
	0N025		110	3	4		4	
	0N026		110					1
	0N028	Kilrush Marina	110	1			1	1
Ringed Plover	0H519	Poulnasherry inner bay	120			15		
	0N025	Poulnasherry bay	120			3		
Golden Plover	0H517	Querrin	920		15			660
	0H519	Poulnasherry inner bay	920	180	92			360
	0H520	Poulnasherry outer bay	920	2		1		
	0N025		920			18		
Grey Plover	0H519	Poulnasherry inner bay	30	20	16	52*	39*	
Lapwing	0H517	Querrin	850	94	81		69	214
	0H519	Poulnasherry inner bay	850	81	188	9	152	12
	0H520	Poulnasherry outer bay	850		23	1		
	0N025		850	15	87	9	1	44
	0N028	Kilrush Marina	850			1	24	
Knot	0H519	Poulnasherry inner bay	160					58
Dunlin	0H517	Querrin	460	48	37	51		35
	0H519	Poulnasherry inner bay	460	430	394	1100*	1315	
	0N025		460			2		
Black-tailed Godwit	0H520	Poulnasherry outer bay	200	3			2	
Bar-tailed Godwit	0H517	Querrin						1

	0H519	Poulnasherry inner bay	170		6	31	7	
	0H520	Poulnasherry outer bay	170	1				
	0N025		170	1		1	1	
	0N027	0H517/518 combined	170				1	
Curlew	0H517	Querrin	350	2	31	42	30	34
	0H519	Poulnasherry inner bay	350	118	151	66	134	104
	0H520	Poulnasherry outer bay	350	8	47	5	7	20
	0N025		350	4	5	5	2	4
	0N026		350				1	2
	0N027	0H517/518 combined	350					1
	0N028	Kilrush Marina	350	1	1			1
Greenshank	0H517	Querrin	20	1	2		3	1
	0H519	Poulnasherry inner bay	20	6	2	3	4	5
	0H520	Poulnasherry outer bay	20	1				
	0N025		20	2	1	3	1	
	0N028	Kilrush Marina	20				1	1
Redshank	0H517	Querrin	240	42	56	2	38	24
	0H519	Poulnasherry inner bay	240	64	92	156	99	38
	0H520	Poulnasherry outer bay	240	20		1		4
	0N025		240	22	33	6	15	6
	0N026		240					1
	0N027	0H517/518 combined	240				1	1
	0N028	Kilrush Marina	240				3	1
Black-headed Gull	0H517	Querrin		2	1	11		1
	0H519	Poulnasherry inner bay		24	25	389	281	122
	0H520	Poulnasherry outer bay		11	10	6	15	
	0N025			200	2	380	53	5
	0N028	Kilrush Marina		1		38	3	9

Further details available on www.emff.marine.ie

Managing Authority EMFF 2014-2020	Specified Public Beneficiary Body
Department of Agriculture Food & the Marine Clogheen, Clonakilty, Co. Cork. P85 TX47 Tel: (+)353 (0)23 885 9500 www.agriculture.gov.ie/emff	Marine Institute Rinville, Oranmore, Co. Galway, H91 R673 Phone: (+)353 (0)91 38 7200 www.marine.ie

This project or operation is part supported by the Irish government and the European Maritime & Fisheries Fund
as part of the EMFF Operational Programme for 2014-2020

Ireland's EU Structural and Investment Funds Programmes 2014 - 2020
Co-funded by the Irish Government and the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

EUROPEAN UNION
This measure is part-financed by the European Maritime and Fisheries Fund

Foras na Mara
Marine Institute