Aquaculture Licencing Appeals Board

Wexford Harbour Appeals

Technical Advisors Report – Waterbird Data

Description An assessment of available waterbird data for Wexford Harbour and Slobs, Co. Wexford. For use in respect of the assessment of multiple aquaculture licence appeals within Wexford Harbour SPA

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Document Control

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V1	04/01/2023	Draft		KC	PJM	KC
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Summary

This document provides an independent appraisal of the context of a range of appeals for mussel aquaculture in Wexford Harbour, emphasising the ornithological interests of the site, recent trends of qualifying interest species, a review of the 2016 Appropriate Assessment, and submissions from various parties associated with the appeals.

Waterbird populations nationally and in the Wexford Harbour & Slobs are severely declining. Whilst there is some I-WeBS wintering waterbird data from Wexford Harbour and surrounding areas, the volume of data is insufficient to undertake statistical analyses of population trends – such as application of 'alerts' methodologies. In lieu of this it has only been possible to examine general trends on the basis of raw counts. These are generally negative at this site for the majority of species and species groups. Such a trend does not necessarily imply intrinsic site-specific activities have or are driving declines and a more formal analysis using more data would be required to do so.

Appropriate Assessment under the EU Directives requires an objective scientific assessment of data. While the 2016 assessment was thorough, that assessment highlights some likely significant impacts of aquaculture on the site on certain species and potential impacts on others; much of the uncertainty of the potential effects is due to very significant data gaps on species numbers and trends, species distribution within the site and behaviour in relation to existing activities.

These data gaps do not allow a thorough assessment such as is required and under a previous ECJ ruling (with respect to a project in Spain) an AA under Article 6 (3) "*cannot be considered appropriate if it contains gaps, and lacks complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works on the SPA concerned*". Moreover, the AA does not consider cumulative effects which is again a requirement under Article 6 (3).

We consider it impossible to assess the potential impacts thoroughly even now, as much of the inadequacies apparent in the 2016 Appropriate Assessment remain. It is our view that, until a detailed programme of original field research is planned and empirical data gathered and appropriately analysed from this site, it is not possible to assess the potential impacts of the proposed aquaculture activities to meet the requirements of an AA.

1. Introduction

This report outlines the basis of the designation of Wexford Harbour as a Special Protection Area and examines available waterbird data for the site to assist the Aquaculture Licencing Appeals Board (ALAB) with their determination of aquaculture licencing appeals within Wexford Harbour. These applications include T03/30A2, T03/30B & E, T03/30/1, T03/99, T03/35A, B, & C, T03/F & G, T03/72B, T03/90, T03/46A, B & C, T03/47A, B & C, T03/83, T03/85, T03/48, T03/91, T03/49A, B, C & D, T03/77, T03/52A, B & E, T03/55C & F, T03/74A & B & T03/80A for culture of mussel at various locations within Wexford Hbr & Slobs. The appeals themselves and submissions from a range of parties were all available for this review.

2. The legislative context: Special Protection Areas

The EU Birds Directive (2009/147/EC) is the primary legislation in Ireland affording protection to the most important bird areas. Together with the Habitats Directive (92/43/EEC), the network of sites are collectively known as Natura 2000 sites in which the primary conservation objective is the maintenance (or restoration) of 'favourable conservation status' of habitats and species of community interest[1].

Article 4 of the Birds Directive requires signatories (in this case the Irish state) to classify the most suitable territories in number and size as Special Protection Areas (SPAs) for the conservation of wild bird species which are (a) Species listed under Annex 1 of the Birds Directive, (b) Regularly occurring migratory species, and (c) wetlands, especially those of international importance[1].

National Parks and Wildlife Service (NPWS), a division within the Department of Housing, Local Government and Heritage (DHLGH), manages the Irish states nature conservation responsibilities under national and European law and international commitments. The criteria used for the selection of SPAs was similar to that underpinning the Ramsar Convention[2] criteria whereby sites which met any or all of the following criteria may be selected as SPAs:

- A site holding 20,000 waterbirds
- A site holding 1% or more of the all-Ireland population of an Annex 1 species
- A site holding 1% or more of the biogeographic population of a migratory species
- A site that is one of the *n* most suitable sites in Ireland for a regularly occurring migratory species or Annex 1 listed species (where *n* is a variable which is related to the proportion of the total biogeographical population of a species held in Ireland)

The biogeographic population estimates and recommended 1% thresholds for wildfowl and waders (collectively 'waterbirds') are taken from periodic reviews of populations by Wetlands International[3]. All-Ireland (national) population estimates[4] are also periodically reviewed, reflecting changes in populations through time.

As the competent authority responsible for maintaining favourable conservation status across the designated sites network, NPWS produce site-specific Conservation Objectives (COs) which aims to define favourable condition for habitats and/or species at a site, and their maintenance at individual sites contributes to their maintenance at a national level. These COs focus on species of Special Conservation Interest (SCIs) which are the list of species for which the site is nationally or internationally important.

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[1] NPWS (2011) Conservation Objectives: Wexford Harbour & Slobs SPA 004076. Version 1.0. National Parks and Wildlife Service, Department of Arts, Culture and the Gaeltacht.
[2] https://www.ramsar.org
[3] The most recent population estimates are for 2012; Wetlands International (2012) Waterbird Population Estimates, 5th edition – Summary Report. Wetlands International, Wageningen, The Netherlands.
[4] The most recent national population estimates are for the period 2011/12 – 2015/16; Burke, B., Lewis, L.J., Fitzgerald, N., Frost, T., Austin, G. & Tierney, D. (2018) Estimates of waterbird numbers wintering in Ireland, 2011/12 – 2015/16. *Irish Birds* 11: 1-12.

3. Wexford Harbour & Slobs SPA

Wexford Harbour is an estuary at the mouth of the River Slaney in Co. Wexford. The Harbour is divided into two logical units – an Inner and Outer Bay – which are separated by a narrowing at Wexford town. Wexford Harbour empties considerably at low-tide, creating an extensive area of mudflat, protected to a degree from the Irish Sea by The Raven to the north and Rosslare Point to the South (Figure 1). The inter-tidal areas comprise a mix of sands and sandy-muds in the more sheltered areas which support a rich invertebrate fauna. A more complete site description is available in the NPWS Site Conservation Objectives[1].

Figure 1. Wexford Harbour & Slobs SPA. *Source:* Report (npws.ie)

Wexford Harbour and Slobs 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.

3.1 Species of Conservation Interest (SCIs)

The Selection Species and Additional Special Conservation Interests[1] for Wexford Harbour and Slobs SPA are listed below and summarised in Table 1. This table also shows the importance of Wexford Harbour and Slobs SPA for these species relative to the importance of other sites within Ireland, within the south-eastern region, and within Co. Wexford at the time of designation.

The Selection Species listed for Wexford Harbour and Slobs SPA are as follows:-

- The site regularly supports 1% or more of the all-Ireland population of the Annex I species Bewick's Swan (*Cygnus columbianus*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 191 individuals.
- The site regularly supports 1% or more of the all-Ireland population of the Annex I species Whooper Swan (*Cygnus cygnus*). The mean peak number within the SPA during the baseline period (1995/96 – 1999/00) was 100 individuals.
- The site regularly supports 1% or more of the biogeographic population of the Annex I species Greenland White-fronted Goose (*Anser albifrons flavirostris*). The mean peak number within the SPA during the baseline period (1994/95 – 1998/99) was 9,111 individuals.
- The site regularly supports 1% or more of the biogeographical population of Light-bellied Brent Goose (*Branta bernicla hrota*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,469 individuals.
- 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 753 individuals.
- The site regularly supports 1% or more of the all-Ireland population of Teal (*Anas crecca*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,538 individuals.
- The site regularly supports 1% or more of the all-Ireland population of Scaup (*Aythya marila*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 339 individuals.
- 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 209 individuals.
- The site regularly supports 1% or more of the all-Ireland population of Cormorant (*Phalacrocorax carbo*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 495 individuals.
- The site regularly supports 1% or more of the all-Ireland population of Oystercatcher (*Haematopus ostralegus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,493 individuals
- The site regularly supports 1% or more of the all-Ireland population of the Annex I species Golden Plover (*Pluvialis apricaria*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 5,013 individuals.
- The site regularly supports 1% or more of the all-Ireland population of Grey Plover (*Pluvialis squatarola*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,279 individuals.
- The site regularly supports 1% or more of the all-Ireland population of species Lapwing (*Vanellus vanellus*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 11,826 individuals.
- The site regularly supports 1% or more of the all-Ireland population of Sanderling (*Calidris alba*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 210 individuals.
- The site regularly supports 1% or more of the biogeographical population of Black-tailed Godwit (*Limosa limosa*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 790 individuals.

- The site regularly supports 1% or more of the biogeographical population of the Annex I species Bar-tailed Godwit (*Limosa lapponica*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,696 individuals.
- The site regularly supports 1% or more of the all-Ireland population of Curlew (*Numenius arquata*). The mean peak number of this species within the SPA during the baseline period (1995/96 – 1999/00) was 1,771 individuals.
- 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 5,977 individuals.
- The site is selected for Little Tern (*Sterna albifrons*). In 2000, 30 pairs were breeding at this site. This exceeds the all-Ireland 1% threshold for this Annex I species.

The following species are identified as additional Special Conservation Interests (SCIs) for Wexford Harbour and Slobs SPA as they were recorded in numbers of all-Ireland importance during the baseline period (1995/96 – 1999/00):

Wigeon (*Anas penelope*), Mallard (*Anas platyrynchos*), Pintail (*Anas acuta*), Goldeneye (*Bucephala clangula*), Little Grebe (*Tachybaptus ruficollis*), Great Crested Grebe (*Podiceps cristatus*), Grey Heron (*Ardea cinerea*), Coot (*Fulica atra*), Knot (*Calidris canutus*), Dunlin (*Calidris alpina*), Redshank (*Tringa totanus*), Lesser Black-backed Gull (*Larus fuscus*). In addition to the aforementioned waterbird species of additional Special Conservation Interest, the Annex I species Hen Harrier (*Circus cyaneus*) is listed as an additional Special Conservation Interests (SCI) species.
The wetland habitats contained within Wexford Harbour and Slobs SPA are identified to be of conservation importance for breeding and non-breeding (wintering) migratory waterbirds. Therefore, the wetland habitats are considered to be an additional Special Conservation Interest.

The importance of Wexford Harbour & Slobs for SCI species relative to their populations at a variety of spatial scales (*National*: all Irish wetland SPAs; *Regional*: regions as defined by the Irish regions office; *County*: refers to wetland SPAs in County Wexford).

Table 1. Wexford Harbour & Slobs SPA Site Selection Species and SCIs including their relative rank nationally, regionally and within county. SCIs ranked within the top 5 nationally are shown in bold. *Source: From NPWS (2011)*

	Special Conservation Interests Species	National Importance Rank[5]	Regional Importance Rank[5]	County Importance Rank[5]
Site selection species	Bewick's Swan	2	2	2
	Whooper Swan	18	2	2
	Greenland White-fronted Goose	1	1	1
	Light-bellied Brent Goose	2	1	1
	Shelduck	4	1	1
	Teal	3	1	1
	Scaup	3	1	1
	Red-breasted Merganser	2	1	1
	Cormorant	2	1	1
	Oystercatcher	4	1	1
	Golden Plover	10	1	1
	Grey Plover	1	1	1
	Lapwing	2	1	1
	Sanderling	7	1	1
	Black-tailed Godwit	7	2	1
	Bar-tailed Godwit	2	1	1
	Curlew	2	1	1
	Black-headed Gull	n/c	n/c	n/c
	Little Tern	n/c	n/c	n/c
Additional Special Conservation Interests	Wigeon	9	2	2
	Mallard	2	1	1
	Pintail	6	2	2
	Goldeneye	5	1	1
	Little Grebe	3	1	1
	Great Crested Grebe	6	1	1
	Grey Heron	4	1	1
	Hen Harrier	n/c	n/c	n/c
	Coot	8	2	2
	Knot	12	3	2
	Dunlin	13	3	2
	Redshank	14	3	1
	Lesser Black-backed Gull	n/c	n/c	n/c

Other conservation designations associated with the site	SAC	RAMSAR SITE	IMPORTANT BIRD AREA (IBA)	WILDFOWL SANCTUARY	OTHER
	Yes	Yes	Yes	Yes	

[5] Ranking based on the relative position of the average maximum counts over the baseline period (1995/96 – 1999/00) relative to SPAs at *national* (all Irish wetland SPAs), *regional* (wetlands in the SE region as defined by the regions office) and *county* (Co. Wexford wetland SPAs) levels.

3.2 Conservation Objectives

The overarching Conservation Objective for Wexford Harbour & Slobs SPA 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[6].

Objective 1 – the maintenance of the waterbird SCI species listed in favourable condition defined as:

- The long-term population trend for each waterbird SCI species should be stable or increasing. Waterbird populations are deemed to be unfavourable when they have declined by 25% or more, as assessed by the most recent population trend analysis
- To be favourable, there should be no significant decrease in the numbers or range (distribution) of areas used by the SCI waterbird species, other than that occurring from natural patterns of variation

Typical factors which the site COs suggest could adversely affect the achievement of Objective 1 include (a) disturbance and (b) habitat modification. Disturbance effects, such as caused by anthropogenic sources, include those which occur at or near the site and are either singular or cumulative in nature and could result in the displacement or one or more of the listed SCI species within the SPA, and/or a reduction in their numbers.
Habitat modifications have the potential to adversely affect populations through modifications of discrete areas or the overall habitats(s) within the SPA in terms of how one or more of the SCI species utiltise the site for important functions (such as for foraging) which could be displaced from areas within the SPA and/or cause a reduction in numbers utilising the site.

Objective 2 – the maintenance of wetland habitat in favourable condition as a resource for the regularly-occurring migratory waterbirds that utilise it.

This objective is defined by the following attribute and target:

- To be favourable the permanent **area** occupied by the wetland habitat should be stable and not significantly less than the area of 10,203ha, other than that occurring from natural patterns of variation.

The maintenance of the quality of wetland habitat lies outside the scope of this objective. However, for the SCI species, 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[6].

[6] NPWS (2011) Conservation Objectives: Wexford Harbour & Slobs SPA 004076. Version 1.0. National Parks and Wildlife Service, Department of Arts, Culture and the Gaeltacht.

4. Recent waterbird data

4.1 I-WeBS Data

The Irish Wetland Birds Survey (I-WeBS) is the primary scheme for waterbird monitoring in Ireland during the non-breeding season. Running continuously since the winter of 1994/95, the survey generates count data across the wintering period normally on an annual basis, enabling periodic revisions of national population estimates, assessment across multiple winters of the numbers of individual and aggregated waterbird species at sites (and nationally) thereby enabling assessment of changes in populations at a variety of spatial scales through time. These I-WeBS 'core' counts aim to generate site totals as opposed to low-tide counts which describe and examine within-site usage.

Assessment of site-based trends is an important function of I-WeBS and this exercise has only been completed once in Ireland thus far, based on data for the period 1994/95 to 2019/20[7]. To generate robust site trends a minimum level of coverage (counts) in the relevant time window is necessary. That threshold is currently 50% if potential count-months (months x years in the period being examined); the possible months included in the analysis are 7 for wildfowl and 4 for waders, reflecting the phenology of usage of Irish sites by these species groups.

This for the period 1994/95 to 2019/20 a minimum of 91 and 52 good quality counts are required for wildfowl and waders, respectively, to enable modelling site-based trends[8]. The number of counts in this period at Wexford Harbour & Slobs has not enabled such an analysis given the history of waterbird counting via I-WeBS at Wexford Harbour & Slobs. Though it may well be the case that constituent subsites are more frequently covered (e.g. The North Slob Wildfowl Reserve) it is often the case that the large and extensive mudflats (which are more complex to count) are not counted as frequently.

In lieu of such an analysis being available here we have examined the population trends in Wexford Harbour in the following way:

- The 12-year site trend and Site Conservation Condition trends (1995/96 to 2007/08) are as shown in NPWS (2011) Conservation Objectives.
- The classification of conservation condition is as follows:
    - Favourable – population is stable / increasing
    - Intermediate (unfavourable) population decline in the range 1.0 – 24.9%
    - Unfavourable – populations have declined at a rate of between 25.0 and 49.9% between two time periods (in these cases in the short- or long-term from the baseline of 1995/96)
    - Highly unfavourable – populations have declined by greater than 50% from the baseline reference value

[7] National and site-level trends are available here: https://birdwatchireland.ie/apps/uploads/2022/030/04/iwebs_trends_report.html

[8] Kennedy, J., Burke, B., Fitzgerald, N., Kelly, S., Walsh, A. & Lewis, L.J. (2022) I-WeBS Trends Report Methodology. Available at : https://birdwatchireland.ie/app/uploads/2022/04/iwebs_trends_methodology_2022.pdf

- The threshold levels of >25 and >50% are as has become standard convention in waterbird monitoring and indeed other species in Ireland (e.g. BoCCI[9]) and the UK (BoCC-UK[10]).
- We accessed the 2020/21 dataset from the I-WeBS Site Total online table for Wexford Harbour & Slobs and using the same approach calculated the change in in population change for the majority of species (stability, decreases or increases in the long-term) expressed as % change
- We applied the same criteria threshold values as shown above to the long-term (25 year) trend from 1995/96 to 2020/21 (Table 2).

Trends generated from the long-term datasets are necessary to detect real long-term changes. As waterbirds are relatively long-lived bird species, changes in population size can take several years to become evident. Short-term trends are useful indicators of change but can reflect inter-annual effects of productivity (for example increase in the years following a good arctic/sub-arctic breeding season) as well as mask longer-term changes. For example, although a species' long-term trend may be negative, the short-term trend could be positive if numbers have increased during the shorter time period (often five-year time blocks) being assessed.

Long-term trends are much more valuable in detecting the real trajectory of populations but producing population indices and alerts by the methods outlined by Kennedy *et al*. (2022[8]) is the most robust way of statistically examining trends.

Table 2 shows these values and it is evident that the 25-year trend and therefore the categorisation of the site condition gives some reasons for concern. Whilst the short-term (12-year) trend showed 25-50% declines (*Unfavourable*) and >50% declines (*Highly Unfavourable*) for six and two species respectively, the long-term trends classify a total of 22 species to unfavourable or highly unfavourable status - five species as *Unfavourable* and 17 species as *Highly Unfavourable*.

Bewick's Swans have declined markedly in Ireland, are primarily terrestrial-feeders (e.g. arable and grassland habitats) and the site trend is consistent with the national picture. Typically fewer than ten birds occur in Ireland annually in recent decades.

Many of the duck species in Table 2 use both inter-tidal and terrestrial parts of Wexford Harbour & Slobs and their long-term trends appear to be wholly negative. This includes three 'dabbling' species - Wigeon, Teal, Mallard, two of the three 'diving' suck species (Goldeneye and Scaup) and Shelduck. The majority of waders have also declined - the main exceptions being Black-tailed Godwit (increase) and Golden Plover (stable). Figures 2 and 3 show trends (as average annual maximum counts) in selected SCI species in the period 2011/12 to 2020/21 (from I-WeBS site trends[7]), showing the inter-annual variability in counts and why averaging 5-year time periods and comparing across time periods is so valuable and important. Note that the counts shown here do not account for missing subsectors and/or poor-quality counts and caution is required to interpret them.

[9] Successive Birds of Conservation Concern assessments use these threshold levels for analysis of short- and long-term trends and similar colour coding (amber and red, linked to the severity of change) in Ireland (e.g Lynas *et al*., 2007 *Irish Birds* 8: 149-166; Colhoun & Cummins, 2013 *Irish Birds* 9: 523-544; Gilbert *et al*., 2021 *Irish Birds* 43: 1-22)

[10] E.g. Eaton *et al*., 2015 *British Birds* 108: 708-746

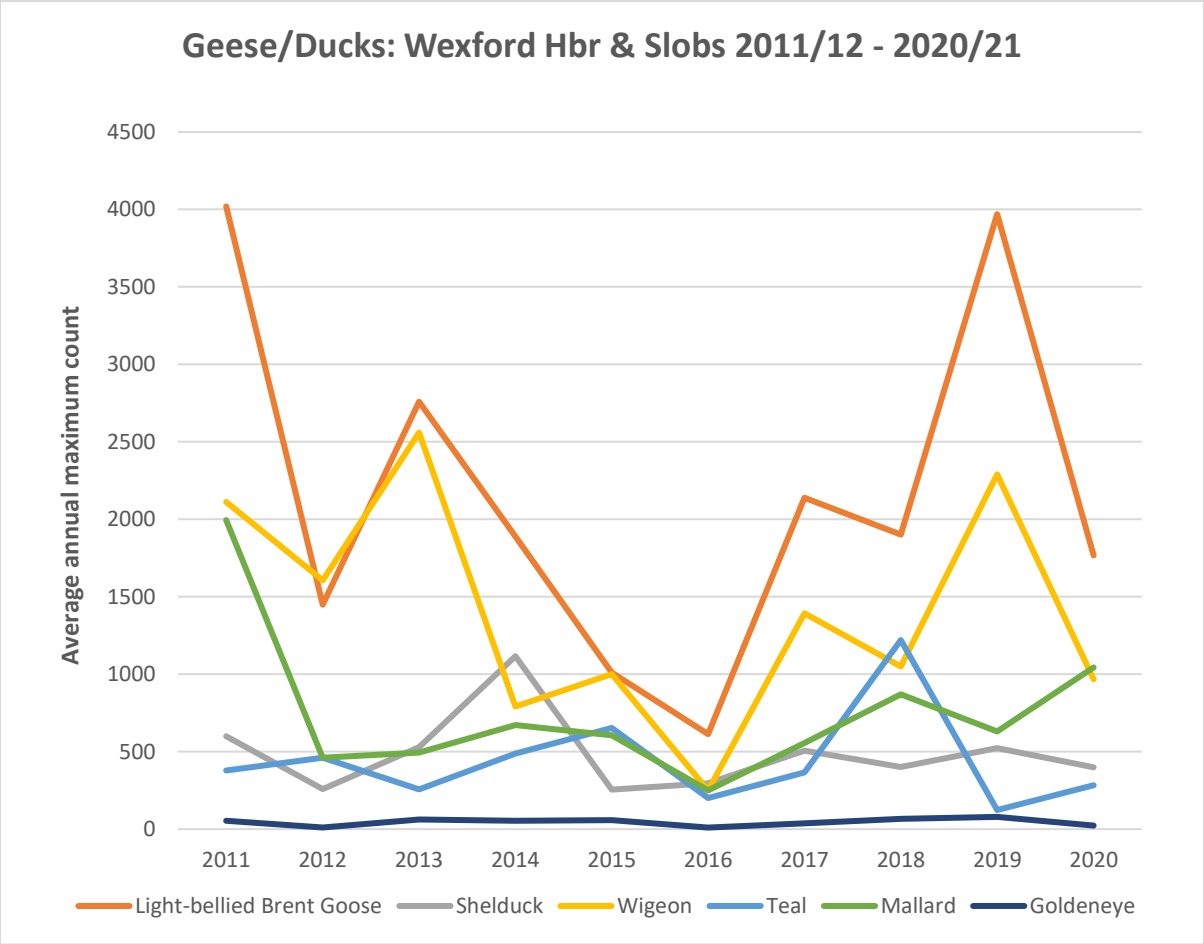

Figure 2. I-WeBS trends selected wildfowl. *Data Source:* Site Summary Tables_S27 (caspio.com)

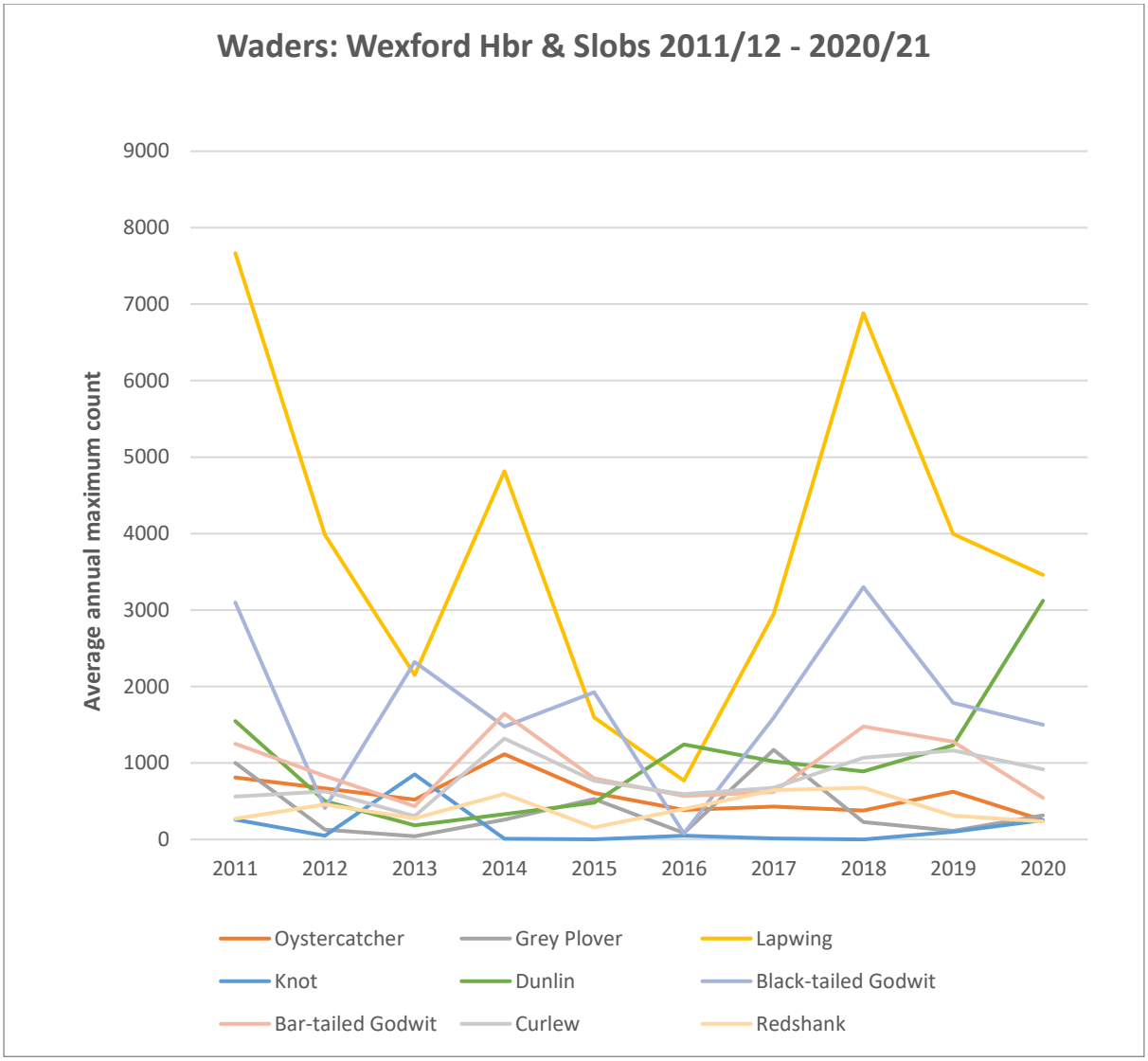

Figure 3. I-WeBS trends selected waders. *Data Source:* Site Summary Tables_S27 (caspio.com)

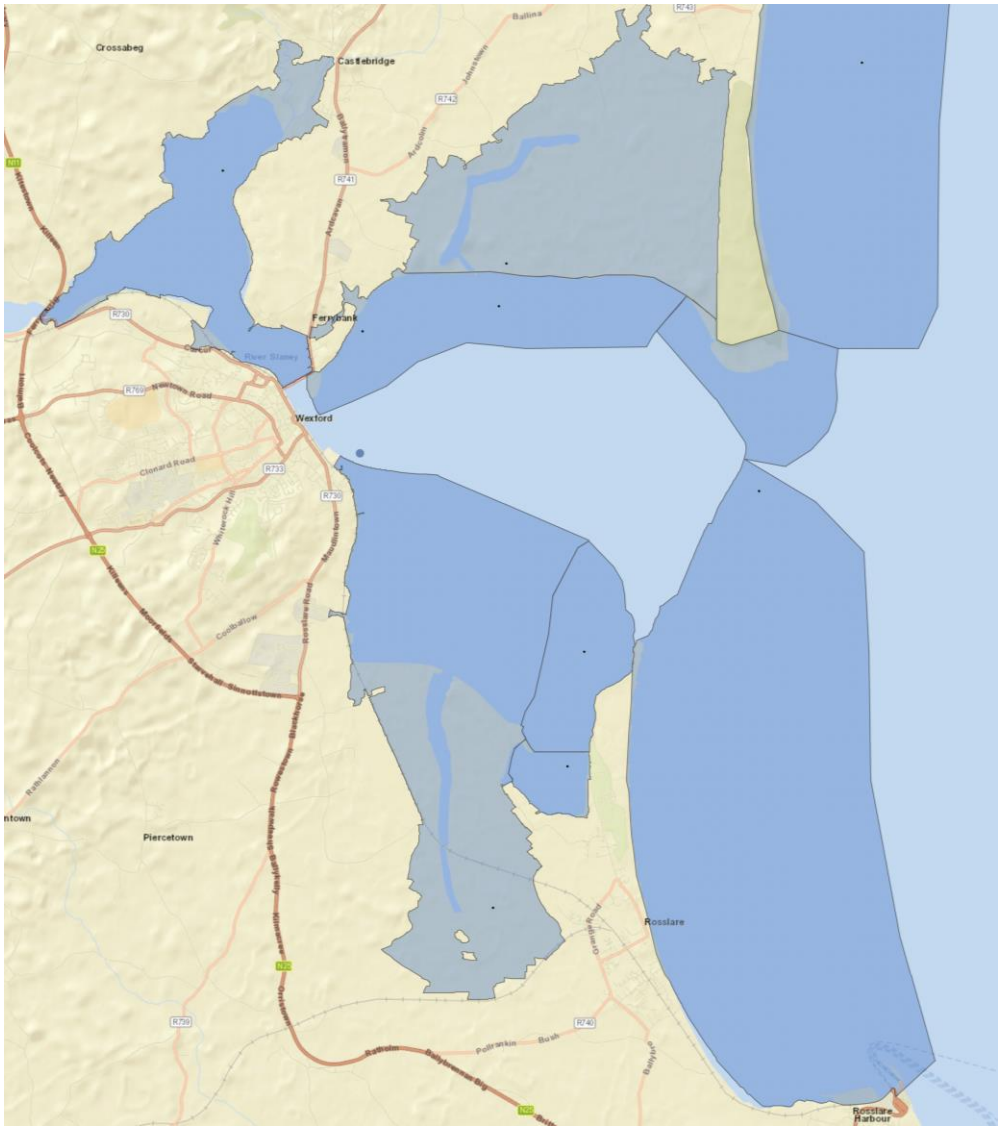

Figure 4. I-WeBS core count sub-sites (sectors) in and adjacent to Wexford Harbour & Slobs (*Source:* https://bwi.maps.arcgis.com/apps/View/index.html?appid=1043ba01fcb74c78bc75e306eda48d3a)

Table 2. Wexford Harbour & Slobs SPA waterbird SCI mean peak counts over a number of time periods. Population sizes and trends over varying time frames are shown. Declines of 25-50% are highlighted amber, while declines > 50% are highlighted red.

	Wexford Hbr & Slobs SCI Species	Average population size at baseline (1995/96 – 1999/00)[11]	Average population size (2004/05-2008/09)[12]	Average population size - recent (2016/17-2020/21)[13]	12-year Site trend (1995/96 - 2007/08)[14]	25-year site trend (1995/96 - 2020/21)[15]	Site Conservation Condition (1995/96 – 2007/08)	Site Conservation Condition (1995/96 – 2020/21)
Site selection species	Bewick's Swan	191	47	6	-79.7	-92.6[16]	Highly Unfavourable	Highly Unfavourable
	Whooper Swan	100	450*	425*	+193	+307	Favourable	Favourable
	Greenland White-fronted Goose	9,111*	8,703*	6,264*	-	-19.9	Intermediate (Unfavourable)	Intermediate (Unfavourable)
	Light-bellied Brent Goose	1,496*	2,555*	2,078*	+50	+18.1	Favourable	Favourable
	Shelduck	753	489	425	-15.6	-47	Intermediate (Unfavourable)	Unfavourable
	Teal	1,538	1,153	438	+69.8	-81.5	Favourable	Highly Unfavourable
	Scaup	339	37	4	+14.8	-98.8	Favourable	Highly Unfavourable
	Red-breasted Merganser	209	95	131	-15	-17.7	Intermediate (Unfavourable)	Intermediate (Unfavourable)
	Cormorant	495	320	205	+45	-50.9	Favourable	Highly Unfavourable
	Oystercatcher	1,493	487	414	+5	-83.1	Favourable	Highly Unfavourable
	Golden Plover	5,013	10,915*	5,728	+39.7	-0.5	Favourable	Favourable
	Grey Plover	1,279	106	382	-45.5	-75.3	Unfavourable	Highly Unfavourable

[11] * refers to species which occurred in internationally important numbers in Wexford at that time

[12] As per NPWS (2011), the exception being Greenland White-fronted Geese, figures for which are based on the period 2005/06 – 2009/10

[13] Latest I-WeBS site totals were accessed here: Site Summary Tables S27 (caspio.com)

[14] From Table 4.2 NPWS (2011)

[15] Data derived from the 1995/96 baseline as shown; 2020/21 data from Site Summary Tables S27 (caspio.com)

[16] No Bewick's Swans were recorded in 2020/21 so the latest count (for 2019/20) is used; the trend is thus for 24 years

	Lapwing	11,826	6,684	3,611	-31	-70.7	Unfavourable	Highly Unfavourable
	Sanderling	210	16	43	-2	-82.8	Intermediate (Unfavourable)	Highly Unfavourable
	Black-tailed Godwit	790*	1,379*	1,651*	+72.1	+190	Favourable	Favourable
	Bar-tailed Godwit	1,696*	967	898	-6	-67.9	Intermediate (Unfavourable)	Highly Unfavourable
	Curlew	1,771	800	883	-30.0	-48.2	Unfavourable	Unfavourable
	Black-headed Gull[17]	5,977	524	1,325	n/c	-45.5	-	-
	Little Tern	30 pairs	n/a	n/a	n/a	n/a	n/a	n/a
Additional Special Conservation Interests	Wigeon	2,752	4,067	1,190	-7.8	-64.8	Intermediate (Unfavourable)	Highly Unfavourable
	Mallard	3,290	1,255	670	-16.6	-68.3	Intermediate (Unfavourable)	Highly Unfavourable
	Pintail	66	113	24	+53	-12.1	Favourable	Intermediate (Unfavourable)
	Goldeneye	182	69	43	-42.3	-87.3	Unfavourable	Highly Unfavourable
	Little Grebe	82	43	21	-13.1	-79.3	Intermediate (Unfavourable)	Highly Unfavourable
	Great Crested Grebe	117	63	113	-8.8	-49.6	Intermediate (Unfavourable)	Unfavourable
	Grey Heron	52	13	11	+45.4	-76.9	Favourable	Highly Unfavourable
	Hen Harrier	8 individuals	n/a	n/a	n/a	n/a	n/a	n/a
	Coot	351	40	3	-48	-99.4	Unfavourable	Highly Unfavourable
	Knot	453	21	83	-39.9	-44.8	Unfavourable	Unfavourable
	Dunlin	2,485	709	1,501	-61.7	+25.7	Highly Unfavourable	Favourable
	Redshank	555	298	454	+18.4	-57.6	Favourable	Highly Unfavourable
	Lesser Black-backed Gull[15]	1,086	13	5	n/c	-99.4	-	-

[17] Trends in gull populations need interpreted with caution as they may not be properly assessed during I-WeBS counts

Table 3 compares long-term published trends for selected species[13] with those from Wexford Harbour (as per Table 2) and the following observations are notable:

- Of the declining/unfavourable species in Wexford Hbr & Slobs, 11 are also declining nationally at similar rates/levels
- For 12 species the Wexford Hbr & Slobs trend is more negative (worse) than at the national level – this is the case for Shelduck, Teal, Cormorant, Oystercatcher, Sanderling, Bar-tailed Godwit, Wigeon, Mallard, Little Grebe, Grey Heron, Coot and Redshank
- Populations of 5 species in Wexford Hbr & Slobs show a similar or better trend than is the case nationally – Whooper Swan, Light-bellied Brent Goose, Golden Plover, Black-tailed Godwit and Dunlin

There is insufficient data (too many gaps in the matrix of months/species/year) analysis for modelling population trends for individual species at this site. This is why there are no site alerts published for this site by I-WeBS. In lieu of this, through provision of monthly counts across all subsites by the I-WeBS office, we have examined trends by aggregated species (waders and other waterbirds) to illustrate waterbird trends at Wexford Harbour over the most recent five-year period for which data are available (2017/18 onwards). These show an overall decline in the number of all waterbirds at the site of -48% (sum) and -24% (mean) in the four years 2017 – 2020 (Figure 5). When examined separately for waders and other waterbirds it is evident that the declines in the latter aggregated totals and averages of these values are greatest in the case of non-waders (average decline -35%, decline in sum -58%) but also considerable for waders (average decline -14%, decline in sum -39%; Table 5; Figure 6).

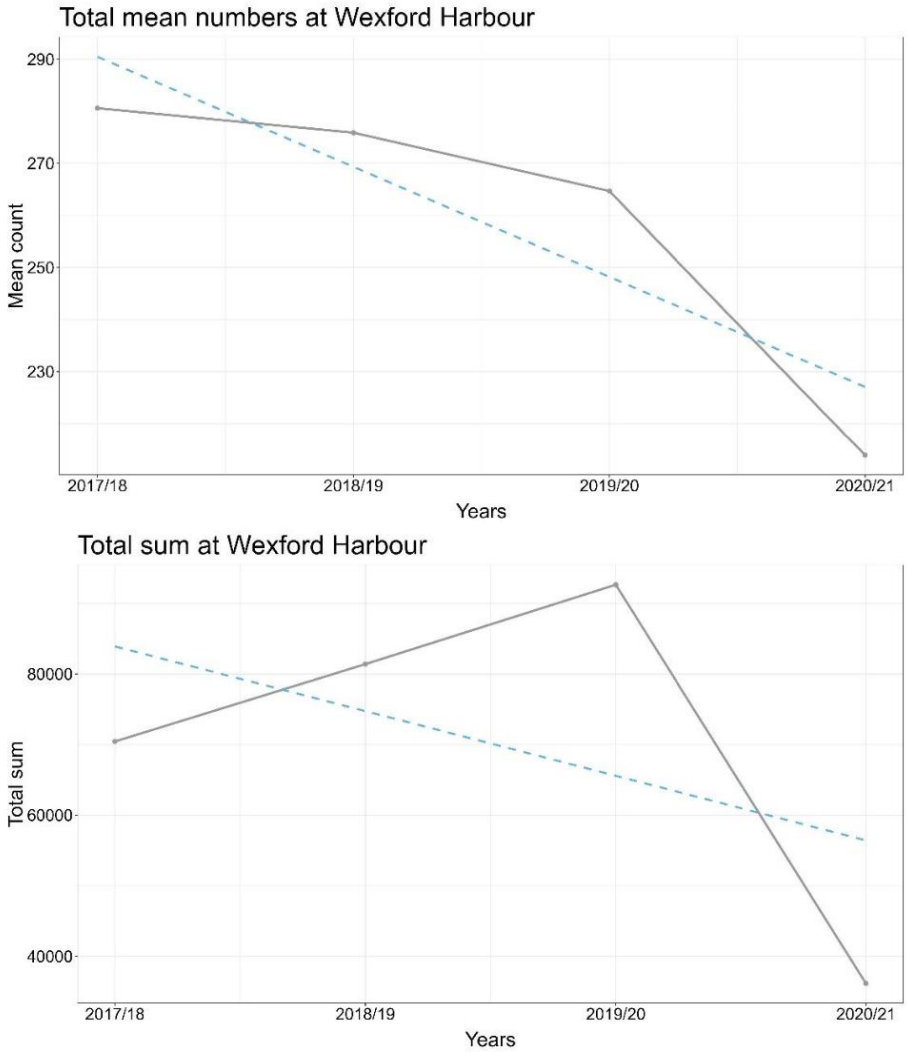

Figure 5. I-WeBS data for Wexford Harbour & Slobs for 2017/18 to 2020/21 inclusive. The data are raw counts of all waterbirds showing average of annual peaks for each species summed (top), and sum of species annual peaks (bottom), with the general trend shown as the hatched line. Respectively these reflect -24% and -49% declines in raw core count data for the site over these four years.

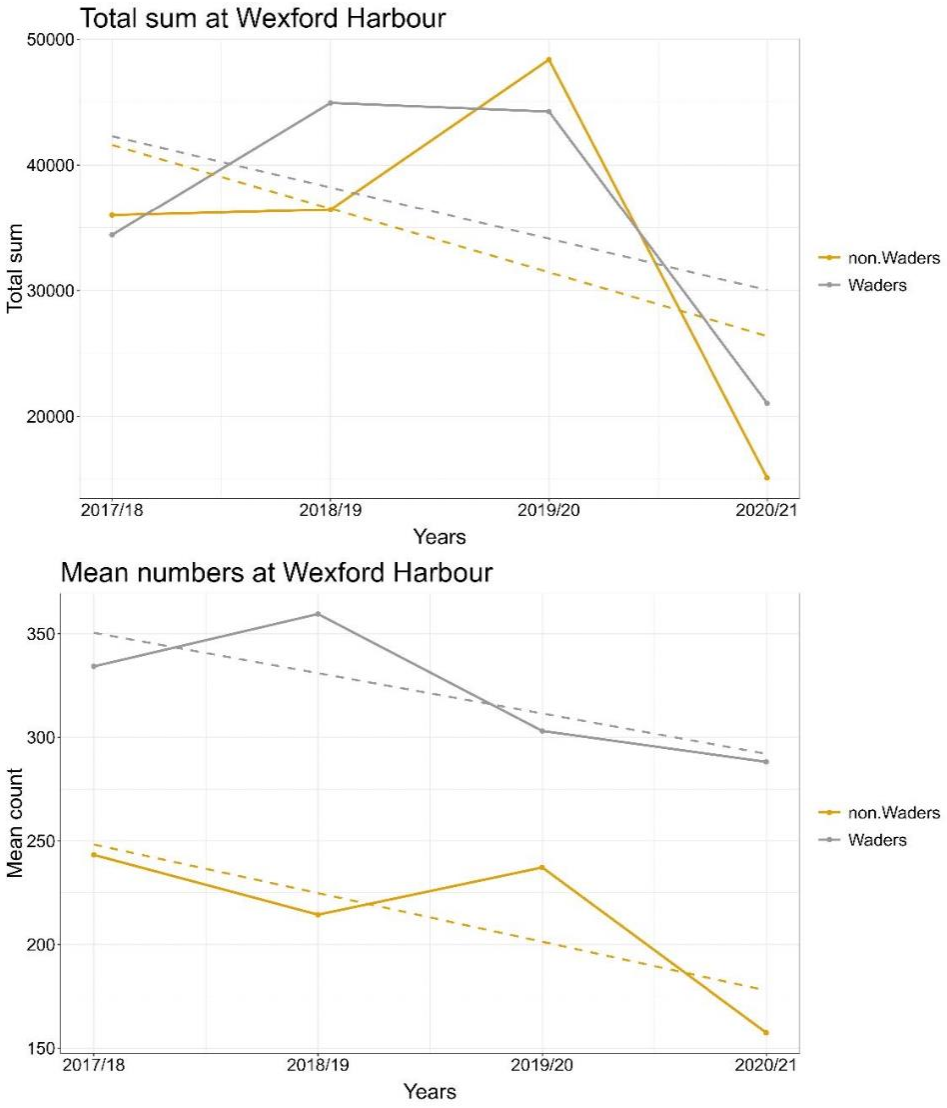

Figure 6. I-WeBS data for Wexford Harbour & Slobs for 2017/18 to 2020/21 inclusive. The data are raw counts, shown separately for waders and non-waders, showing average of annual peaks for each species summed (bottom), and sum of species annual peaks (top), with the general trend shown as the hatched lines for each grouping and summary statistic. Given the overall decline as shown in Figure 5, it is no surprise that both species groups have shown a decline in summed counts and averages over the period, greatest in non-waders.

4.2 Other data sources

There has been no extensive programme of low-tide counts in recent times at Wexford Harbour & Slobs, such as the programmes underway, normally in relation to aquaculture assessments at sites such as Dungarvan (Waterford), Bannow Bay (Wexford) and Castlemaine Harbour (Kerry). The last such data gathered extends back to the 2010s and we suggest is of limited value in this regard. As 'core' counts are undertaken at or near high water (their objective is mostly to generate total counts at sites) it would be somewhat misleading to assess the significance of individual sub-sites within the

Wexford Harbour area. The sub-sites used by I-WeBS (Figure 4) are somewhat crude for such a sectoral analysis. The absence of contemporary multi-year low-tide count data from this site greatly limits our ability to understand the potential impacts of existing aquaculture or expansion within the site.

4.3 Site visit - observations

A site visit was undertaken in February 2023 near high water to observe travel to/from mussel beds and generally understand the processes and potential impacts involved. We observed three boats in the harbour zone, one of which was operational in the outer bay throughout our observation period. The scale of the site is such that a fairly large scale and complex series of surveys would be required to fully understand and evaluate the potential impacts of the aquaculture activities at this site. Some further notes of observations are provided in Annex 1.

Plate 1-3 below show a selection of images of the operational or berthed mussel boat activity in Wexford Harbour.

4.4 Studies of aquaculture and its interactions with waterbirds

The most comprehensive study of the potential effects of aquaculture on waterbird populations in Ireland was that undertaken by Gittings & O'Donoghue (2012[18]). This was study was restricted,

[18] Gittings, T. & O'Donoghue, P. D. (2012) The effects of intertidal oyster culture on the spatial distribution of waterbirds. Report prepared for the Marine Institute. Atkins, Cork.

however, to oyster culture and its concomitant use of trestle structures. Table 4 summarises the results of this study with respect to the nature of the responses (including inter alia variable, neutral/positive, negative, exclusion etc). Waterbirds are vulnerable to both direct effects (such as loss in extent or quality of inter-tidal feeding habitat) and indirect effects such as is caused during harvesting and other operations. There have been relatively few studies of the effects of bottom-culture Mussel cultivation on inter-tidal flats. Caldow et al. (2003[19]) undertook an experimental study which showed that none of the five most abundant species declined in abundance significantly following the laying of mussels, with some increasing and some decreasing. They caution, however, against assuming that negative impacts do not occur and recommend that proposal to initiate or expand bottom cultivation needs to be assess on a case-by-case basis.

The Wexford Harbour, the Raven and Rosslare Bay Appropriate Assessment Report (2016) concluded that

- disturbance from bottom mussel-related boat activity may cause significant displacement impacts to Red-breasted Merganser, and
- insufficient evidence to rule out significant impacts beyond reasonable scientific doubt in relation to bottom mussel culture impacts on the following species - Greenland-white-fronted Goose, Scaup, Goldeneye, Red-breasted Merganser, Great Crested Grebe, Golden plover, Grey Plover, Knot, Sanderling, Bar-tailed Godwit and Little Tern.

The AA also stated that significant additional information for the AA was required including:

- Research into impact of bottom mussel culture on several species to assess the impacts of aquaculture on habitat quality
- Further research on Red-breasted Merganser (in addition to that already published – see below)
- Examining displacement impacts on other species including Great Crested Grebe, Goldeneye and Scaup
- Surveys of high-tide tern and wader roosts (to assess potential impacts of boat-based activity)
- Surveys of the low-tide distribution of waterbirds (see section 4.2 of this report)
- Research into Little Tern ecology

Gittings & O'Donoghue (2016[20]) subsequently showed particular sensitivity of Red-breasted Mergansers which showed *a high degree of sensitivity to disturbance from marine traffic*.

A major debate between mussel cultivation and nature conservation interests took place in the Wadden Sea in the 1990s. Intensive fishing in the Dutch Wadden Sea in the late 1980s, combined with effects of storms and low spatfall, led to an almost complete disappearance of intertidal mussel beds and cockles there in 1990 which appeared to have a negative impact on populations of Oystercatcher

https://oar.marine.ie/bitstream/handle/10793/983/Oyster%20Trestles%20%20Shorebirds%20Atkins.pdf?sequence=1&isAllowed=y

[19] Caldow *et al*. (2003) Effects of intertidal mussel cultivation on bird assemblages. *Mar Ecol Progress Series* 259: 173-183. https://researchportal.hw.ac.uk/en/publications/effects-of-intertidal-mussel-cultivation-on-bird-assemblages

[20] Gittings, T. & O'Donoghue, P. (2016) Disturbance response of Red-breasted Merganser *Mergus serrator* to boat traffic in Wexford Harbour. *Irish Birds* 10: 329-334.

and Eider (Floor *et al*, 2018[21]). A similar effect was noted in the Wash when heavy fishing pressure on mussels and cockles in the 1980s and 1990s led to changes in waterbird assemblages, there being a gradual shift from bivalve-feeders to worm-feeding species and increased mortality in Oystercatcher in three winters (Atkinson *et al*., 2010[22]). To ensure that a balance is achieved between providing enough shellfish resources for birds and for commercial shellfishery sustainability, fishery managers have set levels of Total Allowable Catch (TAC) in many areas. Development of TAC levels in recent years has been informed by considering the amount of food required by birds relative to the amount available within estuaries. In the Dutch Wadden Sea these models led to changes in fisheries such that 70% of the relevant bird population's energy requirements for the overwinter period were reserved for birds and TAC levels adjusted accordingly.

[21] Floor, J.R., van Koppen, C.S.A. & van Tatenhove, J.P.M. (2018) Knowledge uncertainties in environmental conflicts: how the mussel fishery controversy in the Dutch Wadden Sea became depoliticised. *Environmental Politics* 28: 1236 – 1258.

[22] Atkinson, P.W., Maclean, I.M.D. & Clark, N.A. (2010). Impacts of shellfisheries and nutrient inputs on waterbird communities in the Wash, England. *Journal of Applied Ecology* 47: 191-199.

Table 3. Long-term trends in waterbird populations in Ireland and in Wexford Harbour & Slobs for the Wexford Harbour & Slobs SCI species. National trends are based on the I-WeBS National Trends Report[23] unless indicated otherwise.

	Wexford Hbr & Slobs SCI Species	25-year site trend (1995/96 - 2020/21)[24]	Site Conservation Condition (1995/96 – 2020/21)	Long-term National Trend (%)	Long-term trend (category)
Site selection species	Bewick's Swan	-92.6[23]	Highly Unfavourable	n/a	Large decline*
	Whooper Swan	+307	Favourable	85 [25]	Stable or increasing*
	Greenland White-fronted Goose	-19.9	Intermediate (Unfavourable)	-20.9[26]	Moderate decline
	Light-bellied Brent Goose	+18.1	Favourable	93.3	Stable or increasing
	Shelduck	-47	Unfavourable	9.3	Stable or increasing
	Teal	-81.5	Highly Unfavourable	19.4	Stable or increasing
	Scaup	-98.8	Highly Unfavourable	-89.2	Large decline
	Red-breasted Merganser	-17.7	Intermediate (Unfavourable)	-14.7	Intermediate decline
	Cormorant	-50.9	Highly Unfavourable	42.9	Stable or increasing
	Oystercatcher	-83.1	Highly Unfavourable	10.8	Stable or increasing
	Golden Plover	-0.5	Favourable	-54.1	Large decline
	Grey Plover	-75.3	Highly Unfavourable	-57.8	Large decline
	Lapwing	-70.7	Highly Unfavourable	-63.9	Large decline
	Sanderling	-82.8	Highly Unfavourable	84.6	Stable or increasing
	Black-tailed Godwit	+190	Favourable	92.3	Stable or increasing
	Bar-tailed Godwit	-67.9	Highly Unfavourable	-5.1	Intermediate decline
	Curlew	-48.2	Unfavourable	-43.1	Moderate decline
	Black-headed Gull[27]	-45.5	-	-	-
	Little Tern	n/a	n/a	n/a	n/a
Additional Special Conservation Interests	Wigeon	-64.8	Highly Unfavourable	-18.2	Intermediate decline
	Mallard	-68.3	Highly Unfavourable	-19.1	Intermediate decline
	Pintail	-12.1	Intermediate (Unfavourable)	-13.7	Intermediate decline
	Goldeneye	-87.3	Highly Unfavourable	-66.9	Large decline
	Little Grebe	-79.3	Highly Unfavourable	38.2	Stable or increasing
	Great Crested Grebe	-49.6	Unfavourable	-10.8	Intermediate decline
	Grey Heron	-76.9	Highly Unfavourable	6.6	Stable or increasing
	Hen Harrier	n/a	n/a	n/a	n/a
	Coot	-99.4	Highly Unfavourable	-23.2	Intermediate decline
	Knot	-44.8	Unfavourable	-9.8	Intermediate decline
	Dunlin	+25.7	Favourable	-45.2	Moderate decline
	Redshank	-57.6	Highly Unfavourable	6.7	Stable or increasing
	Lesser Black-backed Gull[15]	-99.4	-	-	-

[23] https://birdwatchireland.ie/app/uploads/2022/04/iwebs_trends_00000_National.html
[24] Data derived from the 1995/96 baseline as shown; 2020/21 data from Site Summary Tables S27 (caspio.com)

[25] Comparison of all-Ireland totals in 1986 (Merne & Murphy (1986) with the 2020 census data (Burke *et al.* (2021))
[26] From Fox *et al.* (2018)
[27] Trends in gull populations need interpreted with caution as they may not be properly assessed during I-WeBS counts

Table 4. Responses of inter-tidal using waterbird species to inter-tidal oyster cultivation. SCI species in Wexford Harbour & Slobs are shown in bold type.

Species	Response
Oystercatcher `	Neutral/ Positive
Curlew	Neutral/ Positive
Greenshank	Neutral/ Positive
Redshank	Neutral/ Positive
Turnstone	Neutral/ Positive
Light-bellied Brent Goose	Variable
Black-headed Gull	Variable
Common Gull	Variable
Herring Gull	Variable
Shelduck	Negative
Ringed Plover	Negative
Lapwing	Negative
Sanderling	Negative
Dunlin	Negative
Black- tailed godwit	Negative
Bar-tailed Godwit	Negative
Great Black-backed Gull	Negative
Grey Plover	Exclusion
Knot	Exclusion
Little Egret	Unknown (neutral/ positive)
Grey Heron	Unknown (neutral/ positive)
Lesser Black-backed Gull	Unknown (Variable)
Wigeon	Unknown (negative)
Teal	Unknown (negative)
Mallard	Unknown (negative)
Pintail	Unknown (negative)
Golden Plover	Unknown (negative)

Table 5. Changes in waterbird populations in Wexfrod Hbr & Slobs in the period 2017/18 to 2020/21. All figures are from I-WeBS core counts and are summed totals or averages based on raw data without imputation or modelling.

Group	Site	Year	Mean	SD	Sum	Diff to first year (mean)	Diff to first year (sum)
Waders	Wexford Harbour & Slobs	2017	334.2427	675.7378	34427	0.0%	0.0%
	Wexford Harbour & Slobs	2018	359.56	894.6516	44945	7.6%	30.6%
	Wexford Harbour & Slobs	2019	303.0959	807.5466	44252	-9.3%	28.5%
	Wexford Harbour & Slobs	2020	288.1507	785.5579	21035	**-13.8%**	**-38.9%**
non-Waders	Wexford Harbour & Slobs	2017	243.2635	1049.39	36003	0.0%	0.0%
	Wexford Harbour & Slobs	2018	214.3706	950.0146	36443	-11.9%	1.2%
	Wexford Harbour & Slobs	2019	237.1814	1022.526	48385	-2.5%	34.4%
	Wexford Harbour & Slobs	2020	157.3646	681.5478	15107	**-35.3%**	**-58.0%**

4.5 Potential for cumulative impacts

The 2016 AA explicitly does not assess potential cumulative, in-combination impacts which is a requirement for a full and complete AA. That report states "the cumulative impact assessment can only be prepared when there is a reasonable level of certainty about the likely impacts arising directly form the activities being assess, which is not the case for the present assessment". They add that there are likely to be "significant impacts arising from the cumulative impact of hunting pressures in combination with impacts from aquaculture activities" but data was not available for the assessment.

Given the nature of inter-connectedness of coastal wetland sites, our expert judgement is that there is considerable potential for cumulative impacts at this site given that (a) coastal wetland sites show a high degree of connectivity (based on various colour-marking/tracking projects), and (b) the proximity of the Wexford Harbour & Slobs to other important wetlands (including but not limited to Tacumshin, Lady's Island Lake and other Natura 2000 sites).

5. Recommendations

Waterbird populations have declined significantly in Ireland over recent decades globally; in Ireland declines over 20 years of 40% overall have been described in the lifetime of the I-WeBS project (since 1995/96[28]).

Significant long-term declines are evident in Wexford Harbour; based on analysis of available I-WeBS data (comparing average annual maxima between 5-year time blocks over ~ 25 years). Some of these patterns are consistent with (and contribute to) the national pattern, indicating that a combination of intrinsic (within all wintering habitats) and extrinsic (e.g. flyway-scale) factors likely underpin these declines.

In addition to a generally poor understanding of the potential effects of aquaculture on waterbirds, the direct loss of habitat of sufficient quality and quantity and displacement due to anthropogenic factors inevitably has mostly negative rather than positive effects. Site-specific studies are required to provide the scientific evidence base to prove an absence of negative effects beyond reasonable doubt. Compared to, for example, the potential impacts of oyster-trestle aquaculture, the potential effects of bottom culture mussel aquaculture are poorly-understood. In this case the primary impact that should be evaluated includes the potential indirect effects of activities which cause disturbance).

Site- specific studies are required to investigate the potential effects of mussel aquaculture in Wexford Harbour & Slobs SPA to ensure that the Conservation Objectives, including of maintenance of populations in favourable condition are met. The most recent Conservation Objectives (2012) are now 10 years old (and evaluate on even older data) and a robust baseline analysis of population trends should be undertaken. Based on the evaluation presented here, it is likely that the number of species in unfavourable condition has increased considerably in the interim.

The 2016 Appropriate Assessment (hereafter AA) prepared by Atkins[29] was mostly based on desk-review. It did not rule out the potential for 'likely significant effects' and was unable to assess the cumulative impact which "*could only be prepared when there is a reasonable level of certainty about the likely impacts arising from the activities being assess, which is not the case for he present assessment* (p. xiv). The assessment of cumulative/in-combination impacts is a requirement of Article 6.3 of the Habitats Directive[30].

The AA indicated potential impacts where the evidence indicates a high likelihood of significant impacts occurring in the case of bottom mussel culture on (a) Red-breasted Merganser, and (b) Little Tern. In the case of the former whilst the AA indicates the impact based on predicted displacement, the population-level consequences are unknown. They suggest, in the case of Little Tern, that appropriate adaptive management strategies may mitigate potential impacts. It is clear that this needs to be properly evaluated to assess the potential impacts of bottom mussel aquaculture activities on these QI species.

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[28] Burke *et al*. (2018) Estimates of waterbird numbers wintering in Ireland 2011-12 to 2015/16. *Irish Birds* 41: 1-12.

[29] Annex II Wexford Harbour, the Raven and Rosslare Bay: Appropriate Assessment of Aquaculture

[30] Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives

In addition to the above, the AA identifies the following potential impacts where the available evidence is not sufficient to rule out significant impacts beyond reasonable scientific doubt:

- Potential disturbance impacts on the wintering population of Greenland White-fronted Geese
- Potential disturbance to night-time roosts of Scaup, Goldeneye, Red-breasted Merganser and Great Crested Grebe
- Potential impacts of mussel culture on inter-tidal mussel beds
- Potential impacts of mussel-related boat activity on roosts
- Potential displacement impacts on various wader species
- Potential impact of oyster culture on Little Tern

The uncertainty associated with the above means that a complete Appropriate Assessment is not possible. ECJ ruling C-404/092 and ECR I-7495[31] states that an AA under Article 6(3) "cannot be considered appropriate if it contains gaps, and lacks complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works on the SPA concerned" (line 10 of the judgement 24 Nov 2011[32].

It is unclear as to why the shortcomings identified by the 2016 AA have not been addressed in the subsequent years – most if not all of the issues identified in that report remain and the recommendations appear to have, on the whole, not been implemented.

A revised Appropriate Assessment (based on much more recent data) is required to assess *in situ* and *ex situ* impacts and this can only be underpinned by addressing the very significant data gaps and uncertainties highlighted in the 2016 Appropriate Assessment.

Some of these data gaps are identified and described by the AA and in the submissions by, for example, An Taisce and BirdWatch Ireland. We would recommend that careful consideration be given to review the nature and scale of any desk-based and/or new field assessments so that a robust scientific assessment can be made at this site to form the basis of future decision-making.

Any future work has to initially review the recommendations arising from the 2016 AA, in particular those areas where incomplete or inadequate data was highlighted and determined necessary for providing the scientific evidence base for decision-making.

All available data has to be collated and we suggest an independent programme of work commissioned with very clear objectives and resources to undertake desk, field and analytical work. It is important that this work is carefully planned out with realistic objectives and testable hypotheses to investigate *inter alia* carrying capacity, bird population dependence on shellfisheries resources, and direct and indirect energetic consequences of shellfish activities on SCI species identified. To this end, we suggest that commissioning such work should have independent expert prescriptive input – to identify clear hypotheses and the design of field and analytical approaches.

[31] An assessment made under Article 6(3) of the Habitats Directive cannot be regarded as appropriate if it contains gaps and lacks complete, precise and definitive findings and conclusions capable of removing all reasonable scientific doubt as to the effects of the works proposed on the SPA concerned (see, to that effect, Case C-304/05 *Commission* v *Italy* [2007] ECR I-7495, paragraph 69)

[32] https://curia.europa.eu/juris/document/document.jsf;jsessionid=46C9E7B6E0CF18B5C7193B2E9AFC0FD3?text=&docid=115208&pageIndex=0&doclang=EN&mode=lst&dir=&occ=first&part=1&cid=2071901

Given stochastic variability, we would recommend that any new field study should take place over a period of a minimum of two, ideally three years, with fieldwork spanning the full range of months in which SCI species are present at the site. For 'wintering' species this should extend into the passage periods (e.g. July, August, and May) outwith the typical September – March window. This is because, aside from June, many Irish wetlands are heavily used by significant populations of waterbirds. In April and May these include populations of Black-tailed Godwit and Whimbrel whose numbers significantly increase on northward passage. From July onwards the first arrivals of arctic and sub-arctic migrants arrive and go largely unmonitored at Irish estuaries due to lack of systematic counting.

Such monitoring needs to generate (a) complete counts at a whole-site (core counts) level on at least a monthly basis, recording numbers and distribution at smaller constituent sub-site levels (such as existing I-WeBS subsites), in addition to (b) through-the-tide counts of waterbirds within the main inter-tidal areas following 'low-tide count' methods. More focussed work investigating detailed movements site use (including nocturnally), and distribution of key species may require use of specialised techniques such as thermal-imaging surveys, GPS telemetry and analysis of inter-tidal food supplies.

Production of a site-based TAC model, as has been used in similar situations elsewhere, would utilise these data. In its simple form, a TAC which measures food availability and requirements of bird populations is inadequate for a number of reasons, including for example, due to the fact that not all food is 'available' and competition between species can exclude individuals. This *Ecological Multiplier effect* means that 2.5-7.7 times more food is required than may be expected using simplistic models and values lie at the higher end of this range on mussel-dominated systems. Overcoming these issues led to the development of Individuals-based models which have been applied at a number of sites to manage shellfisheries in the UK, including Burry Inlet, the Dee Estuary, Morecambe Bay and Exe Estuary. A range of more recent statistical models have also been developed which could play a role in the development of a sustainable shellfisheries model in Wexford Harbour. In addition to being parameterised by generic values (e.g. metabolic rates, average body masses etc), such models fundamentally require information on, for example, the numbers of individual species feeding on the shellfish types and the period over which they are dependent, and the existing stock of shellfish as a food resource.

Annex 1 – Notes from site visit, February 2023

There were 3 boats active during our visit (The XX, YY and ZZ), all in the harbour zone. The XX had just got in when we arrived, the YY came in just before high water and the ZZ was out throughout. The two boats we saw were harvesting (presumably both: we saw one unloading mussels) off the North Slob. The mooring area is just by the main bridge very close to the town centre.

Out in the bay there were 8 GC Grebe and 3 RB Merganser, with a small raft of prob goldeneye far out. We didn't see any interactions between these birds and the boats, although the boats were quite far out and there could have been more birds out of sight.

There seem to be 2 main high tide roosts, one on a small island marked as the Ballast bank just off the quay and close to the mooring area, and one on a 3 pronged breakwater North of the bridge. These held approx:

400 Lapwing
40 Bar-tailed godwit
25 Redshank
100 Dunlin
10 Cormorant
40 Oystercatcher
20 Turnstone

In addition to various Herring, GBBG, LBBG, and Black-headed Gulls.

There was also a very large and very distant small wader flock in flight (probably Knot), 4 Light-bellied Brent Geese overhead and a Common Seal in the harbour.

When the CC came in, it passed between ballast bank and the quay and flushed a high proportion of the birds there for a few minutes, particularly the (more flighty) Lapwings.

Whilst writing notes, the YY came flushing the vast majority of the roosting birds which settled on the slightly exposed breakwater leading into the mooring area.

We visited the area by the Wexford Wildfowl Reserve (Slobs) but didn't see any Greenland White-fronted Geese in the fields nearby the Reserve buildings, and the mussel boat wasn't close enough to shore to disturb any that may have been in nearby fields.