Grey seal moult population survey in the Republic of Ireland, 2007

CMRC

AN ROINN COMHSHAOIL, OIDHREACHTA AGUS RIALTAIS ÁITIÚIL
DEPARTMENT OF THE ENVIRONMENT, HERITAGE AND LOCAL GOVERNMENT

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Cover photo: Aerial image of grey seals hauled out on the Great Blasket Island in March 2007. © Oliver Ó Cadhla

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SUMMARY

The first comprehensive nationwide assessment of Ireland's grey seal breeding population was carried out in 2005-06, estimating the number of pups born nationally and extrapolating to an overall estimate of population size. Considering the results of the breeding population assessment, a secondary question remained unanswered regarding the seasonal status of Ireland's grey seal population. Since it is believed that the largest proportion of the grey seal population is hauled out ashore during the annual moult, it was considered important to carry out a moult population assessment from which the relationship between *all-age population size* (from 2005 breeding season figures) and *moult haul-out abundance* could be investigated. The moult population estimate would be a minimum estimate, similar to that acquired in 2003 for harbour seals.

The primary objectives of the research were:

1. To estimate the minimum number of grey seals occurring around the Republic of Ireland during the annual moult;
2. To investigate whether immigration during the moult is a national, regional or local phenomenon;
3. To better inform the government and scientific community on issues of seasonal seal abundance and habitat use;
4. To provide management advice for effective future population assessment and monitoring.

Following closely the methods and logistical arrangements established in 2005, a series of aerial reconnaissance surveys began around the coast of the Republic of Ireland in February 2007 to supplement background knowledge of this period of the annual cycle in Ireland. Thereafter, aerial survey effort continued into early March when a set of six consecutive regional surveys were completed, to cover all identified haul-out sites for moulting grey seals and other potential habitats.

Key results from the research were as follows:

- A total of 5,343 grey seals was recorded among haul-out sites in the Republic of Ireland between 1st-9th March, 2007. This minimum estimate represents a repeatable quantitative descriptor for future one-off population surveys during the moult season;
- According to data gathered in February and March 2007, moulting grey seals appeared to be particularly concentrated along the Atlantic seaboard;
- Two islands – Inishkea North, Co. Mayo and the Great Blasket Island, Co. Kerry, contained over 45% of all grey seals recorded nationally during the moult survey;
- 27.7% of all grey seals recorded during the nationwide survey were located at Inishkea North.
- The Inishkea Group, Co. Mayo as a whole contained a minimum estimate of 1,882 grey seals on 2nd March representing over 35% of the national figure derived during the survey;
- Nationally-significant haul-out group sizes were also recorded at key sites off the coasts of Co. Dublin and Co. Wexford;
- Group sizes at a number of grey seal colonies exceeded figures expected from breeding data, indicating that changes in population distribution may occur seasonally, and do so on a regional scale;
- The data suggest that future national monitoring programmes should include similar surveys during the moult season.

Results presented in this report are discussed and a number of recommendations made, based on the study's findings.

1. INTRODUCTION

Two species of seal (Family *Phocidae*) commonly breed in the Republic of Ireland – the Grey seal (*Halichoerus grypus*) and Harbour seal (*Phoca vitulina, a.k.a.* common seal). Both are protected under national and European legislation and, in accordance with member-state requirements under the European Union's Habitats Directive (92/43/EEC), the Irish government has designated Special Areas of Conservation (SACs) for each species; ten sites for the grey seal (Ó Cadhla *et al*., 2007; Appendix I) and seven for the harbour seal (*see* Cronin *et al*., 2004). These first designations were based on breeding count data dating to the years 1978-1984, which represented the best available information in the mid-1990s.

In recent years consistent research efforts have culminated in the delivery of reliable minimum estimates for both populations and an improved picture of both species' terrestrial distribution around the island of Ireland. A minimum estimate of Ireland's harbour seal population was derived from nine regional surveys held on consecutive days in August 2003, during the moult phase of the annual cycle (Cronin *et al*., 2007). This was followed by a comprehensive national grey seal population assessment during the 2005 breeding season, spanning the months of August to December (Ó Cadhla *et al*., 2007).

In both population assessments, discrete terrestrial phases of each species' annual cycle were targeted for survey using optimal methodologies. However, for mobile marine mammals like seals, seasonal changes in local population size, distribution and habitat use may underscore the limitations of single-season estimates and present significant challenges for species conservation and management planning. Previous research at regional colonies in the Republic of Ireland concerning the number of grey seals hauled out ashore during the annual moult, summer and breeding seasons (Kiely, 1998; Kiely *et al*., 2000) indicated that the size and age/sex composition of haul-out groups can be highly variable throughout the year. In one significant case, among the Inishkea Group of islands in western Ireland, moult figures can exceed the estimated breeding population size for the area, suggesting an annual immigration during this season (Kiely, 1998).

Given the nationwide experience and results obtained during the 2005 grey seal breeding assessment which concluded that the Republic of Ireland currently contains a population numbering approximately 5,509-7,083 grey seals (Ó Cadhla *et al*., 2007), it was decided that an ancillary assessment of moult population size and distribution should also be conducted as soon as possible. The primary objectives of this survey were as follows:

1. To estimate the minimum number of grey seals occurring around the Republic of Ireland during the annual moult;
2. To investigate whether seasonal immigration to breeding colonies occurs as a national/regional/local phenomenon;
3. To better inform the government and scientific community on issues of seasonal seal abundance and habitat use;
4. To provide management advice for effective future population assessment and monitoring.

2. METHODS

2.1 INTRODUCTION

Although differences in individual life histories, behaviour and seasonal cycles mean that the entire population of grey seals is never fully available for counting, the presence ashore of significant portions of the grey seal population during breeding and moulting facilitate the assessment of population size over a large geographic area. According to background data gathered in the Republic of Ireland, the annual moult season for grey seals occurs somewhat earlier than generally described by Bonner (1990), beginning as early as November (Plate 1) for adult females and juveniles and continuing up to April for adult males (Kiely, 1998). Such a large time-span and limited international knowledge on the grey seal moult makes it difficult to determine the appropriate time-frame in which

to estimate moult population size. However preliminary studies during the species' moult season in the Republic of Ireland (i.e. Kiely, 1998; Kiely *et al.*, 2000) indicated that the peak in numbers of grey seals ashore may occur in the months of February and March. For this reason it was decided that this new nationwide survey should target a four-week period between mid-February and mid-March, when aerial survey conditions and available flying-hours would also be more favourable. Similar to the national harbour seal population assessment, therefore, the intention was to cover the entire coastline of the Republic of Ireland via consecutive regional surveys in as short a time-frame as possible, yielding a numerical 'snapshot' of moult population size and distribution.

Plate 1. Haul-out group of moulting adult female grey seals at a pupping site in late November.

2.2 PRELIMINARY RECONNAISSANCE

Given the availability of aircraft, the very large potential survey area and experience from the 2005 breeding population assessment, it was decided that a series of preliminary aerial surveys of the coastline should be conducted with the Irish Air Corps as early as possible in 2007. This reconnaissance, carried out in February using single-engine *Cessna 172* aircraft, was necessary due to the absence of moult haul-out data from large portions of the Irish coastline at this time of year. The purpose of these scoping surveys was:

a. to identify sites containing moulting and other grey seals around the Irish coast;
b. to familiarise the team with flying and light conditions at this time of year;
c. to re-evaluate aerial survey methodologies, including flight planning options;
d. to re-acquaint the research team with airfields and personnel;
e. to determine aerial journey times within regional areas during the moult.

2.3 AERIAL SURVEY METHODS

Following background research and aerial reconnaissance carried out during February, aerial survey methods were largely based on techniques and logistical arrangements put in place for the 2005 breeding population assessment (*see* Ó Cadhla *et al.*, 2007). A high-wing, twin-engine Britten-Norman *Islander* aircraft was hired from Aer Arann Islands, Inverin, Co. Galway for up to 6 surveys, its passenger windows in the front and rear of the plane fitted with hatches for aerial photography.

Surveys using an *Alouette III* helicopter were also factored in by arrangement with the Irish Air Corps, the availability of which had proved invaluable in the 2005 survey. Helicopter surveys in 2007 were aimed at known sections of the west and northwest coast containing high coastal topography (>600 feet) and intricate sea cliff, gully and beach systems which, where they occur together, are very difficult to survey safely by fixed-wing aircraft due to air turbulence and limited space for manoeuvring (Ó Cadhla *et al.*, 2007).

Based on preliminary reconnaissance the survey altitude for moult surveys was set at 1,200-1,500 feet with optimal aircraft speed over ground at 70-90 knots, depending on weather conditions and the coastal terrain under survey. This altitude and speed were chosen to allow aerial photography to proceed effectively while attempting to minimise disturbance to haul-out groups and facilitate more accurate counting. As in 2005, the time spent surveying any haul-out site was minimised as much as possible by survey design and planning.

Aerial survey teams consisted of two research personnel in the following roles: (i) photographer/navigator, and (ii) data-logger. Flights were planned in advance using the survey location system developed in 2005. In addition to the surveying of pre-identified haul-out locations, a flexible 'search' mode was also used when transiting nearby potential habitats. This involved observers scanning sites with the naked eye and binoculars while the aircraft passed by or circled potential haul-out habitat.

With the exception of a few locations containing very small numbers of grey seals ashore or in the water (i.e. 1-5 animals in total), which were counted in real time, the estimation of moult population size in 2007 was reliant on the use of digital aerial photography from which counts would be carried out in the laboratory. Sites found to contain such groups of grey seals were photographed completely covering all the necessary habitats, including surrounding waters up to 50m from the shore. A handheld digital SLR camera (Canon™ EOS 1DS) fitted with a 300mm zoom lens was used for photography. Still images were taken obliquely whether obtained from the fixed-wing plane or helicopter, while efforts were made to collect near-vertical images as much as possible to allow for better identification of adjacent animals. Image sequences and location data were logged in-flight by the data-logger and a distinct image bank was collated after each survey flight.

2.4 DATA ANALYSIS

Image analysis was based on methods described in Ó Cadhla *et al*. (2007). Counts of grey seals recorded in the water and ashore at haul-out sites were assigned to a survey location. Results from the moult survey programme and estimates of haul-out group size were displayed using *ArcView* GIS (Geographical Information System) software. This enables the incorporation of new or historic survey data in successive data layers, providing an appropriate framework for the analysis and presentation of data from ongoing national monitoring effort. In mapping survey locations and discrete sites or areas within those locations, positional data were given for the approximate centre-point of each, whether an individual island or stretch of surveyed coastline (e.g. Appendix III).

3. RESULTS

3.1 AERIAL SURVEY RESULTS

The 2007 moult population survey was completed successfully covering the entire coastline of the Republic of Ireland between the 1st and 9th March, 2007, although breaks due to poor weather were necessary on the 4th, 5th and 8th March. While working around prevailing conditions, the survey design allowed all potential and identified haul-out locations to be surveyed as planned from the air. Over 1,500 still images were obtained during the survey programme. These were analysed in the laboratory between the months of April and June 2007.

3.2 GREY SEAL DISTRIBUTION RECORDED DURING MOULT SURVEYS

Data gathered during February and March 2007 indicated that moulting grey seals were particularly concentrated along the Atlantic coastline of Ireland in Counties Kerry, Galway, Mayo and Donegal (Fig. 1). However, nationally-significant haul-out groups were also recorded at key sites off the coasts of Co. Cork, Co. Dublin and Co. Wexford (Appendix III). The research also indicated that national grey seal distribution ashore during the moult season may be somewhat narrower than that observed during breeding (Fig. 1), when the recording of newborn pups is the primary focus of survey effort (Ó Cadhla *et al*., 2007). Such differences were most apparent in haul-out data from Counties Galway, Mayo and Donegal (Appendix III).

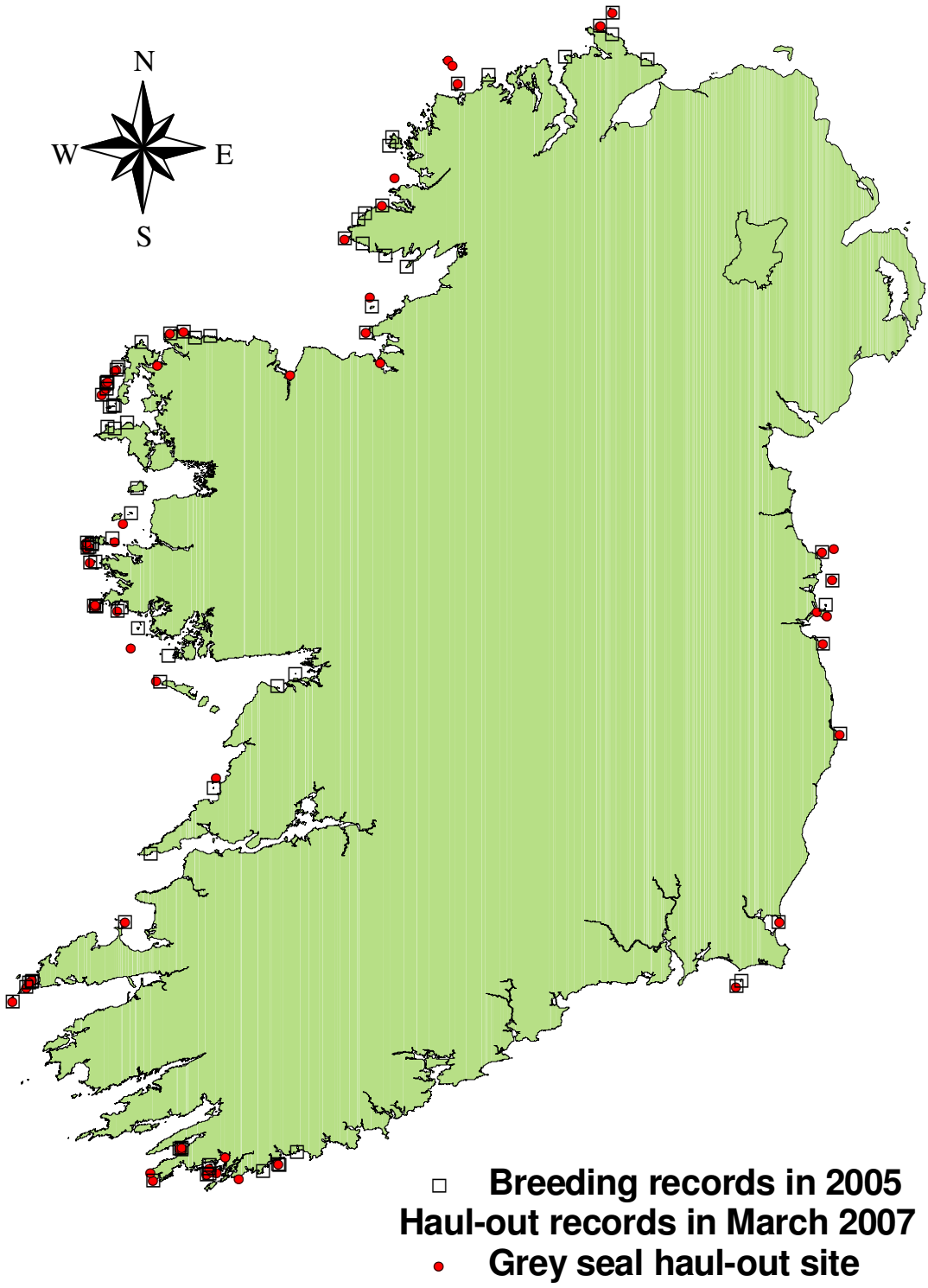

Figure 1. The distribution of grey seal haul-out sites in the Republic of Ireland in March 2007, relative to known breeding locations recorded in 2005. Haul-out locations are plotted as the centre points assigned to individual sites.

3.3 MINIMUM POPULATION ESTIMATES IN MARCH 2007

Based on count data obtained by means of aerial survey imagery and a small number of real time counts, the minimum population estimate delivered by the survey programme was as follows:

> Republic of Ireland moult population estimate, 2007 = 5,343 grey seals

Two islands – Inishkea North, Co. Mayo and the Great Blasket Island, Co. Kerry, contained over 45% of all grey seals recorded nationally during the moult survey. Large haul-out group sizes of over 900 animals were recorded on large sheltered sandy beaches at each of these islands (Appendix III). In total 27.7% of all grey seals recorded during the nationwide survey (Fig. 2) were located at Inishkea North, most centred about a site known as 'the Dock' (Plate 2). The Inishkea Group as a whole contained a minimum estimate of 1,882 grey seals on 2nd March – over 35% of the national figure.

Plate 2. Aerial image of grey seals hauled out and in shallows at 'the Dock' on Inishkea North, Co. Mayo, March 2007.

Other haul-out group sizes noteworthy in a regional context (Fig. 2; Appendix III) were recorded at Low Island, the West Calf Island (Plate 3) and Carbery Island (Co. Cork), Ferroon Rocks, Chapel Island & Inishgort (Co. Galway), Inishkea South & Inishkeeragh (Co. Mayo), Slievetooey (within Location 109: Glenlough to Maghera) & Inishtrahull (Plate 4; Co. Donegal), St. Patrick's Island & Lambay Island (Co. Dublin), and Raven Point & Great Saltee Island (Co. Wexford).

Terrestrial habitats used by moulting grey seals around the Irish coastline varied from rocky skerries (e.g. Bomore, Co. Sligo), island coastlines consisting of rock ledges and outcrops to sand beaches and sandbanks (e.g. Ballisadare Bay, Co. Sligo; Raven Point, Co. Wexford). In two cases (Ferroon Rocks and Glassillan, Co. Galway), haul-out groups were recorded on the grassy summits of islands.

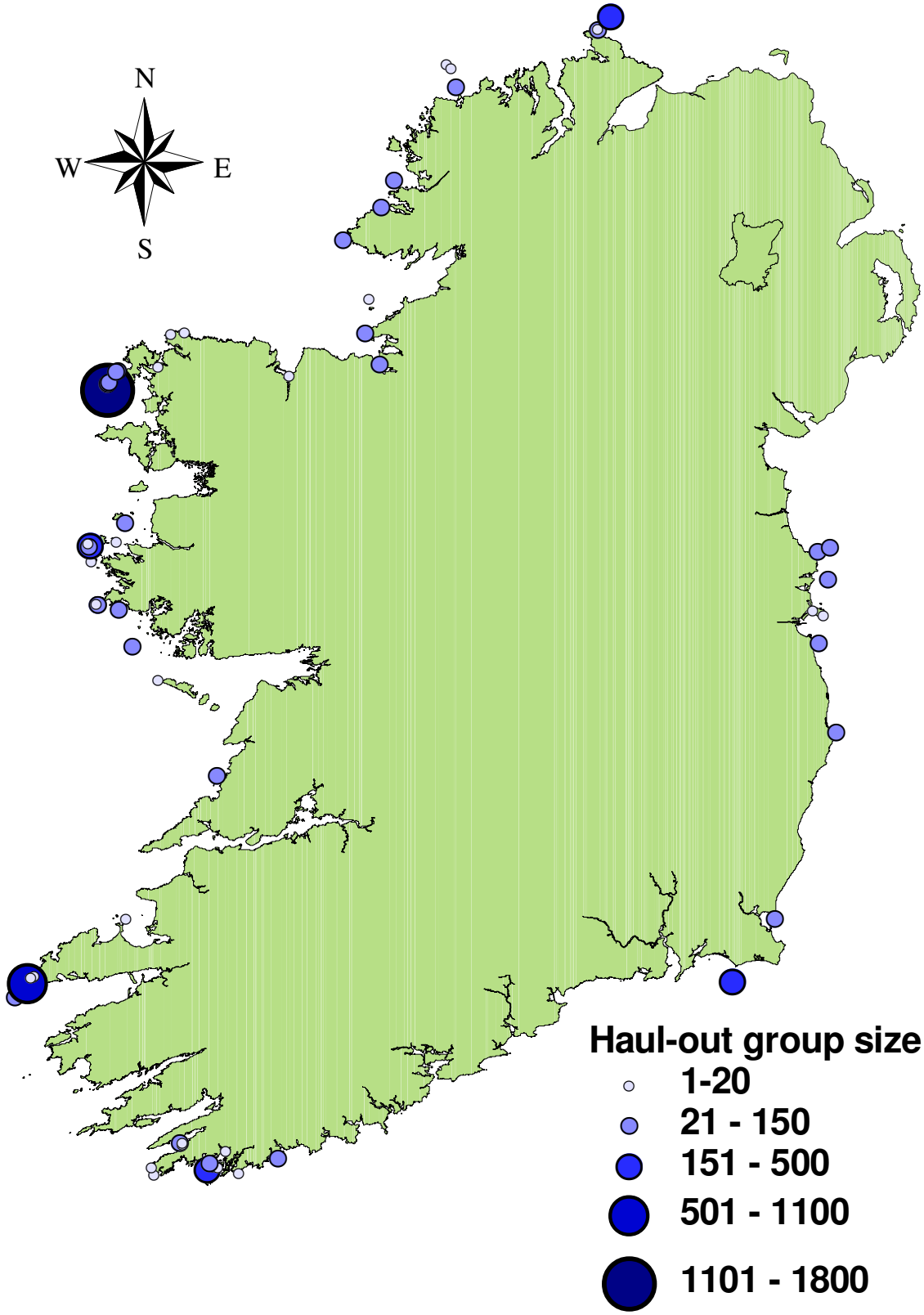

Figure 2. Grey seal regional distribution and group sizes derived from aerial imagery and data gathered in the Republic of Ireland in March 2007, during the annual moult season.

Plate 3. Moulting grey seals hauled out on mixed beach substrate at Calf Island West, Co. Cork.

Plate 4. Haul-out group of grey seals on an enclosed sandy beach at Inishtrahull off the Co. Donegal coast.

4. DISCUSSION

The 2007 moult survey represents the first large-scale numerical assessment conducted in Irish or UK waters during the season and confirms the method's potential use as a long-term population monitoring tool. Heretofore efforts to estimate grey seal populations have traditionally focused on the breeding period (Ó Cadhla *et al*., 2007). In this context the survey established an important reference point in the investigation of grey seal stock distribution throughout the year, building on similar data collected during the summer of 2003 (Cronin *et al*., 2004).

The moult survey delivered a figure approaching the 2005 minimum population estimate of 5,509-7,083 (Ó Cadhla *et al*., 2007). It must be noted, however, that the survey programme was short-term in nature, with reconnaissance and aerial surveys spanning only 2-3 weeks of a protracted season (November-April; Kiely, 1998). Given that a turnover in animals doubtlessly occurs throughout the entire moult season, the total 5,343 grey seals counted between 1st-9th March must be considered a minimum subset of the available all-age population during the season. Based on data collected historically in Ireland (Kiely, 1998; Kiely *et al*., 2000) similar nationwide surveys conducted in the months of December, January and February would provide significant additional context to the current estimate and better address questions of population size, distribution and habitat use during the season as a whole.

The data obtained in 2007 confirmed, in a national context, several findings from previous research during the moult season in Ireland. Firstly the importance of islands in the Inishkea Group and Blasket Islands for moulting grey seals (Kiely, 1998) was reiterated in 2007 and given a national setting. Previous moult data gathered at the Inishkea Group recorded up to 2,200 grey seals among haul-out sites in the area with group sizes variable from day to day and month to month (Kiely, 1998). The 2007 data also reaffirmed the importance of specific moult sites within the Inishkea Group, most significantly 'the Dock' site, the use of which appears to be confined to the moult season only. The nearby island of Inishkeeragh also contains a specific moult site not utilised at other times of the year (Kiely, 1998). Such data highlight the need to consider a seasonal component in conservation and management planning to account for changes in terrestrial site use by the species.

The total of 989 grey seals recorded at the Blasket Islands in 2007, 947 of which were ashore on the Great Blasket Island, represents the highest number on record at these islands, more than twice that obtained in 1996-97 (Kiely, 1998) and considerably higher than that provided by anecdotal or unpublished sources (O. Ó Cadhla, CMRC, *unpubl*.). While it is difficult to interpret the result, given inconsistent and breeding-focused monitoring, it is noteworthy that the figure exceeds the 2005 all-age population estimate by c. 150 seals (*see* Ó Cadhla *et al*., 2007). Group sizes at several other locations (e.g. Low Island, Calf Islands, Carbery Island, the Inishkea Group) also exceeded population estimates based on breeding data (Ó Cadhla *et al*., 2007) suggesting a level of seasonal immigration first described at the Inishkea Group (Kiely, 1998).

In contrast, 2007 moult estimates for several other key breeding areas (e.g. Saltee Islands, northwest Galway, southwest Donegal) were well below 2005 breeding population figures, which is to be expected in a 'closed population' scenario where only a proportion of the animals associated with a given location are moulting simultaneously and a level of moult population turnover occurs during the season as a whole.

The 2007 survey thus indicated that changes in population distribution may occur seasonally in the Republic of Ireland, operating on a regional scale and conferring on certain sites an importance exceeding breeding population expectations. Data gathered in 2005 indicate that Ireland's breeding population may be increasing at key colonies (Ó Cadhla *et al*., 2007). Given that the species' moult phase occurs prior to the key annual foraging period, whether male or female (Bonner, 1990), it is important that moult-based research and monitoring continue, to facilitate a better understanding of Ireland's changing grey seal population and its role in the wider marine ecosystem.

5. CONCLUSIONS

5.1 Implementation of the research project

This first nationwide moult population survey was implemented satisfactorily, delivering valuable data and guidance for future research in the Republic of Ireland.

5.2 Grey seal moult population size in the Republic of Ireland

The current grey seal moult population estimate for the Republic of Ireland is 5,343 seals of all ages. This is a minimum estimate and as such represents an appropriate national baseline figure during this phase of the annual cycle.

5.3 Areas of importance for moulting grey seals, regional and local

The moult population assessment underlined the importance on a national scale of nine key colonies located in Counties Donegal (north and southwest), Mayo (Inishkea Group), Galway (Inishgort & adjacent islands; Slyne Head islands), Kerry (Great Blasket Island), Cork (Western Calf Island), Wexford (Great Saltee Island) and Dublin (Lambay Island). Other moult haul-out sites of regional and local importance were identified. Most occurred along the Atlantic coastline from west Cork to Donegal.

5.4 Population changes at key colonies

Seasonal changes in population size at grey seal colonies are to be expected. The data gathered nationally during the moult season indicate that a number of locations may experience seasonal immigration during this phase of the annual cycle. It is not clear at this stage whether the represents a regional redistribution of national stock or the involvement of breeding stocks from outside the island of Ireland.

6. RECOMMENDATIONS

6.1 Future seasonal population assessments on the island of Ireland

It is recommended that the present study be used as the baseline for future moult population assessments in the Republic of Ireland. If possible, future surveys seeking to estimate moult population size should be coordinated with similar research effort in Northern Ireland, in order to deliver comprehensive figures for the island of Ireland.

6.2 National monitoring programmes for grey seals

It is recommended that an annual monitoring programme at key grey seal breeding colonies in the Republic of Ireland should be extended to include periodic investigation of stock size and distribution ashore during the moult season.

6.3 Priority research areas

It is recommended that a number of priority areas for population research should be supported, based on the information gathered in 2007 and significant information gaps that remain. These are:

(i) studies of grey seal movements and foraging ecology from regional population centres (a) after the breeding season and (b) after the moult season;

(ii) dedicated research into grey seal habitat preferences, inter-site movement and population biology at key accessible breeding colonies (e.g. Inishkea Group, Blasket Islands, Saltee Islands).

ACKNOWLEDGEMENTS

The 2005 grey seal moult population survey was funded by the Republic of Ireland's Department of the Environment, Heritage and Local Government. Members of its National Parks & Wildlife Service were involved in the study at all levels and we would like to express here our appreciation to the members of the project team (Appendix II) and other colleagues for their assistance, professionalism and enthusiasm in facilitating and carrying out the survey. We are also very grateful to a wider pool of NPWS staff for their support and advice via steering group meetings and other communications: Noreen Grealis, Dr Deirdre Lynn, Dr David Lyons, Dr Ciaran O'Keeffe and Dr Elizabeth Sides.

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Go raibh míle maith agaibh go léir.

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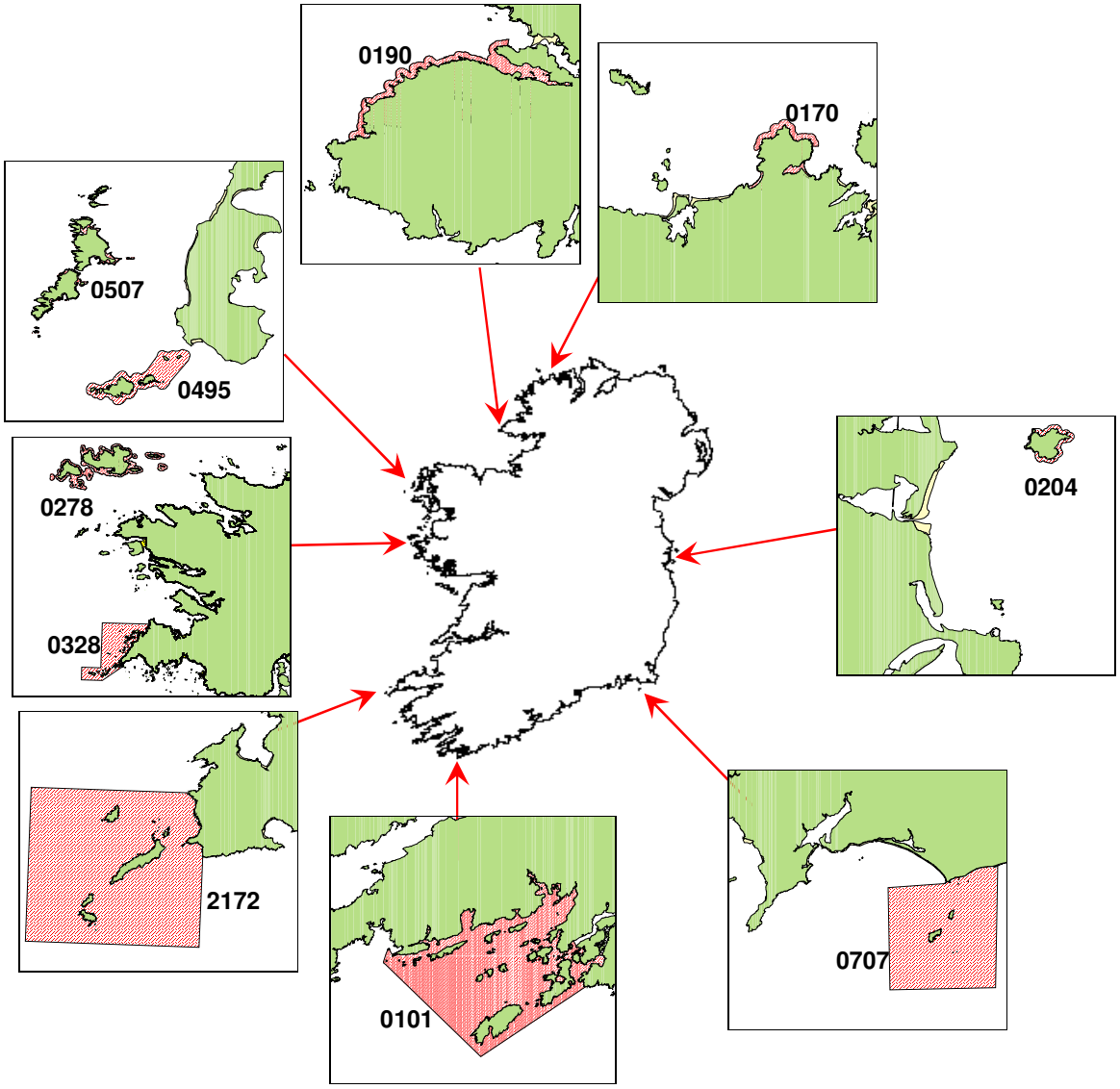
APPENDIX I SPECIAL AREAS OF CONSERVATION (SACs) FOR GREY SEALS IN THE REPUBLIC OF IRELAND.



Legend:

Site Code	*Name of site*	*County*
000204	LAMBAY ISLAND	DUBLIN
000707	SALTEE ISLANDS	WEXFORD
000101	ROARINGWATER BAY AND ISLANDS	CORK
002172	BLASKET ISLANDS	KERRY
000328	SLYNE HEAD ISLANDS	GALWAY
000278	INISHBOFIN AND INISHSHARK	GALWAY
000495	DUVILLAUN ISLANDS	MAYO
000507	INISHKEA ISLANDS	MAYO
000190	SLIEVE TOOEY/ TORMORE ISLAND/ LOUGHROS BEG BAY	DONEGAL
000147	HORN HEAD AND RINCLEVAN	DONEGAL

APPENDIX II PROJECT TEAM FOR THE 2007 MOULT POPULATION SURVEY.

Project Management: Oliver Ó Cadhla, Denis Strong, David Lyons

Survey design & analysis: Oliver Ó Cadhla, Denis Strong

Aer Arann Islands Pilots Des Collins, Alan Grimes

Moult season aerial survey teams:

Search Area A (northwest)	*Search Area B (west)*	*Search Area C (south)*	*Search Area D (east)*
Oliver Ó Cadhla	Oliver Ó Cadhla	Oliver Ó Cadhla	Oliver Ó Cadhla
Tim Roderick	Cameron Clotworthy	Pascal Dower	Tony Murray
Pat Vaughan	Rob Holloway	Brian Duffy	Alyn Walshe
	Lee McDaid	Danny O'Keeffe	
	Pat Vaughan		

NPWS coordinators: Dave Duggan (NW), Denis Strong (W), Ger O'Donnell (W), Declan O'Donnell (SW), Cyril Saich (SE), Wesley Atkinson (E)

Irish Air Corps assistance:

Coordination & Operations	104 Squadron – *Cessna 172*	303 Squadron – *Alouette III*
Comdt Owen McGrath (104 Squadron)	Lt Paul Grennan	Capt Lee Brennan
Sgt Stephen White (Operations)	Lt Michael Noonan	Sgt Red O'Keane
Cpl Elaine Fitzgerald (Helicopter Operations)	Lt Alan Grey	

APPENDIX III MOULT HAUL-OUT DATA FOR THE REPUBLIC OF IRELAND, 2007.

Locations and sites covered during grey seal moult population surveys in 2007 and estimated haul-out group sizes (N_g) delivered by the programme.

[Recon = Reconnaissance survey; * = evidence of breeding in 2005; I. = Island; Hd. = Head]

Location Number	County	Site/Area name	Lat. °N	Long. °W	No. of surveys	Recon date	Count date	N_g	Breeding* (Y/N)
1	**Cork**	Capel I.	51.883	7.853	1	18 Feb		0	N
2	Cork	Ballycotton Islands	51.826	7.986	1	18 Feb		0	N
3	Cork	Lahard	51.786	8.166	1	18 Feb		0	N
4	Cork	Doonavanig	51.751	8.302	1	18 Feb		0	N
5	Cork	Holeopen Bay	51.620	8.540	1	18 Feb		0	N
6	Cork	Rochestown	51.640	8.610	1	18 Feb		0	N
7	Cork	Coolim cliffs	51.604	8.692	1	18 Feb		0	N
	Cork	Seven Heads	51.573	8.740	1	18 Feb		0	N
8	Cork	Brownstown	51.574	8.879	1	18 Feb		0	N
	Cork	Dunowen	51.540	8.920	1	18 Feb		0	N
9	Cork	Castle Bay	51.560	9.030	1	18 Feb		0	Y
10	Cork	High I.	51.514	9.125	2	18 Feb	3 Mar	0	Y
	Cork	Low I.	51.516	9.129	2	18 Feb	3 Mar	82	Y
	Cork	Rabbit I.	51.530	9.122	1	18 Feb		0	N
11	Cork	Horse I.	51.507	9.184	1	18 Feb		0	N
12	Cork	Farranconnor	51.492	9.214	1	18 Feb		0	Y
13	Cork	Gokane	51.488	9.261	1	18 Feb		0	N
	Cork	Stag Rocks	51.469	9.224	2	18 Feb	3 Mar	0	N
14	Cork	Kedge I.	51.463	9.343	2	18 Feb	3 Mar	1	N
15	Cork	Illaunbrock	51.453	9.442	1	18 Feb		0	N
16	Cork	Clear I. – Cape Clear	51.427	9.520	1	18 Feb		0	N
17	Cork	Calf I. West	51.474	9.518	2	18 Feb	3 Mar	224	Y
	Cork	Calf I. Middle	51.479	9.504	2	18 Feb	3 Mar	0	Y
	Cork	Calf I. East	51.483	9.488	2	18 Feb	3 Mar	4	N
	Cork	Toorane Rocks	51.482	9.460	2	18 Feb	3 Mar	2	N
	Cork	Carthy's Islands	51.495	9.506	2	18 Feb	3 Mar	21	Y
18	Cork	Castle I.	51.507	9.506	2	18 Feb		0	Y
	Cork	Skeam West	51.503	9.459	1	18 Feb		0	N
	Cork	Skeam East	51.505	9.444	1	18 Feb		0	N
	Cork	Mannin I. to Carrigviglash	51.537	9.419	2	18 Feb	3 Mar	3	N
19	Cork	Goat Islands	51.487	9.603	2	18 Feb	3 Mar	0	N
	Cork	Illaunricmonia	51.484	9.616	2	18 Feb	3 Mar	0	N
	Cork	Dick's I.	51.496	9.637	2	18 Feb	3 Mar	0	N
20	Cork	Mizen Hd.	51.451	9.810	1	3 Mar	3 Mar	3	Y
	Cork	Dunlough – south	51.477	9.822	1	3 Mar	3 Mar	1	N
21	Cork	Knocknamaddree	51.513	9.770	1	3 Mar	3 Mar	0	N
22	Cork	Carbery I.	51.562	9.669	1	3 Mar	3 Mar	99	Y
	Cork	Furze I.	51.559	9.657	1	3 Mar	3 Mar	11	Y
	Cork	Cold I.	51.565	9.657	1	3 Mar	3 Mar	9	Y
	Cork	Horse I.	51.558	9.650	1	3 Mar	3 Mar	0	N
23	Cork	Ballyieragh	51.550	9.790	1	3 Mar	3 Mar	0	N
24	Cork	Sheep's Hd. to Foilakilly	51.583	9.770	1	3 Mar	3 Mar	0	N
25	Cork	Bear I. – south	51.615	9.879	1	3 Mar	3 Mar	0	N
	Cork	Dunboy – south	51.620	9.931	1	3 Mar	3 Mar	0	N
26	Cork	Loughane More	51.600	10.090	1	3 Mar	3 Mar	0	N
27	Cork	Foher	51.623	10.090	1	3 Mar	3 Mar	0	N
28	Cork	Inishfarnard	51.711	10.020	1	3 Mar	3 Mar	0	N
29	**Kerry**	Sherky I. to Inishkeragh	51.790	9.900	1	3 Mar	3 Mar	0	N
	Kerry	Illaunleagh	51.796	9.942	1	3 Mar	3 Mar	0	N
30	Kerry	Two Headed I.	51.737	10.152	1	3 Mar	3 Mar	0	N
	Kerry	Moylaun I.	51.739	10.171	1	3 Mar	3 Mar	0	N
31	Kerry	Deenish I.	51.735	10.220	1	3 Mar	3 Mar	0	N
32	Kerry	Pointacannigavallig	51.773	10.193	1	3 Mar	3 Mar	0	N

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33	Kerry	Ducalla Hd. – east	51.801	10.342	1	3 Mar	3 Mar	0	N
34	Kerry	Foilnageragh	51.870	10.389	1	3 Mar	3 Mar	0	N
35	Kerry	Valencia I. – Coosnaraka	51.908	10.409	1	3 Mar	3 Mar	0	N
35	Kerry	Valencia I. – Crush north	51.914	10.380	1	3 Mar	3 Mar	0	N
36	Kerry	Lamb I.	51.942	10.299	1	3 Mar	3 Mar	0	N
	Kerry	Killelan – north	51.963	10.300	1	3 Mar	3 Mar	0	N
37	Kerry	Canglass to Carrigower	51.992	10.243	1	3 Mar	3 Mar	0	N
38	Kerry	Cooscreagh	52.017	10.157	1	3 Mar	3 Mar	0	N
	Kerry	Coostemple	52.022	10.146	1	3 Mar	3 Mar	0	N
39	Kerry	Gleensk - north	52.040	10.060	1	3 Mar	3 Mar	0	N
40	Kerry	Acres	52.128	10.082	1	3 Mar	3 Mar	0	N
	Kerry	Glan Mountain	52.116	10.108	1	3 Mar	3 Mar	0	N
41	Kerry	Inishvickillane	52.044	10.608	1	3 Mar	3 Mar	30	Y
42	Kerry	Great Blasket I.	52.093	10.537	1	3 Mar	3 Mar	947	Y
	Kerry	Beginish	52.115	10.507	1	3 Mar	3 Mar	10	Y
	Kerry	Young's I.	52.120	10.505	1	3 Mar	3 Mar	1	Y
	Kerry	Illaunbwee	52.112	10.523	1	3 Mar	3 Mar	1	Y
43	Kerry	Clogher Hd. – southeast	52.145	10.470	1	3 Mar	3 Mar	0	N
44	Kerry	Sauce Creek	52.272	10.212	1	3 Mar	3 Mar	0	N
45	Kerry	Illaunimmil	52.333	10.049	1	3 Mar	3 Mar	0	N
	Kerry	Illauntannig to Illaunboe	52.328	10.022	1	3 Mar	3 Mar	0	N
	Kerry	Mucklaghbeg	52.327	10.000	1	3 Mar	3 Mar	12	Y
	Kerry	Illaunturlogh	52.326	10.013	1	3 Mar	3 Mar	0	N
46	Kerry	Kerry Hd. to Kilmore	52.437	9.819	1	3 Mar	3 Mar	0	N
47	Kerry	Doon to Kilconly	52.538	9.669	1	3 Mar	3 Mar	0	N
48	**Clare**	Loop Hd. to Rehy Hill	52.561	9.870	1	3 Mar	3 Mar	0	Y
49	Clare	Ross to Moveen	52.634	9.773	1	3 Mar	3 Mar	0	N
	Clare	Corbally – west	52.702	9.652	1	3 Mar	3 Mar	0	N
	Clare	Bealnalicka	52.726	9.623	1	3 Mar	3 Mar	0	N
50	Clare	Mattle I.	52.790	9.525	1	3 Mar	3 Mar	0	Y
51	Clare	Mutton I.	52.811	9.526	1	3 Mar	3 Mar	0	N
	Clare	Carrickaneelwar, Seal Rock	52.824	9.509	1	3 Mar	3 Mar	29	N
52	Clare	Freagh to Rinneen	52.890	9.420	1	3 Mar	3 Mar	0	N
53	Clare	Ballylaan – west	52.943	9.474	1	3 Mar	3 Mar	0	N
	Clare	Cliffs of Moher	52.969	9.430	1	3 Mar	3 Mar	0	N
54	**Galway**	Straw I.	53.117	9.629	2	20 Feb	3 Mar	0	N
55	Galway	Brannock I.	53.146	9.839	2	20 Feb	2 Mar	0	Y
	Galway	Rock I.	53.148	9.858	2	20 Feb	2 Mar	1	N
56	Galway	Deer I.	53.184	9.073	2	20 Feb	2 Mar	0	Y
57	Clare	Farthing Rocks	53.141	9.175	2	20 Feb	2 Mar	0	Y
58	Galway	Illaunnanownim	53.223	9.693	1	20 Feb		0	N
59	Galway	Eagle Rock	53.234	9.796	1	20 Feb		0	Y
60	Galway	Birmore I.	53.273	9.794	1	20 Feb		0	N
	Galway	Inishmuskerry	53.274	9.826	1	20 Feb		0	N
	Galway	Duck I.	53.280	9.847	1	20 Feb		0	N
61	Galway	Illauneeragh	53.280	9.738	1	20 Feb		0	N
	Galway	Illaunmaan	53.286	9.758	1	20 Feb		0	N
62	Galway	Avery I.	53.304	9.894	1	20 Feb		0	N
	Galway	Wheroon I.	53.306	9.904	1	20 Feb		0	N
	Galway	St. Macdara's I.	53.305	9.920	1	20 Feb		0	N
63	Galway	Skerd Rocks	53.257	10.008	2	20 Feb	2 Mar	23	N
64	Galway	Croaghnakeela I.	53.326	9.972	2	20 Feb	2 Mar	0	Y
	Galway	Illauncroagh Beg	53.340	9.958	2	20 Feb	2 Mar	0	N
	Galway	Illauncroagh More	53.346	9.963	2	20 Feb	2 Mar	0	N
65	Galway	Wherune I.	53.395	10.068	2	20 Feb	2 Mar	0	Y
66	Galway	Hen I.	53.382	10.094	2	20 Feb	2 Mar	57	Y
	Galway	Carrickacammer	53.391	10.122	1	20 Feb		0	N
67	Galway	Carrickfia	53.407	10.158	1	20 Feb		0	N
	Galway	Carrickarone	53.420	10.203	1	20 Feb		0	N

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68	Galway	Ferroon Rocks	53.396	10.215	2	20 Feb	2 Mar	79	Y
	Galway	Illaunamid	53.398	10.230	2	20 Feb	2 Mar	5	Y
	Galway	Chapel I.	53.398	10.213	2	20 Feb	2 Mar	66	Y
	Galway	Maddens Rocks	53.401	10.221	2	20 Feb	2 Mar	12	N
69	Galway	Carrickrana Rocks	53.487	10.159	1	20 Feb		0	N
	Galway	Eeshal I.	53.507	10.171	1	20 Feb		0	N
	Galway	Cruagh	53.524	10.217	1	20 Feb		0	N
70	Galway	High I.	53.546	10.258	2	20 Feb	2 Mar	6	Y
	Galway	Friar I.	53.549	10.230	1	20 Feb	2 Mar	0	Y
71	Galway	Glassillan	53.595	10.271	2	20 Feb	2 Mar	14	Y
	Galway	Inishgort	53.597	10.263	2	20 Feb	2 Mar	226	Y
	Galway	Black Rock	53.594	10.276	2	20 Feb	2 Mar	25	N
71	Galway	Inishshark	53.610	10.280	2	20 Feb	2 Mar	1	Y
	Galway	Inishskinnymore	53.605	10.248	2	20 Feb		0	Y
	Galway	Inishskinnybeg	53.609	10.249	2	20 Feb		0	Y
72	Galway	Inishlyon	53.612	10.169	1	20 Feb		0	N
73	Galway	Davillaun	53.627	10.135	1	20 Feb		0	Y
	Galway	Lecky Rocks	53.617	10.120	2	20 Feb	2 Mar	4	N
74	Galway	Inisbroon	53.608	10.066	1	20 Feb		0	N
	Galway	Freaghillaun North	53.616	10.016	1	20 Feb		0	N
	Galway	Crump I.	53.622	9.999	1	20 Feb		0	N
75	**Mayo**	Frehill I.	53.662	9.956	1	20 Feb		0	N
	Mayo	Govern I.	53.655	9.940	1	20 Feb		0	N
76	Mayo	Inishdalla	53.681	10.072	2	20 Feb	2 Mar	28	N
77	Mayo	Inishturk – northeast	53.712	10.097	1	20 Feb		0	N
78	Mayo	Caher I.	53.717	10.030	1	20 Feb		0	Y
79	Mayo	Clare I.	53.800	10.000	2	26 Feb	9 Mar	0	Y
80	Mayo	Clew Bay - south	53.809	9.659	2	26 Feb	9 Mar	0	N
81	Mayo	Clew Bay - centre	53.853	9.655	2	26 Feb	9 Mar	0	N
	Mayo	Clew Bay - north	53.880	9.708	2	26 Feb	9 Mar	0	N
82	Mayo	Achill I. – Dooega west	53.929	10.056	1	26 Feb	9 Mar	0	N
83	Mayo	Carrickmore South	53.960	10.163	1	26 Feb	9 Mar	0	N
84	Mayo	Achill I. - Saddle Hd.	54.006	10.182	1	9 Mar	9 Mar	0	Y
85	Mayo	Achill I. – Annagh Strand	54.001	10.139	1	9 Mar	9 Mar	0	Y
86	Mayo	Achill I. – Doogort West	54.022	10.072	1	9 Mar	9 Mar	0	Y
87	Mayo	Keely I.	54.078	10.140	1	2 Mar	2 Mar	0	Y
87	Mayo	Duvillaun Beg	54.078	10.152	1	2 Mar	2 Mar	0	Y
87	Mayo	Duvillaun More	54.074	10.171	1	2 Mar	2 Mar	0	Y
88	Mayo	Inishkea South	54.115	10.218	1	2 Mar	2 Mar	120	Y
88	Mayo	Inishkea North	54.136	10.196	2	2 Mar	2 Mar	1481	Y
88	Mayo	Carrickawilt	54.154	10.195	2	2 Mar	2 Mar	38	Y
	Mayo	Carrigee	54.157	10.195	2	2 Mar	2 Mar	39	Y
	Mayo	Carrickmoylenacurhoga	54.160	10.188	2	2 Mar	2 Mar	64	Y
89	Mayo	Inishkeeragh	54.202	10.137	1	2 Mar	2 Mar	116	Y
	Mayo	Carricknaronty Rocks	54.197	10.146	1	2 Mar	2 Mar	24	N
	Mayo	Inishglora	54.211	10.129	1	2 Mar	2 Mar	0	Y
90	Mayo	Spinkadoon	54.286	10.025	1	2 Mar	2 Mar	0	N
	Mayo	Ooghwee	54.296	9.999	1	2 Mar	2 Mar	0	Y
	Mayo	Inishderry	54.220	9.902	1	2 Mar	2 Mar	1	N
91	Mayo	Benwee Hd. – west	54.331	9.832	2	2 Mar	2 Mar	15	Y
	Mayo	Benwee Hd. – east	54.341	9.810	2	2 Mar	2 Mar	0	N
	Mayo	Doonvinalla	54.338	9.791	1	2 Mar	2 Mar	0	N
92	Mayo	Corraduff, Claddaghrone	54.337	9.752	1	2 Mar	2 Mar	1	Y
	Mayo	Pig I.	54.329	9.721	1	2 Mar	2 Mar	0	N
93	Mayo	Porturlin to Skelp	54.317	9.687	1	2 Mar	2 Mar	0	Y
94	Mayo	Illanmaster to Belderg	54.325	9.600	1	2 Mar	2 Mar	0	Y
95	Mayo	Carrickneill I. to Minaun	54.320	9.500	1	9 Mar	9 Mar	0	N
	Mayo	River Moy – estuary banks	54.197	9.133	1	9 Mar	9 Mar	2	N
96	**Sligo**	Ballisadare Bay – banks	54.243	8.607	1	9 Mar	9 Mar	38	N

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97	Sligo	Horse I.	54.343	8.677	2	3 Feb	1 Mar	0	N
	Sligo	Ardboline	54.346	8.693	2	3 Feb	1 Mar	22	Y
98	Sligo	Inishmurray	54.433	8.660	2	3 Feb	1 Mar	0	Y
99	Sligo	Bomore	54.464	8.674	2	3 Feb	1 Mar	11	N
100	**Donegal**	St. John's Point	54.568	8.462	1	3 Feb		0	Y
101	Donegal	Inishduff	54.598	8.546	1	3 Feb		0	N
102	Donegal	Muckros	54.607	8.584	1	3 Feb		0	Y
103	Donegal	Rossarrell to Bunglass	54.646	8.719	1	3 Feb		0	Y
104	Donegal	Rathlin O'Birne I.	54.664	8.827	2	3 Feb	1 Mar	35	Y
105	Donegal	Malin Bay – skerries	54.671	8.798	1	3 Feb		0	N
106	Donegal	Oughig to Doon Point	54.706	8.791	1	3 Feb		0	N
107	Donegal	Glen Hd. to Sturrall	54.730	8.748	3	3 Feb	1 Mar	0	Y
108	Donegal	Sturrall to Glenlough	54.752	8.705	3	3 Feb	1 Mar	0	Y
109	Donegal	Glenlough to Maghera	54.777	8.609	3	3 Feb	1 Mar	92	Y
110	Donegal	Inishbarnog	54.813	8.560	1	3 Feb		0	N
111	Donegal	Roaninish	54.870	8.534	2	3 Feb	1 Mar	44	N
112	Donegal	Illancrone	54.941	8.480	1	3 Feb		0	N
	Donegal	Inishkeeragh	54.957	8.495	1	3 Feb		0	N
113	Donegal	Aran I. – Cronagarn	54.981	8.568	1	3 Feb		0	Y
114	Donegal	Aran I. – Lighthouse Lot	55.010	8.550	1	3 Feb		0	Y
115	Donegal	Umfin I.	55.102	8.367	1	3 Feb		0	N
	Donegal	Inishmeane	55.104	8.338	1	3 Feb		0	N
	Donegal	Inishsirrer	55.120	8.338	1	3 Feb		0	N
116	Donegal	Inishbofin	55.174	8.172	1	3 Feb		0	N
	Donegal	Inishdooey	55.193	8.165	2	3 Feb	1 Mar	21	Y
	Donegal	Inishbeg	55.204	8.162	2	3 Feb	1 Mar	0	N
117	Donegal	Tory I. – north	55.270	8.221	2	3 Feb	1 Mar	3	N
118	Donegal	Tory I. – east	55.257	8.195	2	3 Feb	1 Mar	5	N
119	Donegal	Pollaguill	55.206	8.019	1	3 Feb		0	N
120	Donegal	Horn Hd. – west, east	55.221	7.982	2	3 Feb	1 Mar	0	Y
121	Donegal	Stowney	55.237	7.838	1	3 Feb		0	N
122	Donegal	Island Reagh	55.197	7.793	1	3 Feb		0	N
123	Donegal	Fanad Hd. to Doagh Beg	55.258	7.623	1	3 Feb		0	N
124	Donegal	Colpaghs Rocks	55.171	7.513	1	3 Feb		0	N
125	Donegal	Dunaff Hd.	55.285	7.522	1	3 Feb		0	Y
126	Donegal	Suil Point to Pollan Bay	55.291	7.412	1	3 Feb		0	N
127	Donegal	Glashedy I.	55.319	7.399	2	3 Feb	1 Mar	0	N
128	Donegal	Garvan Is. – Middle I.	55.386	7.313	2	3 Feb	1 Mar	58	Y
	Donegal	Garvan Is. – northeast	55.388	7.311	2	3 Feb	1 Mar	3	N
129	Donegal	Inishtrahull	55.431	7.236	2	3 Feb	1 Mar	373	Y
	Donegal	The Tor Rocks	55.446	7.253	2	3 Feb	1 Mar	0	N
130	Donegal	Esky Bay to Glengad Hd.	55.359	7.242	1	3 Feb		0	Y
131	Donegal	Doonglass to Rubonid	55.288	7.110	1	3 Feb		0	N
132	Donegal	Tremone to Dungloon	55.270	7.031	1	3 Feb		0	Y
	Donegal	Ballybane to Inishowen	55.254	6.957	1	3 Feb		0	N
133	**Dublin**	St. Patrick's I.	53.585	6.074	1	7 Mar	7 Mar	137	Y
	Dublin	Colt I.	53.585	6.089	1	7 Mar	7 Mar	0	N
	Dublin	Shenick's I.	53.572	6.084	1	7 Mar	7 Mar	0	N
	Dublin	Rockabill	53.597	6.004	1	7 Mar	7 Mar	26	N
134	Dublin	Lambay I.	53.490	6.020	1	7 Mar	7 Mar	110	Y
135	Dublin	Ireland's Eye	53.406	6.064	1	7 Mar	7 Mar	0	Y
	Dublin	Howth Hd. - east	53.367	6.054	1	7 Mar	7 Mar	4	N
	Dublin	North Bull I.	53.383	6.114	1	7 Mar	7 Mar	1	N
136	Dublin	Dalkey I.	53.272	6.085	1	7 Mar	7 Mar	36	Y
137	**Wicklow**	Wicklow Hd.	52.966	6.000	1	7 Mar	7 Mar	22	Y
138	Wicklow	Mizen Hd.	52.859	6.057	1	7 Mar	7 Mar	0	N
139	**Wexford**	The Raven Point - banks	52.333	6.368	1	6 Mar	6 Mar	130	Y
	Wexford	Tuskar Rock	52.203	6.207	1	6 Mar	6 Mar	0	N
140	Wexford	Great Saltee I.	52.117	6.615	1	6 Mar	6 Mar	246	Y

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140	Wexford	Little Saltee I.	52.137	6.586	1	6 Mar	6 Mar	0	Y
141	Wexford	Keeragh Islands	52.198	6.736	1	6 Mar	6 Mar	0	N
142	**Waterford**	Swines Hd. to Red Hd.	52.138	7.009	1	18 Feb		0	N
143	Waterford	Brownstown	52.132	7.088	1	18 Feb		0	N
144	Waterford	Annestown to Newtown	52.131	7.218	1	18 Feb		0	N
145	Waterford	St. John's I. to Bunmahon	52.130	7.390	1	18 Feb		0	N
146	Waterford	Ballyvoyle to Stradbally	52.111	7.481	1	18 Feb		0	N
147	Waterford	Crobally to Helvick Hd.	52.001	7.583	1	18 Feb		0	N
148	Waterford	Ardoginna to Ram Hd.	51.939	7.722	1	18 Feb		0	N