

An aerial survey of harbour seals in Ireland:

Part 2: Galway Bay to Carlingford Lough

August-September 2012

A Report for the National Parks & Wildlife Service of the Department of Arts,
Heritage & the Gaeltacht (DAHG)

Contract Title:

Aerial thermal imaging survey for harbour seals (August-September 2012)

This report summarises the results of an aerial survey of harbour seals carried out in August-September 2012. The survey and analysis detailed in this report were conducted by the Sea Mammal Research Unit, University of St Andrews, with funding from the National Parks & Wildlife Service (NPWS), Department of Arts, Heritage & the Gaeltacht, Dublin.

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Summary

In August and September 2012, the Sea Mammal Research Unit (SMRU) of the University of St Andrews carried out an aerial survey of moulting harbour seals (*Phoca vitulina*, also known as common seals) in the west, south-west, south and east of Ireland, between Galway Bay and Carlingford Lough. This was the completion of a survey of seals around the whole of Ireland that started in August 2011, when the coast from Lough Foyle to Galway Bay was surveyed (Duck & Morris, 2012). Although the primary aim of this survey was to count harbour seals hauled out ashore, grey seals (*Halichoerus grypus*), when encountered, were also counted.

The 2011 and 2012 surveys were undertaken in order to update information from a previous nationwide aerial survey of harbour seals carried out in August 2003 (Cronin *et al.*, 2004; Cronin *et al.*, 2007). The surveys incorporated improved techniques which resulted in more accurate species identification and, consequently, more accurate final counts compared with the 2003 survey. This should be kept in mind when interpreting any differences in counts from the two surveys.

In Co. Galway (part), Co. Clare, Co. Limerick, Co. Kerry, Co. Cork, Co. Waterford, Co. Wexford, Co. Wicklow, Co. Dublin, Co. Meath and Co. Louth, **1,444** harbour seals were counted in August-September 2012 compared with **1,441** in August 2003. Although not the target of the survey, 1,129 grey seals were also counted in 2012 compared with 628 in 2003. In 2012, the harbour seal count was almost identical to the 2003 count whereas 80% more grey seals were counted than in 2003. No seals of either species were seen in Co. Limerick.

Combining the 2011 and 2012 surveys, a total of **3,489** harbour seals were counted in Ireland compared with **2,955** in 2003, an overall increase of 18.1%. In 2011 and 2012, a total of 2,964 grey seals were counted in Ireland compared with 1,309 in 2003, an overall increase of 126.4%. Care should be taken in the interpretation of these figures, however, since they involve assumptions concerning seal haul-out behaviour and regional distribution between survey years. Note also that 50 harbour seals and 22 grey seals were mistakenly located in Carlingford Lough, Northern Ireland in 2003. These account for the difference in these totals to those reported by Cronin *et al.* (2004 & 2007).

For comparison with the 3,489 harbour seals counted in Ireland, SMRU counted 2,739 harbour seals in the Outer Hebrides in 2011, 2,687 harbour seals in Orkney in 2010 and 3,039 in Shetland in 2009.

Although the number of grey seals counted in Ireland in 2011 and 2012 was more than twice the number counted in 2003, grey seal numbers remain low compared with several areas in Scotland. Compared to the 2,964 grey seals counted in Ireland, SMRU counted 2,518 grey seals in the Outer Hebrides in 2011, 9,083 in Orkney in 2010 and 1,536 in Shetland in 2009. It is important to point out that grey seal haul-out counts can be far more variable than harbour seal counts during the summer months, including the harbour seal moulting season, and in advance of the main breeding period (September-November). On account of this variability, it is important therefore not to over-emphasise the difference between the 2003 and the 2011/12 grey seal counts.

Compared with most areas of Scotland, the overall numbers of both harbour and grey seals in Ireland appear to be relatively low, especially considering the extent and availability of apparently suitable coastal habitat.

Introduction

This report summarises the results from a survey of harbour seals (*Phoca vitulina*) in the west, south-west, south and east of Ireland, from Galway Bay to Carlingford Lough in August-September 2012. It also summarises the results of the all-Ireland survey, completed in August 2011 (Duck & Morris, 2012) and August-September 2012 and compares the results with a previous survey carried out in August 2003 (Cronin *et al.*, 2004, 2007).

Harbour seals are included in Annex II of the European Union's Directive 92/43/EEC, commonly known as the Habitats Directive. The Directive's aim is to encourage the maintenance of biodiversity through the conservation of natural habitats and wild fauna and flora in the territories of European Union member states.

The Sea Mammal Research Unit (SMRU) undertakes routine surveys of harbour and grey seals around Scotland and part of England and previously surveyed Ireland in August 2003, in a collaborative project funded by the National Parks & Wildlife Service (NPWS; Cronin *et al.*, 2004, 2007). The 2003 project was the first complete aerial survey of harbour and grey seals in Ireland. Nationwide surveys targeting grey seals were subsequently conducted in 2005 (Ó Cadhla *et al.*, 2008) and 2007 (Ó Cadhla & Strong, 2007) and national monitoring of both species continues to the present day (see www.npws.ie/marine/marinemammals/).

In Ireland and the UK, population surveys of harbour seals are carried out during their annual moulting period which occurs between July and September. Grey seals hauled ashore are also counted during these surveys, providing additional information on their summer distribution, although grey seal numbers can be highly variable from day to day during the summer months.

Since 2007, high resolution digital still photographs taken of most groups of harbour and grey seals have been used to confirm or correct numbers and species identity of groups of seals located using thermal imagery.

Methods

The Sea Mammal Research Unit carried out surveys of harbour seals by helicopter using a thermal imaging camera, following the standard SMRU survey protocol:

- Surveys were restricted to within two hours either side of low tides occurring between approximately 12:30 and 19:30.
- Surveys were restricted to the harbour seal moult season.
- There was no surveying on days with moderate or persistent rainfall.
- The footage obtained by the thermal imaging camera was recorded to a digital video recorder and groups of hauled-out seals were reviewed and recounted on a computer at SMRU's base at the Scottish Oceans Institute in St Andrews, UK.
- High resolution digital still photographs were taken of almost all groups of harbour seals and grey seals recorded ashore, in order to improve the accuracy of counts and to confirm species identification.
- A detailed track of each day's progress was recorded on a GPS unit. This enabled the placement of capture locations for the high-resolution digital images onto the survey track. Combining this with an accurate low-water GIS map of Ireland and viewing detailed satellite imagery of the Irish coast, enabled accurate positioning of all groups of seals encountered.

Part of Co. Galway and a small section of Co. Clare that were surveyed in August 2011 (Duck & Morris, 2012) were resurveyed in September 2012. Following SMRU's standard

procedure, the most recent counts were used for locations surveyed in August 2011 that were resurveyed in August or September 2012. Other options include using a mean count; or the first count; or the counts with the highest numbers. There was less than 2% difference in overall counts of harbour or grey seals, using these other options.

Results and Discussion

The west, south-west, south and east of Ireland was surveyed between the 31st August and the 5th September 2012, including part of the coast of Co. Galway and the entire coast of Counties Clare, Limerick, Kerry, Cork, Waterford, Wexford, Wicklow, Dublin, Meath and Louth. Part of Co. Galway was surveyed on 18th and 20th August 2011 and the remaining coast, including the Aran Islands, was surveyed in September 2012. The daily 2012 survey segments are shown in Figure 1. Surveying was not possible on 3rd September 2012 due to thick, persistent mist and low cloud. The daily survey schedule is outlined in Table 1.

The Irish coast was subdivided into regions (the same as counties) and smaller subregions so that counts may be examined at a more local level. Regions and subregions are shown in Figure 2 and are outlined in Figures 3a and 4a. Counts of harbour seals within surveyed regions are in Table 2, including regional counts from Cronin *et al.* (2004, 2007). Counts of grey seals are in Table 3.

In August-September 2012, between Galway Bay and Carlingford Lough, a total of **1,444** harbour seals were counted compared with **1,441** in 2003 (Cronin *et al.* 2004, 2007). In 2012, the main concentrations of harbour seals were in Galway Bay, Kenmare and Bantry Bay, similar to those found in 2003. Figure 3a (actual haul-out sites) and 3b (counts aggregated by 10km squares) show the distribution of harbour seals in west, south-west, south and east Ireland in August-September 2012. For comparison, Figure 3c shows harbour seal distribution in August 2003 (aggregated by 10km).

In August-September 2012, 1,129 grey seals were counted compared with 628 counted in 2003. Although the 2012 count was 79.8% greater than the 2003 count, both are considered to be surprisingly low given the extent of suitable and available habitat. Grey seal haul-out counts during the summer can be highly variable and care should be taken not to over-emphasise this difference. The apparent difference in numbers counted is also put into perspective by haul-out count data reported by Ó Cadhla & Strong (2007). During the grey seal moulting season in March 2007, they counted 1,882 grey seals in the Inishkea Island group (Co. Mayo) alone.

A number of errors in the locations of seals from the 2003 survey were discovered during the 2011-12 survey. Two errors were locating groups of seals to the wrong region or subregion: the Aran Islands were included in Co. Clare instead of Co. Galway; Deer Island was erroneously assigned to the Inner Galway Bay subregion in 2003 instead of Blackhead. The most important error occurred in Carlingford Lough, where 50 harbour seals and 22 grey seals were assigned to Carlingford Lough North (Northern Ireland) that should have been in Carlingford Lough South (Co. Louth). In this report, the 2003 survey numbers given by Cronin *et al.* (2004, 2007) have been amended to accommodate these errors.

The distribution of grey seal haul-outs in 2012 (Figure 4a, actual haul-out sites and 4b aggregated by 10km squares) was very similar to that recorded in 2003 (Figure 4c, aggregated by 10km).

A comparison of the numbers of harbour seals counted in regions (counties) of the west, south-west, south and east of Ireland in 2003 and 2012 is shown in Figure 5a. Figure 5b shows the proportion, of the 2003 and 2012 harbour seal totals, in each region. Similarly, a

comparison of the numbers of grey seals counted in regions (counties) of the west, south-west, south and east of Ireland in 2003 and 2012 is shown in Figure 6a. Figure 6b shows the proportion of the 2003 and 2012 grey seal total in each region.

All Ireland, 2011 and 2012 surveys combined

Combining the results of the two recent surveys, **3,489** harbour seals were counted in 2011 and 2012 compared with **2,955** counted in 2003 (Appendix 1). In 2011 and 2012, 2,964 grey seals were counted compared with 1,309 counted in 2003 (Appendix 2). This summation of results from 2011 and 2012 into a single national assessment for either species is predicated on the assumption that no significant change in seal haul-out behaviour or regional distribution occurred between the two surveys. This should be kept in mind when interpreting the combined data as presented and care should be taken that the results are not over-interpreted. Harbour seal distribution in Ireland in 2011 and 2012 with counts aggregated by 10km squares, is shown in Figure 7. For comparison, harbour seal distribution in 2003, also aggregated by 10km squares, is in Figure 3c. Similarly, Figure 8 shows grey seal distribution in Ireland in 2011 and 2012 and Figure 4c shows the 10km grey seal distribution in 2003.

A comparison of the numbers of harbour seals within regions (counties) in 2011/12 with 2003 is shown in Figure 9a. The biggest difference was in Co. Galway, where 886 harbour seals were counted in 2011/12 compared with a count of 506 in 2003. Harbour seal numbers in Co. Donegal, Co. Mayo and Co. Wexford were slightly greater in 2011/12 than in 2003, while in Co. Sligo, Co. Cork and Co. Louth, numbers in 2011/12 were slightly lower than in 2003. There was very little difference in numbers in Co. Clare, Co. Kerry and Co. Dublin. Figure 9b compares the proportion of harbour seals counted within each region in relation to the overall total count for both surveys.

The number of grey seals counted in Ireland in 2011/12 was more than double the number counted in 2003, with the biggest differences in Co. Donegal, Co. Mayo, Co. Galway, Co. Kerry and in Co. Cork (Figure 10a). Only in Co. Dublin were more grey seals counted in 2003 than in 2011/12. The regional proportions of the total count for both surveys are compared in Figure 10b.

Grey seal numbers can be highly variable during the summer months, even from day to day. It is also worth noting that the dates for survey in 2012 coincided with the onset of the breeding season for grey seals in Ireland (i.e., late August-December; Ó Cadhla *et al.*, 2008). Regional differences between the 2011/12 and 2003 counts are thus more likely to reflect differences in seal haul-out behaviour than simply representing an actual increase in population size and care should be taken in the interpretation of these data.

A summary of counts of harbour seals in regions and subregions of Ireland from aerial surveys carried out in 2011 and 2012 and in 2003 is provided in Appendix 1. A summary of counts of grey seals from the same surveys and in the same areas is provided in Appendix 2.

Acknowledgments

The surveys would not have been possible without the help and support of: PDG Helicopters, their pilots (Karl Franz and John McKenzie) and ground crew (Jonny Davidson and Phil Shewan). Richard Fitch of Horton Levi provided and supported the Barr and Stroud IR18 thermal imaging camera. Claire Brett drove around North and West Ireland in 2011, carrying our support equipment and arranging overnight accommodation. Oliver Ó Cadhla (Department of Arts, Heritage & the Gaeltacht) kept us on the right lines during the surveys,

was indefatigably enthusiastic throughout all the planning and operational stages and liaised with NPWS ground-counting teams. Eamonn Kelly of the Department of Arts, Heritage & the Gaeltacht smoothed any waters before they ever became troubled. Thank you all for making both surveys as worthwhile and productive as they could be.

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Figure 1. Map showing the Irish coastline surveyed each day during the August-September 2012 harbour seal survey. More detailed information is provided in Table 1.

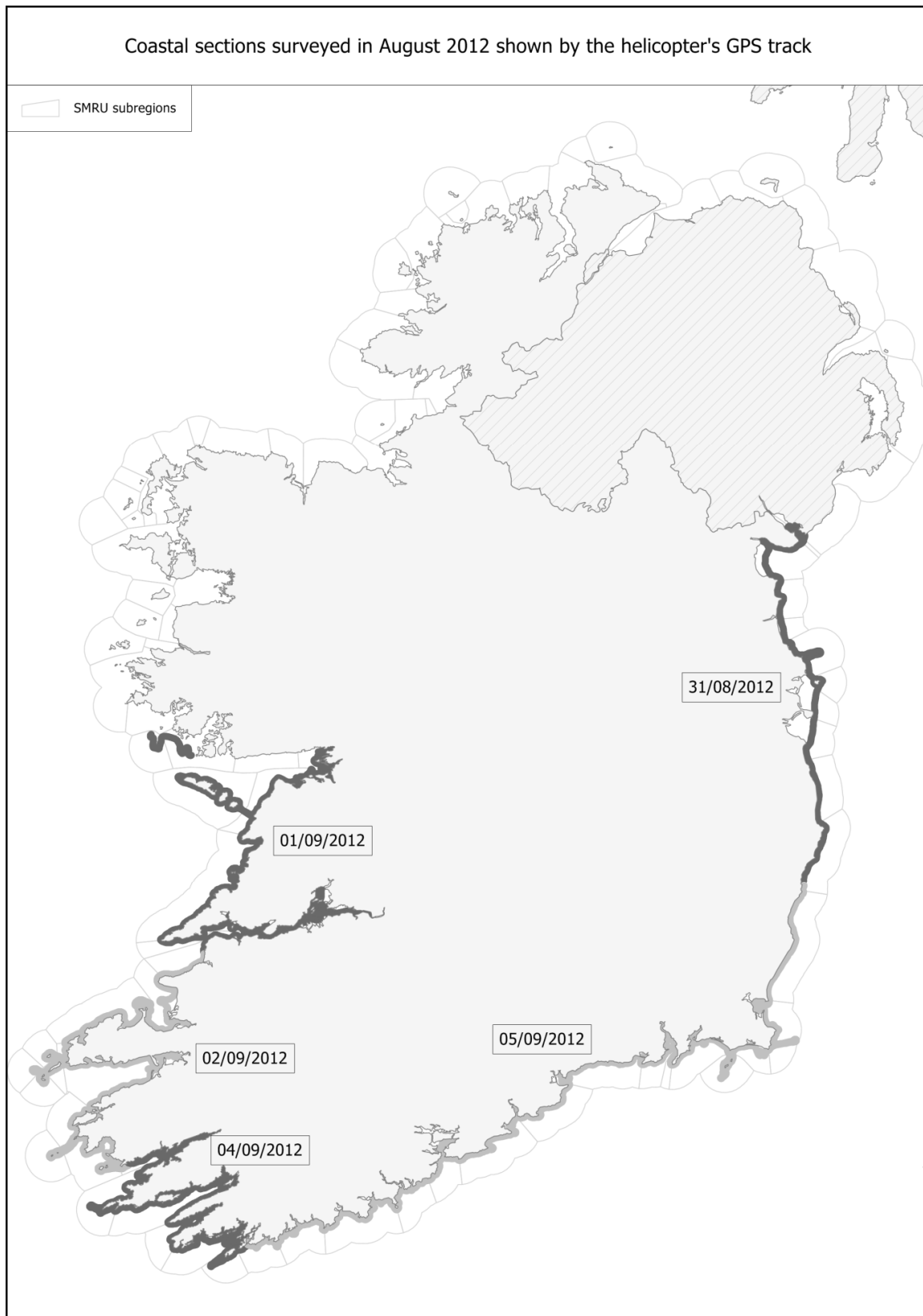


Figure 2. Regions (counties, in green text) and subregions around Ireland as defined by SMRU. Counts of harbour seals and grey seals in each subregion are provided in Tables 2 and 3 respectively.

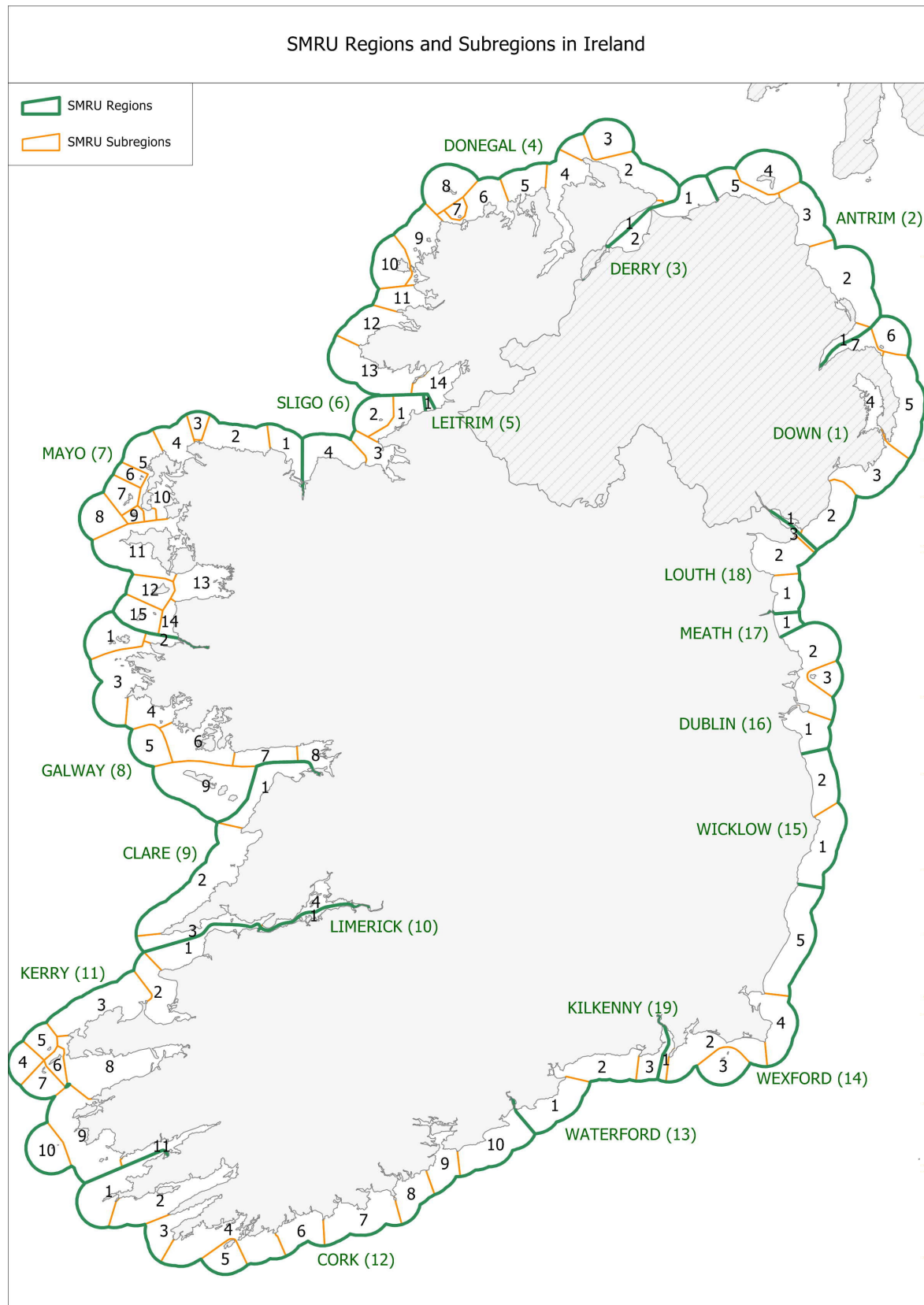


Figure 3a. The number and distribution of harbour seals counted in west, south-west, south and east Ireland in August-September 2012. Regions and subregions, as defined by SMRU and detailed in Figure 2 and Table 2, are outlined. Figure 3b shows harbour seal distribution at a 10km resolution. Data were collected by the Sea Mammal Research Unit, University of St Andrews for the Department of Arts, Heritage and the Gaeltacht.

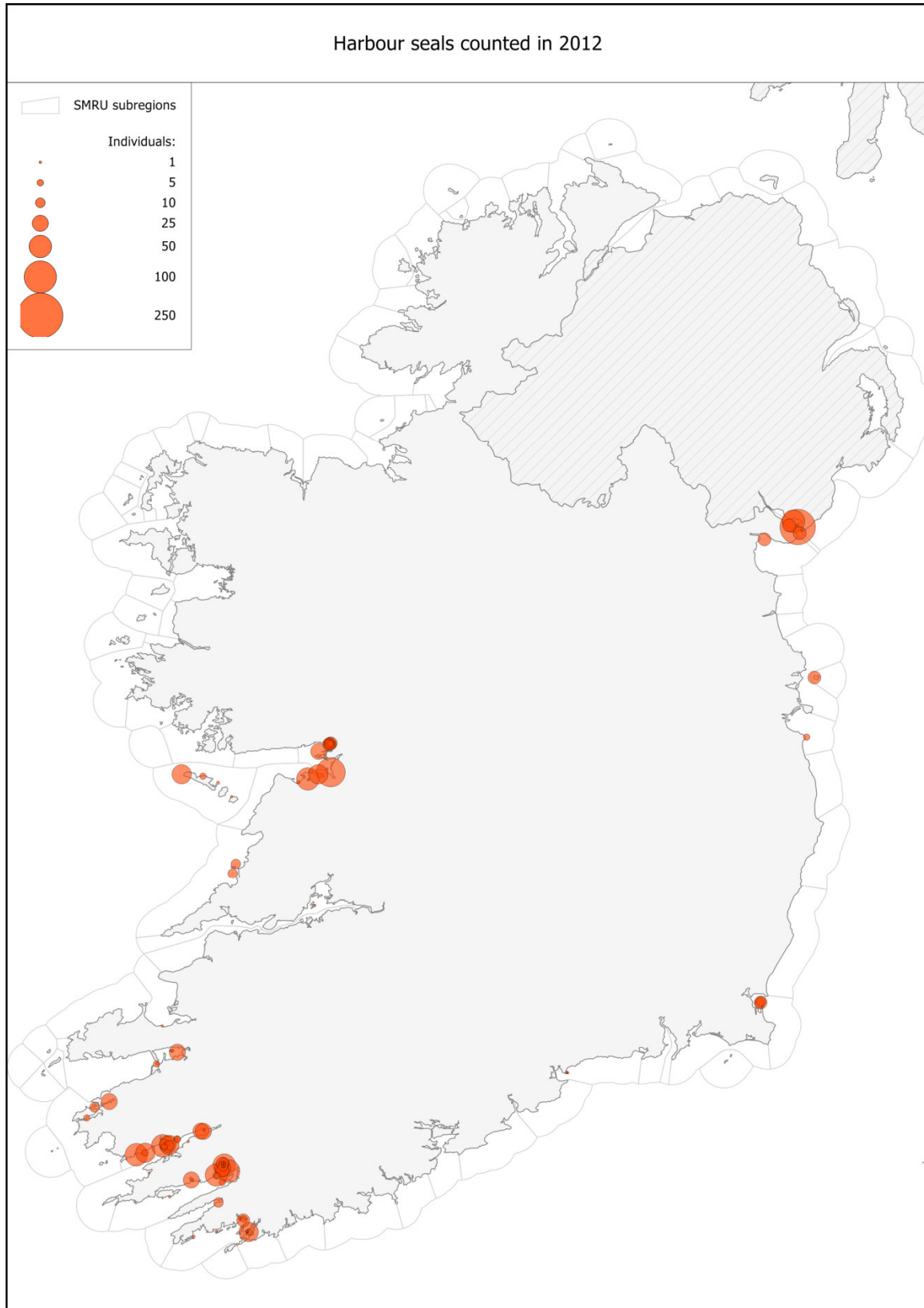


Figure 3b. This map shows the same harbour seal data in east, west, south-west and south Ireland as Figure 3a but aggregated by 10km squares (background grid). Data were collected by the Sea Mammal Research Unit, University of St Andrews for the Department of Arts, Heritage and the Gaeltacht.

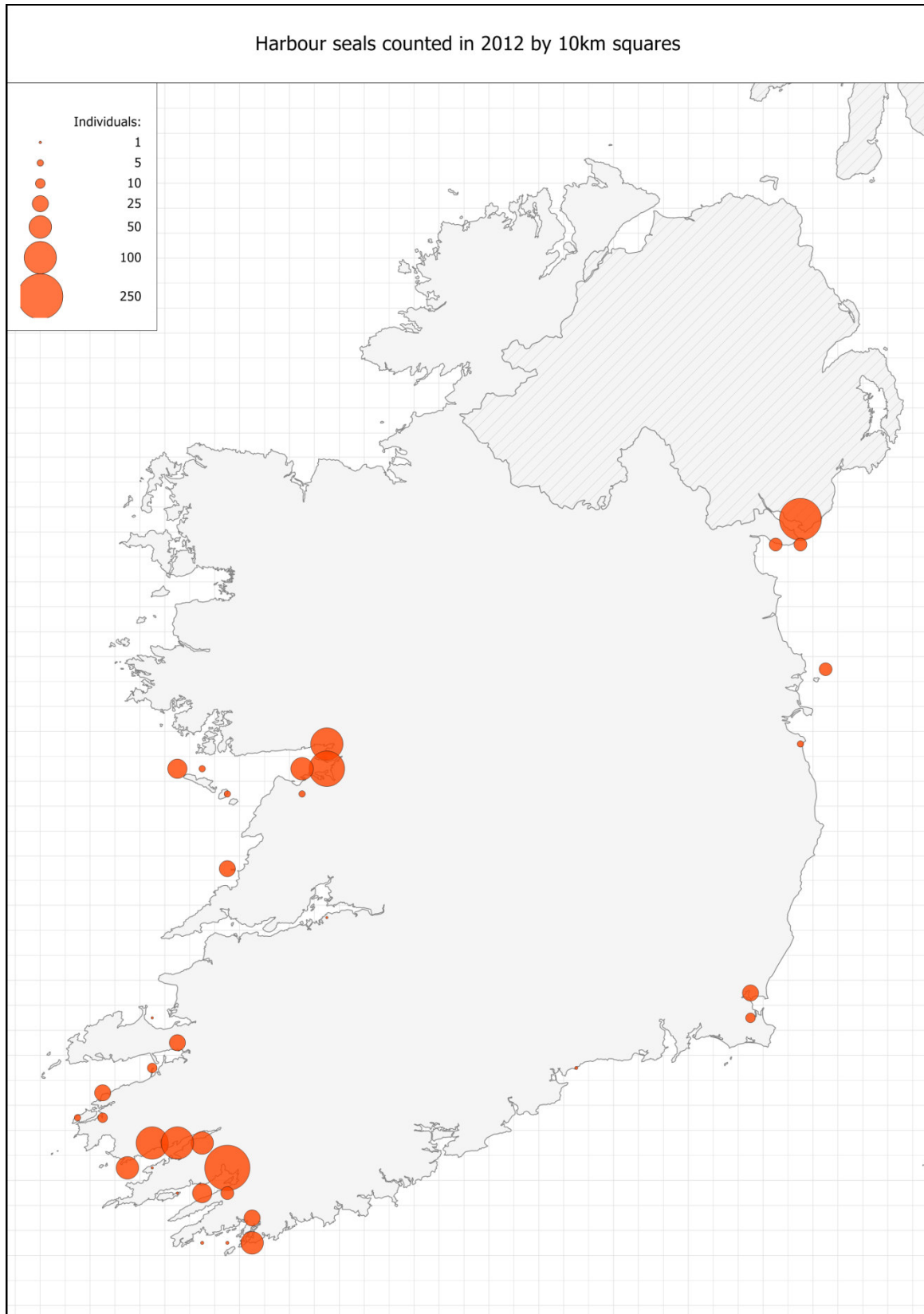


Figure 3c. Harbour seal distribution in Ireland in August 2003, with counts aggregated by 10km squares (background grid). This Figure is included for comparison with the 2011/12 data (Figure 3a). Data were collected by the Sea Mammal Research Unit, University of St Andrews and Coastal and Marine Resources Centre, University College Cork for the Department of the Environment, Heritage and Local Government.

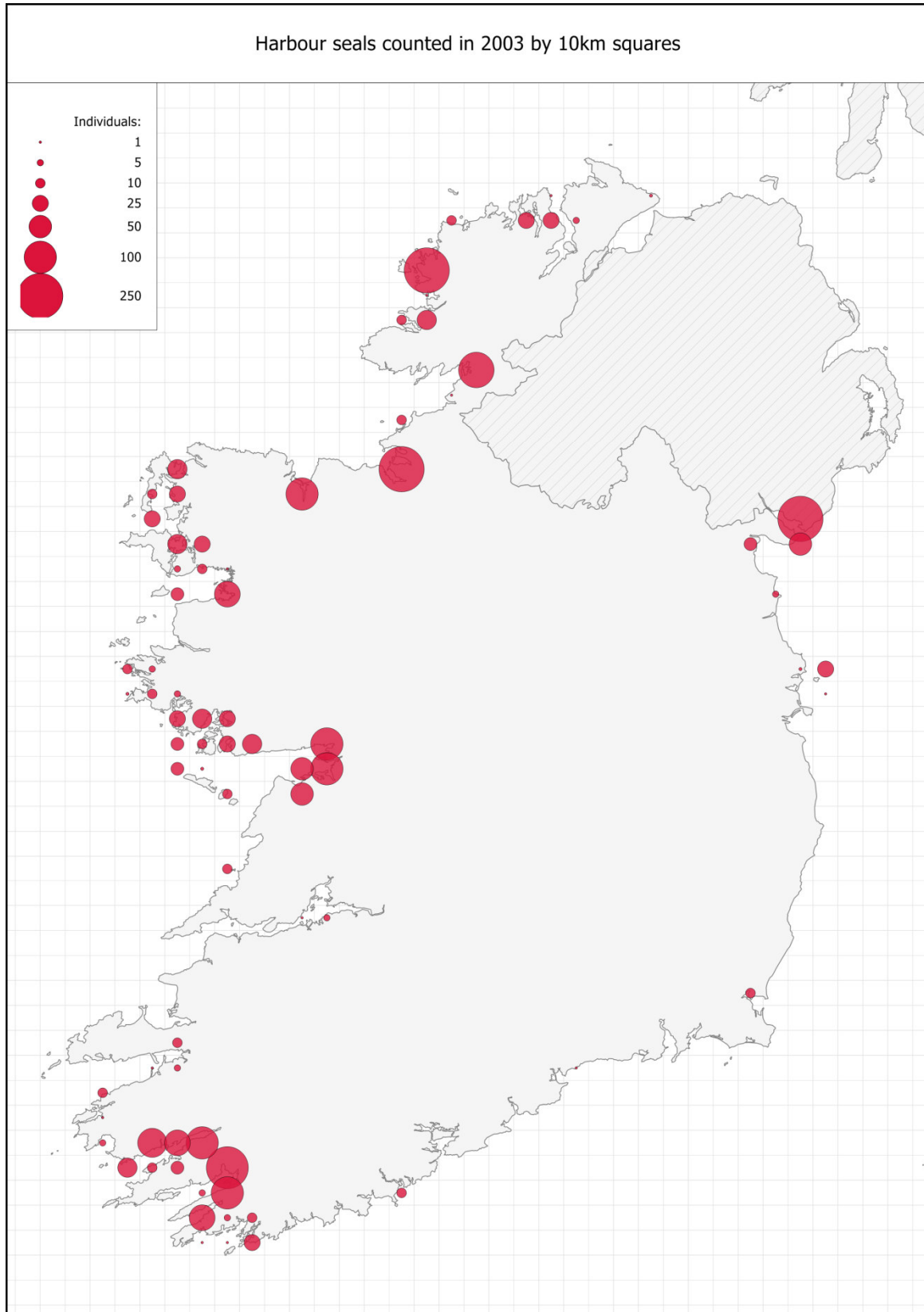


Figure 4a. The number and distribution of grey seals counted in the west, south-west, south and east of Ireland in August-September 2012. Regions and subregions as defined by SMRU and detailed in Figure 2 and Table 3 are outlined. Figure 4b shows the same data at a 10km resolution. Data were collected by the Sea Mammal Research Unit, University of St Andrews for the Department of Arts, Heritage and the Gaeltacht.

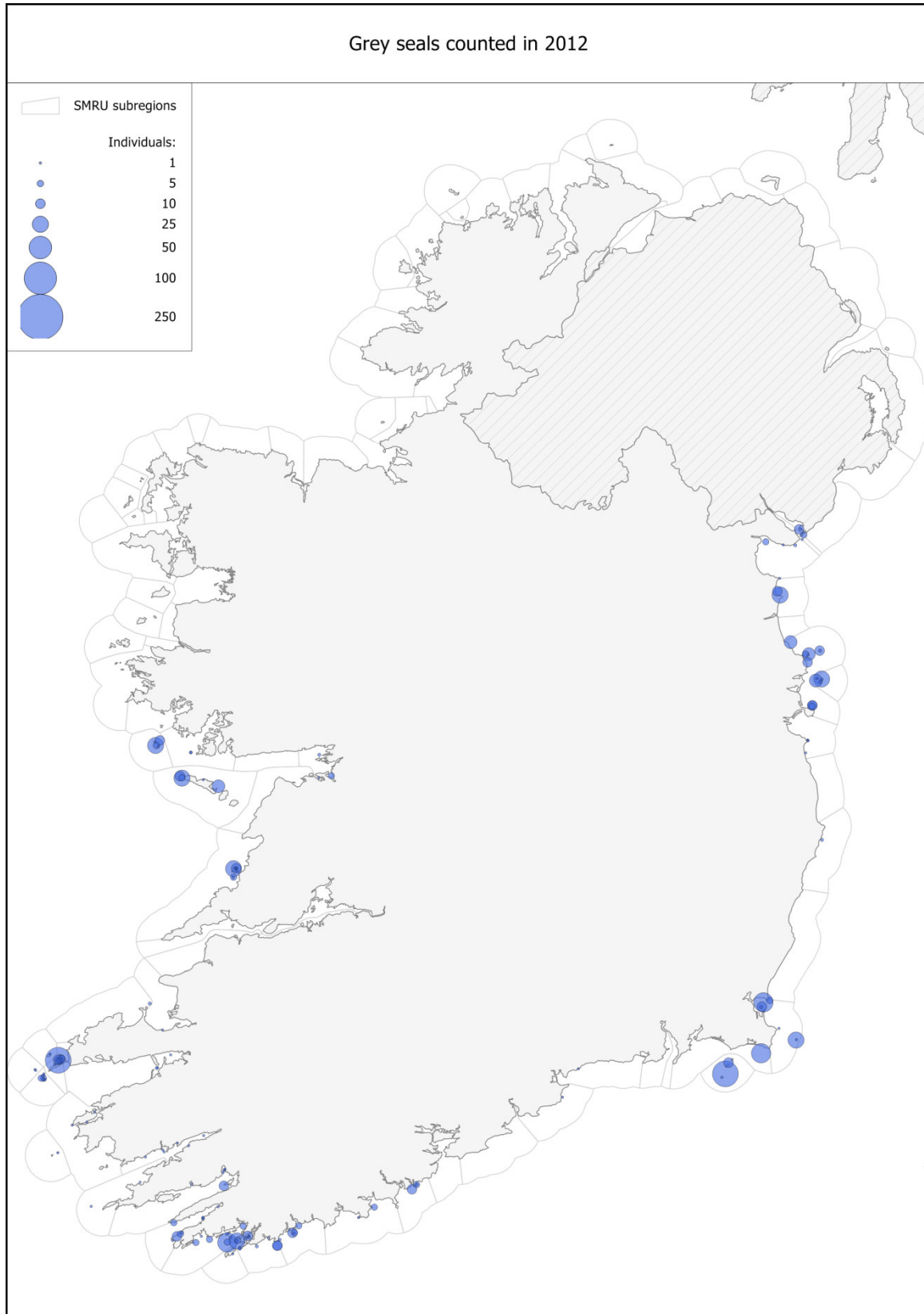


Figure 4b. This map shows the same grey seal data in the west, south-west, south and east of Ireland as Figure 4a but counts are aggregated by 10km squares (background grid). Data were collected by the Sea Mammal Research Unit, University of St Andrews for the Department of Arts, Heritage and the Gaeltacht.

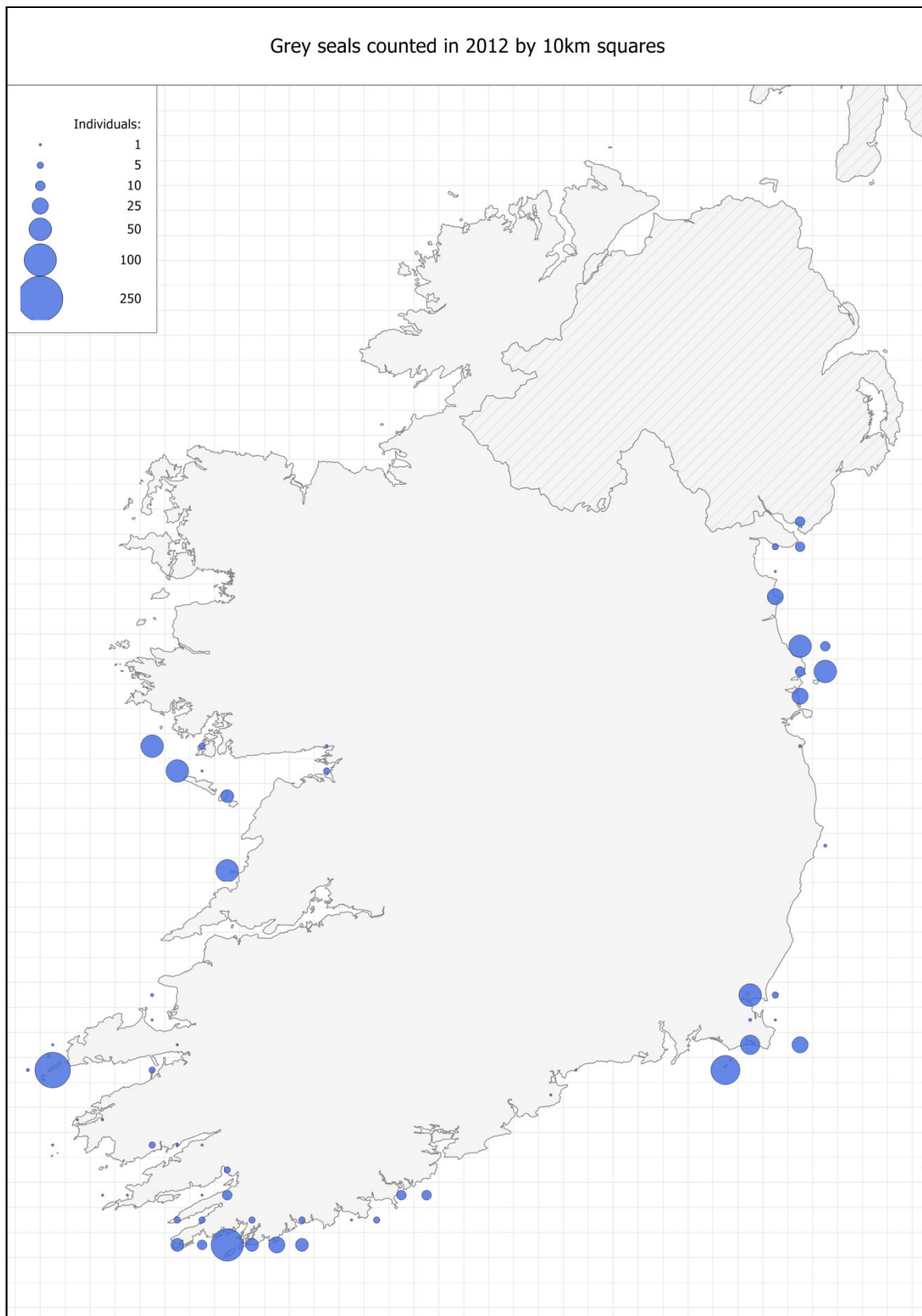


Figure 4c. Grey seal distribution in Ireland in August 2003, with counts aggregated by 10km squares (background grid). This Figure is included for comparison with the 2011/12 data (Figure 4b). Data were collected by the Sea Mammal Research Unit, University of St Andrews and Coastal and Marine Resources Centre, University College Cork, for the Department of the Environment, Heritage and Local Government.

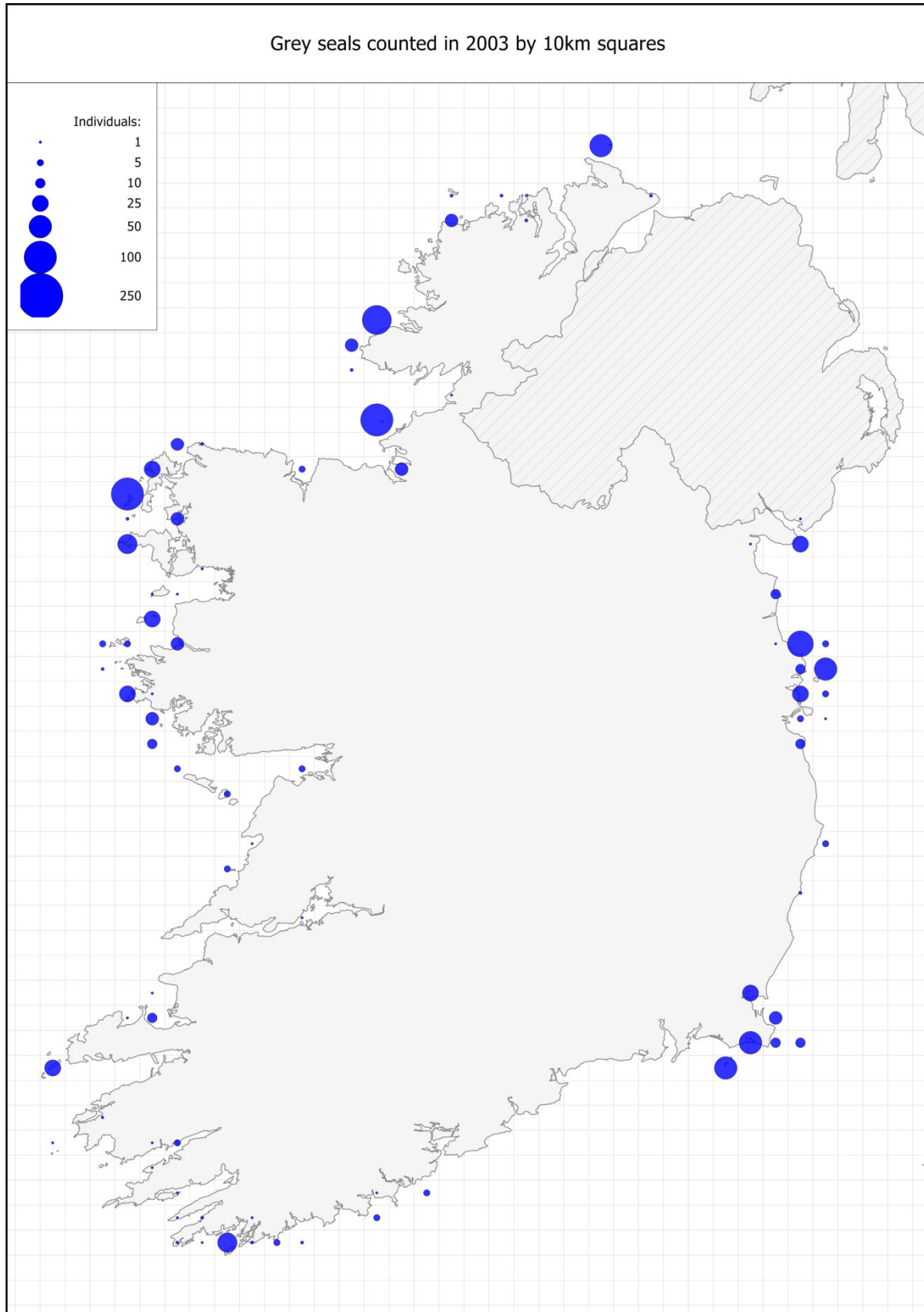
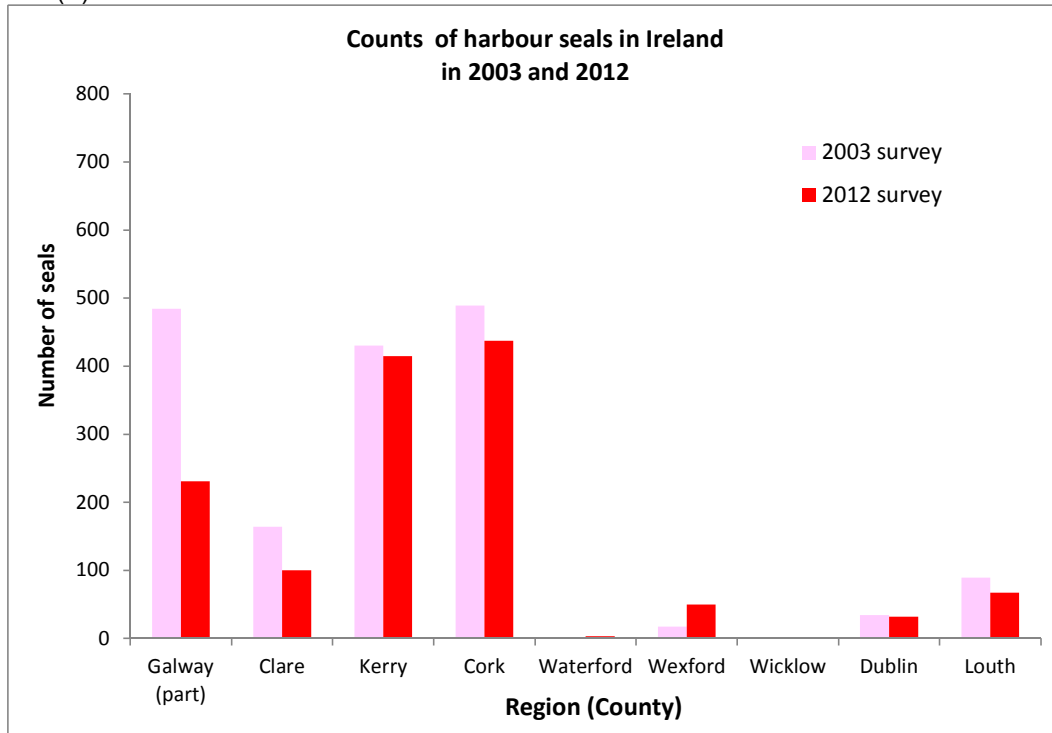


Figure 5. Numbers and proportions of harbour seals counted in regions (i.e. counties) of the west, south-west, south and east of Ireland in August-September 2012, compared with numbers counted in a previous survey in August 2003. The first column shows numbers counted during the 2003 aerial survey as reported by Cronin *et al.* (2004, 2007).

(a) Actual counts



(b) Proportion of harbour seals in regions of Ireland in 2012 compared with 2003

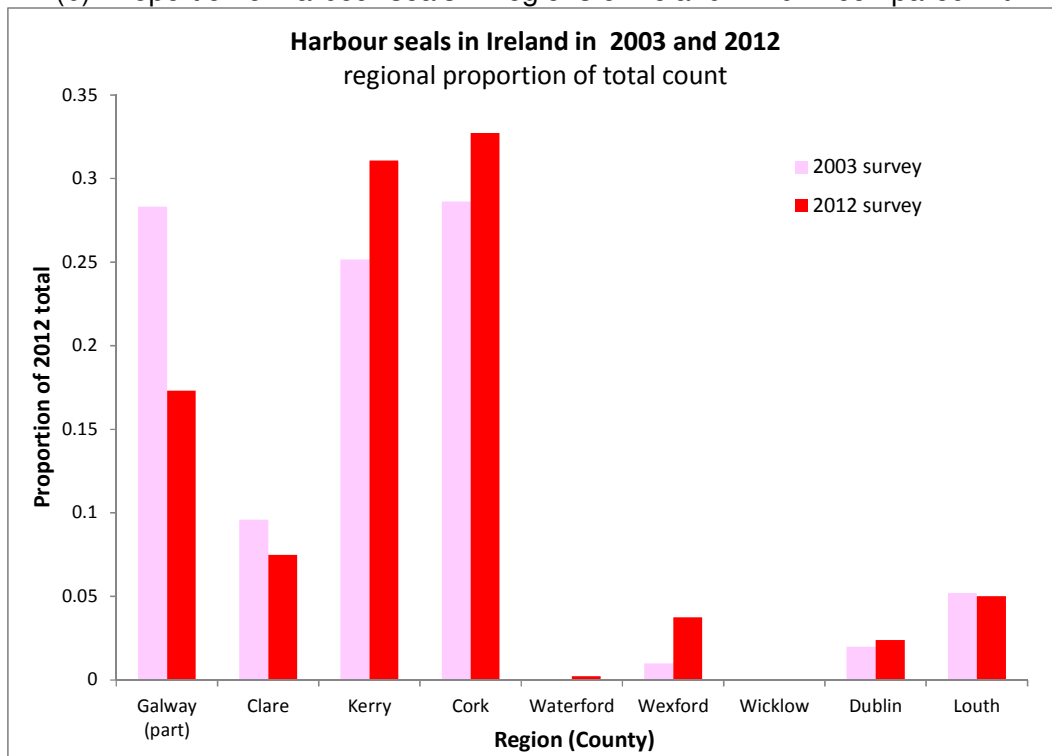
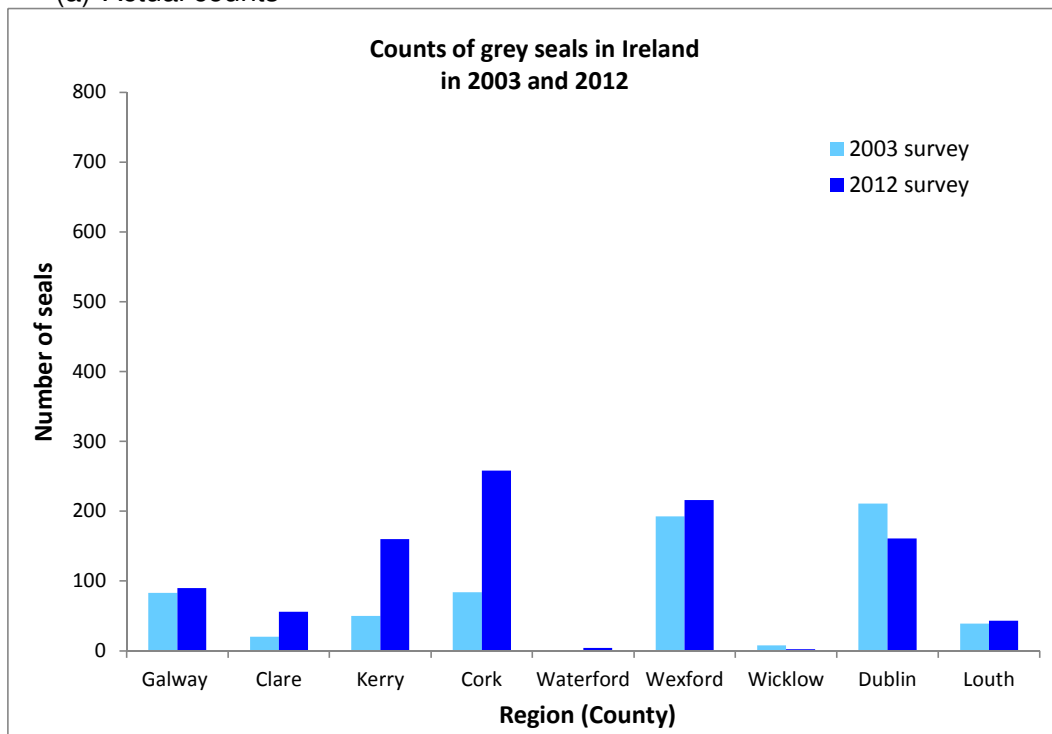


Figure 6. Numbers of grey seals counted in regions (i.e. counties) of the west, south-west, south and east of Ireland in August-September 2012, compared with numbers counted in a previous survey in August 2003 (Cronin *et al.* 2004, 2007).

(a) Actual counts



(b) Proportion of grey seals in regions of Ireland in 2012 compared with 2003.

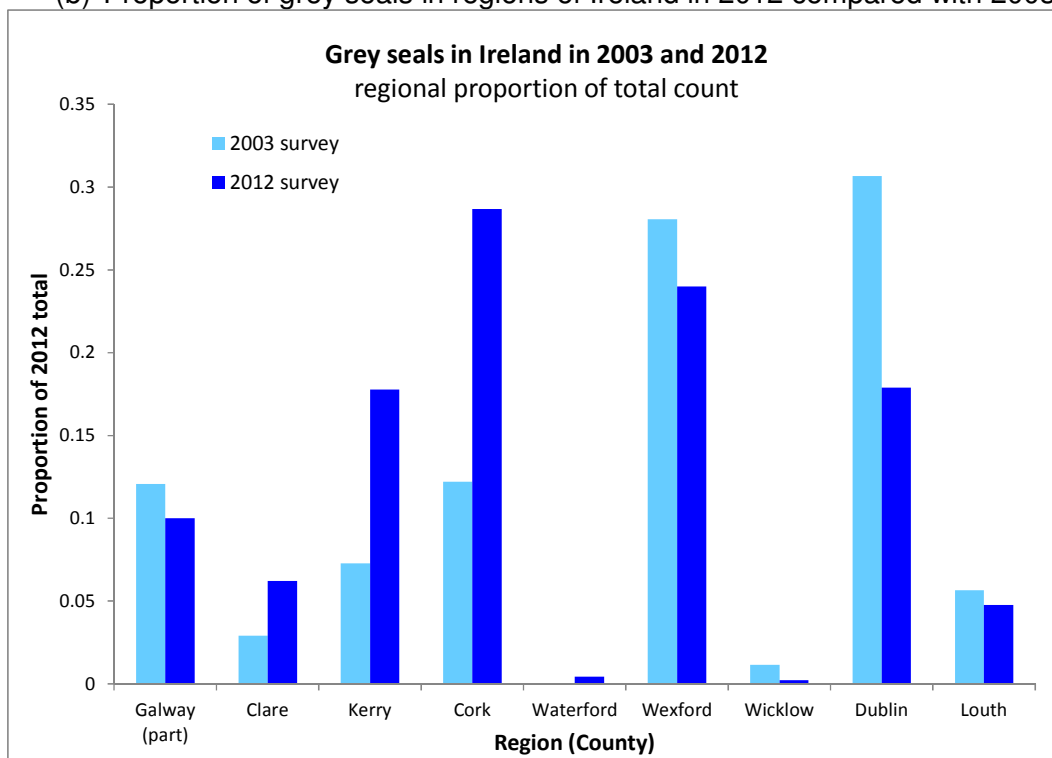


Figure 7. Harbour seal distribution in Ireland in August-September 2011 and 2012, with counts aggregated by 10km squares (background grid). Data were collected by the Sea Mammal Research Unit, University of St Andrews for the Department of Arts, Heritage and the Gaeltacht. These data can be compared with a previous survey in 2003 (Figure 3c; Cronin *et al.* 2004, 2007).

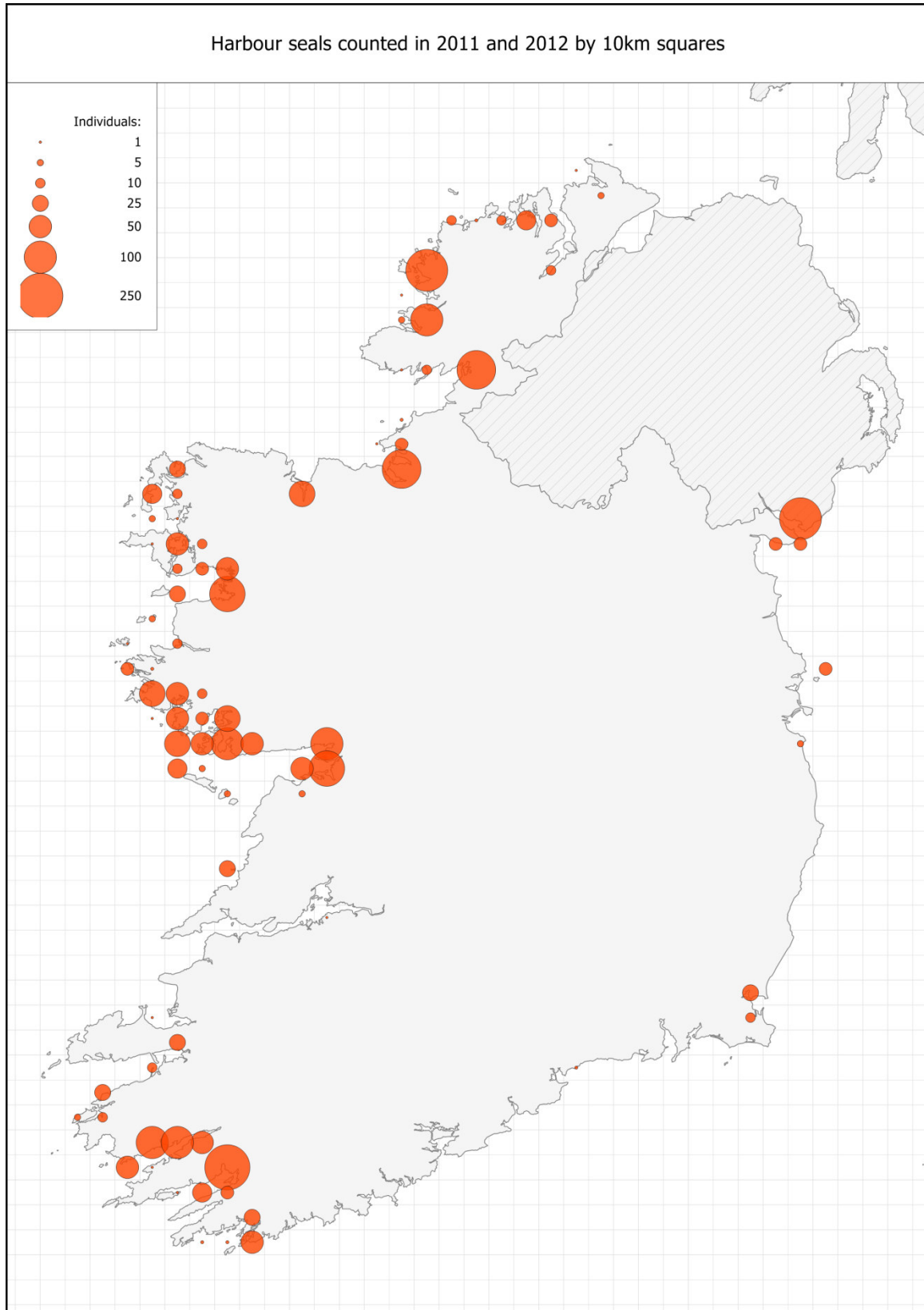


Figure 8. Grey seal distribution in Ireland in August-September 2011 and 2012, with counts aggregated by 10km squares. Data were collected by the Sea Mammal Research Unit, University of St Andrews for the Department of Arts, Heritage and the Gaeltacht. These data can be compared with a previous survey in 2003 (Figure 4c; Cronin *et al.* 2004, 2007).

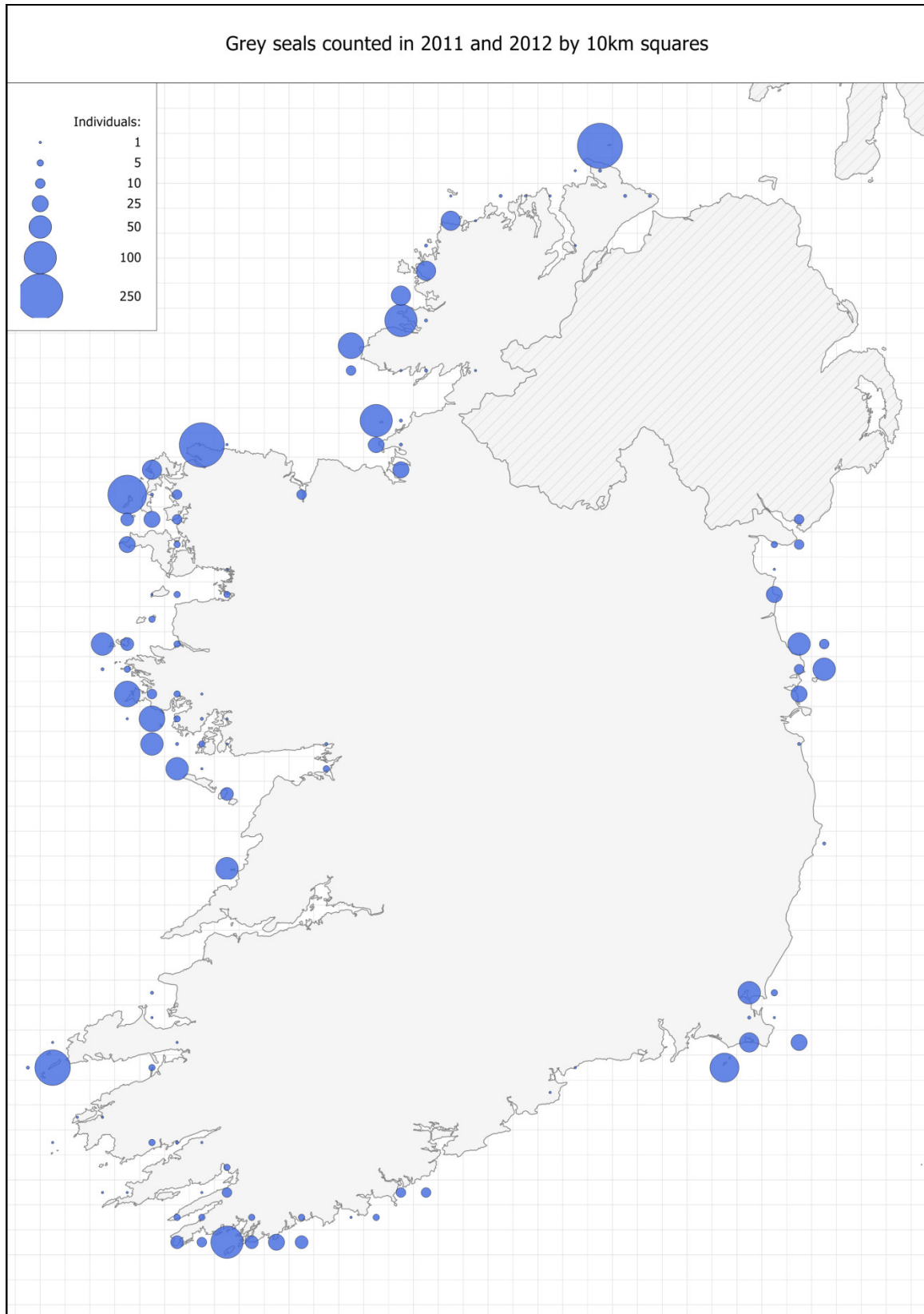
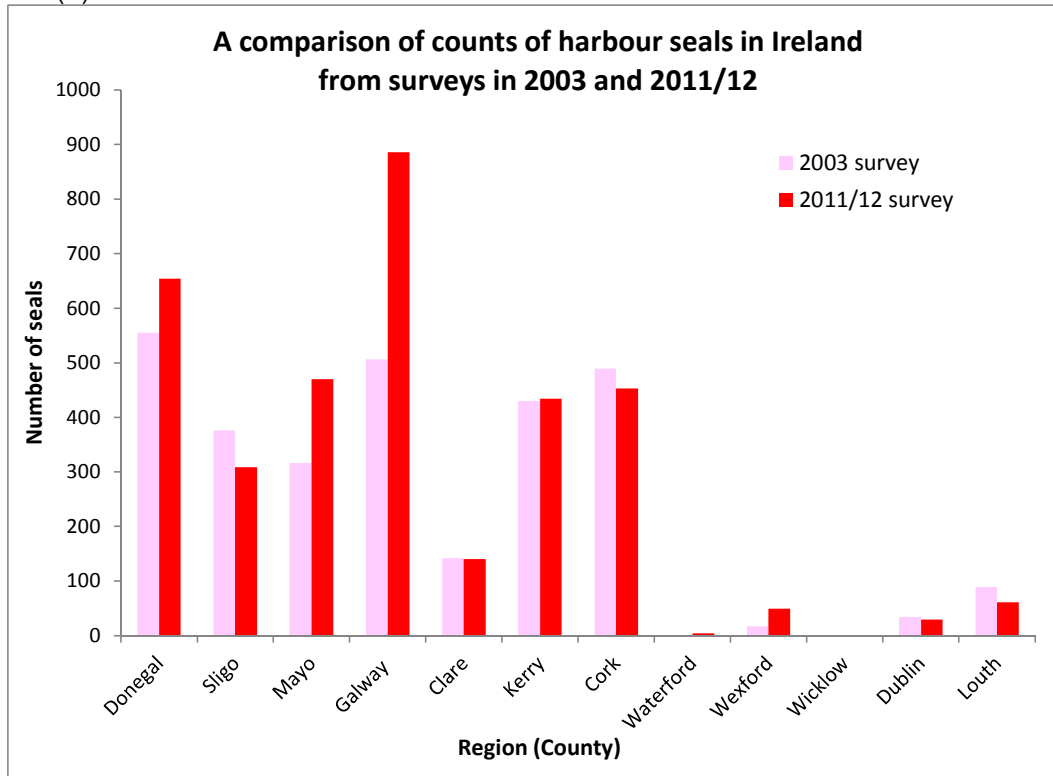


Figure 9a. Numbers and proportions of harbour seals counted in regions (i.e. counties) of Ireland in August 2011 and August-September 2012, compared with numbers counted in a previous survey in August 2003. The first column shows numbers counted during the 2003 aerial survey as reported by Cronin *et al.* (2004, 2007).

(a) Actual counts

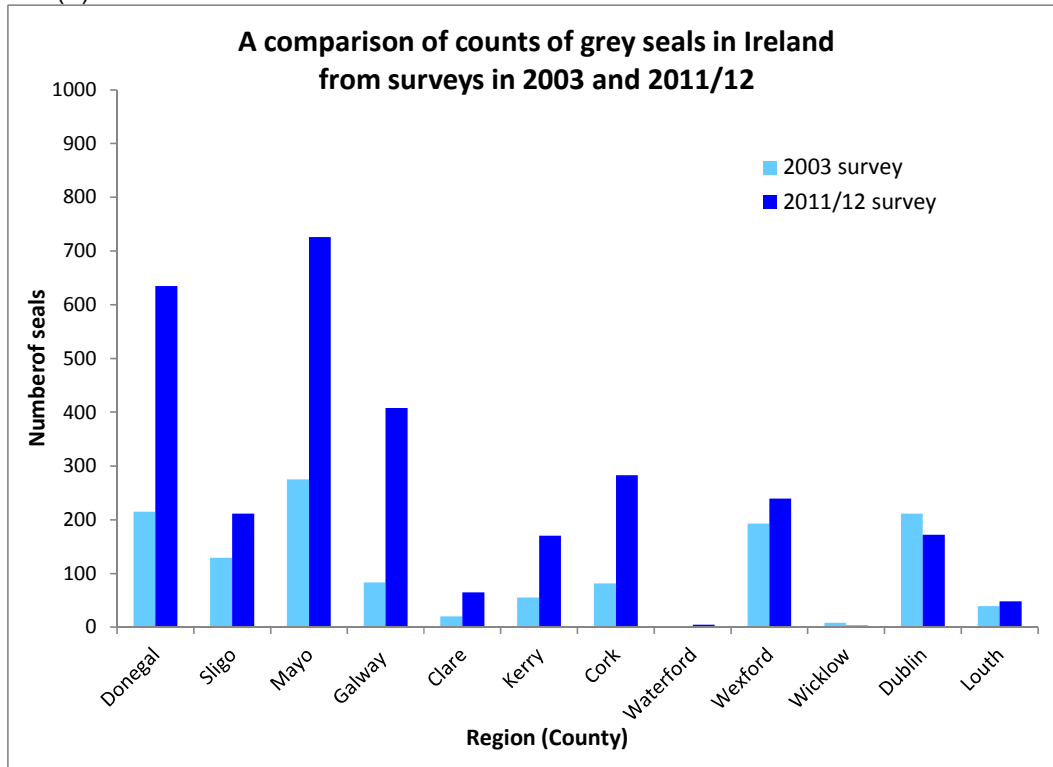


(b) Proportion of total count within regions



Figure 10 The numbers of grey seals counted in regions (i.e. counties) of Ireland in August 2011 and August-September 2012, compared with numbers counted in a previous survey in August 2003. The first column shows numbers counted during the 2003 aerial survey as reported by Cronin *et al.* (2004, 2007).

(a) Actual counts



(b) Proportion of total count within regions

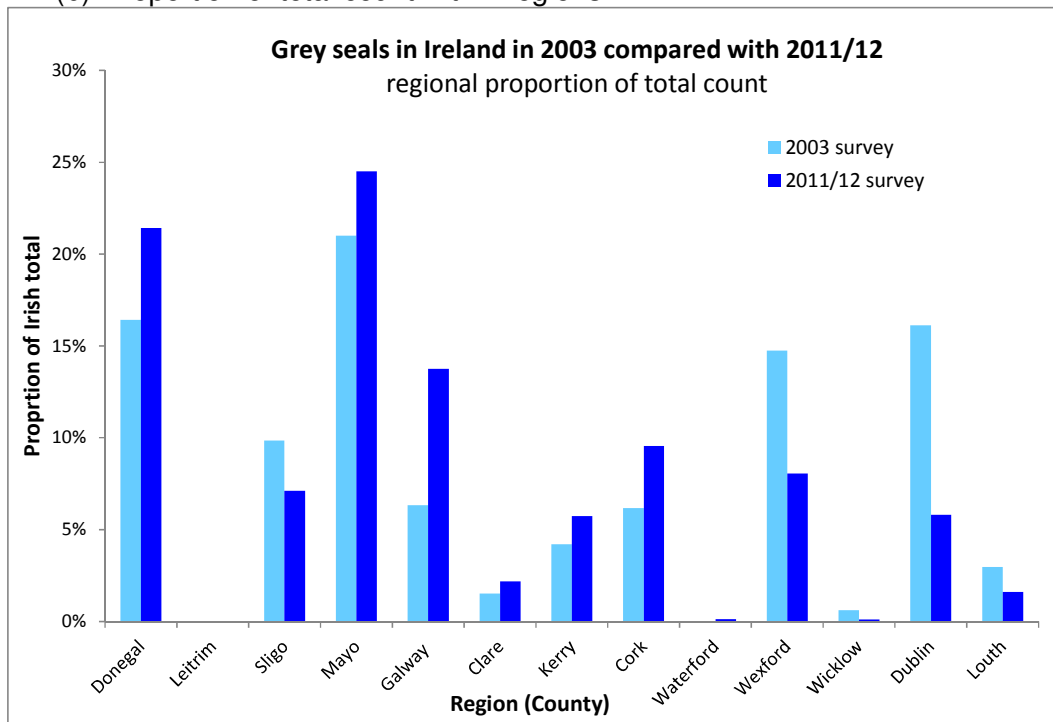


Table 1. Calendar of the August-September 2012 survey showing the areas covered.

Date		Area covered	Comments	Conditions
Fri	31 Aug 2012	Ferry crossing Cairnryan - Belfast. Picked up by helicopter at Newtonards, refuelled at PDG Dublin, then surveyed from Arklow Head to Carlingford Lough. Then, after refuelling at Ravensdale, transferred to West coast and stopped for the night in Clifden.	Couldn't enter Dublin airspace during survey so mainland within and W coast of Ireland's Eye not surveyed. 3 kayaks on Dalkey Island. Winkle picker on Carigahoulla Skerry (S of Dundalk). Boat with winkle picker on Artillery Fort (Carlingford L).	Dry throughout survey, cloudy, low light towards end.
Sat	01 Sept 2012	Surveyed offshore skerries N of Aran Islands (that weren't surveyed in 2011), then headed to Galway and surveyed from Galway Bay to Spanish Pt, refuelled at a private site and continued survey to Ballybunnion.	Strong SW wind so some potential Hg sites were exposed to waves. 5 kayaks on NW skerries in Kinvarra Bay. Boat with winkle picker on Deer Island (Galway Bay).	Dry, mainly cloudy, some bright spells, strong SW wind.
Sun	02 Sept 2012	Surveyed from Ballybunnion to Inch, refuelled, then surveyed from Inch to Caherdaniel.		Cloudy to start, with short drizzly patch, then turning sunnier and warmer, not much wind.
Mon	03 Sept 2012	No survey due to very low cloud.	Not possible to fly, never mind survey	Ideal conditions in morning but low cloud during entire survey window.
Tue	04 Sept 2012	Surveyed from Caherdaniel to Adrigole, refuelled at private site, then surveyed from Adrigole to Baltimore.	Dead fin whale (juv female) at Carthy's Islands. It had entered Baltimore Harbour a few weeks ago and died there. It was wrapped in net and placed off Carthy's Islands.	Ideal conditions for first few hours, then rocks quite warm from sun but ok, no significant wind.
Wed	05 Sept 2012	Surveyed from Baltimore to Dungarvan, refuelled and waited for 1 hour for tide, then surveyed from Dungarvan to Arklow Head.		Sunny (not too hot), few thin cloud in some places, no significant wind.

Table 2. A comparison of the numbers of harbour seals counted in regions (i.e. counties) and subregions of west, south-west, south and east Ireland in August 2003 and in August and September 2012. The right-hand column shows the percentage difference between the two surveys.

REGION	SUBREGION	SUBREGION CODE	HARBOUR SEALS COUNTED		DIFF. IN %
			2003	2012	
GALWAY	SKERDMORE SKERRIES	08_05	0	0	
GALWAY	KILKIERAN BAY (small part covered in 2012)	08_06	0	0	
GALWAY	INNER GALWAY BAY	08_08	200	221	
GALWAY	ARAN ISLANDS	08_09	39	53	
GALWAY	Total (for areas surveyed in 2012)	08	239	274	+14.6%
CLARE	BLACK HEAD	09_01	117	112	
CLARE	LISCANNOR BAY	09_02	17	27	
CLARE	OUTER SHANNON NORTH	09_03	0	0	
CLARE	INNER SHANNON NORTH	09_04	8	1	
CLARE	Total	09	142	140	-1.4%
LIMERICK	INNER SHANNON SOUTH	10_01	0	0	
LIMERICK	Total	10	0	0	
KERRY	OUTER SHANNON SOUTH	11_01	0	0	
KERRY	TRALEE BAY	11_02	0	1	
KERRY	BRANDON	11_03	0	0	
KERRY	TEARAGHT ISLAND	11_04	0	0	
KERRY	INISHTOOSKERT	11_05	0	0	
KERRY	GREAT BLASKET ISLAND	11_06	0	0	
KERRY	INISHNABRO, INISHVICKILLANE	11_07	0	0	
KERRY	DINGLE BAY	11_08	22	45	
KERRY	VALENCIA	11_09	22	45	
KERRY	SKELLIG ROCKS	11_10	0	0	
KERRY	KENMARE RIVER	11_11	386	343	
KERRY	Total	11	430	434	+0.9%
CORK	OUTER KENMARE SOUTH	12_01	5	2	
CORK	BANTRY BAY	12_02	341	353	
CORK	DUNMANUS BAY	12_03	81	10	
CORK	ROARINGWATER BAY	12_04	52	88	
CORK	CLEAR ISLAND	12_05	0	0	
CORK	ROSCARBERRY	12_06	0	0	
CORK	CLONAKILTY BAY	12_07	0	0	
CORK	KINSALE HARBOUR	12_08	10	0	
CORK	CORK HARBOUR	12_09	0	0	
CORK	POWER HEAD TO YOUGHAL	12_10	0	0	
CORK	Total	12	489	453	-7.4%
WATERFORD	YOUGHAL TO HELVICK HEAD	13_01	0	0	
WATERFORD	HELVICK HEAD TO BROWNSTOWN HEAD	13_02	1	4	
WATERFORD	WEST WATERFORD HARBOUR	13_03	0	0	
WATERFORD	Total	13	1	4	+300.0%
WEXFORD	EAST WEXFORD HARBOUR	14_01	0	0	
WEXFORD	HOOK HEAD TO CARNSORE POINT	14_02	0	0	
WEXFORD	SALTEE ISLANDS	14_03	0	0	
WEXFORD	CARNSORE TO WEXFORD	14_04	17	49	
WEXFORD	WEXFORD TO KILMICHAEL	14_05	0	0	
WEXFORD	Total	14	17	49	+188.2%
WICKLOW	KILMICHAEL TO WICKLOW	15_01	0	0	
WICKLOW	WICKLOW TO BRAY	15_02	0	0	
WICKLOW	Total	15	0	0	
DUBLIN	DUBLIN BAY	16_01	0	6	
DUBLIN	BAILY LIGHTHOUSE TO KNOCKNAGIN	16_02	3	0	
DUBLIN	LAMBAY ISLAND	16_03	31	23	
DUBLIN	Total	16	34	29	-14.7%
MEATH	KNOCKNAGIN TO SOUTH BULL	17_01	0	0	
MEATH	Total	17	0	0	
LOUTH	SOUTH BULL TO DUNANY POINT	18_01	8	0	
LOUTH	DUNDALK BAY	18_02	18	21	
LOUTH	CARLINGFORD LOUGH SOUTH	18_03	63	40	
LOUTH	Total	18	89	61	-31.5%
SW,S & E IRELAND	TOTAL HARBOUR SEALS COUNTED IN AREAS SURVEYED IN 2012		1,441	1,444	+0.2%

Table 3. A comparison of the numbers of grey seals counted in regions (i.e. counties) and subregions of west, south-west, south and east Ireland in August 2003 and in August and September 2012. The right-hand column shows the percentage difference between the two surveys.

REGION	SUBREGION	SUBREGION	GREY SEALS COUNTED		DIFF.
		CODE	2003	2012	IN %
GALWAY	SKERDMORE SKERRIES	08_05	10	58	
GALWAY	KILKIERAN BAY (small part covered in 2012)	08_06	0	6	
GALWAY	INNER GALWAY BAY	08_08	0	8	
GALWAY	ARAN ISLANDS	08_09	11	73	
GALWAY	Total (for areas surveyed in 2012)	08	21	145	+590.5%
CLARE	BLACK HEAD	09_01	7*	1	
CLARE	LISCANNOR BAY	09_02	11	64	
CLARE	OUTER SHANNON NORTH	09_03	0	0	
CLARE	INNER SHANNON NORTH	09_04	2	0	
CLARE	Total	09	20	65	+225.0%
LIMERICK	INNER SHANNON SOUTH	10_01	0	0	
LIMERICK	Total	10	0	0	
KERRY	OUTER SHANNON SOUTH	11_01	0	0	
KERRY	TRALEE BAY	11_02	12	1	
KERRY	BRANDON	11_03	2	4	
KERRY	TEARAGHT ISLAND	11_04	0	3	
KERRY	INISHTOOSKERT	11_05	0	1	
KERRY	GREAT BASKET ISLAND	11_06	1	117	
KERRY	INISHNABRO, INISHVICKILLANE	11_07	30	24	
KERRY	DINGLE BAY	11_08	0	6	
KERRY	VALENCIA	11_09	1	4	
KERRY	SKELLIG ROCKS	11_10	1	1	
KERRY	KENMARE RIVER	11_11	8	9	
KERRY	Total	11	55	170	+209.1%
CORK	OUTER KENMARE SOUTH	12_01	0	2	
CORK	BANTRY BAY	12_02	1	19	
CORK	DUNMANUS BAY	12_03	9	36	
CORK	ROARINGWATER BAY	12_04	55	168	
CORK	CLEAR ISLAND	12_05	0	1	
CORK	ROSCARBERRY	12_06	3	29	
CORK	CLONAKILTY BAY	12_07	7	8	
CORK	KINSALE HARBOUR	12_08	6	20	
CORK	CORK HARBOUR	12_09	0	0	
CORK	POWER HEAD TO YOUGHAL	12_10	0	0	
CORK	Total	12	81	283	+249.4%
WATERFORD	YOUGHAL TO HELVICK HEAD	13_01	0	2	
WATERFORD	HELVICK HEAD TO BROWNSTOWN HEAD	13_02	0	2	
WATERFORD	WEST WATERFORD HARBOUR	13_03	0	0	
WATERFORD	Total	13	0	4	
WEXFORD	EAST WEXFORD HARBOUR	14_01	0	0	
WEXFORD	HOOK HEAD TO CARNSORE POINT	14_02	56	43	
WEXFORD	SALTEE ISLANDS	14_03	61	95	
WEXFORD	CARNSORE TO WEXFORD	14_04	72	101	
WEXFORD	WEXFORD TO KILMICHAEL	14_05	4	0	
WEXFORD	Total	14	193	239	+23.8%
WICKLOW	KILMICHAEL TO WICKLOW	15_01	8	3	
WICKLOW	WICKLOW TO BRAY	15_02	0	0	
WICKLOW	Total	15	8	3	-62.5%
DUBLIN	DUBLIN BAY	16_01	16	4	
DUBLIN	BAILY LIGHTHOUSE TO KNOCKNAGIN	16_02	131	106	
DUBLIN	LAMBAY ISLAND	16_03	64	62	
DUBLIN	Total	16	211	172	-18.5%
MEATH	KNOCKNAGIN TO SOUTH BULL	17_01	0	0	
MEATH	Total	17	0	0	
LOUTH	SOUTH BULL TO DUNANY POINT	18_01	16	35	
LOUTH	DUNDALK BAY	18_02	1	10	
LOUTH	CARLINGFORD LOUGH SOUTH	18_03	22	3	
LOUTH	Total	18	39	48	+23.1%
SW,S & E IRELAND	TOTAL GREY SEALS COUNTED IN AREAS SURVEYED IN 2012		628	1,129	+79.8%

Appendix 1

Numbers of harbour seals counted in regions (i.e. counties) and subregions of Ireland in August and September 2011 and 2012 compared with 2003 (data from Cronin *et al.* 2004). The right-hand column shows the percentage difference between the two surveys.

REGION	SUBREGION	SUBREGION CODE	HARBOUR SEALS COUNTED			DIFF. IN %
			2003	2011	2012	
DONEGAL	LOUGH FOYLE WEST	04_01	4	0		
DONEGAL	INISHOWEN HEAD TO MALIN HEAD	04_02	0	0		
DONEGAL	GARVAN ISLES & INISHTRAHULL	04_03	0	0		
DONEGAL	MALIN HEAD TO FANAD HEAD	04_04	5	20		
DONEGAL	MULROY BAY	04_05	57	59		
DONEGAL	SHEEP HAVEN	04_06	0	17		
DONEGAL	INISHBOFIN, DONEGAL	04_07	12	16		
DONEGAL	TORY ISLAND	04_08	0	0		
DONEGAL	INISHFREE BAY	04_09	268	230		
DONEGAL	ARANMORE ISLAND, DONEGAL	04_10	0	0		
DONEGAL	GWEEBARRA BAY	04_11	42	103		
DONEGAL	DAWROS HEAD TO ROSSAN POINT	04_12	17	5		
DONEGAL	KILLYBEGS	04_13	0	14		
DONEGAL	DONEGAL BAY	04_14	150	190		
DONEGAL	Total	04	555	654		+17.8%
LEITRIM	Total	05	0	0		-
SLIGO	DERNISH	06_01	12	4		
SLIGO	INISHMURRAY	06_02	0	0		
SLIGO	SLIGO BAY	06_03	257	224		
SLIGO	SLIGO WEST	06_04	107	81		
SLIGO	Total	06	376	309		-17.8%
MAYO	KILLALA BAY WEST	07_01	1	0		
MAYO	NORTH MAYO	07_02	0	0		
MAYO	STAGS OF BROADHAVEN	07_03	0	0		
MAYO	BROAD HAVEN	07_04	47	34		
MAYO	BLACKSOD POINT	07_05	0	0		
MAYO	INISHGLORA	07_06	0	0		
MAYO	INISHKEA NORTH & SOUTH	07_07	0	0		
MAYO	BLACK ROCK, SW of INISHKEA IS.	07_08	0	0		
MAYO	DUVILLAUN MORE	07_09	0	0		
MAYO	BLACKSOD BAY	07_10	69	59		
MAYO	ACHILL ISLAND	07_11	80	90		
MAYO	CLARE ISLAND	07_12	0	0		
MAYO	CLEW BAY	07_13	95	241		
MAYO	KILLARY HARBOUR NORTH	07_14	24	39		
MAYO	INISHTURK	07_15	0	7		
MAYO	Total	07	316	470		+48.7%
GALWAY	INISHBOFIN, GALWAY	08_01	0	1	-	
GALWAY	KILLARY HARBOUR SOUTH	08_02	0	0	-	
GALWAY	CLIFDEN BAY	08_03	36	85	-	
GALWAY	BERTRAGHBOY BAY	08_04	36	94	-	
GALWAY	SKERDMORE SKERRIES	08_05	0	-	0	
GALWAY	KILKIERAN BAY (majority covered in 2011)	08_06	146	377	0	
GALWAY	GALWAY BAY NORTH (surveyed in 2011 & 12)	08_07	49	55	-	
GALWAY	INNER GALWAY BAY	08_08	200	(248)*	221	
GALWAY	ARAN ISLANDS	08_09	39	-	53	
GALWAY	Total (2011 & 2012 combined)	08	506	886		+75.1%
CLARE	BLACK HEAD	09_01	117	(167)*	112	
CLARE	LISCANNOR BAY	09_02	17		27	
CLARE	OUTER SHANNON NORTH	09_03	0		0	
CLARE	INNER SHANNON NORTH	09_04	8		1	
CLARE	Total	09	142		140	- 1.4%

(Appendix 1 continued)

LIMERICK	INNER SHANNON SOUTH	10_01	0	0	
LIMERICK	Total	10	0	0	
KERRY	OUTER SHANNON SOUTH	11_01	0	0	
KERRY	TRALEE BAY	11_02	0	1	
KERRY	BRANDON	11_03	0	0	
KERRY	TEARAGHT ISLAND	11_04	0	0	
KERRY	INISHTOOSKERT	11_05	0	0	
KERRY	GREAT BLASKET ISLAND	11_06	0	0	
KERRY	INISHNABRO, INISHVICKILLANE	11_07	0	0	
KERRY	DINGLE BAY	11_08	22	45	
KERRY	VALENCIA	11_09	22	45	
KERRY	SKELLIG ROCKS	11_10	0	0	
KERRY	KENMARE RIVER	11_11	386	343	
KERRY	Total	11	430	434	+ 0.9%
CORK	OUTER KENMARE SOUTH	12_01	5	2	
CORK	BANTRY BAY	12_02	341	353	
CORK	DUNMANUS BAY	12_03	81	10	
CORK	ROARINGWATER BAY	12_04	52	88	
CORK	CLEAR ISLAND	12_05	0	0	
CORK	ROSCARBERRY	12_06	0	0	
CORK	CLONAKILTY BAY	12_07	0	0	
CORK	KINSALE HARBOUR	12_08	10	0	
CORK	CORK HARBOUR	12_09	0	0	
CORK	POWER HEAD TO YOUGHAL	12_10	0	0	
CORK	Total	12	489	453	- 7.4%
WATERFORD	YOUGHAL TO HELVICK HEAD	13_01	0	0	
WATERFORD	HELVICK HEAD TO BROWNSTOWN HEAD	13_02	1	4	
WATERFORD	WEST WATERFORD HARBOUR	13_03	0	0	
WATERFORD	Total	13	1	4	+300.0%
WEXFORD	EAST WEXFORD HARBOUR	14_01	0	0	
WEXFORD	HOOK HEAD TO CARNSORE POINT	14_02	0	0	
WEXFORD	SALTEE ISLANDS	14_03	0	0	
WEXFORD	CARNSORE TO WEXFORD	14_04	17	49	
WEXFORD	WEXFORD TO KILMICHAEL	14_05	0	0	
WEXFORD	Total	14	17	49	+188.2%
WICKLOW	KILMICHAEL TO WICKLOW	15_01	0	0	
WICKLOW	WICKLOW TO BRAY	15_02	0	0	
WICKLOW	Total	15	0	0	
DUBLIN	DUBLIN BAY	16_01	0	6	
DUBLIN	BAILY LIGHTHOUSE TO KNOCKNAGIN	16_02	3	0	
DUBLIN	LAMBAY ISLAND	16_03	31	23	
DUBLIN	Total	16	34	29	-14.7%
MEATH	KNOCKNAGIN TO SOUTH BULL	17_01	0	0	
MEATH	Total	17	0	0	
LOUTH	SOUTH BULL TO DUNANY POINT	18_01	8	0	
LOUTH	DUNDALK BAY	18_02	18	21	
LOUTH	CARLINGFORD LOUGH SOUTH	18_03	63	40	
LOUTH	Total	18	89	61	-31.5%
Subtotals for 2011 & 2012			2,045	1,444	
TOTAL HARBOUR SEALS COUNTED IN REPUBLIC OF IRELAND			2,955	3,489	+18.1%

*Not included in totals. Using the 2011 instead of the 2012 counts for Inner Galway Bay (08_08) and Black Head (09_01) would give a slightly higher 2011/12 total of **3,543** harbour seals. Using 2011/12 averages for the areas surveyed in both years would result in an overall total of **3,516** harbour seals.

Appendix 2

Numbers of grey seals counted in regions (i.e. counties) and subregions of Ireland in August and September 2011 and 2012 compared with 2003 (data from Cronin *et al.* 2004). The right-hand column shows the percentage difference between the two surveys.

REGION	SUBREGION	SUBREGION CODE	GREY SEALS COUNTED			DIFF. IN %
			2003	2011	2012	
DONEGAL	LOUGH FOYLE WEST	04_01	0	4		
DONEGAL	INISHOWEN HEAD TO MALIN HEAD	04_02	4	4		
DONEGAL	GARVAN ISLES & INISHTRAHULL	04_03	60	266		
DONEGAL	MALIN HEAD TO FANAD HEAD	04_04	0	3		
DONEGAL	MULROY BAY	04_05	7	3		
DONEGAL	SHEEP HAVEN	04_06	0	5		
DONEGAL	INISHBOFIN, DONEGAL	04_07	23	39		
DONEGAL	TORY ISLAND	04_08	4	2		
DONEGAL	INISHFREE BAY	04_09	0	43		
DONEGAL	ARANMORE ISLAND, DONEGAL	04_10	0	0		
DONEGAL	GWEEBARRA BAY	04_11	0	48		
DONEGAL	DAWROS HEAD TO ROSSAN POINT	04_12	90	131		
DONEGAL	KILLYBEGS	04_13	26	86		
DONEGAL	DONEGAL BAY	04_14	1	1		
DONEGAL	Total	04	215	635	+195.3%	
LEITRIM	Total	05	0	0	-	
SLIGO	DERNISH	06_01	0	4		
SLIGO	INISHMURRAY	06_02	109	112		
SLIGO	SLIGO BAY	06_03	20	78		
SLIGO	SLIGO WEST	06_04	0	17		
SLIGO	Total	06	129	211	+63.6%	
MAYO	KILLALA BAY WEST	07_01	5	0		
MAYO	NORTH MAYO	07_02	0	1		
MAYO	STAGS OF BROADHAVEN	07_03	0	0		
MAYO	BROAD HAVEN	07_04	22	342		
MAYO	BLACKSOD POINT	07_05	2	9		
MAYO	INISHGLORA	07_06	58	36		
MAYO	INISHKEA NORTH & SOUTH	07_07	71	193		
MAYO	BLACK ROCK, SW of INISHKEA IS.	07_08	0	0		
MAYO	DUVILLAUN MORE	07_09	4	33		
MAYO	BLACKSOD BAY	07_10	0	33		
MAYO	ACHILL ISLAND	07_11	63	50		
MAYO	CLARE ISLAND	07_12	1	2		
MAYO	CLEW BAY	07_13	1	7		
MAYO	KILLARY HARBOUR NORTH	07_14	19	12		
MAYO	INISHTURK	07_15	29	8		
MAYO	Total	07	275	726	+164.0%	
GALWAY	INISHBOFIN, GALWAY	08_01	10	72	-	
GALWAY	KILLARY HARBOUR SOUTH	08_02	0	0	-	
GALWAY	CLIFDEN BAY	08_03	23	64	-	
GALWAY	BERTRAGHBOY BAY	08_04	29	114	-	
GALWAY	SKERDMORE SKERRIES	08_05	10	-	58	
GALWAY	KILKIERAN BAY (majority covered in 2011)	08_06	0	13	6	
GALWAY	GALWAY BAY NORTH (surveyed in 2011 & 12)	08_07	0	0	-	
GALWAY	INNER GALWAY BAY	08_08	0	(11)*	8	
GALWAY	ARAN ISLANDS	08_09	11	-	73	
GALWAY	Total (2011 & 2012 combined)	08	83	408	+391.6%	
CLARE	BLACK HEAD	09_01	7	(9)*	1	
CLARE	LISCANNOR BAY	09_02	11		64	
CLARE	OUTER SHANNON NORTH	09_03	0		0	
CLARE	INNER SHANNON NORTH	09_04	2		0	
CLARE	Total	09	20	65	+225.0%	

(Appendix 2 continued)

LIMERICK	INNER SHANNON SOUTH	10_01	0	0	
LIMERICK	Total		10	0	0
KERRY	OUTER SHANNON SOUTH	11_01	0	0	
KERRY	TRALEE BAY	11_02	12	1	
KERRY	BRANDON	11_03	2	4	
KERRY	TEARAGHT ISLAND	11_04	0	3	
KERRY	INISHTOOSKERT	11_05	0	1	
KERRY	GREAT BASKET ISLAND	11_06	1	117	
KERRY	INISHNABRO, INISHVICKILLANE	11_07	30	24	
KERRY	DINGLE BAY	11_08	0	6	
KERRY	VALENCIA	11_09	1	4	
KERRY	SKELLIG ROCKS	11_10	1	1	
KERRY	KENMARE RIVER	11_11	8	9	
KERRY	Total		11	55	170 +209.1%
CORK	OUTER KENMARE SOUTH	12_01	0	2	
CORK	BANTRY BAY	12_02	1	19	
CORK	DUNMANUS BAY	12_03	9	36	
CORK	ROARINGWATER BAY	12_04	55	168	
CORK	CLEAR ISLAND	12_05	0	1	
CORK	ROSCARBERRY	12_06	3	29	
CORK	CLONAKILTY BAY	12_07	7	8	
CORK	KINSALE HARBOUR	12_08	6	20	
CORK	CORK HARBOUR	12_09	0	0	
CORK	POWER HEAD TO YOUGHAL	12_10	0	0	
CORK	Total		12	81	283 +249.4%
WATERFORD	YOUGHAL TO HELVICK HEAD	13_01	0	2	
WATERFORD	HELVICK HEAD TO BROWNSTOWN HEAD	13_02	0	2	
WATERFORD	WEST WATERFORD HARBOUR	13_03	0	0	
WATERFORD	Total		13	0	4
WEXFORD	EAST WEXFORD HARBOUR	14_01	0	0	
WEXFORD	HOOK HEAD TO CARNSORE POINT	14_02	56	43	
WEXFORD	SALTEE ISLANDS	14_03	61	95	
WEXFORD	CARNSORE TO WEXFORD	14_04	72	101	
WEXFORD	WEXFORD TO KILMICHAEL	14_05	4	0	
WEXFORD	Total		14	193	239 +23.8%
WICKLOW	KILMICHAEL TO WICKLOW	15_01	8	3	
WICKLOW	WICKLOW TO BRAY	15_02	0	0	
WICKLOW	Total		15	8	3 -62.5%
DUBLIN	DUBLIN BAY	16_01	16	4	
DUBLIN	BAILY LIGHTHOUSE TO KNOCKNAGIN	16_02	131	106	
DUBLIN	LAMBAY ISLAND	16_03	64	62	
DUBLIN	Total		16	211	172 -18.5%
MEATH	KNOCKNAGIN TO SOUTH BULL	17_01	0	0	
MEATH	Total		17	0	0
LOUTH	SOUTH BULL TO DUNANY POINT	18_01	16	35	
LOUTH	DUNDALK BAY	18_02	1	10	
LOUTH	CARLINGFORD LOUGH SOUTH	18_03	22	3	
LOUTH	Total		18	39	48 +23.1%
Subtotals for 2011 & 2012			1,835	1,129	
TOTAL GREY SEALS COUNTED IN REPUBLIC OF IRELAND			1,309	2,964	+126.4%

* Not included in totals. Using the 2011 instead of the 2012 counts for Inner Galway Bay (08_08) and Black Head (09_01) would give a slightly lower 2011/12 total of **2,911** grey seals. Using 2011/12 averages for the areas surveyed in both years would result in an overall total of **2,938** grey seals.