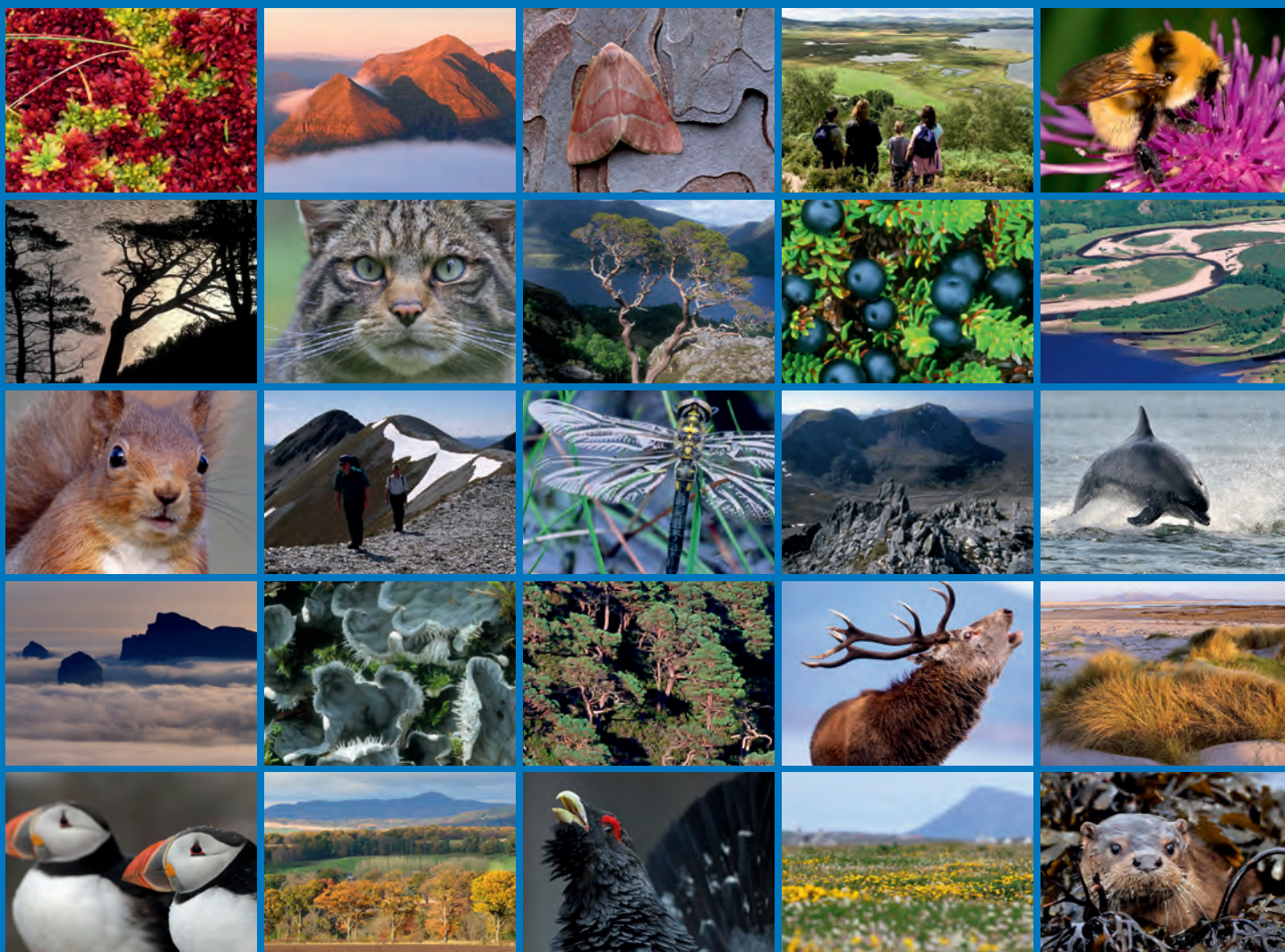


Surveys of harbour and grey seals on the south-east (border to Aberlady Bay) and south-west (Sound of Jura to Solway Firth) coasts of Scotland, in Shetland, in the Moray Firth and in the Firth of Tay in August





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COMMISSIONED REPORT

Commissioned Report No. 929

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south-east (border to Aberlady Bay) and
south-west (Sound of Jura to Solway Firth)
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Moray Firth and in the Firth of Tay in August
2015**

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COMMISSIONED REPORT

Summary

Surveys of harbour and grey seals on the south-east (border to Aberlady Bay) and south-west (Sound of Jura to Solway Firth) coasts of Scotland, in Shetland, in the Moray Firth and in the Firth of Tay in August 2015

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Keywords

Harbour (common) seal; grey seal; East Scotland, West Scotland; Shetland; Moray Firth; Firth of Tay; Special Area of Conservation (SAC).

Background

The Sea Mammal Research Unit (SMRU) aims to complete Scotland-wide August surveys of harbour and grey seals on an approximate five-year cycle. Over the last 15 years, SMRU surveys have documented a continuing decline of more than 75% in counts of harbour seals in Orkney and a continuing decline of over 90% in the Firth of Tay & Eden Estuary. In marked contrast, harbour seal numbers on the west coast of Scotland have increased. Harbour seal numbers in the Western Isles appeared to be declining until a high count in August 2011. In 2015, a large section of the Scottish south-west coast, Shetland, the Moray Firth and the Firth of Tay were surveyed to complete the current round-Scotland survey that started in 2011.

Main findings

- In August 2015, the Sea Mammal Research Unit, University of St Andrews, carried out aerial surveys of moulting harbour seals and of grey seals on part of the south-east coast of Scotland, from the English border to Aberlady Bay, on part of the west coast of Scotland, from the northern end of the Sound of Jura to the Solway Firth, in Shetland, in the Moray Firth and in the Firth of Tay & Eden Estuary.
- Two out of 10 survey days, the 4th and 5th of August, were lost to weather on account of high seas produced by strong winds.
- No harbour seals were counted on the south-east coast of Scotland, between the English border and Aberlady Bay.
- In the southern section of the West Scotland Management Area, a total of **7,645** harbour seals were counted in 2014 and 2015, compared with 5,276 counted in 2007, an increase of 45% over seven years. This is the highest count for West Scotland – South to date.

- The updated total count of harbour seals in West Scotland was **15,184** (2013-2015 data) compared with 9,972 counted in 2007 and 2008 or 8,811 counted in 1996 and 1997. This is the highest count for West Scotland to date.
- In the Southwest Scotland Management Area, **1,200** harbour seals were counted compared with 834 counted in 2007, an increase of 44% over eight years. This is the highest count for Southwest Scotland; the great majority of harbour seals were in the Firth of Clyde.
- In the South-east Islay Skerries harbour seal SAC, **1,087** harbour seals were counted compared with 666 counted in 2009, an increase of 63% over six years. This is the highest harbour seal count for the South-east Islay Skerries SAC.
- In Shetland, **3,369** harbour seals were counted compared with 3,039 counted in 2009, an increase of 11% over six years. This is the first increase in the Shetland harbour seal count since 1993.
- In the Mousa harbour seal SAC, only **23** harbour seals were counted, the lowest number recorded by SMRU. The harbour seal count in the Yell Sound Coast SAC was **205**, which is 22% higher than in 2009 (168) and similar to the count in 2006 (212).
- In the Moray Firth, **705** harbour seals were counted in the area surveyed annually (Helmsdale to Findhorn) in 2015, compared with 693 counted in 2014. These are the two lowest counts for this area, just over 20% lower than the mean count between 2002 and 2013 (909).
- In the Dornoch Firth and Morrich More SAC, **120** harbour seals were counted in 2015 compared with 111 in 2014 and 143 in 2013. This represents only 20% of the mean count between 1992 and 1997 (599).
- In the Firth of Tay and Eden Estuary SAC, **60** harbour seals were counted in August 2015 compared with 29 in 2014. This is still less than 10% of the numbers generally counted in the 1990s and in the early 2000s.
- The most recent estimate of the minimum size of the harbour seal population around Scotland is **25,399**. This is the number of hauled-out harbour seals counted during surveys carried out in 2011 (Western Isles, north Moray Firth), 2013 (East Scotland from Aberlady Bay to Fraserburgh, east Moray Firth, Orkney, North Coast and West Scotland from Cape Wrath to Ullapool), 2014 (West Scotland from Ullapool to Scarba in the Firth of Lorn) and 2015 (part East Scotland from border to Aberlady Bay, Firth of Tay and Eden Estuary, West Scotland from Firth of Lorn to southern tip of the Mull of Kintyre, Southwest Scotland, 'inner' Moray Firth, and Shetland).

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1. INTRODUCTION

SMRU undertakes routine surveys of harbour and grey seals around Scotland and in part of England. These surveys provide the basis of the information the Natural Environment Research Council is obliged to submit to the Scottish Government and to the Department of the Environment, Food and Rural Affairs (Defra) under the Marine (Scotland) Act 2010 and the Conservation of Seals Act 1970 respectively, on the size, distribution and status of UK seal populations. The most recent advice can be found at: http://www.smrु.st-andrews.ac.uk/documents/scos/SCOS_2015.pdf. The surveys also provide information required by Scottish Natural Heritage to satisfy Scottish obligations under the EU's Habitats Directive on reporting the conservation status of seals within Special Areas of Conservation (SACs) and in Scotland.

In the UK, harbour seal population surveys are carried out during their annual moult, in August. In Scotland, the entire coast is surveyed approximately on a five year cycle (Figure 2), although surveys are carried out annually in the Moray Firth and the Firth of Tay & Eden Estuary. Harbour seals in part of the Moray Firth are also surveyed annually during their breeding season, between mid-June and mid-July. Grey seals hauled ashore are also counted during all surveys, providing information on their summer distribution. However, grey seal numbers can be highly variable from day to day during the summer months.

This report summarises the results from August 2015 surveys of harbour and grey seals on the east coast of Scotland (from the border to Aberlady Bay, the Firth of Tay and Eden Estuary) the west coast of Scotland (Firth of Lorn coast, opposite Scarba, to the Solway Firth), the Moray Firth and in Shetland. The surveys were carried out to obtain updated estimates of the numbers of harbour and grey seals in the seven Scottish Seal Management Areas (Figure 1) and completed the current round-Scotland survey that started in 2011.

2. METHODS

The Sea Mammal Research Unit (SMRU) carried out most surveys of harbour seals by helicopter using a thermal imaging camera. In estuarine areas (Moray Firth and Firth of Tay & Eden Estuary) a small fixed-wing aircraft without a thermal imaging camera was used. Oblique high-resolution digital images were taken during all flights, and all surveys followed the standard SMRU survey protocol:

- Surveys were restricted to within two hours either side of low tides occurring between 12:30 and 19:30 (approximately).
- Surveys were restricted to the August harbour seal moult.
- There was no surveying on rainy days.
- High resolution digital photographs were taken of almost all groups of seals on shore.
- During the helicopter surveys, initial counts were made in real time and subsequently confirmed or corrected by reviewing the thermal image footage in conjunction with the high-resolution digital images.

All maps were produced using Manifold System 8.0 Ultimate Edition. The coastlines were drawn using Global Self-consistent, Hierarchical, High-resolution Shoreline data (Wessel & Smith, 1996), available to download from the National Geophysical Data Center website and high-resolution Scotland mean high and low water shape-files based on Ordnance Survey data (Pope, 2011).

3. RESULTS

3.1 Scotland - composite

Figure 2 shows the years in which different segments of the Scottish coast were surveyed most recently, between 2011 and 2015. (Note that a small section of the north Moray Firth coast, from Wick to Duncansby Head, was last surveyed in 2008 when only 1 harbour seal and only 7 grey seals were counted). The distribution of harbour seals in Scotland from these most recent August surveys is shown in Figure 3. Counts have been aggregated by 10km squares in order to show the general August distribution more clearly. The numbers of harbour seals counted in Seal Management Areas in Scotland are given in Table 1. West Scotland is now by far the most important Management Area for harbour seals in Scotland. From the most recent surveys of the Scottish coast, a total of **25,399** harbour seals were counted between 2011 and 2015. This is significantly higher than the previous round-Scotland total of 20,430 (2007-2009), due to increases in western areas of Scotland; but is still lower than the 1996-1997 total of 29,514, following large declines in northern and eastern areas.

Figure 4 similarly shows the summer distribution of grey seals in Scotland. In 2011, there was a very low grey seal count for the Monach Isles, off North Uist, which was likely due to the sunny day and high ambient temperatures. Large numbers of grey seals were observed in the water close to haul-out sites but, because they were not on land, were not included in the count. Since this consistently high count was 'missing' in 2011, data for the Monach Isles from the 2008 survey are used here instead. The numbers of grey seals counted in Seal Management Areas in Scotland are given in Table 2. The numbers of grey seals hauling out can be highly variable in the summer months and caution is advised when interpreting August counts of grey seals. Counts of grey seals are used elsewhere to refine estimates of the size of the grey seal population (Lonergan *et al.*, 2011).

Figure 5 shows the trends in numbers of harbour seals counted in all Seal Management Areas in Scotland since 1996. Five points have been added for 2015: for Southwest Scotland, West Scotland, Shetland, the Moray Firth and East Scotland. Most plotted points are an amalgamation of counts from different years with new points added only in years with significant new data. There is a marked difference in the trajectories of counts in the west of Scotland (general increase) and counts in Orkney and east of Scotland (general decrease).

3.2 Helicopter & thermal imager surveys in 2015

See Figure 6 for coasts surveyed.

- 3 Aug 2015: Farne Islands to Aberlady Bay (part NE England, part East Scotland)
- 6 Aug 2015: Islay, Jura, Oronsay, Colonsay, part West Kintyre (West Scotland)
- 7 Aug 2015: East Kintyre, L Fyne, part of Firth of Clyde, (Southwest & West Scotland)
- 8 Aug 2015: Inner Clyde, Ayrshire and Galloway coast to Luce Bay (Southwest Scotland)
- 9 Aug 2015: Solway Firth coast (Southwest Scotland)
- 10 Aug 2015: The Deeps, south Mainland, Bressay, part east Shetland (Shetland)
- 11 Aug 2015: West Mainland, Foula, East Mainland, Whalsay, Out Skerries (Shetland)
- 12 Aug 2015: Yell Sound, Yell, Unst, Fetlar (Shetland)

3.2.1 East Scotland

The southern part of East Scotland, from the Border to Aberlady Bay was surveyed on 3 August 2015 (Figure 6). No harbour seals were seen on this section of coast in August 2015 but 26 grey seals were counted.

3.2.2 West Scotland - South

Helicopter surveys of the West Scotland - South Seal Management Area were carried out between 6 and 7 August 2015. The sections of the West Scotland coast surveyed on different days are shown in Figure 6. The subregions of West Scotland that were surveyed in August 2015 are shown in Figure 7.

The large West Scotland Management Area is divided into three subdivisions (Figure 1). Counts for the North subdivision were completed in 2013 and in 2014; the Central subdivision was counted in 2014 while the South subdivision was counted in 2014 and 2015 (Figure 2). The distribution of harbour seals in the part of West Scotland - South that was surveyed in August 2015 is shown in Figure 8 with counts in Table 3. Similarly, the distribution of grey seals in West Scotland is shown in Figure 9 with counts in Table 4. The boundaries for these subregions are shown in Figure 7.

Only part of West Scotland - South was surveyed, from Craobh Haven in the Firth of Lorn to the southern tip of the Mull of Kintyre, including Jura, Islay and Colonsay. On this section of coast, **3,818** harbour seals were counted, compared with a total of 2,489 counted in 2007 and 2009, an apparent average annual increase of 6% over seven years. In West Scotland - South, a total of **7,645** harbour seals were counted in 2014 and 2015, compared with 5,930 counted in 2007 and 2009. This is an apparent increase of 29% over seven years.

The total harbour seal count for West Scotland, from surveys in 2013 to 2015, was **15,184**, compared with 10,626 from surveys between 2007 and 2009, an apparent increase of 43% over seven years (Duck & Morris, 2014; 2015).

3.2.3 Southwest Scotland

The entire coast of Southwest Scotland, from the southern tip of the Mull of Kintyre to the head of the Solway Firth, including Arran, was surveyed between 7 and 9 August 2015. A total of **1,200** harbour seals were counted compared with 834 counted in 2007 (Table 5). This was the highest count for the Southwest Scotland Seal Management Area. The great majority of harbour seals were in the Firth of Clyde (97%) with the remainder in Dumfries and Galloway (Table 5). The distribution of grey seals in Southwest Scotland is shown in Figure 9 with counts in Table 6.

3.2.4 Shetland

Shetland, including Foula but excluding Fair Isle, was surveyed between 10 and 12 August 2015. Shetland sub-regions are shown in Figure 10 with the 2015 distribution of harbour seals in Figure 11. A total of **3,369** harbour seals were counted compared with 3,039 in 2009 (Table 7). This is an increase of 12% over six years and is equivalent to an average annual increase of 1.7%. The 2015 Shetland harbour seal count is of particular interest as it shows the first increase since 1993 (Table 7), following a period of consistent decline (Lonergan *et al.*, 2007). Harbour seal numbers on Mousa, South-east Mainland and on Out Skerries were the lowest since 1991; numbers in The Deeps were the highest (Table 7). The distribution of grey seals in Shetland is shown in Figure 12 with counts in Table 8.

3.3 Annual fixed-wing surveys

3.3.1 Moray Firth

Figure 13 shows harbour and grey seal distribution around the Moray Firth, between Findhorn and Helmsdale, on 20 August 2015. The numbers of harbour seals counted in the Moray Firth from 1992 to 2015, including totals from different sections of the coast between Findhorn and Helmsdale, are in Table 9 and are shown as histograms in Figure 14. While

the count of harbour seals in the Cromarty Firth (**22**) was the lowest recorded by SMRU, the count for Culbin and Findhorn was the highest recorded (**330**). Detailed counts of grey seals in the Moray Firth are in Table 10 and their distribution in Figure 15.

3.3.2 Firth of Tay and Eden Estuary

In East Scotland, the Firth of Tay & Eden Estuary SAC was surveyed on 19 August 2015. Figure 16 shows the distribution of harbour and grey seals in the Firth of Tay & Eden Estuary. Only **60** harbour seals were counted in August 2015, approximately 9% of the mean count between 1990 and 2002 (641). Figure 17 & Figure 18 show the contributions to the harbour and grey seal counts from different areas of the SAC. Counts of harbour seals from these areas are in Table 11 with counts of grey seals in Table 12.

3.4 Harbour seal SACs

Counts of harbour seals within most Scottish SACs have changed considerably since they were first identified in the early 1990s (Figure 22, Table 13). All of the nine harbour seal SACs in Scotland have been surveyed since 2011.

Compared with SACs in other Management Areas, the three SACs in West Scotland show the least dramatic variation in counts since 1996 (Figure 22). At the Ascrib, Isay and Dunvegan SAC and at the Lismore SAC (SMRU aerial survey data only), there have been gradual declines interspersed with occasional increases. In the South-east Islay harbour seal SAC, **1,087** harbour seals were counted (Figure 19; Table 13) in 2015 compared with 666 counted in 2009, an increase of 63% over six years. This is the highest harbour seal count for the South-east Islay Skerries SAC (Table 13).

The remaining six SACs in the Western Isles, Shetland, Orkney and the North Coast, the Moray Firth, and in East Scotland all show consistent declines with the most severe on Sanday (Orkney), in the Firth of Tay & Eden Estuary, and on Mousa (Shetland). The decline in the Sanday SAC count was from 1,458 in 1997 to 93 in 2013 (93.7%) over 16 years, equivalent to an average annual decline of almost 16%. The Firth of Tay & Eden Estuary SAC count declined from a mean of 641 between 1990 and 2002 to **60** in 2015 (a 90% drop), an average annual decline of approximately 17% over 13 years. On Mousa, only **23** harbour seals were counted in 2015 (Figure 20), the lowest number recorded by SMRU. This new count is 83% lower than the highest count recorded in 1997 (402). The number of harbour seals in the Yell Sound SAC (Figure 21; Table 13) was similar to the number counted in 2006 and was 22% higher than the number counted in 2009.

Note: 'Lismore' is an abbreviation of this SAC's full name, Eileanan agus Sgeirean Lios Mòr.

3.5 Surveys planned for 2016

In August 2016, SMRU proposes to survey Orkney & North Coast and Western Isles.

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ANNEX 1: TABLES

Table 1. August counts of harbour seals in Scottish Seal Management Areas. SMAs are lightly shaded. Totals are also given for subdivisions of some of the SMAs. In 1996 and 1997, harbour seals were fairly evenly spread between Shetland, Orkney and West Scotland. Since then, West Scotland has supported an increasing proportion of the Scottish population while the proportion in Shetland and Orkney has declined. Data from aerial surveys carried out by the Sea Mammal Research Unit.

Seal Management Area	Harbour seal counts		
	2011-2015	2007-2009	1996-1997
1 Southwest Scotland	1,200 (2015)	923 (2007; 2009)	929 (1996)
2 West Scotland ^a	15,184 (2013-2015)	10,626 (2007-2009)	8,811 (1996-1997)
2a West Scotland - South	7,645 (2014-2015)	5,930 (2007; 2009)	5,651 (1996)
2b West Scotland - Central	6,424 (2014)	4,004 (2007; 2008)	2,700 (1996)
2c West Scotland - North	1,115 (2013; 2014)	692 (2008)	460 (1996-1997)
3 Western Isles	2,739 (2011)	1,804 (2008)	2,820 (1996)
4 North Coast & Orkney	1,938 (2013)	2,979 (2008-2009)	8,787 (1997)
4a North Coast	73 (2013)	112 (2008)	265 (1997)
4b Orkney	1,865 (2013)	2,867 (2008-2009)	8,522 (1997)
5 Shetland	3,369 (2015)	3,039 (2009)	5,994 (1997)
6 Moray Firth	745 (2008; 2011; 2013; 2015)	776 (2007-2009)	1,409 (1997)
6.1 Duncansby Head to Helmsdale	1 (2008; 2011)	1 (2008)	1 (1997)
6.2 Helmsdale to Findhorn	705 (2015)	775 (2009)	1,407 (1997)
6.3 Burghead to Fraserburgh	39 (2013)	0 (2007)	1 (1997)
7 East Scotland	224 (2013; 2015)	283 (2007; 2010)	764 (1997)
7.1 Fraserburgh to Carnoustie	18 (2013)	24 (2007)	15 (1997)
7.2 Tay & Eden SAC	60 (2015)	111 (2009)	633 (1997)
7.3 St Andrews to border	146 (2013; 2015)	148 (2007)	116 (1997)
SCOTLAND TOTAL	25,399 (2011; 2013-2015)	20,430 (2007-2009)	29,514 (1996-1997)

SOURCES - Most counts were obtained from aerial surveys conducted by SMRU and were funded by Scottish Natural Heritage (SNH) and the Natural Environment Research Council (NERC). Exceptions are:

^a Parts of the West Scotland survey in 2009 funded by Scottish Power and Marine Scotland.

Table 2. August counts of grey seals in Scottish Seal Management Areas. SMAs are lightly shaded. Totals are also given for subdivisions of some of the SMAs. Unlike harbour seals (Table 1), the relative proportion of grey seals within each area of Scotland has remained fairly constant over these three intervals. Data from aerial surveys carried out by the Sea Mammal Research Unit.

Seal Management Area	Grey seal counts		
	2011-2015	2007-2009	1996-1997
1 Southwest Scotland	374 (2015)	233 (2007; 2009)	75 (1996)
2 West Scotland ^a	5,064 (2013-2015)	2,515 (2007-2009)	3,435 (1996-1997)
2a West Scotland - South	3,618 (2014-2015)	1,777 (2007; 2009)	2,125 (1996)
2b West Scotland - Central	1,056 (2014)	561 (2007; 2008)	931 (1996)
2c West Scotland - North	390 (2013; 2014)	177 (2008)	379 (1996-1997)
3 Western Isles [*]	4,038 (2011)	3,808 (2008)	4,062 (1996)
4 North Coast & Orkney	8,106 (2013)	8,525 (2008-2009)	9,427 (1997)
4a North Coast	266 (2013)	504 (2008)	597 (1997)
4b Orkney	7,840 (2013)	8,021 (2008-2009)	8,830 (1997)
5 Shetland	1,558 (2015)	1,536 (2009)	1,724 (1997)
6 Moray Firth	1,917 (2008; 2011; 2013; 2015)	1,113 (2007-2009)	551 (1997)
6.1 Duncansby Head to Helmsdale	15 (2008; 2011)	9 (2008)	0 (1997)
6.2 Helmsdale to Findhorn	1,644 (2015)	1,043 (2009)	486 (1997)
6.3 Burghead to Fraserburgh	258 (2013)	61 (2007)	65 (1997)
7 East Scotland	2,296 (2013; 2015)	1,238 (2007; 2010)	2,328 (1997)
7.1 Fraserburgh to Carnoustie	991 (2013)	400 (2007)	145 (1997)
7.2 Tay & Eden SAC	836 (2015)	450 (2009)	1,891 (1997)
7.3 St Andrews to border	469 (2013; 2015)	388 (2007)	292 (1997)
SCOTLAND TOTAL	23,353 (2011; 2013-2015)	18,968 (2007-2009)	21,602 (1996-1997)

SOURCES - Most counts were obtained from aerial surveys conducted by SMRU and were funded by Scottish Natural Heritage (SNH) and the Natural Environment Research Council (NERC). Exceptions are:

^a Parts of the West Scotland survey in 2009 funded by Scottish Power and Marine Scotland.

^{*} During the 2011 survey, warm weather probably kept hundreds of grey seals from hauling out at the Monach Isles. Therefore the 2011 count for the Monach Isles has been replaced with the 2008 count.

Table 3. August counts of harbour seals in the West Scotland Seal Management Area. Red = lowest count for a given area, green = highest count. The light grey boxes indicate which counts were used to calculate the totals in the dark grey boxes. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions & SMA subdivisions	1988	1989	1990	1991	1996	1997	2000	2004	2005	2007	2008	2009	2013	2014	2015
1 Kinlochbervie				33		69			22		7		18		
2 Eddrachillis Bay				207		252			257		277		355		
3 Enard Bay				6		13			30		38		56		
4 Summer Isles				80		120			347		327		666		
5 Little Loch Broom	1				0				10		4			0	
6 Gruinard Bay	3				5				15		6			0	
7 Loch Ewe	7				1				28		33			20	
West Scotland - North TOTAL		337			460				709		692		1,115		
1 Gairloch	2				7				0	1				5	
2 Torridon	18				3		36		20	53				188	
3 Applecross	48				45		134		86	86				323	
4 Plockton	282	158			277		271		279	335				549	
5 Raasay	3				38		155		90	151				294	
6 Rona	21				101		163	194	173	257				582	
7 Skye	1,233	1,269			1,728		2,220		1,899	1,757				2,411	
8 Kyle	43	15			9				31	23				78	
9 Sound of Sleat	43	53			76				60	83				100	
10 Loch Nevis	30	68			75		26		79	31				26	
11 Arisaig	456	499			213		597		650	692				1,006	
12 Ardnamurchan North	33				13		118		153	148				258	
13 Rum			10		2				0		0			24	
14 Eigg			29		36				77		66			92	
15 Muck			25		58				140		94			107	
16 Canna			41		19				219		227			381	
West Scotland - Central TOTAL		2,292			2,700		3,927		3,956	4,004				6,424	
1 Ardnamurchan South	85				139		325		112	165				284	
2 Sound of Mull	23				36		77		62	80				119	
3 Loch Linnhe	110				135		150		125	74				126	
4 Coll			367		947		987			690				1,223	
5 Tiree			124		338		357			231				244	
6 Mull	* 607	940	1,008	883	1,059		1,616			989		1,596		1,332	
7 Treshnish Isles	29				41		31			14				0	
8 Lismore	535	398	491	405	611		457			326		498		392	
9 Loch Creran	36				66		67			55				50	
10 Loch Etive			35		26		31			27				41	
11 Firth of Lorn	†		461		431		527			380					418
12 Colonsay			109		83		102			59		87		64	
13 Oronsay			24		0		75			2		0		1	
14 Jura			375		122		548			539		601		887	
15 Islay			724		605		1,108			1,001		792		1,365	
16 West Coast Kintyre	‡		1,153		1,012		832			644		629		1,083	
17 Dubh Artach & Skerryvore														16	
West Scotland - South TOTAL		5,154			5,651		7,290			5,276				7,645	
	1988-1991			1996-1997			1996-2000	2000-2005	2005-2007	2007-2008			2013-2015		
West Scotland TOTAL	7,783			8,811			11,802	11,702	9,921	9,972			15,184		

* Torran Rocks were not surveyed in 2009. The 2009 total shown includes 81 harbour seals counted there in 2007.

† Firth of Lorn subregion mainly surveyed in 2014 and finished in 2015.

‡ West Coast Kintyre not completed in 2000. The 2000 total shown includes 51 harbour seals counted there in 1996.

Table 4. August counts of grey seals in the West Scotland Seal Management Area. Red = lowest count for a given area, green = highest count. The light grey boxes indicate which counts were used to calculate the totals in the dark grey boxes. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions & SMA subdivisions	1988	1989	1990	1991	1996	1997	2000	2004	2005	2007	2008	2009	2013	2014	2015
1 Kinlochbervie				157		136			40		45		29		
2 Eddrachillis Bay				3		122			116		54		166		
3 Enard Bay				9		82			7		7		9		
4 Summer Isles				21		24			73		54		144		
5 Little Loch Broom	0				0				14		12			8	
6 Gruinard Bay	0				0				0		2			12	
7 Loch Ewe	0				15				1		3			22	
West Scotland - North TOTAL	190					379			251		177		390		
1 Gairloch	0				0				0	3				4	
2 Torridon	0				0		0		5	0				28	
3 Applecross	11				0		3		1	2				23	
4 Plockton	0	0			0		1		0	0				1	
5 Raasay	0				0		1		6	5				14	
6 Rona	5				0		4	4	4	3				41	
7 Skye	130	46			378		328		156	203				270	
8 Kyle	0	0			0				0	0				0	
9 Sound of Sleat	0	6			2				2	0				2	
10 Loch Nevis	0	0			0		16		3	1				2	
11 Arisaig	0	20			0		5		9	4				5	
12 Ardnamurchan North	0				0		0		1	0				4	
13 Rum			57		84				22		66			72	
14 Eigg			31		9				26		66			21	
15 Muck			17		22				13		18			73	
16 Canna			151		436				113		190			496	
West Scotland - Central TOTAL	344				931		911		361	561				1,056	
1 Ardnamurchan South	0				0		9		1	0				3	
2 Sound of Mull	0				0		1		0	0				0	
3 Loch Linnhe	0				0		0		0	0				0	
4 Coll			167		243		274			98				562	
5 Tiree			337		910		450			330				674	
6 Mull	* 52	47	35	32	63		86			100		89		125	
7 Treshnish Isles	56				170		65			73				85	
8 Lismore	0	3	0	0	0		25			3		10		20	
9 Loch Creran	0				0		0			0				0	
10 Loch Etive			0		0		0			0				0	
11 Firth of Lorn	†		10		0		4			10				21	
12 Colonsay			17		35		57			21		63		118	
13 Oronsay			303		230		342			395		392		981	
14 Jura			26		27		19			59		39		75	
15 Islay			162		441		415			551		657		787	
16 West Coast Kintyre	‡		17		6		27			21		13		111	
17 Dubh Artach & Skerryvore														56	
West Scotland - South TOTAL	1,130				2,125		1,774			1,661				3,618	
	1988-1991			1996-1997			1996-2000	2000-2005	2005-2007	2007-2008			2013-2015		
West Scotland TOTAL	1,664			3,435			3,000	2,377	2,274	2,399			5,064		

* Torran Rocks were not surveyed in 2009. The 2009 total shown includes 34 grey seals counted there in 2007.

† Firth of Lorn subregion mainly surveyed in 2014 and finished in 2015.

‡ West Coast Kintyre not completed in 2000. The 2000 total shown includes 3 grey seals counted there in 1996.

Table 5. August counts of harbour seals in subregions of the Southwest Scotland Seal Management Area. The highest completed counts for each subregion are in green and the lowest counts in red. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions		1989	1992	1996	2005	2007	2015
1	Clyde Estuary	381		923	581	811	1,167
2	Dumfries & Galloway		8	6	42	23	33
Southwest Scotland TOTALS				929	623	834	1,200

Table 6. August counts of grey seals in subregions of the Southwest Scotland Seal Management Area. The highest completed counts for each subregion are in green and the lowest counts in red. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions		1989	1992	1996	2005	2007	2015
1	Clyde Estuary	117		0	132	272	304
2	Dumfries & Galloway		4	75	74	102	70
Southwest Scotland TOTALS				75	206	374	374

Table 7. August counts of harbour seals in subregions of the Shetland Seal Management Area. The highest completed counts for each subregion are in green and the lowest counts in red. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions		1991	1993	1997	2001	2006	2009	2015
1	SW Mainland	339	385	359	264	141	116	210
2	The Deeps	125	273	258	202	308	227	358
3	W Mainland	130	185	148	137	99	88	93
4	Foula	0	3	3	3	36	36	18
5	St Magnus Bay	343	660	627	856	424	550	682
6	NW Mainland	119	65	58	140	54	39	66
7	Yell Sound	861	929	1,506	992	642	572	638
8	Yell	352	353	247	239	183	168	314
9	Unst	346	288	338	140	49	72	51
10	Fetlar	354	568	297	126	53	76	80
11	Out Skerries	280	326	140	229	16	29	10
11	Whalsay	416	512	397	313	98	243	181
12	E Mainland	286	335	281	170	192	176	321
13	Bressay	116	83	159	59	45	29	40
14	SE Mainland	342	807	774	781	615	525	284
15	Mousa	388	455	402	235	83	93	23
16	Fair Isle	†						
Shetland TOTALS		4,797	6,227	5,994	4,886	3,038	3,003	3,369

* Foula not surveyed in 1997, 2001 and 2009. Count from the most recent survey used.

† Fair Isle not surveyed.

Table 8. August counts of grey seals in subregions of the Shetland Seal Management Area. The highest completed counts for each subregion are in green and the lowest counts in red. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions		1991	1993	1997	2001	2006	2009	2015
1	SW Mainland	32	621	646	701	42	422	141
2	The Deeps	19	8	5	0	0	29	48
3	W Mainland	0	55	21	2	59	13	23
4	Foula	37	38	38	38	178	178	49
5	St Magnus Bay	49	316	106	203	486	237	277
6	NW Mainland	56	99	53	36	46	7	11
7	Yell Sound	5	7	46	8	28	94	127
8	Yell	7	15	56	15	50	39	94
9	Unst	43	85	105	23	9	23	61
10	Fetlar	102	14	33	6	16	95	99
11	Out Skerries	10	0	340	142	18	109	124
11	Whalsay	0	0	96	102	107	31	296
12	E Mainland	0	0	64	3	111	64	99
13	Bressay	1	0	45	8	56	110	39
14	SE Mainland	16	9	38	15	119	19	26
15	Mousa	0	23	32	14	46	66	44
16	Fair Isle	†						
Shetland TOTALS		377	1,290	1,724	1,316	1,371	1,358	1,558

* Foula not surveyed in 1997, 2001 and 2009. Count from the most recent survey used.

† Fair Isle not surveyed.

Table 9. August counts of harbour seals in the Moray Firth Seal Management Area. Mean values are given for areas surveyed more than once in a single season (2004-2008); red = lowest (mean) count for given area, green = highest (mean) count. A histogram of these data is given in Figure 14 and a distribution map for 2015 data is shown in Figure 13. Data are from aerial surveys by the Sea Mammal Research Unit.

Area	1992	1993	1994	1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Survey method	fw	fw	fw	ti	fw	fw & ti	fw	2fw	2fw & 1ti	fw & ti	fw & ti	fw & ti	fw	fw	ti	fw	fw	fw	fw
Duncansby Head to Helmsdale		2		1					1			1							
Helmsdale to Brora		92		193		188			113	150	54	73	19	101	87	102	70	1	21
Loch Fleet		16		27	33	59	56	64	71	80	83	82	65	114	113	133	135	156	144
Dornoch Firth (SAC)	662		542	593	405	220	290	231	191	257	144	145	166	219	208	157	143	111	120
Cromarty Firth	41		95	95	38	42	113	88	106	106	102	90	90	140	101	144	63	100	22
Beaully Firth (incl. Milton & Munlo	220		203	219	204	66	151	178	127	176	146	150	85	140	57	60	30	37	34
Ardersier (incl. Eathie)			221	234	191	110	205	202	210	197	154	145	277	362	195	183	199	28	34
Culbin & Findhorn			58	46	111	144	167	49	93	58	79	92	73	123	163	254	218	260	330
Burghhead to Fraserburgh			0	1					3		0				29		39		
Dornoch Firth to Ardersier			1,061	1,141	838	438	759	699	634	736	546	530	618	861	561	544	435	276	210
Loch Fleet to Ardersier				1,168	871	497	815	763	705	816	629	612	683	975	674	677	570	432	354
Loch Fleet to Findhorn				1,214	982	641	982	812	798	874	708	704	756	1,098	837	931	788	692	684
Helmsdale to Findhorn				1,407		829			911	1,024	762	777	775	1,199	924	1,033	858	693	705
Moray Firth SMA	*			1,409		831			915	1,028	763	778	776	1,200	954	1,063	898	733	745

* For years where only the main area was surveyed (i.e. Helmsdale to Findhorn), the most recent counts for the outlying areas are used to give a total for the Moray Firth Seal Management Area.
fw, fixed-wing survey; ti, thermal imager helicopter survey; SMA, Seal Management Area.

Table 10. August counts of grey seals in the Moray Firth Seal Management Area. Mean values are given for areas surveyed more than once in a single season (2004-2008); red = lowest (mean) count for given area, green = highest (mean) count. A histogram of these data is given in Figure 15 and a distribution map for 2015 data is shown in Figure 13. Data are from aerial surveys by the Sea Mammal Research Unit.

Area		1992	1993	1994	1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Survey method		fw	fw	fw	ti	fw	fw & ti	fw	2fw	2fw & 1ti	fw & ti	fw & ti	fw & ti	fw	fw	ti	fw	fw	fw	fw	
(MEAN) COUNTS	Duncansby Head to Helmsdale *		33		0					59			9			15					
	Helmsdale to Brora				3		6			111	102	52	449	72	635	156	316	81	27	161	
	Loch Fleet		0		0	0	0	0	0	0	1	3	1	0	7	7	20	18	7	10	
	Dornoch Firth (SAC)	233		903	456	121	321	79	473	431	748	516	523	819	717	679	74	604	127	716	
	Cromarty Firth	9		0	0	0	0	0	0	0	1	0	0	0	1	2	1	3	1	0	
	Beaully Firth (incl. Milton & Munlc	8		2	3	8	0	0	0	0	3	4	0	0	2	3	1	5	2	0	
	Ardersier (incl. Eathie)			36	24	85	0	3	44	55	142	74	142	94	297	74	24	109	2	14	
	Culbin & Findhorn			0	0	0	0	10	0	11	11	28	75	58	58	179	121	218	93	743	
	Burghead to Fraserburgh			30	65					205		61				18		258			
<hr/>																					
TOTALS	Dornoch Firth to Ardersier			941	483	214	321	82	517	486	894	594	665	913	1,017	758	100	721	132	730	
	<hr/>																				
	Loch Fleet to Ardersier				483	214	321	82	517	486	895	597	666	913	1,024	765	120	739	139	740	
	<hr/>																				
	Loch Fleet to Findhorn				483	214	321	92	517	497	906	625	741	971	1,082	944	241	957	232	1,483	
	<hr/>																				
Helmsdale to Findhorn				486		327				608	1,008	677	1,190	1,043	1,717	1,100	557	1,038	259	1,644	
<hr/>																					
Moray Firth SMA	†				551		392			872	1,272	797	1,260	1,113	1,787	1,133	590	1,311	532	1,917	

* In 2011, Duncansby Head to Wick was not surveyed. Therefore the 15 grey seals given for the northern most area in 2011 include 7 counted in 2008.

† For years where only the main area was surveyed (i.e. Helmsdale to Findhorn), the most recent counts for the outlying areas are used to give a total for the Moray Firth Seal Management Area.

fw, fixed-wing survey; ti, thermal imager helicopter survey; SMA, Seal Management Area.

Table 11. Counts of harbour seals in the Firth of Tay & Eden Estuary SAC. Mean values are given for areas surveyed more than once in a single season; red = lowest (mean) count for given area, green = highest (mean) count. A histogram of these data is given in Figure 17 and a distribution map for 2015 data is shown in Figure 16. Data are from aerial surveys by the Sea Mammal Research Unit.

Area	1990	1991	1992	1994	1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Survey method	1fw	1fw	1fw	1fw	1ti	1fw	1fw	1fw	1fw	2fw,1ti	1fw	1fw,1ti	2fw	1fw	1fw	1fw	1fw	1ti	1fw	1fw
(MEAN) COUNTS																				
Upper Tay	27	73	148	89	113	115	51	83	134	91	91	63	49	45	41	16	40	36	21	51
Broughty Ferry	77	83	97	64	35	52	0	90	55	51	31	27	13	28	15	18	16	3	0	2
Buddon Ness	13	86	72	53	0	113	109	142	66	25	96	64	27	8	23	11	8	10	1	3
Abertay & Tentsmuir	319	428	456	289	262	153	167	53	126	63	34	31	50	8	9	0	5	0	0	0
Eden Estuary	31	0	0	80	223	267	341	93	78	105	90	90	83	22	36	32	19	1	7	4
SAC total	467	670	773	575	633	700	668	461	459	335	342	275	222	111	124	77	88	50	29	60

fw, fixed-wing survey; ti, thermal imager helicopter survey; SAC, Special Area of Conservation

Table 12. Counts of grey seals in the Firth of Tay & Eden Estuary SAC. Mean values are given for areas surveyed more than once in a single season; red = lowest (mean) count for given area, green = highest (mean) count. A histogram of these data is given in Figure 18 and a distribution map for 2015 data is shown in Figure 16. Data are from aerial surveys by the Sea Mammal Research Unit.

Area	1990	1991	1992	1994	1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Survey method	1fw	1fw	1fw	1fw	1ti	1fw	1fw	1fw	1fw	2fw,1ti	1fw	1fw,1ti	2fw	1fw	1fw	1fw	1fw	1ti	1fw	1fw
(MEAN) COUNTS																				
Upper Tay	0	0	18	20	61	64	78	50		42	22	27	41	55	98	16	39	127	62	115
Broughty Ferry	0	3	0	9	0	0	0	16		0	8	1	4	0	0	2	3	0	2	0
Buddon Ness	0	0	1	104	0	101	0	33		11	25	85	4	0	12	22	13	18	0	2
Abertay & Tentsmuir	912	1,546	1,191	1,335	1,820	2,088	1,490	1,560		763	1,267	1,375	442	395	1,406	1,265	1,111	323	531	687
Eden Estuary	0	0	16	0	10	0	25	4		27	57	31	17	0	39	17	36	14	39	32
SAC total	912	1,549	1,226	1,468	1,891	2,253	1,593	1,663		843	1,379	1,519	508	450	1,555	1,322	1,202	482	634	836

fw, fixed-wing survey; ti, thermal imager helicopter survey; SAC, Special Area of Conservation

Table 13. August counts of harbour seals in Special Areas of Conservation (SACs) designated for the protection of harbour seals. Red = lowest count for a given area, green = highest count. Data are from aerial surveys by the Sea Mammal Research Unit. Information on the criteria for selecting SACs and on the grading system can be found in Pinn (2009).

Harbour seal SAC	Grade	1996	1997	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
South-east Islay Skerries	B	552		812							741		666						1,087
Lismore/ Eileanan agus Sgeiran Lios mór	B	603		453							325		498					380	
Ascrib, Isay & Dunvegan	B	656		968				664	678		719							434	
Sound of Barra	C	576		276		249	201			179		92			116				
Sanday	B		1,458		1,148					478	425	260	308	107		180	92		
Mousa	B		402		235					83			93						23
Yell Sound Coast	B		501		351					212			168						205
Dornoch Firth & Morrich More	B		593	405		220	290	231	191	257	144	145	166	219	208	157	143	111	120
Firth of Tay & Eden Estuary	B		633	700		668	461	459	335	342	275	222	111	124	77	88	50	29	60

ANNEX 2: FIGURES

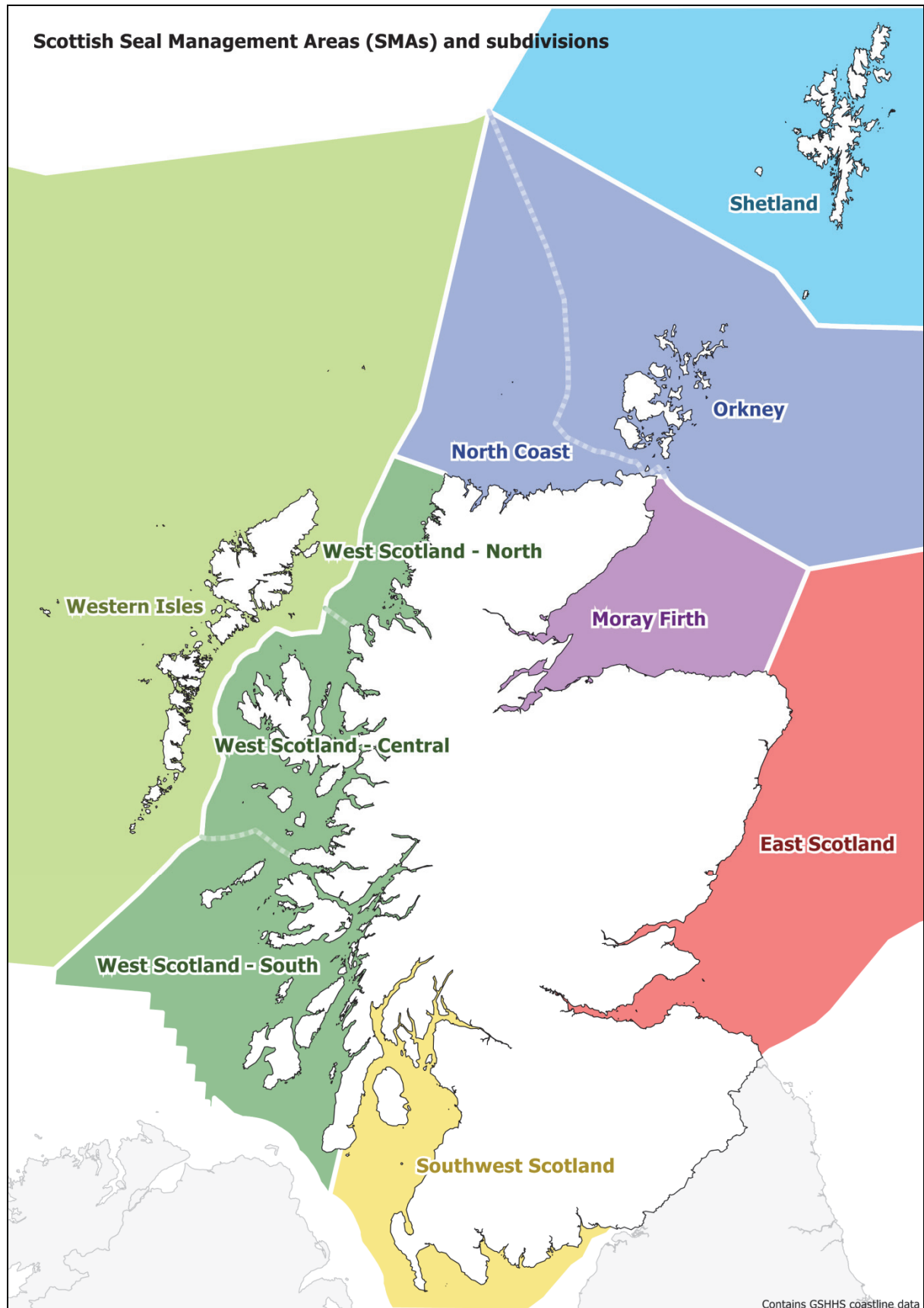


Figure 1. Scottish Seal Management Areas and subdivisions (dotted lines).

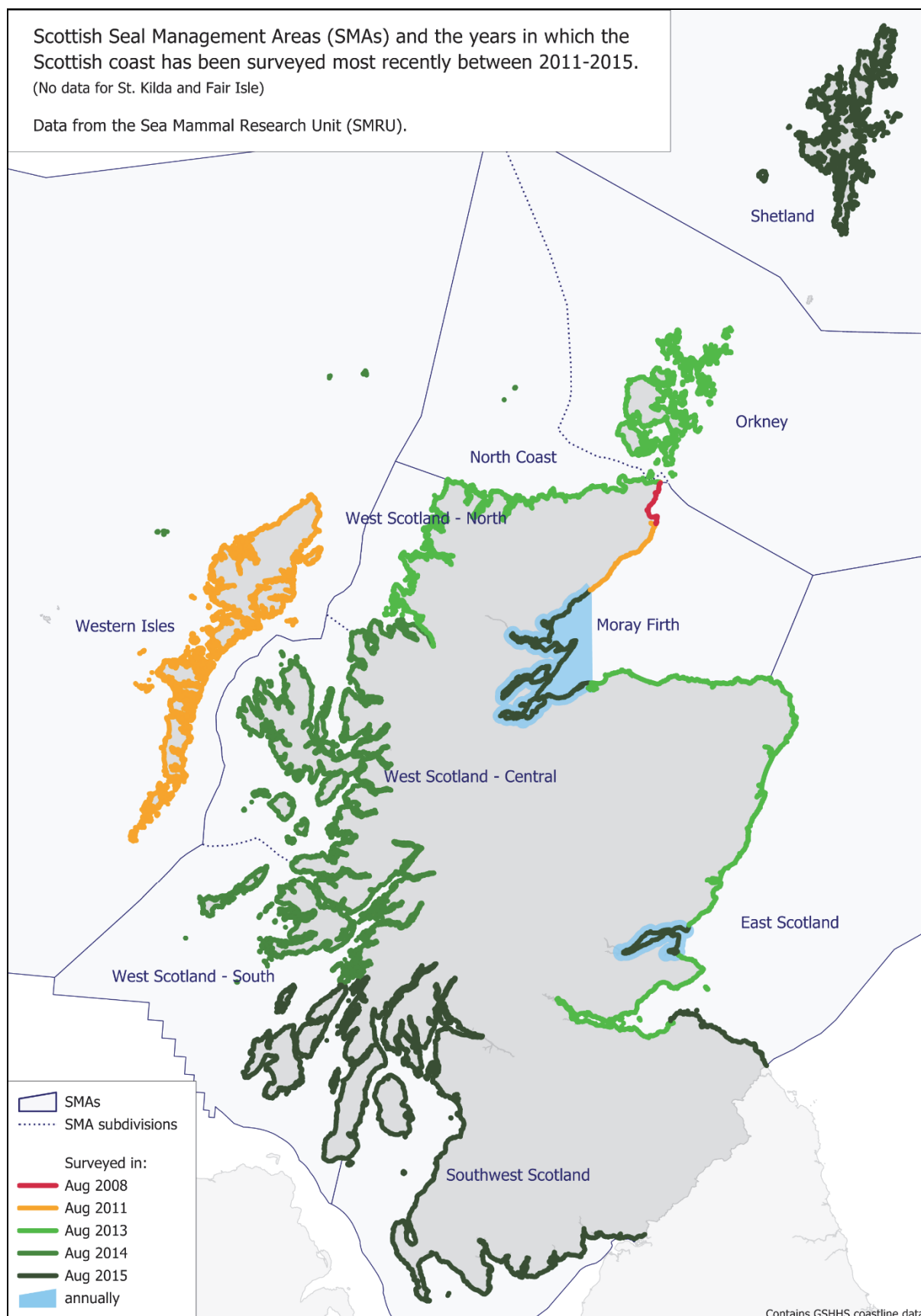


Figure 2. Map showing the years in which different parts of Scotland were most recently surveyed for harbour seals. Most areas were surveyed between 2011 and 2015. The Firth of Tay and part of the Moray Firth are surveyed every year by fixed-wing aircraft. All other areas were surveyed by helicopter using a thermal imager.

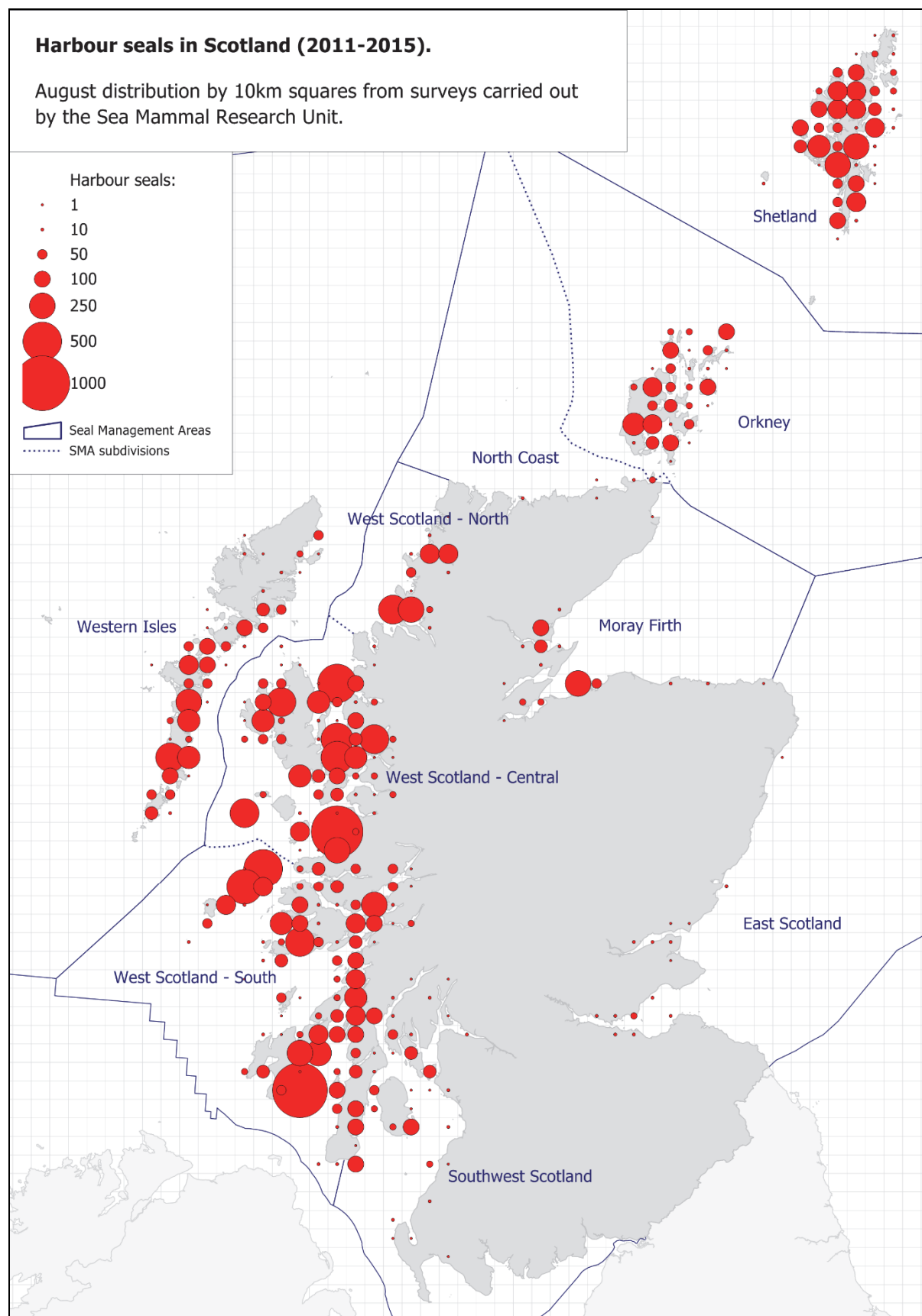


Figure 3. The number and summer distribution of harbour seals at haul-out sites in Scotland by 10km squares. Seal Management Areas (SMAs) and subdivisions (dotted lines) are outlined.

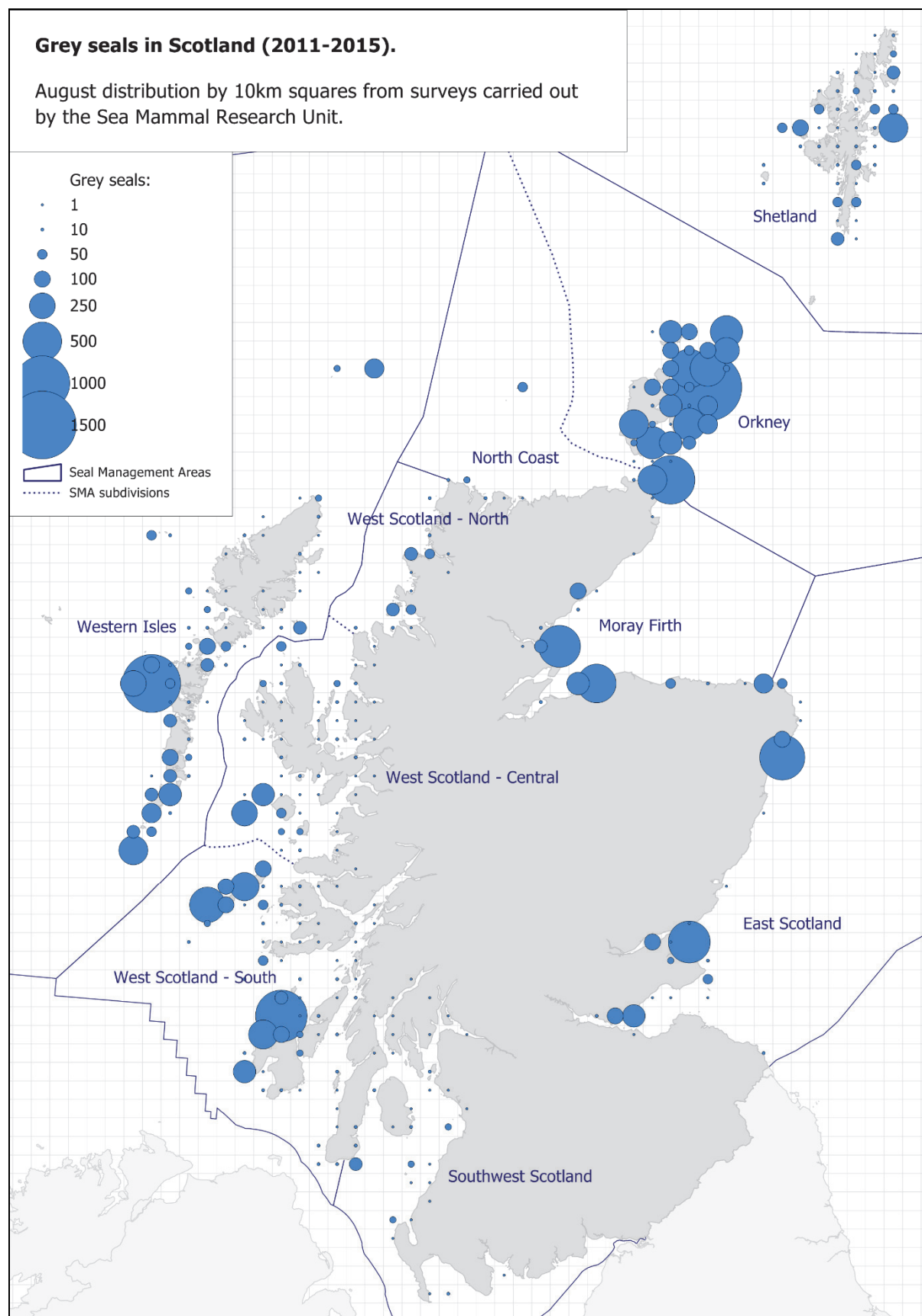


Figure 4. The number and summer distribution of grey seals at haul-out sites in Scotland by 10km squares. Seal Management Areas (SMAs) and subdivisions (dotted lines) are outlined.

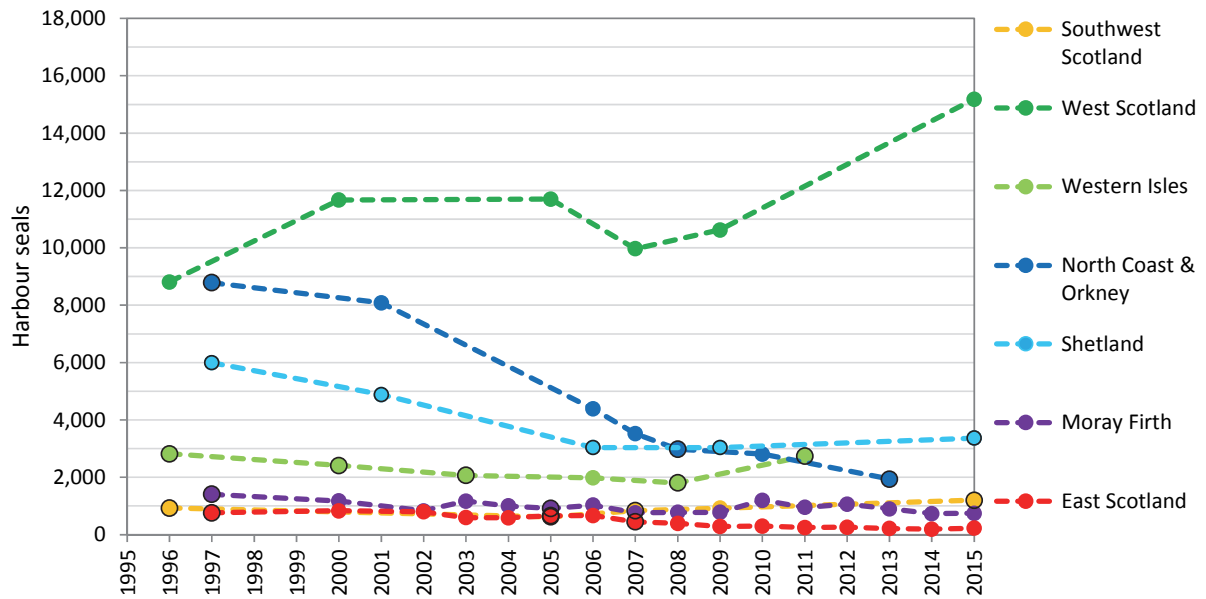


Figure 5. A comparison of August counts of hauled-out harbour seals in Scottish Seal Management Areas from 1996 to 2015. All surveys were carried out by the Sea Mammal Research Unit. Since 2006, thermal image counts have been verified using digital still images where possible. Note that because these data points represent counts of harbour seals distributed over large areas, individual data points may not be from surveys from only one year. Points are only shown for years in which a significant part of the SMA was surveyed. Points with a black outline are counts obtained in a single year.

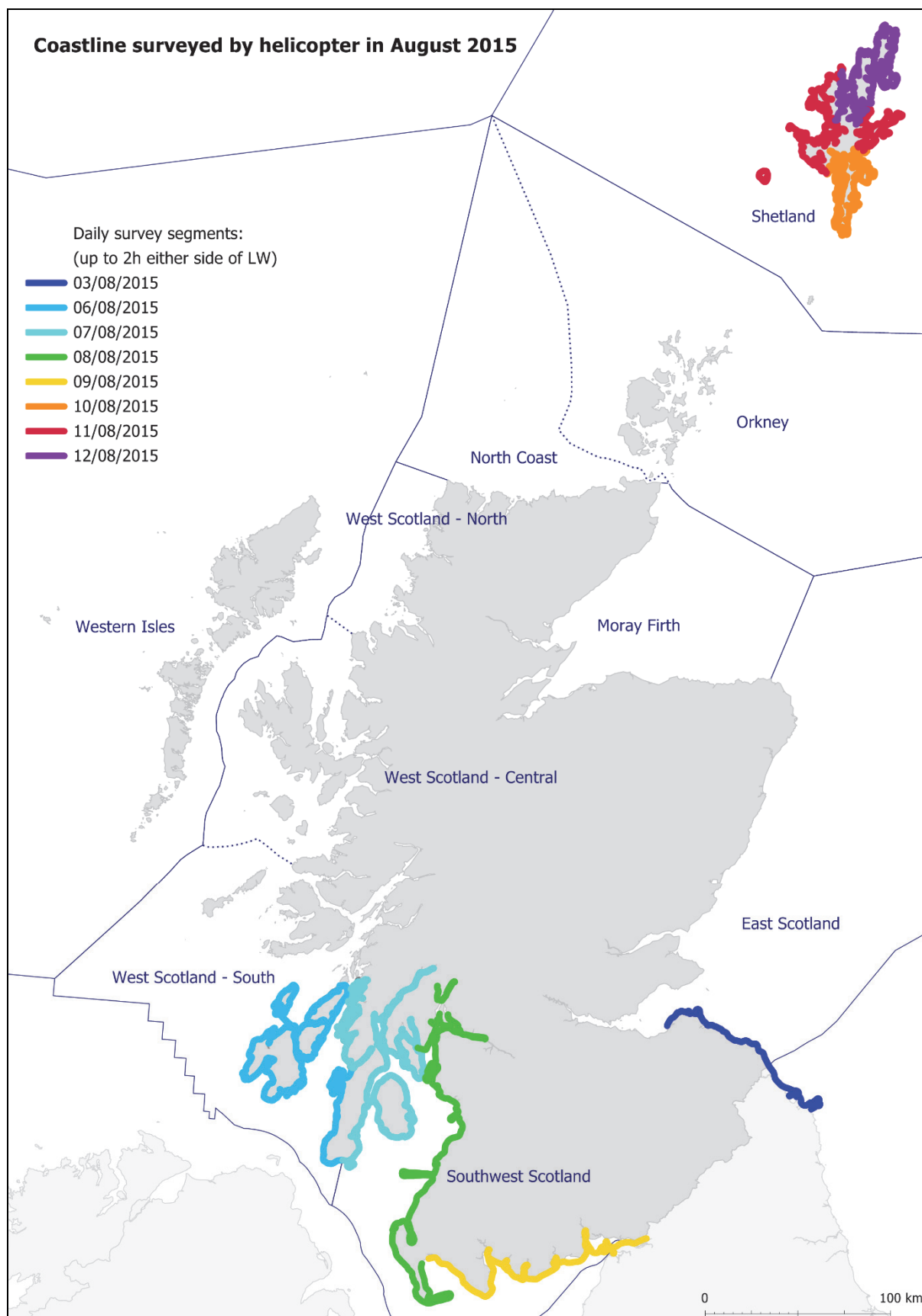


Figure 6. Sections of coastline covered each day during the August 2015 survey.

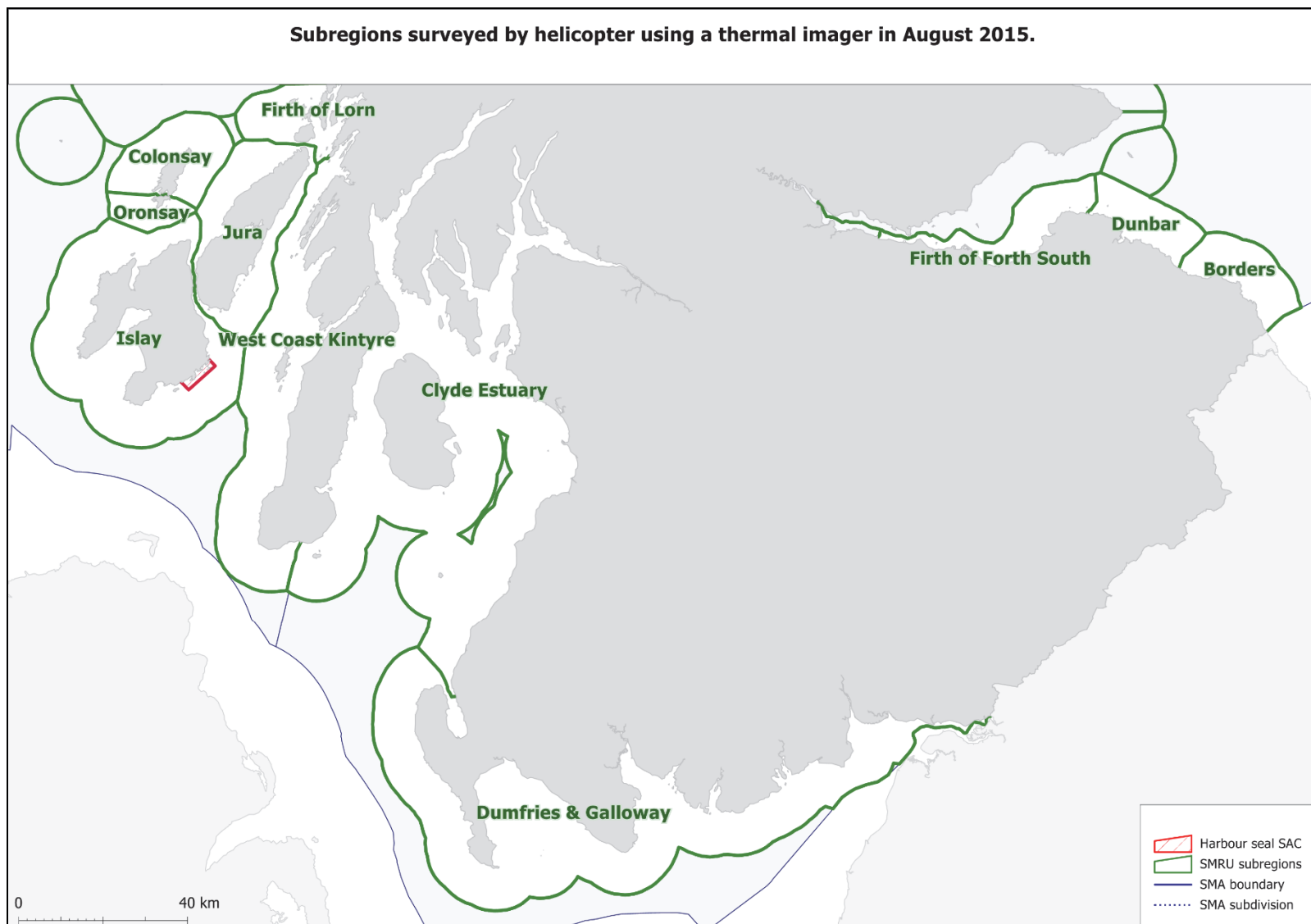


Figure 7. The subregions in West Scotland - South, Southwest Scotland and East Scotland that were (at least partly) surveyed in August 2015. Harbour seal SACs within the area surveyed are outlined in red.

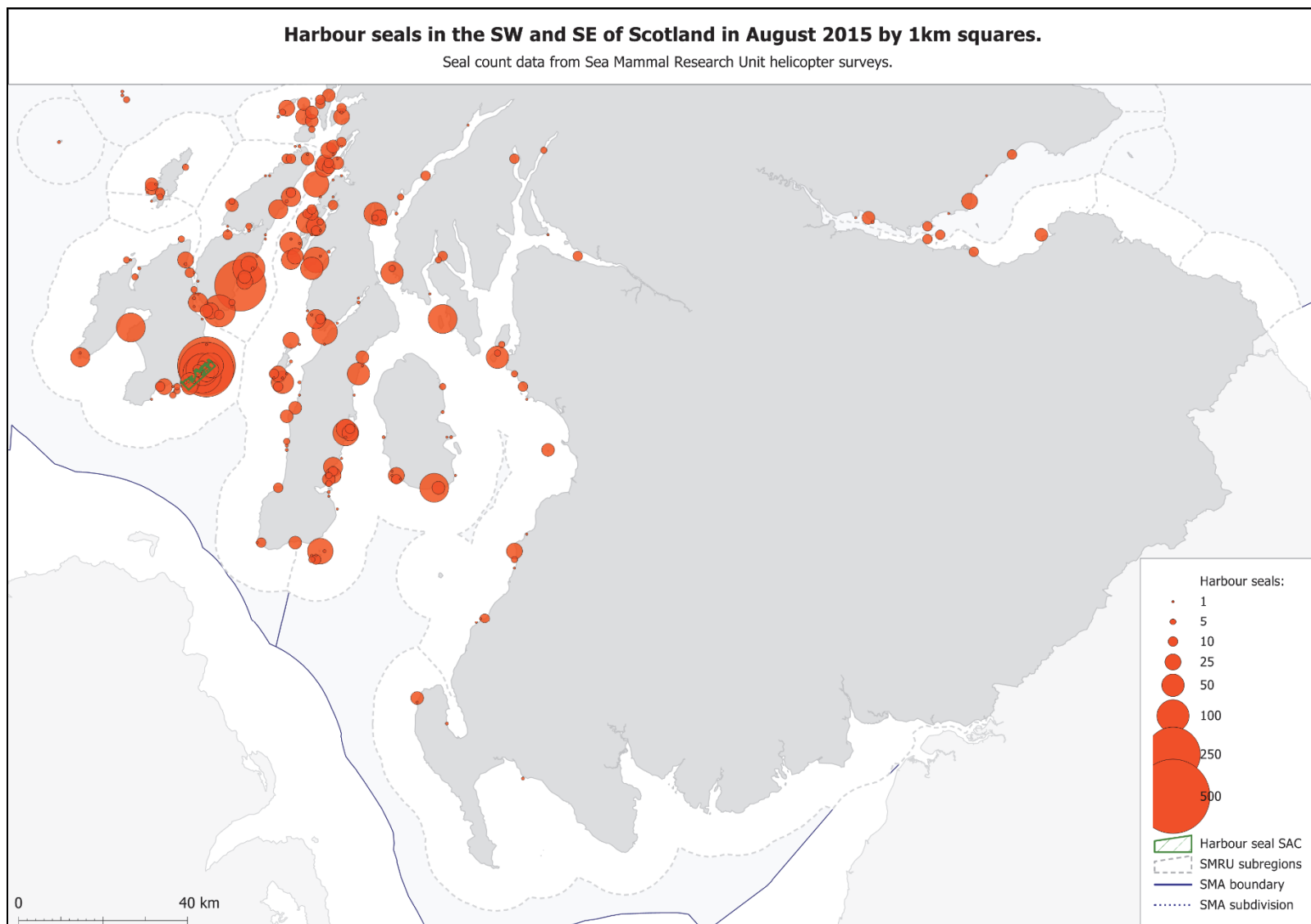


Figure 8. The distribution of harbour seals counted in West Scotland - South and in Southwest Scotland in August 2015. Harbour seals previously counted on adjacent coasts (shaded in grey) are included. Counts are aggregated by 1km squares. Details of counts are given in Table 3 and Table 5.

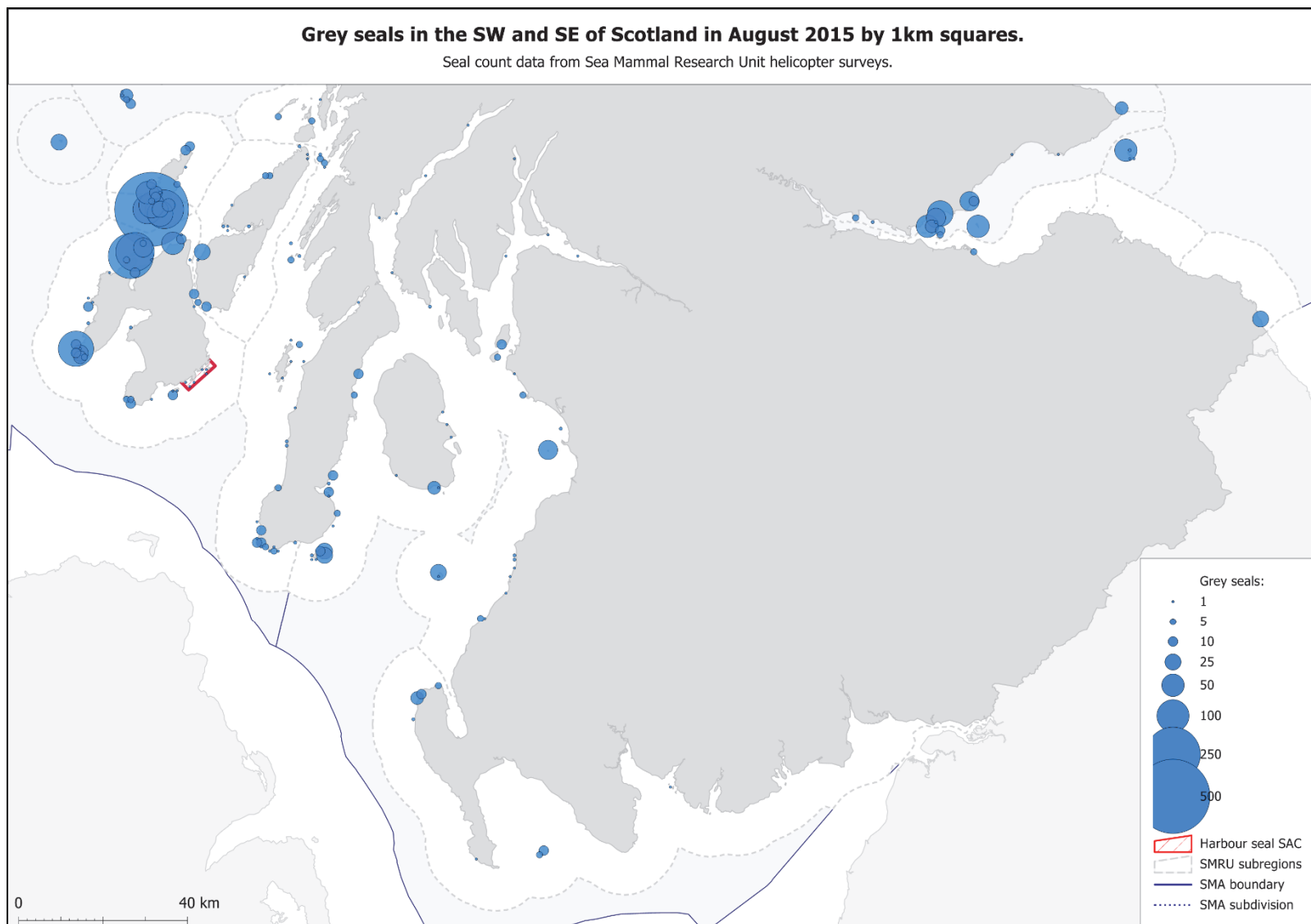


Figure 9. The distribution of grey seals counted in West Scotland - South and in Southwest Scotland in August 2015. Grey seals previously counted on adjacent coasts (shaded in grey) are included. Counts are aggregated by 1km squares. Details of counts are given in Table 4 and Table 6.

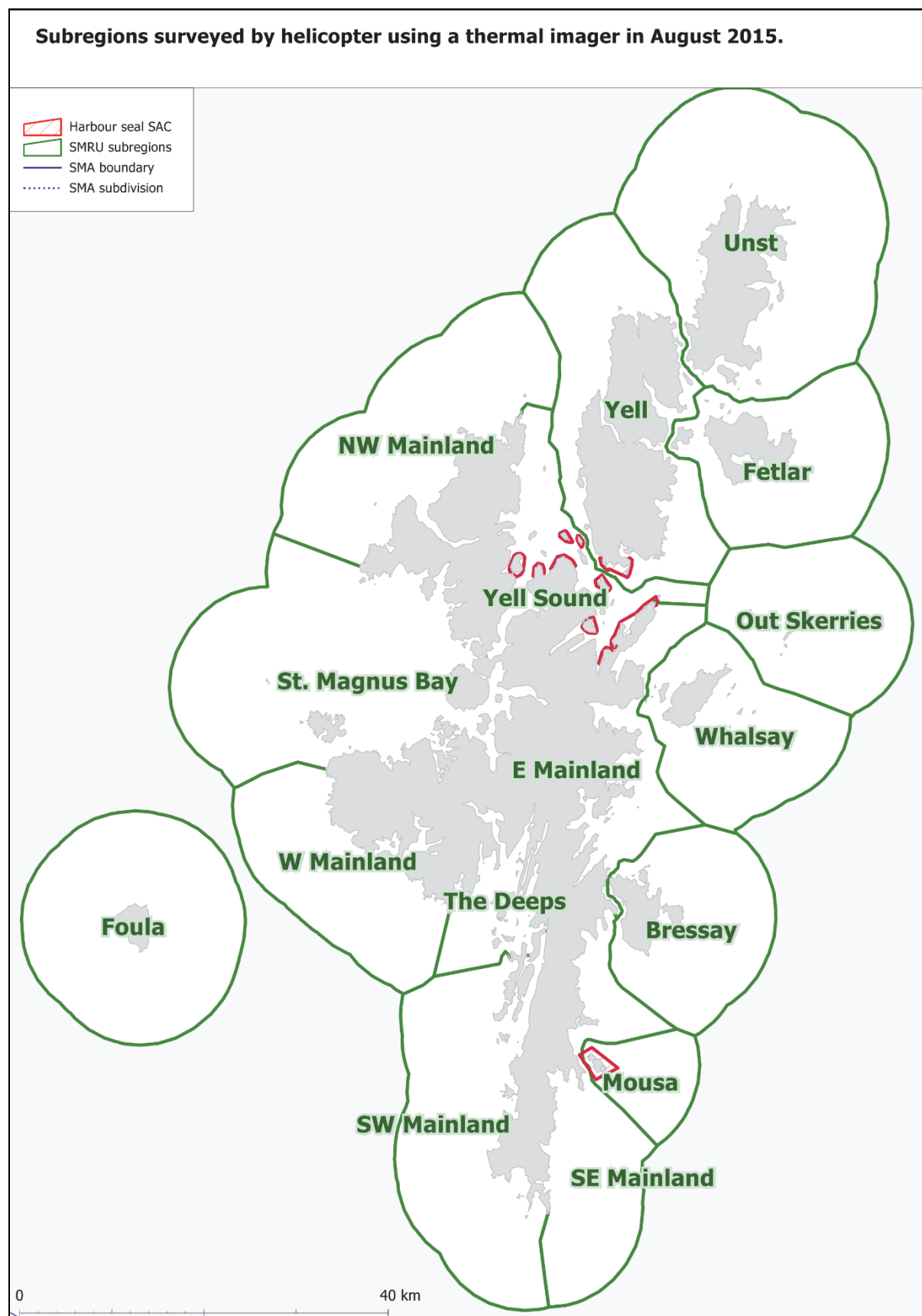


Figure 10. The subregions in Shetland that were surveyed in August 2015. Harbour seal SACs within the area surveyed are outlined in red.

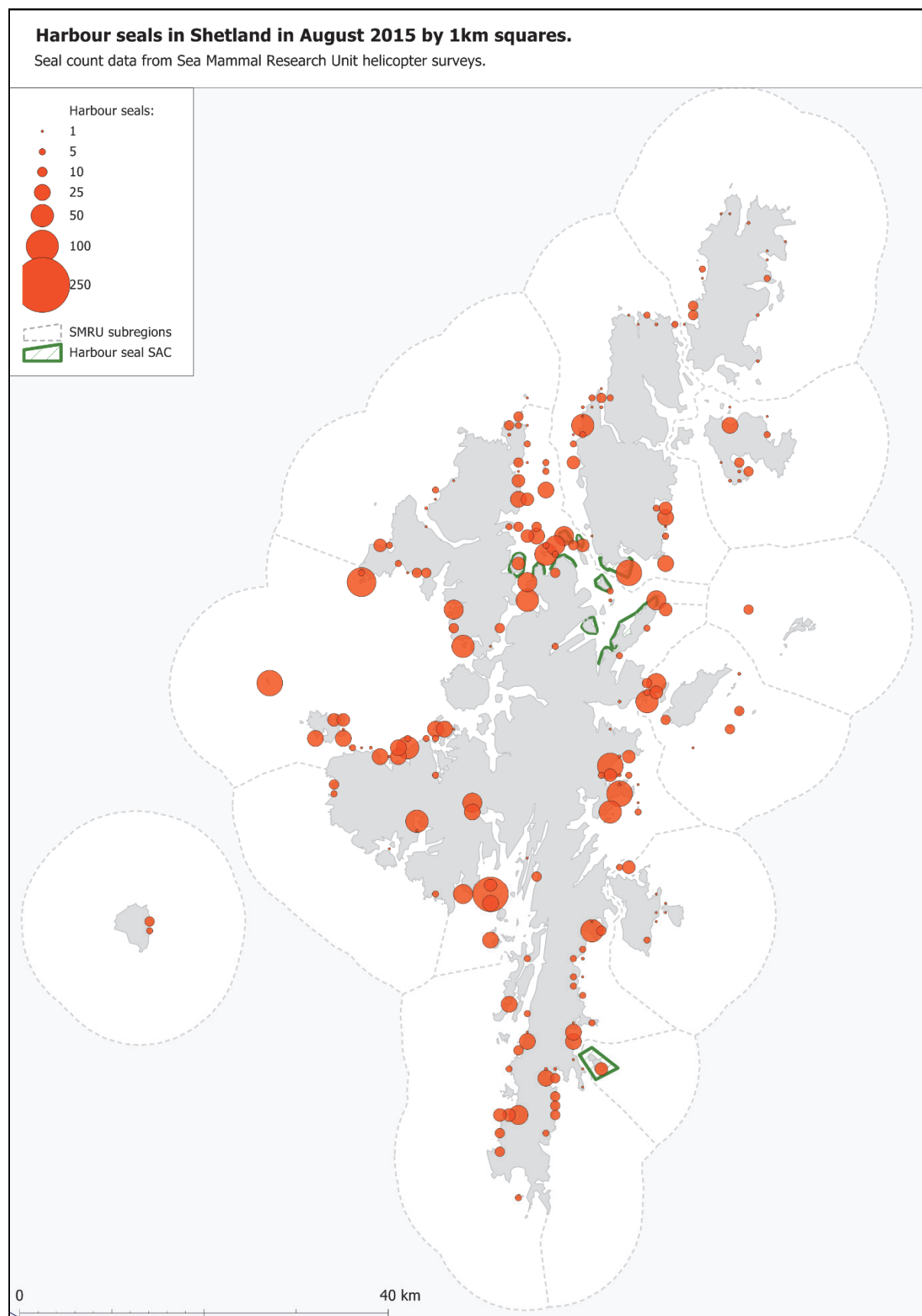


Figure 11. The distribution of harbour seals counted in Shetland in August 2015. Counts are aggregated by 1km squares. Details of counts are given in Table 7.

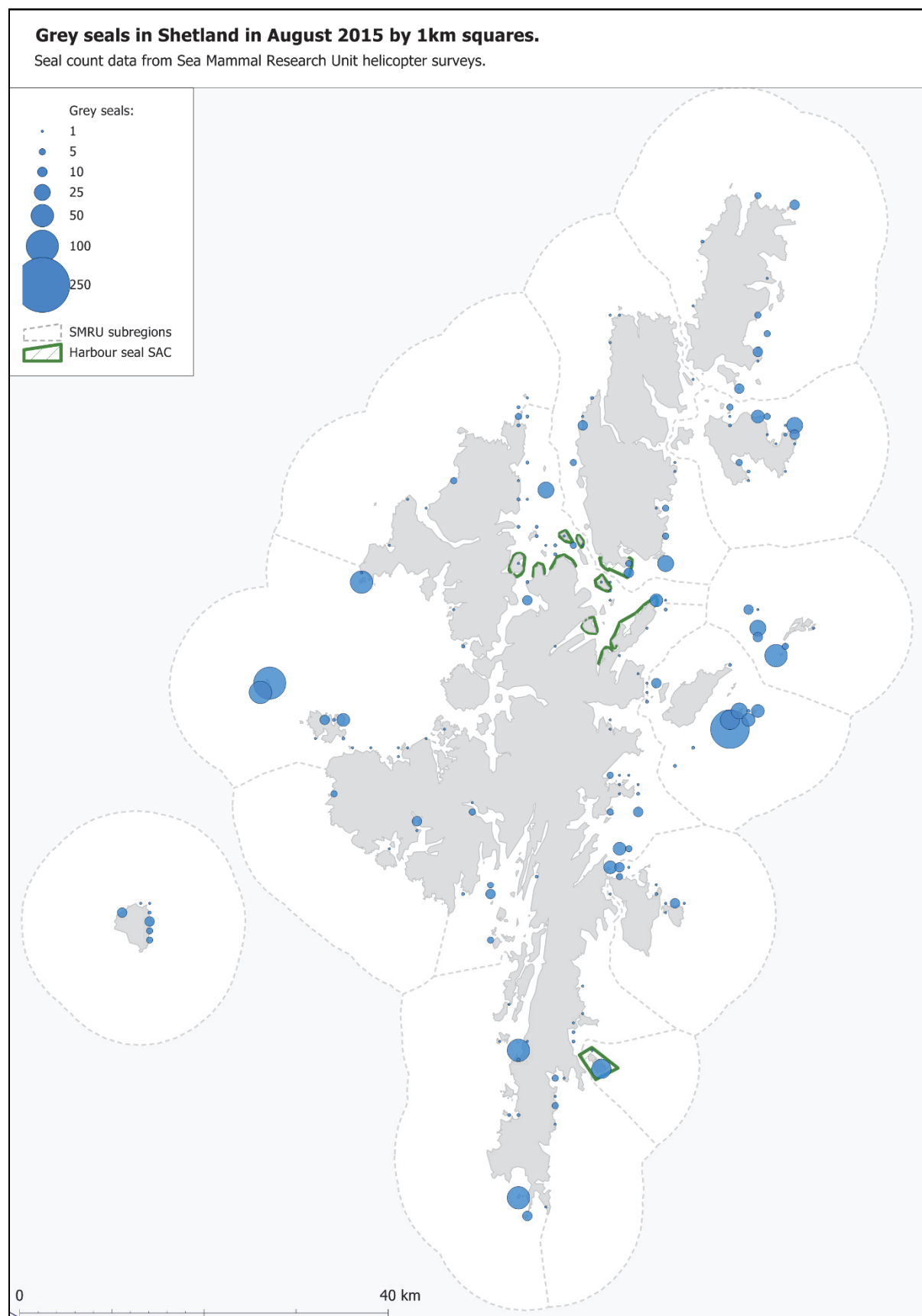


Figure 12. The distribution of grey seals counted in Shetland in August 2015. Counts are aggregated by 1km squares. Details of counts are given in Table 8.

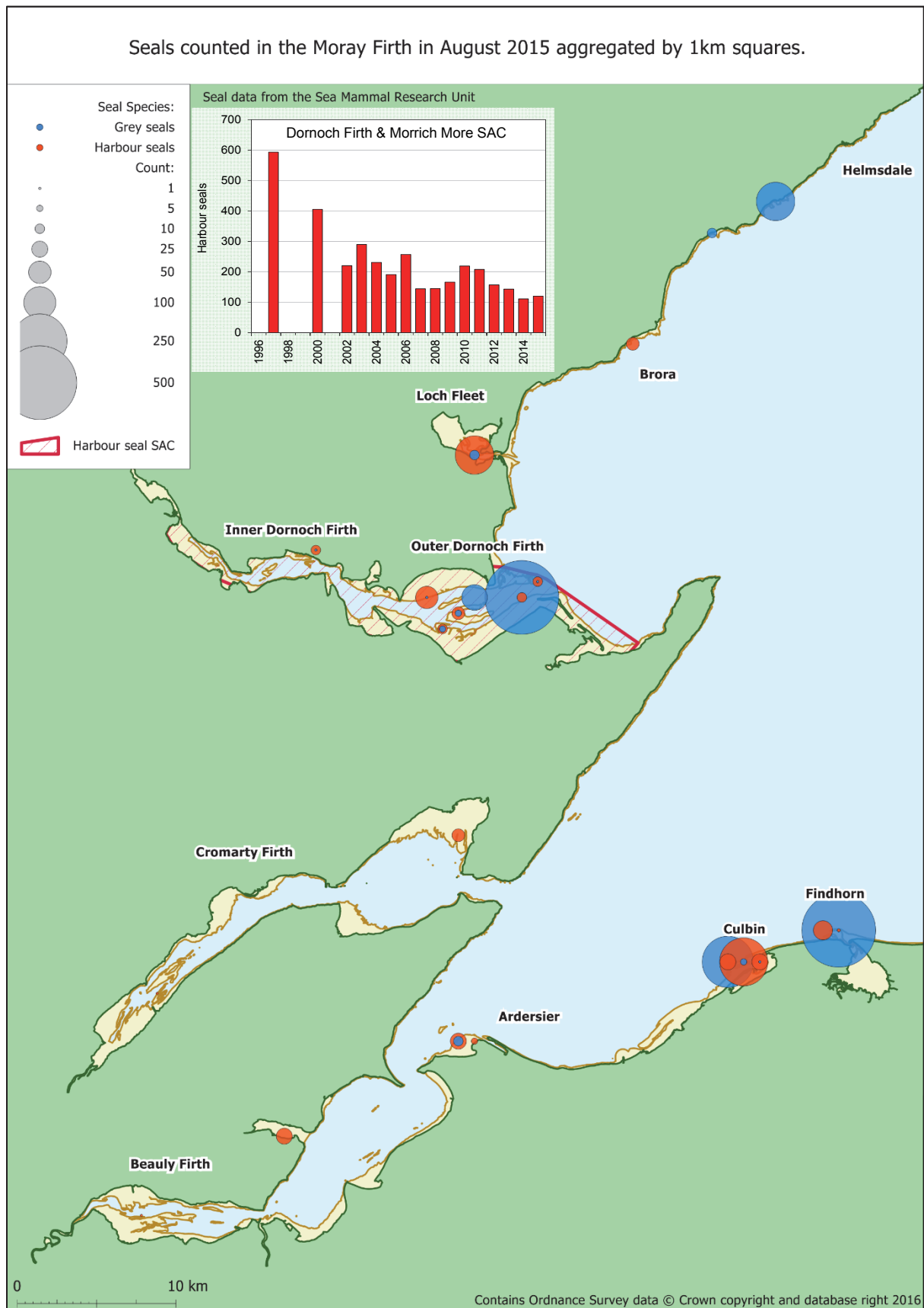


Figure 13. The distribution of harbour and grey seals counted in the Moray Firth in August 2015. Detailed counts are given in Table 9 (harbour seals) and Table 10 (grey seals).

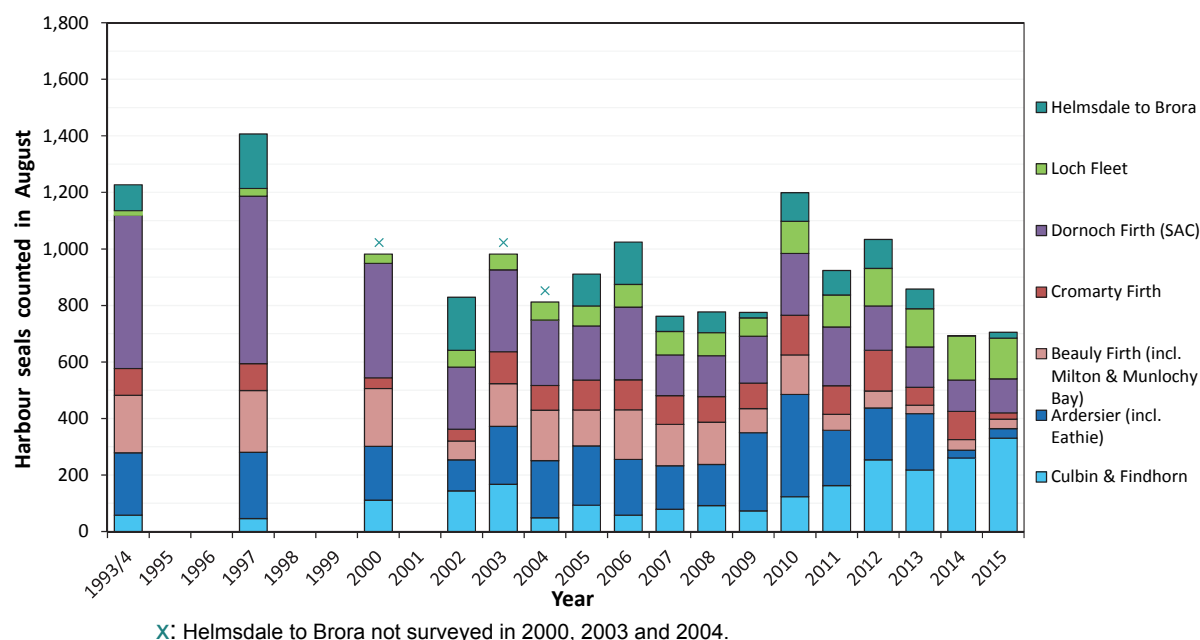


Figure 14. August counts of harbour seals in parts of the Moray Firth from 1994 to 2015. Detailed counts are given in Table 9. Mean values were used for areas surveyed more than once in a single season (2002, 2004-2008). Helmsdale to Brora and Loch Fleet were not surveyed in 1994, so 1993 counts were used for these areas. The Dornoch Firth and Morrich More is a harbour seal SAC. Data are from aerial surveys by the Sea Mammal Research Unit.

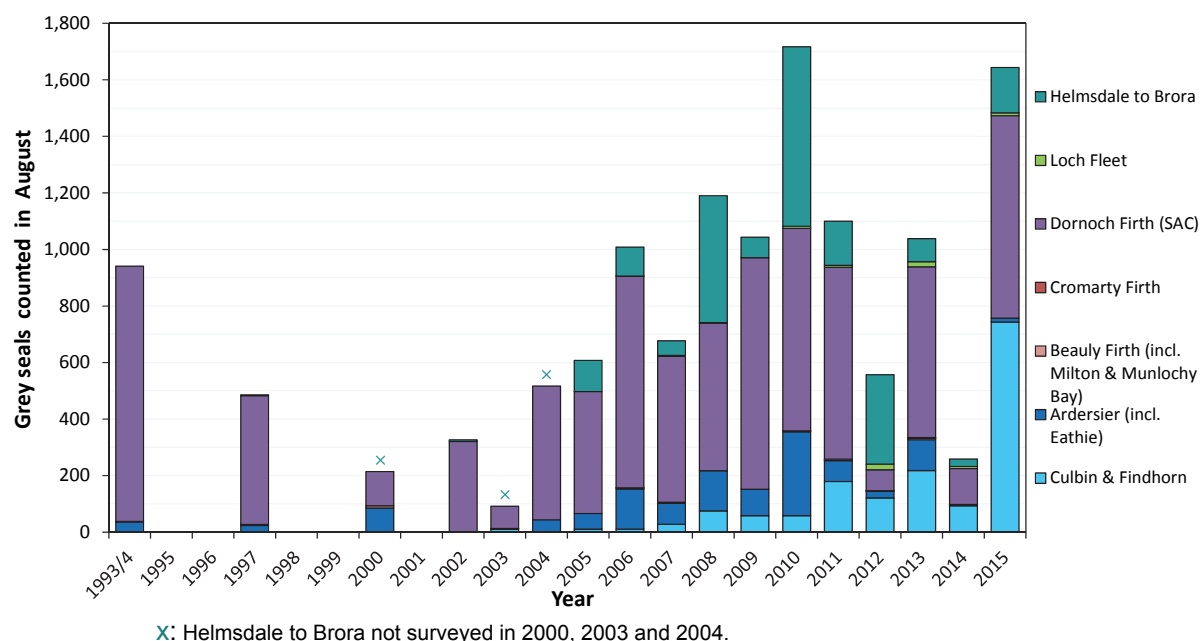


Figure 15. August counts of grey seals in parts of the Moray Firth from 1994 to 2015. Detailed counts are given in Table 10. Mean values were used for areas surveyed more than once in a single season (2002, 2004-2008). Helmsdale to Brora and Loch Fleet were not surveyed in 1994, so 1993 counts were used for these areas. The Dornoch Firth and Morrich More is a harbour seal SAC. Data are from aerial surveys by the Sea Mammal Research Unit.

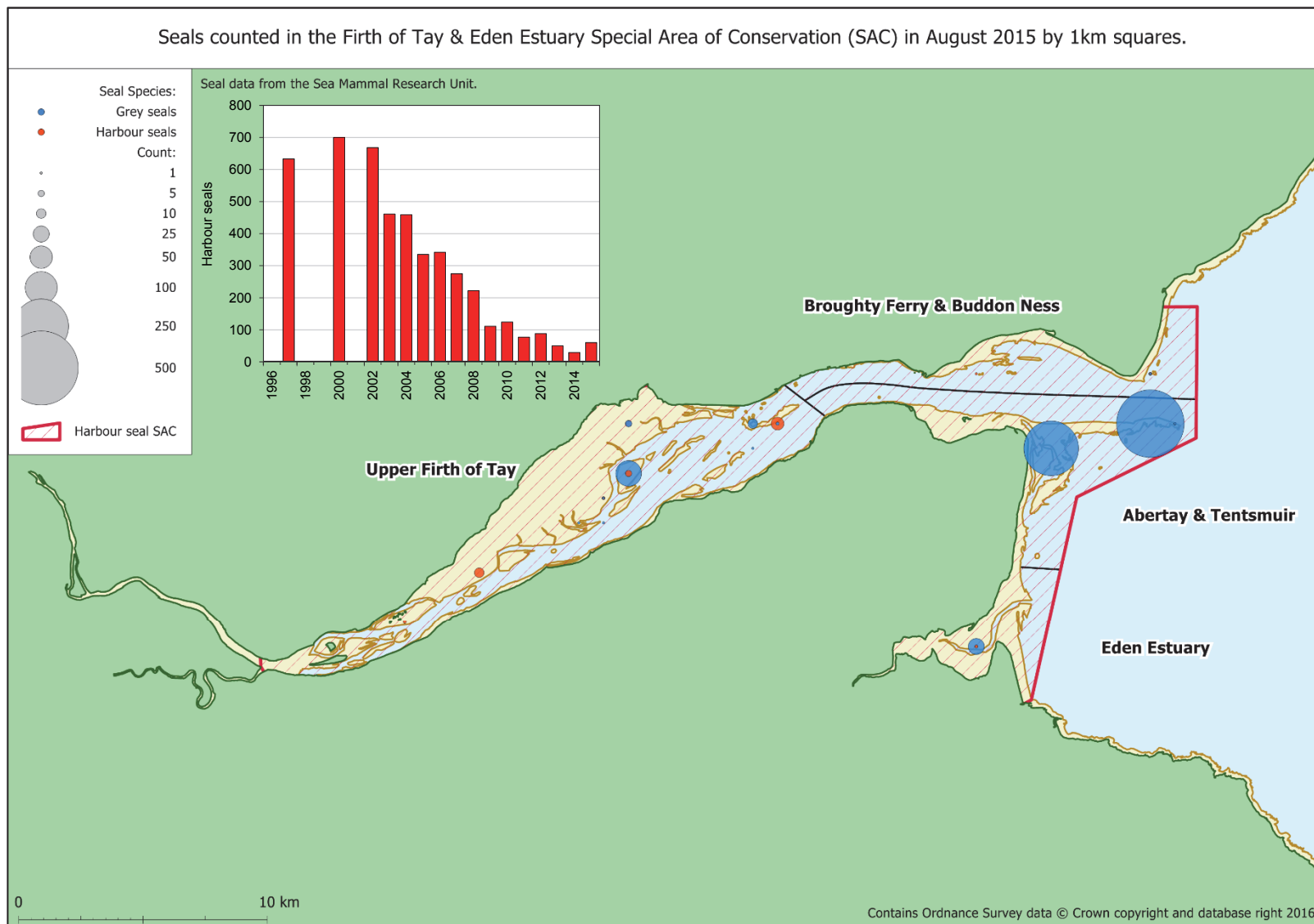


Figure 16. The distribution of harbour and grey seals counted in the Firth of Tay & Eden Estuary SAC in August 2015. Detailed counts for the SAC are given in Table 11 (harbour seals) and Table 12 (grey seals).

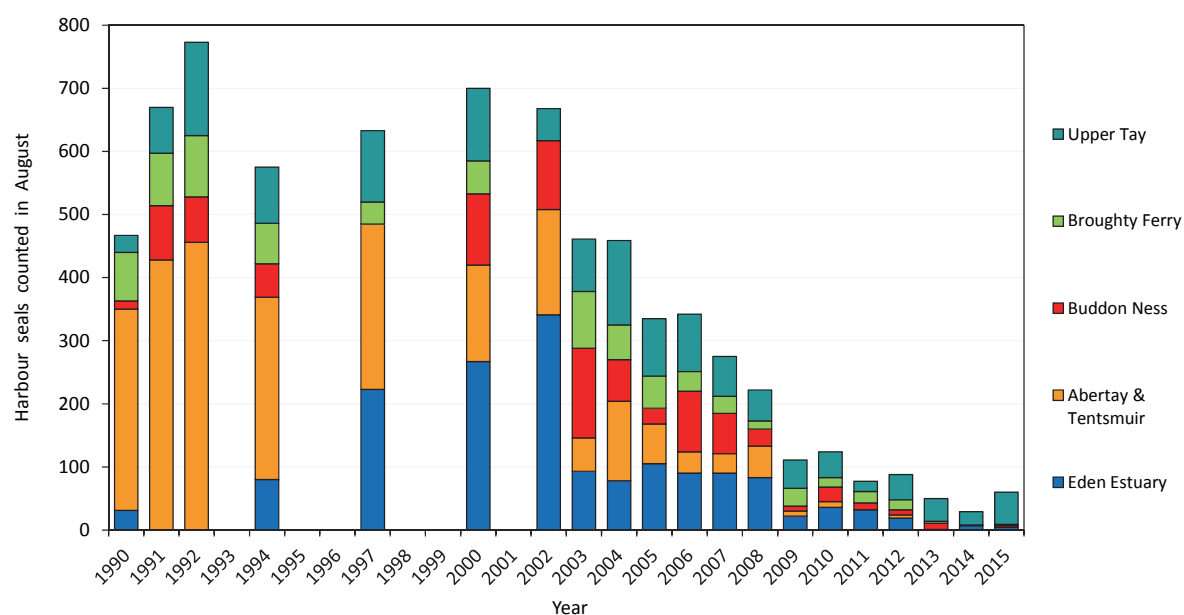


Figure 17. August counts of harbour seals in the Firth of Tay & Eden Estuary harbour seal SAC from 1990 to 2015. Mean values are given for areas surveyed more than once in a single season (2005, 2007, 2008); red = lowest (mean) count for given area, green = highest (mean) count. Detailed counts for each subarea are given in Table 11, and a distribution map for 2015 counts is shown in Figure 16. Data are from aerial surveys by the Sea Mammal Research Unit.

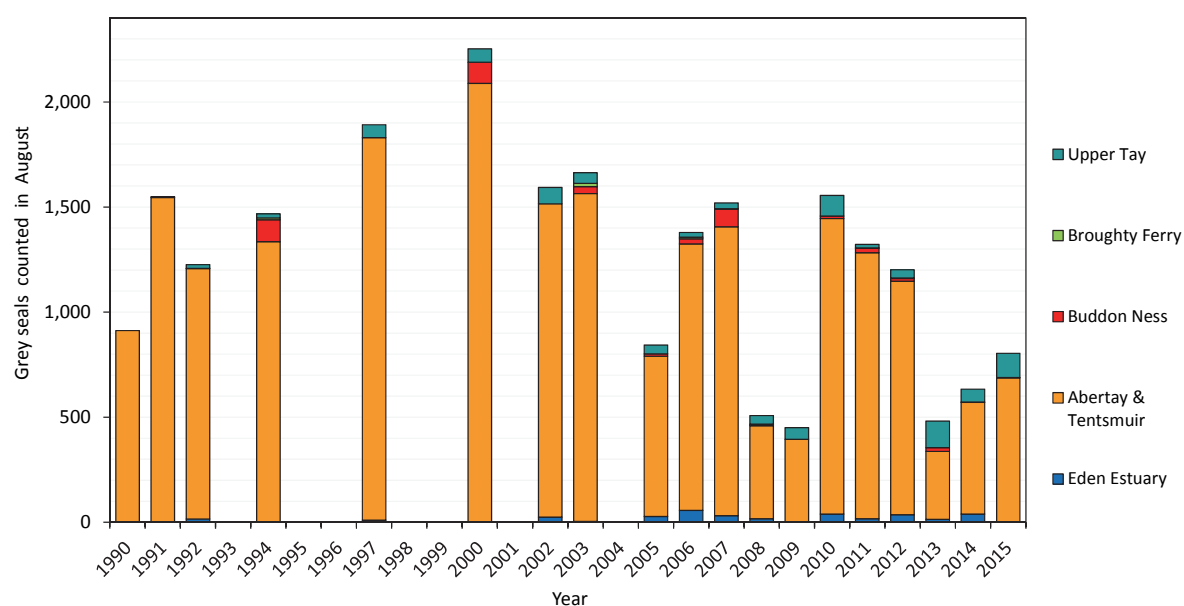


Figure 18. August counts of grey seals in the Firth of Tay & Eden Estuary harbour seal SAC from 1990 to 2015. Mean values are given for areas surveyed more than once in a single season (2005, 2007, 2008); red = lowest (mean) count for given area, green = highest (mean) count. Detailed counts for each subarea are given in Table 12, and a distribution map for 2015 counts is shown in Figure 16. Data are from aerial surveys by the Sea Mammal Research Unit.

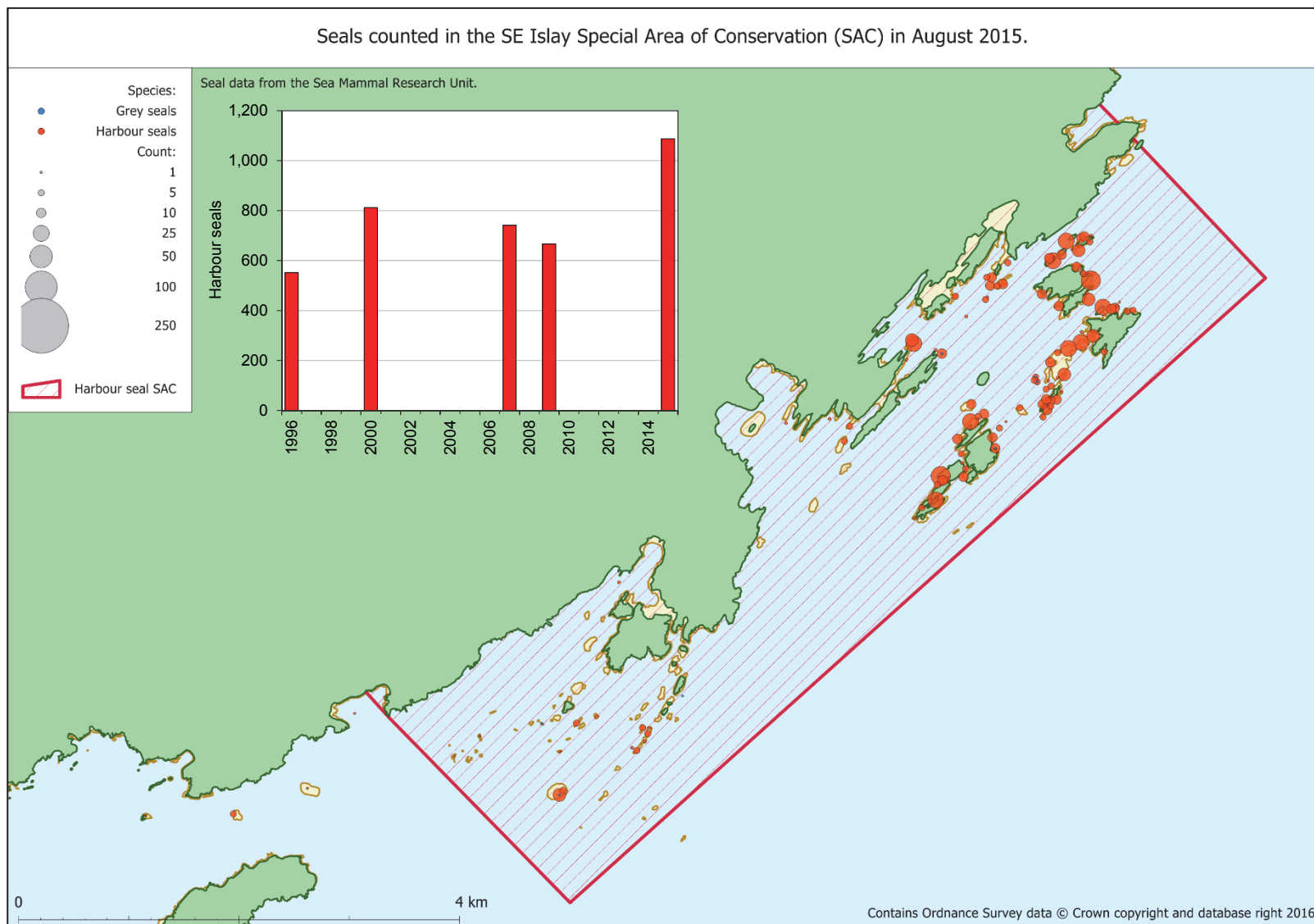


Figure 19. The distribution of harbour seals in and around the South-east Islay Skerries harbour seal SAC in August 2015.

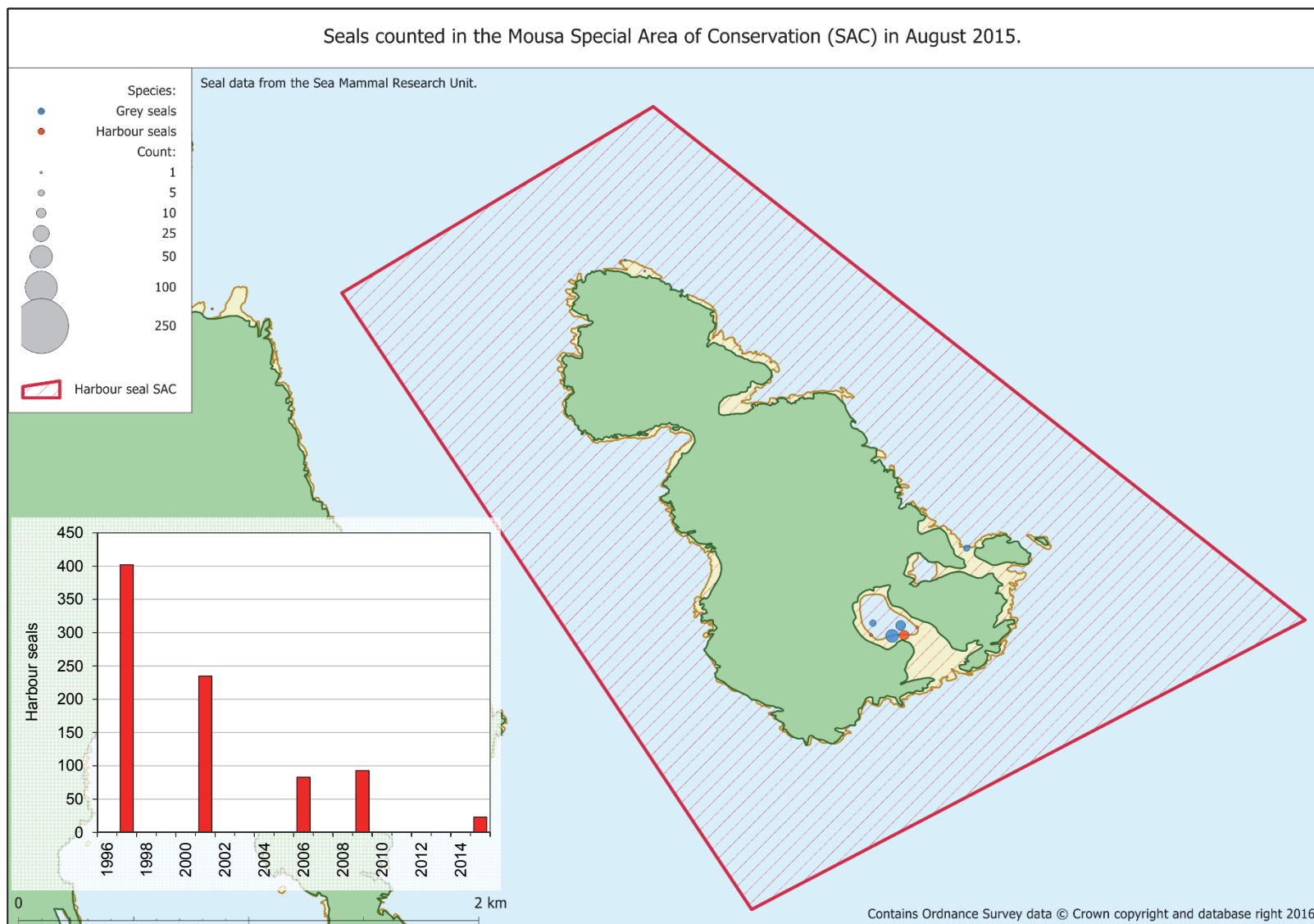


Figure 20. The distribution of seals in the Mousa harbour seal SAC in Shetland in August 2015.

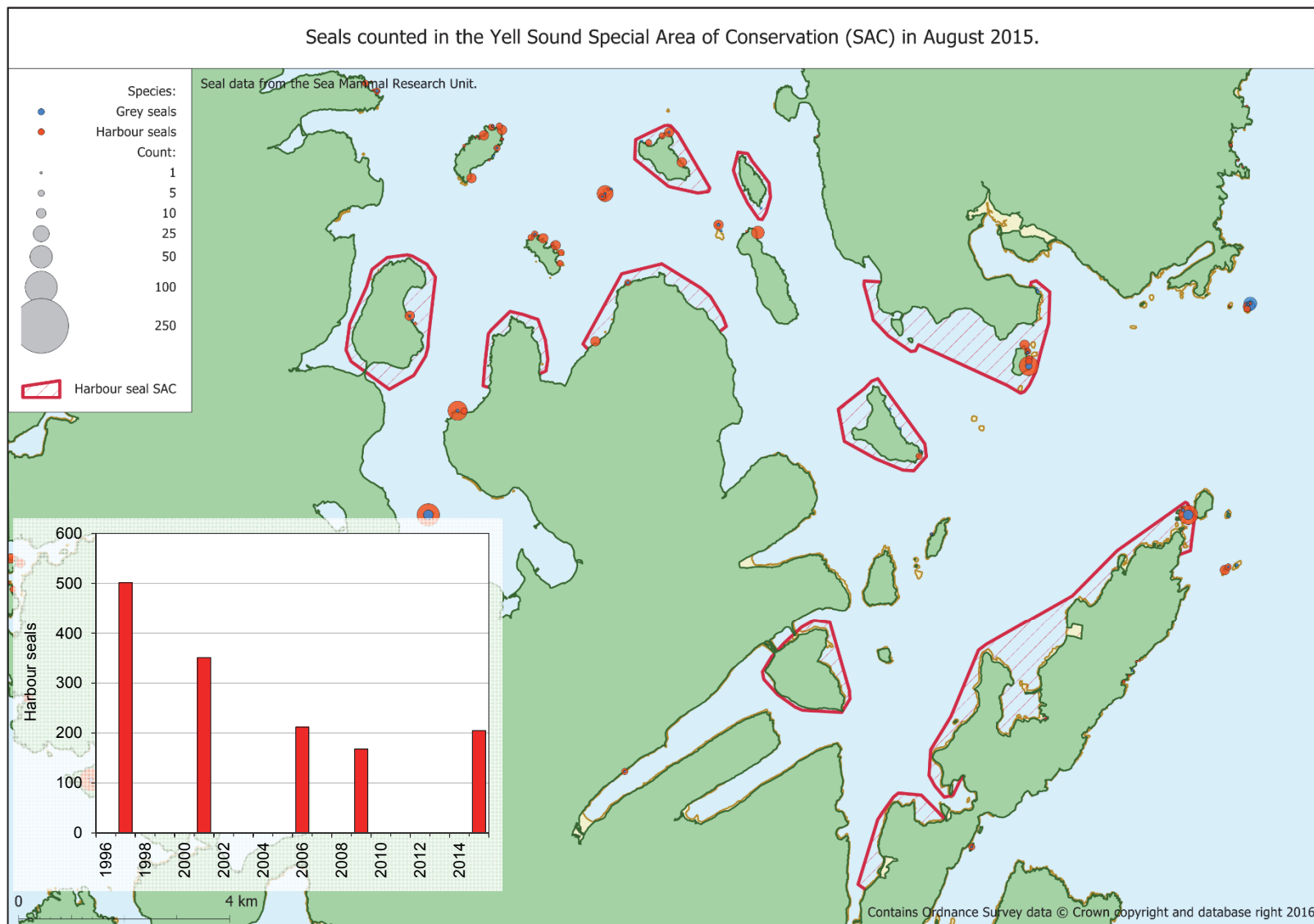


Figure 21. The distribution of seals in and around the Yell Sound harbour seal SAC in Shetland in August 2015.

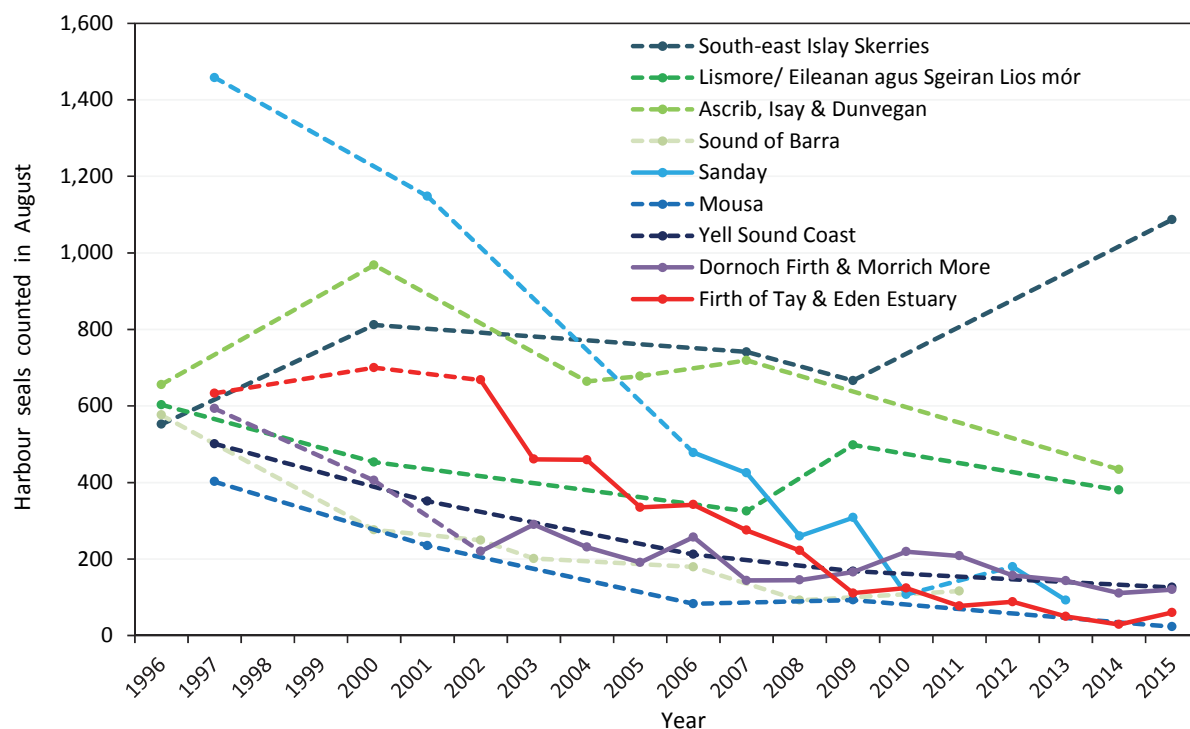


Figure 22. A comparison of harbour seals counted in Special Areas of Conservation in Scotland, designated for the protection of harbour seals, from 1996 to 2015. Detailed counts for each SAC are given in Table 13. Dotted lines indicate gaps of one or more years between surveys.

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