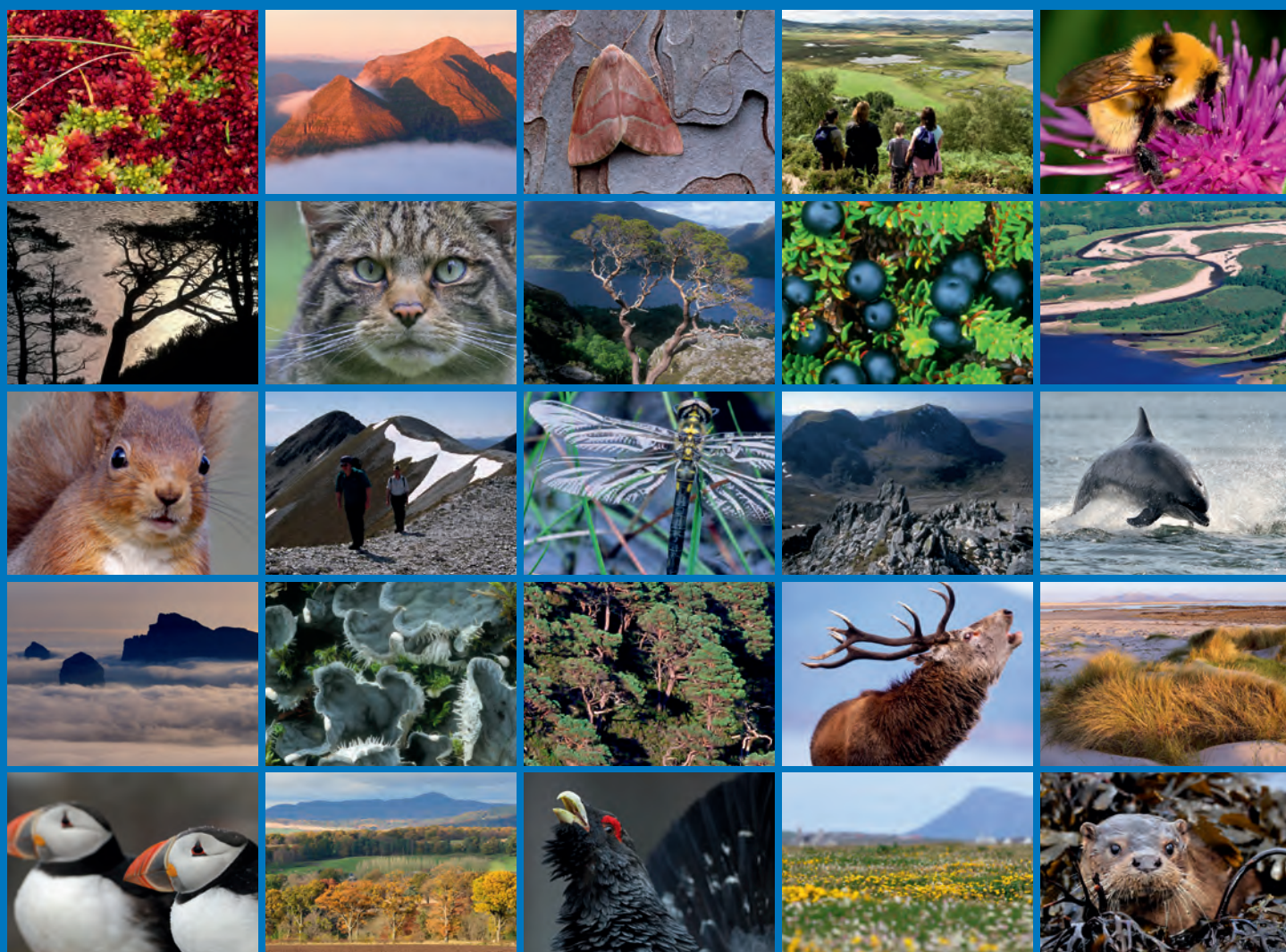


# Surveys of harbour (common) and grey seals on the east, north and north-west coast of Scotland and in Orkney, including the Moray Firth and the Firth of Tay, in August 2013





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# COMMISSIONED REPORT

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**Commissioned Report No. 759**

**Surveys of harbour (common) and grey  
seals on the east, north and north-west  
coast of Scotland and in Orkney, including  
the Moray Firth and the Firth of Tay,  
in August 2013**

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*This report should be quoted as:*

Duck, C.D. and Morris, C.D. 2014. Surveys of harbour and grey seals on the east, north and north-west coast of Scotland and in Orkney, including the Moray Firth and the Firth of Tay, in August 2013. *Scottish Natural Heritage Commissioned Report No. 759.*

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## COMMISSIONED REPORT

# Summary

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### Surveys of harbour and grey seals on the east, north and north-west coast of Scotland and in Orkney, including the Moray Firth and the Firth of Tay, in August 2013

**Commissioned Report No.: 759**

**Project no: 14486**

**Contractor: St Andrews University, Sea Mammal Research Unit**

**Year of publication: 2014**

#### **Keywords**

Harbour (common) seal; grey seal; Orkney; Moray Firth; Firth of Tay; decline.

#### **Background**

The Sea Mammal Research Unit (SMRU) aims to complete Scotland-wide surveys of harbour and grey seals on an approximate five-year cycle. Recent SMRU surveys have documented a continuing decline of more than 65% in counts of harbour seals in Orkney and a decline of over 90% in the Firth of Tay from the maximum counts in the 1990s. The last complete survey of Orkney was undertaken in 2010 and a further survey was considered necessary to establish whether the decline was continuing. The serious decline in the Firth of Tay population meant that a further survey was required to establish the up-to-date status of this population. The Moray Firth population was also surveyed to compare with the trends observed in Orkney and the Firth of Tay and to help try to explain the declines. The Scottish east, north and north-west coast were surveyed as a continuation of the current round-Scotland survey.

#### **Main findings**

- In August 2013, the Sea Mammal Research Unit, University of St Andrews, planned to carry out aerial surveys of moulting harbour seals in Orkney, along the east, north and north-west coast of Scotland, in the Moray Firth and in the Firth of Tay.
- All proposed areas were surveyed successfully with the exception of the south-east coast of Scotland between the Farne Isles and Aberlady Bay.
- On the east coast of Scotland between Aberlady Bay and Fraserburgh, **213** harbour seals were counted compared with 459 in 2007, a decline of 53.6% over six years. The south-east coast between the Scottish Border and Aberlady Bay was not surveyed due to time constraints.
- In the Firth of Tay and Eden Estuary SAC, **50** harbour seals were counted in August 2013 compared with 78 in 2012 and 77 in August 2011. This is the lowest count for the Firth of Tay and represents 7.8% of the mean count (641) between 1990 and 2002.
- In Orkney, **1,865** harbour seals were counted compared with 2,687 in 2010, a decrease of 30.6% over three years. On Sanday, 114 harbour seals were counted compared with

131 in 2010 and 220 in 2012. Of the 114 harbour seals counted, 99 were within the Sanday SAC compared with 196 in 2012 and 116 in 2010.

- On the north coast of Scotland, **73** harbour seals were counted compared with 112 in 2008, a decline of 34.8% over five years.
- In the Moray Firth Seal Management Area, **898** harbour seals were counted compared with 841 in 2008. In the area surveyed annually, between Findhorn and Helmsdale, **858** harbour seals were counted in 2013, compared with 1,033 in 2012 and 924 in 2011. There were **143** harbour seals in the Dornoch Firth and Morrich Mor SAC in 2013 compared with 157 in 2012 and 208 in 2011.
- In contrast to the declines observed on the east coast and in Orkney, on the north-west coast between Cape Wrath and Ullapool, **1,095** harbour seals were counted compared with 649 in 2008, an increase of 68.7%.
- Using data from the 2013 surveys, the updated estimate of the minimum size of the harbour seal population in Scotland was **20,720**. This is the number of harbour seals counted during surveys carried out in 2007 (west Scotland, part of Inner Hebrides, Firth of Clyde, Solway Firth, south-east coast from Border to Aberlady Bay), 2008 (West Scotland Small Isles, Moray Firth from Wick to Duncansby Head), 2009 (Shetland, part of Argyll), 2011 (Outer Hebrides, Moray Firth from Helmsdale to Wick) and 2013 (east coast from Aberlady Bay to Fraserburgh, part Moray Firth from Fraserburgh to Helmsdale, Orkney, North Coast from Duncansby Head to Cape Wrath and north-west coast from Cape Wrath to Ullapool).

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## 1. INTRODUCTION

This report summarises the results from surveys of harbour and grey seals on the Scottish east coast between Aberlady Bay and Fraserburgh, in the Moray Firth from Fraserburgh to Helmsdale, in Orkney, along the north coast of Scotland and the north-west coast of Scotland from Cape Wrath to Ullapool. The surveys were carried out to obtain updated estimates of the numbers of harbour and grey seals in these areas.

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.smru.st-and.ac.uk/documents/1619.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 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 four to five year cycle (Figure 1), although surveys are carried out annually in the Moray Firth and the Firth of Tay. 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 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.

Since 2007, high resolution digital still photographs have been taken of most groups of harbour and grey seals and were used to correct numbers and species identity of seals in the haul-out groups. The data provided in this report are obtained from a combination of counts from the thermal images and from digital still images.

## 2. METHODS

The Sea Mammal Research Unit (SMRU) carried out most surveys of harbour seals by helicopter using a thermal imaging camera. For estuarine areas (Moray Firth and Firth of Tay) 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 moult.
- There was no surveying on rainy days.
- High resolution digital photographs were taken of most groups of harbour seals on shore and of almost all groups of grey seals.
- 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 surveys were carried between 2 August and 16 August 2013:

- 2 Aug 13: East coast from Aberlady to Carnoustie (incl. the Firth of Tay)
- 3 Aug 13: East coast from Carnoustie to Fraserburgh and Moray Firth from Fraserburgh to Findhorn
- 4-6 Aug 13: Orkney
- 7 Aug 13: North coast and north-west from Cape Wrath to Scourie
- 8 Aug 13: Pilot rest day
- 9 Aug 13: Rain day
- 10 Aug 13: North-west coast from Scourie to Ullapool
- 16 Aug 13: Moray Firth from Helmsdale to Findhorn (by plane)

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 AND DISCUSSION**

#### **3.1 Scotland**

Figure 1 shows the years in which different segments of the Scottish coast were surveyed most recently. The distribution of seals in Scotland from these most recent August surveys, between 2007 and 2013, is shown in Figure 2a & 3a (harbour seals) and 2b & 3b (grey seals) respectively.

In Figure 2a, harbour seal distribution in Scotland is aggregated into 1km squares. At this scale of map, many points overlap. In 3a, the same data are aggregated by 10km squares. This map shows the small-scale August distribution of harbour seals around Scotland more clearly but at a more coarse resolution. In both maps, Seal Management Areas in Scotland are marked with solid lines with Sub-Areas indicated by dotted lines.

In Figure 2b, grey seal distribution in Scotland is aggregated into 1km squares. In Figure 3b, the same data are aggregated by 10km squares. This coarser resolution map shows the small-scale August distribution of grey seals around Scotland more clearly. Note that in 2011, there was a very low grey seal count in the Monach Isles, off North Uist, which may have been 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. This potentially large point was 'missing' in 2011.

Figure 4 shows the trends in numbers of harbour seals counted in all Seal Management Areas in Scotland since 1990. Four new points for 2013 have been added for: East Scotland, Moray Firth, Orkney & North Coast, and West Scotland (although only part of the north sub-section of West Scotland was surveyed). Figure 5a shows the numbers of harbour seals and Figure 5b the numbers of grey seals counted in the areas surveyed in August 2013 in comparison with counts from previous surveys. Detailed counts for each Seal Management Area are given in Table 1a & b (East Coast), Table 2a & b (Orkney & North Coast), Table 4a & b (Moray Firth) and Table 6a & b (West Scotland).

## 3.2 Orkney

The lowest total of **1,865** harbour seals was counted in Orkney in 2013 compared with 2,687 in 2010, a decline of 30.6% over three years (Table 2a). The average annual decline of 11.5% since 2010 is in line with the average annual rate observed since 2006 (12%; Lonergan *et al.*, 2007). This was the first time the count has fallen below 2,000. The lowest harbour seal count was recorded in nine out of the 16 subregions where harbour seals were seen.

Figure 6a shows the results of the August 2013 survey in Orkney and the immediately adjacent part of the north coast of Scotland. The highest counts (from the 1997 survey) are included in the background to demonstrate the location and extent of the harbour seal population decline in Orkney.

Figure 6b shows the distribution of grey seals in Orkney in August 2013. Counts of grey seals in Orkney subregions are in Table 2b. With the exception of 2001, when Orkney and Shetland surveys were during an extended period of very wet conditions, and in 1989 when the survey method was very different, the numbers of grey seals in Orkney in August has remained remarkably constant.

Dividing Orkney into three approximately similar-sized subareas shows regional differences in the severity of the decline in harbour seal numbers (Figure 7). The northern outer islands (blue) had the highest counts of harbour seals, peaking in 1997 and show the greatest decline. Scapa Flow and the southern islands (green) counts also peaked in 1997 and have declined thereafter. Although counts in this area were initially lower than in the outer northern islands, they are now actually slightly higher for the first time. The north and east mainland and adjacent islands (purple) showed a different trend, a slow and more gradual decline since the late 1980s.

### 3.2.1 Sanday, Orkney

Figure 8 compares the number and distribution of harbour and grey seals on Sanday in 2013 (a) with numbers in 1997 (b). Counts of both seal species were very considerably lower in 2013 than in 1997 (1,670 harbour seals in 1997 compared with **114** in 2013, Table 3a; 1,888 grey seals in 1997 compared with 525 in 2013, Table 3b). On Sanday, approximately 90% of both seal species are consistently found within the Sanday harbour seal SAC. Note that counts of grey seals, as well as counts of harbour seals, have declined.

## 3.3 North Coast

On the north coast of Scotland, **73** harbour seals were counted in 2013 compared with 112 in 2008 (Table 2a). The grey seal count was also lower, with 195 counted in 2013 compared with 344 in 2008 (Table 2b). The north coast counts for both species were the lowest recorded to date, although this section of the coast has never contributed many or large seal haul-out sites to the Management Area.

## 3.4 Moray Firth

Figure 9 shows harbour and grey seal distribution around the Moray Firth, between Findhorn and Helmsdale, in August 2013. The number of harbour seals in the Moray Firth in August 2013 (Table 4a), including totals from different sections of the coast between Findhorn and Helmsdale. The counts of harbour seals in the Beaully Firth (**30**) and the Dornoch Firth and Morrich Mor harbour seal SAC (**143**) were the lowest recorded by SMRU, but counts at Ardersier, Culbin and Loch Fleet remained high (Table 4a). The mean Dornoch Firth SAC count between 1992 and 2000 was 551; the mean count between 2003 and 2013 was 195.

Figure 10a shows the contribution to the harbour seal count from different parts of the wider Moray Firth and Figure 10b shows the counts of grey seals from different parts of the Moray Firth. Detailed counts of grey seals in the Moray Firth are in Table 4b.

### 3.5 East Scotland

The south-east coast of Scotland, between the Scottish Border and Aberlady Bay, was not surveyed due to time constraints. Between Aberlady Bay and Fraserburgh, **214** harbour seals were counted compared with 459 in August 2007, equivalent to an average annual decline of 12% over six years (Table 1a). Numbers in the Firth of Forth remained similar (**145** in 2013 compared with 148 in 2007) but numbers in the Firth of Tay declined further (see 3.7 below). There were **18** harbour seals between Carnoustie and Fraserburgh, compared with 24 in August 2007. There was a large haul-out of grey seals at the mouth of the River Ythan, of over 700 seals. This was the biggest group of grey seals recorded on the east coast of Scotland and is one of the biggest grey seal haul-outs in the whole of the UK (Figure 2b).

#### 3.5.1 Firth of Tay and Eden Estuary SAC

In the Firth of Tay and Eden Estuary SAC, only **50** harbour seals were counted in August 2013 (Table 5a), the lowest count recorded. The dramatic decline in harbour seal numbers in this SAC continues. Figure 11 shows the distribution of harbour and grey seals in the Firth of Tay and Eden Estuary harbour seal SAC and in the Firth of Forth in August 2013. Figure 12a & b shows the contributions to the harbour seal count (a) and the grey seal count (b) from different areas of the SAC. Counts of harbour seals from these areas are in Table 5a and counts of grey seals in Table 5b. The 2013 count of harbour seals in the SAC represents only 7.8% of the mean count between 1990 and 2002 (641).

### 3.6 North-west Scotland

In the northern sub-area of the West Scotland Management Area, between Cape Wrath and Ullapool, **1,095** harbour seals were counted in 2013 compared to the previous highest total of 649 in 2008 (Table 6a; Figure 13), an apparent average annual increase of 11% over five years. This increase is in marked contrast to the declines observed in the Northern Isles, and the north and east coasts of Scotland. The 2013 grey seal count of 348 was higher than the 2008 count of 160, but similar to the 1997 count of 364 (Table 6b). The main harbour seal increases were recorded in the Summer Isles (**666** in 2013 and 327 in 2008; equivalent to an average of +15.3% p.a.) and in Eddrachillis Bay (**355** in 2013 and 277 in 2008). It is not clear whether this increase is mainly due to changes in overall population size or due to redistribution around the coast. The proposed 2014 survey of the west coast from Ullapool south will provide useful additional information for the west coast of Scotland.

### 3.7 Harbour seal SACs

Counts of harbour seals within most Scottish SACs have changed considerably since they were first identified in the early 1990s (Table 7, Figure 14). In two of the three SACs in West Scotland, numbers have remained reasonably constant (Ascribs, Isay & Dunvegan and the South-east Islay Skerries). Numbers on Lismore (SMRU aerial survey data only) suggest a slow decline between 1996 and 2007, with a recovery in 2009. The remaining five SACs in the Northern Isles and on the east coast (including the Moray Firth) all show consistent declines, the most severe being on Sanday, Orkney, where numbers have dropped from 1,481 in 1997 to **114** in 2013 and in the Firth of Tay and Eden Estuary. The overall decline on Sanday was 92.3% over 16 years, equivalent to an average annual decline of 10.6%. The Firth of Tay SAC count declined from a mean of 641 between 1990 and 2002 (92%), an average annual decline of 21% over 11 years since 2002.

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

### **3.8 Surveys planned for 2014**

In August 2014, SMRU proposes to survey the west coast of Scotland from Ullapool to the southern tip of the Mull of Kintyre, including the Inner Hebrides.

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**Table 1a&b.** Counts of seals in the East Scotland Seal Management Area (SMA) in August 2013 compared with previous counts. Note that part of south-east Scotland was not surveyed in 2013.

a) harbour seals

SMA	Region	Subregion	1997	2005	2007	2013
East Scotland:	Grampian:	North East Coast	0	14	22	2
		South East Coast	15	22	0	0
	Tayside:	Montrose & Arbroath	0	9	2	16
		Firth of Tay North	92	92	164	45
	Fife:	Firth of Tay South	56	48	14	4
		St Andrews Bay	485	221	109	1
		Firth of Forth N	76	176	92	100
	Central:	Isle of May	0	0	0	0
		Upper Forth	0	0	1	0
	Lothian:	Firth of Forth S <sup>1</sup>	39	72	55	46
Subtotal for areas surveyed in 2013			763	654	459	214
East Scotland:	Lothian:	Firth of Forth S <sup>2</sup>	1	18	0	n.s.
		Dunbar	0	14	0	n.s.
Total East Scotland SMA			764	686	459	

<sup>1</sup> section surveyed in 2013

<sup>2</sup> section not surveyed in 2013

b) grey seals

SMA	Region	Subregion	1997	2005	2007	2013
East Scotland:	Grampian:	North East Coast	131	400	388	987
		South East Coast	14	11	12	2
	Tayside:	Montrose & Arbroath	0	0	0	2
		Firth of Tay North	61	43	108	42
	Fife:	Firth of Tay South	0	0	0	103
		St Andrews Bay	1,849	530	1,469	359
		Firth of Forth N	176	73	151	349
	Central:	Isle of May	46	18	140	65
		Upper Forth	0	0	0	0
	Lothian:	Firth of Forth S <sup>1</sup>	15	12	13	7
Subtotal for areas surveyed in 2013			2,292	1,087	2,281	1,916
East Scotland:	Lothian:	Firth of Forth S <sup>2</sup>	33	1	19	n.s.
		Dunbar	0	14	0	n.s.
Total East Scotland SMA			2,325	1,102	2,300	

<sup>1</sup> section surveyed in 2013

<sup>2</sup> section not surveyed in 2013

**Table 2a.** Counts of harbour seals in subregions of the Orkney & North Coast Seal Management Area from 1985 - 2013. The highest complete count for each subregion is highlighted in green, the lowest in red. See Figure 6a for a distribution map and details on subregion boundaries. Orkney surveys were not completed in 2009 and 2012 due to poor weather conditions. Data are from aerial surveys by the Sea Mammal Research Unit, University of St Andrews; 1985 and 1989 surveys were visual surveys in conjunction with the University of Aberdeen. Counts from these two surveys could be lower than if they had incorporated a thermal imager.

SMRU subregions	1985	1989	1991	1993	1997	2001	2005	2006	2007	2008	2009	2010	2012	2013
1 Mainland, East & North	558	686		950	592	349		435	313	314		254		229
2 Mainland, South & West	131	273		131	708	384		387	283	186		281		267
3 South Ronaldsay & Burray	212	275		377	390	511		132	100	62		104		111
4 Hoy	227	304		341	530	419		204	178	158		114		112
5 Flotta, Cava, Rysa, Fara, Barrel of Butter	855	690		801	575	596		359	258	164		180		154
6 Shapinsay	204	308		287	185	125		118	83	89	114	93		64
7 Rousay, Egilsay, Wyre, Scockness, Eynhallow	1,098	1,087		185	853	769		393	356	323	390	377		169
8 Graemsay	3	0		8	17	13		33	13	0		0		15
9 Stronsay	398	487		659	658	657		399	328	271		257	161	123
10 Eday & Calf of Eday	44	43		55	76	184		59	66	65		62		25
11 Sanday	738	1,108		1,661	1,670	1,247		519	470	312	349	131	220	114
12 Westray & Papa	597	586		776	825	1,326		487	385	339	312	304	195	222
13 Auskerry	271	13		75	271	75		3	2	0		0	2	3
14 North Ronaldsay	244	264		417	478	341		246	205	275	204	195	129	133
15 Green Holms, M & L	0	0		1	2	2		49	30	15	12	19	25	27
16 Sweynholm, Gairsay, Grass Holm	317	421		180	104	37		156	89	108		187		58
17 Little Linga, Huip, Linga Holm, Spurness	48	63		47	35	12		9	0	1		0	0	0
18 Faray, Holm of Faray & Rusk Holm	6	3		6	9	14		10	9	1	3	0	0	0
19 Copinsay	0	0		1	9	8		0	0	0		0	0	0
20 Switha, Swona, Stroma	704	526		914	535	683		240	206	184		129		39
21 Pentland Skerries	0	0		1	0	0		0	0	0		0		0
<b>Orkney TOTALS</b>	<b>6,655</b>	<b>7,137</b>		<b>7,873</b>	<b>8,522</b>	<b>7,752</b>		<b>4,238</b>	<b>3,374</b>	<b>2,867</b>		<b>2,687</b>		<b>1,865</b>
Pentland Firth			0	141	208	101	73			83				59
Tongue			211	124		73				29				14
<b>North Coast TOTALS</b>			<b>211</b>	<b>265</b>		<b>174</b>				<b>112</b>				<b>73</b>
<b>Orkney &amp; North Coast Seal Management Area TOTALS</b>				<b>8,787</b>						<b>2,979</b>				<b>1,938</b>

**Table 2b.** Counts of grey seals in subregions of the Orkney & North Coast Seal Management Area from 1989 - 2013. The highest complete count for each subregion is highlighted in green, the lowest in red. See Figure 6b for a distribution map and details on subregion boundaries. Orkney surveys were not completed in 2009 and 2012 due to poor weather conditions. Data from aerial surveys by the Sea Mammal Research Unit, University of St Andrews; the 1989 survey was in conjunction with the University of Aberdeen, no grey seal data from 1985.

SMRU subregions	1989	1991	1993	1997	2001	2005	2006	2007	2008	2009	2010	2012	2013
1 Mainland, East & North	37		173	679	96		432	167	258		223		673
2 Mainland, South & West	2		58	165	41		10	36	53		76		86
3 South Ronaldsay & Burray	73		99	124	0		58	39	38		231		217
4 Hoy	41		248	214	143		307	218	365		264		293
5 Flotta, Cava, Rysa, Fara, Barrel of Butter	73		14	146	1		263	165	111		105		330
6 Shapinsay	4		41	204	45		250	30	88	78	43		119
7 Rousay, Egilsay, Wyre, Scockness, Eynhallow	175		93	298	94		393	386	437	314	253		213
8 Graemsay	2		0	3	14		16	3	0		0		10
9 Stronsay	131		525	1,788	553		1,336	949	1,665		1,430	1,345	1,286
10 Eday & Calf of Eday	51		236	223	225		70	255	230		111		114
11 Sanday	255		1,182	1,888	88		462	646	452	393	107	769	525
12 Westray & Papa	122		374	764	347		419	879	1,057	681	704	918	509
13 Auskerry	20		79	99	20		133	100	69		188	219	121
14 North Ronaldsay	148		637	474	397		1,076	1,028	385	556	235	741	383
15 Green Holms, M & L	40		27	23	67		21	95	23	64	32	17	41
16 Sweynholm, Gairsay, Grass Holm	282		58	123	31		28	27	171		83		111
17 Little Linga, Huip, Linga Holm, Spurness	158		340	743	121		220	224	290		647	332	932
18 Faray, Holm of Faray & Rusk Holm	81		129	165	427		529	486	506	654	283	388	452
19 Copinsay	15		98	244	11		160	151	208		390	362	196
20 Switha, Swona, Stroma	1,029		1,438	29	117		2,216	494	705		1,268		390
21 Pentland Skerries	520		972	434	75		1,180	737	910		2,410		883
<b>Orkney TOTALS</b>	<b>3,259</b>		<b>6,821</b>	<b>8,830</b>	<b>2,913</b>		<b>9,579</b>	<b>7,115</b>	<b>8,021</b>		<b>9,083</b>		<b>7,884</b>
Pentland Firth			1	0	36		2	223		66			86
Tongue			88	597			353		278				109
<b>North Coast TOTALS</b>		<b>89</b>		<b>597</b>		<b>355</b>			<b>344</b>				<b>195</b>
<b>Orkney &amp; North Coast Seal Management Area TOTALS</b>				<b>9,427</b>					<b>8,365</b>				<b>8,079</b>

**Table 3a.** Numbers of harbour seals counted in the Sanday Special Area of Conservation, Orkney. Highest counts for each subarea are in green, lowest counts in red. Subareas are numbered in Figure 8 which shows the distribution of harbour and grey seals on Sanday in 2013 and in 1997.

Section of Sanday coast	1985	1989	1993	1997	2001	2006	2007	2008	2009	2010	2012	2013
1 Holms of Ire	286	272	417	440	328	179	153	59	99	20	64	24
2 The Riv	0	0	34	0	35	6	0	0	0	0	0	0
3 Whitemill	8	0	122	37	69	82	67	39	0	16	6	25
4 Otterswick	131	278	313	314	200	26	48	48	82	32	34	20
5 Taings	23	67	118	213	194	28	40	45	17	7	20	2
6 Tofts	45	78	96	127	78	36	2	12	45	8	23	14
7 Start Point	30	85	217	218	113	98	87	43	42	18	19	4
8 Lopness	8	0	1	2	0	0	0	0	0	1	0	1
9 Tres Ness	26	30	36	31	46	10	7	0	0	0	4	2
10 Els Ness	89	126	148	98	59	14	31	14	23	13	23	7
11 Kettletoft	0	5	2	1	30	0	0	0	7	1	3	0
<b>TOTAL Sanday SAC</b>	<b>646</b>	<b>941</b>	<b>1,504</b>	<b>1,481</b>	<b>1,152</b>	<b>479</b>	<b>435</b>	<b>260</b>	<b>315</b>	<b>116</b>	<b>196</b>	<b>99</b>
12 Quoy Ness	60	113	147	121	13	24	16	22	13	11	12	3
13 Spur Ness	0	0	0	0	0	3	5	0	0	0	0	0
14 Lamba Ness	32	54	10	68	71	12	14	30	21	4	12	7
15 Brough	0	0	0	0	11	1	0	0	0	0	0	5
<b>TOTAL Sanday</b>	<b>738</b>	<b>1,108</b>	<b>1,661</b>	<b>1,670</b>	<b>1,247</b>	<b>519</b>	<b>470</b>	<b>312</b>	<b>349</b>	<b>131</b>	<b>220</b>	<b>114</b>

**Table 3b.** Numbers of grey seals counted in the Sanday Special Area of Conservation, Orkney. Highest counts for each area are in green, lowest counts in red. Areas are numbered in Figure 8 which shows the distribution of harbour and grey seals on Sanday in 2013 (left) and in 1997 (right).

<b>Section of Sanday coast</b>	<b>1989</b>	<b>1993</b>	<b>1997</b>	<b>2001</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2012</b>	<b>2013</b>
1 Holms of Ire	1	0	76	4	33	92	0	54	0	24	52
2 The Riv	4	201	255	58	0	31	1	0	0	15	72
3 Whitemill	2	0	195	0	69	0	55	40	0	25	30
4 Otterswick	2	0	30	0	42	78	7	22	0	7	5
5 Taings	2	24	80	0	47	16	27	3	0	111	216
6 Tofts	113	393	271	5	21	111	42	98	9	79	25
7 Start Point	1	101	97	16	47	139	139	58	6	316	10
8 Lopness	3	10	15	0	0	13	22	22	14	27	15
9 Tres Ness	105	172	481	2	127	141	113	57	44	74	45
10 Els Ness	1	137	171	3	9	4	15	14	4	35	11
11 Kettletoft	0	0	0	0	0	0	0	0	0	0	1
<b>TOTAL Sanday SAC</b>	<b>234</b>	<b>1,038</b>	<b>1,671</b>	<b>88</b>	<b>395</b>	<b>625</b>	<b>421</b>	<b>368</b>	<b>77</b>	<b>713</b>	<b>482</b>
12 Quoy Ness	18	142	215	0	67	19	31	20	28	43	35
13 Spur Ness	0	0	0	0	0	0	0	0	0	0	0
14 Lamba Ness	3	0	0	0	0	2	0	5	2	13	7
15 Brough	0	2	2	0	0	0	0	0	0	0	1
<b>TOTAL Sanday</b>	<b>255</b>	<b>1,182</b>	<b>1,888</b>	<b>88</b>	<b>462</b>	<b>646</b>	<b>452</b>	<b>393</b>	<b>107</b>	<b>769</b>	<b>525</b>

**Table 4a.** 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); fw = fixed-wing aircraft, ti = helicopter with thermal imager; red = lowest (mean) count for given area, green = highest (mean) count. A histogram of these data is given in Figure 10a and a distribution map for 2013 data is shown in Figure 9. Data are from aerial surveys by the Sea Mammal Research Unit. Since 2006, all surveys incorporated hand-held oblique digital photography.

Area	1992	1993	1994	1997	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		
	Survey method	fw	fw	fw	ti	fw	fw&ti	fw	2fw	2fw&1ti	fw&ti	ti	fw&ti	fw	fw	ti	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		
Loch Fleet		16		27	33	59	56	64	71	80	83	82	65	114	113	133	135		
Dornoch Firth (SAC)	662		542	593	405	220	290	231	191	257	144	145	166	219	208	157	143		
Cromarty Firth	41		95	95	38	42	113	88	106	106	102	90	90	140	101	144	63		
Beaully Firth (incl. Milton)	220		203	219	204	66	151	178	127	176	146	150	85	140	57	60	30		
Ardersier (incl. Eathie)			221	234	191	110	205	202	210	197	154	145	277	362	195	183	199		
Culbin & Findhorn			58	46	111	144	167	49	93	58	79	92	73	123	163	254	218		
Burghead to Fraserburgh			0	1					3		0				29		39		
<hr/>																			
Dornoch Firth to Ardersier			1,061	1,141	838	438	759	699	634	736	546	530	618	861	561	544	435		
<hr/>																			
Loch Fleet to Ardersier				1,168	871	497	815	763	705	816	629	612	683	975	674	677	570		
<hr/>																			
Loch Fleet to Findhorn				1,214	982	641	982	812	798	874	708	704	756	1,098	837	931	788		
<hr/>																			
Helmsdale to Findhorn				1,407		829			911	1,024	762	777	775	1,199	924	1,033	858		
<hr/>																			
Moray Firth SMA *				1,409		831			914	1,028	763	778	776	1,200	954	1,063	898		

\* 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.

**Table 4b.** 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); fw = fixed-wing aircraft, ti = helicopter with thermal imager; red = lowest (mean) count for given area, green = highest (mean) count. A histogram of these data is given in Figure 10b and a distribution map for 2013 data is shown in Figure 9. Data are from aerial surveys by the Sea Mammal Research Unit. Since 2006, all surveys incorporated hand-held oblique digital photography.

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

\* 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.

**Table 5a&b.** Counts of seals in the Firth of Tay & Eden Estuary Special Area of Conservation. Mean values are given for areas surveyed more than once in a single season (2005, 2007, 2008); fw = fixed-wing aircraft, ti = helicopter with thermal imager; red = lowest (mean) count for given area, green = highest (mean) count. A histogram of these data is given in Figure 12a & b and a distribution map for 2013 data is shown in Figure 11. Data are from aerial surveys by the Sea Mammal Research Unit. Since 2006, all surveys incorporated hand-held oblique digital photography.

(a) Harbour seals

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

(b) Grey seals

Area	1990	1991	1992	1994	1997	2000	2002	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013
Survey method	1fw	1fw	1fw	1fw	1ti	1fw	1fw	1fw	2fw,1ti	1fw	1fw,1ti	2fw	1fw	1fw	1fw	1fw	1ti
Upper Tay	0	0	18	20	61	64	78	50	42	22	27	41	55	98	16	39	110
Broughty Ferry	0	3	0	9	0	0	0	16	0	8	1	4	0	0	2	3	0
Buddon Ness	0	0	1	104	0	101	0	33	11	25	85	4	0	12	22	13	18
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
Eden Estuary	0	0	16	0	10	0	25	4	27	57	31	17	0	39	17	36	14
<b>SAC total</b>	<b>912</b>	<b>1,549</b>	<b>1,226</b>	<b>1,468</b>	<b>1,891</b>	<b>2,253</b>	<b>1,593</b>	<b>1,663</b>	<b>843</b>	<b>1,379</b>	<b>1,519</b>	<b>508</b>	<b>450</b>	<b>1,555</b>	<b>1,322</b>	<b>1,202</b>	<b>465</b>

**Table 6a.** Counts of harbour seals in the West Scotland Seal Management Area; red = lowest count for a given area, green = highest count.

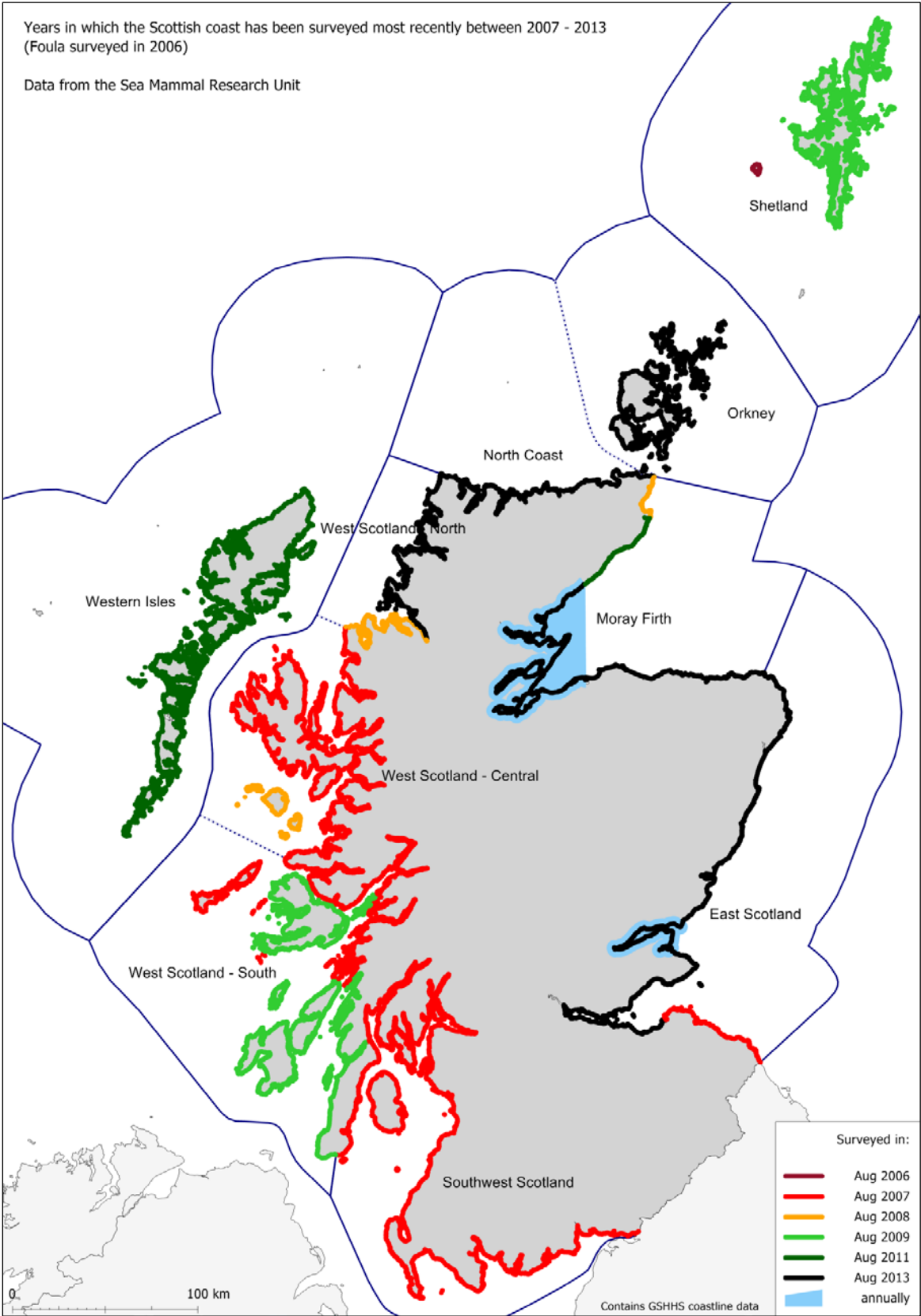
Seal Management Area subdivision	Subregion	1988	1989	1990	1991	1992	1996	1997	2000	2005	2007	2008	2009	2013
West Scotland - North:	Kinlochbervie				33			69		22		7		18
	Eddrachillis Bay				207			252		257		277		355
	Enard Bay				6			13		30		38		56
	Summer Isles				80			120		347		327		666
<b>Subtotal for areas surveyed in 2013</b>					<b>326</b>			<b>454</b>		<b>656</b>		<b>649</b>		<b>1,095</b>
West Scotland - North:	Little Loch Broom	1					0			10		4		
	Gruinard Bay	3					5			15		6		
	Loch Ewe	7					1			28		33		
<b>Total West Scotland - North</b>										<b>709</b>		<b>692</b>		
West Scotland - Central:	Gairloch	2					7			0		1		
	Torridon	18					3		36	20	53			
	Applecross	48					45		134	86	86			
	Plockton	282	158				277		271	279	335			
	Raasay	3					38		155	90	151			
	Rona	21					101		163	173	257			
	Skye	1,233	1,269			1,296	1,728		2,220	1,899	1,757			
	Kyle	43	15				9		0	31	23			
	Sound of Sleat	43	53				76			60	83			
	Loch Nevis	30	68				75		26	79	31			
	Arisaig	456	499				213		597	650	692			
	Ardnamurchan N	33	27				13		118	153	148			
	Rhum			10			2			0		0		
	Eigg			29			36			77		66		
	Muck			25			58			140		94		
Canna			41			19			219		227			
<b>Total West Scotland - Central</b>							<b>2,700</b>			<b>3,956</b>				
West Scotland - South:	Ardnamurchan S	85					139		325	112	165			
	Sound of Mull	23					36		77	64	108			
	Loch Linnhe	110					135		150	125	74			
	Coll			367			947		987		690			
	Tiree			124			338		357		231			
	Mull	607	940	1,008	883	825	1,059		1,616		981		1,483	
	Treshnish Isles	29					41		31		14			
	Lismore	535	398	491	405	340	611		457		326		498	
	Loch Creran	36				12	66		67		55			
	Firth of Lorn			461			431		527		380			
	Colonsay			109			83		102		59		87	
	Jura			375			122		548		539		601	
	Islay			724			605		1,108		1,001		792	
	West Coast Kintyr			1,153			1,012		781		644		629	
	Oronsay			24			0		75		2		0	
Loch Etive			35			26		31		27				
<b>Total West Scotland - South</b>							<b>5,651</b>		<b>7,239</b>		<b>5,296</b>			
		<i>1988 - 1991</i>			<i>1996 - 1997</i>			<i>2007 - 2008</i>						
<b>Total West Scotland SMA</b>		<b>7,511</b>			<b>8,811</b>			<b>9,992</b>						

**Table 6b.** Counts of grey seals in the West Scotland Management Area; red = lowest count for a given area, green = highest count.

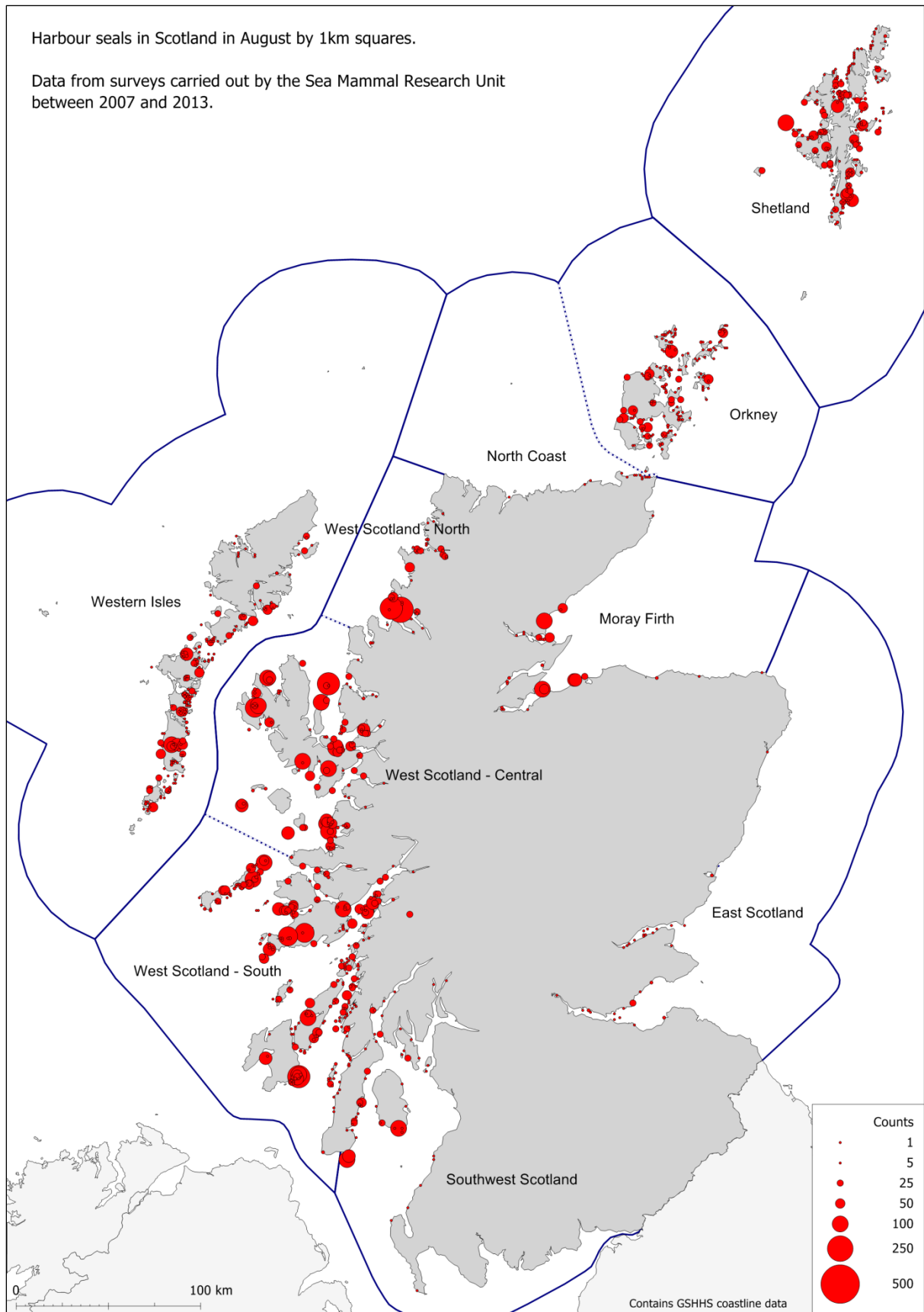
Seal Management Area subdivision	Subregion	1988	1989	1990	1991	1992	1996	1997	2000	2005	2007	2008	2009	2013
West Scotland - North:	Kinlochbervie				157			136		40		45		29
	Eddrachillis Bay				3			122		116		54		166
	Enard Bay				9			82		7		7		9
	Summer Isles				21			24		73		54		144
<b>Subtotal for areas surveyed in 2013</b>					<b>190</b>			<b>364</b>		<b>236</b>		<b>160</b>	<b>348</b>	
West Scotland - North:	Little Loch Broom	0					0			14		12		
	Gruinard Bay	0					0			0		2		
	Loch Ewe	0					15			1		3		
<b>Total West Scotland - North</b>										<b>251</b>		<b>177</b>		
West Scotland - Central:	Gairloch	0					0			0	3			
	Torridon	0					0		0	5	0			
	Applecross	11					0		3	1	2			
	Plockton	0	0				0		1	0	0			
	Raasay	0					0		1	6	5			
	Rona	5					0		4	4	3			
	Skye	135	46			242	378		328	156	203			
	Kyle	0	0				0		0	0	0			
	Sound of Sleat	0	6				2			2	0			
	Loch Nevis	0	0				0		16	3	1			
	Arisaig	0	20				0		5	9	4			
	Ardnamurchan N	0	3				0		0	1	0			
	Rhum				57		84			22			66	
	Eigg				31		9			26			66	
	Muck				17		22			13			18	
Canna				151		436			113			190		
<b>Total West Scotland - Central</b>							<b>931</b>		<b>361</b>					
West Scotland - South:	Ardnamurchan S	0					0		9	1	0			
	Sound of Mull	0					0		1	0	0			
	Loch Linnhe	0					0		0	0	0			
	Coll				167		243		274		98			
	Tiree				337		910		450		330			
	Mull	52	47	35	32	72	63		86		100			55
	Treshnish Isles	56					170		65		73			
	Lismore	0	3	0	0	0	0		25		3			10
	Loch Creran	0					0		0		0			
	Firth of Lorn				10		0		4		10			
	Colonsay				17		35		57		21			63
	Jura				26		27		19		59			39
	Islay				162		441		415		551			657
	W Coast Kintyre				17		6		24		21			13
	Oronsay				303		230		342		395			392
Loch Etive				0		0		0		0				
<b>Total West Scotland - South</b>							<b>2,125</b>		<b>1,771</b>		<b>1,661</b>			
		<i>1988 - 1991</i>			<i>1996 - 1997</i>			<i>2007 - 2008</i>						
<b>Total West Scotland SMA</b>		<b>1,656</b>			<b>3,435</b>			<b>2,399</b>						

**Table 7.** Counts of harbour seals in Special Areas of Conservation (SACs) designated for the protection of harbour seals; red = lowest count for a given SAC, green= highest count.

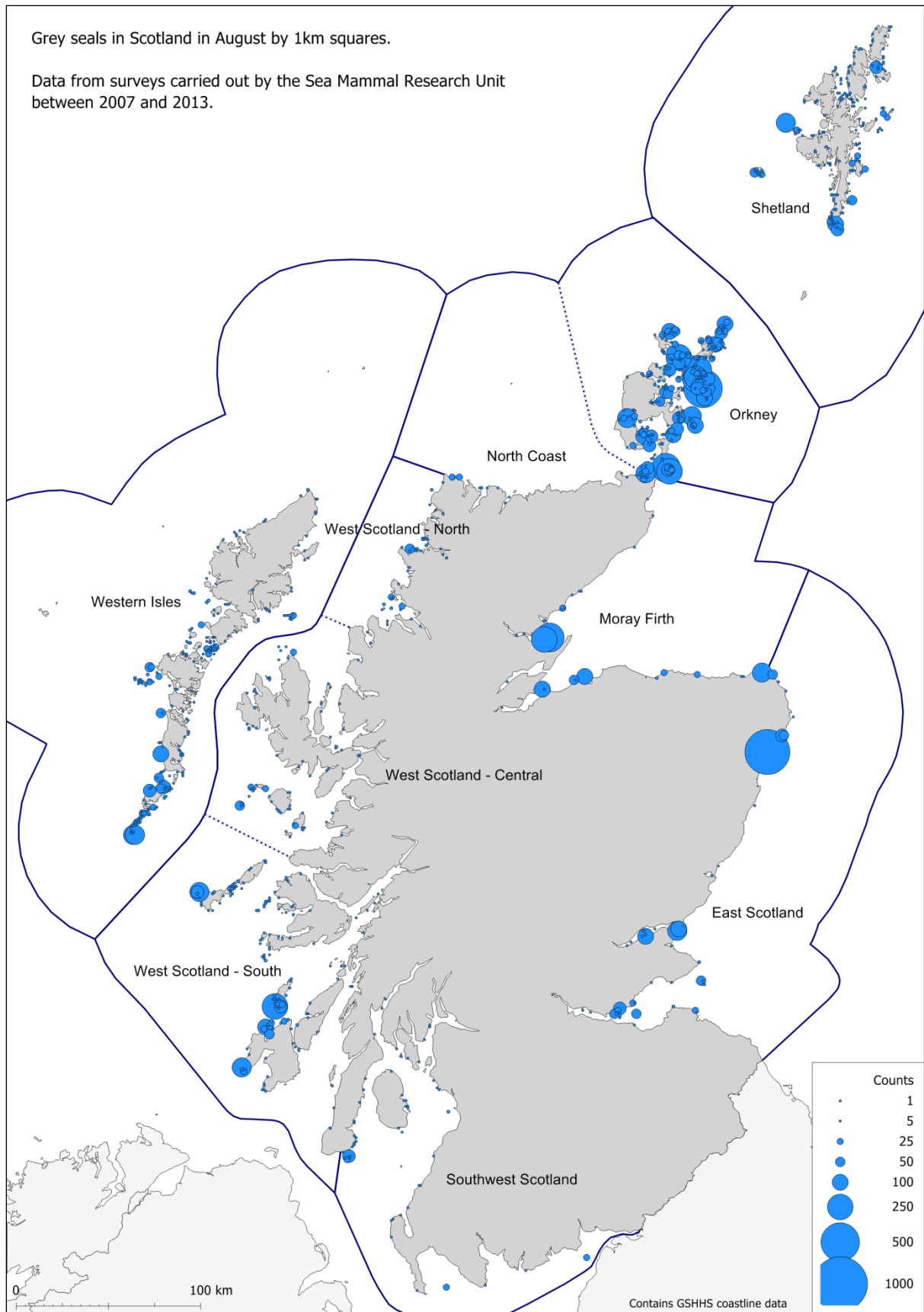
Harbour seal SAC	1996	1997	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
South-east Islay Skerries	552		812							741		666				
Lismore	591		453							322		498				
Ascrib, Isay & Dunvegan	656		968					678		719						
Sanday		1,481		1,152					479	435	260	315	116		220	114
Mousa		402		235					83			93				
Yell Sound		501		351					212			168				
Dornoch Firth & Morrich More		593	405		220	290	231	191	257	144	145	166	219	208	157	143
Firth of Tay & Eden Estuary		633	700		668	461	459	335	342	275	222	111	124	77	88	50



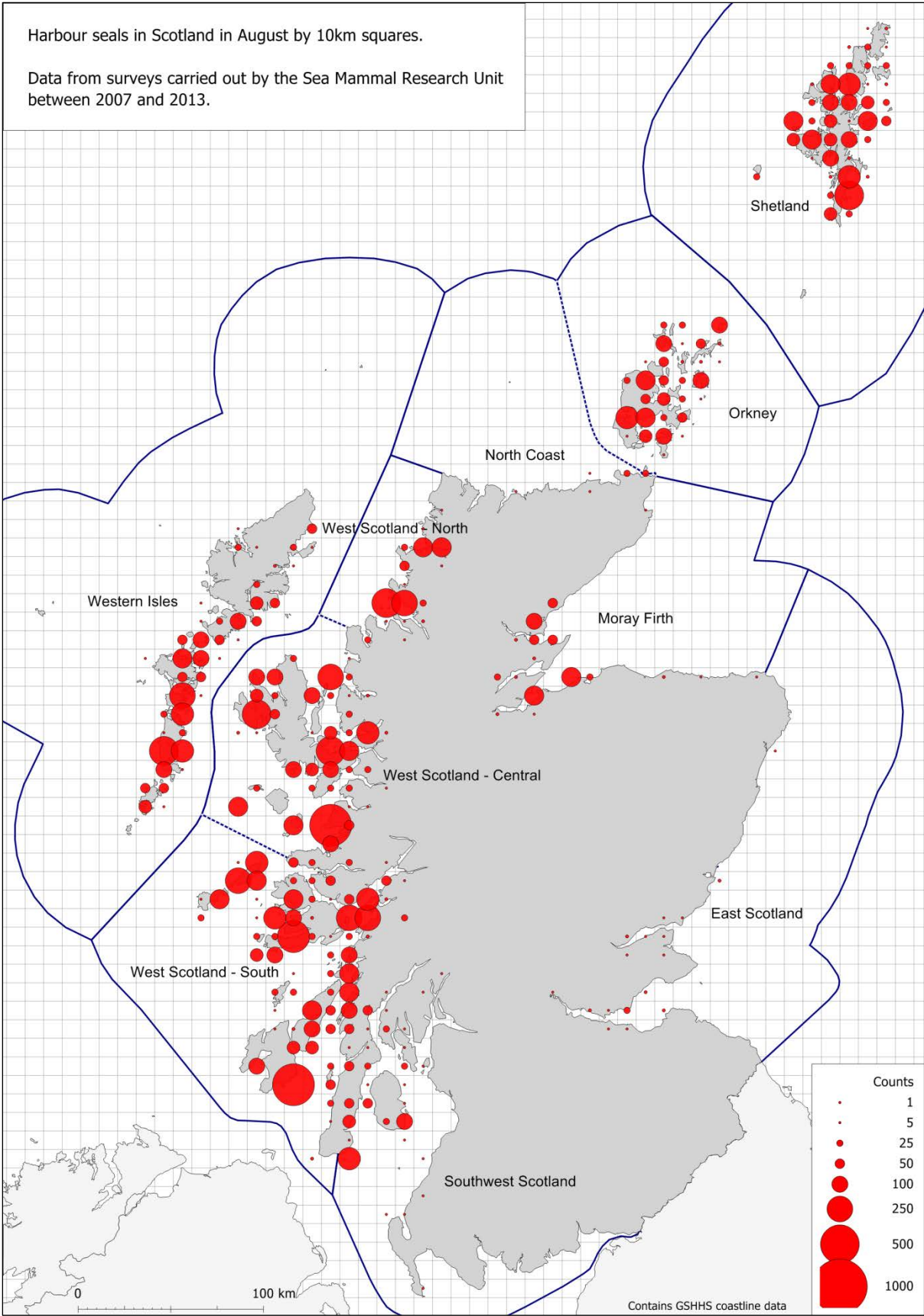
**Figure 1.** Map showing the years in which different parts of Scotland were surveyed for harbour seals most recently. Most areas were surveyed between 2007 and 2013. Foula, off Shetland, was last surveyed in 2006. The Firth of Tay and the Moray Firth (Helmsdale and Findhorn), are surveyed every year by fixed-wing aircraft. All other areas are surveyed by helicopter using a thermal imager.



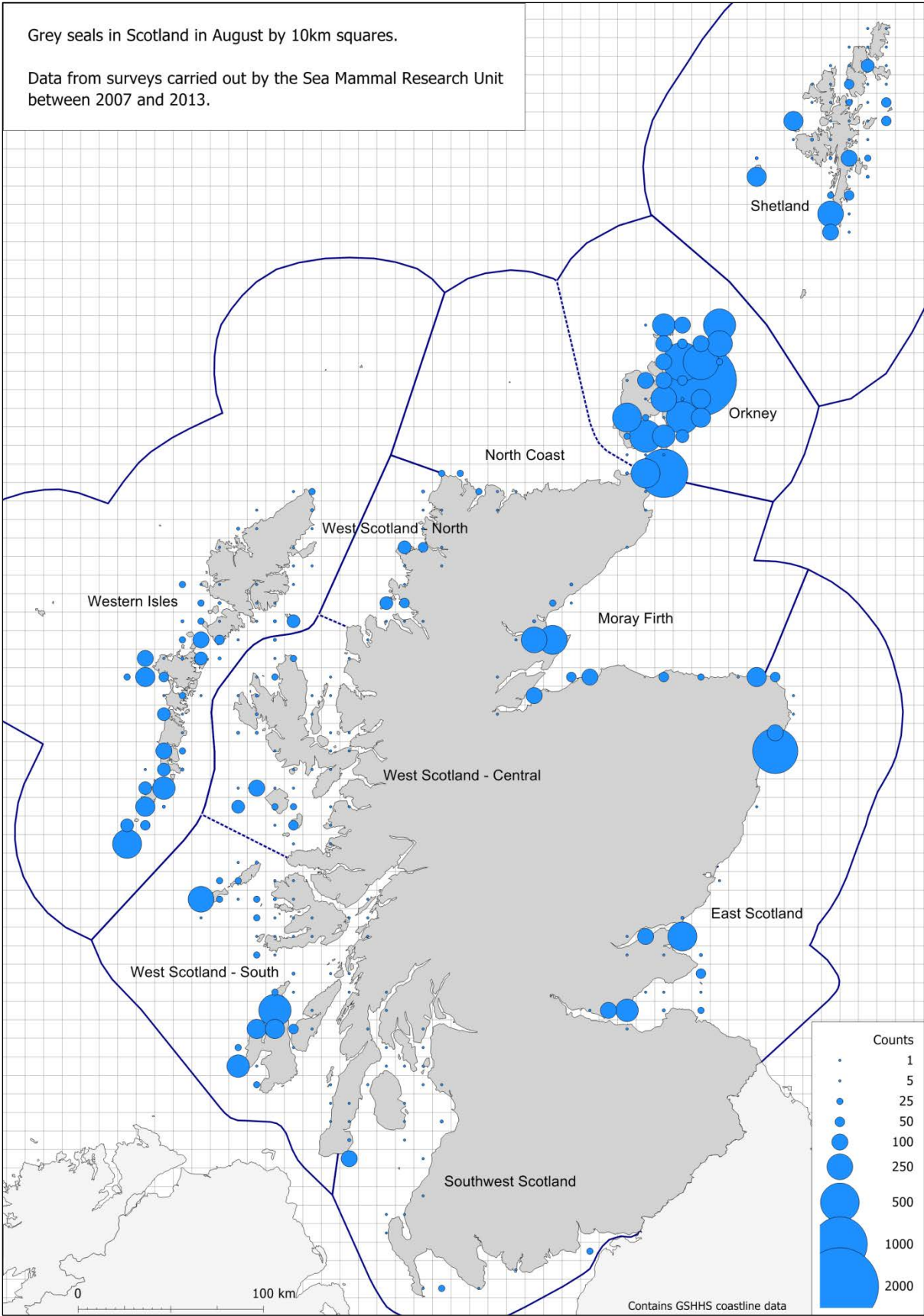
**Figure 2a.** The number and distribution of harbour seals in Scotland within 1km squares. Seal Management Areas (SMAs) and subdivisions (dotted lines) are outlined.



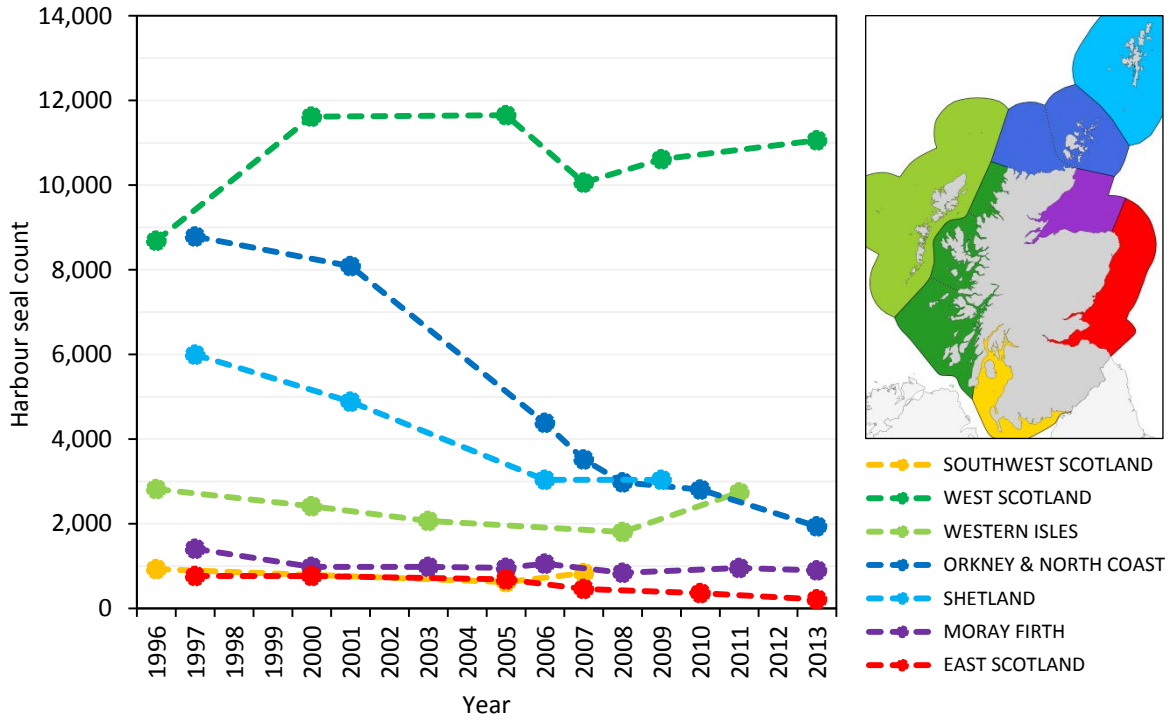
**Figure 2b.** The number and distribution of grey seals in Scotland within 1km squares. Seal Management Areas (SMAs) and subdivisions (dotted lines) are outlined.



**Figure 3a.** This map shows the same data for harbour seals in Scotland as Figure 2a but aggregated by 10km squares, removing many overlaps between data points.

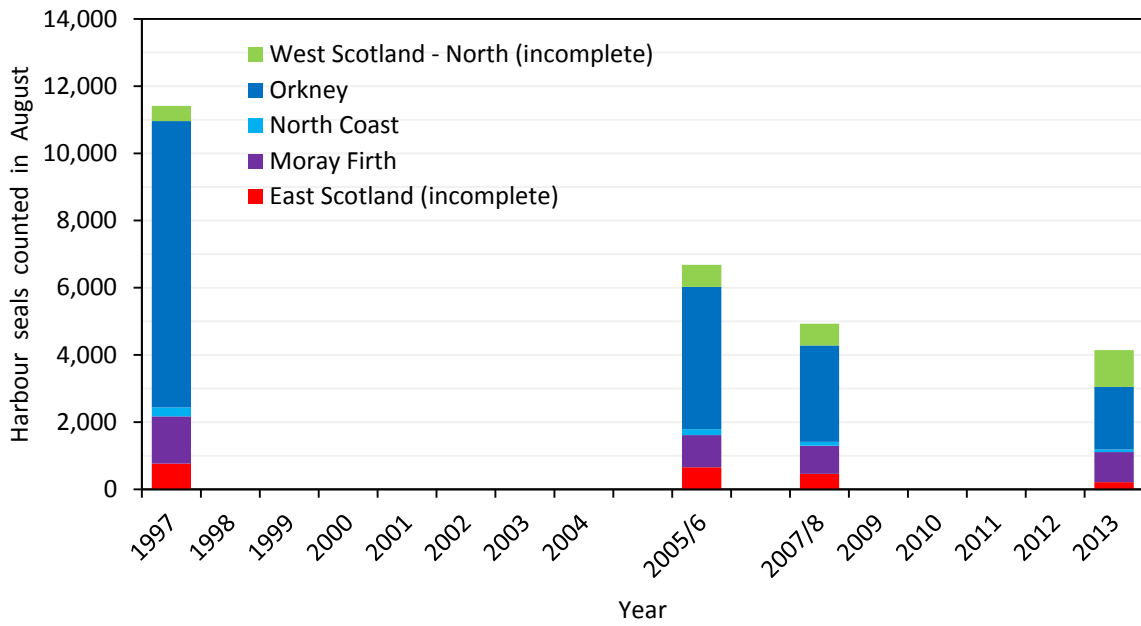


**Figure 3b.** This map shows the same data for grey seals in Scotland as Figure 2b but aggregated by 10km squares, removing many overlaps between data points.

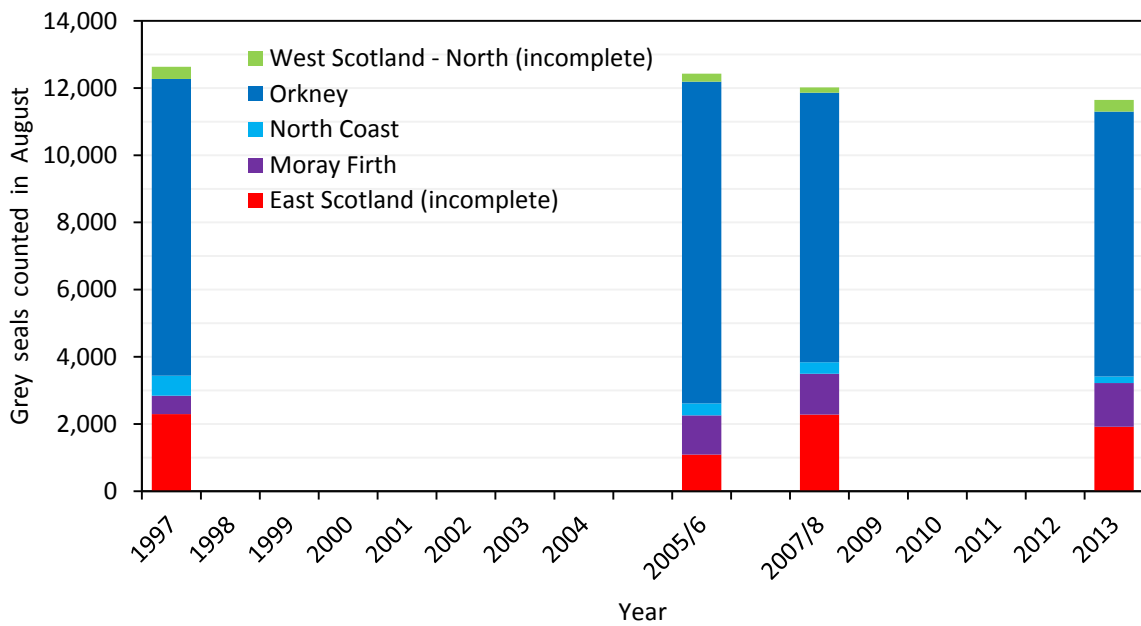


**Figure 4.** A comparison of August counts of harbour seals in Scottish Seal Management Areas (SMAs) from 1996 to 2013. All surveys were carried out by the Sea Mammal Research Unit. From 2006, thermal image counts have been verified using digital still images where possible. Note that because these 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.

(a) Harbour seals counted in areas surveyed in August 2013

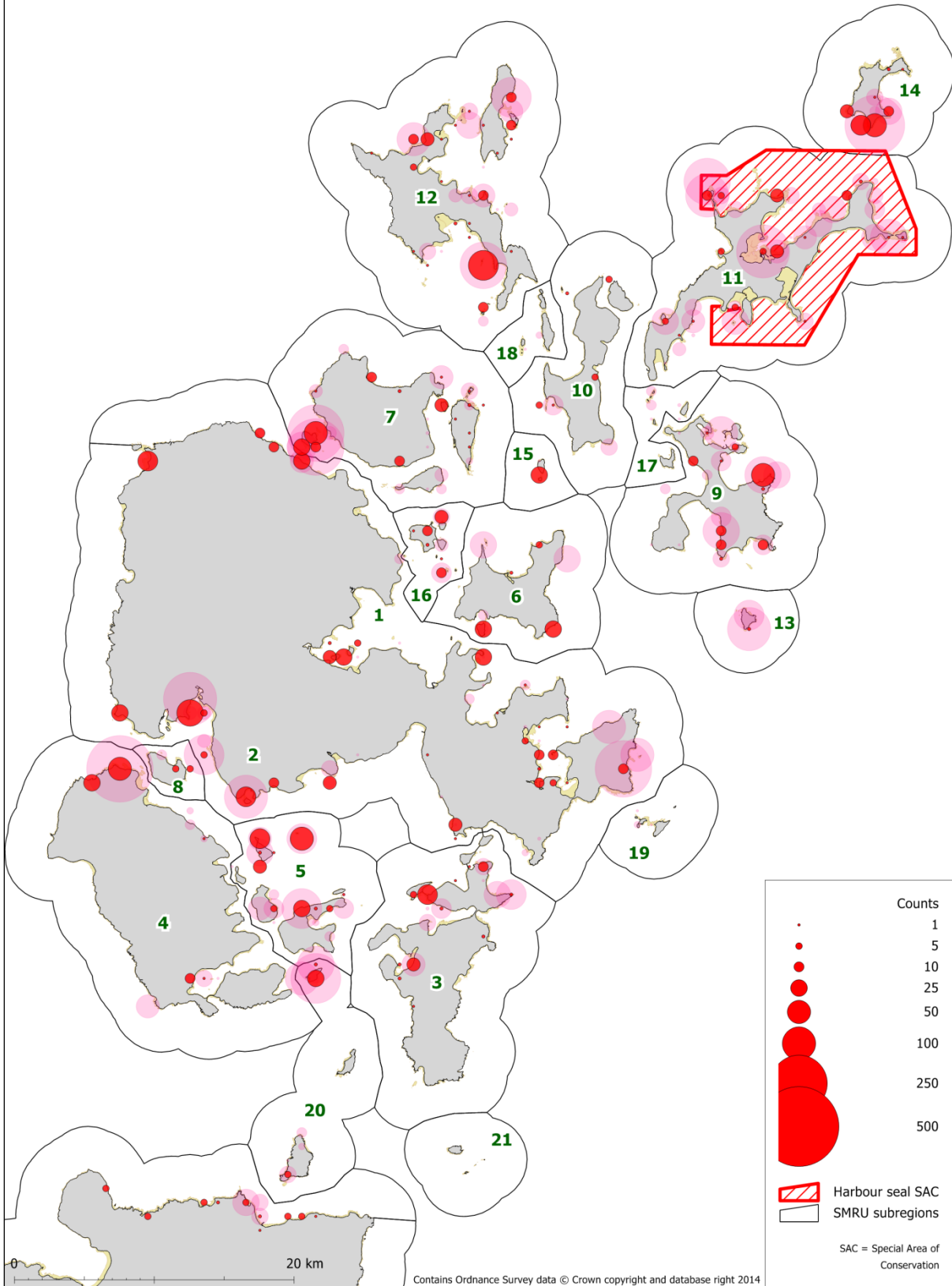


(b) Grey seals counted in areas surveyed in August 2013

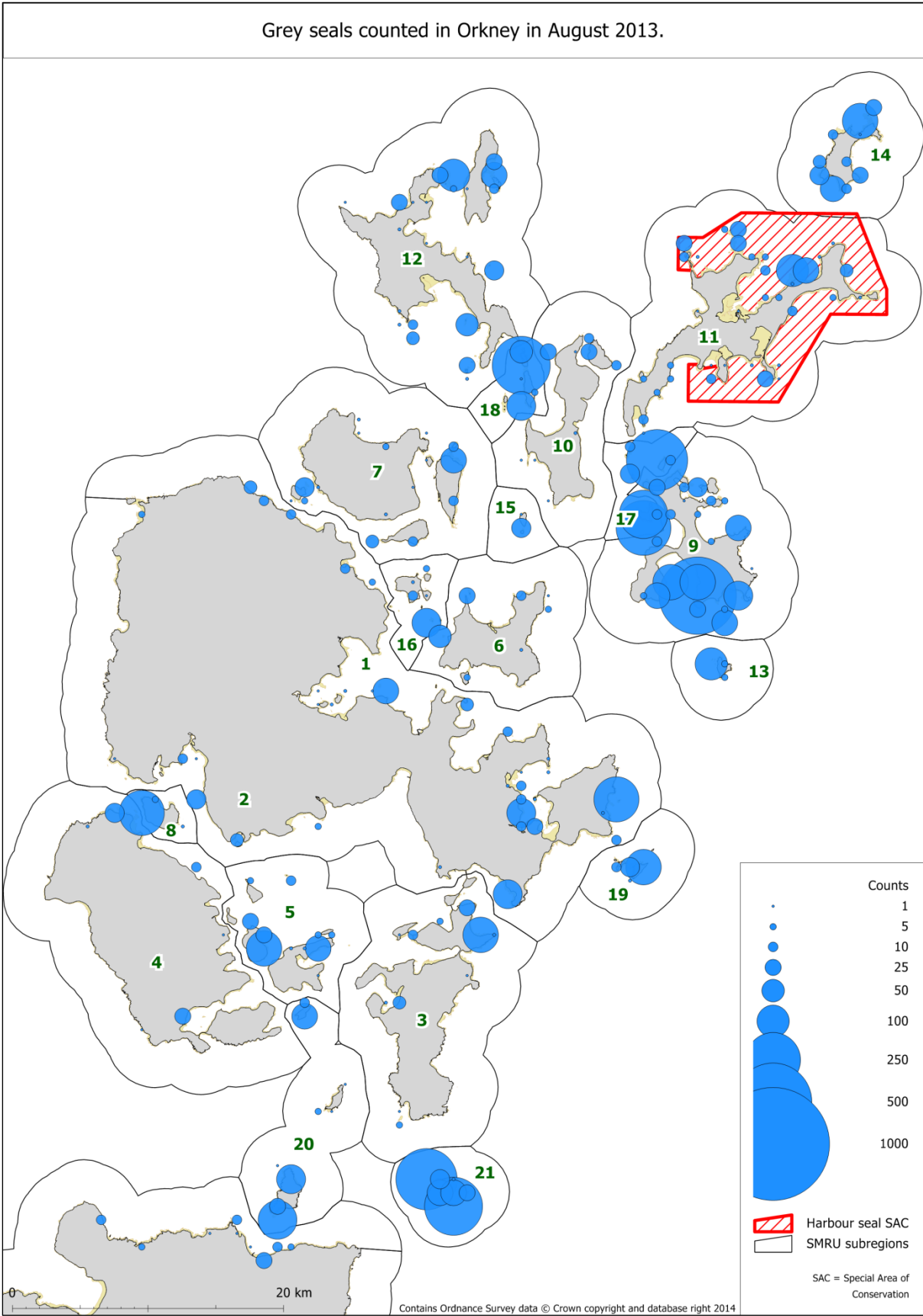


**Figure 5a&b.** Seals counted in Seal Management Areas surveyed in August 2013 compared to counts from previous surveys covering the same area.

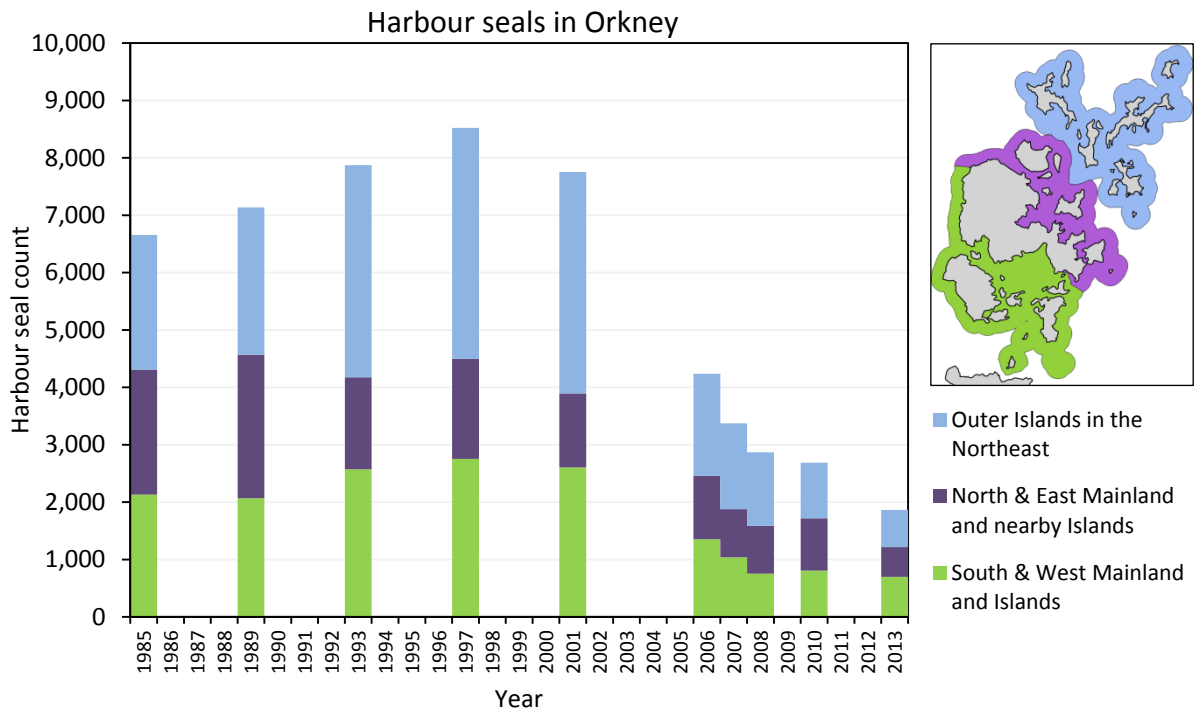
Harbour seals counted in Orkney in August 2013 compared to the highest previous count in 1997.



**Figure 6a.** Harbour seals counted in Orkney in August 2013. Data have been aggregated by 1km squares to better display seal distribution. Data from the highest Orkney count in 1997 are shown in pink. Counts of seals in the numbered subregions are given in Table 2a.



**Figure 6b.** Grey seals counted in Orkney in August 2013. Data have been aggregated by 1km squares to better display seal distribution. Counts of seals in the numbered subregions are given in Table 2b.



**Figure 7.** A comparison of the numbers of harbour seals counted in three subareas of Orkney in August 2013 with counts from previous surveys.

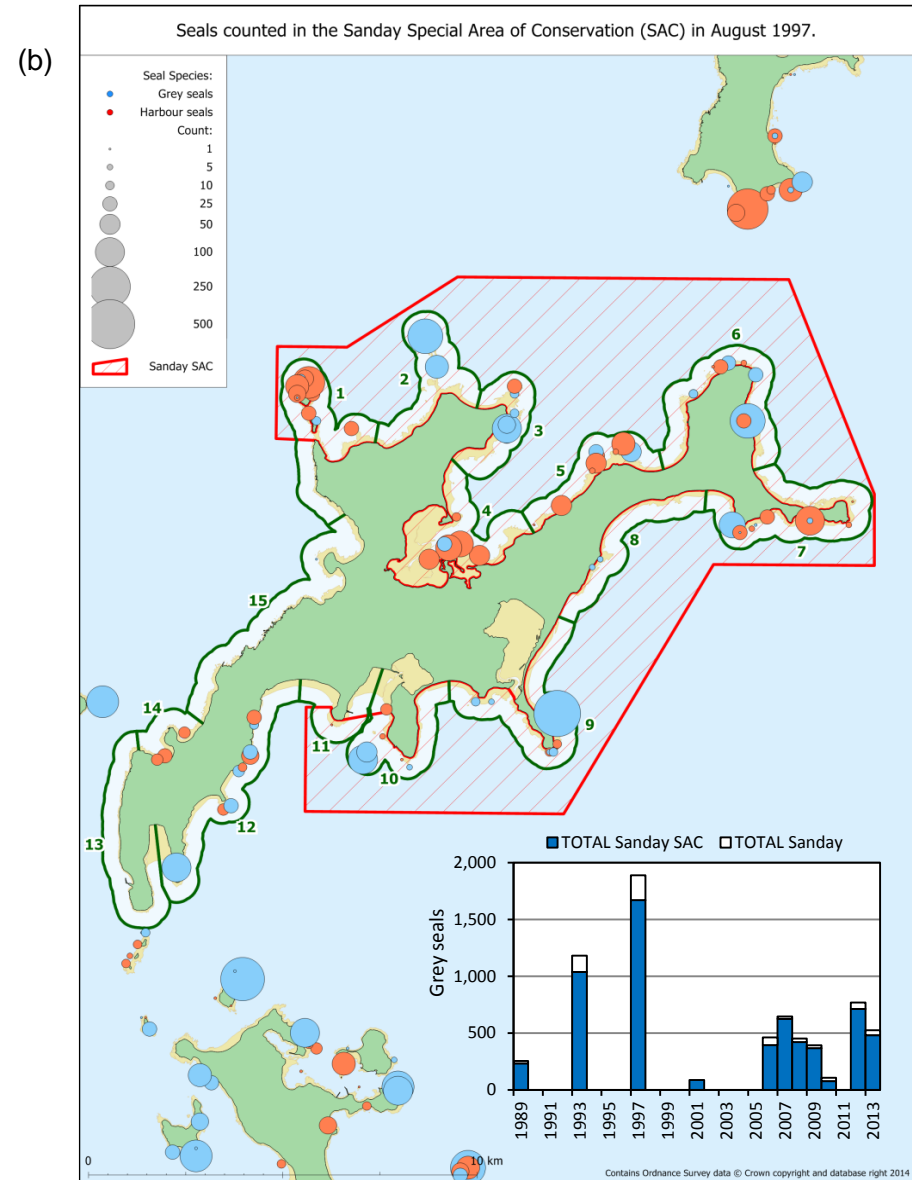
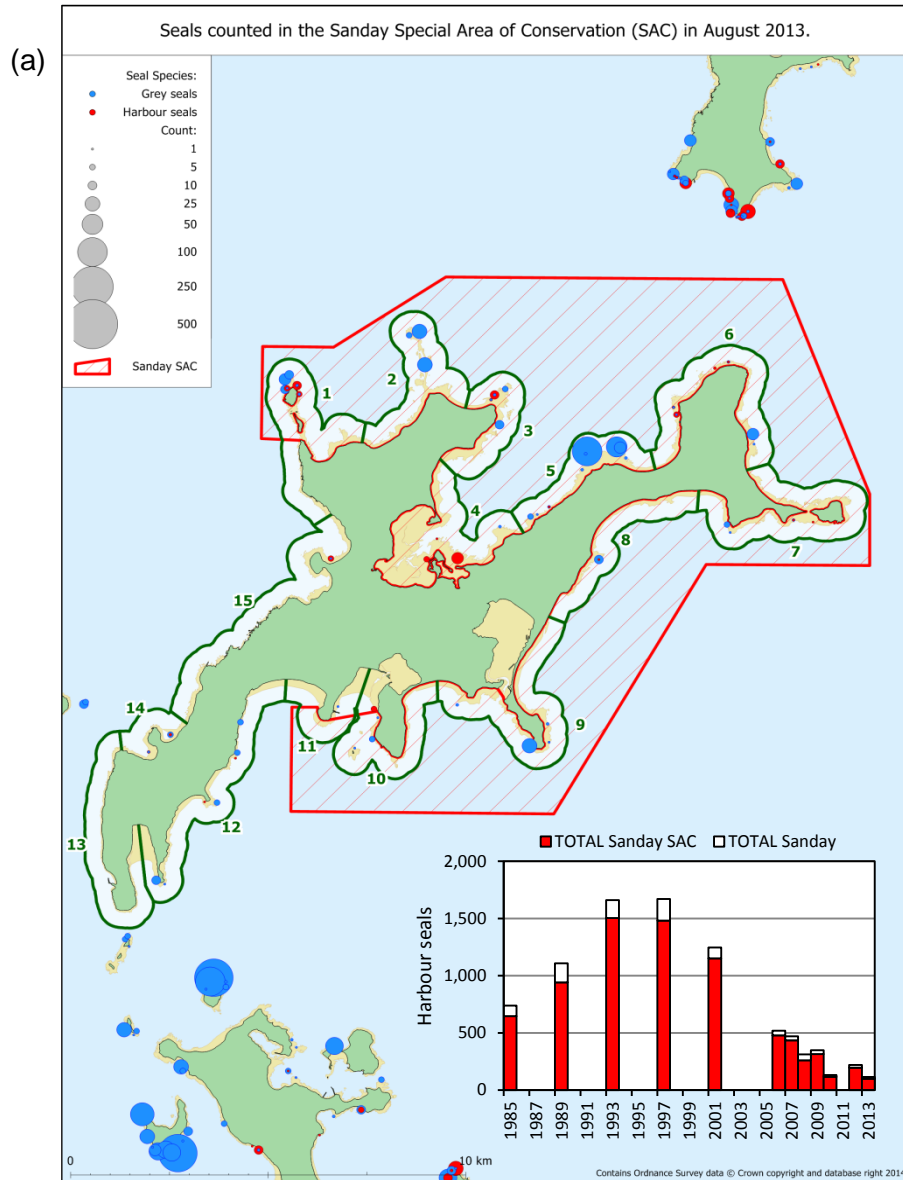
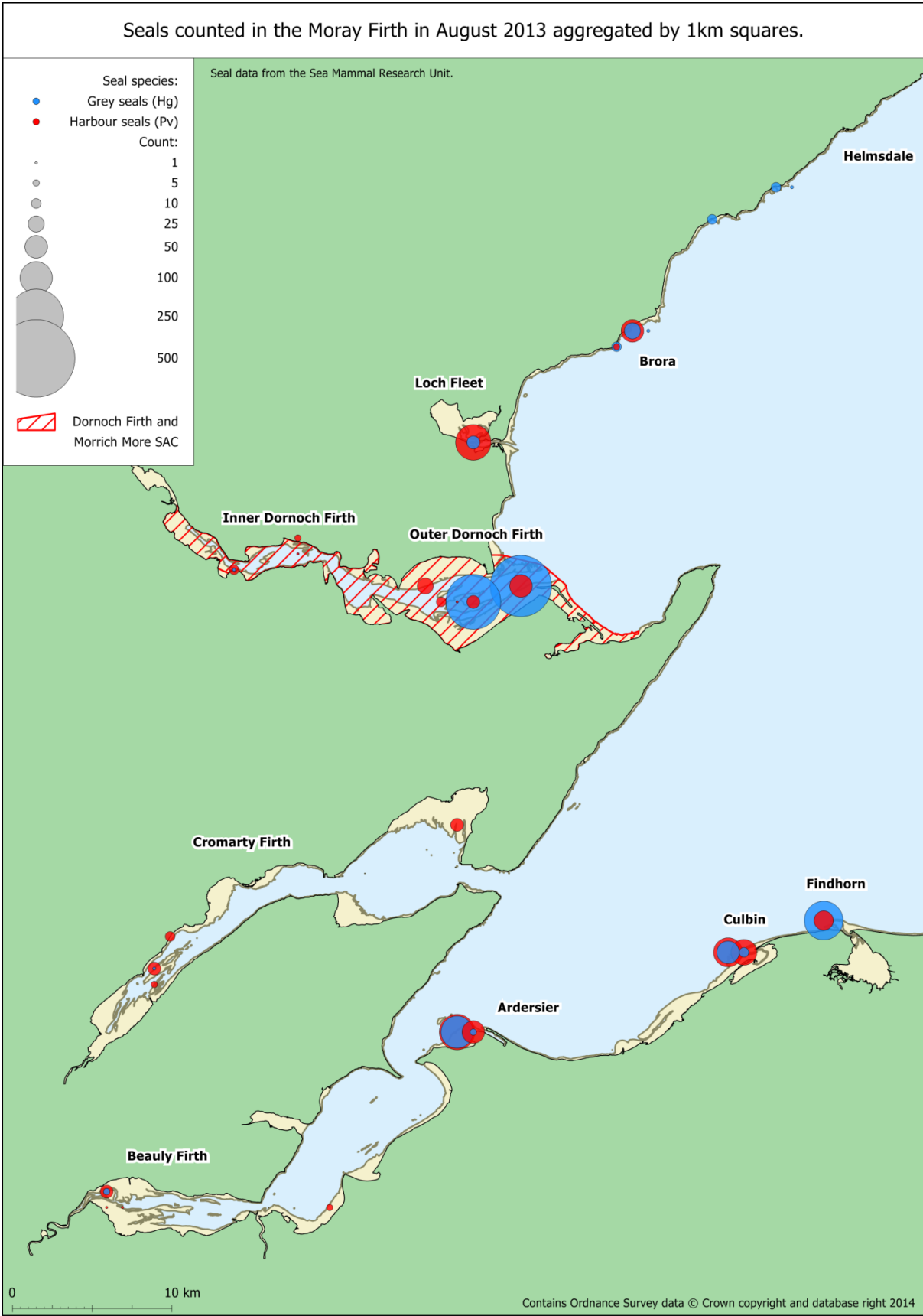
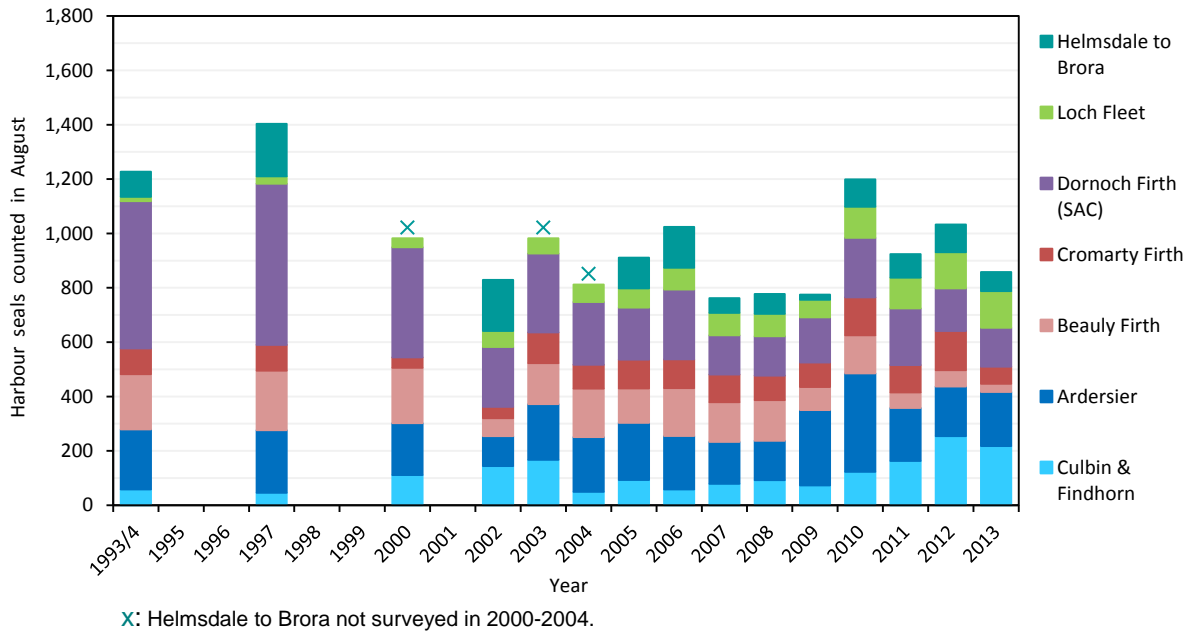


Figure 8a&b. The distribution of harbour and grey seals on Sanday, Orkney, showing the differences between Aug 2013 (a) and Aug 1997 (b).

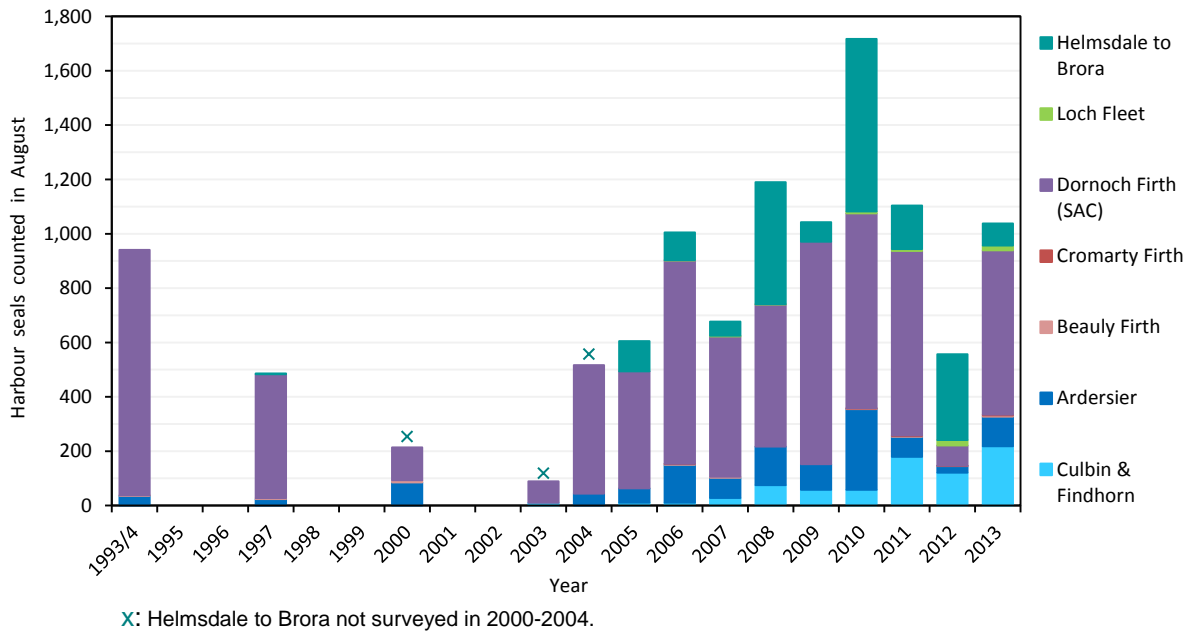


**Figure 9.** Distribution of harbour and grey seals counted in the Moray Firth, between Helmsdale and Findhorn, from an aerial survey carried out on 16<sup>th</sup> August 2013. Detailed counts are given in Table 4a (harbour seals) and Table 4b (grey seals).

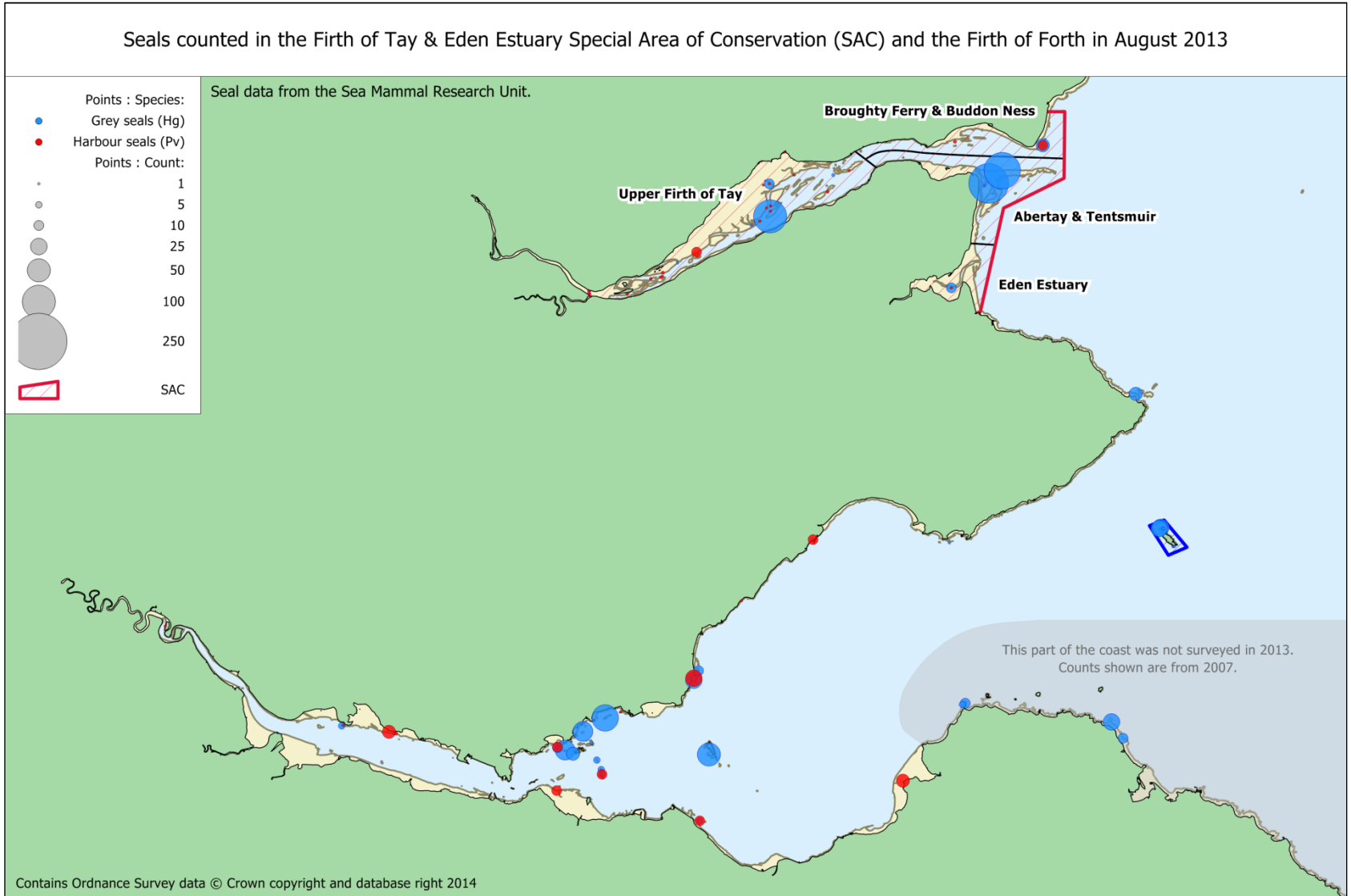
(a) harbour seals in the Moray Firth in August



(b) grey seals in the Moray Firth in August

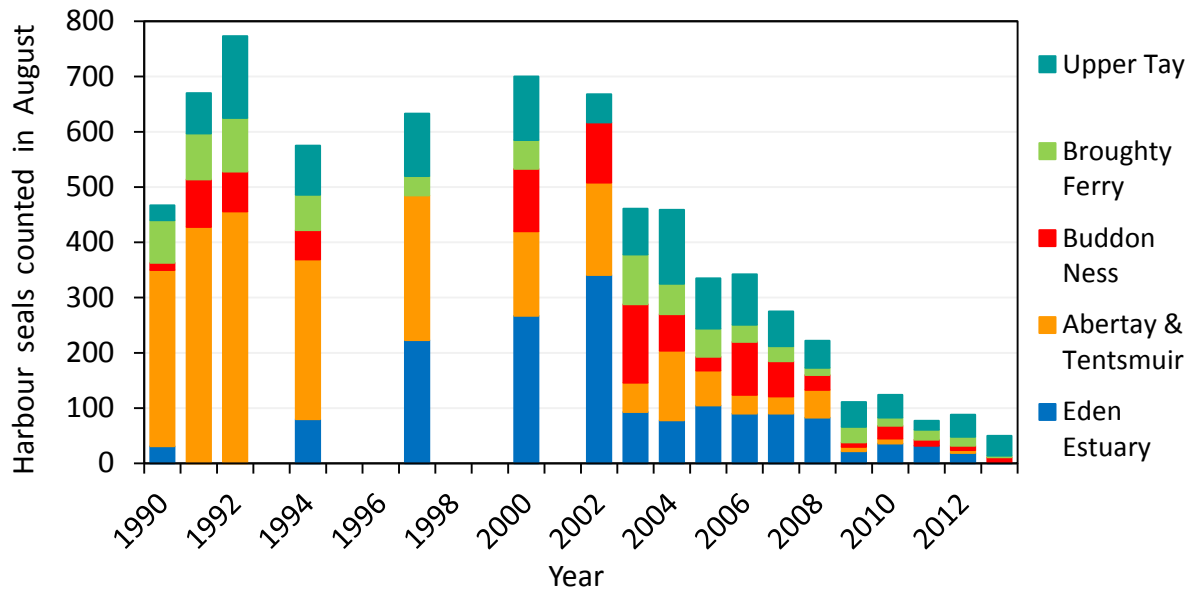


**Figure 10a&b.** August counts of harbour seals (a) and grey seals (b) in parts of the Moray Firth from 1994 - 2013 (see Figure 9). Mean values were used for areas surveyed more than once in a single season (2004-2008). Helmsdale to Brora and Loch Fleet were not surveyed in 1994, so 1993 counts were used for these areas. The Dornoch Firth and Morrich Mhor is a harbour seal SAC. Data are from aerial surveys by the Sea Mammal Research Unit.

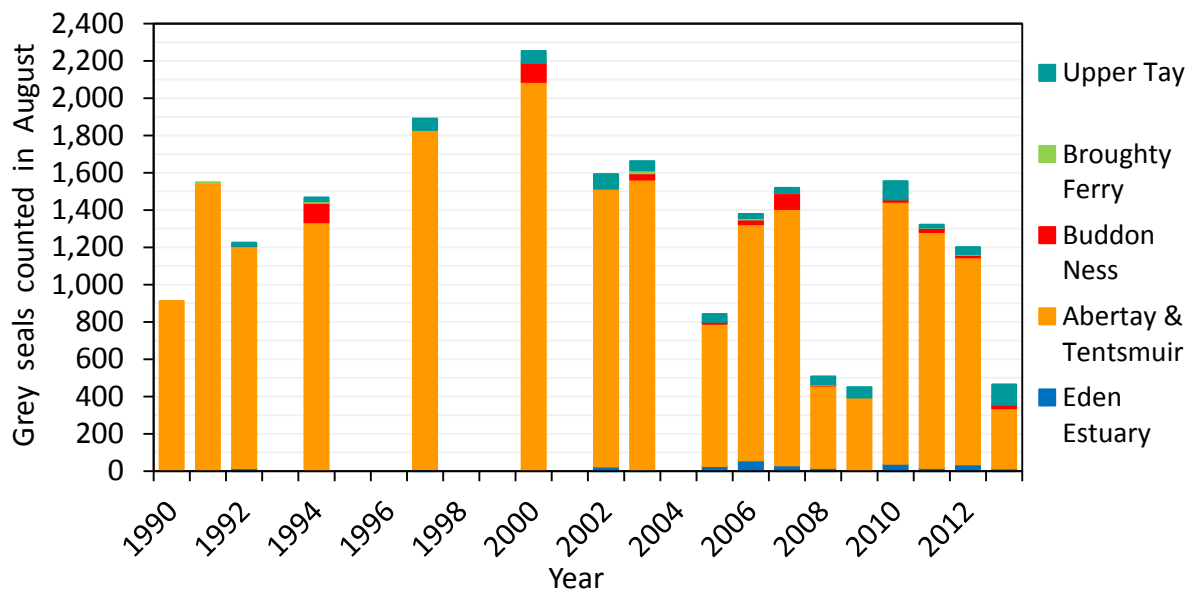


**Figure 11.** Distribution of harbour and grey seals counted in the Firth of Tay and the Firth of Forth in August 2013. Detailed counts for the SAC are given in Table 5a & b.

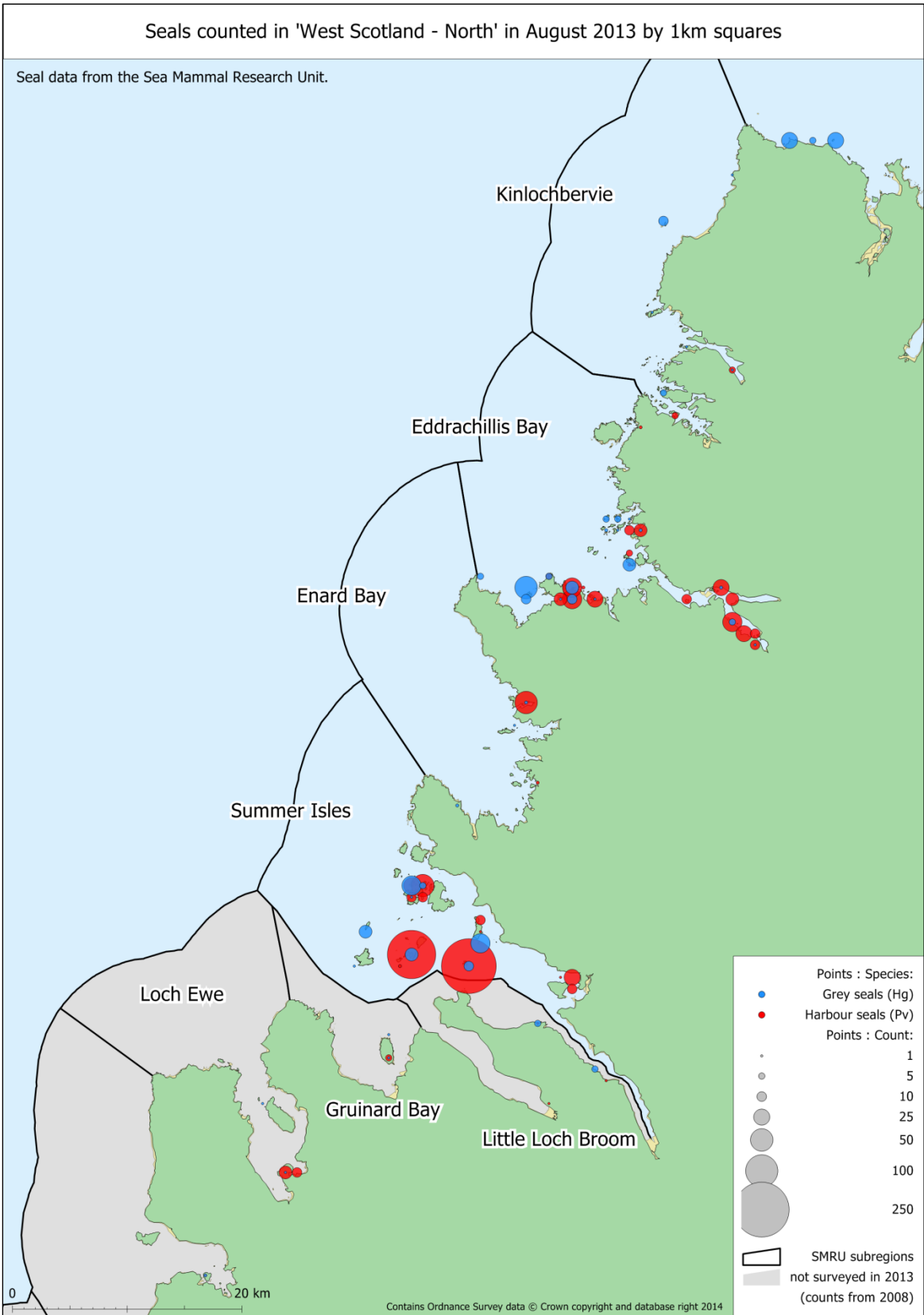
(a) Harbour seals counted in the Firth of Tay & Eden Estuary SAC in August.



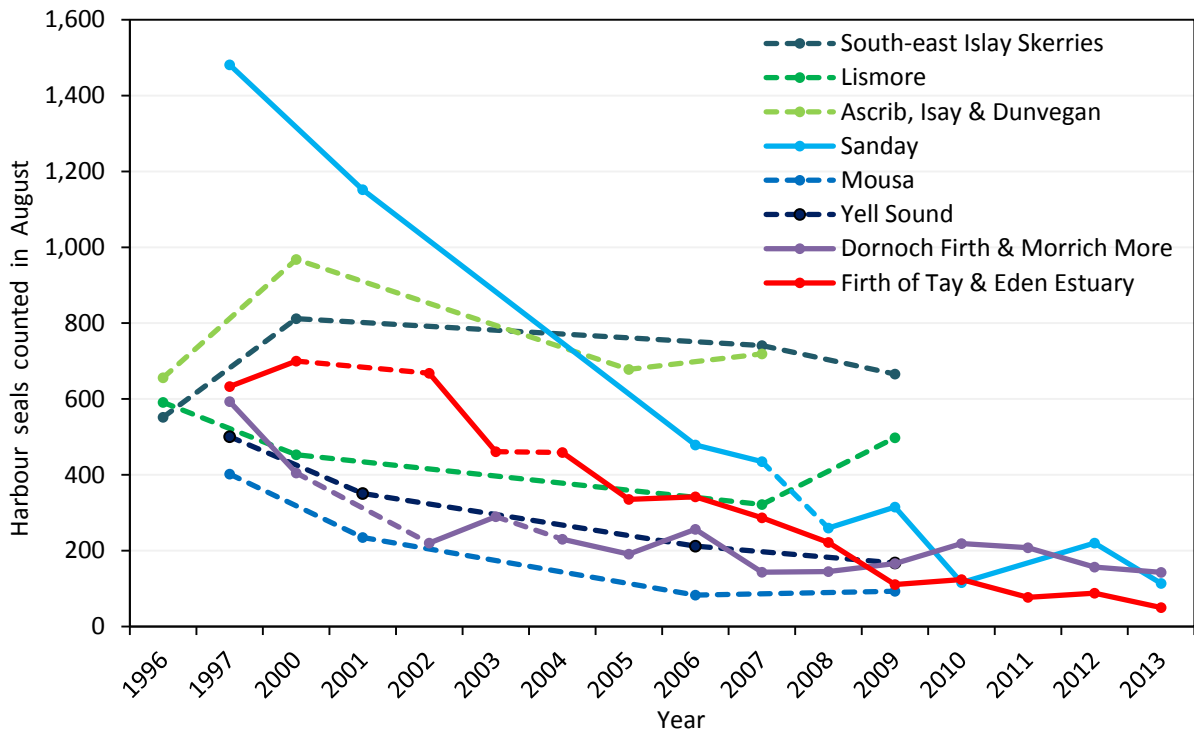
(b) Grey seals counted in the Firth of Tay & Eden Estuary SAC in August.



**Figure 12a&b.** August counts of seals in the Firth of Tay & Eden Estuary harbour seal SAC from 1990 - 2013. 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 5a & b and a distribution map for 2013 counts is shown in Figure 11. Data are from aerial surveys by the Sea Mammal Research Unit. Since 2006, all surveys incorporated hand-held oblique digital photography.



**Figure 13.** Harbour and grey seals counted in the northern section of West Scotland in August 2013 (grey shaded coast was not surveyed). Counts are aggregated by 1km squares. Details of counts are given in Table 6a (harbour seals) and Table 6b (grey seals).



**Figure 14.** Comparison of harbour seals counted in Special Areas of Conservation (SACs) designated for the protection of harbour seals from 1996 - 2013. Detailed counts for each SAC are given in **Error! Reference source not found.**. Lismore is abbreviated from Eileanan agus Sgeirean Lios Mòr.

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© Scottish Natural Heritage 2014  
ISBN: 978-1-78391-157-8

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