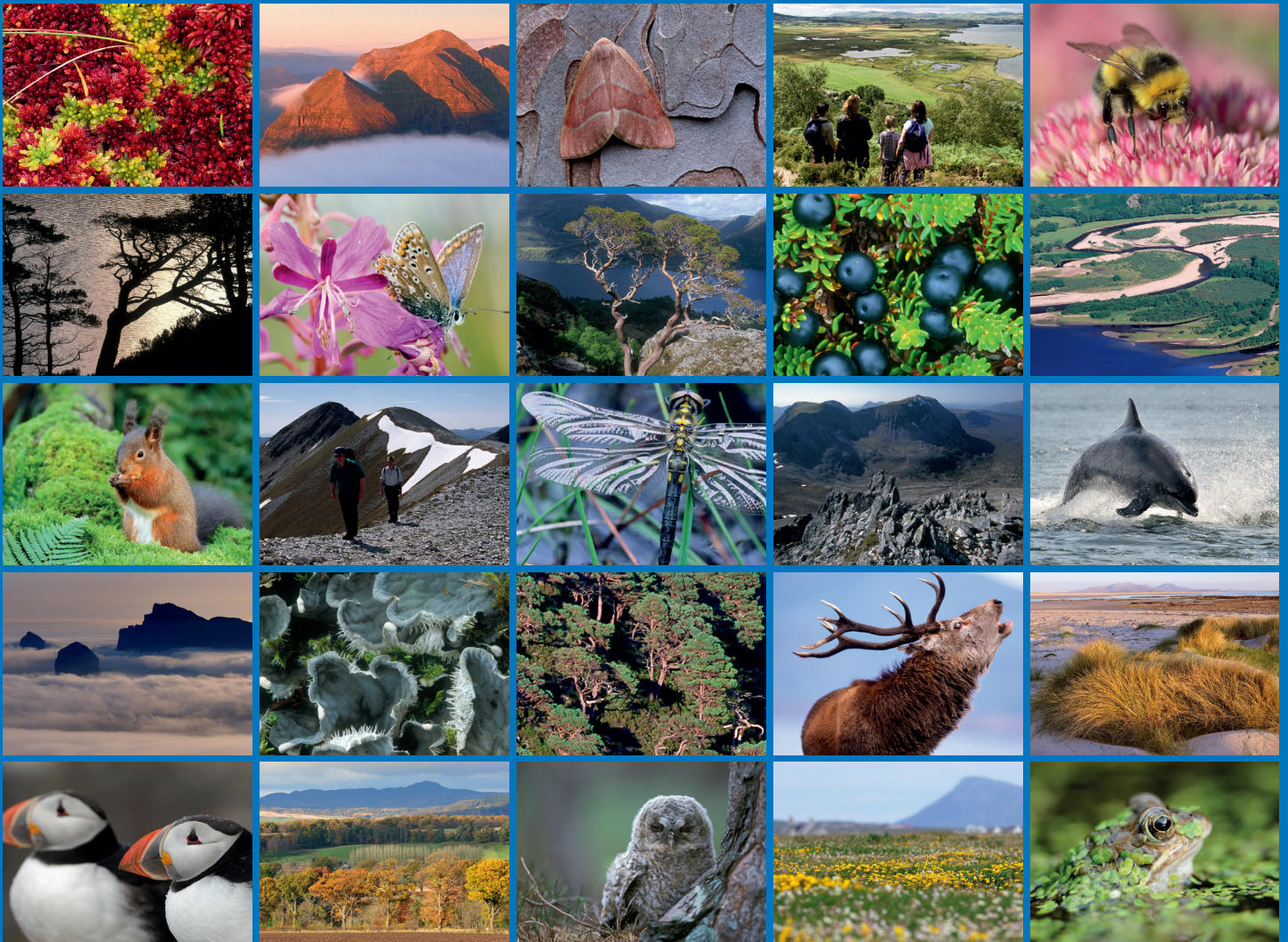


# Aerial survey of harbour (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) in Scotland in August 2017: the Western Isles, part of West Scotland and part of East Scotland





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# RESEARCH REPORT

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Research Report No. 1143

**Aerial survey of harbour (*Phoca vitulina*)  
and grey seals (*Halichoerus grypus*) in  
Scotland in August 2017: the Western Isles,  
part of West Scotland and part of East  
Scotland**

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## RESEARCH REPORT

# Summary

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### Aerial survey of harbour (*Phoca vitulina*) and grey seals (*Halichoerus grypus*) in Scotland in August 2017: the Western Isles, part of West Scotland and part of East Scotland

Research Report No. 1143

Project No: 016503

Contractor: St Andrews University, Sea Mammal Research Unit

Year of publication: 2019

#### Keywords

Harbour (common) seal; grey seal; West Scotland; Western Isles; 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-yearly cycle. Over the past 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 gradually declining until a high count in August 2011.

The previous round-Scotland survey was completed between 2011 and 2015. The current survey was carried out in August 2017 and forms the second year in a four year cycle to complete a new round-Scotland survey. The 2017 aerial surveys of moulting harbour seals and of grey seal summer distribution covered the Western Isles, part of West Scotland, part of the Moray Firth and the Firth of Tay and Eden Estuary in East Scotland.

#### Main findings

- Only part of West Scotland was surveyed. In West Scotland - north, **1,084** harbour seals were counted, only slightly fewer than the previous highest count of 1,115 in 2013 and 2014. There was a big drop in the numbers of harbour seals on the Summer Isles: **184** counted in 2017 compared with 666 in 2013. In the part of West Scotland - Centre that was surveyed, **5,166** harbour seals were counted compared with 4,430 counted in 2014.
- The harbour seal count for the Western Isles was **3,533** and was the highest count recorded in the Western Isles since surveys began in 1992. In comparison, previous high counts were 2,739 in 2011 and 2,820 in 1996. Within the Western Isles, highest counts of harbour seals (when compared with previous years) were recorded in Lewis and Harris, Benbecula and South Uist. Lowest counts were recorded in North Uist.

- In the Sound of Barra SAC, 132 harbour seals were counted in 2017, compared with 116 counted in 2011.
- In the part of the Moray Firth that is surveyed annually (Helmsdale to Findhorn), **831** harbour seals were counted in 2017 compared with 892 counted in 2016. In the Moray Firth Seal Management Area, **879** harbour seals were counted compared with the previous count of 940 (2013 & 2016).
- In the Dornoch Firth and Morrich More SAC, in the Moray Firth, **39** harbour seals were counted in 2017 compared with 85 counted in 2016. This is SMRU's lowest count of harbour seals in the Dornoch Forth.
- In Culbin and Findhorn in the Moray Firth, **526** harbour seals were counted in 2017, compared with 484 counted in 2016. This is SMRU's highest count of harbour seals at Culbin and Findhorn.
- In the Firth of Tay and Eden Estuary SAC, **29** harbour seals were counted in 2017 compared with 51 in 2016.
- The most recent estimate of the minimum size of the harbour seal population around Scotland is **26,565**. This is the number of hauled-out harbour seals counted during surveys carried out between 2008 and 2017.

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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.smru.st-andrews.ac.uk/research-policy/scos/>. The surveys also provide information required by Scottish Natural Heritage to satisfy 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 seven Scottish Seal Management Areas (Figure 1) making up the entire coast are surveyed approximately on a five-year cycle, although surveys are carried out annually in the Moray Firth and the Firth of Tay & Eden Estuary (Figure 2). 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 harbour seal surveys. Grey seal numbers can be highly variable from day to day during the summer months but these surveys do provide useful information on their summer distribution. The August grey seal counts are also used as an independent estimate to inform a more detailed population estimate that is derived from counts of pups born during the autumn grey seal breeding season (Lonergan *et al.*, 2011; Russell *et al.*, 2017)

This report summarises the results from the August 2017 survey of harbour and grey seals in north and centre West Scotland, in the Western Isles, in the Moray Firth and the Firth of Tay and Eden Estuary in East Scotland. 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 2) and form the second year of a new round-Scotland survey. The previous round-Scotland survey was carried out between 2011 and 2015 (Duck & Morris, 2012; 2013; 2014 and 2015).

## 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 12:00 and 19:30 (approximately).
- Surveys were restricted to the August harbour seal moult.
- There was no surveying on days with moderate, heavy or prolonged rain.
- High resolution digital photographs were taken of almost all groups of seals on shore.
- A new mapping system enabled all groups of seals to be accurately identified, counted and located in a GIS, when reviewing the thermal, video and high-resolution digital images.

All maps were produced using Manifold System 8.0 Ultimate Edition GIS. 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).

## 2.1 Helicopter & thermal imager surveys in August 2017

Figure 3 shows the sections of coasts that were surveyed on different days:

- 4 Aug 2017: Cape Wrath to Achmelvich, by Lochinver
- 5 Aug 2017: Achmelvich to Rubha nan Sasan, Loch Ewe
- 6 Aug 2017: Rubha nan Sasan to Ardintoul Point, Loch Alsh
- 7 Aug 2017: Kylerhea to Loch Dunvegan, south and west Skye
- 8 Aug 2017: Loch Dunvegan to Broadford, Rona and west Raasay
- 9 Aug 2017: Kylerhea to Broadford, east Raasay, Ascrib Islands, Gob Rubha Uisinis to Stornoway
- 10 Aug 2017: West Tarbert to Stornoway
- 11 Aug 2017: West Tarbert, Sound of Harris, north and west North Uist to Balemøre
- 12 Aug 2017: Monach Isles, west side of Uists and Benbecula, Barra and islands to south
- 13 Aug 2017: Pol a'Charra, south and east South Uist to Wiay, east Benbecula
- 14 Aug 2017: NE North Uist to Loch Uiskeavagh, east Benbecula
- 15 Aug 2017: Berneray, Pabbay, Shillay, Renish Point to Gob Rubha Uisinis

## 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 2017. (Note that a small section of the north Moray Firth coast, from Wick to Duncansby Head, was last surveyed in 2008 when only one harbour seal and seven grey seals were counted).

- 2008: Duncansby Head to Wick
- 2011: part Moray Firth (Wick to Helmsdale)
- 2013: part East Scotland (Aberlady Bay to North Queensferry)
- 2014: part West Scotland (Glenelg to Scarba in the Firth of Lorn)
- 2015: part East Scotland (border to Aberlady Bay), part West Scotland (Firth of Lorn to southern tip of the Mull of Kintyre), South-west Scotland, Shetland
- 2016: Orkney and North Coast, part Moray Firth (Helmsdale to Fraserburgh), part East Coast of Scotland (Fraserburgh to North Queensferry)
- 2017: Western Isles, part West Scotland (Cape Wrath to Glenelg, including Skye, Rona and Raasay)

Figure 3 shows the sections of coast surveyed each day in August 2017.

The distribution of harbour seals in Scotland from these most recent August surveys is shown in Figure 4. Counts have been aggregated by 10 km squares in order to show their August distribution more clearly. The numbers of harbour seals counted in Seal Management Areas in Scotland are given in Table 1. From the most recent surveys of the Scottish coast (mainly between 2014 and 2017), a total of **26,565** harbour seals were counted (Duck & Morris, 2012; 2014; 2015; 2016).

This latest total count is slightly higher than the previous round-Scotland total of 25,149 (2008 - 2016; Duck & Morris, 2019) but remains lower than the 1996 - 1997 total of 29,514, following large declines in northern and eastern areas (Lonergan *et al.*, 2007). West Scotland is now by far the most important Management Area for harbour seals in Scotland.

Figure 5 shows the August distribution of grey seals in Scotland between 2013 and 2017. From the most recent surveys of the Scottish coast (mainly between 2013 and 2017) a total of 27,526 grey seals were counted during August surveys (Table 2).

The numbers of grey seals counted in Seal Management Areas in Scotland during summer are given in Table 2. The numbers of grey seals hauling out in the summer months can be highly variable from day to day and caution is advised when interpreting August counts of grey seals. None the less, the total of these counts is used elsewhere to refine estimates of the size of the UK grey seal population (Lonergan *et al.*, 2011; Russell *et al.*, 2017).

Figure 6 shows the trends in numbers of harbour seals counted in all Seal Management Areas in Scotland since 1996. Four points have been added for 2017: the Western Isles, West Scotland, the Moray Firth and East Scotland. Most plotted points are an amalgamation of counts from different years and new points are added only in years when significant new data are available. There is a marked difference in the trajectories of counts from the west of Scotland (general increase) compared with counts from Orkney and the North and East Coasts of Scotland (general decline).

## 3.2 Area summaries

### 3.2.1 West Scotland - North

West Scotland - North was surveyed on 4<sup>th</sup>, 5<sup>th</sup> and part of 6<sup>th</sup> August 2017. The distribution of harbour and grey seals in West Scotland - North is shown in Figure 7. A total of **1,084** harbour seals were counted, the second highest count for this area. The previous high count of 1,115 was from surveys in 2013 and 2014. Numbers of harbour seals in different subareas of West Scotland - North are in Table 3. All subareas, bar two, had their highest counts recorded. The 2017 count for the Summer Isles (184) was considerably lower than the previous 2013 count (666).

The count of grey seals in West Scotland - North are in Table 4. The 2017 count (479) was the highest recorded since 1996.

### 3.2.2 West Scotland - Centre (part)

Part of West Scotland - Centre, from Rubha Reidh to Kylerhea, including Skye, Rona and Raasay, was surveyed between 6<sup>th</sup> and 9<sup>th</sup> August. The distribution of harbour seals in West Scotland - Centre is in Figure 7. In this area, a total of **5,166** harbour seals were counted in 2017 compared with 4,430 counted in 2014. The total count for West Scotland - Centre was **7,160**, from counts in 2014 and 2017. Numbers of harbour seals counted in West Scotland Centre are in Table 3. In 2017, the counts of harbour seals were the highest since 1996 for all subareas bar Rona, off east Skye.

The grey seal count for the part of West Scotland - Centre that was surveyed in 2017 was 495, compared with 381 in 2014 (Table 4). The total grey seal count for West Scotland - Centre was **1,170** in 2014 and 2017, compared with 1,056 in 2014 (Table 4; Figure 7). This was the highest grey seal count for West Scotland - Centre since 1996.

### 3.2.3 Western Isles

The Western Isles were surveyed between 9<sup>th</sup> and 15<sup>th</sup> August 2017. A total of **3,533** harbour seals were counted, the highest count to date (Table 2; Table 5; Figure 6). The harbour seal count for Lewis and Harris was the highest recorded (1,547) and was more than double the previous count (700 in 2011; Table 5). Highest counts were also recorded for Benbecula and South Uist (Table 5). In contrast, the count for North Uist (284) was less



than half the previous count (602 in 2011; Table 5). The distribution of harbour and grey seals in the Western Isles is in Figure 7.

The numbers of grey seals counted in surveys of the Western Isles are in Table 6. The 2017 count (**5,772**) was the highest recorded, compared with 4,085 counted in 2011 and 2014.

#### *3.2.4 Moray Firth (Inner)*

Aerial surveys of harbour and grey seals are carried out annually in the inner part of the Moray Firth, between Helmsdale and Findhorn. Figure 10 shows the distribution of Moray Firth harbour and grey seals from the survey on 13<sup>th</sup> August 2017, when **831** harbour seals were counted compared with 892 counted in 2016. Counts of harbour seals are in Table 7. Numbers of harbour seals at Culbin and Findhorn continue to increase but have declined in other areas (Figure 11). Over half of the harbour seals counted in the Moray Firth were in Culbin and Findhorn.

The number of grey seals counted in the Moray Firth are in Table 8. The relative numbers of grey seals in different parts of the Moray Firth are in Figure 12.

#### *3.2.5 Firth of Tay and Eden Estuary (SAC)*

Seals in the Firth of Tay and Eden Estuary are also surveyed annually. The distribution of harbour and grey seals counted on the survey on 13<sup>th</sup> August 2017 is in Figure 13. Counts of harbour seals from this and previous surveys are in Table 9. The 2017 count of **29** was the joint lowest on record, with one harbour seal seen in the Eden Estuary and 28 seen in the Upper Tay. No harbour seals were seen on Abertay Sands, Buddon Ness or at Broughty Ferry (Table 9). The change in numbers of harbour seals in different parts of the Firth of Tay and Eden Estuary are shown in Figure 14.

Counts of grey seals in the Firth of Tay and Eden Estuary are in Table 10. The variation in numbers of grey seals counted in different parts of the Firth of Tay and Eden Estuary is shown in Figure 15.

### **3.3 Harbour seal SACs**

Four of the nine SACs for harbour seals in Scotland were surveyed in August 2017: the Ascris, Isay and Dunvegan in West Scotland - Centre; the Sound of Barra in the Western Isles; the Dornoch Firth and Morrich More in the Moray Firth and the Firth of Tay and Eden Estuary in East Scotland. Counts of harbour seals within Scottish SACs are in Table 11. The trajectories of these counts can be seen in Figure 16.

The harbour seal count for the Ascrib, Isay and Dunvegan SAC in West Scotland in August 2017 was **712**, higher than the previous (lowest) 2014 count of 434, similar to counts in 1996, 1994, 1996 and 2007 and lower than the (highest) count of 968 in 2000 (Table 11). The 2017 harbour seal count for the Sound of Barra SAC of **132** was the highest count since 2006 (Table 11). The 2017 count for the Dornoch Firth and Morrich More SAC was 39, the lowest count to date (Table 11) and less than half the 2016 count (85). The 2017 count for the Firth of Tay and Eden Estuary SAC was 29. This was the lowest count for this SAC, the same as in 2014 (Table 11).

#### **4. DISCUSSION**

This report provides the results of the second year of a four year programme of surveys that aims to cover the entire coastline of Scotland to provide the most up-to-date assessment of Scotland's harbour seal population.

The 2017 counts provide further indication that numbers of harbour seals on the west coast of Scotland and in the Western Isles remain stable or are increasing. In marked contrast, the numbers of harbour seals on the east coast of Scotland generally remain at low levels, with a historically low count in the Firth of Tay and Eden Estuary. Harbour seal numbers in the Inner Moray Firth were slightly lower than the previous count, despite localised increases within the Findhorn-Culbin area.

There was no obvious reason for the difference in counts for the Summer Isles, where 666 harbour seals were counted in August 2013 with 184 counted in August 2017. Although the Summer Isles are a popular tourist destination, there was no visible evidence that seals had recently moved from their haul-out sites (i.e. no groups of seals were seen in the water). Within SACs designated for harbour seals, new counts were obtained for Ascrib, Isay and Dunvegan SAC, the Sound of Barra SAC, Dornoch Firth and Morrich More SAC and the Firth of Tay and Eden Estuary SAC.

Areas to be surveyed by SMRU in 2018 include West Scotland - south, Southwest Scotland, and the southern part of East Scotland. In August 2019, SMRU propose to survey Shetland and Orkney to complete the four year programme of surveys covering the entire Scottish coastline. Once all the fieldwork and analyses are completed, the results from the full cycle of surveys (2016 - 2019) will be collated into a single report.

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## ANNEX 1: TABLES

*Table 1. August counts of harbour seals in Scottish Seal Management Areas. 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, Orkney and on the East coast has declined. Data from aerial surveys carried out by the Sea Mammal Research Unit.*

Seal Management Area	Harbour seal counts			
	2008-2017	2007-2009	2000-2006	1996-1997
1 Southwest Scotland	1,200	923	623	929
2 West Scotland <sup>a</sup>	15,889	10,626	11,666	8,811
2a West Scotland - South	7,645	5,930	7,001	5,651
2b West Scotland - Central	7,160	4,004	3,956	2,700
2c West Scotland - North	1,084	692	709	460
3 Western Isles	3,533	1,804	1,981	2,820
4 North Coast & Orkney	1,349	2,979	4,388	8,787
4a North Coast	109	112	150	265
4b Orkney	1,240	2,867	4,238	8,522
5 Shetland	3,369	3,039	3,038	5,994
6 Moray Firth	879	776	1,028	1,409
7 East Scotland	346	283	667	764
<b>SCOTLAND TOTAL</b>	<b>26,565</b>	<b>20,430</b>	<b>23,391</b>	<b>29,514</b>

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:

<sup>a</sup> 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. 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			
	2008-2017	2007-2009	2000-2006	1996-1997
1 Southwest Scotland	374	233	206	75
2 West Scotland <sup>a</sup>	5,267	2,526	2,383	3,435
2a West Scotland - South	3,618	1,788	1,771	2,125
2b West Scotland - Central	1,170	561	361	931
2c West Scotland - North	479	177	251	379
3 Western Isles	5,772	3,808	3,929	4,062
4 North Coast & Orkney	9,714	8,525	10,315	9,427
4a North Coast	414	504	736	597
4b Orkney	9,300	8,021	9,579	8,830
5 Shetland	1,558	1,536	1,371	1,724
6 Moray Firth	1,189	1,113	1,272	551
7 East Scotland	3,652	1,238	1,898	2,328
<b>SCOTLAND TOTAL</b>	<b>27,526</b>	<b>18,979</b>	<b>21,374</b>	<b>21,602</b>

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:

<sup>a</sup> Parts of the West Scotland survey in 2009 funded by Scottish Power and Marine Scotland.

Table 3. Numbers of harbour seals counted in West Scotland. The highest completed counts for each subarea are in green and the lowest counts in red. Most subareas surveyed were close to, or had, the highest harbour seal count since 1996, with the exception of the Summer Isles. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions & SMA subdivisions		1996	1997	2000	2004	2005	2007	2008	2009	2013	2014	2015	2017
1	Kinlochberrie		69			22		7		18			40
2	Eddrachillis Bay		252			257		277		355			378
3	Enard Bay		13			30		38		56			140
4	Summer Isles		120			347		327		666			184
5	Little Loch Broom	0				10		4			0		213
6	Gruinard Bay	5				15		6			0		54
7	Loch Ewe	1				28		33			20		75
<b>West Scotland - North</b>		<b>460</b>				<b>709</b>		<b>692</b>		<b>1,115</b>			<b>1,084</b>
1	Gairloch	7				0	1				5		21
2	Torridon	3		36		20	53				188		241
3	Applecross	45		134		86	86				323		377
4	Plockton	277		271		279	335				549		689
5	Raasay	38		155		90	151				294		397
6	Rona	101		163	194	173	257				582		473
7	Skye	1,728		2,220		1,899	1,757				2,411		2,819
8	Kyle	9				31	23				78		149
9	Sound of Sleat	76				60	83				100		
10	Loch Nevis	75		26		79	31				26		
11	Arisaig	213		597		650	692				1,006		
12	Ardnamurchan North	13		118		153	148				258		
13	Rum	2				0		0			24		
14	Eigg	36				77		66			92		
15	Muck	58				140		94			107		
16	Canna	19				219		227			381		
<b>West Scotland - Central</b>		<b>2,700</b>		<b>3,927</b>		<b>3,956</b>	<b>4,004</b>				<b>6,424</b>		<b>7,160</b>
1	Ardnamurchan South	139		325		112	165				284		
2	Sound of Mull	36		77		62	80				119		
3	Loch Linnhe	135		150		125	74				126		
4	Coll	947		987			690				1,223		
5	Tiree	338		357			231				244		
6	Mull	[1] 1,059		1,616			989		1,596		1,332		
7	Treshnish Isles	41		31			14				0		
8	Lismore	611		457			326		498		392		
9	Loch Creran	66		67			55				50		
10	Loch Etive	26		31			27				41		
11	Firth of Lorn	[2] 431		527			380					418	
12	Colonsay	83		102			59		87			64	
13	Oronsay	0		75			2		0			1	
14	Jura	122		548			539		601			887	
15	Islay	605		1,108			1,001		792			1,365	
16	West Coast Kintyre	[3] 1,012		832			644		629			1,083	
17	Dubh Artach & Skerryvore										16		
<b>West Scotland - South</b>		<b>5,651</b>		<b>7,290</b>			<b>5,276</b>				<b>7,645</b>		
		1996-1997		1996-2000		2005-2007	2007-2008				2014-2017		
<b>West Scotland TOTALS</b>		<b>8,811</b>		<b>11,802</b>		<b>9,921</b>	<b>9,972</b>				<b>15,889</b>		

[1] Torran Rocks were not surveyed in 2009. The 2009 totals include 81 counted in 2007.

[2] Firth of Lorn subregion mainly surveyed in 2014 and completed in 2015 (367+51 harbour seals).

[3] West Coast Kintyre not completed in 2000. The 2000 totals include 51 harbour seals counted in 1996.

Table 4. Numbers of grey seals counted in West Scotland. The highest completed counts for each subarea are in green and the lowest counts in red. Many subareas had the highest grey seal count since 1996. Data from aerial surveys carried out by the Sea Mammal Research Unit.

SMRU subregions & SMA subdivisions		1996	1997	2000	2004	2005	2007	2008	2009	2013	2014	2015	2017
1	Kinlochbervie		136			40		45		29			58
2	Eddrachillis Bay		122			116		54		166			210
3	Enard Bay		82			7		7		9			85
4	Summer Isles		24			73		54		144			82
5	Little Loch Broom	0				14		12			8		31
6	Gruinard Bay	0				0		2			12		1
7	Loch Ewe	15				1		3			22		12
<b>West Scotland - North</b>		<b>379</b>				<b>251</b>		<b>177</b>		<b>390</b>			<b>479</b>
1	Gairloch	0				0	3				4		10
2	Torridon	0		0		5	0				28		17
3	Applecross	0		3		1	2				23		22
4	Plockton	0		1		0	0				1		2
5	Raasay	0		1		6	5				14		17
6	Rona	0		4	4	4	3				41		1
7	Skye	378		328		156	201				270		426
8	Kyle	0				0	0				0		0
9	Sound of Sleat	2				2	0				2		
10	Loch Nevis	0		16		3	1				2		
11	Arisaig	0		5		9	4				5		
12	Ardnamurchan North	0		0		1	0				4		
13	Rum	84				22		66			72		
14	Eigg	9				26		66			21		
15	Muck	22				13		18			73		
16	Canna	436				113		190			496		
<b>West Scotland - Central</b>		<b>931</b>		<b>911</b>		<b>361</b>	<b>559</b>				<b>1,056</b>		<b>1,170</b>
1	Ardnamurchan South	0		9		1	0				3		
2	Sound of Mull	0		1		0	0				0		
3	Loch Linnhe	0		0		0	0				0		
4	Coll	243		274			98				562		
5	Tiree	910		450			330				674		
6	Mull	[1] 63		86			100		89		125		
7	Treshnish Isles	170		65			73				85		
8	Lismore	0		25			3		10		20		
9	Loch Creran	0		0			0				0		
10	Loch Etive	0		0			0				0		
11	Firth of Lorn	[2] 0		4			10					21	
12	Colonsay	35		57			21		63			118	
13	Oronsay	230		342			395		392			981	
14	Jura	27		19			59		39			75	
15	Islay	441		415			551		657			787	
16	West Coast Kintyre	[3] 6		27			21		13			111	
17	Dubh Artach & Skerryvore										56		
<b>West Scotland - South</b>		<b>2,125</b>		<b>1,774</b>			<b>1,661</b>				<b>3,618</b>		
		1996-1997		1996-2000		2005-2007		2007-2008		2014-2017			
<b>West Scotland TOTALS</b>		<b>3,435</b>		<b>3,000</b>		<b>2,274</b>		<b>2,397</b>		<b>5,267</b>			

[1] Torran Rocks were not surveyed in 2009. The 2009 totals include 34 counted in 2007.

[2] Firth of Lorn subregion mainly surveyed in 2014 and completed in 2015 (13+8 grey seals).

[3] West Coast Kintyre not completed in 2000. The 2000 totals include 3 harbour seals counted in 1996.

*Table 5. Numbers of harbour seals counted in the Western Isles. Subareas are numbered in Figure 7 which shows the distribution of harbour and grey seals in the Western Isles in 2017. The highest completed counts for each subarea are in green and the lowest counts in red. Data from aerial surveys carried out by the Sea Mammal Research Unit.*

SMRU subregion		1992	1996	2000	2003	2005	2006	2008	2011	2014	2017
1	Harris And Lewis	517	926	600	528		522	532	700		1,547
2	North Uist	[1] 357	724	745	651			561	602		284
3	Benbecula	212	249	267	200			217	386		507
4	Monach Islands	0	0	0	0		3	0		0	0
5	South Uist	785	666	551	404		389	311	769		907
6	Barra	458	255	250	284		216	183	282		288
7	Flannan Isles					0				0	
8	St. Kilda	[2]									
9	North Rona & Sula Sgeir					0				0	
<b>Western Isles TOTAL</b>		<b>2,329</b>	<b>2,820</b>	<b>2,413</b>	<b>2,067</b>		<b>1,981</b>	<b>1,804</b>	<b>2,739</b>		<b>3,533</b>

[1] Causamul was not surveyed in 2017. The 2017 totals include 1 counted in 2011.

[2] No seal survey data are available for St Kilda.

*Table 6. Numbers of grey seals counted in Western Isles. Subareas are numbered in Figure 7 which shows the distribution of harbour and grey seals in the Western Isles in 2017. The highest completed counts for each subarea are in green and the lowest counts in red. Data from aerial surveys carried out by the Sea Mammal Research Unit.*

SMRU subregion		1992	1996	2000	2003	2005	2006	2008	2011	2014	2017
1	Harris And Lewis	[1] 431	609	1,194	547		563	989	547		1,171
2	North Uist	[2] 477	615	878	421			255	401		252
3	Benbecula	0	0	12	0			11	27		21
4	Monach Islands	[3] 1,520	1,537	1,921	1,261		2,009	1,421		1,468	2,761
5	South Uist	120	287	309	176		119	235	301		274
6	Barra	278	1,014	865	659		416	496	1,046		998
7	Flannan Isles					222				92	
8	St. Kilda	[4]									
9	North Rona & Sula Sgeir					179				203	
<b>Western Isles TOTAL</b>		<b>2,826</b>	<b>4,062</b>	<b>5,179</b>	<b>3,064</b>		<b>3,929</b>	<b>3,808</b>	<b>4,144</b>	<b>4,085</b>	<b>5,772</b>

[1] Taransay Glorigs and Gasker were not surveyed in 2017. The 2017 totals include 40 plus 48 counted in 2011.

[2] Causamul was not surveyed in 2017. The 2017 totals include 109 counted in 2011.

[3] Deasker was not surveyed in 2014 or 2017. The 2014 and 2017 totals include 20 counted in 2011.

[4] No seal survey data are available for St Kilda.



*Table 7. 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. Figure 10 shows the distribution of harbour and grey seals counted in the annually surveyed section of the Moray Firth in August 2017. A histogram of the counts in this Table is shown in Figure 11. 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	2016	2017
	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	ti	fw
(MEAN) COUNTS	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	40	22
	Loch Fleet		16		27	33	59	56	64	71	80	83	82	65	114	113	133	135	156	144	145	138
	Dornoch Firth (SAC)	662		542	593	405	220	290	231	191	257	144	145	166	219	208	157	143	111	120	85	39
	Cromarty Firth	41		95	95	38	42	113	88	106	106	102	90	90	140	101	144	63	100	22	72	20
	Beauly Firth (incl. Milton & Munlochy)	220		203	219	204	66	151	178	127	176	146	150	85	140	57	60	30	37	34	30	5
	Ardersier (incl. Eathie)			221	234	191	110	205	202	210	197	154	145	277	368	195	183	199	28	34	36	81
	Culbin & Findhorn			58	46	111	144	167	49	93	58	79	92	73	123	163	254	218	260	330	484	526
	Burghhead to Fraserburgh			0	1					3		0				29		39			47	
TOTALS	Dornoch Firth to Ardersier			1,061	1,141	838	438	759	699	634	736	546	530	618	867	561	544	435	276	210	223	145
	Loch Fleet to Ardersier				1,168	871	497	815	763	705	816	629	612	683	981	674	677	570	432	354	368	283
	Loch Fleet to Findhorn				1,214	982	641	982	812	798	874	708	704	756	1,104	837	931	788	692	684	852	809
	Helmsdale to Findhorn				1,407		829			911	1,024	762	777	775	1,205	924	1,033	858	693	705	892	831
	Moray Firth SMA	*			1,409		831			915	1,028	763	778	776	1,206	954	1,063	898	733	745	940	879

\* 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 8. 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. Figure 10 shows the distribution of harbour and grey seals counted in the annually surveyed section of the Moray Firth in August 2017. A histogram of these grey seal counts is shown in Figure 12. 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	2016	2017
	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	ti	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	28	201
	Loch Fleet		0		0	0	0	0	0	0	1	3	1	0	7	7	20	18	7	10	31	22
	Dornoch Firth (SAC)	233		903	456	121	321	79	473	431	748	516	523	819	717	679	74	604	127	716	387	273
	Cromarty Firth	9		0	0	0	0	0	0	0	1	0	0	0	1	2	1	3	1	0	1	0
	Beauly Firth (incl. Milton & Munlochy)	8		2	3	8	0	0	0	0	3	4	0	0	2	3	1	5	2	0	2	0
	Ardersier (incl. Eathie)			36	24	85	0	3	44	55	142	74	142	94	331	74	24	109	2	14	28	87
	Culbin & Findhorn			0	0	0	0	10	0	11	11	28	75	58	58	179	121	218	93	743	717	548
	Burghhead to Fraserburgh			30	65					205		61				18		258			43	
TOTALS	Dornoch Firth to Ardersier			941	483	214	321	82	517	486	894	594	665	913	1,051	758	100	721	132	730	418	360
	Loch Fleet to Ardersier				483	214	321	82	517	486	895	597	666	913	1,058	765	120	739	139	740	449	382
	Loch Fleet to Findhorn				483	214	321	92	517	497	906	625	741	971	1,116	944	241	957	232	1,483	1,166	930
	Helmsdale to Findhorn				486		327			608	1,008	677	1,190	1,043	1,751	1,100	557	1,038	259	1,644	1,194	1,131
	Moray Firth SMA †				551		392			872	1,272	797	1,260	1,113	1,821	1,133	590	1,311	532	1,917	1,252	1,189

\* 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 9. 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 distribution map for 2017 data is shown in Figure 13 and a histogram of the harbour seal counts in this Table is in Figure 14. Data are from aerial surveys by the Sea Mammal Research Unit.**

Area	1990	1991	1992	1994	1997	2000	2002	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Survey method	1fw	1fw	1fw	1fw	1ti	1fw	1fw	1fw	2fw,1ti	1fw	1fw,1ti	2fw	1fw	1fw	1fw	1fw	1ti	1fw	1fw	1ti	1fw
(MEAN) COUNTS																					
Upper Tay	27	73	148	89	113	115	51	83	91	91	63	49	45	41	16	40	36	21	51	41	28
Broughty Ferry	77	83	97	64	35	52	0	90	51	31	27	13	28	15	18	16	3	0	2	4	0
Buddon Ness	13	86	72	53	0	113	109	142	25	96	64	27	8	23	11	8	10	1	3	0	0
Abertay & Tentsmuir	319	428	456	289	262	153	167	53	63	34	31	50	8	9	0	5	0	0	0	1	0
Eden Estuary	31	0	0	80	223	267	341	93	105	90	90	83	22	36	32	19	1	7	4	5	1
SAC total	467	670	773	575	633	700	668	461	335	342	275	222	111	124	77	88	50	29	60	51	29

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

**Table 10. 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 distribution map for 2017 data is shown in Figure 13 and a histogram of the grey seal counts in this Table is in Figure 14. Data are from aerial surveys by the Sea Mammal Research Unit.**

Area	1990	1991	1992	1994	1997	2000	2002	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Survey method	1fw	1fw	1fw	1fw	1ti	1fw	1fw	1fw	2fw,1ti	1fw	1fw,1ti	2fw	1fw	1fw	1fw	1fw	1ti	1fw	1fw	1ti	1fw
(MEAN) COUNTS																					
Upper Tay	0	0	18	20	61	64	78	50	42	22	27	26	55	98	16	39	127	62	115	132	78
Broughty Ferry	0	3	0	9	0	0	0	16	0	8	1	8	0	0	2	3	0	2	0	0	0
Buddon Ness	0	0	1	104	0	101	0	33	11	25	85	7	0	12	22	13	18	0	2	0	0
Abertay & Tentsmuir	912	1,546	1,191	1,335	1,820	2,088	1,490	1,560	763	1,267	1,375	483	395	1,406	1,265	1,111	323	531	687	738	596
Eden Estuary	0	0	16	0	10	0	25	4	27	57	31	33	0	39	17	36	14	39	32	66	76
SAC total	912	1,549	1,226	1,468	1,891	2,253	1,593	1,663	843	1,379	1,519	557	450	1,555	1,322	1,202	482	634	836	936	750

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

*Table 11. 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	1996	1997	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
South-east Islay Skerries	552		812							741		666					1,087			
Lismore/ Eileanan agus Sgeiran Lios mór	603		453							325		498					380			
Ascrib, Isay & Dunvegan	656		968				664	678		719							434			712
Sound of Barra	576		276		249	201			179		92			116						132
Sanday		1,458		1,148					478	425	260	308	107		180	92			72	
Mousa		402		235					83			93						23		
Yell Sound Coast		501		351					212			168						205		
Dornoch Firth & Morrich More		593	405		220	290	231	191	257	144	145	166	219	208	157	143	111	120	85	39
Firth of Tay & Eden Estuary		633	700		668	461	459	335	342	275	222	111	124	77	88	50	29	60	51	29



## ANNEX 2: FIGURES

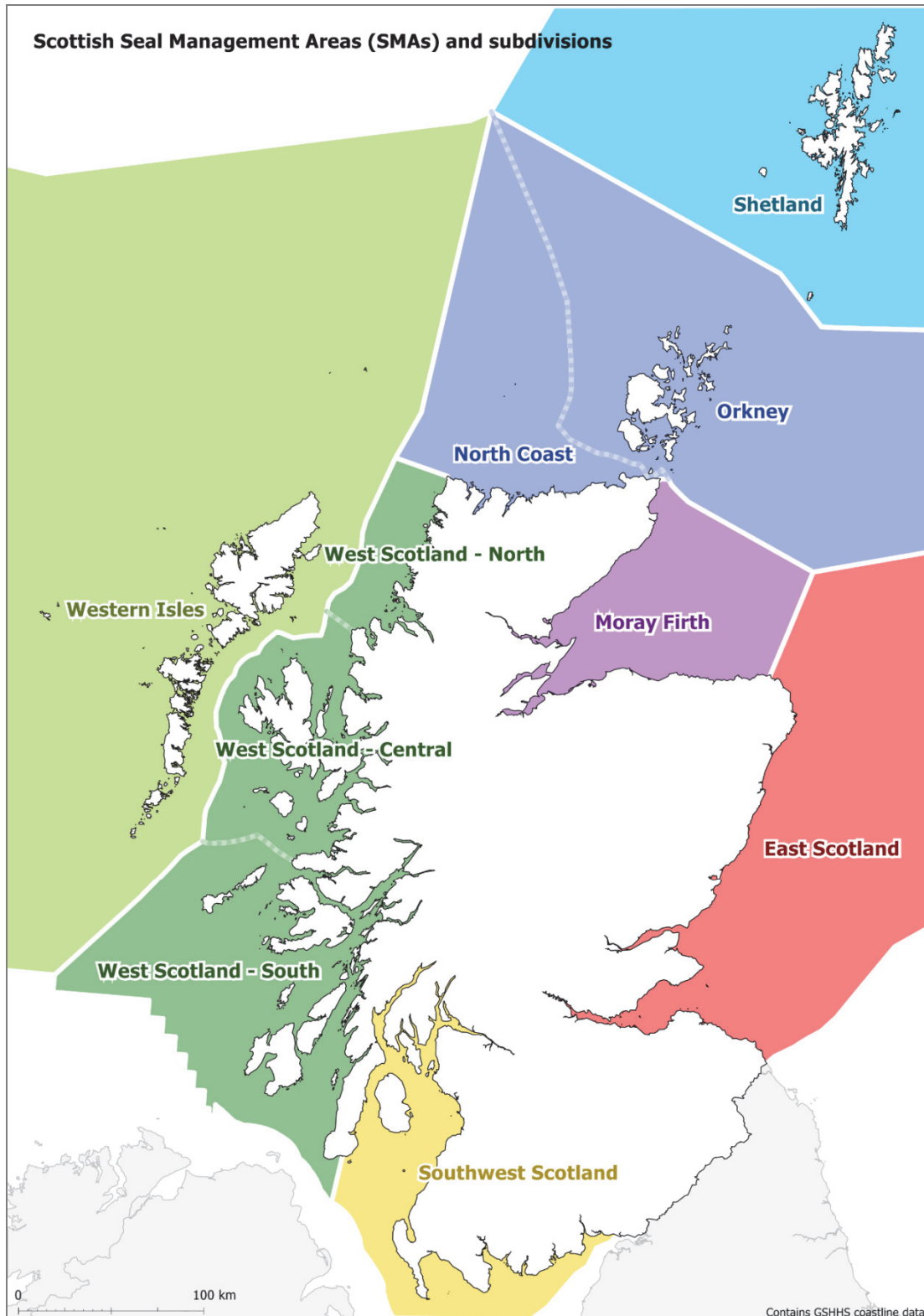


Figure 1. Scottish Seal Management Areas and subdivisions (dotted lines).

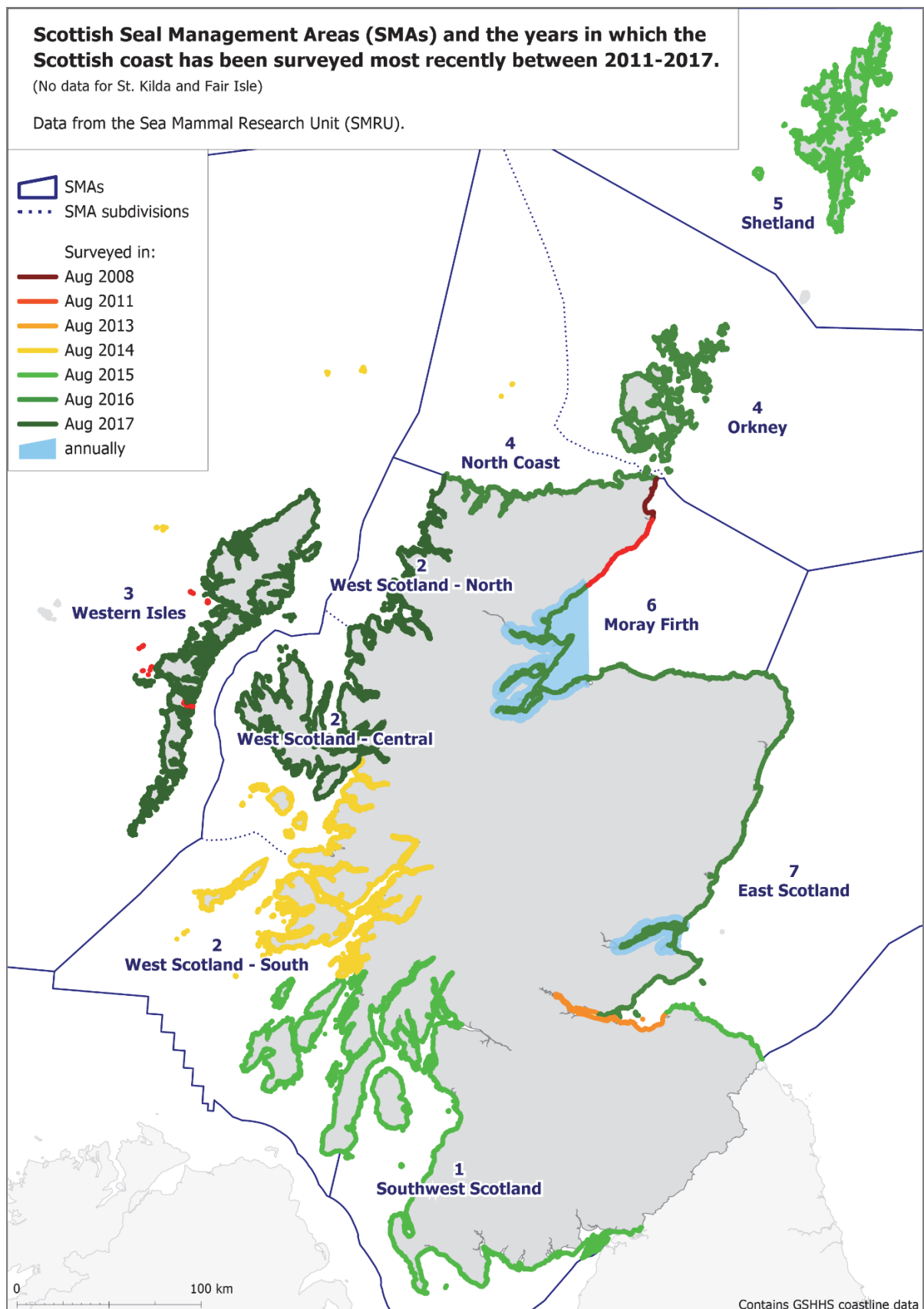


Figure 2. Map of Scotland showing the years that different areas were most recently surveyed for harbour and grey seals.

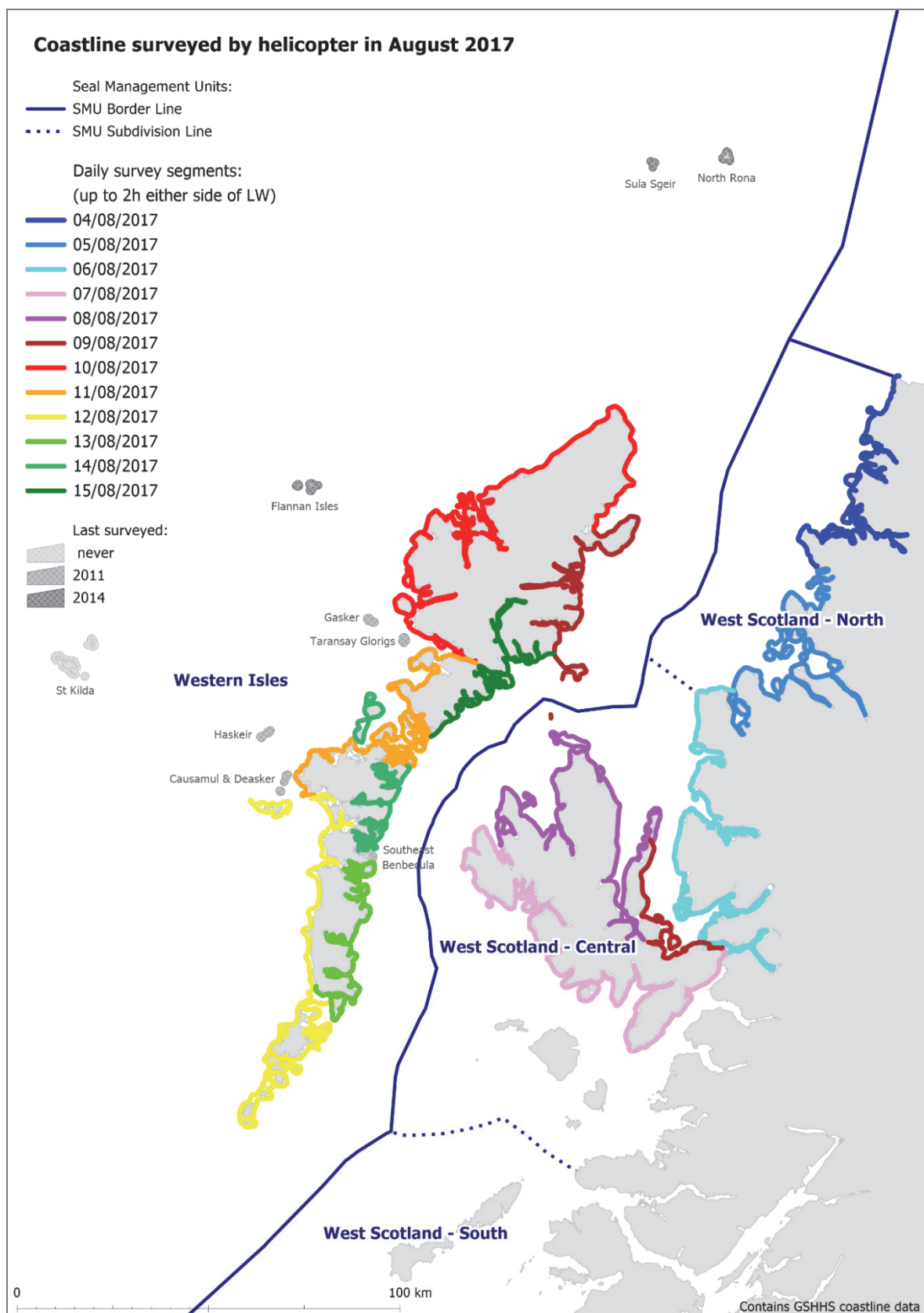
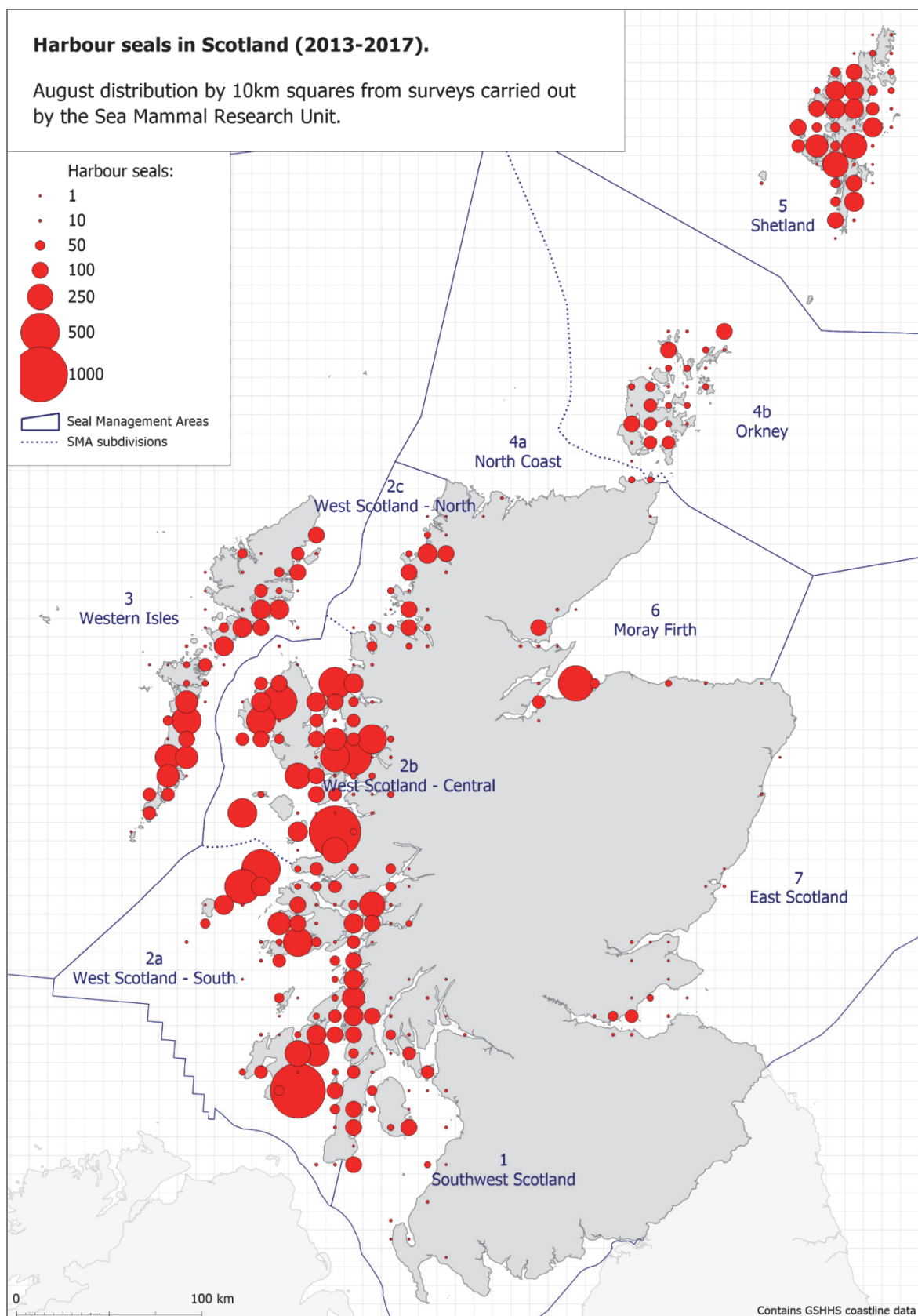


Figure 3. Map of Scotland showing the dates of survey of different areas in August 2017.



*Figure 4. The number and summer distribution of harbour seals at haul-out sites in Scotland by 10 km squares. Seal Management Areas (SMAs) and subdivisions (dotted lines) are outlined. Data from aerial surveys by the Sea Mammal Research Unit.*

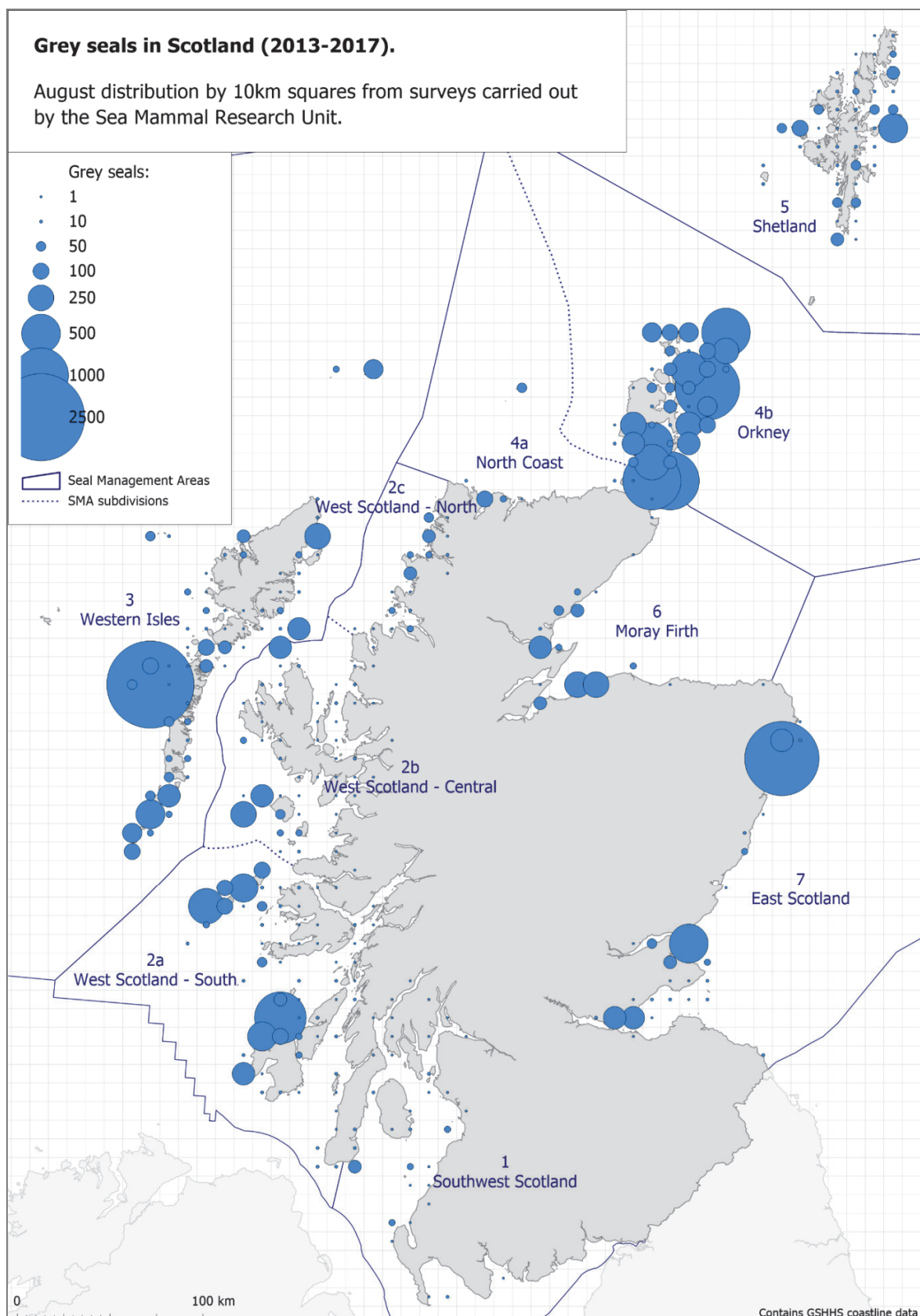


Figure 5. The number and summer distribution of grey seals at haul-out sites in Scotland by 10 km squares. Seal Management Areas (SMAs) and subdivisions (dotted lines) are outlined. Data from aerial surveys by the Sea Mammal Research Unit.

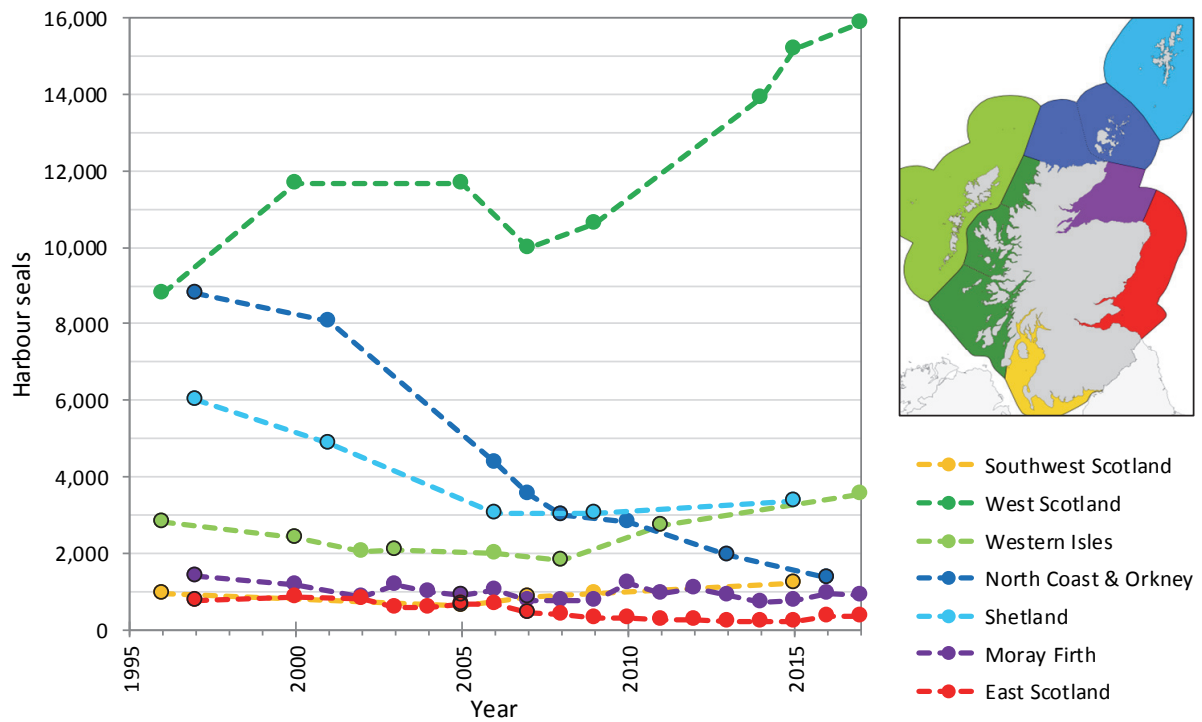


Figure 6. A comparison of August counts of hauled-out harbour seals in Scottish Seal Management Areas from 1996 to 2017. All surveys were carried out by the Sea Mammal Research Unit. Since 2006, thermal image counts have been verified using digital still images where possible. Note that because these 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. Data from aerial surveys by the Sea Mammal Research Unit.



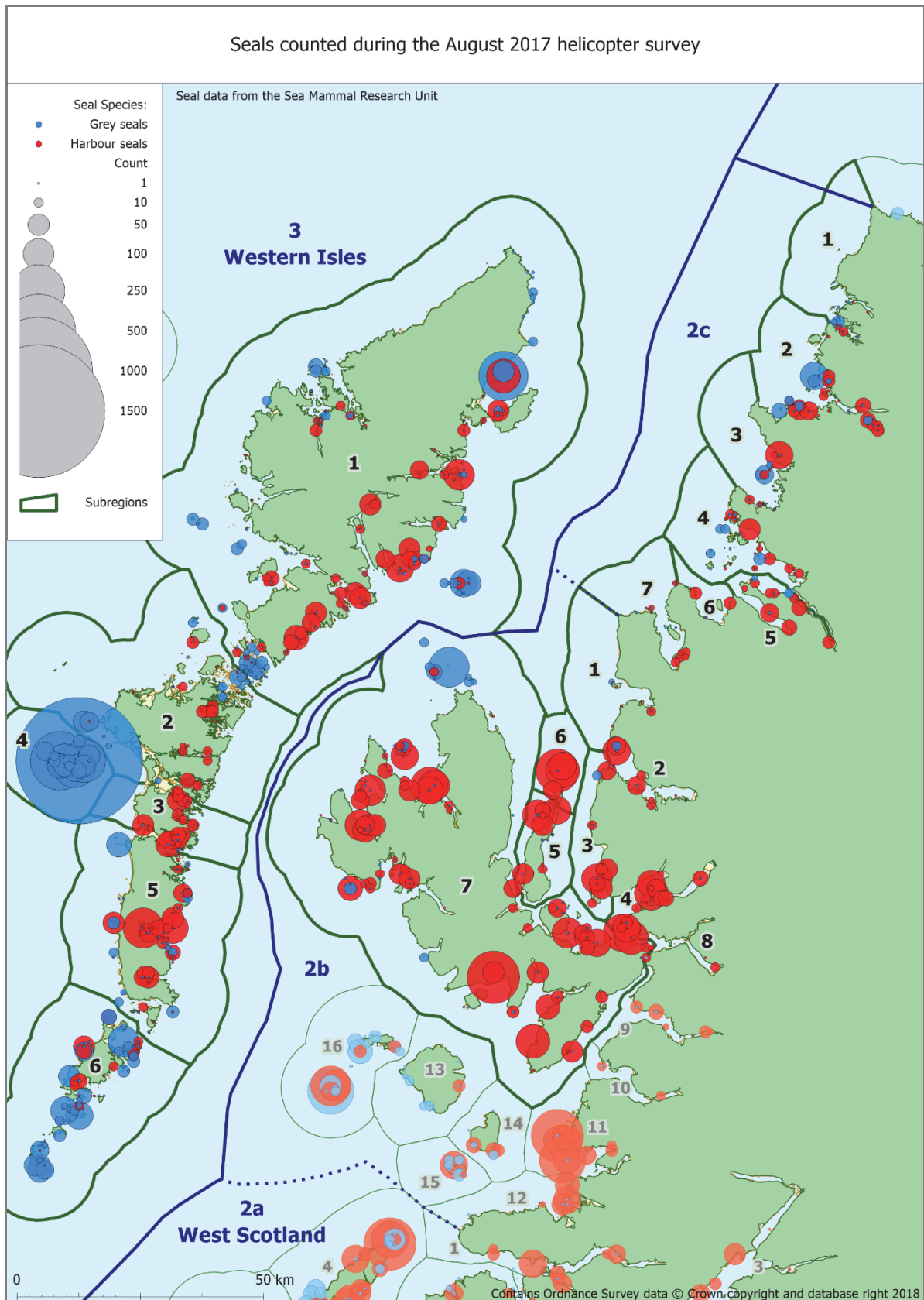
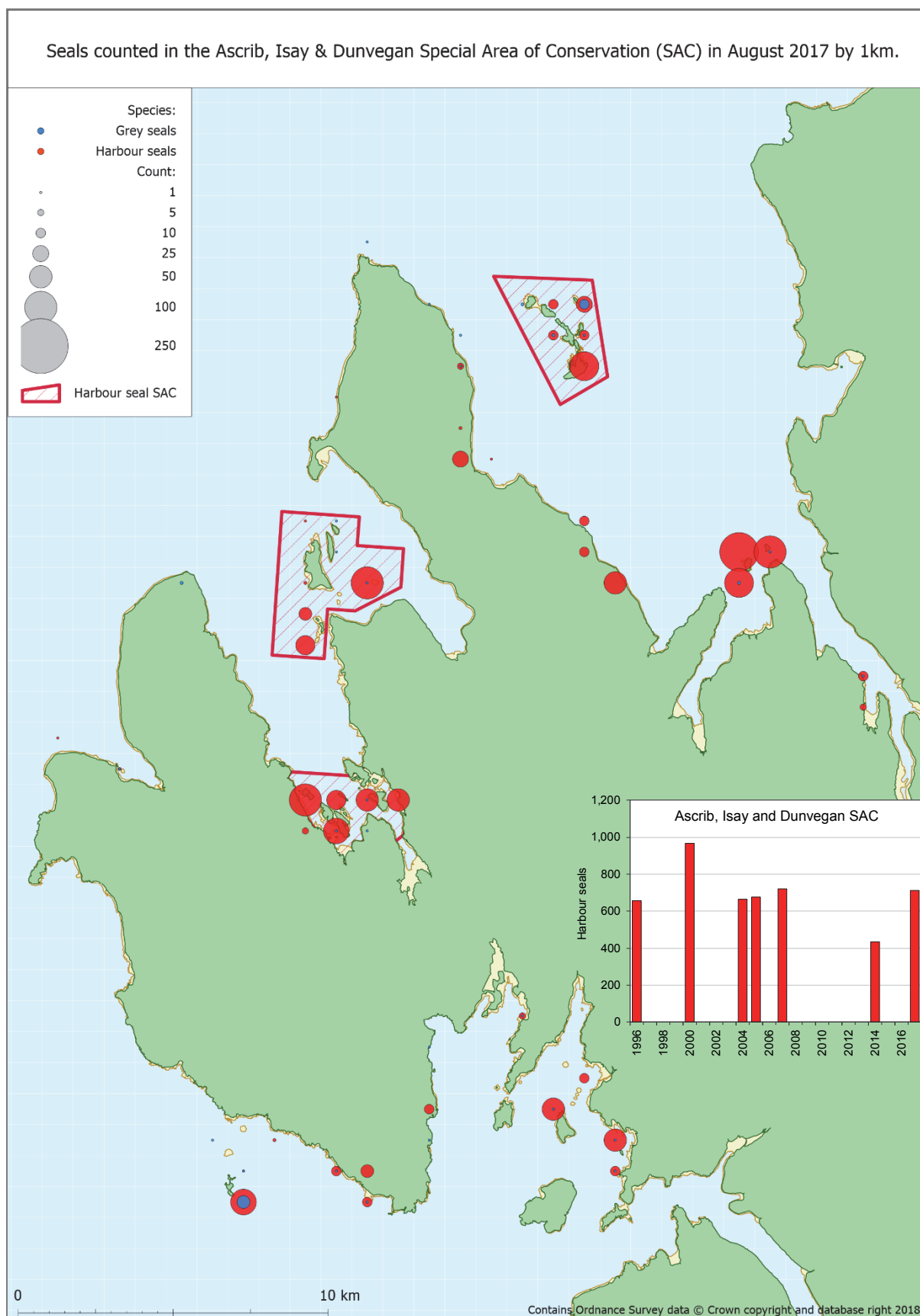


Figure 7. The distribution of harbour and grey seals counted in part of West Scotland and in the Western Isles in August 2017. Counts per subarea are given in Table 3 to Table 6. Maps of the Special Areas of Conservations for harbour seals are in Figure 8 (Ascrubs, Isay and Dunvegan and Figure 9 (Sound of Barra). Data from aerial surveys by the Sea Mammal Research Unit.



*Figure 8. Harbour and grey seals counted in the Ascrib, Isay and Dunvegan SAC in August 2017. Distribution is aggregated by 1m squares. Counts of harbour seals from this and previous surveys are in Table 11. Data from aerial surveys by the Sea Mammal Research Unit.*



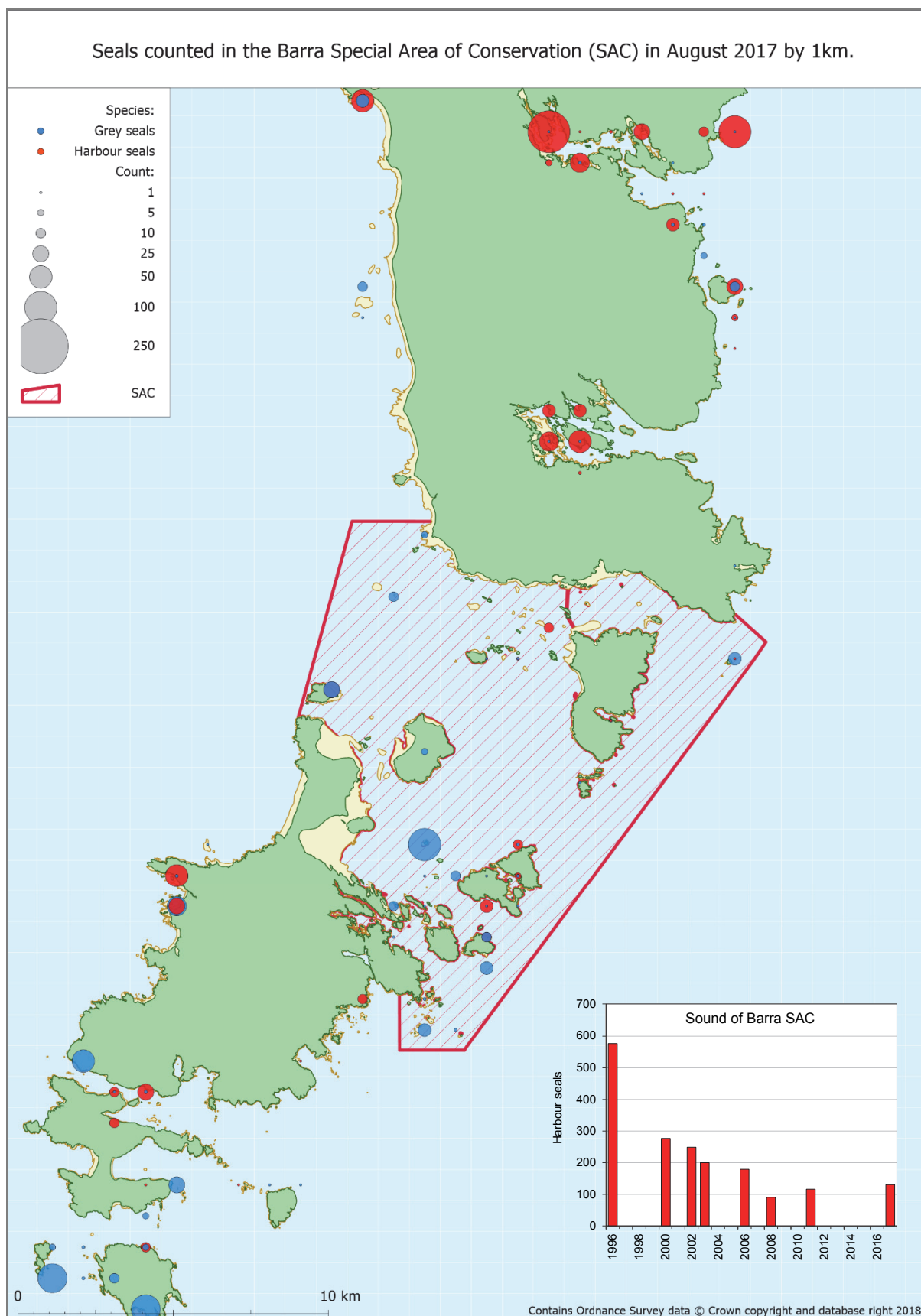


Figure 9. Harbour and grey seals counted in the Sound of Barra SAC in August 2017. Data from aerial surveys by the Sea Mammal Research Unit.

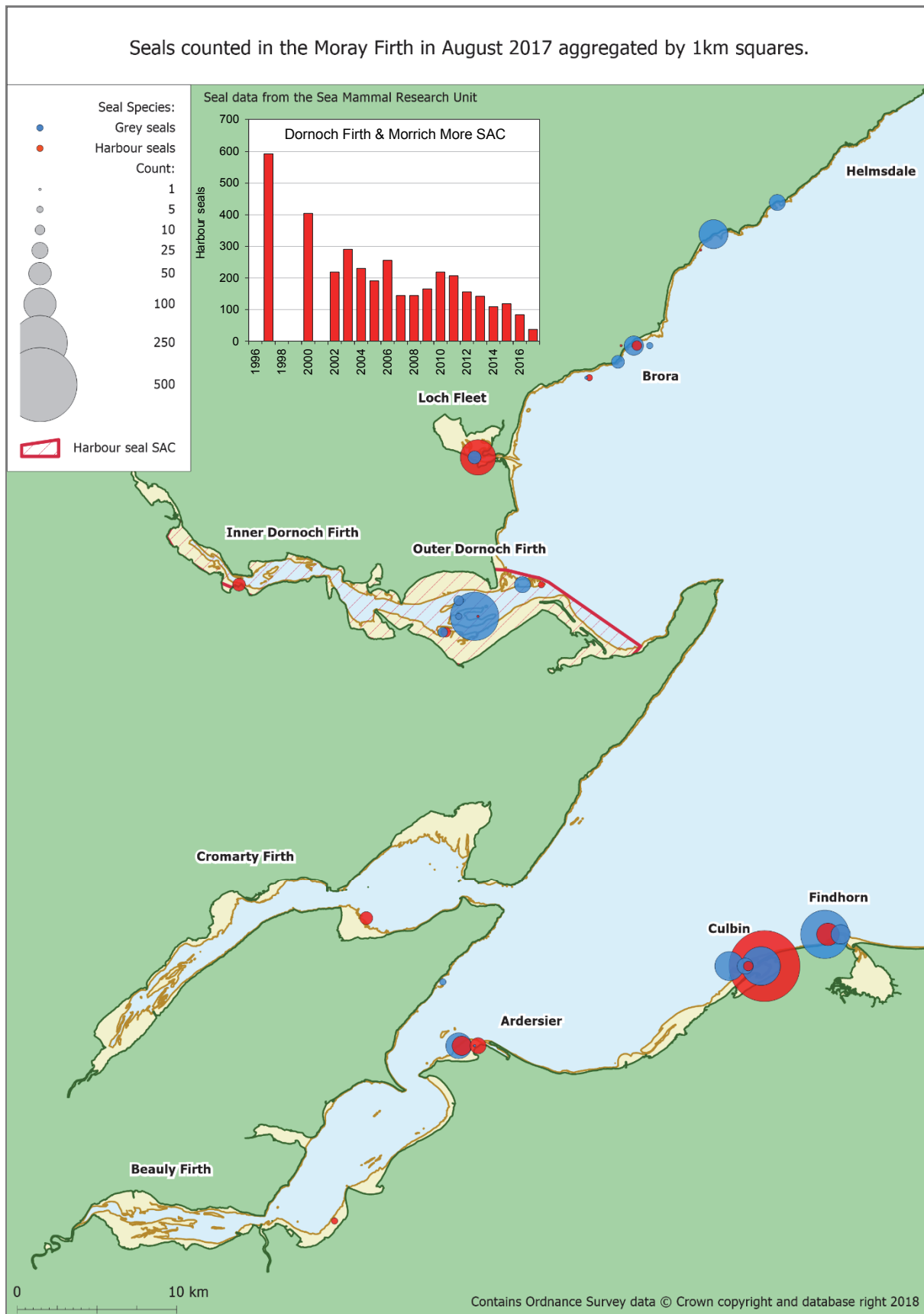
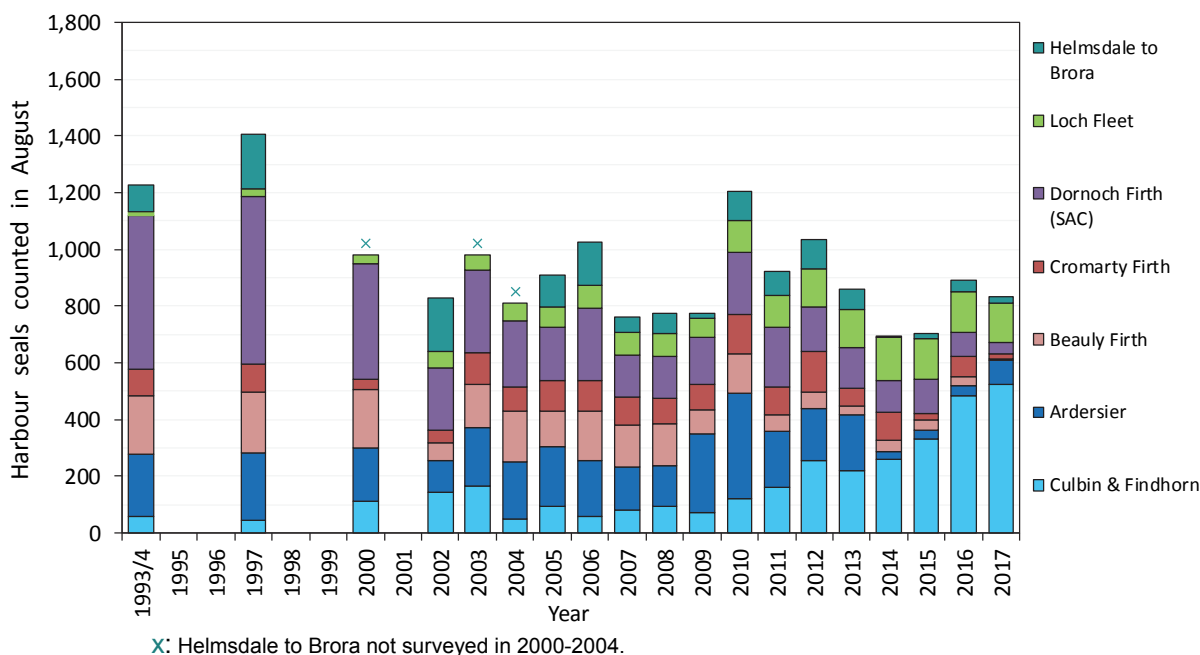
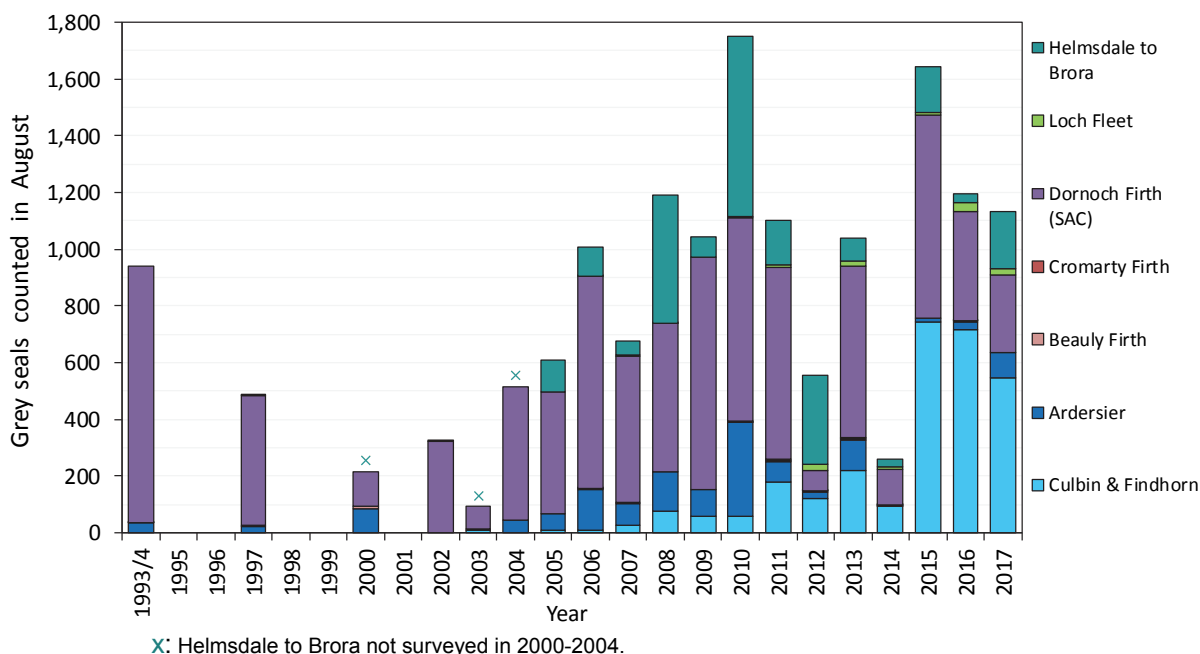


Figure 10. The distribution of harbour and grey seals counted in the Moray Firth in August 2017. Detailed counts (by year) of harbour seals are in Table 7 and Figure 10 and of grey seals in Table 8 and Figure 11. The Dornoch Firth and Morrich More SAC is outlined in red. Data from aerial surveys by the Sea Mammal Research Unit.



**Figure 11.** August counts of harbour seals in parts of the Moray Firth from 1994 to 2017. Detailed counts are in Table 7. 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 12.** August counts of grey seals in parts of the Moray Firth from 1994 to 2017. Detailed counts are in Table 8. 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.

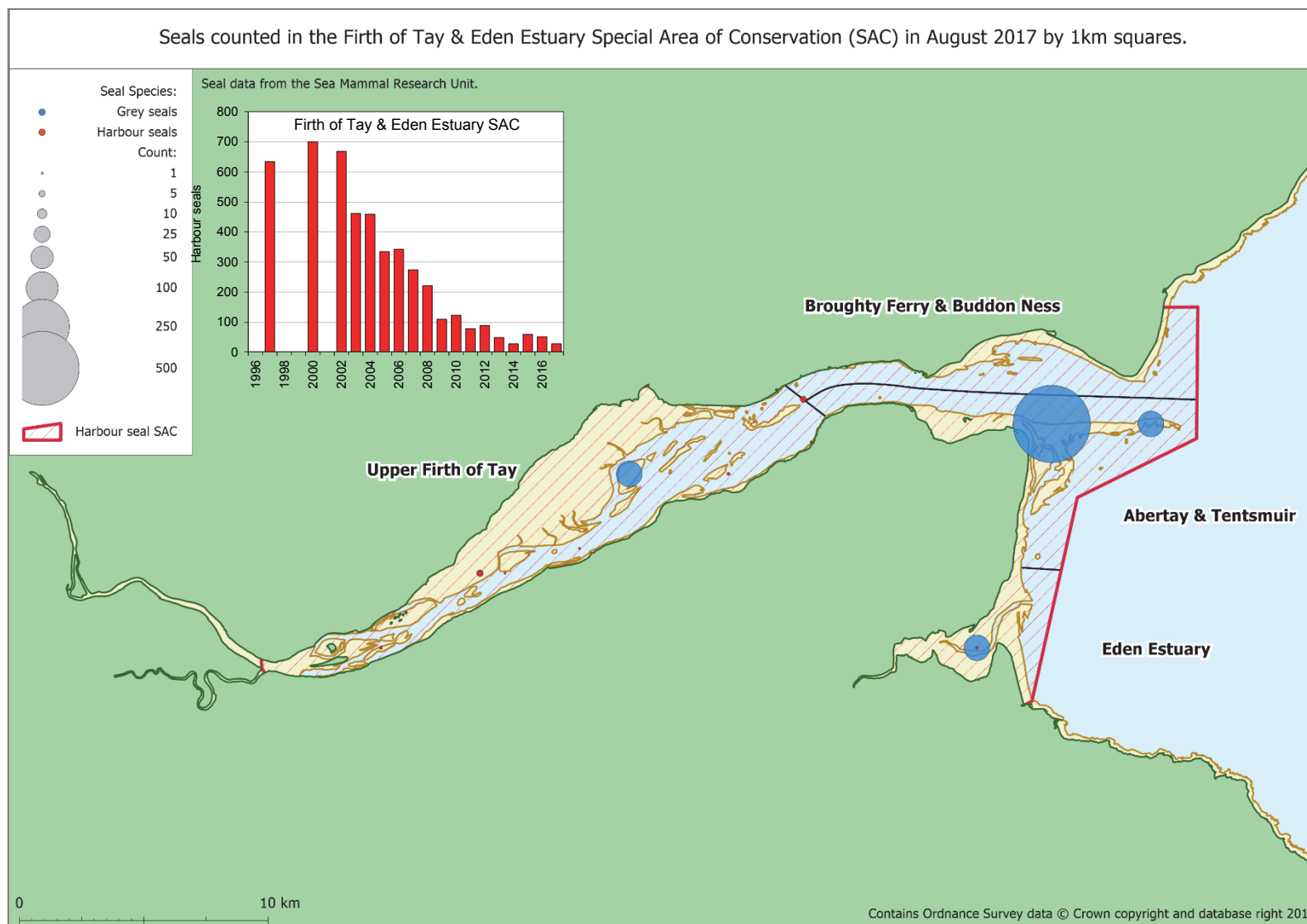
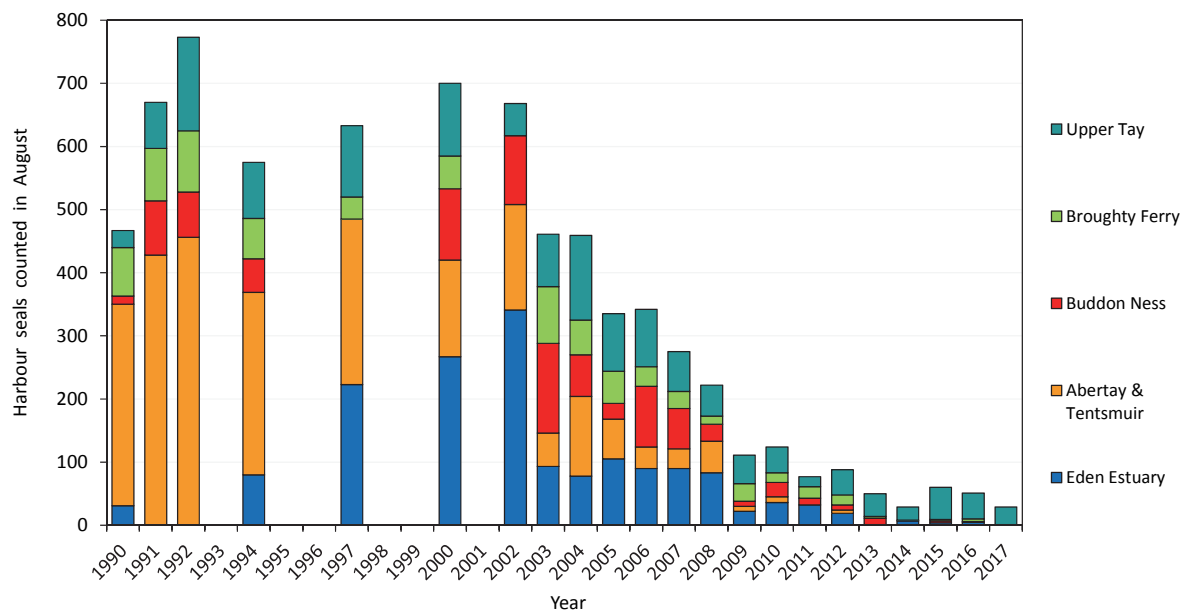
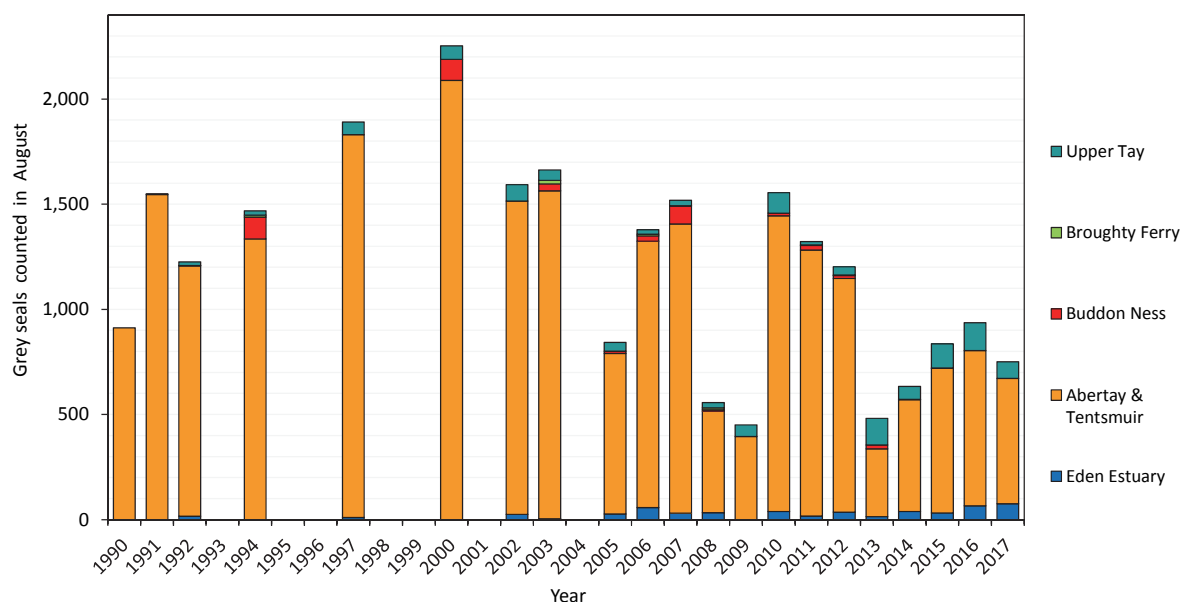


Figure 13. The distribution of harbour and grey seals counted in the Firth of Tay and Eden Estuary SAC in August 2016. Detailed counts of harbour seals in the SAC are given in Table 9 and of grey seals in Table 10. Data from aerial surveys by the Sea Mammal Research Unit.



**Figure 14.** August counts of harbour seals in the Firth of Tay & Eden Estuary SAC from 1990 to 2017. Mean values are given for areas surveyed more than once in a single season (2005, 2007, 2008). Detailed counts for each subarea are given in Table 9, and a distribution map for 2017 counts is shown in Figure 13. Data are from aerial surveys by the Sea Mammal Research Unit.



**Figure 15.** August counts of grey seals in the Firth of Tay & Eden Estuary SAC from 1990 to 2017. Mean values are given for areas surveyed more than once in a single season (2005, 2007, 2008). Detailed counts of grey seals in each subarea are given in Table 10, and a distribution map for 2017 counts is shown in Figure 13. Data are from aerial surveys by the Sea Mammal Research Unit.

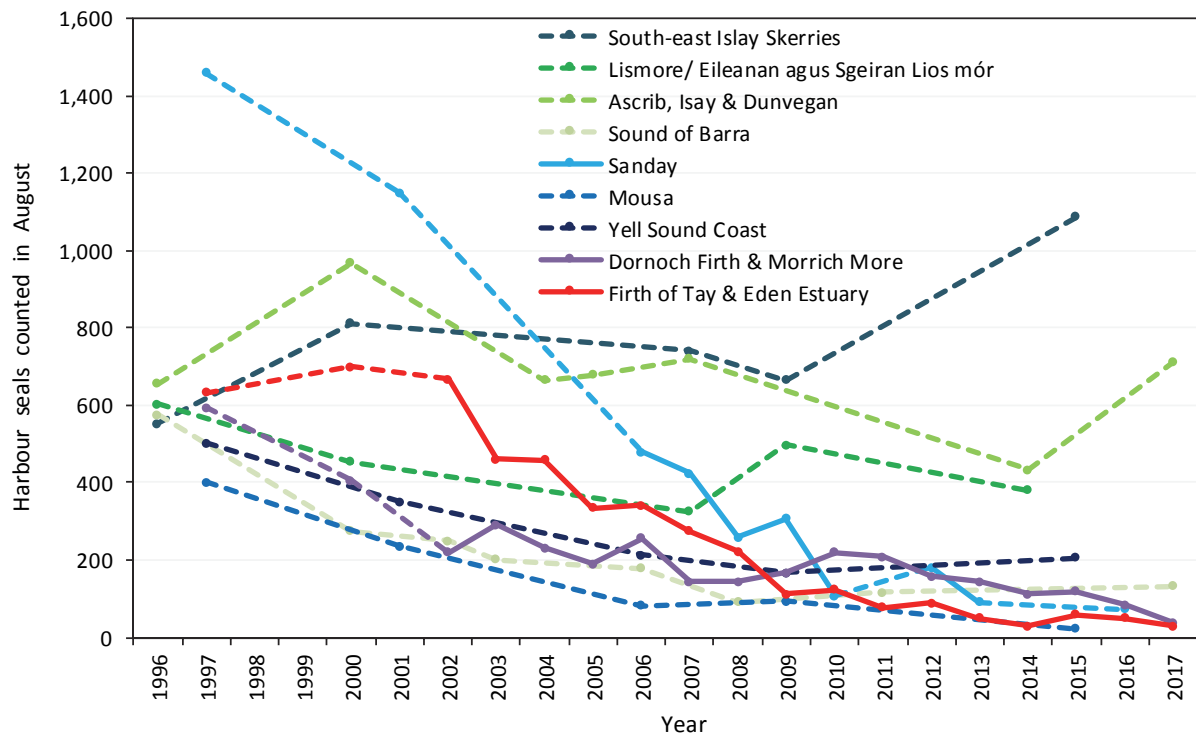


Figure 16. A comparison of harbour seal counts in Special Areas of Conservation in Scotland from 1996 to 2017. Detailed counts for each SAC are given in Table 11. Dotted lines indicate intervals of two or more years between surveys. Data from aerial surveys by the Sea Mammal Research Unit.

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